



INSTITUTO DE BOTÂNICA DE SÃO PAULO
Programa de Pós-Graduação em Biodiversidade Vegetal e Meio Ambiente



Sistemática, Filogenia e Biogeografia de *Pourouma* Aubl. (Urticaceae)

Tese apresentada ao Instituto de Botânica da Secretaria do Meio Ambiente, como parte dos requisitos exigidos para a obtenção do título de DOUTOR em BIODIVERSIDADE VEGETAL E MEIO AMBIENTE, na Área de Concentração de Plantas Vasculares em Análises Ambientais.

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RESUMO

Pourouma inclui 43 espécies distribuídas nas florestas úmidas da América do Sul e Central, com maior diversidade nas florestas de terra firme da região Amazônica, preferencialmente em baixas altitudes. O gênero é caracterizado como um grupo arbóreo e dióico, geralmente com raízes escoras, folhas alternas espiraladas, estípulas terminais amplexicaules, inflorescências axilares cimosas, perianto pistilado urceolado e aquênio recoberto por perianto acrescente carnosos, com um estigma persistente. A posição sistemática de *Pourouma* em Urticaceae é contestada por alguns autores, argumentada pela falta de análises moleculares para o gênero. Por apresentar caracteres morfológicos intermediários entre Moraceae e Urticaceae, o gênero já esteve classificado em quatro famílias (Artocarpeae, Cecropiaceae, Moraceae e Urticaceae), duas subfamílias (Conocephaloideae e Cecropioideae) e três tribos (Cecropieae, Pouroumeae, Artocarpeae *proprie*). Na presente tese é apresentado o primeiro estudo molecular de *Pourouma*, com 24 terminais, incluindo 22 táxons, através da análise das regiões plastidial *psbA-trnH* e nuclear 26S e *FA16180b*, englobando todos os gêneros de Cecropieae, na qual *Pourouma* é incluído. Os resultados das análises de máxima parcimônia, máxima verossimilhança e método Bayesiano, sustentam fortemente a monofilia de *Pourouma*, bem como de Cecropieae, incluídos em Urticaceae. Dentro de Cecropieae, emergem duas linhagens: a primeira formada por *Coussapoa*, *Myrianthus* e *Pourouma* e a segunda formada por *Cecropia* e *Musanga*. Análises sobre a evolução dos caracteres morfológicos foram realizadas e os caracteres chaves foram sugeridos na topologia apresentada para Cecropieae. Com base nos resultados filogenéticos, realizamos a revisão taxonômica de *Pourouma*, resultando em 43 espécies, dentre as quais, um novo status (*P. persecta*), duas novas espécies (*P. amacayacuensis* e *P. bergii*) e 11 espécies restabelecidas (*P. apaporiensis*, *P. apiculata*, *P. chocoana*, *P. digitata*, *P. essequiboensis*, *P. hispida*, *P. maroniensis*, *P. scobina*, *P. tessmannii*, *P. triloba*, and *P. venezuelensis*). São apresentadas descrições, ilustrações, comentários, observações sobre a distribuição geográfica, fenologia e

categorias de conservação para todas as espécies de *Pourouma*. Por meio dos resultados dos estudos moleculares, morfológicos, taxonômicos e biogeográficos, foi possível elaborar hipóteses sobre a evolução e diversificação espaço-temporal do grupo. *Pourouma* provavelmente surgiu durante o Oligoceno, no noroeste da região Amazônica. O soerguimento dos Andes teria desempenhado um papel central na diversificação das principais linhagens em *Pourouma*, durante o final do Oligoceno e Mioceno. Mudanças geológicas e ambientais ao longo do Plioceno e Pleistoceno possivelmente acarretaram a diversificação das linhagens recentes do gênero.

Palavras-chave: Análises moleculares, área de reconstrução ancestral, Cecropieae, *Cecropia*, *Coussapoa*, estimativas de tempo de divergência, *Musanga* e *Myrianthus*

ABSTRACT

Pourouma includes 43 species distributed in the rainforests of South and Central America, with the greatest diversity in “terra firme” forests of the Amazon region, mainly in lowland tropical moist forest. The genus is characterized by dioecious trees, often with stilt-roots, leaves in spirals, stipules fused, fully amplexicaul, inflorescences in axillary, paired cymose, pistillate perianth urceolate, and achenes enclosed by the enlarged, fleshy perianth at maturity, with persistent stigma. Some authors contested the systematic position of *Pourouma* in Urticaceae, arguing the lack of molecular analyses for genus. For presenting morphological characters intermediate between Moraceae and Urticaceae, the genus has been classified into four families (Artocarpeae, Cecropiaceae, Moraceae and Urticaceae), two subfamilies (Conocephaloideae and Cecropioideae) and three tribes (Cecropieae, Pouroumeae, Artocarpeae *proprie*). In this thesis is presented the first molecular phylogenetic study of *Pourouma*, with 24 terminals, including 22 taxa, through the analyses of the regions plastid *psbA-trnH* and nuclear 26S and *FA16180b*, comprising all genera of Cecropieae tribe, in which *Pourouma* is included. Results of the analyses of maximum parsimony, maximum likelihood and Bayesian method provide strong support to the monophyly of *Pourouma*, as well as of Cecropieae, included in Urticaceae. Within Cecropieae arose two lineages: the first formed by *Coussapoa*, *Myrianthus* and *Pourouma* and a second formed by *Cecropia* and *Musanga*. Analyses on the evolution of morphological characters were carried out and key innovation triggering was suggested in the topology presented for Cecropieae. Based on phylogenetic results, we conducted the taxonomic revision of *Pourouma*, which resulted in 43 species recognized, with one new status (*P. persecta*), two new species (*P. amacayacuensis* and *P. bergii*) and 11 species re-established (*P. apaporiensis*, *P. apiculata*, *P. chocoana*, *P. digitata*, *P. essequiboensis*, *P. hispida*, *P. maroniensis*, *P. scobina*, *P. tessmannii*, *P. triloba*, and *P. venezuelensis*). Descriptions, illustrations, comments, remark on the geographical distribution, phenology and conservation categories for all *Pourouma* species are presented.

Furthermore, phylogenetic analyses and taxonomic revision provided biogeographic studies about the spatio-temporal evolution of the group. Through the convergence of molecular analyses, morphological, taxonomic and biogeographic, it was possible to develop hypotheses about the evolution and diversification of space-time group. Our analyses suggest that *Pourouma* originated in northwestern Amazon rainforest, during Oligocene. The Andean uplift has probably played a central role in the diversification of the major lineages in *Pourouma*, during the Late Oligocene and Miocene. Geologic and environmental change during Pliocene and Pleistocene might have driven to diversification of recent lineages of the genus.

Keywords: Ancestral reconstruction area, Cecropieae, *Cecropia*, *Coussapoa*, divergence time estimates, molecular analyses, *Musanga* and *Myrianthus*.

I. INTRODUÇÃO GERAL

Urticaceae Juss., a família das urtigas, inclui ervas, hemiepífitas, arbustos ou árvores, monóicos ou dióicos, caracterizados pelos laticíferos restritos à casca ou ausentes e gemas caulinares protegidas por estípulas. As folhas são alternas ou opostas, inteiras ou palmatilobadas, com presença de cistólitos e ou concreções de silicatos em idioblastos. As inflorescências são axilares, cimosas ou racemosas, em panículas, espigas, capítulos ou glomérulos. As flores são díclinas, actinomorfas, aclamídeas ou monoclamídeas com até 5 tépalas, ovário súpero, 2-carpelar, 1-locular, 1-óvulo por lóculo, com placentação basal a lateral (*Pourouma* Aubl.), estilete indiviso, estigma filiforme, penicilado, peltado ou comoso. Os frutos são aquênios com perigônio membranáceo ou acrescente carnosos na maturação; semente 1, globosa, elipsóide ou ovóide, geralmente com endosperma; embrião reto; cotilédones membranáceos ou carnosos. A família compreende seis tribos, com cerca de 55 gêneros e mais de 2000 espécies (Deng & al, 2013; Wu & al, 2013; Romaniuc-Neto & Gaglioti, 2013; Gaglioti & Romaniuc-Neto, 2014), com distribuição cosmopolita, sendo o centro de diversidade na região tropical e maior concentração de espécies na Ásia.

A sistemática de Cecropieae Dumort., bem como dos gêneros incluídos nesta tribo, têm sido recentemente contestadas por Conn & Hadiah (2009), argumentada pela falta de estudos moleculares para *Musanga* R. Br., *Myrianthus* P. Beauv. e *Pourouma*.

Cecropieae inclui cinco gêneros (*Cecropia* Loefl., *Coussapoa* Aubl., *Musanga*, *Myrianthus* e *Pourouma*) e aproximadamente 180 espécies. pode ser reconhecida como um grupo arbóreo, arbustivo ou hemiepifítico (*Coussapoa*), dióico, geralmente com raízes adventícias, látex reduzido a casca, folhas espiraladas, estípulas amplexicaules terminais, estames retos no botão e óvulo ortótopo com placentação basal ou lateral (*Pourouma*).

A autoria da tribo é atribuída a Dumortier (1829), que incluiu nesta tribo *Cecropia* e *Coussapoa*. Gaudichaud (1830) descreveu a tribo Pouroumeae, com base em *Pourouma* e classificou a Cecropieae em “Urticées vraies” (Urticaceae verdadeiras). Em 1847, Trécul classificou esse grupo, na família Artocarpeae e incluiu *Cecropia* e *Coussapoa* na tribo Conocephaleae, juntamente com *Conocephalus* Blume (= *Poikilospermum* Zipp. ex Miq.), *Dicranostachys* Trécul (= *Myrianthus*). Engler (1889) propõe um novo status para a tribo Conocephaleae, como subfamília Conocephaloideae de Moraceae. Em 1978, Berg propõe a criação da família Cecropiaceae, com base na posição do óvulo (basal a sub-basal e ortótropo), forma do estilete (inteiro), estames (retos no botão) e no hábito arbóreo, para separar seis gêneros (*Cecropia*, *Coussapoa*, *Musanga*, *Myrianthus*, *Poikilospermum* e *Pourouma*) de Urticaceae e Moraceae. A família Cecropiaceae é aceita nos sistemas de Cronquist (1981; 1988) e de Thorne (1983; 1992). Romaniuc-Neto (1999) propôs uma nova subdivisão para Moraceae, considerando os gêneros de Cecropiaceae senso Berg (1978), como uma subfamília Cecropioideae de Moraceae, exceto *Poikilospermum* que é transferido para Urticaceae.

A partir dos estudos moleculares sobre o grupo (Sytsma *et al.*, 2002; Datwyler & Weiblen, 2004; Zerega *et al.*, 2005; Monro, 2006; Hadiyah *et al.*, 2008; APG, 2009; Clement & Weiblen, 2009; Judd *et al.*, 2009; Wu *et al.*, 2013), os gêneros de Cecropieae foram classificados em Urticaceae. Porém, *Musanga* não foi testado nas análises moleculares e apenas uma espécie de *Pourouma* e uma de *Myrianthus*, foi respectivamente testada por Datwyler & Weiblen (2004) e Wu *et al.* (2013).

Os representantes de Cecropieae desempenham um importante papel ecológico pela diversidade de espécies, que servem de alimento e abrigo para inúmeros animais, como por exemplo: macacos, bicho-preguiça, formigas, morcegos e etc. O grupo conta ainda, com um grande número de espécies pioneiras.

Cecropia, *Coussapoa* e *Pourouma* compreendem cerca de 170 espécies, distribuídas preferencialmente nas florestas tropicais úmidas da América do Sul e Central. No Brasil, estes gêneros são representados por 61 espécies e 14 subespécies (Romaniuc-Neto & Gaglioti, 2010; Romaniuc-Neto & Gaglioti, 2014), com maior diversidade de espécies nas regiões úmidas da Amazônia e Mata Atlântica.

Musanga e *Myrianthus* incluem aproximadamente dez espécies, distribuídas na região Afrotropical, com maior diversidade de espécies concentradas nas áreas de florestas tropicais úmidas da costa oeste da África.

Pourouma, gênero exclusivamente neotropical de Cecropieae, é caracterizado por árvores dioicas, frequentemente com raízes adventícias escoras, ramos geralmente odoríferos, laticíferos presentes, com látex aquoso a mucilaginoso. As folhas são alternas, espiraladas, inteiras ou palmatilobadas, as estípulas são terminais, completamente amplexicaules, caducas, deixando cicatrizes horizontais que circundam completamente o ramo. As inflorescências são axilares, cimosas e geralmente pareadas, com as flores organizadas em cimeiras, fascículos ou glomérulos. As flores estaminadas são sésseis ou pediceladas, com perigônio urceolado a infundibuliforme e 2-4 estames livres ou conados. As flores pistiladas são pediceladas, com perigônio tubular e estigma persistente no fruto. Os aquênios são elipsoides, ovóides a globosos, com pericarpo seco, endocarpo crustáceo, envolto em perigônio crescente carnosos na maturação.

O gênero inclui 43 espécies distribuídas nas florestas úmidas da América do Sul e Central, com maior diversidade de espécies nas florestas de terra firme da região Amazônica, preferencialmente em baixas altitudes. Os frutos da maior parte de suas espécies são comestíveis, dentre essas, se destaca *Pourouma cecropiifolia* Mart., cujos frutos são apreciados em diversas países da América do Sul e utilizados na fabricação de um tipo de vinho doce.

A falta de estudos moleculares e biogeográficos, além das divergências na organização sistemática do grupo, motivaram a realização deste estudo em *Pourouma*.

O grande número de sinônimos e a escassez de estudos taxonômicos para o gênero também incentivaram a presente pesquisa. Além disso, atualmente apenas duas espécies constam da lista vermelha da IUCN (2014): *Pourouma oraria* Standl. & Cuatrec. e *P. petiolulata* C.C. Berg.

Cabe ressaltar, que o presente tese colaborou, com o “Programa REFLORA” proc. 10/52487-2, aprovado junto à FAPESP/CNPq/CAPES, e faz parte de um projeto maior, intitulado: “Sistemática, filogenia, biogeografia e conservação de Urticineae”, IBt 01.134-proc. 3625/2013, ambos coordenado pelo Dr. Sergio Romaniuc Neto.

II. OBJETIVOS

1. Reconstruir a filogenia de *Pourouma* em nível específico, bem como, propor uma hipótese filogenética para os gêneros da tribo Cecropieae, com base em análises moleculares e inferir as inovações morfológicas “chaves” das linhagens.
2. Propor uma revisão taxonômica das espécies de *Pourouma*.
3. Estimar os tempos de divergência de linhagens em *Pourouma*, a fim de propor hipóteses sobre a evolução espaço-temporal do gênero, baseado nos eventos da biogeografia histórica e reconstrução das áreas ancestrais das linhagens.

III. ORGANIZAÇÃO DA TESE

O presente trabalho foi dividido em três capítulos, na forma de artigos, escritos no idioma inglês, de acordo com as normas dos periódicos científicos a que serão submetidos :

Chapter 1: Generic phylogeny in Cecropieae (Urticaceae) inferred from nuclear, plastid DNA regions and character evolution, with a focus on *Pourouma*;

Chapter 2: Revision of *Pourouma* (Urticaceae);

Chapter 3: Pattern of biogeographic regionalization and biogeographical history of *Pourouma* with comments about other genus of Cecropieae (Urticaceae).

De acordo com o código internacional de nomenclatura para algas, fungos e plantas (McNeill et al. 2012), os nomes novos apresentados não são validamente publicados.

As citações bibliográficas no texto da introdução, seguem as normas apresentadas no periódico do Instituto de Botânica - Hoehnea ([//www.scielo.br/revistas/hoehnea/iinstruc.htm](http://www.scielo.br/revistas/hoehnea/iinstruc.htm)).

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Chapter 1

Generic phylogeny in Cecropieae (Urticaceae) inferred from nuclear, plastid DNA regions and character evolution, with a focus on *Pourouma*

For submission to the journal *Taxon*

1 **Gaglioti & Romaniuc-Neto • Phylogeny of *Pourouma***

2

3 **Generic phylogeny in Cecropieae (Urticaceae) inferred from nuclear, plastid DNA**
4 **regions and character evolution with a focus on *Pourouma***

5

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11

1 **Abstract** Urticaceae is commonly known as the nettle family, which comprises six
2 tribes, 55 genera and more than 2000 species. The tribe Cecropieae includes five genera
3 and about 180 species. Molecular studies in Cecropieae are still scarce and so far there
4 is not a phylogenetic hypothesis that includes all genera. Furthermore, the systematic of
5 Cecropieae as well as its position in Urticaceae are controversial. Conn & Hadiah (2009)
6 considered the position of *Pourouma* not evaluated within Cecropieae, and the genus
7 afro-tropical *Musanga* was not assessed on molecular phylogenies. In the present study
8 we examine the phylogenetic relationships among all genera of Cecropieae and
9 investigate the pattern of morphological evolution based on analysis of plastid (*psbA-*
10 *trnH*) and two nuclear DNA regions (26S and *FA16180b*). Sequence data were analysed
11 using maximum parsimony, likelihood and Bayesian inference, and selected
12 morphological traits were mapped onto the molecular tree and selected morphological
13 traits were mapped onto the molecular tree. The molecular results strongly supported
14 monophyly of Cecropieae (*Cecropia*, *Coussapoa*, *Musanga*, *Myrianthus*, *Pourouma*)
15 into Urticaceae. All genera of Cecropieae were monophyletic. The inferred phylogeny
16 reveals two main lineages (I and II) in Cecropieae. Lineage I included three clades with
17 three genera: *Coussapoa*, *Pourouma* and *Myrianthus*. Also, *Myrianthus* arises as sister
18 group of *Pourouma*. Lineage II included two clade and two genera: *Cecropia* and
19 *Musanga* with a strong support. Additionally, the morphological analysis corroborated
20 with the molecular phylogeny in the formation of lineages. The presence of arboreal
21 habit without unligified vessels elements, amplexicaul stipule, silicon-accumulation
22 and filaments straight in bud is the derived status in Cecropieae, and it might have been
23 a key innovation triggering species diversification in the tribe.

24 **Keywords** *Cecropia*; Cecropieae; *Coussapoa*; *Musanga*; *Myrianthus*

25

1 INTRODUCTION

2

3 Urticaceae Juss. is commonly known as the nettle family, which comprises about
4 55 genera and more than 2000 species (Deng & al., 2013; Wu & al., 2013; Gaglioti &
5 Romaniuc-Neto, 2014). It is distributed throughout tropical and temperate regions
6 worldwide, but its center of diversity is indicated for the tropics, with largest
7 concentration of species in Asia (Wu & al., 2013). The family includes herbs, hemi-
8 epiphytes, shrubs, or trees, and its synapomorphies are: latex restrict to the bark,
9 cystoliths or silicon-accumulation in the leaves, pseudomonomerous ovary with one
10 style, basal orthotropous ovule, achene fruits. The inflorescences are morphologically
11 diverse, ranging from panicle in *Laportea* Gaudich. to spike in *Cecropia* Loefl.
12 Urticaceae is quite diversity and abundant in tropical moist forest (Wu & al., 2013),
13 with some genera pioneer (e.g., *Cecropia*), and or mostly found in secondary forest.

14 Some genera (e.g. *Pilea* Lindl., *Laportea*, *Urtica* L., *Urera* Gaudich.) display
15 medicinal potencial as anti-inflammatory, antimicrobial, antiulcer, antidiabetic and
16 anesthetic (Badilla & al., 1999; Gulcin & al. 2004; Momo & al. 2006, Luo & al. 2011),
17 or as a source of natural antioxidants (Chahardehi & al. 2008). Moreover, the family has
18 economically important species for the fabrication of fibers and ornamental usage
19 (Woodland, 1989), such as: rami, *Boehmeria nivea* (L.) Gaudich. (Duan & al., 2012),
20 *Urtica dioica* L. (Bodros & Baley, 2008; Baci & al., 2009), and *Girardinia heterophylla*
21 (Vahl) Decne. (Tripathi & al., 2013).

22 Based on molecular phylogenetics studies (Sytsma & al., 2002; Datwyler &
23 Weiblen, 2004; Zerega & al., 2005; Hadiyah & al., 2008; Clement & Weiblen, 2009;
24 APG III, 2009; Zhang & al., 2011; Wu & al., 2013), Urticaceae was strongly supported

1 as monophyletic, but a remarkable diversity of complex inflorescence structures,
2 breeding systems, and growth forms in the family has complicated the taxonomy of the
3 group.

4 The most recent tribal classification of the Urticaceae based on molecular and
5 morphological studies (Conn & Hadiah, 2009; Wu & al., 2013) proposed six tribes for
6 the family, which are: Boehmerieae Gaudich., Elatostemateae Gaudich., Forsskaoleae
7 Gaudich., Parietarieae Gaudich., Urticeae Lam. & DC., and Cecropieae Dumort.

8 The genera of Cecropieae have been considered in four families: Artocarpeae Lam.
9 & DC. (Trécul, 1847), Cecropiaceae C.C. Berg (Berg, 1978; Takhtajan, 1980; Cronquist,
10 1988; Thorne, 1992), Moraceae Gaudich. (Engler, 1889; Chew, 1963; Romaniuc-Neto,
11 1999), or Urticaceae Juss. (Jussieu, 1789; Dumortier, 1829; Gaudichaud, 1830; Corner,
12 1962; Collinson, 1989; Sytsma & al., 2002; Datwyler & Weiblen, 2004; Zerega & al.,
13 2005; Hadiah & al., 2008; Clement & Weiblen, 2009; APG III, 2009; Wu & al., 2013);
14 two subfamilies: Conocephaloideae Engl. (Engler, 1889) and Cecropioideae (C.C. Berg)
15 Romaniuc-Neto (Romaniuc-Neto, 1999); and two tribes: Artocarpeae (Dumortier, 1829;
16 Miquel, 1853) and Pouroumeae Gaudich. (Gaudichaud, 1830).

17 Conn & Hadiah (2009) considered the position of *Pourouma* Aubl. not evaluated
18 within Cecropieae tribe, and the genus afrotropical, *Musanga* R. Br. was not tested on
19 molecular phylogenies. Only one specimen of *Pourouma*, without specific epithet was
20 analyzed by Datwyler & Weiblen (2004), which was related to the evolutionary lineages
21 *Coussapoa-Cecropia* within Urticaceae.

22 Wu & al. (2013) suggested that Cecropieae includes five genera (*Cecropia* Loebl.,
23 *Coussapoa* Aubl., *Musanga*, *Myrianthus* P. Beauv., and *Pourouma*) about 180 species
24 (Fig. 1), and can be recognized as a group arboreal or hemi-epiphytic, dioecious, usually

1 with adventitious roots, reduced latex to the bark, spiral leaves, amplexicaul terminal
2 stipules, straight stamens on the bud and orthotropous ovule, with basal or lateral
3 (*Pourouma*) placentation (Fig. 1).

4 *Musanga* and *Myrianthus* include approximately ten species distributed in the
5 Afrotropical region, with the greatest diversity of species concentrated in the areas of
6 humid tropical forests on the west coast of Africa (Ruiter, 1976).

7 *Cecropia*, *Coussapoa*, and *Pourouma* comprise about 170 species, preferentially
8 distributed in the tropical rainforests of South and Central America, with the greatest
9 diversity of species in the moist regions of the Amazon and Atlantic Forest (Berg & al.
10 2005; Romaniuc-Neto & Gaglioti 2010; Gaglioti & Romaniuc-Neto, 2014a).

11 *Pourouma* is a neotropical genus including 43 species (see, Chapter 2). It occurs in
12 tropical moist forest in South and Central America, but is absent from the Lesser and
13 Greater Antilles. The greatest diversity of species occurs within the Amazon region,
14 mainly in lowland tropical moist forest. Most of the *Pourouma* species are associated
15 with “terra firme” (non-inundated) secondary forest at elevations up to 1000 m. Only
16 three species occurs in the Atlantic forest (southeast of Brazil). Some species, e.g. *P.*
17 *guianensis* Aubl., are pioneer and commonly found in areas disturbed of the forest.
18 Others species, e.g. *P. elliptica* Standl., are only found in undisturbed forest (Gaglioti &
19 Romaniuc-Neto 2014b; Gaglioti & Romaniuc-Neto 2014c)

20 The genus comprises dioecious trees (Fig. 6 A), often with stilt-roots (Fig 6 C) ,
21 leafy twigs not fistulous, releasing a watery exudate when cut, the exudates turning
22 black on exposure to the air, entire to palmatilobed leaves born in spirals, fully
23 amplexicaul, axillary inflorescences usually comprising a pleiochasia (Fig. 1 I-J; Fig. 4
24 Q; Fig. 6 G), pistillate perianth urceolate, and achenes enclosed by the enlarged, fleshy

1 perianth at maturity, with a persistent stigma (Gaglioti & Romaniuc-Neto 2014b;
2 Gaglioti & Romaniuc-Neto 2014c). Most part of species has edible fruits, and the grape
3 amazon (*Pourouma cecropiifolia* Mart., Fig. 1 I) is the most popular.

4 This is the first molecular phylogenetic study that included all genera of
5 Cecropieae. Our data set is comprised of the *ptpsbA-trnH* and two nr26S, nrFA16180b
6 markers in order to assess monophyly and generic relationships within Cecropieae, with
7 focus in *Pourouma*. We used these molecular data to investigate questions related
8 character evolution in Cecropieae.



Figure 1. Morphological diversity of tribe Cecropieae. A, *Cecropia peltata* (tree); B, *Cecropia glaziovii* (leafy twigs, leaves, and stipule); C, *Cecropia pachystachya* (trichilia, Müllerian bodies, and ant); D, *Cecropia glaziovii* (staminate inflorescence); E, *Cecropia pachystachya* (spathes, and staminate inflorescence); F, *Musanga cecropioides* (tree, and leaves); G, *Musanga cecropioides* (leaf, stipule, and pistillate inflorescences); H, *Musanga cecropioides* (leaves, stipule, and staminate inflorescences); I, *Pourouma cecropiifolia* (leaves, and infructescences); J, *Pourouma mollis* (stipule, and staminate inflorescences); K, L, M, *Myrianthus holstii* (leaves [K], staminate inflorescence [L], infructescence [M]); O, N *Coussapoa microcarpa* (leaves, and pistillate inflorescences); P, *Coussapoa villosa* (stipule, and staminate inflorescences). Photos: A, B-E, I-J, N-P from A.L. Gaglioti; C from L.C. Pederneras; F-H from J. Nakos; K-L, from E. Kami.

1 MATERIALS AND METHODS

2
3 **Taxon sampling.** — We included 42 accessions (36 taxa) in this study. The
4 ingroup comprised all genera that have been placed in Cecropieae in the most recent
5 circumscriptions (Datwyler & Weiblen, 2004; Clement & Weiblen, 2009; Wu & al.,
6 2013). Thus, the ingroup two accessions each of *Musanga* (1 taxon), and *Myrianthus* (2
7 taxa), three of *Cecropia* (3), six of *Coussapoa* (4) and 24 of *Pourouma* (20). Although
8 47% of *Pourouma* species were sampled, remaining species were not included because
9 fresh material was unavailable and DNA extraction from herbarium material was
10 unsuccessful. Additionally, within *Pourouma* were analysed six subspecies from 24
11 accessions.

12 Outgroup taxa belong to four other tribes of Urticaceae and one taxon each of
13 *Boehmeria* (Boehmerieae), *Parietaria* (Parietarieae), *Pilea* (Elatostemateae), and
14 *Poikilospermum* (Urticeae) as recognized in the most recent accounts of the tribes of
15 Urticaceae (Conn & Hadiah, 2009; Wu & al., 2013).

16 Taxa sampled, voucher information, and GenBank accession numbers for the three
17 data sets are listed in Appendix 1.

18
19 **DNA extraction, PCR amplification, and sequencing.** — Leaf samples were
20 collected either in silica gel or from herbarium sheets (Appendix 1). Genomic DNA was
21 extracted from 15–20 mg of dried leaf tissue using the Qiagen DNeasy plant extraction
22 kit (Quiagen, Inc., Valencia, California, USA); or using a modified CTAB
23 (cetyltrimethylammonium bromide) method (Weiblen, 2000).

24 DNA amplification was performed in a thermocycler (Mastercycler®, Eppendorf,

1 USA). Polymerase chain reaction (PCR) amplification of the *ptpsbA-trnH* DNA region
2 was achieved in one fragment using *psbA* forward (5'-
3 GTTATGCATGAACGTAATGCTC-3') and *trnH* reverse (5'-
4 CGCGCATGGTGGATTCAACAATC-3') primers from Tian & al. (2009). PCR
5 amplification of the *psbA-trnH* comprised about 20 ng genomic DNA, 1 x BiolaseTM
6 Buffer with 1.5 mM MgCl₂ (Bioline, London, UK), 10 μM of each primer, 0.2 mM each
7 dNTPs, and 1.25 unit of BiolaseTM DNA polymerase (Bioline). The reaction was
8 adjusted with ddH₂O final volume of 20 μL. The amplification profiles included an
9 initial denaturing at 94° C for 5 min, 25 cycles of 45 s at 94° C (denaturation), 45 s at
10 50° C (annealing), and 50s at 72° C extension, with a final extension of 72°C at 4 min.

11 PCR amplification of the nr26S DNA region was achieved in one fragment using
12 S26A forward (5'-GGAGGAAAAGAACTAAC-3') and 26S reverse (5'-
13 AATGGCCCACTTGGAGCTC-3') primers designed for Moraceae from Zerega & al.
14 (2005). Amplification of 26S included about 20 ng genomic DNA, 1x Taq buffer
15 (Qiagen) with 2 mM MgCl₂, 10 μM of each primer, 0.2 mM each dNTPs, and 1.25 unit
16 Taq polymerase (Qiagen). Thermal cycling conditions were 95°C for 1 min (initial
17 denaturing), followed by 35 cycles of 95°C for 1 min (denaturation), 48°C for 1 min
18 (annealing), and 72°C for 1 min 30 s, with a final extension of 72°C for 5min. The
19 reaction was adjusted with ddH₂O final volume of 25 μL.

20 PCR amplification of the nr*FA16180b* DNA region was achieved in one fragment
21 using *FA16180b* forward (5'-CGGACTTATGGAACCAGAGTAATTC-3') and
22 *FA16180b* reverse (5'-GATGCTTCCAGTACAATGACAACAT-3') an exon-primed
23 intron-crossing (EPIC) marker designed specifically for *Ficus* from Yao & al. (2013).
24 Amplification of *FA16180b* included about 20 ng genomic DNA, 1x Taq buffer with

1 1.5 mM MgCl₂ (Qiagen), 5 μM of each primer, 0.2 mM each dNTPs, and 1.25 unit Taq
2 polymerase (Qiagen). The amplification profiles included an initial denaturing at 94°C
3 for 5 min; followed by 35 cycles of 50 s at 94°C, 50 s at 55°C, and 1 min at 72°C, with
4 a final extension of 10 min at 72°C.

5 PCR products were cleaned with the QIAquick or MinElute PCR purification spin
6 columns (Qiagen). Cleaned PCR products were quantified using the NanoDrop 2000
7 spectrophotometer with the software NanoDrop 2000/2000c (Thermo Fisher Scientific,
8 Inc.); or using Pico Green fluorescent dye designed for quantification of dsDNA
9 (Molecular Probes, Oregon, USA) in a Turner Quantech Xuorometer (Barnstead-
10 Thermolyne, Iowa, USA).

11 Sequencing was performed in 10 μl reactions using BigDye Terminator sequencing
12 reagents and protocols (Applied Biosystems, Foster City, California, USA), and data
13 were collected on an ABI 3730xl automated sequencer (Applied Biosystems) by the
14 BioMedical Genomics Center core facility at the University of Minnesota. The *ptpsbA*-
15 *trnH*, *nr26S*, and *nrFA16180b* were sequenced in both directions using the primers
16 above. All sequences will be deposited in GenBank.

17
18 **Sequence Alignment and Phylogenetic analyses.** — Complementary DNA
19 sequences were assembled for each accession using Geneious® 6.1.8 (Kearse & al.,
20 2012; Biomatters, 2013). Multiple-sequence alignment was performed using Clustal W
21 (Chenna & al., 2003) followed by manual optimization. Manual alignment and
22 optimization were performed in Se-AI v2.0a11 (Rambaut, 2002).

23 The trees obtained for each region were examined for high (bootstrap of 80% or
24 higher) or low (bootstrap below 80%) incongruences based on bootstrap support for

1 nodes in both of the separate analyses. Preliminary phylogenetic analyses were
2 conducted to explore the distribution of phylogenetic signal in nr26S, nr*FAI6180b*, and
3 *ptpsbA-trnH* data matrix with and without coded gaps. The resolution and support was
4 affected in substantial way by inclusion of gaps (results shown). All data matrices for
5 this study will be deposited in TreeBASE (<http://www.treebase.org/>).

6 The incongruence length difference (ILD) test between *ptpsbA-trnH*, nr26S, and
7 nr*FAI6180b* results were conducted to assess data congruence (Farris & al., 1995;
8 Barker & Lutzoni, 2002). The ILD test was performed using PAUP* v.4.0b10
9 (Swofford, 2002) and 1000 heuristic search replications after the removal of all
10 invariant positions from the data set (Cunningham, 1997). The consistency index (CI;
11 Kluge & Farris, 1969) and retention index (RI; Farris, 1989) were calculated to measure
12 the amount of homoplasy in the dataset.

13 Phylogenetic analyses of *ptpsbA-trnH* and nr26S, nr*FAI6180b* combined data set
14 were performed using maximum parsimony (MP), maximum likelihood (ML), and
15 Bayesian inference (BI).

16 Based on the Akaike information criterion (Akaike, 1974; Posada & Buckley,
17 2004), individual and combined data sets were evaluated for the appropriate model of
18 molecular evolution using ModelTest v. 3.7 (Posada and Crandall, 1998).

19 Clade support for both MP and ML phylogenies were assessed with a bootstrap
20 analysis using 1,000 replicates with 100 random addition sequence replicates, and tree
21 bisection and reconnection (TBR) branch swapping as implemented in PAUP* 4.01b10
22 (Swofford, 2002). Bootstrap analyses (1000 pseudoreplicates) were conducted with the
23 same parameters to examine the relative level of support for clades on the cladograms
24 (Felsenstein, 1985).

1 The BI tree was constructed using MrBayes v.3.1.2 (Ronquist & Huelsenbeck,
2 2003). Four Markov Chain Monte Carlo simulations were run simultaneously and
3 sampled every 100 generations for a total of 50 000 000 generations until the average
4 deviation of split frequencies was well below 0.01. The first 25000 (25%) of the sample
5 trees from each run were discarded (as the burn-in) as determined by Tracer v.1.6.0
6 (Rambaut et al., 2013). A Bayesian posterior probability (PP) tree was constructed from
7 the remaining trees. The analyses were performed in the Urticineae Laboratory of the
8 Instituto de Botânica, Brazil.

9
10 **Morphological character evolution.** — Morphological data were achieved from
11 field observations, herbarium investigations and literature study. Field observations
12 were realized from multiples trips in the Brazil, Colombia, Peru, and herbarium
13 investigations were carried out from 43 herbaria (see, Chapter 2 - Material and methods).

14 Twenty one characters (growth habit, number of vessels per square (mm), vessel
15 elements, wood fibres, stipule adnation, stipular scars, leaf insertion, lamina, mineral
16 concretion, breeding system, spathe, staminate inflorescence architecture, pistillate
17 inflorescence architecture, interfloral bracts, number of tepals of the staminate perianth,
18 staminate perianth connation, number of stamens per flower, filaments, placentation,
19 seeds size, myrmecophily) were included in the morphological character evolution
20 analysis (Table 1; Appendix 2). All twenty-one characters were selected because of
21 their potential for inferring relationships among genera in Cecropieae (Weddell, 1869;
22 Chew, 1963; Ruitter, 1976; Berg, 1978; Bonsen & Welle, 1983; Bonsen & Welle, 1984;
23 Humphries & Blackmore, 1989; Berg & al., 1990; Sytsma, & al., 2002; Chen & al.,
24 2003; Berg & Rosselli, 2005; Clement & Weiblen, 2009), and their use in previous

1 generic circumscriptions. Growth habit was coded as: (0) herb, (1) hemi-epiphyte (2)
2 tree; number of vessels per square (mm): (0) 5-22, (1) 1-6, (2) 1-3; vessel elements: (0)
3 unligified, (1) ligified; wood fibres: (0) dimorphic, (1) monomorphic; stipule
4 adnation: (0) not amplexicaul (1) amplexicaul; stipular scars: (0) inconspicuous, (1)
5 ascending, (2) horizontal; leaf insertion: (0) not peltate, (1) peltate; lamina: (0) entire, (1)
6 palmatilobed; mineral concretion: (0) cystolith (1) silicon-accumulation; breeding
7 system: (0) monoecious, (1) dioecious; spathe: (0) absent, (1) present; staminate
8 inflorescence architecture: (0) cyme, (1) fasciculate, (2) glomerule, (3) spike; pistillate
9 inflorescence architecture: (0) cyme, (1) fasciculate, (2) glomerule, (3) spike; interfloral
10 bracts: (0) absent, (1) present; number of tepals of the staminate perianth: (0) four, (1)
11 three, (2) two, (3) one; staminate perianth connation: (0) free to basally connate, (1)
12 connate; number of stamens per flower: (0) two to five (1) four, (2) three, (3) two;
13 filaments: (0) inflexed in bud, (1) straight in bud; placentation: (0) basal, (1) lateral;
14 seeds size: (0) megaspermous (greater than 5 mm long), (1) microspermous (less than 5
15 mm long); myrmecophily: (0) absent, (1) present (Table 1; Appendix 2).

16 To infer patterns of character evolution, the most parsimonious tree from the
17 analysis of the combined data set was chosen (Fig. 3). Character reconstructions were
18 carried out under the assumption of unordered and unweighted character states, using
19 the Ancestral State Reconstruction Package in Mesquite v.2.75 (Maddison & Maddison,
20 2011).

1 **RESULTS**

2
3 ***psbA-trnH* and nuclear analyses.** — The *ptpsbA-trnH* alignment for 42
4 accessions from 38 ingroups (Cecropieae) and four outgroups (other tribes of
5 Urticaceae), contained 649 characters. There were 487 (64.2%) variable sites, of which
6 386 (59.5%) were potentially parsimony-informative (Table 3). Analysis of the *ptpsbA-*
7 *trnH* data resulted in 1108 equally parsimonious trees (tree length = 1212, consistency
8 index [CI] = 0.5123, retention index [RI] = 0.7979). The MP strict consensus and ML
9 trees (not shown) were identical in topology to the trees sampled by BI analysis. The BI
10 tree revealed that Cecropieae were supported as monophyletic (bootstrap percentage
11 [BP] = 100, PP = 1.00). Moreover, *Pourouma* was supported as monophyletic with high
12 support (BP = 100, PP = 1.00). Within Cecropieae, monophyly of all genera is well
13 supported, however it will be necessary assessed more terminals some genera (e.g.,
14 *Cecropia* and *Coussapoa*).

15 The aligned nr26S and nrFA16180b matrix consisted of 1373 nucleotides (26S,
16 1001; FA16180b, 372). There were 406 (29.6%) variable sites, of which 345 (25.1%)
17 were potentially parsimony informative (Table 3). Analysis yielded a strict consensus
18 tree of 345 equally parsimonious trees (tree length = 1088, CI = 0.57, RI = 0.91). The
19 MP strict consensus and ML trees (not shown) were identical in topology to the BI tree,
20 except that *Coussapoa* was sister to the clade comprising *Pourouma-Myrianthus*, but
21 with a strong support (BP = 90, PP = 1.00). However, the topology for combined data
22 (pt + nr) this support increases (BP = 85, PP = 0.92). Also, the topology of nuclear is
23 largely similar to that of the *ptpsbA-trnH* tree in highly supported relationships.

24

1 **Combined data analyses.** — The ILD test indicated that *ptpsbA-trnH* and nuclear
2 partitions were not significantly incongruent ($P = 0.061$). Moreover, strongly supported
3 (BP >92) incongruent clades were not found upon comparison of parsimony bootstrap
4 consensus trees generated from the two data sets. The combined strict consensus tree
5 was better resolved than that from either separate analysis. Thus, we chose to combine
6 *ptpsbA-trnH* and nuclear data sets with their weakly-incongruent trees, as also
7 suggested by Wiens (1998), Planet (2006) and Nie & al. (2008).

8 Analysis of the combined data set resulted in 5917 equally parsimonious trees,
9 each of 3230 steps (CI = 0.4949, RI = 0.8406; Table 3). The MP strict consensus and
10 ML trees (not shown) were identical in topology to the BI tree sampled. The BI
11 topology for combined data was strongly supported in the most parts of the clades (Fig.
12 2).

13 The molecular analyses from combined data provided a strong support for
14 monophyly of Cecropieae (BP = 100, PP = 1.00). As with the separate results,
15 *Poikilospermum suaveolens* (Urticeae tribe) was sister to *Cecropieae* with a strong
16 support (BP = 100, PP = 1.00). Within Cecropieae, two main lineages (I and II) were
17 present in the BI tree. Lineage I included three clades with three genera: *Coussapoa*,
18 *Pourouma* and *Myrianthus* with moderate support (BP = 85, PP = 0.92). *Pourouma*
19 (focus of this study) was strongly supported as a monophyletic genus (BP = 100, PP =
20 1.00). Also, *Myrianthus* arises as sister group of *Pourouma* (BP = 100, PP = 1.00).
21 Lineage II included two clade and two genera: *Cecropia* and *Musanga* with a strong
22 support (BP = 100, PP = 1.00).

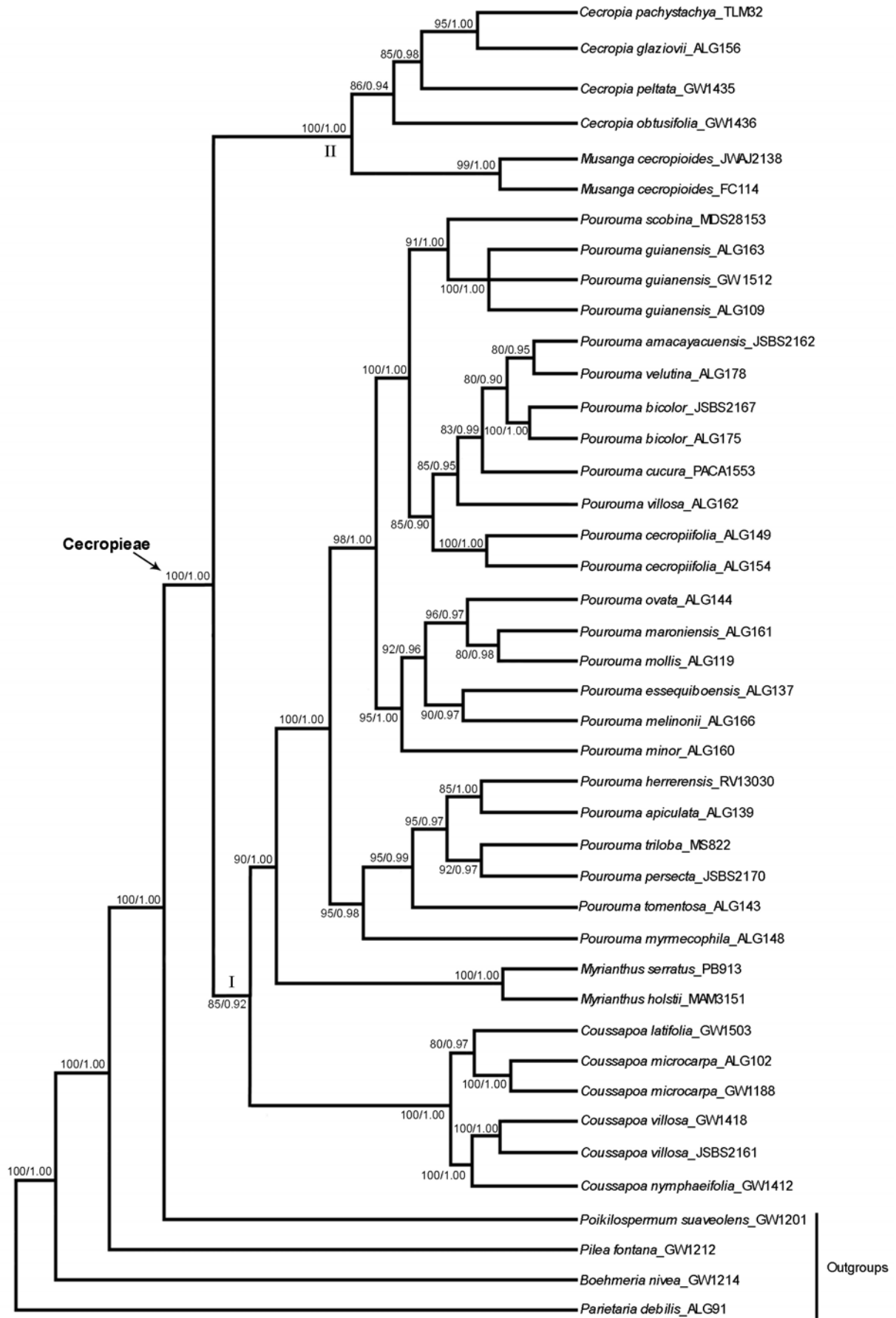


Figure 2. Bayesian consensus tree for Cecropieae based on combined molecular data (*ptpsbA-trnH*, nr26S and nrFA16180b). The numbers along the branches indicate support (maximum likelihood bootstrap [BP] / Bayesian posterior probability [PP]). The two lineages (I, II) within Cecropieae are indicated.

1 **Morphological character evolution.** — Twenty-one morphological characters
2 were mapped on one of the MP trees from the combined analysis (Fig. 3). If we had
3 used any of the other trees, the optimizations described below would not come out
4 differently. Many characters are homoplasious in Cecropieae, and relatively few
5 synapomorphies can be identified that support the hypothesized clades. Nevertheless,
6 the presence of arboreal habit without unlignified vessels elements, amplexicaul stipule,
7 silicon-accumulation and filaments straight in bud is the derived status in Cecropieae
8 and appers as synapomorphies of Cecropieae. We coded the terminals of *Coussapoa* as
9 hemi-epiphyte, which might be related the to *Poikilospermum* as suggested by Berg
10 (1978), although, *Coussapoa* has only lignified vessel elements (Bonsen & Welle, 1983;
11 Humphries & Blackmore, 1989).

12 Based in the most parsimonious reconstruction, we infer that: the hemi-epiphety
13 habit, 1-6 number of vessel per square, stipule scars ascending, lamina leaf not peltate,
14 lamina leaf entire, staminate inflorescence in fascicle, pistillate inflorescence in cymes,
15 interfloral bracts present, four tepals in the staminate flowers, staminate perianth free or
16 basally connate, four stamens per leaf, basal placentation, (seed greater than 5 mm), and
17 myrmecophily absent were progenitorial for Cecropieae (Fig. 3).

18 Systema et al. (2002) indicated the basal placentation as a synapomorphy of
19 Urticaceae. However, *Pourouma* presents placentation lateral, which it might be related
20 to evolution character for the anatropous placentation of Moraceae.

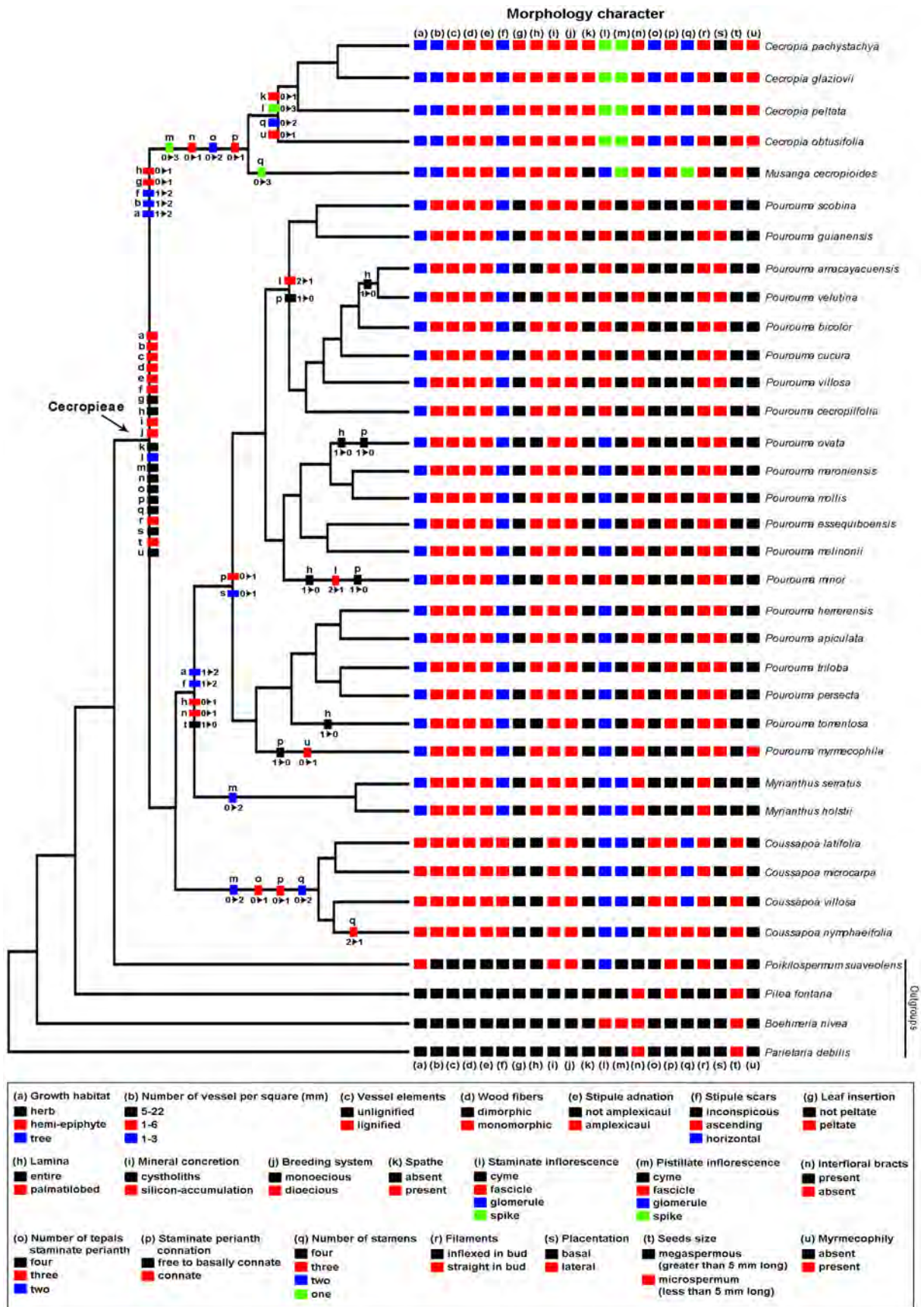


Figure 3. Reconstruction of the evolution of selected morphological characters in Cecropieae based on one of the most trees from combined molecular data. The topology is identical to Fig. 2. The character state at the node of Cecropieae indicates the ancestral state of the Cecropieae clade. Transitions appear as filled boxes on the branches, characters shown above boxes and state transitions below. Descriptions of characters and character states are provided in the figure and supplementary information in appendix 2.

1 Within the lineage II, the *Musanga-Cecropia* group shares several morphological
2 characteristics such as: 1-3 number of vessel per square, lamina leaf peltate, pistillate
3 inflorescence in spike, and two tepals in the staminate flowers (Fig. 4). *Cecropia* clade
4 displays as autapomorphies: spathe, staminate inflorescence in spike, two stamens, and
5 myrmecophily. *Musanga* clade exhibits as autapomorphies: staminate inflorescence in
6 glomerule, and one stamen.

7 Within the lineage I, the *Coussapoa-Myrianthus-Pourouma* group shares some
8 morphological characteristics such as: 1-6 number of vessel per square, and lamina leaf
9 not peltate. *Coussapoa* clade shows as autapomorphies: hemi-epiphyte habit, stipule
10 scars ascending, interfloral bracts, three tepals in the staminate flowers, and two to three
11 stamens. *Myrianthus-Pourouma* clade presents as synapomorphies: four tepals in the
12 staminate flowers, four stamens in staminate flowers, and megaspermous (seed greater
13 than 5 mm).

14 The character states of growth habit (character a), stipule scars (character f),
15 lamina (character h), staminate inflorescence (character l), interfloral bracts (character
16 n), number of tepals staminate perianth (character o), and myrmecophily (character u)
17 appear to have evolved at least twice within Cecropieae, whereas number of vessel per
18 square/mm (character b), leaf insertion (character g), spathe (character k), placentation
19 (character s), and seeds size (character t) appear to have evolved at least one within
20 Cecropieae. Pistillate inflorescence (character m) and number of stamens (character q)
21 appear to have evolved at least three within Cecropieae (Fig. 3).



Figure 4. Morphological diversity of tribe Cecropieae. *Cecropia glaziovii*: A. Leafy twig with pistillate inflorescences and spathe. B. Pistillate flower. C. Detail of the pistillate inflorescence. D. Achene. *Cecropia pachystachya*: E. Leafy twig with staminate inflorescences and spathe. F. Staminate inflorescence transversal section. G. Staminate flower. H. Pistillate flower. *Coussapa microcarpa*: I. Leafy twig with pistillate inflorescences. J. Staminate flower. K. Inflorescence. *Musanga cecropioides*: L. Leafy twig with pistillate inflorescences. M. Pistillate flowers and pistillate flower in frontal section. *Myrianthus arboreus*: N. Leafy twig with staminate inflorescences. O. Inflorescence. P. Staminate flower. *Pourouma myrmecophila*: Q. Leafy twig with pistillate inflorescences and infructescences. V. Pistillate flower. *Pourouma guianensis*: R. Leafy twig with infructescences. S. Pistillate flower, longitudinal section. T. Fruiting perianth and achene. U. Staminate flower. [A-D: Aubréville 23 (P); E-G: Gaglioti et al. 118 (SP); H: Cuatrecasas 26658 (P); I, K: Gaglioti et al. 102 (SP); J: Proença et al. 73 (SP); L-M: Jansen 2138 (P); N, P: Kami 1242 ter (SP); O: Kami 1242 bis (SP); Q, V: Gaglioti et al. 168 (SP); R, T: Gaglioti et al. 163 (SP); S: Carauta et al. 6303 (RB); U: Furlan et al. 1037 (SP)]. Illustrator: Klei Sousa.

1 **Major evolutionary lineages of *Pourouma*.** — Our results strongly supported
2 monophyly of *Pourouma* (BP = 100, PP = 1.00; Fig. 2) within of moderate support
3 lineage I (*Coussapoa-Myrianthus-Pourouma*; BP = 85, PP = 0.92) of Cecropieae.
4 *Pourouma* was more closely related to the Afrotropical *Myrianthus*, arising in the clade
5 with a strong support (BP = 90, PP = 1.00). Previous studies (Trécul, 1847; Engler,
6 1889; Corner, 1962; Chew, 1963; Berg, 1978) suggested a possible relationship
7 between *Pourouma* and *Myrianthus* within this group based on shared megaspermum
8 with seeds greater than 5 mm long (Fig. 1 I, M; Fig. 4 O, T). In fact, this morphology
9 characters might have been a key innovation triggering species diversification in this
10 lineage.

11 All MP, ML and BI analyses of the combined data consistently found four well-
12 supported clades embedded within *Pourouma*, which based on the morphological
13 characters, we suggested six major clades of *Pourouma* (Fig. 5).

14 Clade I — the *Pourouma myrmecophila* clade. This species was strongly
15 supported (BP = 90, PP = 1.00) in a clade with staminate inflorescences in glomerules (I
16 and II). However, *Pourouma myrmecophila* Ducke (Fig. 4 Q-V) is one of two species
17 (*Pourouma formicarum* Ducke, not sampled) of *Pourouma* with domatia at the base of
18 the petiole, which is used as shelter for ants. The myrmecophily is commonly found in
19 *Cecropia* (see more in appendix 2). In both cases, the ants provide protection against
20 herbivory. *Pourouma myrmecophila* occurs in northwest of Brazil (Amazonas), and
21 south of Colombia (Amazonas and Caqueta), in “terra firme” (non-inundated) forest of
22 the Amazonian region, in lowland moist area, at an elevation of about 100 to 300 m
23 above sea level.

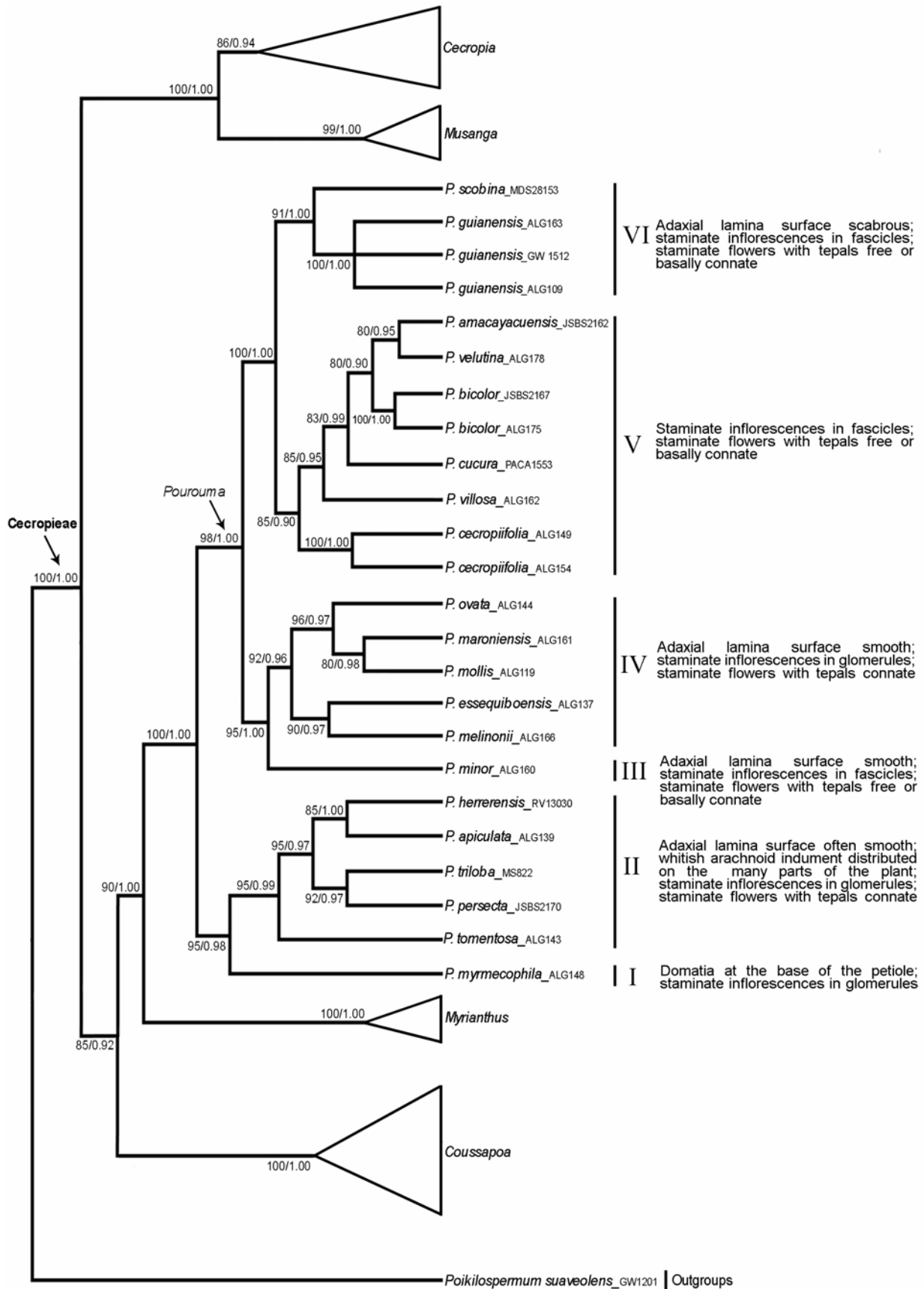


Figure 5. Bayesian consensus tree for Cecropieae with a focus on *Pourouma* (Same topology of the Fig. 2.; modified) based on combined molecular data (*ptpsbA-trnH*, nr26S and nrFA16180b). The six major clades of *Pourouma* resolved in this are indicated and the major diagnostic morphological features are shown in the front of the Roman numeral. The numbers along the branches indicate support (maximum likelihood bootstrap [BP] / Bayesian posterior probability [PP]). The two lineages (I, II) within Cecropieae are indicated.

1 Clade II — the *Pourouma tomentosa* clade. This clade includes five species:
2 *Pourouma tomentosa* Mart. ex Miq., *P. persecta* (C.C. Berg & Heusden) Gaglioti &
3 Romaniuc, *P. triloba* Trécul, *P. apiculata* Spruce ex Benoist, and *P. herrerensis* C.C.
4 Berg. They can be recognized by adaxial lamina surface often smooth, whitish
5 arachnoid indument distributed on the many parts of the plant (Fig. 6 D), staminate
6 inflorescences in glomerules (Fig. 1 J; Fig. 6 F), staminate flowers with tepals connate
7 (Fig. 6 I). *Pourouma tomentosa* is morphologically related to *P. herrerensis* by lamina
8 leaf entire. Nevertheless, *Pourouma herrerensis* was more closely related to *P.*
9 *apiculata* with a strong support (BP = 85, PP = 1.00). These species shared the leafy
10 twigs with indument yellowish, hirsute. They are sympatric in the south of Colombia
11 (Amazonas) and northeast of Peru (Loreto), occurring in “terra firme” forest of the
12 Amazonian region, often in riparian forest, in lowland moist area, at an elevation of
13 about 25 to 300 m above sea level. Although, these species extending for other areas of
14 Amazonian forest. *Pourouma persecta* was more closely related to *P. triloba* with a
15 strong support (BP = 92, PP = 0.97). These species can be recognized by the lamina leaf
16 usually palmatipartite (palmatisect in *P. persecta*) with 3 to 9 lobes, and leafy twigs
17 with indument yellowish, hirsute. They are sympatric in northeast of Brazil (Acre),
18 north of Bolivia (La Paz), occurring in “terra firme” forest of the Amazonian region,
19 mostly in lowland moist areas, usually in riparian forest, at an elevation of about 50 to
20 1350 m above sea level. Although, these species extending for other areas of
21 Amazonian forest.

22 *Pourouma apiculata* and *P. persecta* were considered by Berg & Heusden (1988)
23 as subspecies of *P. tomentosa*, which were not supported in the molecular analyses.

24

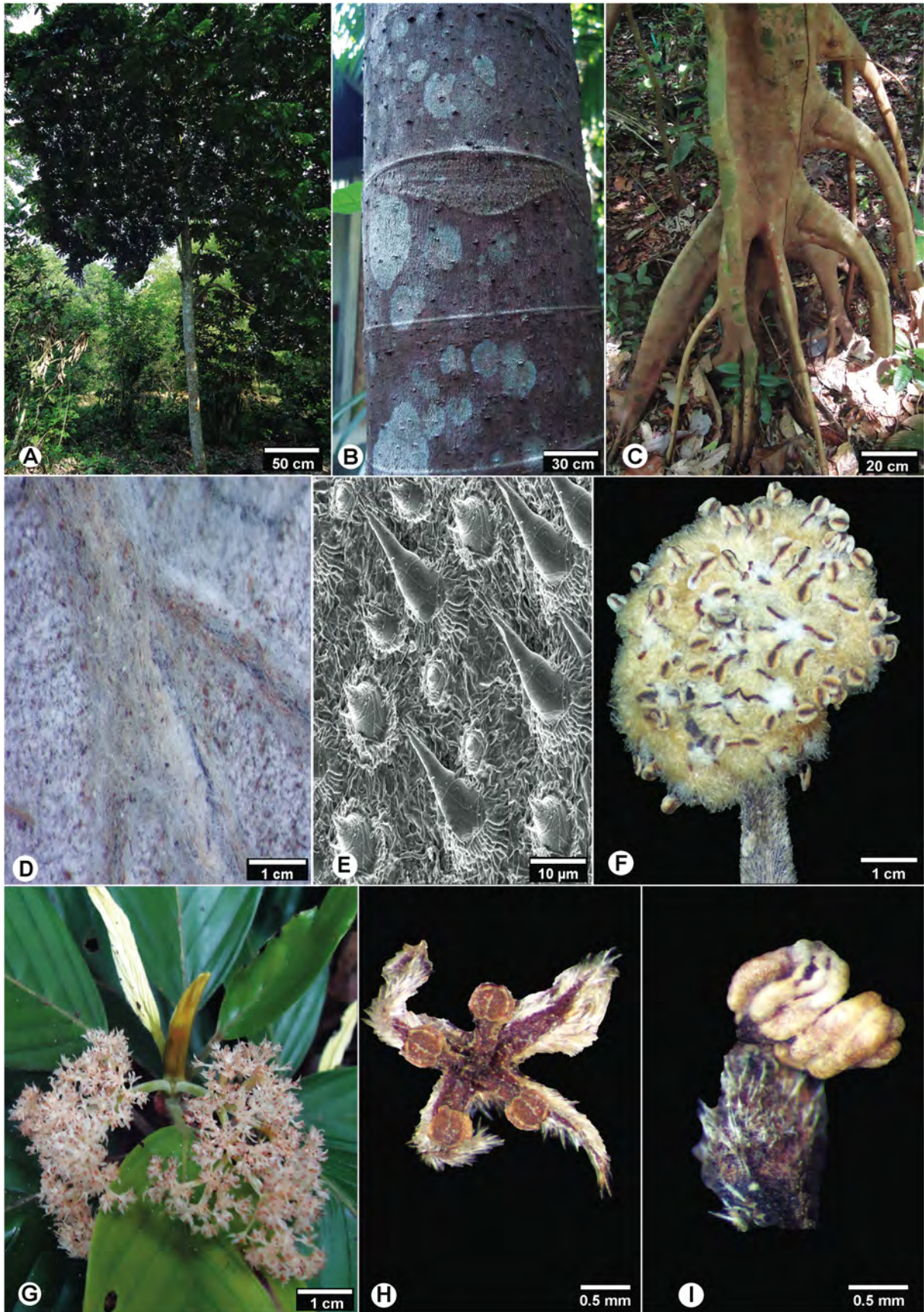


Figure 6. Diagnostic morphological features shown in Fig 5 and morphological diversity of *Pourouma*. A, *P. cecropiifolia* (tree); B, *P. tomentosa*, (scars of the leafy twigs and annular scars of the stipules); C, *P. bicolor* (stilt roots); D, *P. tomentosa*, (arachnoid indument of the abaxial surface lamina leaf); E, *P. guianensis* (strigose indument of the adaxial surface lamina leaf); F, *P. herrerensis*, (glomerule of the staminate inflorescence); G, *P. minor*, (staminate inflorescences); H, *P. scobina*, (staminate flower); I, *P. essequiboensis* (staminate flower). Photos: A.L. Gaglioti.

1 *Pourouma tomentosa* occurs in the northeast of Brazil (Amazonas), south of Venezuela
2 (Amazonas), south of Colombia (Amazonas and Caqueta), and northeast of Peru
3 (Amazonas and Loreto), in “terra firme” forest of the Amazonian region, in lowland
4 moist areas, sometimes in riparian forest, at an elevation of about 50 to 400 m above sea
5 level.

6 Clade III — the *Pourouma minor* clade. This species was strongly supported (BP =
7 95, PP = 1.00) in a clade with adaxial lamina surface smooth (III and IV). However,
8 *Pourouma minor* Benoist distinguished from the species of the clade IV, for presenting
9 staminate inflorescence in fascicles (Fig. 6 G; versus in glomerules, Fig. 6 F) and
10 staminate flowers with tepals free or connate in the base (Fig. 6 H; versus connate, Fig.
11 6 I). Moreover, *Pourouma minor* displays stigma multilobed with 2.8–6 mm in diameter,
12 the greatest among all species of *Pourouma*.

13 It occurs in moist forests in the south of the Central America (Costa Rica and
14 Panama) and north of the South America (north of Brazil, French Guiana, Suriname,
15 Guyana, Venezuela, Colombia, Ecuador, Peru, and Bolivia), often in lowland areas,
16 usually in secondary or riparian forest, at an elevation of about 50 to 1500 m above sea
17 level.

18 Clade IV — the *Pourouma melinonii* clade. This clade includes five species
19 (*Pourouma essequiboensis* Standl., *P. maroniensis* Benoist, *P. melinonii* Benoist, *P.*
20 *mollis* Trécul, and *P. ovata* Trécul) with a strong support (BP = 92, PP = 0.96). Some
21 morphological evidence supports this relationship: adaxial lamina surface smooth,
22 staminate inflorescence in glomerules (Fig. 1 J; Fig. 6 F), and staminate flowers with
23 tepals connate (Fig 6 I; basally connate in *P. ovata*). Within of the clade IV, *Pourouma*
24 *melinonii* was more closely related to *P. essequiboensis* (BP = 90, PP = 0.97), as well as

1 *P. mollis* was related to *P. maroniensis* (BP = 80, PP = 0.98). *Pourouma melinonii* and
2 *P. essequiboensis* are sympatric in the north of Brazil (Amazonas and Para), Suriname
3 (Sipaliwini), and Guyana (Upper Takutu-Upper Essequibo), usually in “terra firme”
4 forest of the Amazonian region, in lowland moist areas, sometimes in riparian forest, at
5 an elevation of about 100 to 500 m above sea level. *Pourouma mollis* and *P.*
6 *maroniensis* are sympatric in the north of Brazil (Amapa), French Guiana (Cayenne and
7 Saint-Laurent-du-Maroni), and Suriname (Marowijne), mostly in “terra firme” forest of
8 the Amazonian region, in lowland moist areas, sometimes in riparian forest, at an
9 elevation of about 25 to 500 m above sea level, although, these species occur for other
10 areas of Amazonian forest. *Pourouma mollis* occurs also in the east of Brazil (Bahia,
11 Espirito Santo, Pernambuco), in dense ombrophilous forest of the Atlantic forest.

12 *Pourouma ovata* was more closely related to *P. maroniensis* and *P. mollis*, within
13 of a clade strongly supported (BP = 96, PP = 0.97). This species distinguished from all
14 species of *Pourouma* (except *P. ferruginea*, not sampled) by the peduncle of the
15 infructescence reaching more than 50 cm long. It occurs in the northwest of Brazil
16 (Acre, Amazonas, western Para, and Roraima), south of Venezuela (Amazonas and
17 Bolivar), south of Colombia (Amazonas, Caqueta, and Vaupes), in “terra firme” forest
18 of the Amazonian region, commonly in lowland moist areas, usually in riparian forest,
19 at an elevation of about 100 to 1800 m above sea level.

20 Clade V — the *Pourouma cecropiifolia* clade. This clade was moderately
21 supported (BP = 85, PP = 0.90) in a clade with staminate inflorescences in fascicles (Fig.
22 6 G) and staminate flowers with tepals free or basally connate (Fig. 6 I). It includes six
23 species: *Pourouma amacayacuensis* Gaglioti & Romaniuc, *P. bicolor* Mart., *P.*
24 *cecropiifolia* Mart., *P. cucura* Standl. & Cuatrec., *P. velutina* Mart. ex Miq., and *P.*

1 *villosa* Trécul Trécul. In fact, the moderate support might be associated to *Pourouma*
2 *cecropiifolia*, which it presents the largest fruits of *Pourouma* (Fig. 1 I). Also, this
3 species distinguished from the other species by palmatilobed leaf with 7–11 lobes (versus
4 entire to palmatilobed leaf with 3–5 lobes) and adaxial lamina surface smooth (versus
5 adaxial lamina surface scabrous, except in *Pourouma villosa*).

6 *Pourouma amacayacuensis*, *P. velutina*, and *P. bicolor* were more closely with
7 moderate support (BP = 80, PP = 0.90). They share to the adaxial lamina surface
8 scabrous (Fig. 6 E) and lamina usually entire.

9 Within of this clade, all species are sympatric in the southwestern of Colombia
10 (Amazonas), in Amazonian “terra firme” forest, in lowland moist area, at an elevation
11 up to 200 m. *Pourouma amacayacuensis* is endemic from Amacayacu Natural National
12 Park, in Amazonian “terra firme” forest, in lowland moist area, at an elevation up to 120
13 m. *Pourouma bicolor*, *P. cecropiifolia*, *P. cucura*, *P. velutina*, and *P. villosa* are
14 sympatric in the north of Brazil, French Guiana (except *P. cecropiifolia*), Suriname
15 (except *P. cecropiifolia*), south of Venezuela (except *P. villosa*), south of Colombia,
16 east of Ecuador (except *P. villosa*), northeast of Peru (except *P. villosa*), northeast of
17 Bolivia (except *P. villosa*), often in “terra firme” forest of the Amazonian region,
18 usually in lowland moist areas, sometimes in riparian forest, at an elevation of about
19 100 to 1500 m above sea level (*P. velutina* up to 400 m above sea level). Moreover,
20 *Pourouma velutina* occurs in the southeast of Brazil (Bahia and Espírito Santo), in
21 dense ombrophilous forest of the Atlantic forest.

22 Clade VI — the *Pourouma guianensis* clade. This clade comprises two species
23 (*Pourouma guianensis* Aubl. and *P. scobina* Benoist) with a strong support (BP = 91,
24 PP = 1.00). These species can be recognized by staminate inflorescences in fascicles,

1 staminate flowers with tepals free or basally connate, adaxial lamina surface scabrous,
2 and usually palmatilobed lamina leaf.

3 The molecular analyses of three accession of *Pourouma guianensis* from three
4 different places (Amapa, Amazonas, and Rio de Janeiro) indicated that these specimens
5 belong to the same species (BP = 100, PP = 1.00). These results corroborated with the
6 diagnostic character of this species, which are: adaxial lamina surface scabrous, adaxial
7 stipules surface scabrous, staminate inflorescence in fascicles, staminate flowers with
8 tepals free or basally connate, and fruiting perianth with indument velutinous to strigose.

9 *Pourouma guianensis* has the most extensive distribution of *Pourouma*, occurring
10 in the north, east and southeast of Brazil, French Guiana, Suriname, Guyana, south of
11 Venezuela, central-south of Colombia, east of Ecuador, Peru, and central-northeast of
12 Bolivia, often in secondary “terra firme” forest of the Amazonian region and in dense
13 ombrophilous forest of the Atlantic forest, often in lowland moist areas, sometimes in
14 riparian forest, at an elevation of about 50 to 1400 m above sea level. It is pioneer and
15 commonly found in open areas and disturbed of the forest. *Pourouma scobina* occurs
16 from south of Mexico to the north of Colombia, northwest Venezuela, and west of
17 Ecuador, in tropical moist evergreen forest, in usually lowland moist areas, often in
18 riparian forest, at an elevation of about 50 to 1600 m above sea level. These species are
19 sympatric only in Napo (Ecuador).

20

DISCUSSION

The molecular analyses and character evolution presented here constitute the most comprehensive study of Cecropieae to provide a well-supported combined tree. Within this phylogenetic framework, we discuss the taxonomic implications of the results and their significance in understanding character evolution within Cecropieae, particularly growth habit, number of vessel per square/mm, vessel elements, wood fibers, stipule adnation stipule scars, leaf insertion lamina, mineral concretion, breeding system, spathe, staminate inflorescence, interfloral bracts, number of tepals staminate perianth, staminate perianth connation, number of stamens, filaments, placentation, seeds size, and myrmecophily, which are key taxonomic characters among these genera.

Results from character evolution suggested that the presence of arboreal habit without unlignified vessels elements, amplexicaul stipule, silicon-accumulation and filaments straight in bud is the derived status in Cecropieae, and it might have been a key innovation triggering species diversification in the tribe. Within the lineage II, the character evolution of *Musanga* and *Cecropia* indicated that the lamina leaf peltate, pistillate inflorescence in spike, and two tepals in the staminate flowers might have been a key innovation triggering species diversification in this group.

Within the lineage I, the results of *Pourouma* and *Myrianthus* corroborated with the megaspermous group suggested by previous studies about the tribe (Trécul, 1847; Engler, 1889; Corner, 1962; Chew, 1963; Berg, 1978), and it might have been a key innovation triggering species diversification of this group. The lateral placentation appears to be key innovation triggering species diversification in *Pourouma*, as suggested by Gaudichaud (1830).

1 The convergence of molecular analyses and the synapomorphies of the lineages
2 guided the taxonomic revision of *Pourouma* (Chapter 2).

3 Our analyses represent a first step towards an understanding of the molecular
4 phylogeny of Cecropieae and more terminals of other genera need to be evaluated for
5 comprehend the infrageneric relationships in the genera

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7

1 **Appendix 1.** Species, voucher with collection locality, and GenBank accession number
 2 for taxa included in this study.

3

4 **Tribe—Species,** collection locality, voucher specimen (Herbarium), GenBank
 5 accession for nuclear *26S/FA16180b*/plastid *psbA-trnH*. (GenBank numbers will be
 6 added after acceptance of manuscript)

7 **Cecropieae—*Cecropia glaziovii*** Snethl., Brazil, Rio de Janeiro, A.L. Gaglioti &
 8 al. 156 (SP), XXX/XXX/XXX; ***Cecropia obtusifolia*** Bertol., Costa Rica, G. Weiblen
 9 1436 (MIN), AY686781/XXX/XXX; ***Cecropia pachystachya*** Trécul, Brazil, Ceara,
 10 T.L. Mioranza 32 (SP), XXX/XXX/XXX; ***Cecropia peltata*** L., Panama, G. Weiblen
 11 1435 (MIN), AY686780/XXX/XXX; ***Coussapoa latifolia*** Aubl., Brazil, G. Weiblen
 12 1503 (MIN), AY686769/XXX/XXX; ***Coussapoa microcarpa*** (Schott) Rizzini, Brazil,
 13 Rio de Janeiro, A.L. Gaglioti & al. 102 (SP), XXX/XXX/XXX; ***Coussapoa microcarpa***
 14 (Schott) Rizzini, Brazil, G. Weiblen 1188 (MIN), AY289260/XXX/XXX; ***Coussapoa***
 15 ***nymphaeifolia*** Standl., Costa Rica, G. Weiblen 1412 (MIN), AY686771/XXX/XXX;
 16 ***Coussapoa villosa*** Poepp. & Endl., Colombia, Leticia, J.S. Barreto-Silva & al. 2161
 17 (COAH, SP), XXX/XXX/XXX; ***Coussapoa villosa*** Poepp. & Endl., Costa Rica, G.
 18 Weiblen 1418, AY686768/XXX/XXX; ***Musanga cecropioides*** R. Br. ex Tedlie,
 19 Liberia, J.W.A. Jansen 2138 (P), XXX/XXX/XXX; ***Musanga cecropioides*** R. Br. ex
 20 Tedlie, Guinea Ecuatorial, F. Cabezas 114 (P), XXX/XXX/XXX; ***Myrianthus holstii***
 21 Engl., Tanzania, M.A. Mwangoka 3151 (MO), XXX/XXX/XXX; ***Myrianthus serratus***
 22 (Trécul) Benth., Mali, P. Birnbaum 913 (P), XXX/XXX/XXX; ***Pourouma***
 23 ***amacayacuensis*** Gaglioti & Romaniuc, Colombia, Leticia, J.S. Barreto-Silva & al.
 24 2162 (COAH, SP), XXX/XXX/XXX; ***Pourouma apiculata*** Spruce ex Benoist, Brazil,
 25 Amazonas, A.L. Gaglioti & al. 139 (SP), XXX/XXX/XXX; ***Pourouma bicolor*** Mart.,
 26 Colombia, Leticia, J.S. Barreto-Silva & al. 2167 (COAH, SP), XXX/XXX/XXX;
 27 ***Pourouma bicolor*** Mart., Brazil, Amazonas, A.L. Gaglioti & al. 175 (EAFM, SP),
 28 XXX/XXX/XXX; ***Pourouma cecropiifolia*** Mart., Brazil, Amazonas, A.L. Gaglioti &
 29 al. 149 (SP), XXX/XXX/XXX; ***Pourouma cecropiifolia*** Mart., Brazil, Acre, A.L.
 30 Gaglioti & al. 154 (SP), XXX/XXX/XXX; ***Pourouma cucura*** Standl. & Cuatrec.,

1 Brazil, Amazonas, P.A.C. Assunção & al. 1553 (INPA), XXX/XXX/XXX; *Pourouma*
 2 *essequiboensis* Standl., Brazil, Amazonas, A.L. Gaglioti & al. 137 (EAFM, SP),
 3 XXX/XXX/XXX; *Pourouma guianensis* Aubl., Brazil, Rio de Janeiro, A.L. Gaglioti &
 4 al. 109 (SP), XXX/XXX/XXX; *Pourouma guianensis* Aubl., Brazil, Amapa, A.L.
 5 Gaglioti & al. 163 (SP), XXX/XXX/XXX; *Pourouma guianensis* Aubl., Brazil,
 6 Amazonas, G. Weiblen 1512 (MIN), AY686835/XXX/XXX; *Pourouma herrensis*
 7 C.C. Berg, Peru, Loreto, R. Vásquez & al. 13030 (MO), XXX/XXX/XXX; *Pourouma*
 8 *maroniensis* Benoist, Brazil, Amapa, A.L. Gaglioti & al. 161 (SP), XXX/XXX/XXX;
 9 *Pourouma melinonii* Benoist, Brazil, Amapa, A.L. Gaglioti & al. 166 (SP),
 10 XXX/XXX/XXX; *Pourouma minor* Benoist, Brazil, Amapa, A.L. Gaglioti & al. 160
 11 (SP), XXX/XXX/XXX; *Pourouma mollis* Trécul, Brazil, Para, A.L. Gaglioti & al. 119
 12 (IAN, SP) XXX/XXX/XXX; *Pourouma myrmecophila* Ducke, Brazil, Amazonas, A.L.
 13 Gaglioti & al. 148 (EAFM, SP), XXX/XXX/XXX; *Pourouma ovata* Trécul, Brazil,
 14 Amazonas, A.L. Gaglioti & al. 144 (EAFM, SP), XXX/XXX/XXX; *Pourouma*
 15 *persecta* (C.C. Berg & van Heusden), Colombia, Leticia, J.S. Barreto-Silva & al. 2170
 16 (COAH, SP), XXX/XXX/XXX; *Pourouma scobina* Benoist, Nicaragua, W.D. Stevens
 17 & al. 28153 (MO), XXX/XXX/XXX; *Pourouma tomentosa* Mart. ex Miq., Brazil,
 18 Amazonas, A.L. Gaglioti & al. 143 (EAFM, SP), XXX/XXX/XXX; *Pourouma triloba*
 19 Trécul, Brazil, Acre, M. Silveira & al. 822 (INPA), XXX/XXX/XXX; *Pourouma*
 20 *velutina* Mart. ex Miq., Brazil, Amazonas, A.L. Gaglioti & al. 178 (EAFM, SP),
 21 XXX/XXX/XXX; *Pourouma villosa* Trécul, Brazil, Amapa, A.L. Gaglioti & al. 162
 22 (SP), XXX/XXX/XXX.

23 **Boehmerieae**—*Boehmeria nivea* (L.) Gaudich., cultivated in the Beal Botanical
 24 Garden, G. Weiblen 1214 (MIN), AY686767/XXX/XXX.

25 **Elatostemateae**—*Pilea fontana* (Lunell) Rydb., cultivated in the Beal Botanical
 26 Garden, G. Weiblen 1212 (MIN), AY686776/XXX/XXX.

27 **Parietarieae**—*Parietaria debilis* G. Forst., Brazil, Sao Paulo, A.L. Gaglioti & al.
 28 91 (SP), XXX/XXX/XXX.

29 **Urticeae**—*Poikilospermum suaveolens* (Blume) Merr., cultivated in the Beal
 30 Botanical Garden, G. Weiblen 1212 (MIN), AY686772/XXX/XXX.

1 **Appendix 2:** Morphological and state characters of Cecropieae tribe and four
2 genera (four tribes) of Urticaceae.

3 **(a). Growth habit:** (0) herb, (1) hemi-epiphyte, (2) tree (Fig. 1 A; Fig. 6 A-C).
4 Herbs are plants without a woody stem and trees are perennial woody plants with
5 secondary thickening, with a clear main stem. We classified *Boehmeria nivea* as herb,
6 because it has no pronounced secondary growth, and *Poikilospermum* as hemi-epiphyte,
7 because its epiphytic for one stage of its life cycle, but rooted in the soil during another
8 stage (Beentje, 2012). Berg (1978) described *Poikilospermum* as hemi-epiphyte
9 scramblers habit for *Poikilospermum*, while Chew (1963) used the term woody
10 scramblers. According to Berg & al. (1990), the *Coussapoa* species analysed have a
11 hemi-epiphyte habit.

12 **(b). Number of vessels per square (mm):** (0) 5-22, (1) 1-6, (2) 1-3. This
13 character is used by Bonsen & Welle (1983) to suggest the morphological proximity
14 between *Cecropia* – *Musanga* group and the *Coussapoa* – *Myrianthus* – *Pourouma*
15 group.

16 **(c). Vessel elements:** (0) unligified, (1) ligified. (Bonsen & Welle, 1983).

17 **(d). Wood fibres:** (0) dimorphic, (1) monomorphic. (Humphries & Blackmore,
18 1989).

19 **(e). Stipule adnation:** (0) not amplexicaul, (1) amplexicaul. The amplexicaul
20 stipule is found only in Cecropieae, covering and protecting the apical meristem (Fig. 1
21 B, G-H, J, N, O; Fig. 4 A, E, I, L, N, Q-R; Fig. 6 G).

22 **(f). Stipular scars:** (0) inconspicuous, (1) ascending, (2) horizontal. This character
23 was used by Berg & al. (1990) in the identification key to genera: *Cecropia*, *Coussapoa*
24 and *Pourouma* (Fig. 1 E, H, J, N; Fig. 4 A, E, I, L, N, R, Q).

1 **(g). Leaf insertion:** (0) not peltate, (1) peltate. Peltate leaves have the petiole
2 attached to the blade not by the margin. This character was used by Berg (1978) in the
3 identification key to distinguish *Cecropia* and *Musanga* from other genera. (Fig. 1 B, F,
4 H, I, K, O; Fig. 4 A, E, I, L, N, Q-R).

5 **(h). Lamina:** (0) entire, (1) palmatilobed. (Fig. 1 B, F, H, I, K, O; Fig. 4 A, E, I, L,
6 N, Q-R). The species of Cecropieae often have palmatilobed lamina leaf, which is entire
7 when juvenile. *Pourouma* displays a gradient in lamina shape from entire to palmatifid,
8 palmatipartite or palmatisect. The character state “palmatilobed lamina” implies that at
9 least some of the leaves in the plant are palmatifid, palmatipartite or palmatisect
10 (Radford & al., 1974; Beentje, 2012).

11 **(i). Mineral concretion:** (0) cystolith (1) silicon-accumulation. (Kachroo & Bhat,
12 1981; Setochi & al., 1993). A cystolith is usually an ellipsoidal or globular, calcified
13 body with a silicified stalk. Members of the Cecropieae accumulate silicon in idioblasts
14 of the leaves.

15 **(j). Breeding system:** (0) monoecious, (1) dioecious. (Berg, 1978; Chen & al.,
16 2003)

17 **(k). Spathe:** (0) absent, (1) present. The inflorescences of *Cecropia* are often
18 completely enclosed by a spathe. (Fig. 1 E; Fig. 4 A, E). At anthesis, the spathe opens
19 and drops. (Berg & Rosselli, 2005).

20 **(l). Staminate inflorescence architecture:** (0) cyme, (1) fasciculate, (2)
21 glomerule, (3) spike. (Fig. 1 D-E, H, J, L, N, P; Fig. 4 E-F, N; Fig. 6 F-G). The
22 staminate inflorescences of *Coussapoa*, *Musanga*, *Poikilospermum* and *Pourouma* are
23 often cymosely branched or repeatedly branched with the flowers gathered in capitate,
24 capitate, glomerate, globose heads, or globose clusters (Chew, 1963; Ruiters, 1976;

1 Berg, 1978; Berg & al., 1990; Chen & al., 2003). We use the term glomerule (a dense
2 cluster of sub-sessile or of small capitula) to standardize the different classifications.
3 The term spike (sessile flowers arranged along the sides of an axis) is used for *Cecropia*
4 by Berg & Rosselli (2005). The term fascicle refers to very contracted cyme, although
5 less than the glomerule (Font Quer, 1985).

6 **(m). Pistillate inflorescence architecture:** (0) cyme, (1) fasciculate, (2)
7 glomerule, (3) spike (Fig. 1 G, I, M, P; Fig. 4 A, K-L, O, Q-R). The term spike (sessile
8 flowers arranged along the sides of an axis) is used by Berg & Rosselli (2005) for
9 *Cecropia*, and Ruiter (1976) for *Myrianthus* and *Musanga*.

10 **(n). Interfloral bracts:** (0) present, (1) absent. The interfloral bracts are present in
11 some species of *Coussapoa* and were used by Berg & al. (1990) in a key identification
12 for species.

13 **(o). Number of tepals of the staminate perianth:** (0) four, (1) three, (2) two. (Fig.
14 4 G, J, P, U; Fig. 6 H-I). There is a wide range of perianth number throughout the
15 Urticaceae, and many species are polymorphic. For example, perianth number in
16 *Poikilospermum* is extremely variable within a species and ranges from four to two
17 tepals, however in *Poikilospermum* was coded the state more frequent in the species as
18 described by Chew (1963).

19 **(p). Staminate perianth connation:** (0) free to basally connate, (3) connate. (Fig.
20 4 G, J, P, U; Fig. 6 H-I). Fusion among perianth parts within a flower varies from none,
21 to basally connate (less than half the length of the perianth is fused), to connate (more
22 than half of the length of the perianth is fused).

23 **(q). Number of stamens per flower:** (0) four, (1) three, (2) two, (3) one. (Fig. 4 G,
24 J, P, U; Fig. 6 H-I).

1 **(r). Filaments:** (0) inflexed in bud, (1) straight in bud. (Fig. 4 G, J, P, U; Fig. 6 H-
2 I). The species of Cecropieae show only straight filaments in bud, while the other tribes
3 of Urticaceae present inflexed filaments that often explosively straighten at anthesis and
4 throw pollen away from the flower. In *Poikilospermum*, the subgenus *Poikilospermum*
5 shows straight filaments in bud and the subgenus *Ligulistigma* exhibit inflexed
6 filaments in bud. Berg (1978) and Chew (1963).

7 **(s). Placentation:** (0) basal, (1) lateral. (Fig. 4 M, S). The basal placentation is a
8 synapomorphy of Urticaceae. However, *Pourouma* presents placentation lateral, which
9 it might be related to evolution character for the anatropous placentation of Moraceae.
10 We consider *Pourouma* with lateral placentation as described by Gaudichaud (1830),
11 when he proposed the “Pouroumées” group (Pouroumeae tribe).

12 **(t). Seeds size:** (0) large (greater than 5 mm long), (1) small (less than 5 mm long).
13 (Fig. 1 I, P, M; Fig. 4 O, T). The seeds size was utilized by Chew (1963) to suggest the
14 transfer of the microspermous genera (*Cecropia*, *Coussapoa*, *Musanga*, and
15 *Poikilospermum*) to the Urticaceae and to leave the megaspermous genera *Pourouma*
16 and *Myrianthus* in the Moraceae.

17 **(u). Myrmecophily:** (0) absent, (1) present (Fig. 1 C). *Cecropia* provide both
18 housing and food for ants. The principal food rewards, Müllerian bodies (MB), are
19 ovoid structures rich in glycogen and containing a small amount of protein (Rickson,
20 1976). MB are produced on hairy platforms termed trichilia, which appear at the bases
21 of leaf petioles at species-specific stages in the development of *Cecropia* seedlings and
22 saplings (O'Dowd, 1982; Davidson & Fisher, 1991). *Pourouma myrmecophila* presents
23 domatia at the base of the petioles, which are used as shelter for ants. In both cases, the
24 ants provide protection against herbivory.

1 **Table 1.** Comparison of the major distinguishing characteristics of currently recognized genera of Cecropieae and four other genera/ tribes of Urticaceae.

Tribe/genus	Cecropieae					Boehmerieae	Elatostemateae	Parietarieae	Urticeae
Characters	<i>Cecropia</i>	<i>Coussapoa</i>	<i>Musanga</i>	<i>Myrianthus</i>	<i>Pourouma</i>	<i>Boehmeria</i>	<i>Pilea</i>	<i>Parietaria</i>	<i>Poikilospermum</i>
Growth habit	tree	hemi-epiphyte or tree	tree	tree	tree	herb or shrub	herb	herb	hemi-epiphyte
Number of vessels per square (mm)	1-3	1-6	1-3	1-6	1-6	5-22	8-15	8-15	5-9
Vessel elements	lignified	lignified	lignified	lignified	lignified	unlignified	unlignified	unlignified	unlignified
Wood fibres	monomorphic	monomorphic	monomorphic	monomorphic	monomorphic	dimorphic	dimorphic	dimorphic	dimorphic
Stipule adnation	amplexicaul	amplexicaul	amplexicaul	amplexicaul	amplexicaul	not amplexicaul	not amplexicaul	not amplexicaul	not amplexicaul
Stipular scars	horizontal	ascending	horizontal	horizontal	horizontal	inconspicuous	inconspicuous	inconspicuous	inconspicuous
Leaf insertion	peltate	not peltate	peltate	not peltate	not peltate	not peltate	not peltate	not peltate	not peltate
Lamina	palmatilobed	entire	palmatilobed	palmatilobed	entire or palmatilobed	entire	entire	entire	entire
Mineral concretion	silicon- accumulation	silicon- accumulation	silicon- accumulation	silicon- accumulation	silicon- accumulation	cystoliths	cystoliths	cystoliths	cystoliths
Breeding system	dioecious	dioecious	dioecious	dioecious	dioecious	monoecious	monoecious	monoecious	dioecious
Spathes	present	absent	absent	absent	absent	absent	absent	absent	absent
Staminate inflorescence architecture	spike	glomerule	glomerule	glomerule	fascicle glomerule	or fascicle or cyme	fascicle or cyme	cyme	glomerule
Pistillate inflorescence architecture	spike	glomerule	spike	glomerule	cyme	cyme	cyme	cyme	cyme

Table 1. Continued

Tribe/genus	Cecropieae					Boehmerieae		Elatostemateae	Parietarieae	Urticeae
Characters	<i>Cecropia</i>	<i>Coussapoa</i>	<i>Musanga</i>	<i>Myrianthus</i>	<i>Pourouma</i>	<i>Boehmeria</i>		<i>Pilea</i>	<i>Parietaria</i>	<i>Poikilospermum</i>
Interfloral bracts	absent	present	absent	absent	absent	absent		absent	absent	present
Number of tepals of the staminate perianth	two	three or rarely four	two	four or sometimes two	four or sometimes three	four		four	four	four or sometimes two
Staminate perianth connation	connate	connate	connate	free to basally connate	free to basally connate or connate	free to basally connate		free to basally connate	free to basally connate	free to basally connate or connate
Number of stamens per flower	two	three or rarely two	one	four or sometimes three	four or sometimes two	four		four	four	four or sometimes two
Filaments	straight in bud	straight in bud	straight in bud	straight in bud	straight in bud	inflexed in bud		inflexed in bud	inflexed in bud	inflexed in bud or straight in bud
Placentation	basal	basal	basal	basal	lateral	basal		basal	basal	basal
Seeds size	microspermous	microspermous	microspermous	megaspermous	megaspermous	microspermous		microspermous	microspermous	microspermous
Myrmecophily	present or absent	absent	absent	absent	absent or present	absent		absent	absent	absent
Number of Species	61	48	2	7	43 (see chapter 2)	80		250	20	20
Distribution	Neotropical	Neotropical (except Antilles)	Afrotropical	Afrotropical	Neotropical (except Antilles and Argentina)	pantropical		pantropical	pantropical	tropical Asia

1 **Table 2.** Best-fitting models and parameter values for separate each marker and combined plastid (pt) + nuclear (nr) markers datasets in this study.

2

Base frequencies	Markers	<i>ptpsbA-trnH</i>	nr26S	nr <i>FA16180b</i>	Combined pt + nr
A		0.3279	0.2077	0.3016	0.2791
C		0.2627	0.2628	0.1875	0.2377
G		0.2254	0.3457	0.1964	0.2558
T		0.1840	0.1838	0.3145	0.2274
Substitution model (rate matrix)					
A-C		1.0762	0.9767	0.8465	0.8672
A-G		3.8274	1.7107	1.5213	1.4531
A-T		1.9278	1.7249	1.9278	2.4818
C-G		0.1232	0.6245	0.9932	0.9849
C-T		2.7374	5.4071	3.4376	3.5583
G-T		1.0000	1.0000	1.0000	1.0000
Model selected (AIC)		GTR + G	GTR + I + G	GTR + G	GTR + I + G

3

4

1 **Table 3.** Number of accessions sequenced for each marker and combined plastid (pt) + nuclear (nr) markers, character statistics, tree statistics for the maximum
 2 parsimony (MP) analyses.

3

Parameters	Markers	<i>ptpsbA-trnH</i>	nr26S	<i>nrFA16180b</i>	Combined	
					nuclear	all combined
Number of accessions (ingroup/outgroup)		42 (38/4)	42 (38/4)	42 (38/4)	42 (38/4)	42 (38/4)
Number of characters (bp)		649	1001	372	1373	2022
Variable characters (%)		487 (64.2)	314 (31.4)	92 (24.7)	406 (29.6)	893 (44.1)
Parsimony informative characters (%)		386 (59.5)	267 (26.7)	78 (21)	345 (25.1)	731 (36)
Number of MP trees		1108	1655	668	2925	5917
MP tree length		1212	2512	974	1984	3230
Consistency index		0.5123	0.4961	0.4762	0.4861	0.4949
Retention index		0.7979	0.8357	0.8584	0.8470	0.8406

4

Chapter 2

Revision of *Pourouma* (Urticaceae)

For submission to the journal *Systematic Botany Monographs*

REVISION OF POUROUMA (URTICACEAE)André Luiz Gaglioti² and Sergio Romaniuc-Neto¹

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Abstract. *Pourouma* is a monophyletic lineage included in the tribe Cecropieae (Urticaceae). The genus is neotropical comprising 43 species. The greatest diversity of species occurs within the Amazon region, mainly in lowland tropical moist forest. It is characterized by dioecious trees, often with stilt-roots, leaves in spirals, entire or palmatilobed, stipules fused, fully amplexicaul, inflorescences in axillary, paired pleiochasia, pistillate perianth urceolate and achenes enclosed by the enlarged, fleshy perianth at maturity, with a persistent stigma. Based on taxonomic divergences between the specialist of the group and molecular analyses results (Chapter 1), we proposed this revision. We analyzed all protologue and types and more than 6,000 materials of national and international herbaria, for comparison of morphological characters, together with voucher samples acquired from multiple field trips. The nomenclature was reviewed of each taxon. Full synonymies and descriptions are provided as well as keys. Each species is illustrated and mapped. Conservation assessments are provided for each species, according to IUCN (2014). The work resulted in 43 species: *P. acuminata*, *P. amacayacuensis* *, ***P. apaporiensis***, ***P. apiculata***, *P. bergii* *, *P. bicolor*, *P. bolivarensis*, *P. cecropiifolia*, ***P. chocoana***, *P. cordata*, *P. cucura*, *P. cuspidata*, ***P. digitata***, *P. elliptica*, ***P. essequiboensis***, *P. ferruginea*, *P. floccosa*, *P. formicarum*, *P. guianensis*, *P. herrerensis*, *P. hirsutipetiolata*, ***P. hispida***, ***P. maroniensis***, *P. melinonii*, *P. minor*, *P. mollis*, *P. montana*, *P. myrmecophila*, *P. napoensis*, *P. oraria*, *P. ovata*,

P. persecta *, *P. petiolulata*, *P. phaeotricha*, *P. saulensis*, ***P. scobina***, *P. stipulacea*, ***P. tessmannii***, *P. tomentosa*, ***P. triloba***, *P. velutina*, ***P. venezuelensis***, *P. villosa*, of which one new status (*P. persecta*), two new species (with *) and 11 species re-established (in bold).

INTRODUCTION

Pourouma Aubl. is a neotropical genus including 43 species. The genus is restricted to the Neotropics where it is most frequently encountered in tropical moist forest in South and Central America. It is absent at the Lesser and Greater Antilles.

The genus comprises dioecious trees, often with stilt-roots, leafy twigs not fistulous, releasing a watery exudate when cut, the exudates turning black on exposure to the air, entire to palmatilobed leaves born in spirals, fully amplexicaul, axillary inflorescences usually comprising a pleiochasia (compound cyme), pistillate perianth urceolate and achenes enclosed by the enlarged, fleshy perianth at maturity, with a persistent stigma.

The greatest diversity of species occurs within Amazon region, mainly in lowland tropical moist forest. Most of *Pourouma* species are associated with “terra firme” (non-inundated) secondary forest at elevations up to 1000 m. Some species, e.g. *P. guianensis* Aubl., are psapidaioneer and commonly found in areas disturbed of the forest. Others species, e.g. *P. elliptica* Standl., are only found in undisturbed forest (Gaglioti & Romaniuc-Neto 2014b; Gaglioti & Romaniuc-Neto 2014c).

For presenting intermediate morphological characters between Moraceae and Urticaceae, *Pourouma* has been classified in four families: Artocarpeae Lam. & DC. (Trécul 1847), Cecropiaceae C.C. Berg (Berg 1978; Cronquist 1988; Thorne 1992), Moraceae Gaudich.(Engler

1889; Chew 1963; Romaniuc-Neto 1999) and Urticaceae Juss. (Jussieu 1789; Dumortier 1829; Gaudichaud 1830; Corner 1962); two subfamilies: Conocephaloideae Engl. (Engler 1889) and Cecropioideae (Romaniuc-Neto 1999); and three tribes: Cecropieae Dumort. (Dumortier 1829); Pouroumeae Gaudich. (Gaudichaud 1830), Artocarpeae *proprie* (Miquel 1853).

However, phylogenetic studies (Sytsma et al. 2002; Datwyler & Weiblen 2004; Zerega et al. 2005; Hadiyah et al. 2008; Clement & Weiblen 2009; APG III 2009; Wu et al. 2013) reinforce that the genera traditionally recognized in Cecropiaceae (*Cecropia* Loefl., *Coussapoa* Aubl., *Musanga* R. Br., *Myrianthus* P. Beauv., *Poikilospermum* Zipp. ex Miq. and *Pourouma*) are included in Urticaceae, forming a monophyletic family. Nevertheless, the systematic position of *Pourouma* in Urticaceae was contested by Conn & Hadiyah (2009), which it was considered not evaluated in molecular analyses.

The genus is taxonomically problematic, especially due to ten combinations (subspecies) and some synonyms proposed by Berg and Heusden (1988). In this work, the authors do not discuss about these combinations or synonyms, creating taxonomic divergences between the specialist of the group. For example, of 13 binomials of *Pourouma* described by Cuatrecasas, a specialist of the group, Berg and Heusden (1988) proposed that 11 are synonyms or subspecies. This fact reflects a the divergences of opinion on the delimitation of taxa.

The article of Berg and Heusden (1988) was used as base for the Flora Neotropica of *Pourouma* (Berg et al. 1990), creating these taxonomic difficulties. In the introduction, Berg et al. (1990) remarked about the difficulties of this treatment: “The lack of sufficient field work must be deemed a great disadvantage in the preparation of the present revision, especially with regard to the variation in the leaves.” These authors recognized 25 species and 12 subspecies of *Pourouma* for the Neotropical region.

Based on taxonomic divergences between the specialist of the group and molecular analyses results (Chapter 1), we proposed this revision.

MATERIAL AND METHODS

Taxonomical and morphological analysis. This revision is primarily based on approximately 6200 herbarium specimens, including 507 types materials. All the protologues of 109 binomials of *Pourouma* were revised. The bibliographies about morphology, anatomy, ethnobotany, physiology, phytochemical and ecology about *Pourouma*, were also analyzed. We visited (in bold) and/or requested herbarium materials for 43 herbaria (AAU, **ALCB**, B, BG, **BM**, BOTU, CAY, **COAH**, **COL**, **CUVC**, **ESA**, **F**, **GUA**, **EAFM**, **HAMAB**, HEPH, **HRCB**, **HUEFS**, HUT, **IAC**, IBGE, **INPA**, **K**, **M**, **MEDEL**, **MBM**, **MIN**, **MIRR**, **MO**, **P**, **PMSP**, QCA, **R**, **RB**, **SP**, **SPF**, **SPSF**, U, **UEC**, **UFACPZ**, **UPCB**, US, VEN).

Seventeen field trips to Benjamin Constant, Belém, Bertioga, Boa Vista, Manaus, Macapá, Novo Airão, Presidente Figueiredo, Rio Branco, Rio de Janeiro, São Paulo, Serra do Navio, Senador Guimard, Tepequém (Brazil), Bogotá, Leticia (Colombia), Santa Rosa (Peru) yielded 110 herbarium specimens of *Pourouma* belonging to 15 species. These herbarium specimens were deposited in the herbarium of Instituto de Botânica (SP), Instituto Amazónico de Investigaciones Científicas SINCHI (COAH), Instituto Federal de Educação, Ciência e Tecnologia do Amazonas (EAFM), Museu Integrado de Roraima (MIRR) and University of Minnesota (MIN). The materials of *Pourouma* were also collected in silica and their sequences are part of the paper: Reconstructing the phylogeny of the tribe Cecropieae Dumort. (Urticaceae).

All herbaria materials of *Pourouma* studied in this revision were photographed and recorded in the database. The software FileMaker Pro 13.0v3 was used to create the database.

The dubious materials cited by Berg et al. (1990) were included in the last subtitle of this Chapter: “Doubtful and excluded materials cited by Berg et al. (1990)”.

The literature survey was held through consultation to Biological Abstracts, Index Kewensis, Kew Records of Taxonomic Literature (Stafleu & Cowan 1976-1988), Index Nominum Genericorum (Farr & Zijlstra 1996). Additionally, we surveyed the bibliographies cited in the work of review and consultation with the main classical works about *Pourouma* (Jussieu 1789, Gaudichaud 1830, Trécul 1847, Miquel 1853, Bureau 1873, Bentham & Hooker 1880).

The main virtual libraries were consulted, including: Archive (2014), Biodiversity (2014), Botanicus (2014), Gallica (2014), IPNI (2014), Jstor (2014), Scielo (2014), Tropicos (2014).

The abbreviations of periodicals and classic works follow Bridson & Smith (1991) and Stafleu & Cowan (1976-1988). The author names are according to Brummitt & Powell (1992).

For the morphological terminology Radford (1974), Hickey (1973), Font Quer (1975), Weberling (1989), Bell (1993), Harris & Harris (2001), Beentje (2012) and Stern (2004) were used. Moreover, we used the colour terms proposed by Beentje (2012), employing the suffix “ish” to the colour families of Beentje (2012), because of the variation in shades.

Scanning electron micrographs (SEM) were obtained from the herbaria voucher for the 43 species of *Pourouma* recognized in this revision. We selected parts of the leaves, stipules, flowers, fruits, and pollen for each species. These samples were coated with gold in a Balzers SCD050 sputter-coater and examined using a Philips v.5.21 scanning electron microscope at the Electronic Microscopy Laboratory of the Instituto de Botanica de São Paulo, Brazil.

Stereo microscope (SM) Discovery V8 Zeiss with Axiocam ERc 5s coupled was used for most part of photos of the morphological study. The Microscope Scope A1 with Axiocam ICc 3

coupled was used for some trichome photos. Moreover, the software AxioVision 4.8.2 SP1 was used to obtain the photos of the both cams. The photos performed at the Laboratory of the Nucleus of Research in Phycology of the Instituto de Botânica de São Paulo, Brazil.

The geographic distribution maps of the *Pourouma* species were georeferenced using the softwares ArcGIS, version 9.3.1 © (Esri 2008). Moreover, the collection points were obtained from herbaria collections and Global Gazetteer (2014), version 2.2.

Assessments of conservation status. Conservation status assessments have been assigned to individual species using the categories defined by the IUCN Species Survival Commission (IUCN 2014), version 11: extinct (EX), extinct in the wild (EW), critically endangered (CR), data deficient (DD) can be applied if necessary. In order to assign one of these categories, five quantitative criteria are defined (A-E), of which at least one needs to be met in order for the species to qualify as threatened. The most valuable criteria for assigning IUCN Red List categories on the basis of herbarium proved to be those relating to distribution (Criteria B). Following IUCN (2014), the software Google Earth pro 7.1.2.2041 was used to estimate the extent of occurrence of the species. Moreover, the informations from multiple field trips within Brazil, Colombia, and Peru were relevant to apply the conservation status assessments of the species of *Pourouma*.

TAXONOMIC HISTORY

The authorship of genus is attributed to Aublet (1775), who described *Pourouma guianensis*, in *Histoire des plantes de la Guiane Française* (“Française”), during his studies with plants of French Guiana. Aublet included *Pourouma* in the “Classis XXII. Dioecia; I. Monandria” of the classification system of Linnaeus (Table 1).

In 1789, Antonii Laurentii Jussieu described “Urticae” (= Urticaceae Juss.) and included *Pourouma* in the third group “Genera Urticis affinia”, together with *Coussapoa* Aubl. Based in the Jussieu’s work, Dumortier (1829) included *Pourouma* in the “Ordo Urticarieae, Famille Artocarpideae”.

Gaudichaud (1830) proposed the Pouroumeae tribe with base in *P. guianensis* and included in Urticeae (=Urticaceae).

Martius in Spix & Martius (1831) and Martius (1843) described new species for *Pourouma* (*P. bicolor* and *P. cecropiifolia*) from collections made in the Brazilian and Colombian Amazon between 1819 and 1820. Poeppig (1838) described *Pourouma palmata*, a new species from Peru.

In 1847, Trécul carried out an important taxonomic treatment for *Pourouma*. Concerning Artocarpeae family, in this work Trécul described in detail the morphology of *Pourouma* and nine new species (*P. acutiflora*, *P. aspera*, *P. digitata*, *P. jussiaeana*, *P. mollis*, *P. multifida*, *P. ovata*, *P. triloba*, and *P. villosa*). In the same year of the Trécul’s work, Klozsch described the homonymous *Pourouma triloba*, based in the pistillate collection of Ruiz & Pavon from Peru.

TABLE 1. Overview of previous suprageneric classifications, showing position of *Pourouma*

PUBLICATION	TAXONOMIC POSITION ¹	GENERA INCLUDED
Aublet (1775)	Classis XXII. Dioecia; I. Monandria	<i>Pourouma</i> Aubl.
Jussieu (1789)	Dicotyledones; Classis XV. Plantae Dicotyledones Apetalae; Ordo III. Urticae [=Urticaceae Juss.]; III. Genera Urticis affinia	<i>Pourouma</i> , <i>Coussapoa</i> Aubl., <i>Bagassa</i> Aubl., <i>Gunnera</i> L., <i>Piper</i> L., <i>Gnetum</i> L., <i>Thoa</i> Aubl.
Dumortier (1829)	Division 1. Endoxylae; Subdivision. 1. Sepalanthae; Classes 3. Torosepalae; Ordo G. Urticariae; Famille 32. Artocarpeae; Tribe 2. Artocarpeae Lam. & DC.	<i>Pourouma</i> , <i>Perebea</i> Aubl., <i>Artocarpus</i> J.R. Forst. & G. Forst.
Gaudichaud (1830)	Urticeae; 3° Urticées; Pouroumeae Gaudich.	<i>Pourouma</i> , <i>Bruea</i> Gaudich.
Trécul (1847)	Urticeae; Famille Artocarpeae, Pouroumeae	<i>Pourouma</i>
Miquel (1853)	Ordo Urticineae Miq.; Subordo Artocarpeae; Tribus I. Artocarpeae <i>proprie</i> ; VI. Subtribus. Pouroumeae	<i>Pourouma</i>
Bureau (1873)	Dicotyledoneae, Monoclamydeae, Ordo CLXXXIIIbis. Moraceae Gaudich.; Tribus I. Conocephaleae Trécul	<i>Pourouma</i> , <i>Cecropia</i> Loefl., <i>Dicranostachys</i> Trécul, <i>Myrianthus</i> P. Beauv., <i>Musanga</i> R. Br., <i>Coussapoa</i> , <i>Conocephalus</i> Blume [=Poikilospermum Zipp. ex Miq.]
Benth & Hooker (1880)	Ordo CLII. Urticaceae	<i>Pourouma</i> , <i>Cecropia</i> , <i>Myrianthus</i> , <i>Musanga</i> , <i>Coussapoa</i> , <i>Conocephalus</i> [=Poikilospermum]
Engler, H.G.A. (1889)	Moraceae; Subfamily III. Conocephaloideae	<i>Pourouma</i> , <i>Cecropia</i> , <i>Myrianthus</i> , <i>Musanga</i> , <i>Coussapoa</i> , <i>Conocephalus</i> [=Poikilospermum]
Dalla Torres & Harms (1900)	Moraceae; Subfamily. Conocephaloideae	<i>Pourouma</i> , <i>Cecropia</i> , <i>Myrianthus</i> , <i>Musanga</i> , <i>Coussapoa</i> , <i>Conocephalus</i> [=Poikilospermum]
Melchior (1964)	Moraceae; Subfamily. Conocephaloideae	<i>Pourouma</i> , <i>Cecropia</i> , <i>Myrianthus</i> , <i>Musanga</i> , <i>Coussapoa</i> , <i>Conocephalus</i>
Thorne (1968)	Moraceae; Subfamily. Conocephaloideae	<i>Pourouma</i> , <i>Cecropia</i> , <i>Myrianthus</i> , <i>Musanga</i> , <i>Coussapoa</i> , <i>Conocephalus</i> [=Poikilospermum]
Hutchinson (1969)	Moraceae; Subfamily. Conocephaloideae	<i>Pourouma</i> , <i>Cecropia</i> , <i>Myrianthus</i> , <i>Musanga</i> , <i>Coussapoa</i> , <i>Conocephalus</i> [=Poikilospermum]

TABLE 1. Continued

PUBLICATION	TAXONOMIC POSITION ¹	GENERA INCLUDED
Berg (1978)	Cecropiaceae	<i>Pourouma</i> , <i>Cecropia</i> , <i>Myrianthus</i> , <i>Musanga</i> , <i>Coussapoa</i> , <i>Poikilospermum</i>
Dalhgren (1980, 1983)	Cecropiaceae	<i>Pourouma</i> , <i>Cecropia</i> , <i>Myrianthus</i> , <i>Musanga</i> , <i>Coussapoa</i> , <i>Conocephalus Poikilospermum</i>
Takhtajan (1969, 1980)	Cecropiaceae	<i>Pourouma</i> , <i>Cecropia</i> , <i>Myrianthus</i> , <i>Musanga</i> , <i>Coussapoa</i> , <i>Conocephalus Poikilospermum</i>
Cronquist (1981, 1988)	Cecropiaceae	<i>Pourouma</i> , <i>Cecropia</i> , <i>Myrianthus</i> , <i>Musanga</i> , <i>Coussapoa</i> , <i>Conocephalus Poikilospermum</i>
Thorne (1983, 1992)	Cecropiaceae	<i>Pourouma</i> , <i>Cecropia</i> , <i>Myrianthus</i> , <i>Musanga</i> , <i>Coussapoa</i> , <i>Conocephalus Poikilospermum</i>
Romaniuc-Neto (1999)	Moraceae; Subfamily. Cecropioideae	<i>Pourouma</i> , <i>Cecropia</i> , <i>Coussapoa</i> , <i>Myrianthus</i> and <i>Musanga</i>
Conn & Hadiah (2009)	Urticaceae; Tribe Cecropieae (<i>Pourouma</i> , <i>Myrianthus</i> and <i>Musanga</i> not evaluated phylogenetically)	<i>Pourouma</i> , <i>Cecropia</i> , <i>Coussapoa</i> , <i>Myrianthus</i> and <i>Musanga</i>
APG III (2009)	Urticaceae; Tribe Cecropieae (<i>Pourouma</i> , <i>Myrianthus</i> and <i>Musanga</i> not evaluated phylogenetically)	<i>Pourouma</i> , <i>Cecropia</i> , <i>Coussapoa</i> , <i>Myrianthus</i> and <i>Musanga</i>
Chase & Reveal (2009)	Urticaceae; Tribe Cecropieae (<i>Pourouma</i> , <i>Myrianthus</i> and <i>Musanga</i> not evaluated phylogenetically)	<i>Pourouma</i> , <i>Cecropia</i> , <i>Coussapoa</i> , <i>Myrianthus</i> and <i>Musanga</i>
Wu et al. (2013)	Urticaceae; Tribe Cecropieae (<i>Pourouma</i> and <i>Musanga</i> not evaluated phylogenetically)	<i>Pourouma</i> , <i>Cecropia</i> , <i>Coussapoa</i> , <i>Myrianthus</i> and <i>Musanga</i>

The species described by Aublet, Martius, Poeppig, Trécul and Klotzsch were included in a survey of *Pourouma* by Miquel (1853) in “Flora brasiliensis”, who added six new species (*P. acuminata*, *P. heterophylla*, *P. cinerascens*, *P. tomentosa*, *P. fuliginea*, and *P. velutina*) from Martius’ collections and recognized 18 species for the South America. For the long time, Miquel’s work was the only comprehensive taxonomic treatment for the Neotropical region.

The works about the flora of Neotropical region carried out along of the 20th century added 55 binomials for *Pourouma*. From among these works are: Ule (1907) for the Brazil; Rusby (1910, 1927) for the Bolivia; Benoist (1922, 1924) for the Central and South America; Mildbraed (1927, 1928) for the South America; Macbride (1930) for the Peru; Ducke (1932, 1947) for the Brazil; Standley (1937a, 1937b, 1939, 1940) for the South America; Cuatrecasas (1951, 1954, 1956a, 1956b, 1956c, 1967) for the Colombia and Venezuela; Woodson and Schery (1960) for the Panama; Burger (1973) for the Costa Rica; Berg and Kooy (1982) for the Guiana region; Berg (1989) for the Peru; Berg (1990) for the Ecuador.

Engler (1889) included *Pourouma* and five related genera (*Cecropia* Loefl., *Coussapoa*, *Musanga* R. Br., *Myrianthus* P. Beauv., and *Conocephalus* Blume [= *Poikilospermum* Zipp. ex Miq.]) in the subfamily Conocephaloidea Engl. of Moraceae Gaudich. As from Engler’s work, many authors considered *Pourouma* within Moraceae, until 1978, when Berg proposed Cecropiaceae family, synonymizing Conocephaloidea.

Berg and Heusden (1988) proposed 10 new combinations (subspecies) and synonymized 51 binomials of *Pourouma*, recognizing 23 species and 12 subspecies for *Pourouma*. This work was used by Berg et al. (1990) as base for the Flora Neotropica of *Pourouma*, which the author recognized 25 species and 12 subspecies. Furthermore, Berg et al. (1990) indicated five “unnamed collections”, three of them were described in Berg & Rosseli (1993) and Berg (2004).

The most recent reviews of the genus were undertaken by Berg & Rosseli (1993), Berg (2004) and Gaglioti & Romaniuc (2014a, 2014b) added more six binomials for *Pourouma*.

In 1978, Berg proposed Cecropiaceae family, based in the studies of Corner (1962) and Chew (1963), synonymizing Conocephaloidea of Engler. Berg pointing as diagnostic characters of Cecropiaceae the ovule basal or subbasal, (sub)orthotropous, style unbranched, straight stamens bud, occasionally inflexos, but without explosive dehiscence and habit arboreal.

Along of the classification systems, *Pourouma* has been classified has been classified in four families: Artocarpeae Lam. & DC. (Trécul 1847), Cecropiaceae C.C. Berg (Berg 1978; Cronquist 1988; Thorne 1992), Moraceae Gaudich. (Engler 1889; Chew 1963; Romaniuc-Neto 1999), and Urticaceae Juss. (Jussieu 1789; Dumortier 1829; Gaudichaud 1830; Corner 1962); two subfamilies: Conocephaloideae Engl. (Engler 1889) and Cecropioideae (Romaniuc-Neto 1999); and three tribes: Cecropieae Dumort. (Dumortier 1829); Pouroumeae Gaudich. (Gaudichaud 1830), Artocarpeae *proprie* (Miquel 1853).

However, phylogenetic studies (Sytsma et al. 2002; Datwyler & Weiblen 2004; Zerega et al. 2005; Hadijah et al. 2008; Monro 2006; Clement & Weiblen 2009; APG III 2009; Wu et al. 2013) reinforce that *Pourouma* and genera traditionally recognized in Cecropiaceae (*Cecropia* Loefl., *Coussapoa* Aubl., *Musanga* R. Br., *Myrianthus* P. Beauv., *Poikilospermum* Zipp. ex Miq., and *Pourouma*) are included in Urticaceae, forming a monophyletic family.

From a phylogenetic standpoint, only one terminal of *Pourouma* (without specific epithet) was sequenced by Datwyler & Weiblen (2004). Nevertheless, the systematic position of *Pourouma* in Urticaceae was contested by Conn & Hadijah (2009), which it was considered not evaluated in molecular analyses.

Our results of analyses of the regions plastid *psbA-trnH* and nuclear 26S and *FAI6180b*, through of the maximum parsimony, maximum likelihood and Bayesian method, provided a

strong support (bootstrap percentage [BP] = 98, posterior probability [PP] = 1.00 to the monophyly of *Pourouma* included in Urticaceae, within of the Cecropieae tribe (Chapter 1, Fig. 2, Fig. 5).

During the present revision, we noticed that many herbarium materials cited by Berg et al. (1990) were dubious. In many cases, it was not possible to identify these materials, even using the identification key proposed by the authors. These materials were mainly juvenil sterile (e.g., Berg et al. 1143, NY), fragments sterile (e.g., Gleason, 174, NY), or dubious sterile (*Gentry et al.* 39264, BG, MO). Theses materials were included in the last subtitle of this Chapter: “Doubtful and excluded materials cited by Berg et al. (1990)”.

We consider a misconception the ten combinations (subspecies) and some synonyms proposed by Berg and Heusden (1988), because these are distinct in morphological plasticity, geographic distribution and ecology amplitudes (see comments of species). Additionally, the molecular analyses (Chapter 1) do not support the proposition of some subspecies for *Pourouma*.

MORPHOLOGY

Habit. *Pourouma* are trees, often with stilt roots from up to 1.5 m tall in the lower part of the trunk (Fig. 1 A-B, D). *P. cecropiifolia*, *P. ovata*, *P. guianensis* e *P. hirsutipetiolata* might have the trunk become buttressed. *P. guianensis*, *P. minor* and *P. scobina* can reach up to 40 m tall, while most of the species range from 10 to 35 m tall. *P. formicarum* has low height up to 10 m high. Most of the species shows the d.b.h. (diameter at breast height) ranging 10 to 40 cm diameter.

Aublet (1775) was the first that describes the habit in *Pourouma*. He described tree with sixty feet, two feet or more in diameter, ash-colored, smooth bark, rather compact, brittle and whitish wood. Architectural patterns of *Pourouma* follow the model of Aubreville (Hallé & Oldeman 1970; Hallé et al. 1978), with monopodial trunk, growing rhythmically and branches plagiotropic by apposition (Fig. 1 A-B). Branch development is often initiated in seedlings, even in the axils of the first formed opposite leaves. Sanchez et al. (2005) studied the germination and seedling development in *P. cecropiifolia*. These authors classified *P. cecropiifolia* with hypogeal germination. Most of the juvenile trees have the trunk unbranched, with the leaves attached to the trunk (Fig. 1 E). In the adult trees, the first branching occurs ranging 3 m (e.g., *P. cecropiifolia*, Fig. 1 A) up to 20 m (e.g., *P. minor*) height. The branches are often caducous, leaving a scar on the trunk. They are usually thicker in species with palmatilobed leaves than in species with entire leaves. Leafy twigs, branches and sometimes the trunk have annular scars of the caducous stipules (Fig. 1 C). The bark can be mostly smooth, lenticellate or striate (Fig. 2 F). We used the term leafy twigs for the branches with leaves.

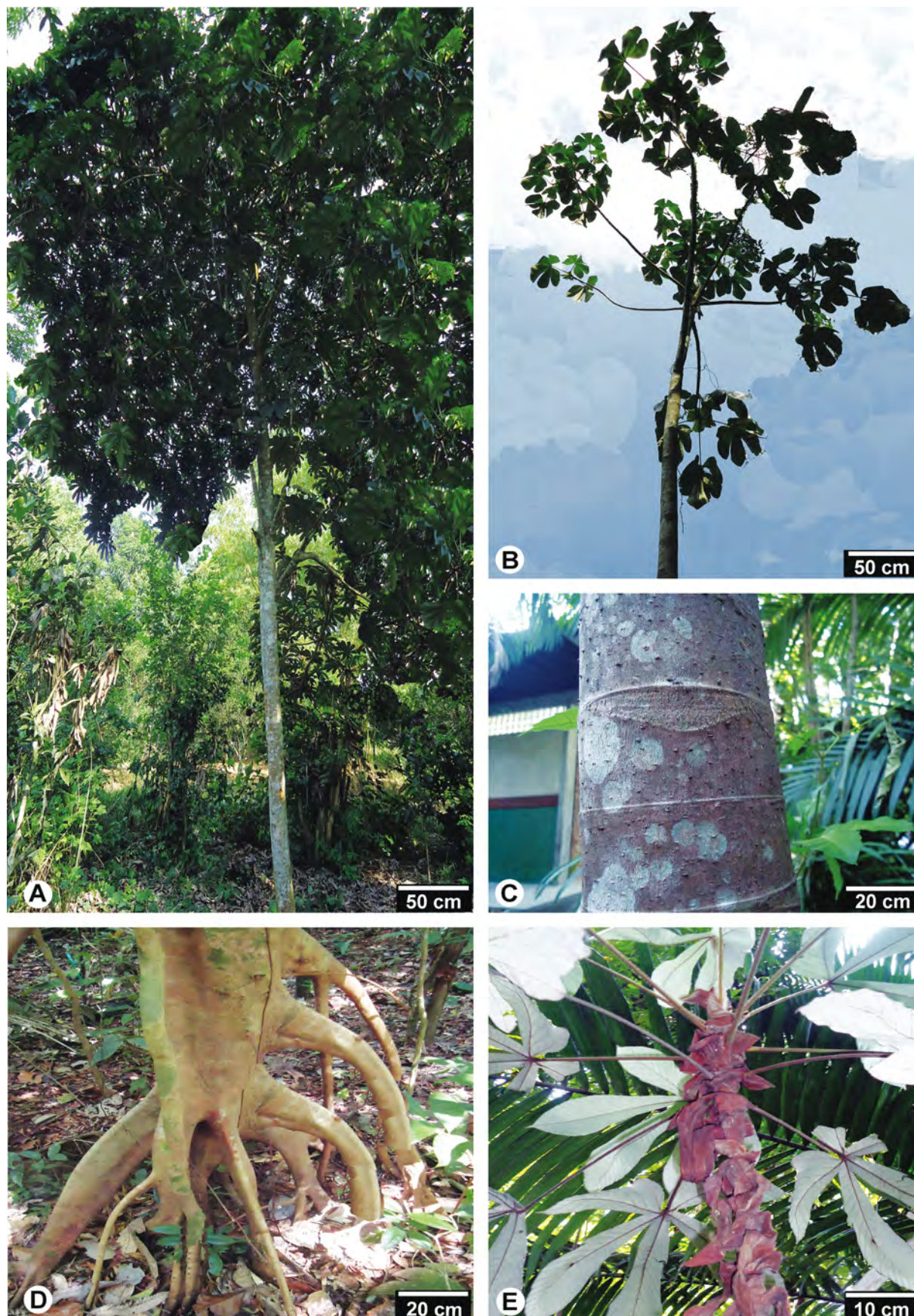


FIG. 1. A. Habit of *Pourouma cecropiifolia* (Gaglioti & Pederneiras 149, SP). B. Habit of *P. guianensis* (Gaglioti et al. 163, SP). C. Scars of caducous branches and annular scars of the caducous stipules of *P. tomentosa* (Gaglioti & Pederneiras 136, SP). D. Stilt roots of *P. bicolor* (Gaglioti et al. 162, SP). E. Juvenile tree of *Pourouma villosa* with the leaves attached to the trunk. Photos: A.L. Gaglioti.

The length of the internodes varies. In young plants, the internodes are long (usually more than 30 mm), however the internodes become short (4-35 mm long) in adult trees, especially in the distal parts of the branches. The internodes are not fistulous, showing usually lenticels, sometimes covered by the indument.

The wood anatomical characters were studied by Renner (1907), Tippo (1938), Bosen & Welle (1983) and Welle et al. (1992). Bosen & Welle (1983) suggested the morphological proximity between *Cecropia-Musanga* group and the *Coussapoa-Myrianthus* group, with *Pourouma* overlapping both groups.

Latex and phytochemistry. Sytsma et al. (2002) showed the latex as a synapomorphy of Moraceae, Urticaceae and Cecropiaceae. These authors also indicated that the laticifers restricted the bark as a synapomorphy of Urticaceae and Cecropiaceae. Bosen & Welle (1983) and Welle et al. (1992) reported radial latex tube in *Pourouma*.

The latex in *Pourouma*, as well as others genera of Cecropieae, is mostly watery and almost translucent, turning black at exposure to the air (Fig. 2 A, C, D). Most parts, like young branches, petioles, and peduncles, exude latex, when cut. However, the color and consistency sometimes is variable, according to the species and life stage. In *P. guianensis* and *P. mollis* the latex may be mucilaginous and yellowish (Fig. 2 B), in *P. bicolor* may be reddish and in juvenile specimens of *P. essequiboensis* can be whitish (Fig. 2 E).

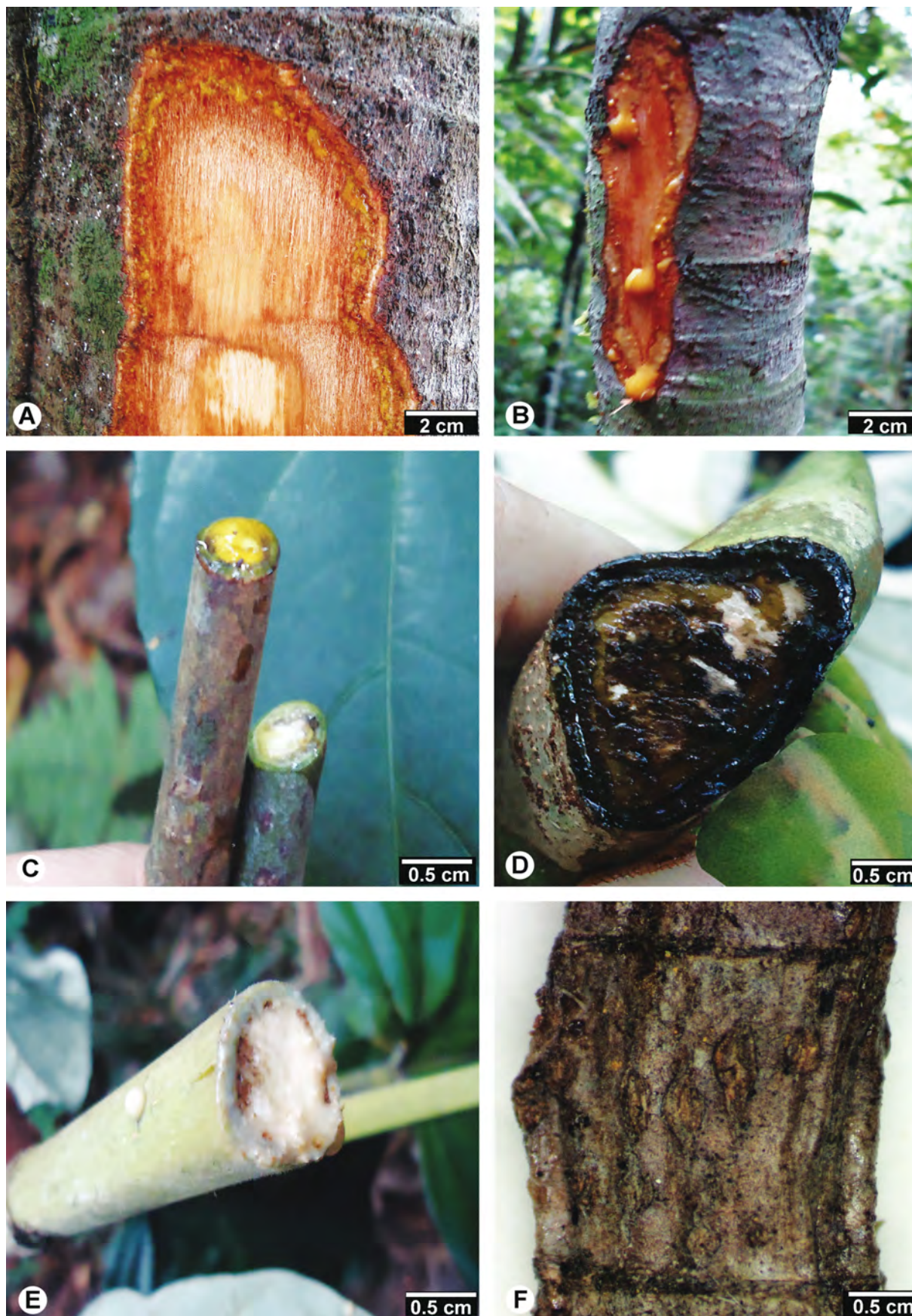


FIG. 2. A. Latex of *Pourouma guianensis* (Gaglioti & Pederneiras 163, SP). B. Latex of *P. mollis* (Gaglioti & Pederneiras 119, SP). C. Latex of *P. minor* (Gaglioti et al. 160, SP). D. Latex of *P. cecropiifolia* (Gaglioti & Pederneira 130, SP). E. Latex of *P. essequiboensis* (Gaglioti & Pederneiras 137, SP). F. Lenticels and annular scars of the caducous stipules of *P. ovata* (Gaglioti & Pederneiras 144, SP). Photos: A.L. Gaglioti.

Lopez (1997) is the most comprehensive thesis on the phytochemistry of *Pourouma*. This author commented that the peculiar odor of *Pourouma guianensis* is derived from methyl salicylate, main component of essential oils extracted from leaves, bark, pistillate flowers and green fruits. This odor is commonly described on the labels of herbarium materials as bengué, balsam, spearmint and winter-green. All species collected show this peculiar odor, which is similar to the menthol for us. In some species (e.g., *P. bicolor* and *P. villosa*) the odor is weak, however in other species (e.g., *P. cecropiifolia*, *P. guianensis*, and *P. myrmecophila*) the odor is more remarkable. The odor is most pronounced in the bark and branches, when cut, nevertheless is also presented in other parts of the plant (e.g., leaves and flowers).

Other studies important on the phytochemistry of *Pourouma* are Lopes et al. (1999), Lopes et al. (1999b), Torres-Santos (2004), Barrios et al. (2010), Guio et al. (2010) and Lopez-Lutz et al. (2010).

Trichomes and indument. All trichomes of species studied here, are simple, unbranched, uniseriate, and unicellular (Fig. 3 A-F; Fig. 4 A-F; Fig. 5 A-B) or multicellular (Fig. 5 C-F). This morphological character was used extensively in taxonomic studies of *Pourouma* for distinguishing species groups. Most part of the authors of *Pourouma* species (e.g., Trécul 1847; Miquel 1853; Cuatrecasas 1956; Berg et al. 1993) attributed the epithet, basing in the type of indument (e.g., *P. villosa*; Fig. 4 B).

The first taxonomic confusion in the genus, might be attributed to the indument. Aublet (1775: 892) described *Pourouma guianensis* (type species of the genus) with the adaxial surface of the lamina as smooth "laevis", although the holotype presents adaxial lamina surface scabrous. This morphological character was found for all specimens of *P. guianensis* studied.

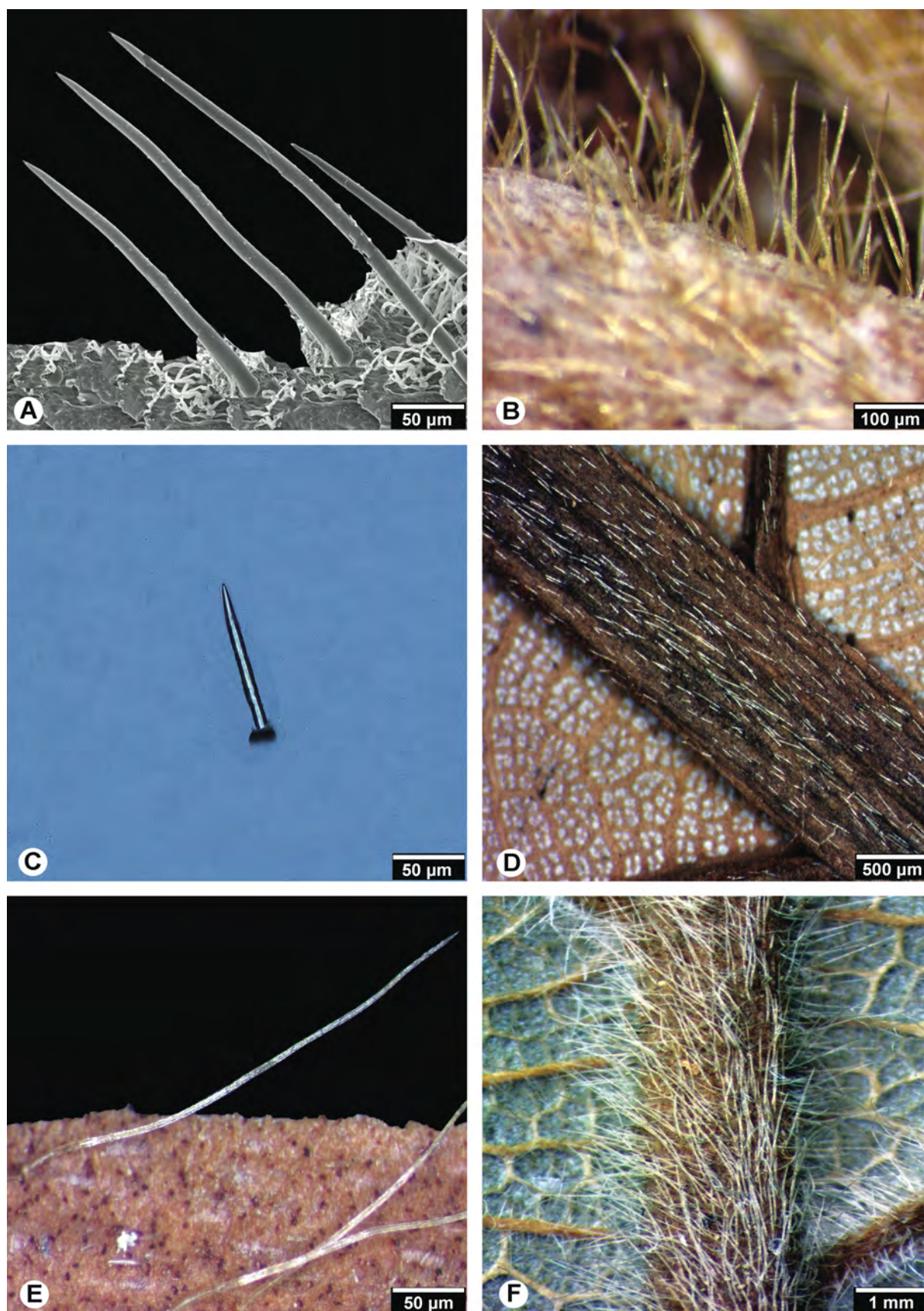


FIG. 3. Scanning electron micrographs (SEM) and stereomicroscope photos of the trichomes and induments of *Pourouma*. A. SEM of acicular trichomes of *P. hispida* (Cuatrecasas 14881, F). B. Hispid indument on the peduncle of *P. hispida* (Cuatrecasas 14881, F). C. Subulate trichome of *P. velutina* (Gaglioti & Pederneiras 128, SP). D. Sericeous indument on the primary vein of *P. bicolor* (Gaglioti et al. 175, SP). E. Attenuate trichomes of *P. hirsutipetiululata* (Callejas et al. 8574, NY). F. Hirsute indument on the primary veins of *P. guianensis* (Gaglioti et al. 163). Photos: A.L. Gaglioti.

Berg et al. (1990) recognized only three types of trichomes: multicellular trichomes, unicellular arachnoid (cobwebby) trichomes and unicellular non-arachnoid. Nevertheless, this classification does not reflect the diversity of the type of indument. According to Payne (1978), we could recognize seven trichome types:

1. Acicular (Fig. 3 A): which is unicellular, having the shape of a needle, ranging 100 μm to 700 μm long. This is stiff sharp, often yellowish, patent, occurring usually in species with hispid indument (e.g., *P. hispida*; Fig. 3 B). It may be easily penetrate and irritate the skin.

2. Subulate (Fig. 3 C): which is unicellular, having awl-shaped, tapering from a broad or thick base to a sharp point, ranging 50 μm to 400 μm long. It may be appressed or patent, soft, straight, shiny or non-shiny, and whitish or yellowish, appearing often in species with sericeous (e.g., *P. bicolor*; Fig. 3 D) or velutinous (e.g., *P. velutina*; Fig.) indument.

3. Attenuate (Fig. 3 E): which is unicellular, developing a long gradual taper, ranging 300 μm to 1 cm long. It is long, patent, rather than stiff, more and less straight, and often yellowish, arising mostly in species with hirsute indument (e.g., *P. guianensis*; Fig. 3 F).

4. Uncinate (Fig. 4 A): which is unicellular, forming hooked at the tip, ranging 30 μm to 1.5 cm long. This may be long or short, soft, more and less patent, often curly, and yellowish or whitish, occurring frequently in species with villous indument (e.g., *P. villosa*; Fig. 4 B).

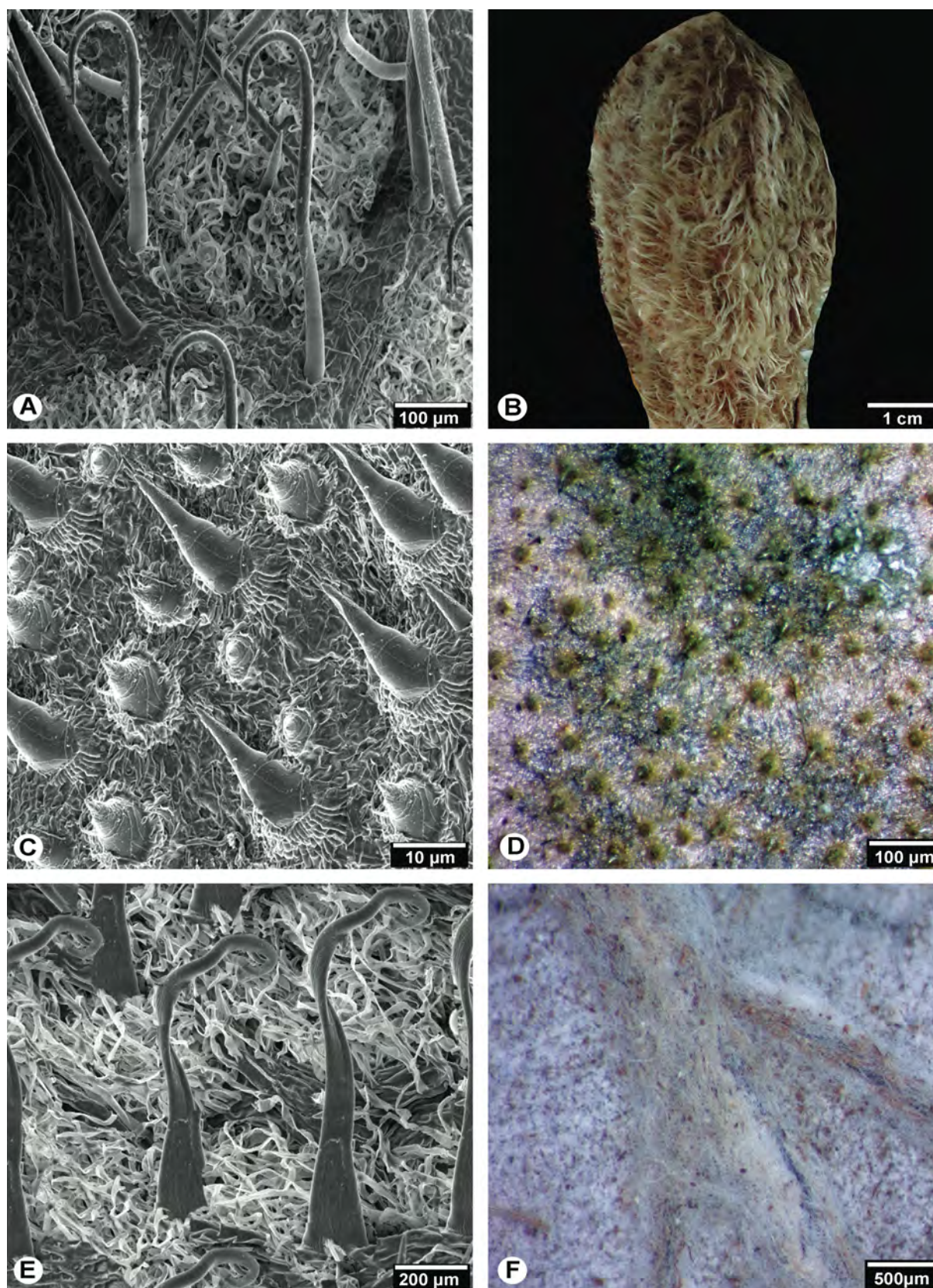


FIG. 4. Scanning electron micrographs (SEM) and stereomicroscope photos of the trichomes and induments of *Pourouma*. A. SEM of unciniate trichomes of *P. vilosa* (Gaglioti et al. 162, SP). B. Villous indument of stipule outside (Gaglioti et al. 162, SP). C. SEM of unciniate trichomes of ornithorhynchous of *P. guianensis* (Gaglioti et al. 163, SP). D. Strigose indument of the adaxial lamina surface of *P. guianensis* (Gaglioti et al. 163, SP). E. SEM of aduncate trichomes of *P. tomentosa* (Gaglioti & Pederneiras 136, SP). F. Arachnoid indument of the abaxial lamina surface of *P. tomentosa* (Gaglioti & Pederneiras 136, SP). Photos: A.L. Gaglioti.

5. Ornithorhynchous (Fig. 4 C): which is unicellular, having a shaped as a bird's bill, ranging 20 μm to 100 μm long. This is short, stiff, usually with swollen bases, appressed, and mostly found in species with indument strigose (e.g., *P. guianensis*; Fig. 4 D).

6. Aduncate (Fig. 4 E): which is unicellular, long, very thin, usually interwoven, crooked, twisted, bent, and hooked, ranging 100 μm to more than 2 cm long when completely developed. It occurs in all *Pourouma* species with arachnoid indument (e.g., *P. tomentosa*; Fig. 4 F), which it was inadequately named as “arachnoid or cobwebby hairs” by many authors (e.g., Berg et al. 1990). Dense covers of arachnoid indument are common on the stipules, the petiole and lower surfaces of the lamina, producing whitish surfaces (Fig. 4 F; 5 A), or sometimes the whitish, arachnoid indument is confined to the areoles of the abaxial lamina surface (e.g., *P. scobina*, Fig. 5 C). In some species, the arachnoid indument is brownish (e.g., *P. amacayacuensis*; Fig. 5 B). These whitish surfaces might have originated the name of the genus (see below etymology).

7. Multicellular trichomes (Fig. 5 C-D): these are often moliniform or more and less globular, ranging 20 μm to 400 μm long. They are mostly brownish to dark brownish or sometimes reddish or vinaceous (e.g., *P. ferruginea*; Fig. 5 F), commonly found at young parts. The moliniform shows regular constrictions, thus resembling a string beads or necklace. In dry material, the multicellular trichomes are usually manifested as a powdery layer, which are mostly found in species with floccose indument (e.g., *P. floccosa*; Fig. 5 E).

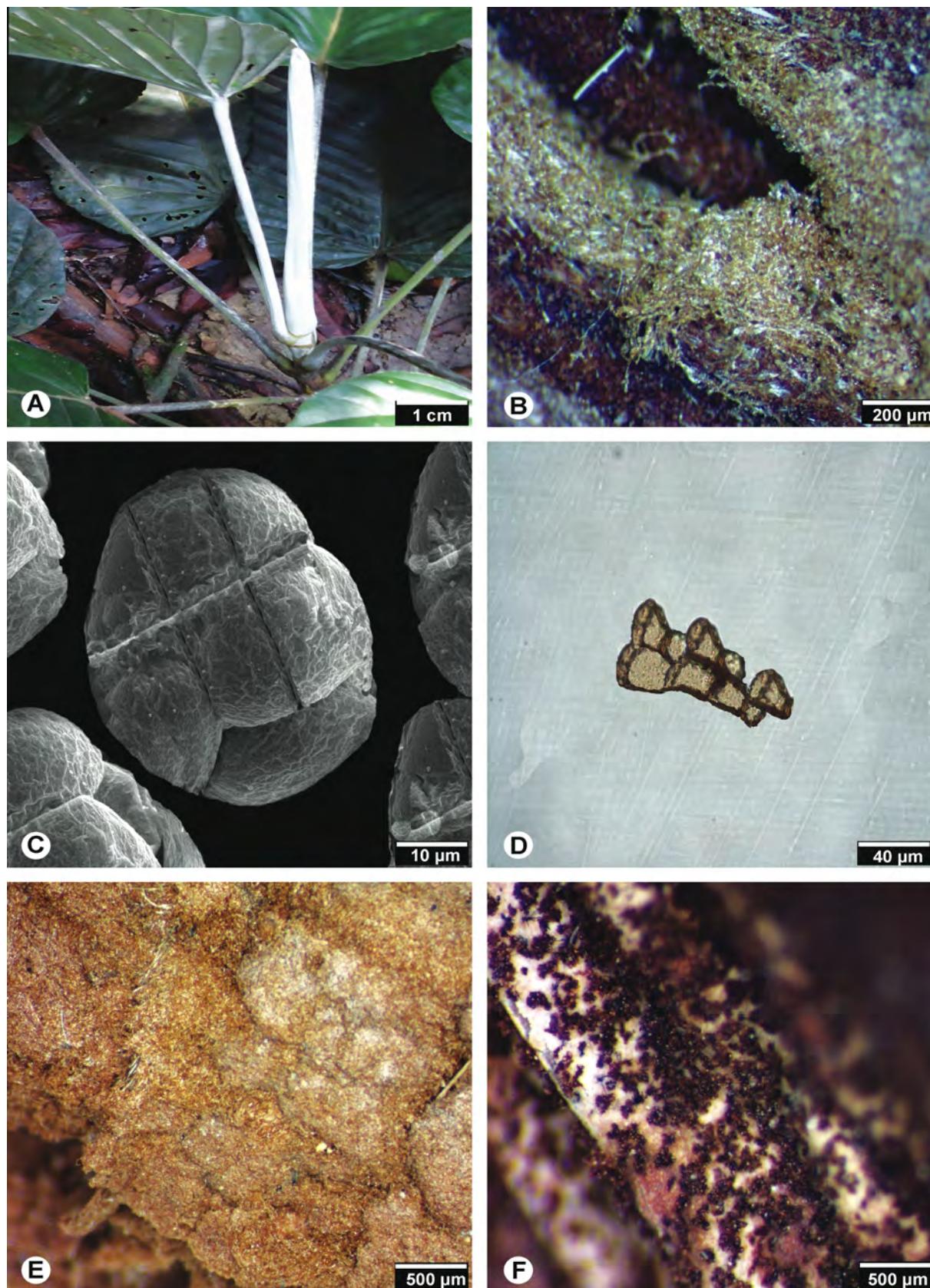


FIG. 5. Scanning electron micrographs (SEM) and stereomicroscope photos of the trichomes and induments of *Pourouma*. A. Arachnoid indument on the stipule outside of *P. tomentosa* (Gaglioti & Pederneiras 136, SP). B. Arachnoid indument on the veins of the abaxial surface lamina of *P. amacayacuensis* (J. S. B. Silva et al. 2162, SP). C. SEM of Multicellular trichomes of *P. chocoana* (Killip & A.C. Smith 35095, F). D. Multicellular trichomes of *P. chocoana* (Killip & A.C. Smith 35095, F). E. Floccose indument on the leafy twig of *P. floccosa* (Cerón et al. 8349, MO). F. Multicellular trichomes on the leafy twig of *P. ferruginea* (Krukoff 8807, NY). Photos: A.L. Gaglioti.

Leaves. The leaves are simple and alternate, with entire (Fig. 6 A-B) or palmatilobed lamina (Fig. 6 C-E). The palmatilobed lamina can be palmatifid (incised reaching about the middle of the distance between margin and radiation point primary veins; Fig. 6 C), palmatipartite (incised reaching more than half of the distance between the margin and radiation point veins, but without reaching the radiation point primary veins; Fig. 6 D), or palmatisect (incised reaching radiation point veins; Fig. 6 E), according to the incision length of the lamina.

According to Font Quer (1985), the term “segment” was used to the division of palmatisect lamina and “lobe” for division of palmatifid and palmatipartite lamina. *P. bergii*, *P. persecta* and *P. petiolulata* belong to group of species with the lamina palmatisect and often with segments pseudo-petiolule. The term “pseudo-petiolule” is a slim portion proximal of the lamina, with narrow or an almost inconspicuous edge, that resembles a petiolule, but isn’t articulate (Fig. 6 E). The types of lamina leaf of *Pourouma* is shown in Fig. 6 A-E.

Most of the juvenile trees have the leaves larger than the adult trees. The number of lobes in species with palmatilobed lamina is larger in juvenile trees, also. The lengths of the lamina leaves are varied, ranging 2.5 cm (e.g., *P. minor*) up to 63 cm (e.g., *P. stipulacea*) long. Palmatilobed lamina is commonly larger than entire lamina.

The lamina can be coriaceous or chartaceous. Adaxial and abaxial lamina surface can be scabrous to scabridulous or smooth. This scabrous to scabridulous surfaces are mostly associated to the strigose to strigulose indument, and they are important for distinguishing species groups.

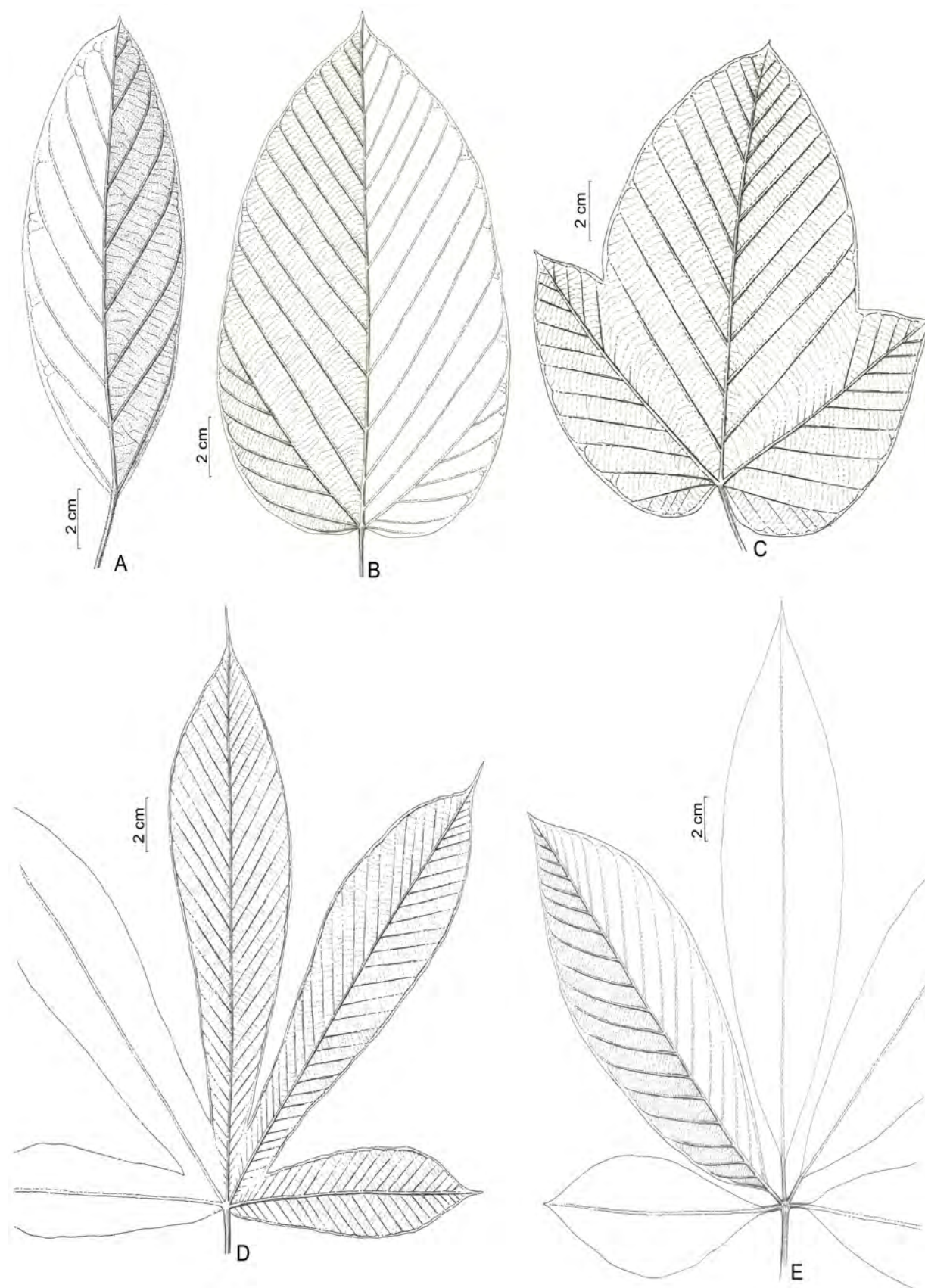


FIG. 6. Types of lamina leaf, abaxial surface of *Pourouma*. A. Lamina entire with basal pair of secondary veins unbranched (*P. phaeotricha* from Grandez *et al.* 1759, MO). B. Lamina entire with basal pair of secondary veins branched (*P. hirsutipetiolata* from Bruijn 1547, US). C. Lamina palmatifid (*P. villosa* from Granville 8093, MO). D. Lamina palmatipartite (*P. triloba* from Díaz *et al.* 8292, F). E. Lamina palmatisect (*P. bergii* from Vásquez & Jaramillo 2809, MO).

Thirteen species (*P. acuminata*, *P. amacayacuensis*, *P. bolivarensis*, *P. cordata*, *P. elliptica*, *P. formicarum*, *P. floccosa*, *P. hirsutipetiolata*, *P. minor*, *P. ovata*, *P. phaeotricha*, *P. tomentosa* and *P. velutina*) have only entire lamina (Fig. 6 A-B). They are mostly ovate to elliptic, and sometimes oblong to obovate. Some species (*P. cecropiifolia*, *P. cuspidata*, *P. digitata*, *P. myrmecophila*, *P. napoensis*, *P. oraria*, *P. stipulacea* and *P. villosa*) display always palmatilobed lamina in adult specimens (Fig. 6 C-E). Other species (*P. apiculata*, *P. bicolor*, *P. cucura*, *P. essequiboensis*, *P. herrerensis*, *P. ferruginea*, *P. guianensis*, *P. hispida*, *P. maroniensis*, *P. mollis*, *P. melinonii* and *P. tessmannii*) presented heterophyllous, with entire and palmatilobed lamina in adult specimens.

We observed that species with heterophyllous (e.g., *P. guianensis*, *P. mollis*) show often more palmatilobed lamina in the top tier of the trees and more entire lamina in the lower tier. The flowering branches have usually entire lamina. Kincaid et al. (1998) verified that the leaf variation in *P. tomentosa* subsp. *maroniensis* (= *P. maroniensis*) was correlated with the position of leaf in the plant and phenology.

The margin of the entire lamina is usually repand (Fig. 6 A-B), or palmatifid (Fig. 6 C-E) in the palmatilobed lamina. It has often trichomes appressed or patent. The base of the entire lamina is often obtuse to rounded to truncate, or sometimes acute to cuneate (e.g., *P. formicarum*) or cordate (e.g., *P. cordata*). In palmatilobed lamina, the base is mostly cordate to deeply cordate, sometimes with overlapping lobes (e.g., *P. oraria*).

Based on the concepts Hickey (1973) and Radford et al. (1974), we used the terms pinnate for entire leaves with a single primary vein (midvein) serving as the origin for the higher order venation; actinodromous for entire leaves with two or more primary veins diverging radially from a single point; and palmately veined for palmatilobed leaves with three or more primary veins arising from a common point (Fig. 6 C-E). Pinnate leaves in *Pourouma* are brochidodromous

(Fig. 6 A-B). The term lateral veins was applied when is not possible distinguish primary and secondary veins, mostly for basal pair of veins.

Sanchez et al. (2005) classified the cotyledons of *P. cecropiifolia* as chriptocotilar. The protophylls are opposite, petiolate, pinnately veneid, and margin lobed. The two arrays of opposite leaves are succeeded by leaves organized in alternate insertion, usually in spiral. The development of the palmatilobed lamina is associated with the transition from the pinnate to the actinodromous veins. Lobation is correlated with a change in venation. Initially one or two basal lateral veins, become stronger. The midribs of these lobes depart from the bases of the primary basal lateral veins. The increase in number of lobes or segments is caused by successive formation of branches from the base pair of basal veins in basipetal direction. Most part of species with palmatilobed lamina has three (e.g., *P. tessmannii*, Fig. 75 A-B) to seven (e.g., *P. scobina*, Fig. 72 A-C) lobes, while in some species (eg, *P. cecropiifolia*, Fig. 33 A) the palmatilobed lamina may have up to eleven lobes.

The lengths of the petioles are varied, ranging 1 cm (e.g., *P. formicarum*, Fig. 47 A-B) up to 65 cm (e.g., *P. stipulacea*) long. In species with palmatilobed lamina, the petioles are usually longer than in species with entire lamina. Benson (1985) described domatia at the base of the petiole of *P. heterophylla* (= *P. myrmecophila*; misidentification) with colonization of *Allomerus* ants. We observed domatia at the base of the petiole only in *P. myrmecophila* (Fig. 7 A) and *P. formicarum* (Fig. 47 A-B). These species are myrmecophilous.

Stipules. The stipules in *Pourouma* are terminals, fully amplexicaul and fused. These are often caducous (Fig. 7 D-E) or in some species persistent (e.g. *P. villosa*; Fig. 7 C). They are varied, ranging 2 cm (e.g., *P. phaeotricha*; Fig. 70 A-D) up to 20 cm long (e.g., *P. cecropiifolia*; Fig. 7 D).



FIG. 7. A. Domatia at the base of the petiole (white arrow) of *Pourouma myrmecophila* (Gaglioti et al. 168, SP). B. Base of the petiole without domatia and annular scar of stipule of *P. tomentosa* (Gaglioti & Pederneiras 136, SP). C. Stipules persistent (white arrow) of *P. villosa* (Gaglioti & Pederneiras 136, SP). D. Stipule caducous of *P. cecropiifolia* (Gaglioti & Pederneira 149, SP). E. Stipule outside of *P. bicolor* (Gaglioti et al. 175, SP). F. Stipule inside of *P. bicolor* (Gaglioti et al. 175, SP). Photos: A.L. Gaglioti.

The stipules enclosed (protect) one pair of young inflorescences (when fertile), one young leaf and terminal bud. They leave a horizontal annular scar, when caducous (Fig. 7 B;). The size of the stipules and type of indument inside and outside (Fig. 7 E-F) provide important characters for of group species delimitation.

Inflorescences. The inflorescences are cymose, comprising usually a compound cyme of the pleiochasium type (Fig. 8 A-C; Fig. 10 A; Fig. 11 A). They occur in pairs in the leaf axils (Fig. 8 A, C; Fig. 11 A). The peduncle bears often at its apex three branches, a dichotomous pattern branching in secondary and further branches.

The bracts are mostly early caducous and therefore, and are not observed in herbarium material. These were observed in many species (e.g., *P. guianensis*) at the base of the peduncle, mostly in young inflorescence. They vary in length from 2–10 mm long.

The branching pattern of pistillate inflorescence is often more reduced than in the staminate flower. In some species (e.g., *P. elliptica*; Fig. 40 D), there is a reduction of the number of branches in the pistillate inflorescence, resulting in a cyme or dichasium. The development of the inflorescences and flowers begin within the stipules. The flower inserted in the bifurcation of the secondary branches is usually caducous before of the stipules opening.

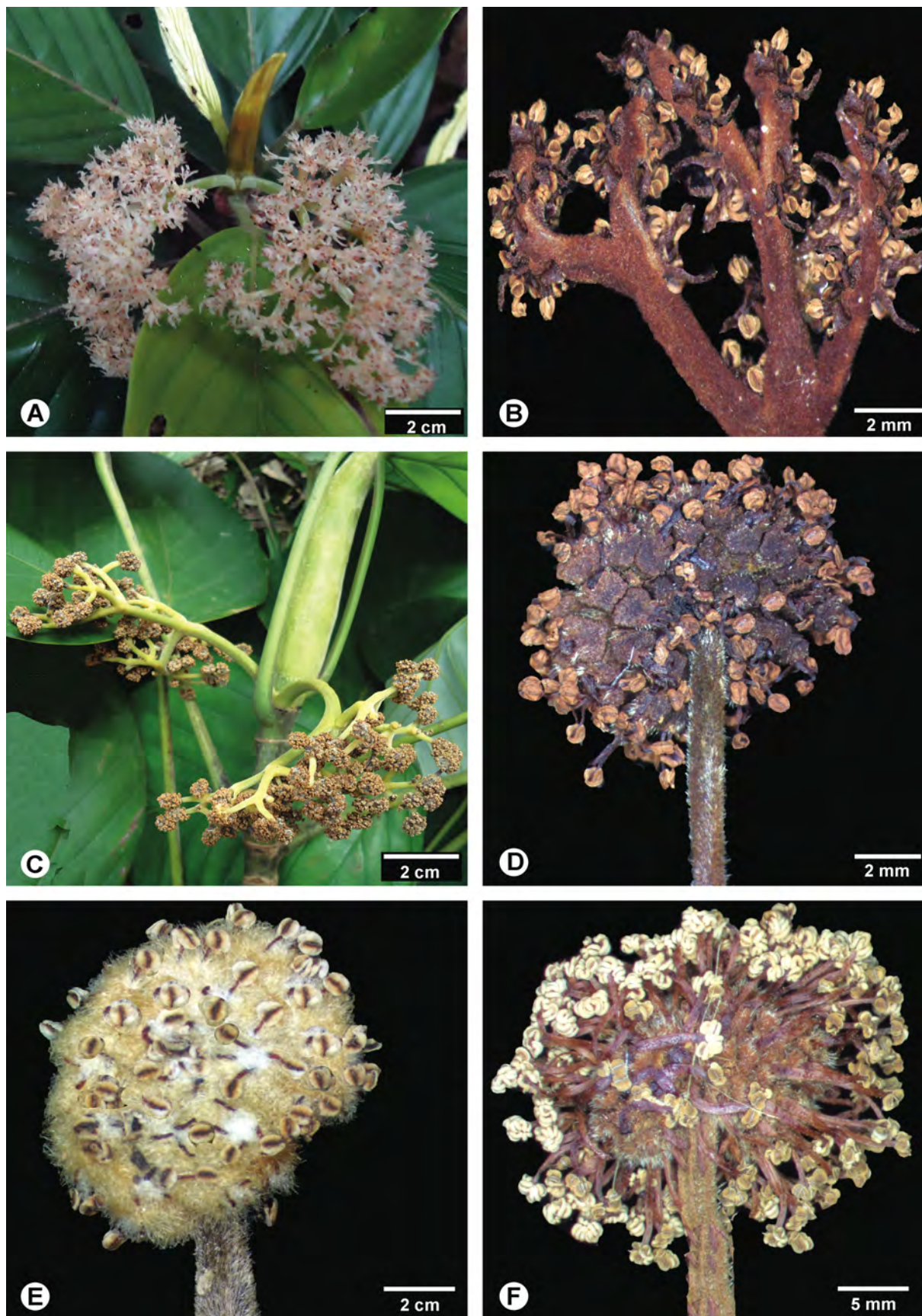


FIG. 8. A. Staminate inflorescence in fascicles of *Pourouma minor* (Gaglioti *et al.* 160, SP). B. Part of staminate inflorescence in fascicles of *P. scobina* (Tonduz 12930, F). C. Staminate inflorescence in glomerules of *P. mollis* (Gaglioti & Pederneiras 121, SP). D. Part of staminate inflorescence in glomerule of *P. triloba* (Prance *et al.* 7907, INPA). E. Part of staminate inflorescence in glomerule of *P. herrerensis* (Spichiger & Loizeau 1995 [=3034], F). F. Part of staminate inflorescence in glomerule of *P. napoensis* (Palacios 1874, MO). Photos: A.L. Gaglioti.

Staminate inflorescences. The staminate inflorescences may have up to 2,150 flowers (e.g., *P. napoensis*). The pattern branching shows up to seven times of dichotomous branches. The primary branching has 2–4 branches. The length of the inflorescence is varied, ranging 4 cm up to 32 cm (e.g., *P. oraria*; Fig. 65 F) long. The coloring of staminate inflorescence is mostly yellowish to brownish.

The clusters of flowers may be confined to the ultimate branches or may extend to more proximal branches. The flowers can be organized in glomerule (globose heads; Fig. 8 C-F), resembling the inflorescences of *Coussapoa* or in fascicle (clusters diffusely distributed along of the branches, Fig. 8 A-B), resembling the inflorescences of *Myrianthus*. According to Font Quer (1985), the term fascicle represents a very contracted cyme inflorescence, but less than in glomerule. The staminate inflorescences may have up to 294 glomerules (e.g., *P. oraria*) or up to 106 fascicles (e.g., *P. guianensis*). We consider each branch with flowers as one fascicle or one glomerule.

The number of flowers and size of glomerules or fascicles are important for delimitation of species. For example, the glomerules of *P. napoensis* measure up to 1.5 cm in diameter and may have up to 75 flowers (Fig. 8 F) and up to, whereas in *P. oraria* measure up to 3.5 mm in diameter and may have up to 10 flowers. The flowers organized in glomerules often show tepals connate (e.g., *P. herrerensis*, Fig. 8 E), whereas flowers organized in fascicles usually display tepals almost free or basally connate (e.g., *P. guianensis*; Fig. 8 B). We consider the fascicles plesiomorphic in relation to the glomerules.

Pistillate inflorescences and infructescences. The size of the inflorescence, number of flowers and indument are important characters for species delimitation. The pistillate inflorescence may have up to 185 flowers (e.g., *P. cecropiifolia*; Fig 11 D - infructescence). Some species (e.g., *P. velutina*) have up to 12 flowers per inflorescence. Falcão & Lleras (1980) estimated the number of flowers per tree of *Pourouma cecropiifolia* ranging between 4,500 and 14,000 with high fruit set (91%).

The pattern branching shows up to five times of dichotomous branches. The primary branching 2–4 branches, or rarely unbranched (e.g., *P. minor*). *P. ferruginea* has the largest inflorescence in length, measuring up to 25 cm long and up to 72 cm in the infructescence (Fig. 45 A).

The development of the inflorescence begins within the stipule and the transition to infructescence is tenuous, occurring outside the stipule. In many cases, there are inflorescence and infructescence in the same branch, and then the inflorescences are closer to the apex of the branches or within the stipules. The infructescences are often larger than the inflorescences, sometimes up to three times larger. The indument of inflorescences is quite varied and often denser on the ultimate branches.

Staminate Flowers. The staminate flowers of *Pourouma* show more variation than the pistillate flowers and provide important characters for delimitation of species. Most part of the species, the staminate flowers measure up to 3 mm long, however in *P. apaporiensis* and *P. napoensis* may have up to 6 mm long (Fig. 9 E). The flowers are often sessile or sometimes pedicellate. Perianth is tetramerous, or sometimes trimerous (Fig. 9 A-B). The tepals are free to connate in the base (e.g., *P. scobina*; Fig. 9 A), or almost completely connate and then they form an urceolate (e.g., *P. essequiboensis*; Fig. 9 C) or infundibuliform perianth (e.g., *P. bergii*; Fig. 9 D).

The stamens are mostly four per flower and shorter than perianth in the species with tepals free to connate in the base (e.g., *P. scobina*; Fig. 9 A), or longer than perianth in the species with connate tepals (Fig. 9 C-D). Reduction in number of stamens was observed in few species (e.g., *P. bergii*; Fig. 9 D). The anthers are mostly introrse, and the filaments are flat or thickened. The filaments of the flowers of *P. apaporiensis* and *P. napoensis* are fully connate. The connation of the perianth and filaments in some species (e.g., *P. apaporiensis*; Fig. 9 E) resembles the flowers of *Coussapoa*. The indument of the perianth is quite varied, in some cases; the tepals are wholly covered of trichomes (e.g., *P. herrerensis*; Fig. 8 E). The flower with tepals free to basally connate might be plesiomorphic in relation to tepals connate.

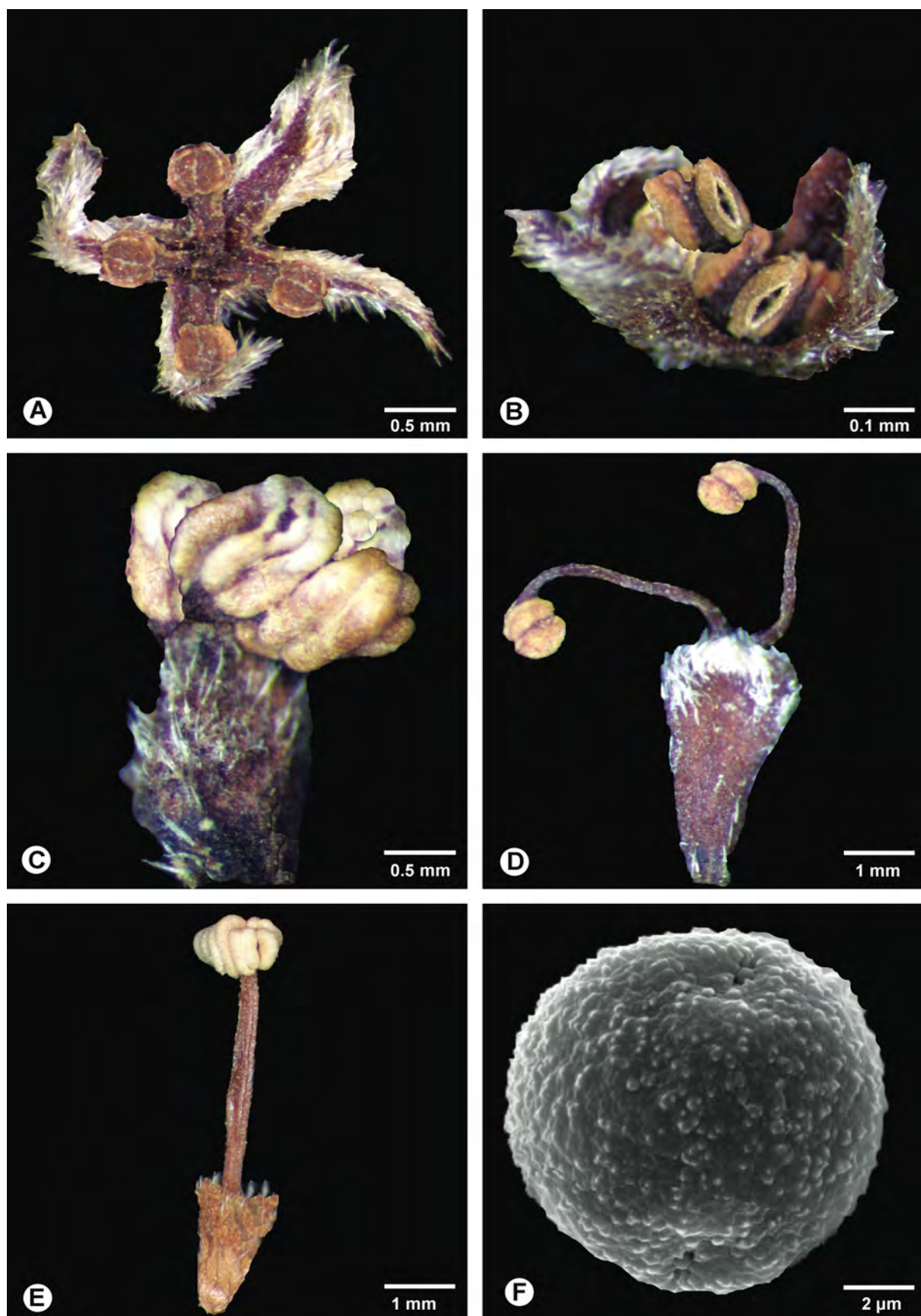


FIG. 9. A. Staminate flower with tepals free or basally connate of *Pourouma scobina* (Lent 3547, F). B. Staminate flower with tepals free or basally connate of *P. chocoana* (Gentry et al. 6679, MO). C. Staminate flower with perianth urceolate of *P. essequiboensis* (Smith 2731, F). D. Staminate flower with perianth infundibuliform of *P. bergii* (Aulestia et al. 745, MO). E. Staminate flower with perianth infundibuliform and filaments connate of *P. apaporiensis* (Defler 371, MO). F. Pollen of *P. guianensis* (Gaglioti & Pederneiras 150, SP). Photos: A.L. Gaglioti.

Pollen. The pollen of *Pourouma* is stenopollinic, diporate, spheroidal and about 10–12.5 μm diameter (Fig. 9 F). Pollen is released from the staminate inflorescences when they are moved or touched. Pollen grains of *Pourouma acutiflora* [= *P. guianensis*] were described by Barth (1975, 1976, 1984) as smaller size (12.5 μm), spheroidal, with bilateral symmetry, diporate and surface spinulate. Burn et al. (2008, 2010) described pollen grains of *Pourouma guianensis* and *P. minor* as smaller size (12.5 μm), isopolar, spheroidal, prolate, diporate and coarsely scabrate. *Pourouma* pollen found in sediments play a role in palaeoecological studies revealing changes in vegetation and climate (Leyden 1984; Burn et al. 2008, 2010).

Pistillate Flowers. The pistillate flower shows variation usually in the type of indument and in the stigma (Fig. 10 A-F; Fig. 11 A). The flowers are pedicelate. The perianth is urceolate, measuring about 2 to 5 mm long and usually covered of indument; the tepals are fused with faintly lobed margin. The ovary is free from the perianth. The style is attached to the ovary apically. The ovule shows lateral placentation (Fig. 10 F; Fig. 11 F). The lateral placentation maybe reveals an evolution of character between Urticaceae (basal placentation) and Moraceae (apical placentation). The short style bears a stigma that can be peltate, bilobed or multilobed, with shape oblate to globose (e.g., *P. minor*, Fig. 10 B). The stigma presents sometimes yellowish (Fig. 10 A) or brownish to vinaceous, multicellular trichomes (Fig. 10 B-F). The arachnoid indument is often found covering the flowers of some species (e.g., *P. maroniensis*, Fig. 10 D).

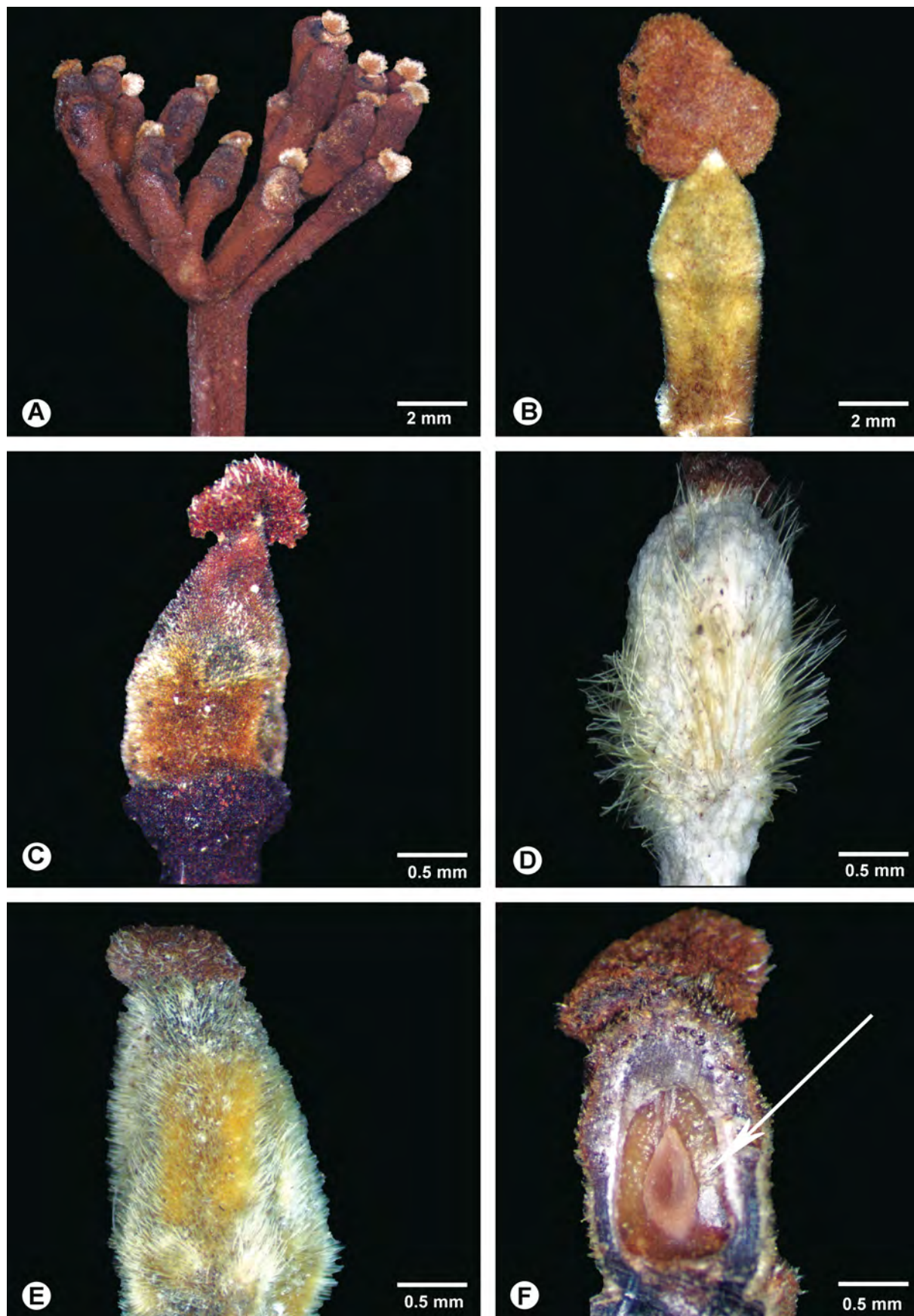


FIG. 10. A. Part of the pistillate inflorescence of *Pourouma digitata* (Allen 6401, F). B. Pistillate flower of *P. minor* (Krukoff 5282, F). C. Pistillate flower of *P. cucura* (Garcia-Barriga 14106, US). D. Pistillate flower of *P. maroniensis* (Riera 1972, NY). E. Pistillate flower of *P. mollis* (Gaglioti et al. 165, SP). F. Longitudinal section of pistillate flower and ovule with lateral placentation of *P. bicolor* (Gaglioti et al. 175, SP). Photos: A.L. Gaglioti.



FIG. 11. A. Pistillate inflorescence of *Pourouma mollis* (Gaglioti et al. 165, SP). B. Infructescences of *P. bicolor* (Gaglioti & Pederneiras 141, SP). C. Infructescence of *P. ovata* (Gaglioti & Pederneiras 144, SP). D. Infructescence of *P. cecropiifolia* (Gaglioti & Pederneiras 131, SP). E. Achene of *P. cecropiifolia* (Gaglioti & Pederneiras 131, SP). F. Longitudinal section of perianth fruiting, achene and seed (white arrow) of *P. bicolor* (Gaglioti et al. 165, SP). Photos: A.L. Gaglioti.

Fruits. The fruits are achenes with perianth enclosed fleshy in the maturation. They are often ellipsoid (e.g., *P. maroniensis*; Fig. 15 E) to ovoid (e.g., *P. digitata*; Fig. 14 A), globose (e.g., *P. ferruginea*; Fig. 14 D) or oblate (e.g., *P. ovata*; Fig. 17 A). The pericarp is crustaceous to woody, glabrous, smooth and dry (Fig. 11 E). The color of the pericarp varies from light brownish to dark brown. The term fruiting perianth is widely used (e.g., Berg et al. 1990; Gaglioti & Romaniuc 2014a; Gaglioti & Romaniuc 2014b) for designated the perianth fleshy and swell during the maturation of the fruit. Diversity of shapes, sizes and indument of fruiting perianth are important for the delimitation of species or group of species, therefore we have illustrated all species (Figs. 12–18 A-Rr). The fruiting perianth is greenish (when immature; Fig. 11 B-D) to vinaceous or black (when mature; Fig. 11 B-D) in outer layer. The inner layer of the fruiting perianth becomes soft, sweetish and whitish to greenish (Fig. 11 F). These are usually aromatic with smell of methyl salicylate. Fruiting perianth in the most part of species have up to 2.5 cm long, however in *Pourouma cecropiifolia* may has up to 3.8 cm long (Fig. 11 D; Fig. 13 B).

Previous studies suggested a possible relationship between *Pourouma* and *Myrianthus* within this group based on shared megaspermum with seeds greater than 5 mm long (Trécul 1847; Engler 1889; Corner 1962; Chew 1963; Berg 1978). Based on reconstruction of morphological characters evolution in Cecropieae (Chapter 1, Fig. 3) this morphology character might have been a key innovation triggering species diversification in this lineage.

Seeds. The seeds are often reniform, ovoid, globose or ellipsoid (when immature) and glabrous. The testa is very thin and brownish. The color of the seed varies from purplish, vinaceous to brownish (Fig. 11 F). Sanchez et al. (2005) described the seeds of *P. cecropiifolia* as recalcitrant. Also, the authors performed studies about germination. The embryo is straight and the radicle is short.



FIG. 12. Stereomicroscope photos of the perianths fruiting and pedicels of *Pourouma*. A. *P. acuminata* (Krukoff 8427, F). B. *P. amacayacuensis* (J. S. B. Silva et al. 2162, SP). C. *P. apaporiensis* (Fonnegra et al. 1879, MO). D. *P. apiculata* (Spruce 2865, F). E. *P. bergii* (Vásquez et al. 809, MO). F. *P. bicolor* (Gaglioti & Pederneiras 141, SP). Photos: A.L. Gaglioti.

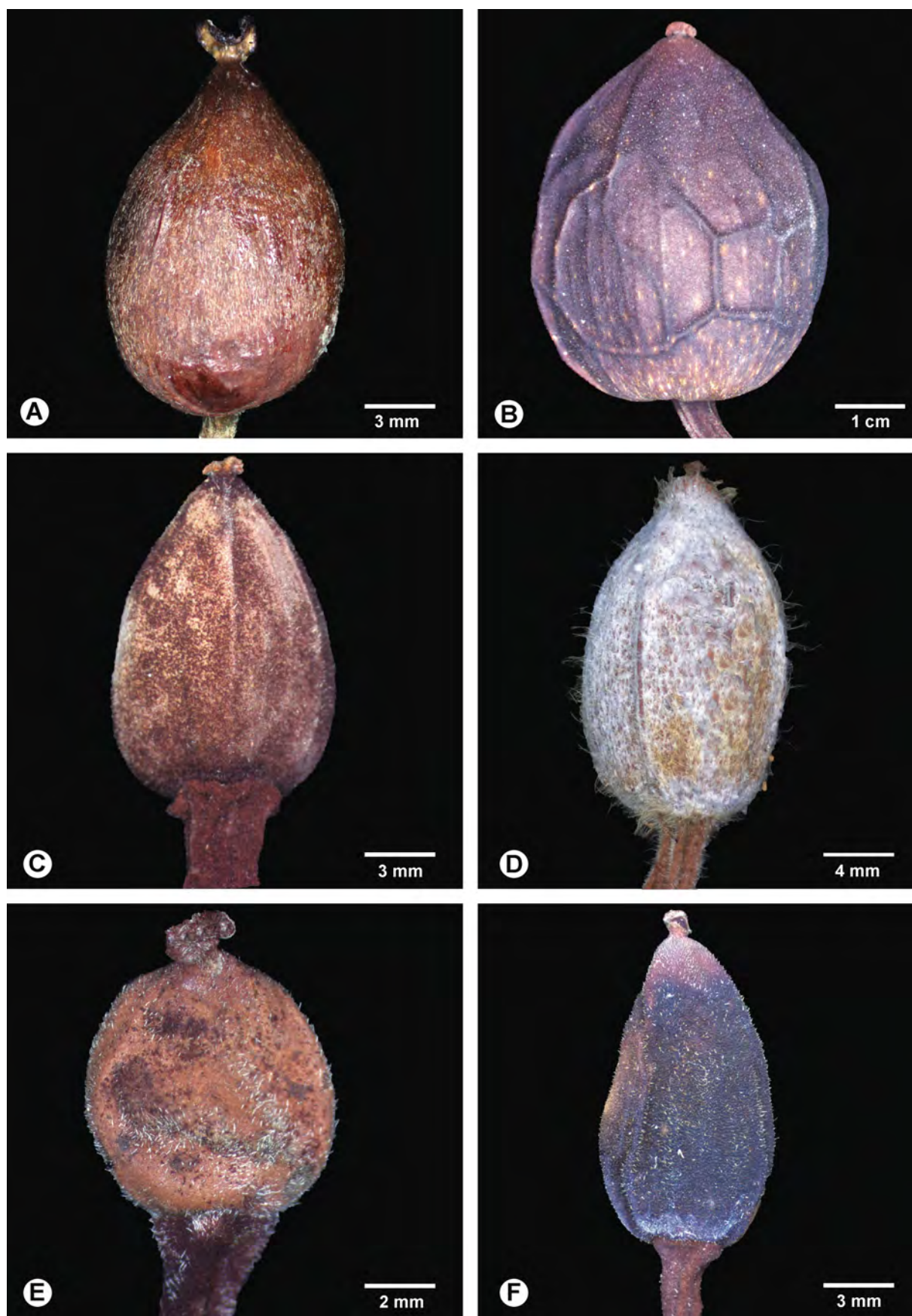


FIG. 13. Stereomicroscope photos of the perianths fruiting and pedicels of *Pourouma*. A. *P. bolivarensis* (Steyermark et al. 92936, NY). B. *P. cecropiifolia* (Lao M. & Ramirez TM-1446, F). C. *P. chocoana* (Johnston 1714, MO). D. *P. cordata* (N. Jaramillo et al. 1284, MO). E. *P. cucura* (Garcia-Barriga 14106, US). F. *P. cuspidata* (E. L. Little Jr. & R. R. Little 9527, F). Photos: A.L. Gaglioti.

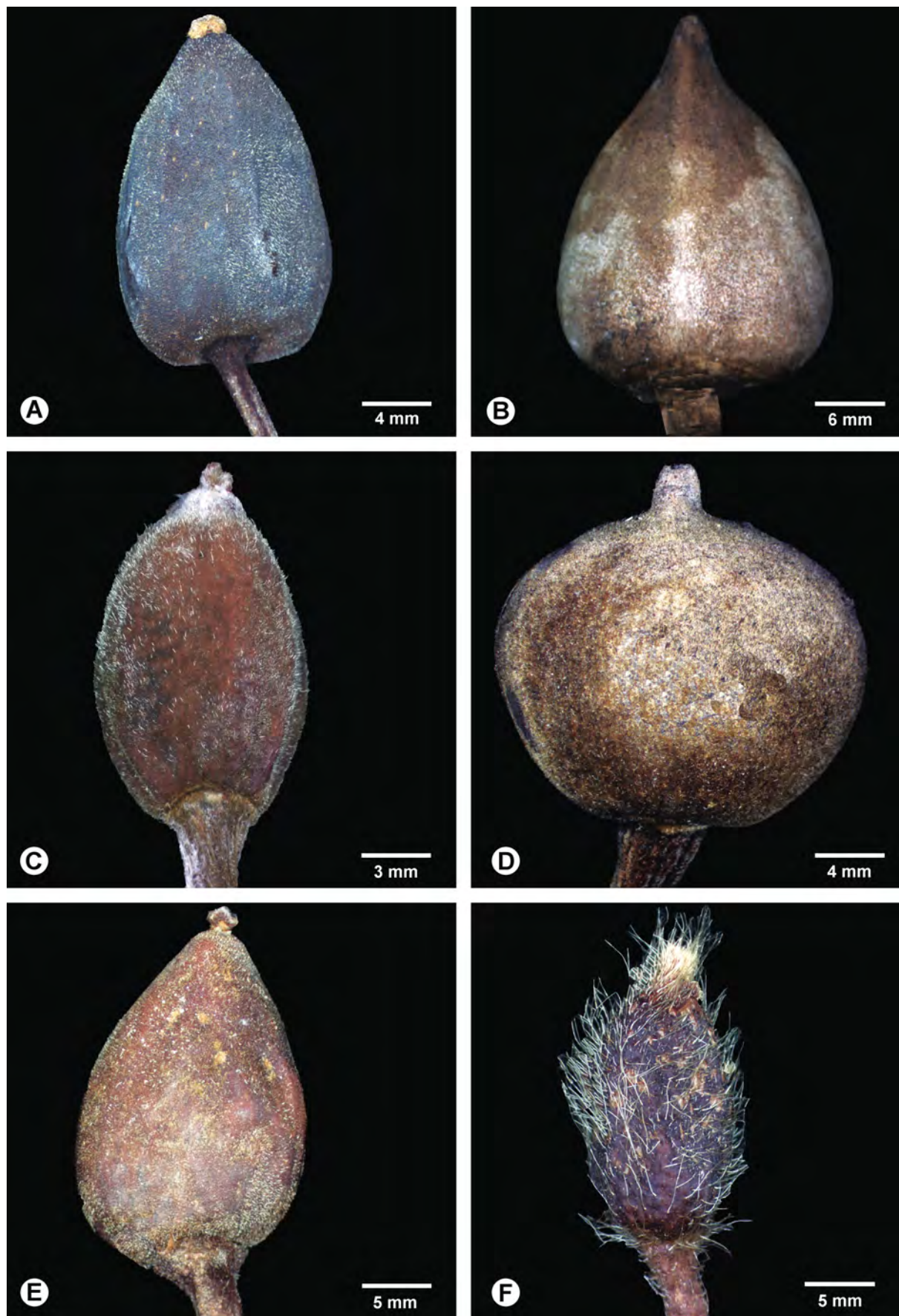


FIG. 14. Stereomicroscope photos of the perianths fruiting and pedicels of *Pourouma*. A. *P. digitata* (Riera 1611, NY). B. *P. elliptica* (Barrier 1175, P). C. *P. essequiboensis* (Gaglioti & Pederneiras 137, SP). D. *P. ferruginea* (A. Ducke 1527, F). E. *P. floccosa* (Cerón et al. 8349, NY). F. *P. formicarum* (C. A. Cid Ferreira et al. 12201, INPA). Photos: A.L. Gaglioti.



FIG. 15. Stereomicroscope photos of the perianths fruiting and pedicels of *Pourouma*. A. *P. guianensis* (Gaglioti et al. 163, SP). B. *P. herrerenensis* (R. Vásquez et al. 7535, F). C. *P. hirsutipetiolata* (Bruijn 1547, US). D. *P. hispida* (Cuatrecasas 14881, F). E. *P. maroniensis* (Gaglioti et al. 161, SP). F. *P. melinonii* (Granville 7152, INPA). Photos: A.L. Gaglioti.

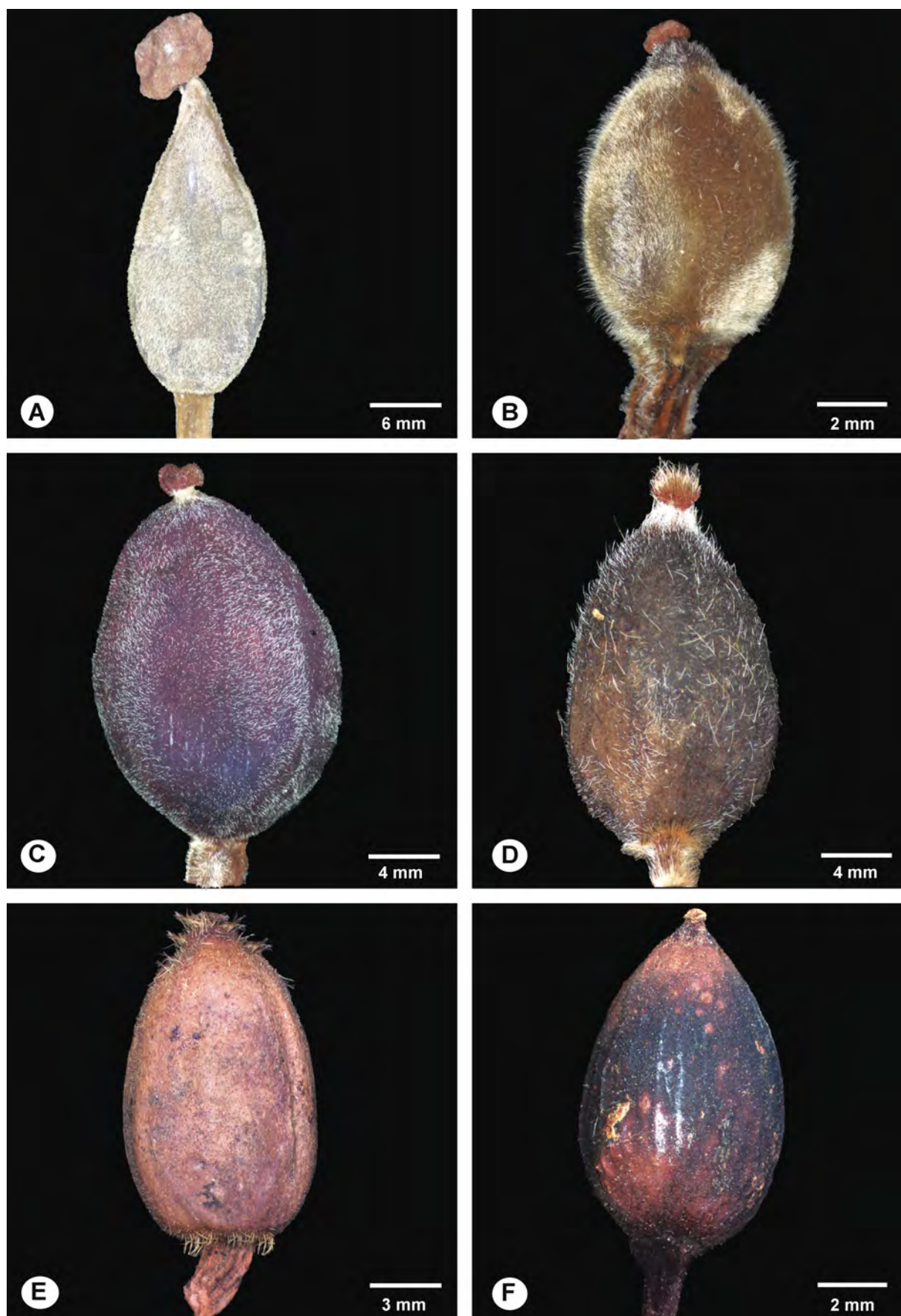


FIG. 16. Stereomicroscope photos of the perianths fruiting and pedicels of *Pourouma*. A. *P. minor* (Krukoff 7071, NY). B. *P. mollis* (L. S. Coelho et al. 272, INPA). C. *P. montana* (C. Díaz et al. 10265, BG). D. *P. myrmecophila* (Gaglioti et al. 168, SP). E. *P. napoensis* (Palacios 1337, MO). F. *P. oraria* (Gentry & Fallen 17804, MO). Photos: A.L. Gaglioti.

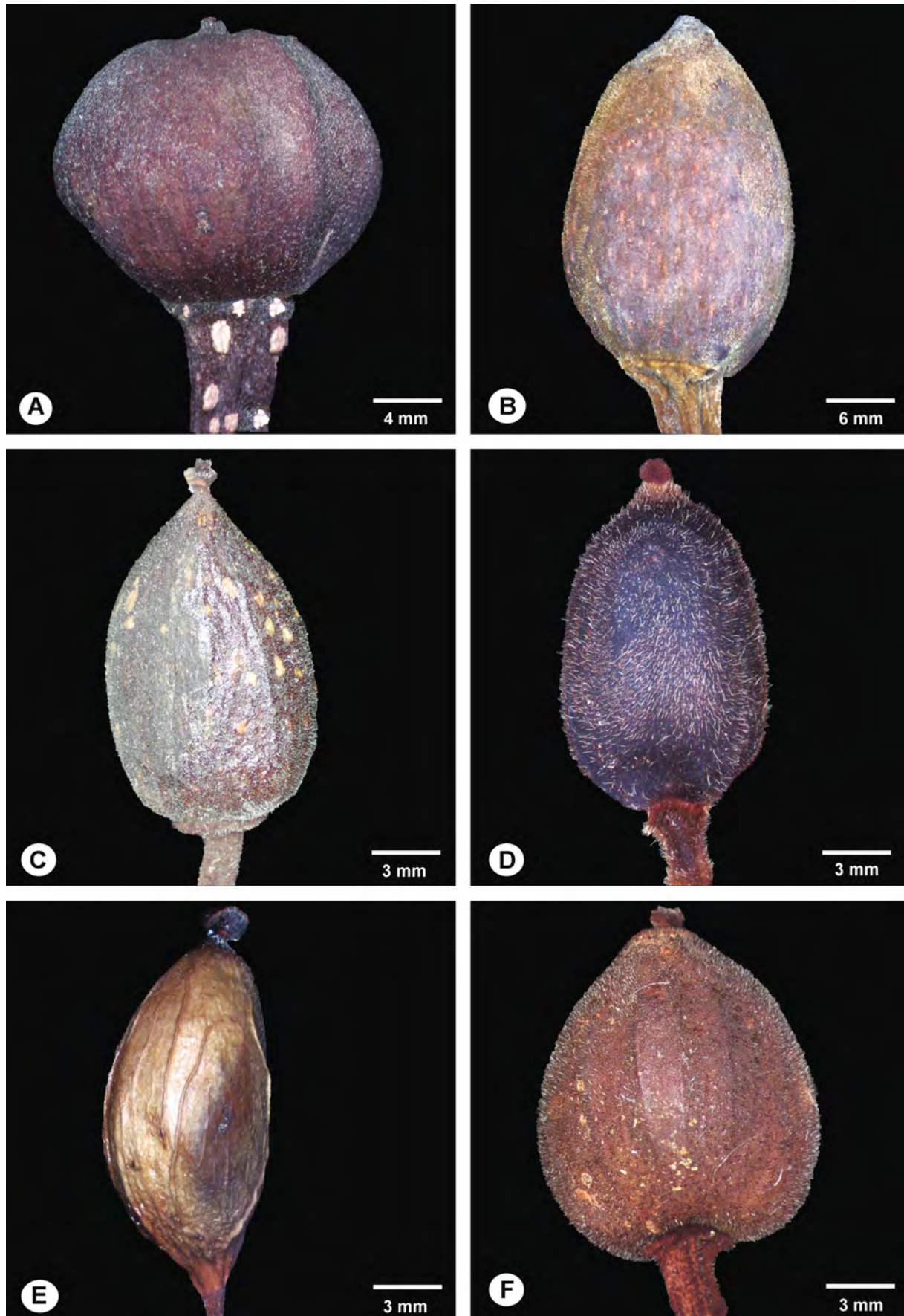


FIG. 17. Stereomicroscope photos of the perianths fruiting and pedicels of *Pourouma*. A. *P. ovata* (Gaglioti & Pederneiras 144, SP). B. *P. persecta* (Krukoff 11062, MO). C. *P. petiolulata* (Aulestia et al. 715, MO). D. *P. phaeotricha* (G. T. Prance et al. 23966, R). E. *P. saulensis* (Mori et al. 17185, F). F. *P. scobina* (Herrera 6619, F). Photos: A.L. Gaglioti.

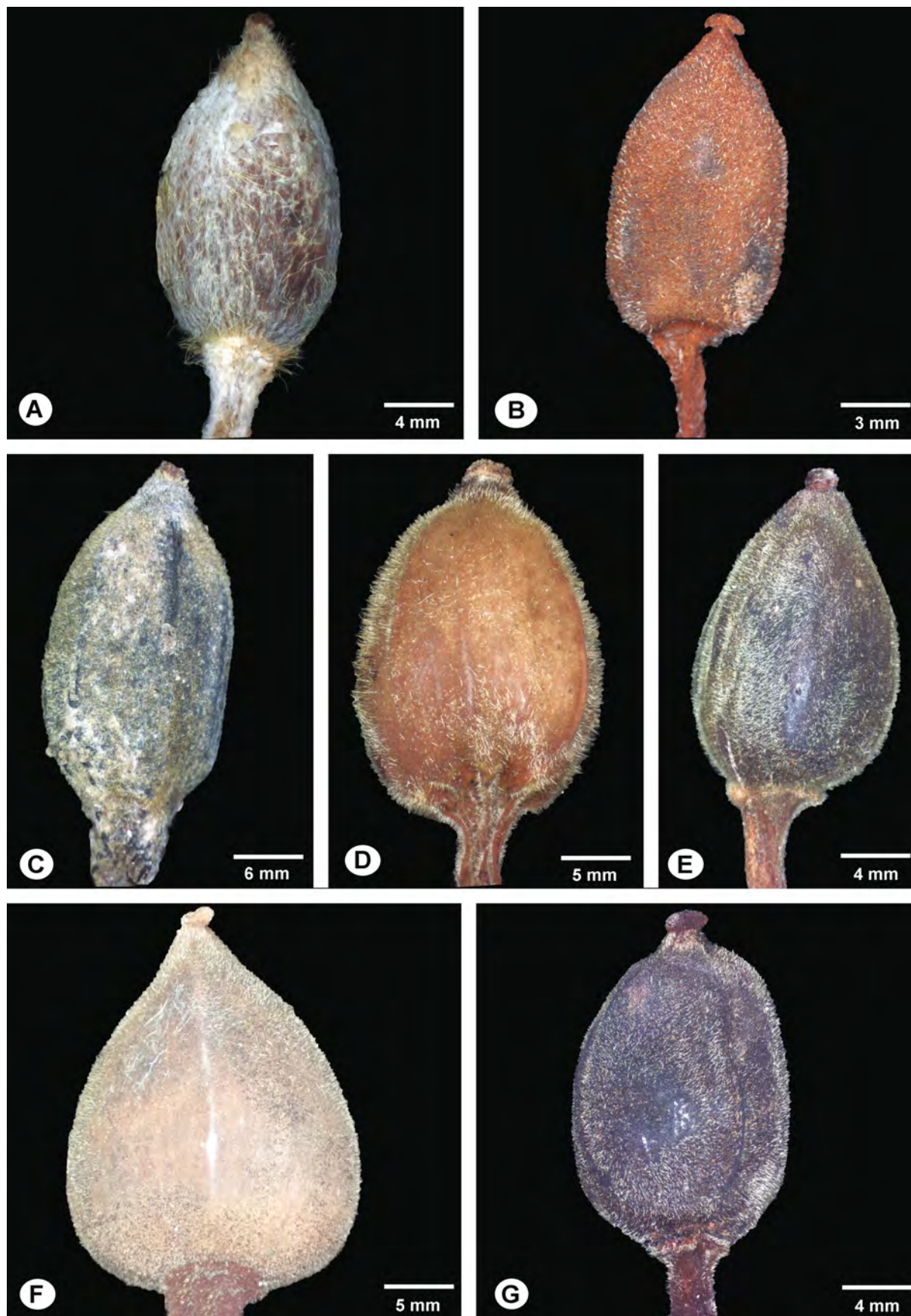


FIG. 18. Stereomicroscope photos of the perianths fruiting and pedicels of *Pourouma*. A. *P. stipulacea* (Pipoly *et al.* 11088, US). B. *P. tessmannii* (Tunqui 7, BG). C. *P. tomentosa* (Spruce *s.n.* or 1219, F). D. *P. triloba* (Vásquez & Jaramillo 2719, F). E. *P. velutina* (S. A. Mori & Thompson 11026, MG). F. *P. venezuelensis* (Steiermark *et al.* 116884, MO). G. *P. villosa* (Daly *et al.* 3790, HAMAB). Photos: A.L. Gaglioti.

ETYMOLOGY

According to Aublet (1775), the genus name was established by Galibis. Probably, *Pourouma* is derived from the Galibis word “Tapouroumé”, which according Étang (1763) means whitish. Many species as *P. guianensis* (type species) has the abaxial lamina surface cover with arachnoid indument whitish, which provide a whitish appearance to the tree.

ETHNOBOTANY

The fruits of the most species are edible, as observed in the labels of herbaria and during field trips. The flavor of fruits is usually sweet (when ripe) to slightly acidic (when immature).

The earliest usage records for *Pourouma* were narrated by Martius in Spix & Martius (1831). Martius described the fruits of *Pourouma cecropiifolia* (cited as *Puruma cecropiaefolia*) as edible with sweet-sour taste, resembling vine. Also, the author related the cultivation of the *Pourouma cecropiifolia* and experiments for the production of wine from fruits.

In 1843, Martius classified *Pourouma* (*P. acuminata*, *P. bicolor* and *P. cecropiifolia*) by medicinal potential in the “classis V: acida” within of Urticaceae. Moreover, Martius indicated *P. bicolor* for cultivated and described the fruits acid-sweet, mucilaginous, with good flavor, invigorating.

Ducke (1925, 1946) related that the fruits of *Pourouma cecropiifolia* have grape flavor and commented about the cultivation of this species by indians from Amazon region of the Peru and Colombia.

Bondar (1937) remarked on the cultivation of three species in the Bahia (Brazil): *Pourouma cecropiifolia* (tararanga preta), *P. guianensis* (tararanga branca) and *P. mollis* (tararanga vermelha).

Le Cointe (1947) commented that the fruits of *Pourouma cecropiifolia* are used in the manufacture of wine by Amazon region indians.

Correa (1952) mentioned the edible fruits of *Pourouma cecropiifolia* and its popular names.

According to a report by the National Academy of Sciences (1975) "Uvilla (*Pourouma cecropiifolia*) exploitation has been totally neglected by science". Moreover, the report proposed a topic for small-scale testing rather than for mass cultivation.

In 1980, Falcão & Lleras carried out the most comprehensive work about phenology, ecology and productivity of the Mapati (*Pourouma cecropiifolia*).

Yáñez (1993) described ethnobotanical aspects of three species of *Pourouma* (*P. cecropiifolia*, *P. napoensis* and *P. tomentosa*) from Amazon region of the Ecuador. The author related the trade of fruits, production of wine and firewood of these species.

Some species of *Pourouma* show medicinal potential as antileishmanial from extract of leaves of *P. guianensis* (Torres-Santos et al. 2004) and anticancer agent from extract of fruits of *P. cecropiifolia* (Barrios et al. 2010). The infusion of the bark of *P. guianensis* is used in the popular medicine to treat dysentery and the decoction of the green fruit is used for cicatrization (Lopes 1997).

Dairon et al. (2007) indicated six species of *Pourouma* (*P. bicolor*, *P. cecropiifolia*, *P. cucura*, *P. melinonii*, *P. minor*, *P. ovata*) as useful for cultivation in the communit of Wacurabá (Vaupés, Colombia).

Lopes-Lutz et al. (2010) related the nutritional benefits of the fruits of *Pourouma cecropiifolia* to human health, and these authors pointed out eaten fresh or processed into jams, jellies, marmalades and wine, also.

HABITATS AND DISTRIBUTION

Pourouma is distributed preferentially in areas of rainforests in South and Central America (except Antilles), and southern Mexico (Veracruz) with only one species (*P. scobina*). The center of diversity of genus is Amazon region, mainly in “terra firme” forest at low altitudes to 450 meter, often in riparian forest. In northwest of South America, between 79°–61°W and 7°N–5°S, occurs 38 species (ca. 88% of total) of *Pourouma* (Fig. 19).

Pourouma guianensis, *P. mollis*, and *P. velutina* occur also, in the Atlantic forest in southeast of Brazil. *P. scobina* is the unique specie to presenting the Mesoamerican-Pacific pattern of biogeographic regionalization.

Some species, e.g. *P. guianensis* Aubl., are pioneer and commonly found in areas disturbed of the forest. Others species, e.g. *P. elliptica* Standl., are only found in undisturbed forest (Gaglioti & Romaniuc-Neto 2014a, 2014b).

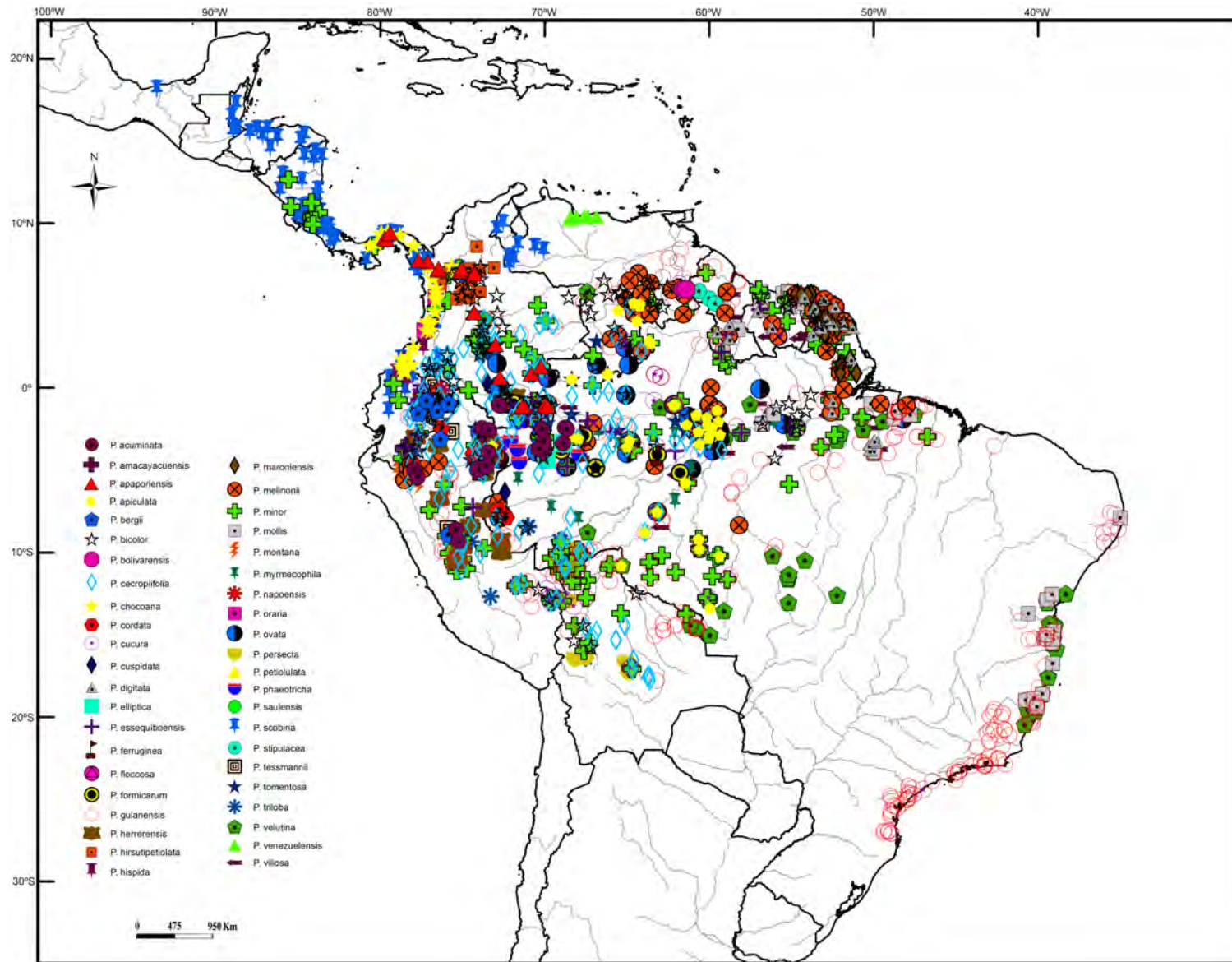


FIG. 19. Map of geographic distribution of *Pourouma*.

CONSERVATION STATUS

Most of conservation assessments provided in this revision has been established on herbarium collections and multiple field trips to the Amazon and Atlantic rainforest regions. Currently, only two species of *Pourouma* (*P. petiolulata* [NT] and *P. oraria* [VU]) are in the IUCN red list (2014). In the present revision, we used mainly the criteria B (geographic range) from IUCN (2014) for provide conservation assessments for the species. Of the 43 species recognized for the genus, 11 (26%) were assigned an IUCN threatened status (vulnerable, endangered and critically endangered) and *Pourouma hirsutipetiolata* was assigned as near treatment. Moreover, 12 (28%) species were considered data deficient, evidencing that the list of threatened species of *Pourouma* might be larger. Results were summarized in the Table 2.

TABLE 2. Summary of IUCN conservation status ratings for species of *Pourouma*. Ratings were determined using Guidelines for IUCN Red List Categories and Criteria, version 11 (IUCN 2014); see treatments of individual species (Taxonomy) for detailed discussions of criteria used.

CONSERVATION STATUS	SPECIES OF <i>Pourouma</i>
Critically Endangered (CR)	2 species: <i>P. bolivarensis</i> and <i>P. floccosa</i>
Endangered (EN)	6 species: <i>P. amacayacuensis</i> , <i>P. elliptica</i> , <i>P. montana</i> , <i>P. oraria</i> , <i>P. stipulacea</i> and <i>P. venezuelensis</i>
Vulnerable (VU)	3 species: <i>P. napoensis</i> , <i>P. petiolulata</i> , and <i>P. saulensis</i>
Near Threatened (NT)	1 species: <i>P. hirsutipetiolata</i>
Least Concern (LC)	19 species: <i>P. apiculata</i> , <i>P. bicolor</i> , <i>P. cecropiifolia</i> , <i>P. chocona</i> , <i>P. cucura</i> , <i>P. digitata</i> , <i>P. essequiboensis</i> , <i>P. guianensis</i> , <i>P. maroniensis</i> , <i>P. melinonii</i> , <i>P. minor</i> , <i>P. mollis</i> , <i>P. myrmecophila</i> , <i>P. ovata</i> , <i>P. scobina</i> , <i>P. tomentosa</i> , <i>P. triloba</i> , <i>P. velutina</i> , and <i>P. villosa</i>
Data Deficient (DD)	12 species: <i>P. acuminata</i> , <i>P. apaporiensis</i> , <i>P. bergii</i> , <i>P. cordata</i> , <i>P. cuspidata</i> , <i>P. ferruginea</i> , <i>P. formicarum</i> , <i>P. herrerensis</i> , <i>P. hispida</i> , <i>P. persecta</i> , <i>P. phaeotricha</i> and <i>P. tessmannii</i>

TAXONOMY

Pourouma Aubl., Hist. pl. Guiane 2: 891, pl. 341. 1775; Jussieu, Gen. Pl.: 406. 1789; Dumortier, Anal. Fam. Pl.: 17. 1829; Gaudichaud, Voy. Uranie: 511. 1830; Trécul, Ann. Sci. Nat. Bot., Sér. 3, 8: 100. 1847; Miquel *in* Martius, Fl. Bras. 4(1): 122. 1853; Bentham *in* Bentham & Hooker, Gen. pl. 3(1): 357. 1880; Baillon, Hist. pl. 6: 141. 1875-1876; Engler *in* Engler & Prantl, Nat. Pflanzenfam. 3(1): 95. 1889; Benoist, Arch. Bot. Mém. 5: 29. 1931; Woodson & Schery, Ann. Missouri Bot. Gard. 47: 165. 1960; Berg & Dewolf, Fl. Suriname 5(1): 265. 1975; Burger, Fieldiana Bot. 40: 200. 1977; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 105. 1988; Spichiger et al., Boissiera 1: 62. 1989; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 110. 1990; Berg, Fl. Guianas 11(22): 113. 1992; Berg & Franco-Rosselli, Fl. Ecuador 27A: 119. 1993; Berg, Fl. Venez. Guayana 4: 185. 1998; Berg, Fl. Venez.: 228. 2000; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1664. 2010.—
TYPE SPECIES: *Pourouma guianensis* Aubl.

Tree, dioecious, often with stilt roots; trichomes simple, uniseriate, unicellular or multicellular. Leafy twigs with stipules scars annular horizontal, often odoriferous; latex translucent to yellowish, turning black at exposure to the air. Leaves in spirals, petiolate, sometimes with domatia at the base of the petiole; lamina entire or palmatilobed, margin entire to repand or palmatifid, venation brochidrodromous, actinodromous or palmate; stipules fully amplexicaul, fused. Inflorescences cymose, axillary, mostly in pairs; mostly bracteate, bracts caducous. Staminate inflorescences in pleiocasium, 3–4-branched; flowers organized in fascicles or glomerules. Pistillate inflorescences often in compound cymes (dichasium or pleiocasium), 3–

4-branched, or cymes. Staminate flowers sessile or pedicellate, tepals (3–) 4, free or connate; perianth actinomorphic (tepals free), urceolate or infundibuliform (tepals connate); stamens (3–) 4, mostly free, sometimes connate; pistillate flowers pedicellate, perianth urceolate; ovary free, stigma peltate, bilobed or multilobed. Fruit an achene, ovoid to ellipsoid, pericarp woody, surrounded by the enlarged, fleshy perianth with a vinaceous to blackish outer layer at full maturity (fruiting perianth); seed without endosperm, embryo straight, cotyledons thick, radicle short.

Key to Species of Pourouma

1. Domatia at the base of the petiole.

2. Lamina entire; petiole 1–1.8 cm long.

18. *P. formicarum*

2. Lamina palmatifid to palmatipartite; petiole 6.4–28.5 cm long.

28. *P. myrmecophila*

1. Domatia absents.

3. Lamina palmatisect, with segments pseudo-petiolules.

4. Adaxial lamina surface scabrous; staminate perianth with tepals free; fruiting perianth with indument hispidulous. 33. *P. petiolulata*

4. Adaxial lamina surface smooth; staminate perianth with tepals connate; fruiting perianth with indument velutinous or tomentose.

5. Leafy twigs and petioles hirsute, with whitish, arachnoid indument; pseudo-petiolules 2–4 mm long; staminate perianth urceolate; stamens 4; fruiting perianth with indument velutinous. 32. *P. persecta*

5. Leafy twigs and petioles glabrous, without whitish, arachnoid indument; pseudo-petiолules 5–12 mm long; staminate perianth infundibuliform; stamens 2; fruiting perianth with indument tomentose. *5. P. bergii*
3. Lamina entire, palmatifid or palmatipartite.
6. Lamina entire with basal secondary veins unbranched.
7. Leafy twigs with dense, floccose, brownish, arachnoid indument.
8. Adaxial lamina surface scabrous; apex acute to acuminate; abaxial lamina surface with whitish, arachnoid indument on the primary vein; fruiting perianth velutinous. *2. P. amacayacuensis*
8. Adaxial lamina surface smooth; apex rounded to emarginate; abaxial lamina surface with whitish, arachnoid indument only on the tertiary, quaternary veins, and areoles; fruiting perianth hispidulous. *17. P. floccosa*
7. Leafy twigs with indument puberulous, sericeous, strigose, hirtellous or hirsute or glabrous.
9. Adaxial lamina surface scabrous to scabridulous.
10. Leafy twigs with dense, brownish, multicellular trichomes; staminate inflorescence in glomerules; infructescence with 11–15 fruits. *33. P. phaeotricha*
10. Leafy twigs often without or rarely with sparse, brownish, multicellular trichomes; staminate inflorescence in fascicles; infructescence with 2–10 fruits. *41. P. velutina*
9. Adaxial lamina surface smooth.
11. Stipules with indument sericeous, hirsute or velutinous inside.

12. Secondary veins 8–10 pairs; leafy twigs with dense, multicellular trichomes; glomerule 1.5–2.5 mm in diameter. 34. *P. phaeotricha*
12. Secondary veins 9–22 pairs; multicellular trichomes on the leafy twigs absent; glomerule with 3–8 mm diameter.
13. Stipules 1–3 cm long; staminate perianth with indument sericeous; peduncle of the infructescence with 12–33,5 cm long. 31. *P. ovata*
13. Stipules 3.5–13.5 cm long; staminate perianth with indument hirsute; peduncle of the infructescence with 4–9 cm long. 20. *P. herrerenensis*
11. Stipules glabrous inside.
14. Leafy twigs glabrous or with indument sparse, puberulous.
15. Stigma bilobed, with 1.5–2.5 mm diameter. 35. *P. saulensis*
15. Stigma multilobed, with 2.8–6 mm diameter. 25. *P. minor*
14. Leafy twigs with indument sericeous, hirtellous to hirsute or with whitish, arachnoid indument.
16. Whitish, arachnoid indument on the leafy twigs and petioles; tepals of the staminate flowers with indument hispidulous; fruiting perianth 2.5–2.8 cm long. 14. *P. elliptica*
16. Whitish, arachnoid indument confined to the areoles tertiary and quaternary veins; tepals of the staminate flowers with indument sericeous or hirtellous; fruiting perianth 1–2.3 cm long.
17. Staminate flowers with tepals connate; stigma peltate, with 1–2 mm in diameter. 1. *P. acuminata*
17. Staminate flowers with tepals free or basally connate; stigma multilobed, with 2.8–6 mm in diameter. 25. *P. minor*

6. Lamina palmatifid to palmatipartite or entire with basal secondary veins branched.
18. Whitish, arachnoid indument on the leafy twigs, stipules, primary vein of the abaxial lamina surface, petioles, staminate flowers, or perianth fruiting.
19. Stipules with indument sericeous, velutinous to hirsute inside.
20. Lamina palmatipartite with 5 lobes; stipules persistent; fruiting perianth with indument hirsute and whitish, arachnoid indument. 37. *P. stipulacea*
20. Lamina entire or palmatifid to palmatipartite with 3 lobes; stipules caducous; fruiting perianth with indument velutinous.
21. Stipules and petioles with whitish, arachnoid indument; glomerule 3–4 mm in diameter; staminate flowers 1.2–1.5 mm long. 4. *P. apiculata*
21. Stipules and petioles without whitish, arachnoid indument; glomerule 5–8 mm in diameter; staminate flowers 1.8–2 mm long.
20. *P. herrerenensis*
19. Stipules glabrous inside.
22. Leafy twigs with dense, vinaceous, multicellular trichomes; peduncle of the infructescence 21.5–52 cm long. 16. *P. ferruginea*
22. Leafy twigs with sparse, brownish multicellular trichomes or absent; peduncle of the infructescence 2–19.5 cm long.
23. Lamina entire.
24. Leafy twigs with indument villous; base of the lamina deeply cordate; fruiting perianth with indument hirsute and whitish, arachnoid indument. 10. *P. cordata*

24. Leafy twigs with indument puberulous, hirsute or hispidulous; base of the lamina acute, rounded, truncate or subcordate; fruiting perianth velutinous.
25. Leafy twigs with indument hirsute to hispidulous; staminate flowers 1.2–1.8 mm long; tepals free or basally connate; fruiting perianth 2.5–2.8 cm. 14. *P. elliptica*
25. Leafy twigs with indument sericeous; staminate flowers 0.5–1 mm long; tepals connate; fruiting perianth 1.5–2.3 cm.
26. Apex of the lamina acuminate; glomerule with 2–3 mm diameter; fruiting perianth with whitish, arachnoid indument. 23. *P. maroniensis*
26. Apex of the lamina rounded, emarginate to obtuse; glomerule with 5–8 mm diameter; fruiting perianth with indument yellowish, velutinous. 39. *P. tomentosa*
23. Lamina palmatifid to palmatipartite.
27. Abaxial lamina surface with indument yellowish, velutinous, hirtellous to hirsute on the veins; staminate flowers 2.2–2.8 mm long. 40. *P. triloba*
27. Abaxial lamina surface with indument whitish, sericeous to strigose on the veins; staminate flowers 1.5–2 mm long.
28. Leafy twigs and stipules with indument yellowish, hirsute; glomerule with 4–6 mm diameter. 32. *P. persecta*
28. Leafy twigs and stipules with indument whitish, sericeous; glomerule with 2–3 mm diameter. 15. *P. essequiboensis*

18. Whitish, arachnoid indument confined to the areoles, tertiary and quaternary veins of the abaxial lamina surface.
29. Adaxial lamina surface scabrous to scabridulous.
30. Stipules with indument sericeous, hirsute to velutinous inside.
31. Lamina entire.
32. Staminate inflorescence in glomerules; staminate flowers with connate tepals. 20. *P. herrerensis*
32. Staminate inflorescence in fascicles; staminate flowers with tepals free or basally connate.
33. Abaxial lamina surface with indument velutinous to hirtellous on the veins; fruiting perianth with indument velutinous. 41. *P. velutina*
33. Abaxial lamina surface with indument sericeous to strigose on the veins; fruiting perianth with indument strigose to strigulose. 6. *P. bicolor*
31. Lamina palmatifid to palmatipartite.
34. Abaxial lamina surface with indument hirsute to hirtellous on the veins; fruiting perianth with 2–2.5 cm long. 42. *P. venezuelensis*
34. Abaxial lamina surface with indument sericeous to strigose on the veins; fruiting perianth with 1–1.5 cm long.
35. Leafy twigs with indument hirsute to villous, at least on the scars of the stipules; stipules often persistent; midsegment of the lamina oblong to elliptic. 9. *P. chocoana*

35. Leafy twigs with indument sericeous to strigose; stipules caducous; midsegment of the lamina lanceolate.
36. Lamina usually entire or palmatifid with 3 lobes; base of the lamina obtuse, truncate, rounded to subcordate; pistillate inflorescence with up to 28 flowers.
6. *P. bicolor*
36. Lamina palmatifid to palmatipartite with 3–9 lobes; base of the lamina deeply cordate to cordate; pistillate inflorescence with up to 66 flowers.
37. Whitish, arachnoid indument on the areoles, tertiary and quaternary veins of the abaxial lamina surface; staminate flowers 0.8–1 mm long. 13. *P. digitata*
37. Whitish, arachnoid indument confined to the areoles; staminate flowers 1.2–1.5 mm long. 36. *P. scobina*
30. Stipules glabrous inside.
38. Leafy twigs without brownish, multicellular trichomes.
39. Lamina palmatifid to palmatipartite with 5–7 lobes; staminate inflorescence in glomerules; staminate flowers with tepals connate; filaments connate. 29. *P. napoensis*
39. Lamina usually entire or palmatifid to palmatipartite with 3 lobes; staminate inflorescence in fascicles; staminate flowers with tepals free or basally connate; filaments free. 11. *P. cucura*
38. Leafy twigs with brownish, multicellular trichomes.

40. Abaxial lamina surface with indument hirtellous to velutinous on the veins; staminate flowers 1.5–3 mm long. 19. *P. guianensis*
40. Abaxial lamina surface with indument sericeous to strigose on the veins; staminate flowers 0.5–1 mm long. 38. *P. tessmannii*
29. Adaxial lamina surface smooth.
41. Stipules with indument sericeous, velutinous, hirtellous to hirsute inside.
42. Stipules persistent.
43. Staminate inflorescences in glomerules; staminate flowers 0.8–1.2 mm long; pistillate inflorescence with 50–120 flowers. 30. *P. oraria*
43. Staminate inflorescences in facicles; staminate flowers 1.5–2.2 mm long; pistillate inflorescence with 6–40 flowers. 43. *P. villosa*
42. Stipules caducous.
44. Lamina palmatifid to palmatipartite with 7–11 lobes
45. Pistillate inflorescence with up to 185 flowers; staminate flowers 2–2.5 mm long; fruiting perianth 2–3.8 cm long. 8. *P. cecropiifolia*
45. Pistillate inflorescence with up to 62 flowers; staminate flowers 0.8–1 mm long; fruiting perianth 1.2–1.8 cm long. 13. *P. digitata*
44. Lamina usually entire or palmatifid to palmatipartite with 3–5 lobes.
46. Abaxial lamina surface scabrous. 6. *P. bicolor*
46. Abaxial lamina surface smooth.

47. Staminate inflorescence in fascicles; staminate flowers with tepals free or basally connate; fruiting perianth with indument hirtellous. 43. *P. villosa*
47. Staminate inflorescence in glomerules; staminate flowers with tepals connate; fruiting perianth indument velutinous. 26. *P. mollis*
41. Stipules glabrous inside.
48. Abaxial lamina surface scabrous. 12. *P. cuspidata*
48. Abaxial lamina surface smooth.
49. Lamina palmatifid to palmatipartite.
50. Adaxial lamina surface with indument hirsute to hirtellous over the whole surface; fruiting perianth with indument hirsute to hirtellous. 29. *P. napoensis*
50. Adaxial lamina with indument sericeous to hirtellous on the veins; fruiting perianth with indument sericeous or velutinous.
51. Leafy twigs with indument whitish, sericeous.
52. Base of the lamina obtuse, rounded to truncate, or subcordate; staminate flowers 1.2–1.5 mm long; staminate perianth urceolate; filaments free. 24. *P. melinonii*
52. Base of the lamina cordate to deeply cordate; staminate flowers 4–6 mm long; staminate perianth infundibuliform; filaments completely connate. 3. *P. apaporiensis*

51. Leafy twigs with indument villous, hirsute or hispid.
53. Staminate inflorescence in fascicles; staminate flowers with tepals free or basally connate; fruiting perianth with indument hirtellous. 43. *P. villosa*
53. Staminate inflorescence in glomerules; staminate flowers with tepals connate; fruiting perianth with indument velutinous.
54. Abaxial lamina surface with indument sericeous on the veins; peduncles with indument hispid; glomerule 5–10 mm in diameter. 22. *P. hispida*
54. Abaxial lamina surface with indument velutinous to hirtellous on the veins; peduncles with indument velutinous to hirtellous; glomerule 3–4 mm in diameter. 26. *P. mollis*
49. Lamina entire.
55. Leafy twigs with indument hirsute or velutinous.
56. Abaxial lamina surface with indument withish, sericeous on the veins; staminate flowers 2–2.5 mm long; staminate perianth infundibuliform. 21. *P. hirsutipetiolata*
56. Abaxial lamina surface with indument yellowish, velutinous to hirtellous on the veins; staminate flowers 1.2–1.8 mm long; staminate perianth urceolate. 26. *P. mollis*
55. Leafy twigs with indument sericeous to strigose.

57. Lamina obovate to broadly elliptic; base of the lamina acute to obtuse. *7. P. bolivarensis*

57. Lamina ovate; base of the lamina rounded to truncate, or subcordate.

58. Basal secondary veins up to 1/2 the length of the lamina; staminate flowers with tepals free or basally connate. *27. P. montana*

58. Basal secondary veins 1/6 to 1/3 the length of the lamina; staminate flowers with tepals connate.

24. P. melinonii

1. *Pourouma acuminata* Mart. ex Miq. in Mart., Fl. bras. 4(1): 130, tab. 40. 1853; Martius, Syst. mat. med. bras. 34. 1843, name; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 109. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 173. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 81. 1993; Berg, Fl. Venez. Guayana 4: 186. 1998; Berg, Fl. Venez.: 243. 2000; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1664. 2010.—TYPE: BRAZIL. Amazonas: Secundum fluv. Japurá in Brazil, prov. Alto Amazonas, Dec 1819 (♀), *Martius s.n.* (holotype: M0174078!; isotypes: U0004751 fragment from M image!).

Pourouma populifolia Standl., Publ. Field Mus. Nat. Hist., Bot. Ser., 17: 184. 1937; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 109. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 173. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 81. 1993; Berg, Fl. Venez. Guayana 4: 186. 1998; Berg, Fl. Venez.: 243. 2000.—

TYPE: BRAZIL. Amazonas: Municipality São Paulo de Olivença, near Palmares, 11–26 Sep-Oct 1936 (♀), *Krukoff 8427* (holotype: NY!; isotypes: A image! BM! BR image! K! F! G image! LE image! LP image! MICH image! MO! P! S image! U! US!).

Tree, 10–28 m tall, 20–22 cm d.b.h., with stilt roots. Leafy twigs 3–9 mm in diameter, with indument sparse yellowish, hirsute; internode 4–25 mm long. Lamina entire, (3.5–) 4.5–18 (–20.5) cm long, (2–) 3–10.5 (–12) cm wide, length:width ratio 1.4–1.8, ovate, rhombic to elliptic, coriaceous; base rounded, obtuse to acute; margin repand, with indument sparse, whitish, sericeous; apex acuminate to long acuminate; adaxial surface smooth, indument of primary vein sparse, whitish, sericeous to glabrous; abaxial surface smooth, indument of primary vein sparse, whitish, sericeous to glabrous; venation brochidodromous; secondary veins 6–14 pairs per leaf, basal pair unbranched, diverging from the midrib at an 25°–35°; tertiary and quaternary veins slightly prominent, with whitish, arachnoid indument confined to the areoles, tertiary and quaternary veins; petiole (2.5–) 3.5–8.5 (–9.5) cm long, with indument sparse, yellowish, hirsute to glabrous, domatia absents; stipules 3–11.5 (–13.5) cm long, with indument yellowish, hirsute and whitish, arachnoid indument outside, glabrous inside, caducous. Staminate inflorescences 6.5–7.2 cm long, 2.3–3.2 cm wide, 3–4 branched; peduncle 2.5–3.2 cm long, peduncle and branches with indument yellowish, hirsute to hirtellous; flowers ca. 120–180, flowers organized in 6–8 glomerules; glomerule 5–8 mm in diameter, ca. 15–25 flowers per glomerule. Staminate flowers 1.5–2 mm long, 1.2–1.5 mm wide; sessile; perianth 0.8–1 mm long, 1–1.2 mm wide, urceolate, tepals connate, with indument yellowish, hirtellous; stamens 4; filaments 1.2–1.5 mm long, free, filaments exceeding the perianth. Pistillate inflorescences 3.5–5 cm long, 5–20 mm wide; peduncle 2.5–3.2 cm long, peduncle and branches with indument yellowish to whitish, velutinous; flowers 4–17 (–20), flowers organized in 2–5 cymes.

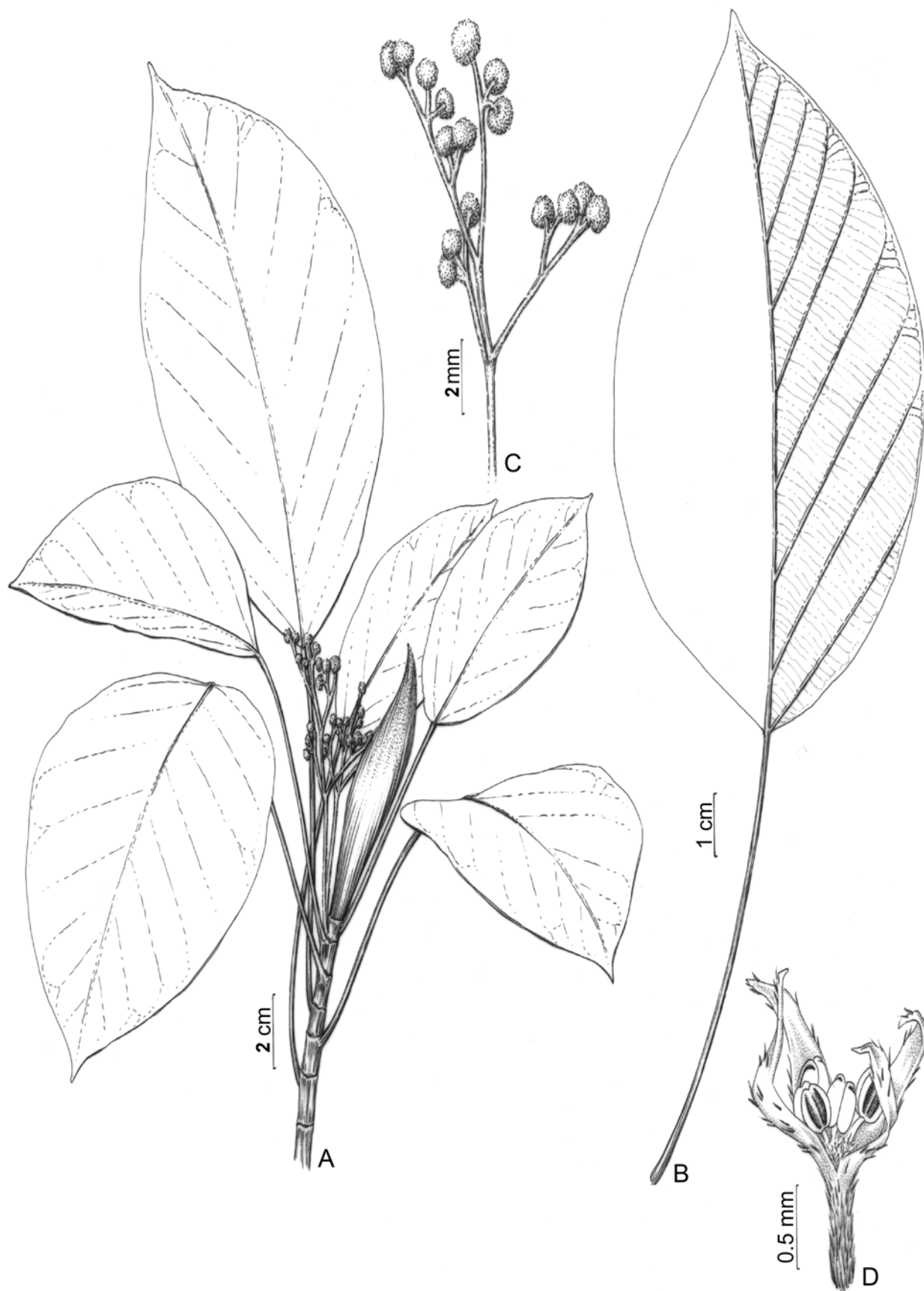


FIG. 20. *Pourouma acuminata*. A. Leafy twig with staminate inflorescence. B. Leaf, abaxial surface. C. Staminate inflorescence. D. Staminate flower. [A-D: from *Monteagudo et al.* 8423 (MO)].

Pistillate flowers 2–4 mm long, 2–3 mm wide; pedicel 3–5 mm long; perianth 1.5–3.5 mm long, with indument yellowish, velutinous, apex papillose, with brownish, multicellular trichomes; stigma peltate, 1–2 mm in diameter, sometimes yellowish, velutinous. Infructescences 6.5–10 (–12.5) cm long, 2.5–5 (–6.5) cm wide; peduncle 3.5–5.3 (–6.5) cm long; fruiting pedicel 1–2.5 cm long. Fruiting perianth 1–1.8 cm long, 5–12 mm wide, ovoid to ellipsoid, vinaceous, with indument yellowish, velutinous. Achene 8–16 mm long, 3–8 mm wide, ovoid to ellipsoid; pericarp crustaceous. Seed 4–8 mm long, 2–4 mm wide, ovoid to reniform, brownish to vinaceous. Fig. 12 A; Figs. 20–21.

Phenology. Staminate flowers collected from May to September, pistillate flowers from August to September and fruits from September to March.

Distribution (Fig. 22). Northwest of Brazil (Amazonas), south of Colombia (Amazonas) and north of Peru (Loreto and Pasco), in “terra firme” forest or varzea of the Amazonian region, mostly in lowland moist area, often in riparian forest, at an elevation of about 100 to 850 m above sea level.

Vernacular Name. Mapaty (Brazil, Amazonas); uva de monte (Colombia, Amazonas); sacho uvilla, uvilla (Peru, Amazonas).

Etymology. The epithet refers to the acuminate apex of the lamina leaf.

IUCN conservation status. *Pourouma acuminata* is known from only twenty one collections, made between 1819 and 2005. Nevertheless, the extent of occurrence of *P. acuminata* is ca. 618,650 km² and the population size are unknown. For these reasons *P. acuminata* is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN 2014).

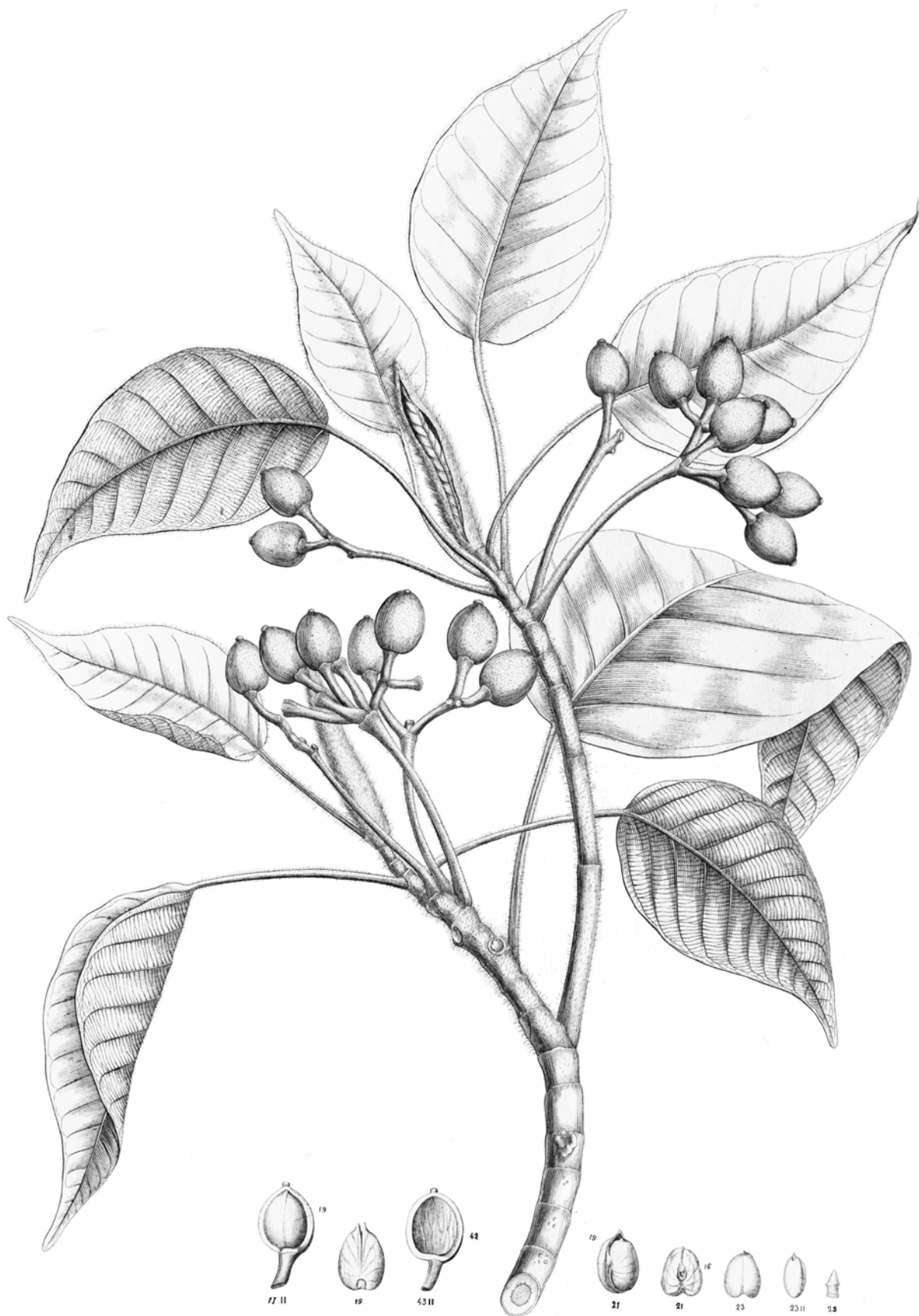


FIG. 21. *Pourouma acuminata*. Leafy twig with infructescence, 17 II. Fruiting perianth, pedicel and fruit. 19. Fruit. 43 II. Fruiting perianth and pedicel. 42. Fruiting perianth. 21. Fruit. 19. Pericarp. 21. Seed. 16. Placentation. 23. Seed. 23 II. Embryo. 25. Radicle. From Martius, *Flora brasiliensis*, 4(1). 1853: Tab. 40 (modified).

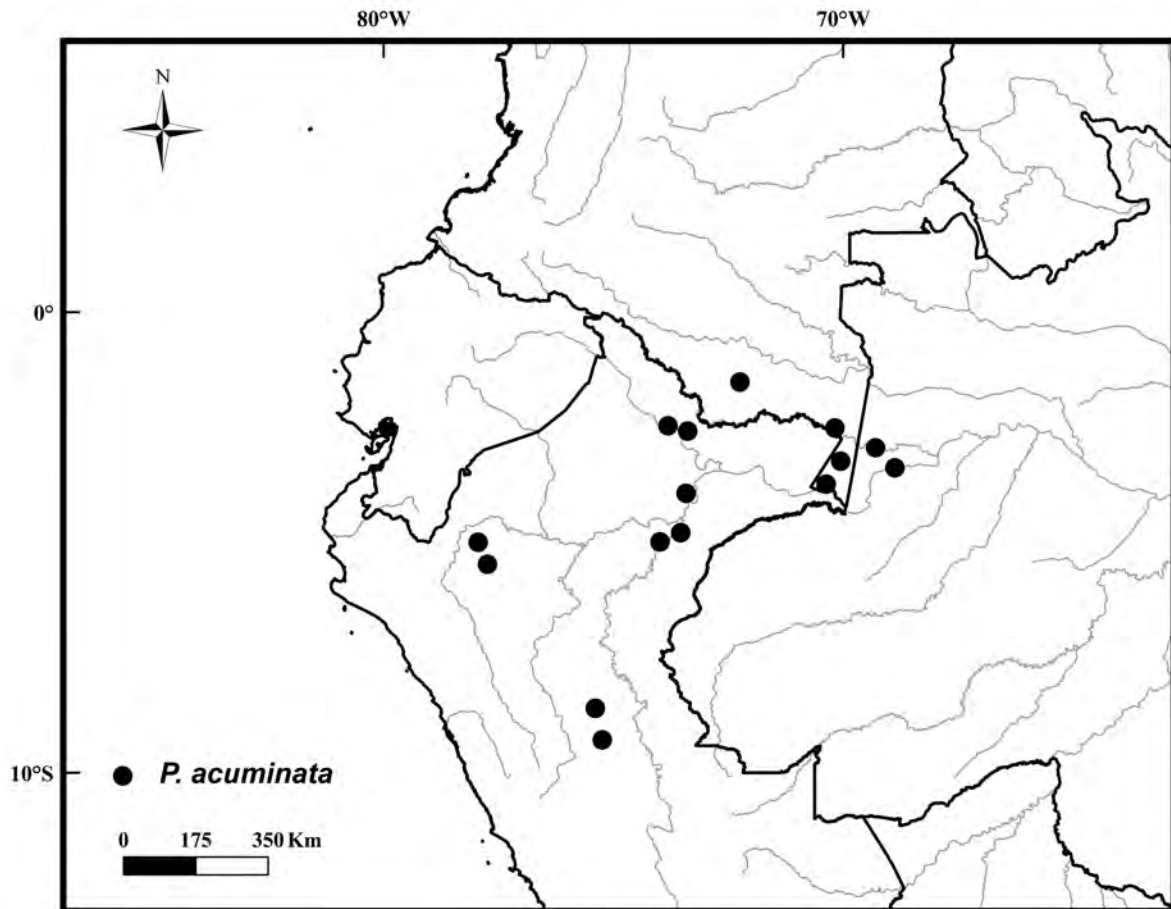


FIG. 22. Distribution of *Pourouma acuminata*.

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAZONAS: Vila Bittancourt, Rio Japurá, margem direita, (♀), *Amaral & C. A. Cid Ferreira 473* (BG, INPA, K, NY); Rio Iça, (♀), *Jobert 682* (P); Rio Iça, (♀), *Schwacke 560* (R, RB) **Colombia.** AMAZONAS: Municipio de Leticia, Parque Nacional Amacayacu, 03°47'S, 70°15'W, (♀), *Rudas et al. 2851* (MO); Municipio de Leticia, Parque Nacional Amacayacu, 03°47'S, 70°15'W, (♀), *Rudas & Prieto 3175* (COL, MO); margen izquierda del Río Caquetá, 7,5 Kilómetro antes de la boca del Q. Del Metá, (♂), *M. Sánchez et al. 5582* (COAH); Parque Nacional Amacayacu, (♀), *R. Vásquez et al. 12586* (COL, F, MO). **Peru.** AMAZONAS: Bagua Province, Distrito Imaza, Comunidad Aguaruna Putuim, (♀),

C. Díaz et al. 7240, (F, MO); Dtto. Imaza, Tayu Mujaji, (♀), *Rojas* 469 (NY).—LORETO: Río Itaya, 5 km above Iquitos, (♀), *Croat* 18888 (C, DUKE, F, GH, MIN, NA, NY, P); Prov. Requena, Caño Ivicahua, abajo de Jenaro Herrera, margen izquierda Río Ucayali, (♀), *Encarnación* 25063 (NY, US); Nuevo Esperanza, (♀), *McDaniel & Rimachi Y.* 20362 (NA); Maynas, Dtto. Iquitos, Río Momon, (♀), *Rimachi Y.* 2586 (MBM, MO, NY); Río Momon, (♀), *Rimachi Y.* 3256 (MO); Maynas, Dtto. Iquitos, Río Itaya, carretera de caserío de San Antonio, (♀), *Rimachi Y.* 11135 (NY); Restinga de la cocha Supaí, arriba de Jenaro Herrera, margen derecha del Río Ucayali, (♀), *Spichiger & Encarnación* 1142 (NY, US).—PASCO: Oxapampa, Dist. Palcazu, Parque Nacional Yanachaga-Chemillén, 10°10'S, 75°10'W, (♂), *Monteagudo et al.* 8423 (MO).

Pourouma acuminata was cited by first time in Martius (1843: 34) and classified in the “classis V: acida” (class V: acid) within of Urticaceae. Nevertheless, *P. acuminata* was described by Miquel (1853: 130) that classified it in the group “3 Folia omnia integra” (leaves always entire).

Berg & Heusden (1988: 109) synonymized *Pourouma populifolia*, although they did not comment anything about this species. We considered *P. populifolia* synonymous of *P. acuminata*, because type collections (Krukoff 8427) sharing the synapomorphies of *P. acuminata*. Also, the author of *P. populifolia* (Standley 1937: 184) did not mention *P. acuminata* and the type locality of both species is from northwest of Amazonas (Brazil).

Pourouma acuminata belongs to the group of species with entire lamina and basal secondary veins unbranched. It displays similarities with *P. minor*, due to the adaxial lamina surface smooth and stipules glabrous inside, but distinguished by primary vein with indument sparse, whitish,

sericeous to glabrous in the abaxial lamina surface, staminate flowers with tepals connate, stigma peltate, with up to 2 mm in diameter.

The staminate specimen is described and illustrated for the first time here (Monteagudo et al. 8423, MO).

The label information of the herbarium material (Glaziou 10070, K000946937) described a specimen cultivated in Rio de Janeiro, Brazil. However, according to the label from the duplicate deposited in the herbarium (P) the specimen is from Itapemirim, Espirito Santo, Brazil. Berg et al. (1990) suggested that this material is probably the same collection as Schwacke 560. Nevertheless, these authors did not mention from herbarium (K).

During the revision of herbarium material and field trip to Rio de Janeiro, we did not find records of this species. For this reason, we consider that *Pourouma acuminata* occurs naturally only in Amazon region.

2. *Pourouma amacayacuensis* Gaglioti & Romaniuc, Syst. Bot. 39 (3): 902. 2014.—TYPE: COLOMBIA. Amazonas: Municipio Leticia, Parque Nacional Natural Amacayacu, Parcela Permanente (árbol 0^o0562), 03°48'33,2"S, 70°16'4,29"W, 3 Nov 2011 (♀), *J. S. B. Silva et al. 2162* (holotype: SP!; isotype: COAH!).

Tree 15–25 m tall, 20–25 cm d.b.h., with stilt roots; bark smelling of menthol. Leafy twigs 3–8 mm in diameter, with dense, floccose, brownish, arachnoid indument; internode 5–30 mm long. Lamina entire, 7–20.5 cm long, 2.5–10 cm wide, length:width ratio 1.8–2.8, elliptic to obovate, discolorous, coriaceous; base obtuse to cuneate; margin entire to slightly repand, with indument sparse, whitish, sericeous; apex acute to acuminate; adaxial surface scabrous,

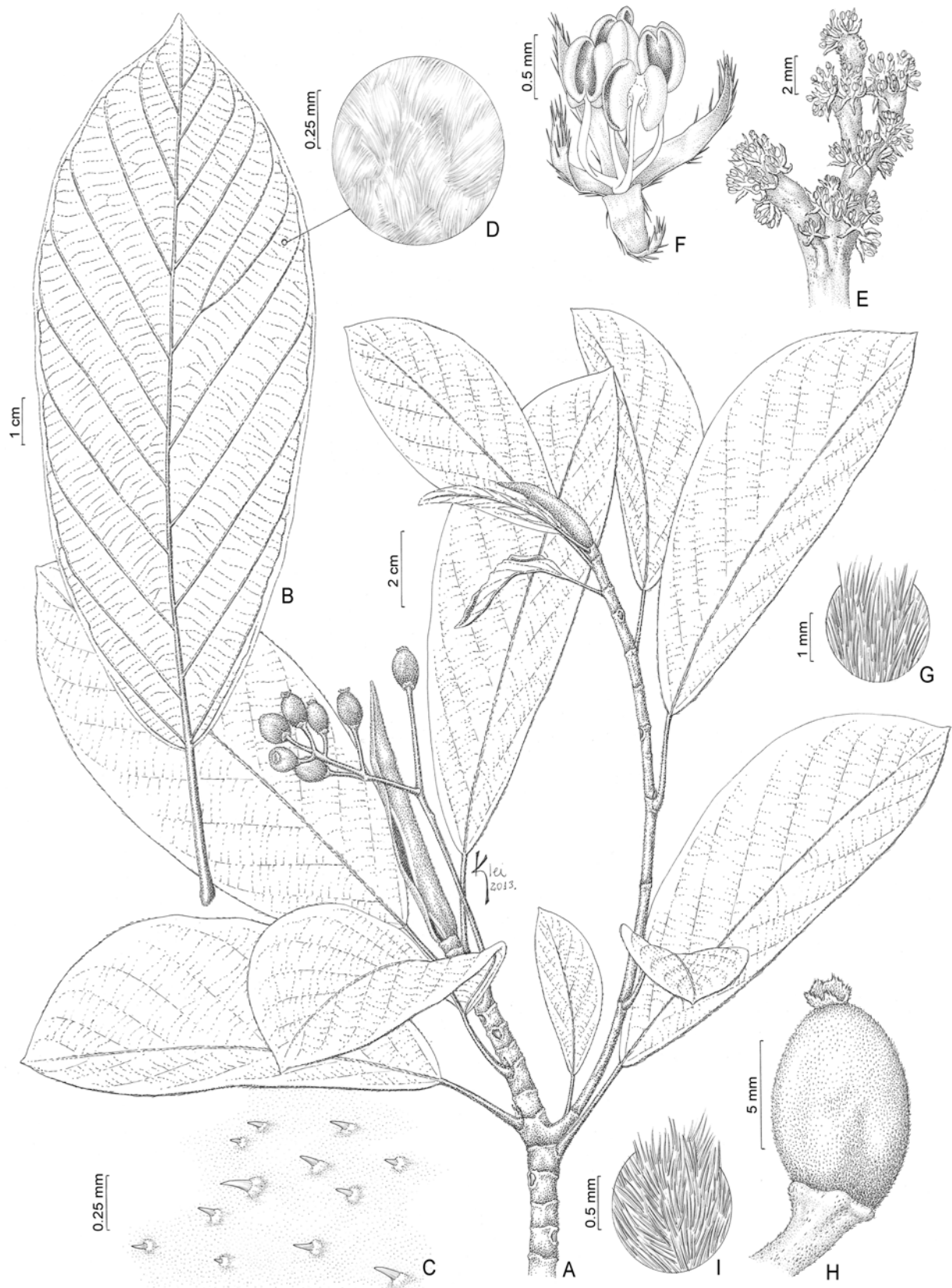


FIG. 23. *Pourouma amacayacuensis*. A. Leafy twig with infructescence. B. Leaf, abaxial surface. C. Strigose indument of the adaxial lamina surface. D. Archnoid indument on the main veins of the abaxial lamina surface. E. Staminate inflorescence. F. Staminate flower. G. Hirsute indument of the stipules outside. H. Fruiting perianth and pedicel. I. Velutinous indument of the pistillate perianth. [A-D, G-I: from *Silva et al.* 2162 (SP); E-F: from *Rudas et al.* 3150 (MO)].

with indument whitish, strigose, indument of primary vein yellowish to whitish, sericeous to strigose; abaxial surface smooth, with dense, whitish, arachnoid indument, indument of primary vein whitish, sericeous and whitish, arachnoid indument; venation brochidodromous; secondary veins 10–12 pairs per leaf, basal pair unbranched, diverging from the midrib at an 30°–45°; tertiary and quaternary veins slightly prominent, with dense, whitish, arachnoid indument in the areoles; petiole (1.2–) 2–4.5 cm long, with indument yellowish to whitish, sericeous to strigose and sparse, floccose, brownish, arachnoid indument, domatia absents; stipules 3.5–7.2 cm long, with indument yellowish, hirsute and sparse, floccose, brownish, arachnoid indument outside, glabrous inside, caducous. Staminate inflorescences 7.5–9 cm long, 4.5–6.5 cm wide, primary branched 4; peduncle 3–4.5 cm long, peduncle and branches with dense, floccose, brownish, arachnoid indument and indument yellowish to whitish, sericeous to strigose; flowers ca. 350–450, flowers organized in 10–35 fascicles, diffusely distributed along the ultimate branches; fascicle 3–8 mm in diameter, ca. 5–25 flowers per fascicle. Staminate flowers 1.5–2 mm long, 1.5–2 mm wide, sessile; tepals 4, 1.2–1.5 mm long, free or basally connate, with indument yellowish to whitish, sericeous to strigose; stamens 4; filaments 0.8–1.2 mm long, free, usually shorter than the tepals. Pistillate inflorescences unknown. Infructescences 10–10.5 cm long, 5–5.5 cm wide; peduncle 5–6.5 cm long, peduncle and branches with dense, floccose, brownish, arachnoid indument and indument yellowish to whitish, sericeous to strigose; fruits 5–11, fruits organized in 2 cymes; fruiting pedicel 0.6–1.3 cm long; stigma peltate, 1.5–3 mm in diameter. Fruiting perianth 1–1.2 cm long, 4–6 mm wide, ovoid to ellipsoid, green to reddish, with indument brownish to yellowish, velutinous. Achene 8–10 mm long, 3–4 mm, ovoid to ellipsoid; pericarp crustaceous. Seed 3–5 mm long, 1.5–2 mm wide, ovoid, brownish to vinaceous. Fig. 5 B; Fig. 12 B; Fig. 23.

Phenology. Staminate flowers collected from September and fruits from November.

Distribution (Fig. 25). Endemic from southwestern of Colombia (Amazonas), inside of the Amacayacu Natural National Park, in Amazonian “terra firme” forest, in lowland moist area, at an elevation up to 120 m.

Vernacular Name. It is known as uvilla by Tikunas of municipality of Leticia, Amazonas, Colombia.

Etymology. The epithet is a tribute to type locality, Amacayacu Natural National Park (Colombia, Amazonas).

IUCN conservation status. According to the IUCN Red list categories (IUCN 2014), *Pourouma amacayacuensis* is considered Endangered, EN B1a,b(iii), because of the small extent of occurrence in Amacayacu Natural National Park (ca. 2,935 km²).

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** AMAZONAS: Municipio Leticia, Parque Nacional Natural Amacayacu, Centro Administrativo Mata-matá, troche que conduce a Amacayacu, en el km 4, 03°47'S, 70°15'W, (♂), *Rudas & Prieto 3150* (COL, MO).

Pourouma amacayacuensis belongs to a group of species with basal secondary veins unbranched, which have lamina usually entire. It shows similarities with *Pourouma floccosa*, due to the dense, floccose, brownish, arachnoid indument in the leafy twigs and abaxial lamina surface with whitish arachnoid indument, but distinguished by foliar lamina with apex acute to acuminate, adaxial lamina surface scabrous, stipules with yellowish hirsute indument outside and pistillate perianth with brownish-yellowish velutinous indument. *Pourouma amacayacuensis* also shows similarities with *P. phaeotricha* by foliar lamina entire, obovate, with adaxial lamina surface scabrous, but distinguished by dense brownish floccose arachnoid indument, lamina with

whitish arachnoid indument on the primary veins of the abaxial lamina surface and staminate flower organized in fascicle.

Our results of molecular analyses (Chapter 1, Fig. 5) provided a moderate support to *Pourouma amacayacuensis* more closely related to *P. velutina* (BP = 80, PP = 0.95) within clade V. These species are morphologically related, due to entire lamina with adaxial lamina surface scabrous, staminate inflorescence in fascicles, and staminate flowers with tepals free or basally connate, but *Pourouma amacayacuensis* distinguished from *P. velutina* by dense, floccose, brownish, arachnoid indument (versus without dense, floccose, brownish, arachnoid indument), abaxial lamina surface with whitish, arachnoid indument on the primary vein (versus without whitish, arachnoid indument), and stipules glabrous inside (versus with indument yellowish, sericeous to velutinous).

3. *Pourouma apaporiensis* Cuatrec., *Caldasia* 7: 297. 1956; Berg & Heusden, Proc. Kon. Ned.

Akad. Wetensch., Ser. C., 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 159. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27^A: 88. 1993; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez.: 239. 2000.—TYPE: COLOMBIA. Amazonas-Vaupes: Rio Apaporis, Lagunas del Chucuro, 22 Nov 1951 (♀), *Garcia-Barriga 13643* (holotype: US!; isotype: COAH! COL! NY!).

Pourouma apaporiensis Cuatrec. Forma *macrophylla* Cuatrec., *Caldasia* 7: 298. 1956; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 159. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27^A: 88. 1993; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez.: 237. 2000.—TYPE: COLOMBIA. Vaupes:

Headwaters of the Río Cubiyú, Tributary of the Río Vaupes, 8 Dec 1943 (♀), *Allen 3251* (holotype: US!; isotypes: COL! MO!).

Pourouma melinonii Benoist *subsp. glabrata* C.C. Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C, 91(2): 108. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 161. 1990.—TYPE: PANAMA. Panama: Canal Zone, Pipeline Rd., 10 km NW of Gamboa, 14 Dec 1973 (♀), *Berg & Nee 355* (holotype: U!; isotypes: BG! COL! K! MO! NY image! PMA image!)

Tree, 6–30 (–36) m tall, 25–30 cm d.b.h., with stilt roots. Leafy twigs 4–15 mm in diameter, with indument whitish, sericeous and brownish to brownish-red to vinaceous, multicellular trichomes; internode 3–25 (–30) mm long. Lamina palmatifid to palmatipartite with 3–7 lobes, (10.5–) 12.5–32.5 (–54) cm long, (12–) 13.5–35 (–58) cm wide, length:width ratio 0.7–1.1, coriaceous; base cordate to deeply cordate; margin palmatifid, with indument whitish to yellowish, sericeous to hirsute; apex acuminate to caudate; adaxial surface smooth, indument of veins sparse, whitish to yellowish, sericeous to hirtellous, sometimes glabrous; abaxial surface smooth, indument of veins whitish to yellowish, sericeous to hirsute and sometimes with brownish to brownish-red, multicellular trichomes; venation palmate; secondary veins in the free part of the midsegment 10–22 pairs per leaf, basal pair branched; tertiary and quaternary veins slightly prominent to prominent, whitish, arachnoid indument in the areoles and sometimes extending to the tertiary and quaternary; petiole 7.5–28 cm long, with indument whitish to yellowish, sericeous to hirsute or puberulous to glabrous, domatia absents; stipules 4–14.5 cm long, with indument whitish to yellowish, sericeous to strigose outside, glabrous inside, caducous. Staminate inflorescences 3.5–12.5 cm long, 2–4.5 cm wide, primary branched 3;



FIG. 24. *Pourouma apaporiensis*. A. Leafy twig with pistillate inflorescences and infructescences. B. Leaf, abaxial surface. C. Staminate inflorescence. D. Staminate flower. E. Pistillate flower and pedicel. F. Fruiting perianth and pedicel. [A, E: from *Fonnegra et al.* 1879 (NY); B, F: from *Allen* 3251 (MO); C-D: from *Defler* 371 (MO)].

peduncle 2–6.5 cm long, peduncle and branches with indument yellowish to whitish, sericeous to hirtellous and sometimes with brownish to brownish-red, multicellular trichomes on the ultimate branches; flowers ca. 300–1050, flowers organized in ca. 10–30 glomerules; glomerule 5–12 mm in diameter, ca. 30–50 flowers per glomerule. Staminate flowers 4–6 mm long, 0.8–1 mm wide; sessile; perianth 1.2–2 mm long, infundibuliform, tepals connate, with indument yellowish, hirtellous; stamens 3–4; filaments 4–6 mm long, completely connate, filaments exceeding the perianth. Pistillate inflorescences 6.5–9.5 cm long, 2.5–5.5 cm wide; peduncle 3–7 cm long, peduncle and branches with indument whitish, sericeous to glabrous; flowers 10–35, flowers organized in 4–8 cymes. Pistillate flowers 4–6 mm long, 3–4 mm wide, pedicel 4–7 mm long; perianth 3–5 mm long, with with indument dense, whitish to yellowish, sericeous to velutinous, sparse in the apex; stigma peltate, 1.5–2 mm in diameter. Infructescences 6–17.5 cm long, 3.5–10.5 cm wide; peduncle 3–9.5 cm long; fruiting pedicel 8–15 mm long. Fruiting perianth 1.5–2 cm long, 8–15 mm wide, ovoid to ellipsoid, brownish to vinaceous, with indument whitish to yellowish, sericeous. Achene 1.2–1.8 cm long, 5–10 mm wide, ovoid to ellipsoid; pericarp crustaceous to woody. Seed 4–10 mm long, 2–5 mm wide, ovoid to reniform, brownish to vinaceous. Fig. 9 E; Fig. 12 C; Fig. 24.

Phenology. Staminate flowers collected from February to July, pistillate flowers from April to November and fruits from September to May.

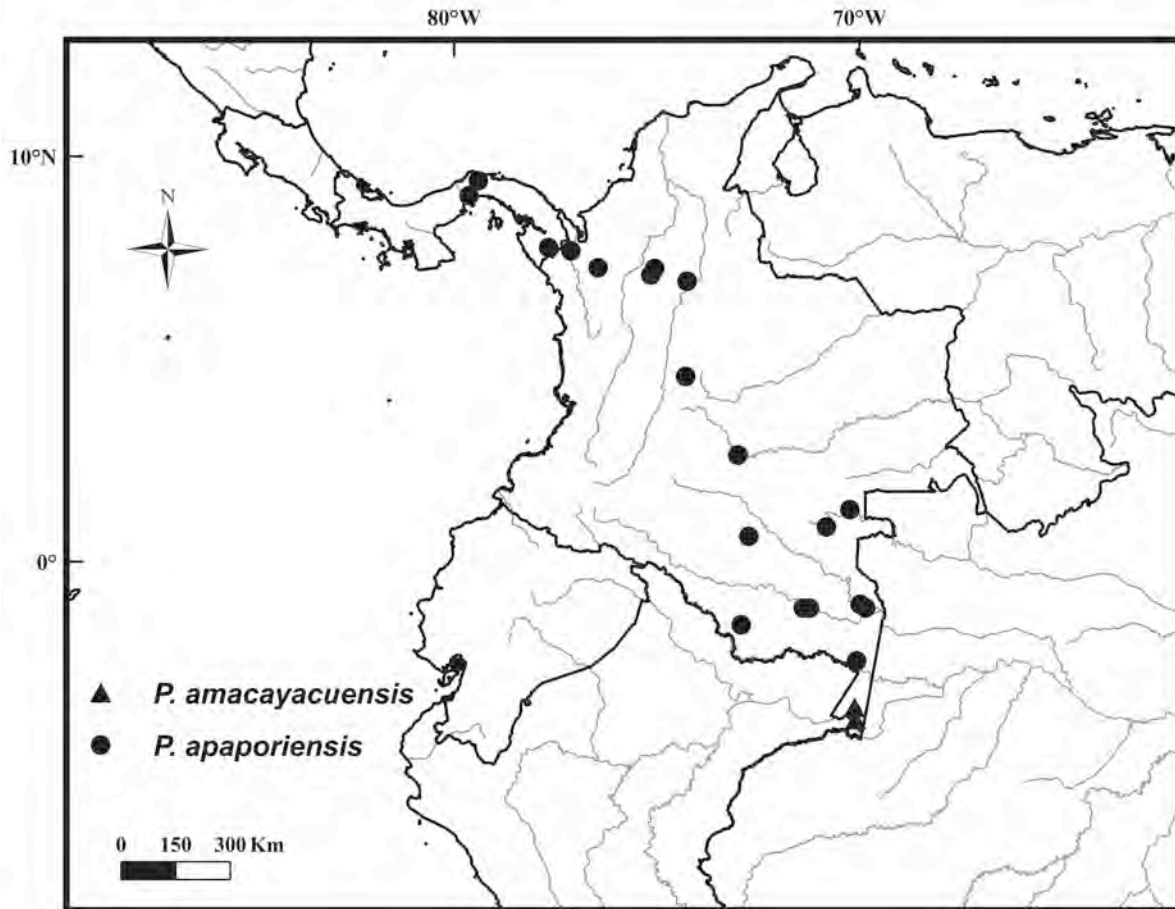


FIG. 25. Distribution of *Pourouma amacayacuensis* and *P. apaporiensis*.

Distribution (Fig. 25). Colombia (Amazonas, Antioquia, Chocó, Guaviare and Vaupes) and central-south of Panama (Darien and Panama), in tropical moist evergreen forest, in mostly lowland moist area, often in riparian forest, at an elevation of about 10 to 850 m above sea level.

Vernacular Name. Cirpe macho (Colombia, Amazonas); uva de orilla (Colombia, Antioquia).

Etymology. The epithet is a tribute to type locality, near to the Apaporis river.

IUCN conservation status. *Pourouma apaporiensis* is known from only twenty collections, made between 1943 and 2009. Nevertheless, the extent of occurrence of *P. apaporiensis* is ca.

412,220 km² and the population size are unknown. For these reasons *P. apaporiensis* is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** AMAZONAS: Rio Apaporis, entre los rios Kananarí y Pacoa, Soratama, (♀), *García-Barriga 14116* (COAH); La Chorrera, Igará Paraná, (♀), *Henaó & Toikemui 410* (COAH); Miriti-Paraná, Santa Isabel, reserva indígena Miraña, qda. El Churuco, (♀), *La Rotta 540* (COAH, COL).—ANTIOQUIA: Border between departamentos Antioquia an Bolívar, 38 km W of Barrancabermeja, (♂), *Bruijn 1496* (F, M, MO, NY, S, U, US, VEN); Border between departamentos Antioquia an Bolívar, 38 km W of Barrancabermeja, 6°55'N, 74°15'W, (♀), *Bruijn 1502* (F, M, MO, NY, S, U, US, VEN); Municipio Mutatá, 1 km Carretera Mutatá-Pavarandó, (♀), *Fonnegra et al. 1879* (MO, NY); Río Anorí beteween dos Bocas & Anorí, (♂), *Shepherd et al. 425* (COL, MO); Anorí, corregimiento de Providencia, (♀), *Soejarto 4283* (F, MO).—CHOCÓ: Riosucio, Parque Natural Nacional Los Katios, (♀), *C. Barbosa et al. 1248* (COL); Parque Nacional Natural Los Katíosquebrada del Marquito, (♀), *Zuloaga R. 424* (COL).—GUAVIARE: El Retorno, vereda El Trueno, estación experimental El Trueno, SINCHI, (♀), *Zarate et al. s.n.* (COAH72221).—VAUPES: Estación Biológica Caparú, 3 km N del lago Taraira, 1°00'S, 69°49'W, (♀), *Defler 369* (COAH, MO); Estación Biológica Caparú, 3 km N del lago Taraira, 1°00'S, 69°49'W, (♂), *Defler 371* (COAH, MO); Municipio de Taraira, Estación Biológica Caparú, 1°04'48"S, 69°30'15"W, (♀), *M. González & Yukuma 36* (COAH, COL); Municipio de Taraira, Estación Biológica Caparú, (♀), *M. González 62* (COAH). **Panama.** DARIEN: South of El Real, called Alturas de Nique, near Cana mine, 7°45'N, 77°40'W, (♀), *McPherson 11510* (BG).—PANAMA: Pipeline Rd., ca. 10km NW of Gamboa1, (♀), *Gentry 2046* (MO); Gamboa, (♀), *Gentry 2657* (MO, NA); San Blas, Rio Cangandí, hills upstream of village of Cangandi, 9°24'S, 79°24'W, (♀), *Nevers et al. 4929* (BG, F, NY).

Pourouma apaporiensis and *P. napoensis* can be distinguished from all other species of *Pourouma* by the staminate flowers with filaments completely connate, resembling flowers of *Coussapoa*. It distinguished from *P. napoensis* by the leafy twigs with indument whitish, sericeous (versus yellowish, hirsute), adaxial lamina surface with indument sericeous to hirsute on the veins (versus hirsute to hirtellous over the whole surface), pistillate inflorescence with up to 35 flowers (versus up to 70 flowers) and pistillate perianth with indument sericeous to velutinous (versus hirsute to hirtellous).

Berg & Heusden (1988: 109) synonymized *Pourouma apaporiensis* and *P. apaporiensis* forma *macrophylla* in *P. melinonii*, but they did not remark anything about these species. Additionally, these authors proposed a new subspecies for *Pourouma melinonii* (*P. melinonii* subsp. *glabrata*), distinguishing from subsp. *melinonii* by the lamina 3–5 parted with base more or less deeply cordate and the subglabrous fruiting perianth.

The staminate inflorescence and flowers of *Pourouma melinonii* are completely different of *P. apaporiensis* (see Table 3). Also, the synapomorphies described for *P. melinonii* subsp. *glabrata* are similar to *P. apaporiensis*. For this reason, we proposed the reestablishment of *Pourouma apaporiensis* and synonymized of *P. melinonii* subsp. *glabrata*.

The size of the lamina of *P. apaporiensis* forma *macrophylla* cited by Cuatrecasas (1956: 298) is peculiar of the young leaf.

TABLE 3. Distinguishing characteristics of *Pourouma apaporiensis* and *P. melinonii*.

Character/Species	<i>P. apaporiensis</i>	<i>P. melinonii</i>
Lamina leaf	Palmatifid to palmatipartite with 3–7 lobes	Entire or sometimes palmatifid to palmatipartite with 3 lobes
Base of the lamina	Cordate to deeply cordate	Obtuse, rounded to truncate, or subcordate
Staminate inflorescence	With ca. 30–50 flowers per glomerule	With ca. 10–30 flowers per glomerule
Staminate perianth	Infundibuliform	Urceolate
Filaments of the stamens	With 4–6 mm long, completely connate	With 0.8–1.2 mm long, free

4. *Pourouma apiculata* Spruce ex Benoist, Bull. Mus. Hist. Nat. (Paris) 28: 321. 1922; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 108. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 168. 1990; Berg, Fl. Venez. Guayana 4: 188. 1998; Berg, Fl. Venez.: 243. 2000.—TYPE: BRAZIL. Amazonas: Prope Panuré ad Rio Uaupés, Oct 1852–Jan 1853, (♀), *Spruce 2865* (holotype: P00756784!; isotypes: B image! BR image! C image! CGE image! E image! F! G image! GH image! GOET image! K! LE image! MG! NY image! OXF image! TCD image! P00756785! US!).

Pourouma apiculata Spruce ex Mildbr., Notizbl. Bot. Gart. Berlin-Dahlem 10: 419. 1928; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 108. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 168. 1990; Berg, Fl. Venez. Guayana 4: 188. 1998.—TYPE: BRAZIL. Amazonas: Prope Panuré ad Rio Uaupés, Oct 1852–Jan 1853, (♀), *Spruce 2865* (holotype: B image!; isotypes: BR image! C image! CGE

image! E image! F! G image! GH image! GOET image! K! LE image! MG! NY! OXF image! TCD image! P00756784! P00756785! US image!)

Coussapoa krukovii Standl., Publ. Field Mus. Nat. Hist., Bot. Ser., 17: 163. 1937; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 108. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 168. 1990; Berg, Fl. Venez. Guayana 4: 188. 1998; Berg, Fl. Venez.: 243. 2000.—TYPE: BRAZIL. Amazonas: Municipality São Paulo de Olivença, near Palmares, 11 Sep-26 Oct 1936 (♂), *Krukoff* 8223 (holotype: NY!; isotypes: A image! COAH! BR image! F! G image! GH image! K! LE image! LP image! MICH image! MO! NY! P! S image! U image! UC image! US image!).

Pourouma tomentosa Miq. subsp. *apiculata* (Benoist) C.C. Berg & Heusden, Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 108. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 168. 1990; Berg, Fl. Venez. Guayana 4: 188. 1998; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez.: 243. 2000; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.

Tree, 15–30 m tall, (15–) 20–30 (–40) cm d.b.h., with stilt roots. Leafy twigs 4–10 mm in diameter, with indument yellowish, hirsute, or at least on the scars of the stipules and sparse, whitish, arachnoid indument; internode 4–25 mm long. Lamina often entire, (3.5–) 5.5–22.5 (–26.5) cm long, (2.5–) 3–14.5 (–16.5) cm wide, length:width ratio 1.2–2.1, ovate to elliptic; or palmatifid to palmatifid with 3 lobes, 6.5–24.5 (–26.5) cm long, 6–23.5 (–25.5) cm wide, length:width ratio 0.8–1.2, coriaceous; base truncate, rounded to obtuse or cordate; margin usually repand or palmatifid, with indument sparse, whitish, sericeous; apex acuminate to acute; adaxial surface smooth or scabridulous, glabrous or with indument whitish, strigulose, indument of veins yellowish, hirtellous to sericeous; abaxial surface smooth and tomentose, with whitish,

arachnoid indument, indument of veins with whitish, sericeous and whitish, arachnoid indument; venation brochidodromous or palmate; secondary veins (5–) 6–16 (–22) pairs per leaf, basal pair branched, diverging from the midrib at an 30° – 45° ; tertiary and quaternary veins slightly prominent, with dense, whitish, arachnoid indument in the areoles; petiole (2–) 3–16.5 (–22.5) cm long, with indument yellowish, hirsute and dense to sparse, whitish, arachnoid indument, domatia absents; stipules (3–) 4.5–10.5 (–14.5) cm long, with indument yellowish, hirsute and whitish, arachnoid indument outside, with indument yellowish, hirsute to sericeous inside, caducous. Staminate inflorescences 3.5–9.5 (–12) cm long, (1.5–) 2.5–6.5 (–7.5) cm wide, primary branched 3–4; peduncle 1.5–5.5 cm long, peduncle and branches with indument yellowish, velutinous to hirtellous on the ultimate branches; flowers ca. 120–850, flowers organized in 8–30 glomerules; glomerule 3–4 mm in diameter, ca. 12–28 flowers per glomerule. Staminate flowers 1.2–1.5 mm long, 0.8–1.2 mm wide; sessile to subsessile; perianth 0.6–0.8 mm long, 0.4–0.8 mm wide, urceolate, tepals connate, with indument yellowish to whitish, hirtellous to sericeous, usually with whitish, arachnoid indument and brownish, multicellular trichomes; stamens 4; filaments 0.8–1.2 mm long, free, filaments exceeding the perianth. Pistillate inflorescences 2.5–5.5 (–6.5) cm long, 1.5–2.5 (–3.5) cm wide; peduncle 1–3.2 (–4.5) cm long, peduncle and branches with indument yellowish, velutinous to hirtellous on the ultimate branches; flowers (6–) 8–25 (–28), flowers organized in 2–4 cymes. Pistillate flowers 4–6 mm long, 2–4 mm wide; pedicel 2–4 mm long; perianth 3–5 mm long, with indument yellowish, velutinous, apex papillose, with brownish, multicellular trichomes; stigma peltate, 1.2–2 mm in diameter, sometimes with indument yellowish, velutinous. Infructescences 6.5–14.5 (–16.5) cm long, 3.5–8.5 (–10.5) cm wide; peduncle 3.5–9.5 (–10.5) cm long; fruiting pedicel 5–10 mm long.

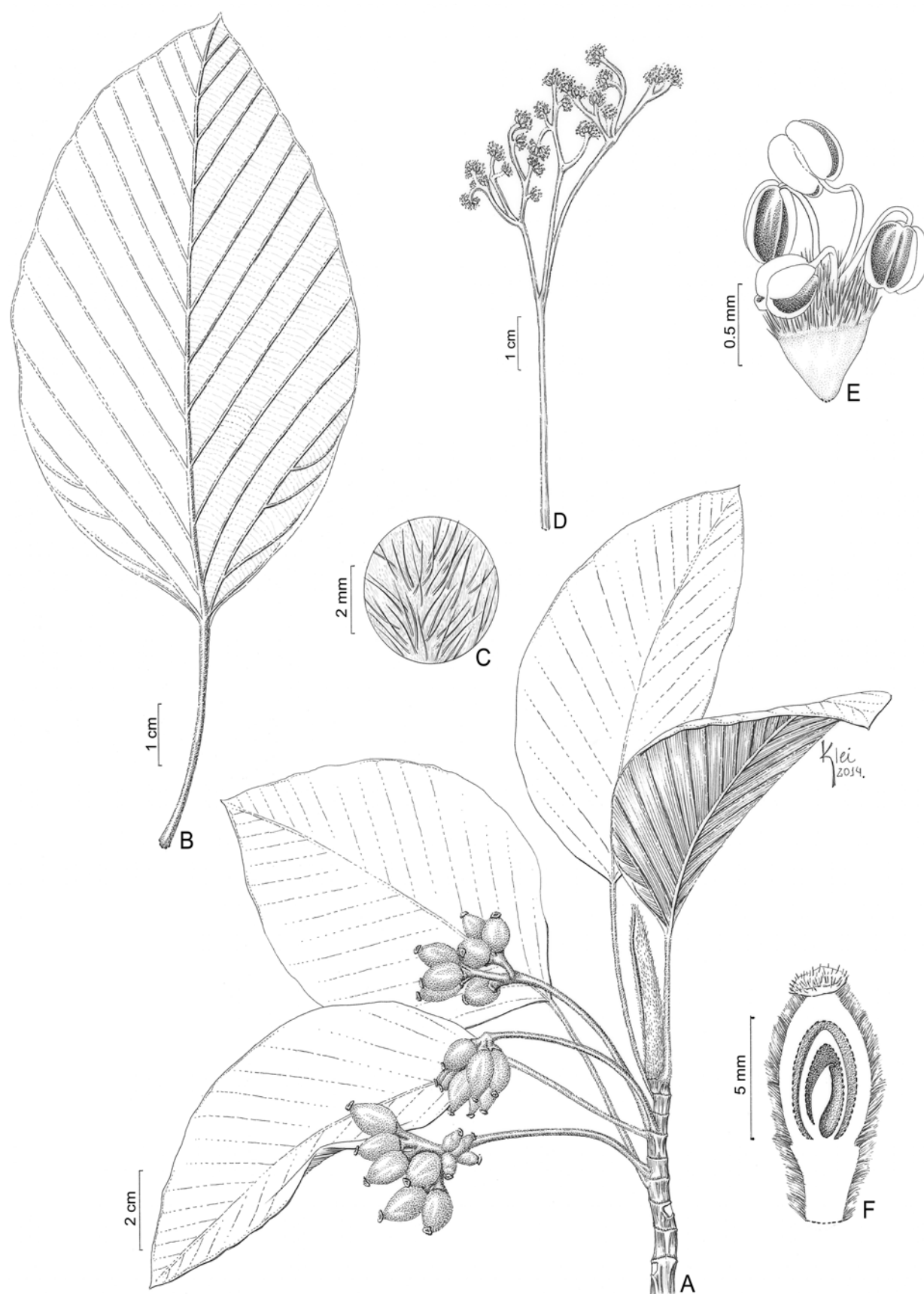


FIG. 26. *Pourouma apiculata*. A. Leafy twig with infructescences. B. Leaf, abaxial surface. C. Hirsute indument of the leafy twig. D. Staminate inflorescence. E. Staminate flower. F. Pistillate flower and pedicel, longitudinal section. [A-C: from Spruce 2865, (F); F: from Ribeiro *et al.* 1459, (RB); D-E: from Prance *et al.* 6292 (MO)].

Fruiting perianth 1.2–2.2 cm long, 5–12 mm wide, ovoid to ellipsoid, vinaceous to black, with indument yellowish, velutinous. Achene 8–20 mm long, 3–8 mm wide, ovoid to ellipsoid; pericarp crustaceous to woody. Seed 5–12 mm long, 2–8 mm wide, ovoid to reniform, vinaceous.

Fig. 12 D; Fig. 26.

Phenology. Staminate flowers collected along all the year, pistillate flowers from May to August and fruits from September to May.

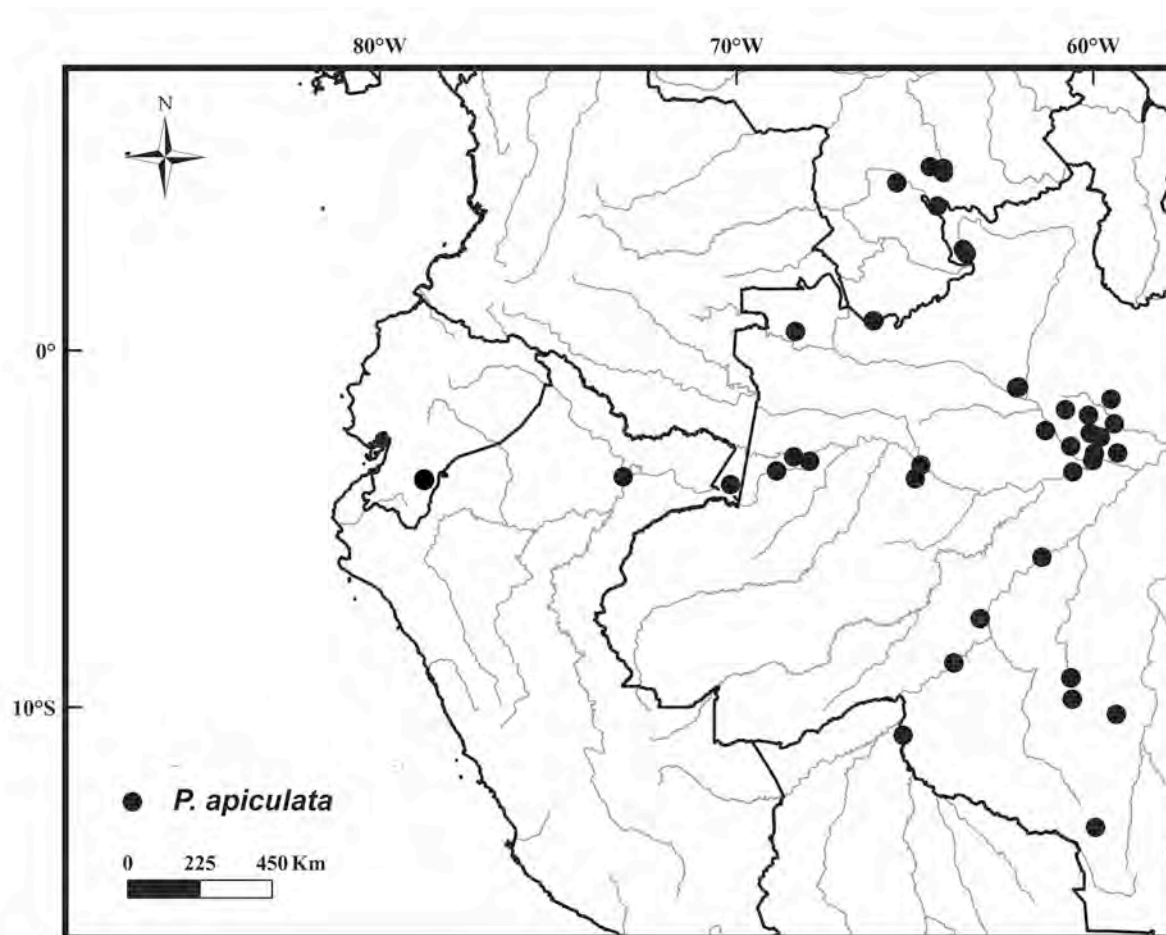


FIG. 27. Distribution of *Pourouma apiculata*.

Distribution (Fig. 27). Southwest of Venezuela (Amazonas and Bolívar), northwest of Brazil (Amazonas, Mato Grosso, Rondônia and Roraima), south of Colombia (Amazonas), northeast of Peru (Loreto) and southeast of Ecuador (Zamora-Chinchipe), in “terra firme” forest of the Amazonian region, commonly in lowland moist areas, often in riparian forest, at an elevation of about 25 to 930 m above sea level.

Vernacular Name. Imbaúbarana, mapati, purumaí (Brazil, Amazonas); sarasara (Venezuela, Bolívar).

Etymology. The epithet refers to the acute to acuminate apex of the lamina leaf.

IUCN conservation status. *Pourouma apiculata* is widely distributed with the extent of occurrence of ca. 1,683,450 Km² and is well represented in herbaria. For these reasons *P. apiculata* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAZONAS: Manaus, Igarapé Barro Branco, (♂), *P. A. C. L. Assunção & E. C. Pereira 700* (INPA, K, MBM, MG); São Paulo de Olivença, (♂), *A. Ducke RB25245* (RB, SP); Manaus, Reserva Florestal Ducke, Trilha do Portal, (♀), *Gaglioti & Pederneiras 139* (EAFM, SP); Humaitá, (♀), *Krukoff 6887* (A, BR, F, G, K, LE, MO, NY, RB, S, U, US); Democracia, Madeira, (♀), *J. G. Kuhlmann 255* (BG, RB, SP, U); Varadouro do Morcego, (♂), *J. G. Kuhlmann 291* (RB); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR-174, Km 72, depois 6 Km Oeste da BR, Fazenda Dimona, Distrito Agropecuário, ZF3, (♂), *Mackenzie et al. INPA/WWF2206.1626* (INPA); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR-174, Km 72, depois 6 Km Oeste da BR, Fazenda Dimona, Distrito Agropecuário, ZF3, (♂), *Mackenzie et al. INPA/WWF2206.2965* (INPA); Distrito Agropecuário, Reserva 1501, Km 41, (♀), *Mori & Wong 19822* (INPA, MO, NY); Manaus, Reserva Florestal Ducke, ao lado do campo de futebol, 02°53'S, 59°58'W, (♂), *J. R. Nascimento et al. 552* (IAN,

INPA, K, MG, RB); Manaus, Reserva Florestal Ducke, ao lado do campo de futebol, 02°53'S, 59°58'W, (♀) *J. R. M. Nascimento & C. F. Silva 673* (IAN, INPA, K, R); Manaus, Distrito Agropecuário da Suframa, 02°25'S, 59°51'W, (♂), *J. R. M. Nascimento et al. INPA/WWF1201.1618* (INPA); Manaus, Distrito Agropecuário, Reserva 1501 (km 41), 02°24'26"S, 59°43'40"W, (♂), *J. R. M. Nascimento et al. INPA/WWF1302.399* (INPA); Manaus, Distrito Agropecuário da Suframa, 02°25'S, 59°51'W, (♀), *J. R. M. Nascimento et al. INPA/WWF1302.2710* (INPA); Presidente Figueiredo, Reserva ZF-3, BR-174, Km 64, (♂), *A. C. A. Oliveira, 235* (INPA); Manaus, Reserva ZF2, BR-174, Km 50, (♀), *A. C. A. Oliveira 306* (INPA); km 159, BR 174, Manaus Caracaraí Road, (♂), *G. T. Prance et al. 22708* (INPA, K, MO, MG, NY, U); Manaus, SW corner of Ducke Forest Reserve, 02°53'S, 59°58'W, (♂), *Pruski et al. 3235* (INPA, IAN, K, MO, NY, R, SP, SPF, UEC); Manaus, Reserva Florestal Ducke, Igarapé Barro Branco, 02°53'S, 59°58'W, (♀), *Ribeiro et al. 1459* (INPA, K, MG, MO, NY, RB, SP); Manaus, Reserva Florestal Ducke, Igarapé Barro Branco, 02°53'S, 59°58'W, (♂), *Ribeiro et al. 1461* (INPA, K, MG, MO, NY, SP); Rio Solimões, Fonte Boa, (♂), *M. Silva 2199* (G, MG).—MATO GROSSO: Rio Aripuanã Núcleo Pioneiro Humboldt, Rio Juruena rd., (♂), *Berg & Steward P.19878* (COL, F, INPA, K, MG, MO, NY, P, R, S, U, US); Aripuanã INPA, Humboldt, (♀), *Rylands 30* (F, INPA); Município de Vila Bela da Santíssima Trindade, 5 km S of border of Rondônia, (♀), *Thomas et al. 4765* (BG, F, INPA, K, MO, NY, SPF).—RONDÔNIA: Porto Velho, BR-319, Km 120, Fazenda Amazonas, (♀), *Lobato 1858* (MG); Rd. To Abuna to Guajara-Mirim, 1 km N of Riberão, (♂), *G. T. Prance et al. 6292* (G, INPA, K, MG, NY, R, S, U, US).—RORAIMA: Caracaraí, Caicubi, 01°01'43"S, 62°05'21"W, (♂), *Alarcón & E. F. Barbosa 20* (INPA); Alto Alegre, Serra do Surucucu, (♂), *S. Almeida & M. Cordeiro 758* (HUEFS, K, MG); Anaris, (♀), *G. T. Prance et al. 9857* (F, GH, INPA, K, MG, NY, P, R, K, S, U, US); Serra dos Surucucus, (♀), *G. T. Prance et al. 9952* (C, INPA, K, MG, MO, NY, R, S, U); Caracaraí,

próximo a Vila de Caicubi, 01°01'43"S, 62°05'21"W, (♂), *Soler A. & E. F. Barbosa 20* (IAN, INPA, RB, SP); Caracaraí, próximo a Vila de Caicubi, 01°01'43"S, 62°05'21"W, (♂), *Soler A. & E. F. Barbosa 61* (IAN, RB, SP); Caracaraí, próximo a Vila de Caicubi, 01°01'43"S, 62°05'21"W, (♂), *Soler A. & E. F. Barbosa 148* (IAN, MBM, RB); Rorainópolis, Reserva Popular Xixuaú-Xiparina, (♀), *Zappi et al. 2969* (SP). **Colombia.** AMAZONAS: Leticia, Parque Nacional Natural Amacayacu, Parcela permanente de Amacayacu, (♀), *J. S. B. Silva et al. 2220* (COAH, SP). **Ecuador.** ZAMORA-CHINCHIPE: Zamora, (♀), *Neill et al. 13006* (MO, NY); Nangaritza, Miazí. Márgen derecha Río Nangaritza, (♀), *W. Palacios 8638* (MO). **Peru.** LORETO: Province of Maynas, 12–18 km on trail E of La Peca in Serrania de Bagua, (♂), *Gentry et al. 22865* (BG, MO); Maynas, Trocha, Quebrada Fillico, (♀), *Grandez, C. 1432* (INPA). **Venezuela.** AMAZONAS: Atabapo, Alto do Orinoco, 02°58'N, 65°21'W, (♀), *Aymard & Delgado 8035* (MO, NY, PORT); Depto. Rio Negro, nr. Cerro de La Neblina Base Camp, (♀), *Liesner 16175* (BG, MO, NY); Depto. Rio Negro, nr. Cerro de La Neblina Base Camp, Along Río Baria, just upstream from Base Camp, 00°49'50"N, 66°09'40"W, (♀), *Nee 30877* (F); along Río Baria, (♀), *Thomas 3349* (MO, NY, BG).—BOLÍVAR: Municipio de Foráneo Aripao, márgen derecha de caño Minchaquene, tributário de Alto Caura, (♀), *Aymard et al. 6842* (NY, PORT); Merida, región de los rios Icabaru, (♂), *Bernardi 2731* (F, NY); Cedeño, Along tributary of the Río Erebato, (♀), *Boom & Marin 10412* (MO, NY); Río Carfin, (♂), *Cardona 1222* (US, VEN); Municipio de Raul Leoni, 05°16'N, 63°19'W, (♀), *Marin 162* (NY, PORT); Unellez Guanare, lomerio bajo escarpado del Río Caura, a la altura del raudal Guanagujaña, 05°6'N, 64°12'W, (♀), *Stergios & Delgado 12608* (NY, PORT, US).

Pourouma apiculata belongs to group species with whitish arachnoid indument on the many part of the plant (e.g., branches, stipules, petiole). Benoist (1922: 321) remarked the resemblances

of *Pourouma apiculata* with *P. tomentosa* and *P. maroniensis*, but he distinguished *P. apiculata* by presence of trichomes on inside surface of the stipules.

Berg & Heusden (1988: 108) proposed a new combination *Pourouma tomentosa* subsp. *apiculata* synonymizing *Pourouma apiculata* and *Coussapoa krukovii*, but they did not comment anything about these species.

Pourouma apiculata distinguished from *P. tomentosa* by leafy twigs with indument hirsute (versus with indument sericeous), stipules with indument yellowish, hirsute to sericeous inside (versus glabrous), lamina entire to palmatilobed (versus always entire), staminate inflorescence with glomerules 3–4 mm in diameter (versus 5–8 mm). Moreover, molecular analyses corroborate for the reestablishment of *Pourouma apiculata* proposed here. This species arose within clade II (Chapter 1, Fig. 5), is more closely related to *Pourouma herrerenensis* (BP = 85, PP = 1.00).

We designated *Spruce* 2865 (P00756784) as holotype, because the label presents the locality type of the species, as described in the protologue.

Coussapoa krukovii was described by Standley (1937: 1937) based in a staminate collection (Krukoff 8223). This material matches with staminate materials of *Pourouma apiculata*.

Pourouma apiculata Spruce ex Mildbr. is a homotypic synonym.

5. *Pourouma bergii* Gaglioti & Romaniuc, *Phytotaxa* 173 (2): 169. 2014.—TYPE: PERU. Loreto: Prov. Alto Amazonas. Andoas; campamento petrolero, Río Pastaza, no. de Iquitos, 02°55'S, 76°25'W, 21 Nov 1980 (♀), R. Vásquez & N. Jaramillo 809 (holotype: MO!; isotypes: BG! F! NY!)

Tree, 8–25 m tall, 10–28 cm d.b.h., with stilt roots. Leafy twigs 5–12 mm in diameter, glabrous, without whitish, arachnoid indument; internode 5–22 mm long. Lamina palmatisect, (10.5–) 12–39.5 (–40.5) cm long, (10–) 13.5–36.5 (–38.5) cm wide, length:width ratio 0.8–1.3; 5–7 segments; pseudo-petiolules 5–12 mm long; segments (5–) 7.5–16.5 (–19.5) cm long, (3.5–) 4.5–7.5 (–8.5) cm wide, length:width ratio 1.4–2.3, lanceolate to elliptic, coriaceous; base acute; margin palmatifid, with indument sparse, yellowish, sericeous; apex acuminate; adaxial surface smooth, indument of primary veins sparse, yellowish, sericeous, adaxial surface smooth, with indument yellowish, sericeous; abaxial surface smooth, with indument yellowish, sericeous and sometimes with sparse, whitish, arachnoid indument; venation palmate; secondary veins in the midsegment 14–26 pairs, basal pair unbranched, diverging from the midrib at an 50°–60°; tertiary and quaternary veins slightly prominent, with dense, whitish, arachnoid indument in the areoles and sometimes extending to the tertiary and quaternary veins; petiole (3.5–) 8.5–18.5 (–26) cm long, glabrous or sometimes with sparse, whitish, arachnoid indument in the juvenile leaves, domatia absents; stipules (3–) 3.5–7.5 (–11.5) cm long, with indument yellowish, hirsute and dense, whitish, arachnoid indument outside, with indument sparse, yellowish, hirsute to glabrous inside, caducous. Staminate inflorescences 5.5–10.5 cm long, 2.5–6.5 mm wide, primary branched 2–3; peduncle 1.5–2.5 cm long, peduncle and branches with indument yellowish, velutinous to hirtellous on the ultimate branches; flowers ca. 250–650, flowers organized in 15–50 glomerules; glomerule 4–6 mm in diameter, ca. 10–30 flowers per glomerule. Staminate flowers 2.2–3.2 mm long, 0.8–1.5 mm wide; sessile; perianth 1.2–1.8 mm long, 0.8–1 mm wide, infundibuliform, tepals connate, with indument sparse, yellowish to whitish, hirtellous to sericeous; stamens 2; filaments 1.5–2 mm long, free, filaments exceeding the perianth. Pistillate inflorescences unknown. Infructescences 6.5–9 cm long, 4.5–6.5 cm wide;



FIG. 28. *Pourouma bergii*. A. Leafy twig with infructescences. B. Leaf, abaxial surface. C. Sericeous indument of the fruiting perianth. D. Staminate inflorescence. E. Staminate flower. [A-C: from Vásquez & Jaramillo 2809 (MO); D-E: from Aulestia & Audi 745, (MO)].

peduncle 3–4.5 cm long, peduncle and branches with indument sparse, whitish, arachnoid indument to glabrous; fruits 6–8, fruits organized in 2–3 cymes; fruiting pedicel 8–15 mm long; stigma peltate, 8–1 mm in diameter, sometimes with indument yellowish, sericeous. Fruiting perianth 1–1.8 cm long, 5–10 mm wide, ovoid to ellipsoid, brownish to vinaceous, tomentose, with indument yellowish to whitish, sericeous, and whitish, arachnoid indument. Achene 8–1.5 mm long, 3–8 mm wide, ovoid to ellipsoid; pericarp crustaceous. Seed 5–10 mm long, 2–5 mm wide, ovoid, brownish to vinaceous. Fig. 9 D; Fig. 12 E; Fig. 28.

Phenology. Staminate flowers collected from September and fruits from September to February.

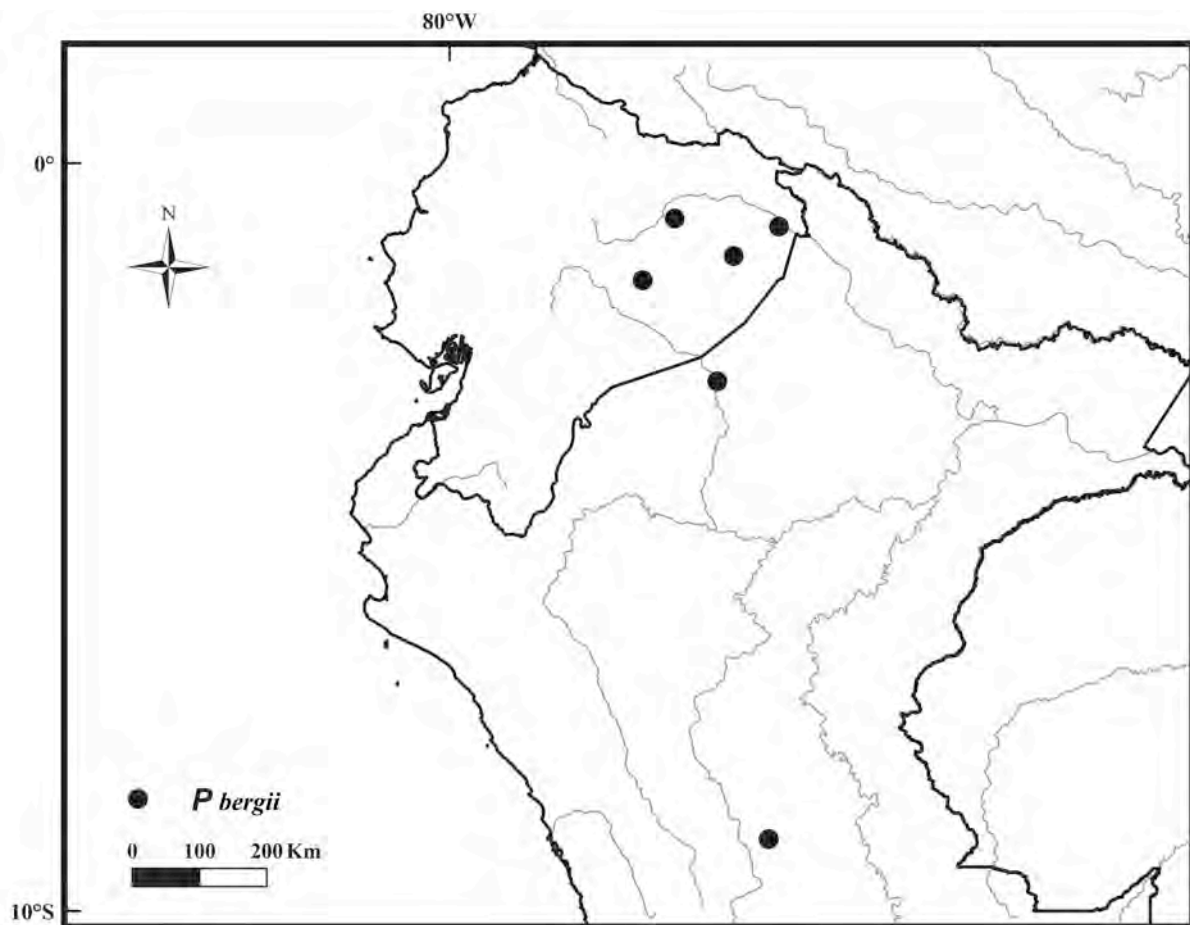


FIG. 29. Distribution of *Pourouma bergii*.

Distribution (Fig. 29). Northeast of Peru (Loreto and Pasco) and Ecuador (Napó and Pastaza), in primary “terra firme” forest of the Amazonian region, in lowland moist area, at an elevation of about 200 to 365 m above sea level.

Vernacular Name. yohue (Ecuador, Pastaza); uvilla (Ecuador, Pastaza); taconilla de monte (Peru, Pasco).

Etymology. The epithet honors Dr. Cornelis Christiaan Berg (1934–2012[†]), a great specialist botanist in Moraceae, Cannabaceae, Ulmaceae and Urticaceae.

IUCN conservation status. *Pourouma bergii* is known from only seven collections in the provinces of Loreto, Pasco (Peru), Napó and Pastaza (Ecuador), made between 1980 and 1994. However, the extent of occurrence of *P. bergii* is ca. 96,000 km² and the population size are unknown. For these reasons *P. bergii* is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Ecuador.** NAPO: Orellana, Parque Nacional Yasuni, carretera y oleoducto de Maxus en construcción, km 54–58, 0°48’S, 76°30’W, (♂), *Aulestia et al.* 745 (MO, QCNE); Orellana, Parque Nacional Yasuni, carretera y oleoducto de Maxus, 00°39’S, 76°26’W, (♀), *Aulestia* 2698 (MO, QCNE); Añangu, NW corner of the “Parque Nacional Yasuni”, (♀), *Korning & Thomsen* 47618 (AAU, BG, MO, NY); Canton Francisco de Orellana, Via de los Zorros, pozo petrolero Jaguar I, 40 km al SW de Coca, 00°44’S, 77°05’W, (♀), *W. Palacios* 3238 (BG, MO, QCNE).—PASTAZA: Pastaza Canton, Pozo petrolero “Moretecocha” de Arco, 01°34’00”S, 77°25’00”W, (♀), *Gudiño et al.* 958 (MO, NY, QCNE). **Peru.** PASCO: Province of Oxapampa, Distr. Iscozacín, (♂), *Pariona & Pedro* 954 (BG, F, MO).

Pourouma bergii belongs to the group of species with palmatisect lamina. It shows similarities to *Pourouma persecta* and *P. petiolulata* by palmatisect lamina with segments usually

pseudo-petiolules. It may be distinguished from *P. persecta* and *P. petiolulata* by glabrous leafy twigs (versus hirsute to hirtellous), adaxial lamina surface smooth (versus scabrous in *P. petiolulata*), infundibuliform staminate perianth (versus perianth urceolate or with free tepals), two stamens (versus four) and tomentose pistillate perianth with whitish arachnoid indument (versus yellowish velutinous or hispidulous).

The related species *Pourouma petiolulata* is endemic of Napo (Ecuador) and *P. persecta* occurs in Bolivia (Cochabamba and La Paz), northwest of Brasil (Amazonas, Acre and Mato Grosso).

6. *Pourouma bicolor* Mart., Syst. mat. med. bras. 34. 1843; Miquel in Martius, Fl. bras. 4(1): 129, tab. 39. 1853; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 108. 1988; Spichiger et al., Boissiera 1: 62. 1989; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 132. 1990; Berg, Fl. Guianas 11(22): 115. 1992; Berg & Franco-Rosselli, Fl. Ecuador 27A: 82. 1993; Berg, Fl. Venez. Guayana 4: 186. 1998; Berg, Fl. Venez.: 235. 2000; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1664. 2010.—TYPE: COLOMBIA. Amazonas: “Habitat in fluvis Japurá ad Porto dos Miranhas provinciae Rio Negro”, Jan 1820 (♀), *Martius s.n.* (holotype: M0174081!)

Pourouma aspera Trécul, Ann. Sci. Nat., Bot., Sér. 3, 8: 102. 1847; Standley, Publ. Field Mus. Nat. Hist., Bot. Ser., 18(1): 391. 1937; Standley & Steyermark, Fieldiana Bot. 24(4): 52. 1946; Berg & Dewolf, Fl. Suriname 5(1): 267. 1975; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 133. 1990; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 132. 1990; Berg, Fl. Guianas 11(22): 115. 1992; Berg & Franco-Rosselli, Fl.

- Ecuador 27A: 83. 1993; Berg, Fl. Venez. Guayana 4: 186. 1998 Berg, Fl. Venez.: 235. 2000.—TYPE: FRENCH GUIANA. Unknown locality and date, (♀), *Poiteau s.n.* (holotype: P00757092!; isotype: K! LE image! P00757091!).
- Pourouma crassivenosa* Mildbr., Notizbl. Bot. Gart. Berlin-Dahlem 10: 419. 1928; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 133. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 83. 1993; Berg, Fl. Venez.: 235. 2000.—TYPE: BOLIVIA. San Carlos bei Mapiri, 15° Süd, Sep 1907 (♀), *Buchtien 2050* (holotype: US!; isotypes: B image! NY!).
- Pourouma lawrancei* Standl., Publ. Field. Mus. Nat. Hist., Bot. Ser., 17: 183. 1937; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 133. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 83. 1993; Berg, Fl. Venez.: 235. 2000.—TYPE: COLOMBIA. Boyacá: El Humbo, 31 Mar 1933 (♂), *Lawrance 727* (holotype: F-681071!; isotypes: A image! B image! E image! F-681070! G image! K! M! MO! S image! U! UC image! US!).
- Pourouma schultesii* Cuatrec., Caldasia 7: 303. 1956; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 133. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 83. 1993; Berg, Fl. Venez.: 235. 2000.—TYPE: COLOMBIA. Amazonas-Vaupés: Rio Apaporis, Jinogojé, at mouth of Río Piraparaná and vicinity, 00°15'S, 70°30'W, 25 Sep 1952 (♀), *Schultes & Cabrera 17615* (holotype: F!).
- Pourouma camaratana* Cuatrec., Acta Bot. Venez. 2(5–8): 202. 1967; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 133. 1990; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 132. 1990; Berg, Fl. Guianas 11(22): 115. 1992; Berg & Franco-

Rosselli, Fl. Ecuador 27A: 83. 1993; Berg, Fl. Venez. Guayana 4: 186. 1998; Berg, Fl. Venez.: 235. 2000.—TYPE: VENEZUELA. Bolívar: Vicinity of Guayaraca Camp, Faldas meridionales, vecindad de “Danto” en la segunda meseta (hombrillo), arriba del valle de Kamaratana, 18 May 1964 (♀), *Steyermark 94180* (holotype: US!; isotypes: NY! VEN image!).

Tree, 8–35 (–37) m tall, 15–40 cm d.b.h., with stilt roots. Leafy twigs 3–20 mm in diameter, with indument yellowish to whitish, sericeous to strigose and brownish, multicellular trichomes; internode 4–35 (–40) mm long. Lamina usually entire, (4.5–) 5–24.5 (–26.5) cm long, (2.5–) 3–16.5 (–18.5) cm wide, length:width ratio 1.2–2.2, ovate or elliptic to oblong; or palmatifid with 3 lobes, 13.5–28 (–30) cm long, 14–29 (–31.5) cm wide, length:width ratio 0.8–1.1, discolorous, coriaceous, sometimes plicate; base obtuse, truncate, rounded to subcordate; margin entire, usually repand or palmatifid, with indument sparse, whitish, sericeous to strigose; apex acuminate to acute or sometimes obtuse; adaxial surface scabrous to scabridulous or sometimes smooth, with indument whitish, strigose to strigulose, indument of veins yellowish to whitish, sericeous to strigose; abaxial surface scabrous or sometimes smooth, with indument whitish to yellowish, sericeous or strigose to strigulose, indument of veins yellowish to whitish, sericeous and whitish, strigulose and sometimes with sparse, brownish, multicellular trichomes; venation brochidodromous or palmate; secondary veins 10–25 pairs per leaf, basal pair branched, diverging from the midrib at an 40°–60°; tertiary and quaternary veins plane to slightly prominent, whitish, arachnoid indument confined to the areoles; petiole (2.5–) 4–14.5 (–16.5) cm long, with indument sparse, whitish, sericeous or glabrous, domatia absents; stipules (2.5–) 3.5–12.5 (–14) cm long, with indument yellowish to whitish, sericeous or hirsute to hirtellous, with brownish, multicellular trichomes outside, with indument dense, yellowish to whitish, velutinous



FIG. 30. *Pourouma bicolor*. Leafy twig with infructescences, 17. Fruiting perianth and pedicel. 17 II. Fruiting perianth, pedicel and fruit. 43 II. Fruiting perianth, pedicel and fruit. 42. Fruiting perianth. 19. Pericarp. 18. Fruit. 21 II. Pericarp and seed, 19 II seed. From Martius, *Flora brasiliensis*, 4(1). 1853: Tab. 39 (modified).

to sericeous inside, caducous. Staminate inflorescences 3.5–8.5 cm long, 2–5.2 (–6.5) cm wide, primary branched 3–4; peduncle 1.5–7.5 cm long, peduncle and branches yellowish to whitish, sericeous and dense, brownish to vinaceous, multicellular trichomes on the ultimate branches; flowers ca. 240–1150, flowers organized in 10–35 fascicles, diffusely distributed along the ultimate branches; fascicle 4–8 mm in diameter, ca. 3–38 flowers per fascicle. Staminate flowers 1.5–2 mm long, 1.2–2 mm wide; sessile; tepals 4, lanceolate, 1.2–1.5 mm long, free or basally connate, with indument yellowish to whitish, sericeous to strigulose; stamens 4; filaments 0.8–1 mm long, free, usually shorter than the tepals. Pistillate inflorescences 3.5–6 cm long, 1–4 cm wide; peduncle 1.5–4.2 cm long, peduncle and branches with indument yellowish to whitish, sericeous and dense, brownish to vinaceous, multicellular trichomes on the ultimate branches; flowers 3–28, flower organized in 1–5 cymes. Pistillate flowers 2–4 mm long, 2–3 mm wide; pedicel 3–5 mm long; perianth 1.5–3.5 mm long, with indument yellowish to whitish, strigose, apex papillose, with brownish, multicellular trichomes; stigma peltate, 1–1.5 mm in diameter. Infructescences 6.5–18.5 (–20.5) cm long, 2.5–12 (–13.5) cm wide; peduncle 3.5–10.5 (–12.5) cm long; fruiting pedicel 0.8–2 cm long. Fruiting perianth 1–1.8 cm long, 5–10 mm wide, ovoid to ellipsoid, vinaceous to black, scabrous to scabridulous, with indument whitish, strigose to strigulose. Achene 8–16 mm long, 3–8 mm wide, ovoid to ellipsoid; pericarp crustaceous. Seed 4–8 mm long, 2–5 mm wide, ovoid to reniform, vinaceous. Fig. 1 D; Fig. 3 D; Fig. 7 E-F; Fig. 10 F; Fig. 30.

Additional illustration. Miquel (1853, Tabula XXXIX; Fig. 30).

Phenology. Staminate flowers collected along all the year, pistillate flowers from August to March and fruits along all the year.

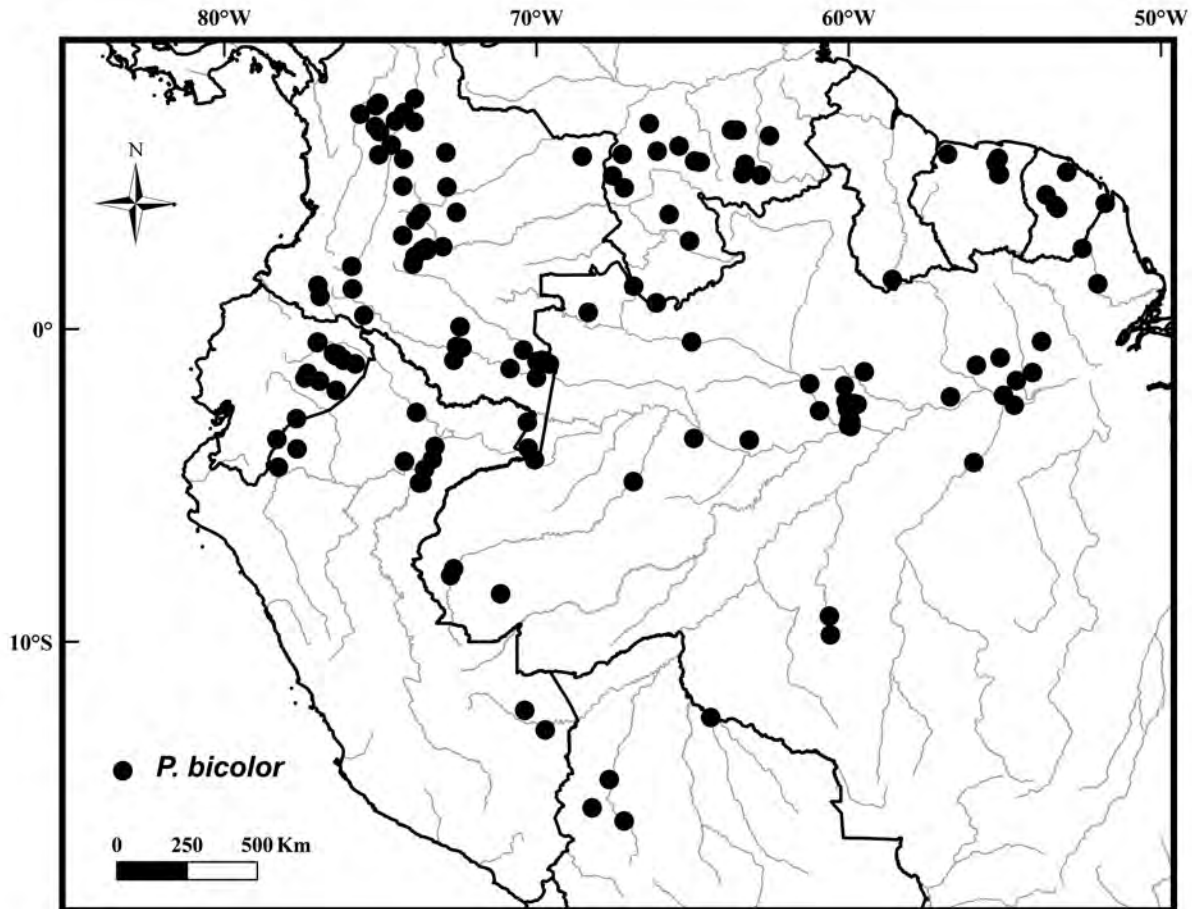


FIG. 31. Distribution of *Pourouma bicolor*.

Distribution (Fig. 31). North of Brazil (Acre, Amapá, Amazonas, Mato Grosso, Pará, Rondônia and Roraima), French Guiana (Cayenne and Saint-Laurent-du-Maroni), north of Suriname (Brokopondo and Nickerie), south of Guyana (Upper Takutu-Upper Essequibo), south of Venezuela (Amazonas and Bolívar), Colombia (Amazonas, Antioquia, Caquetá, Cundinamarca, Guaviare, Meta, Santander, Vaupes, and Vichada), east of Ecuador (Napo, Orellana, Pastaza and Zamora-Chinchipe), Peru (Amazonas, Loreto and Madre de Dios) and north Bolivia (La Paz), often in “terra firme” forest of the Amazonian region, usually in lowland moist areas, sometimes in riparian forest, at an elevation of about 100 to 1500 m above sea level.

Vernacular Name. Imbaúbarana (Brazil, Acre); imbaúba (Brazil, Amazonas); imbaúbarana, tamaquare (Brazil, Mato Grosso); garguaba, mapatirana (Brazil, Pará); uva menueda (Bolivia); iquitoca (Ecuador, Napo); chichico villas, mintitonca (Ecuador, Pastaza); cirpe, cirpe macho, hembra, sirpo (Colombia, Antioquia); uvilla de monte (Colombia, Caquetá); cormi (Colombia, Boyacá); caimaron de mico (Colombia, Meta); chichicuvo (Colombia, Putumayo); cirpo (Colombia, Putumayo); paú shuina (Peru, Amazonas); sacha uvilla, sacha ubillas (Peru, Loreto); tsakap-suiya (Peru, Huambisa); boroma, poeroema, puruma (Suriname); cocura montero, cucura, sadha'fhi (Venezuela, Amazonas); cay-bari-cay, cay-i-wari-cay-yek, sarasara (Venezuela, Bolívar).

Etymology. The epithet suggests to the discolor leaf.

Use. Edible fruits.

IUCN conservation status. *Pourouma bicolor* is widely distributed with the extent of occurrence of ca. 4,398,000 Km². Also, *P. bicolor* is well represented in herbaria. For these reasons *P. bicolor* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Bolivia.** LA PAZ: Near Mapiri, (♂), *Buchtien 2122* (NY, US); Franz Tamayo, Collpamayu, a 500 m de la toma de agua en el arroyo Santa Rosa, (♂), *Cayola et al. 4353* (MO); Province of Larecaja, Tuirí, near Mapiri, on left bank of Rio Mapiri, (♀), *Krukoff 10867* (A, F, G, MO, NY, S, U, UC, US); Province of Larecaja, Tuirí, near Mapiri, on left bank of Rio Mapiri (♂), *Krukoff 10874* (F, NY); Province of Larecaja, Copacabana, about 10 km south of Mapiri, (♀), *Krukoff 11254* (F, MO, NY). **Brazil.** ACRE: Cruzeiro do Sul, Rio Juruá. 2–4 km west of Cruzeiro do Sul, (♀), *G. T. Prance et al. 2754* (INPA, MG, NY, U); Município de Tarauacá, Bacia do Rio Juruá, Seringal Maceió, 08°16'54"S, 71°05'26"W, (♀),

Silveira et al. 884 (INPA, IAN, MO, UFACPZ).—AMAPÁ: Rio Oiapoque, 1–3 km N of Cachoeira Três Saltos, (♂), *Irwin et al.* 48192 (GH, IAN, M, MG, NY, P, U, US); Quadrícula SB-22-VA, ponto 44, (♀), *N. A. Rosa & M. R. Santos* 4234 (MG, NY).—AMAZONAS: Manaus-Caracará road., km 148, roadside, (♂), *Berg et al.* P.18152 (INPA, MG, K, MO, NY, P, U); Manaus-Caracará road., km 148, (♂), *Bisby et al.* P.18118 (F, INPA, K, MO, NY, R, S, U, US); Manaus, Distrito Agropecuário, Reserva 1501, Km 41, Distrito Agropecuário, ZF3, (♀), *Boom et al.* 8532 (INPA, MO, NY); São Gabriel da Cachoeira, Rio Negro, Vaupes, (♀), *Cavalcante* 777 (MG); Manaus-Itacoatiara, km 26, Reserva Florestal Ducke, 02°53'S, 59°58'W, (♀), *M. A. S. Costa et al.* 8 (INPA, K, MG, MO, NY, RB, SP); Benjamin Constant, (♀), *Drees* 9 (INPA, U); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR-174, depois Fazenda, Distrito Agropecuário, ZF3, (♀), *A. J. C. Ferreira INPA/WWF3209.148* (INPA); Manaus, Reserva Florestal Ducke, trilha do Portal, (♀), *Gaglioti & Pederneiras* 141 (EAFM, SP); Manaus, Reserva Florestal Ducke, trilha do Portal, (♀), *Gaglioti & Pederneiras* 142 (EAFM, SP); Presidente Figueiredo, km 80, Ramal da Br 174, 03°04'55"S, 60°00'31"W, (♀), *Gaglioti et al.* 175 (EAFM, SP); Manaus, Escola Agrotécnica Federal de Manaus, encontrada a margem da barragem do IPA, (♀), *Kinupp* 3393 (EAFM); Manaus, Escola Agrotécnica Federal de Manaus, encontrada a margem da barragem do IPA, (♀), *Kinupp* 3434 (EAFM); Manaus, Distrito Agropecuário da Suframa, BR-174, Km 72, depois 6 Km Oeste da BR, 02°19'S, 60°05'W, (♀), *Kukle et al.* 86 (INPA, K, MBM, MO, NY, SP); Manaus, Estação Experimental de Silvicultura Tropical - ZF2, (♀), *Lemos* 34 (INPA); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR-174, Km 72 depois 6 Km Oeste na ZF3, Fazenda Dímona, 02°19'S, 60°05'W, (♂), *Mackenzie et al.* INPA/WWF2206.1603 (INPA); Município de Manaus, Distrito Agropecuário da SUFRAMA, BR-174, Km 72, 02°19'S, 60°05'W, (♀), *Mackenzie et al.* INPA/WWF2206.1615 (INPA); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR-174, Km 72 depois 6 Km

Oeste na ZF3, Fazenda Dímona, 02°19'S, 60°05'W, (♀), *Mackenzie et al. INPA/WWF2206.3044* (INPA); Serra de Neblina, Rio Cauaburi, Camp Tucano, Rio Tucano, (♀), *Maguire et al. 60333A* (F, K, MG, NY, P, U, US); Novo Airão, Área Indígena Waimiri Atroari, Rio Camanaú, Vicinity of Aldeia Maré, (♂), *Miller 614* (INPA); Manaus, Reserva Florestal Ducke, 02°53'S, 59°58'W, 6 Dec 1976 (♀), *J. R. Nascimento & C. Damião INPA66338* (INPA); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR-174, Fazenda Esteio, 02°26'S, 59°48'W, (♀), *J. R. M. Nascimento et al. INPA/WWF1302.1423* (INPA); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR-174, Fazenda Esteio, 02°26'S, 59°48'W, (♀), *J. R. M. Nascimento et al. INPA/WWF1302.2296* (INPA); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR-174, Fazenda Esteio, 02°26'S, 59°48'W, (♀), *J. R. M. Nascimento et al. INPA/WWF1302.4037* (INPA); Distrito Agropecuário da SUFRAMA, Rodovia BR-174, Km 64, Fazenda Esteio, Distrito Agropecuário, ZF3, 02°23'S, 59°51'W, (♀), *Nee 42346* (INPA, K, NY); Presidente Figueiredo, Reserva ZF-3, BR-174, Km 64, (♀), *A. C. A. Oliveira 238* (INPA); São Gabriel da Cachoeira, Rio Negro, Vaupes, (♀), *Pires 502* (IAC, IAN, MO, NY); São Gabriel da Cachoeira, Rio Negro, Serra de São Gabriel, (♂), *Pires 587* (IAN, NY); Santa Isabel do Rio Negro, Tapuruquara by road to airport, (♀), *G. T. Prance et al. 15366* (INPA, K, M, MG, MO, NY, P, R, S, U, US); Manaus, Distrito Agropecuário da Suframa, Br 174 km, 24 km leste na ZF 3, Fazenda Esteio, (♀), *Setz et al. s.n.* (INPA98145).—MATO GROSSO: Aripuanã, área 6–1–34, (♀), *M. Gomes et al. 676* (INPA); Aripuanã, área 5–48–5, (♀), *M. Gomes & Mota 2399* (INPA); Aripuanã, near Humboldt Centre, road to Rio Juruena, 10°12'S, 59°21'W, (♂), *G. T. Prance et al. 18250* (INPA, K, NY, U); Aripuanã INPA, Humboldt, (♀), *Rylands 52* (F, INPA).—PARÁ: Rios Mojú and Acara, south of Belém, ca. 7 km N of Mojú, (♂), *Austin & Cavalcante 4140* (MO); Município de Viseu, basin of the Rio Gurupi, Tembé Indian Reserve, (♀), *Balée & Ribeiro 1331* (MG); Município de Viseu, basin of the Rio Gurupi, Tembé Indian Reserve, (♀), *Balée &*

Ribeiro 1344 (MG); Rio Moju entre a embocadura e a cidade, (♂), *Cavalcante & Austin 2264* (MG, MO); Faro, (♀), *A. Ducke RB13057* (RB); between Rio Pacaja and Rio Muirapiranga, SW of Ilha de Breu, (♀), *G. T. Prance et al. 1397* (NY, US); BR-22, km 64, (♂), *G. T. Prance et al. 58862* (F, GH, NY, S, U, US); Itaituba, ao redor do Parque Nacional da Amazônia, próximo a rodovia Transamazônica, (♂), *C. A. S. L. Silva 106* (MG); Santarém, Rio Maicá, Serra Taperinha, (♀), *M. Silva 1390* (MG, SP); Belém, (♀), *N. T. Silva 57832* (NY, U, US); Ananindeua, (♀), *L. O. Teixeira 61* (MO).—RONDÔNIA: Forte Príncipe da Beira, Estrada do Igarapé da Viúva, (♀), *W. A. Rodrigues & Wilson 4237* (INPA, NY, U).—RORAIMA: Indian trail from Surucucu W to Uaicá between Botamatedi and Maitá, 02°53'S, 63°36'W, (♀), *G. T. Prance et al. 13582A* (INPA, F, GH, K, M, MG, NY, P, S, U). **Colombia.** UNKNOWN DEPARTMENT: unknown locality, (♀), *Triana 861* (P).—AMAZONAS: Rio Negro, 9 km, aguas arriba del rio Orinoco, desde desembocadura del rio Manaviche en el rio Orinoco, 02°26'N, 65°68'W, (♀), *E. Marin 1488* (NY); Tarapacá, cuenca del río Porvenir, 02°26'N, 65°68'W, (♀), *I. Montero et al. 3128* (COAH); Município de Leticia, Parque Nacional Natural Amacayacu, Parcela permanente de Amacayacu, 03°48'33"S, 70°16'4"W, (♀), *J. S. B. Silva et al. 2165* (SP); Município de Leticia, Parque Nacional Natural Amacayacu, parcela permanente, 03°48'33"S, 70°16'4"W, (♀), *J. S. B. Silva et al. 2167* (COAH, SP); Município de Leticia, Parque Nacional Natural Amacayacu, Parcela permanente de Amacayacu, 03°48'33"S, 70°16'4"W, (♀), *J. S. B. Silva et al. 2168* (SP); Município de Leticia, Parque Nacional Natural Amacayacu, parcela permanente, 03°48'33"S, 70°16'4"W, (♀), *J. S. B. Silva 2179* (COAH, SP).—ANTIOQUIA: San Rafael, 8.1 km E of San Rafael on San Rafael-San Carlos road, 06°18'N, 75°01'W, (♀), *Brant & Roldan 1498* (MO); Confluence of Ríos Ité and Tamar into Río Cimitarra, ca. 38 km W of Barrancabermeja, 06°55'N, 74°15'W, (♂), *Bruijn 1497* (F, M, MBM, MO, NY, S, U, US, VEN); Confluence of Ríos Ité and Tamar into Río Cimitarra, ca. 38 km W of Barrancabermeja, 06°55'N, 74°15'W,

(♂), *Bruijn 1514* (F, M, MO, NY, S, U, US, VEN); Confluence of Ríos Ité and Tamarinto Río Cimatarrá, ca. 38 km W of Barrancabermeja, 06°55'N, 74°15'W, (♂), *Bruijn 1517* (F, M, MBM, MO, NY, S, U, US, VEN); Confluence of Ríos Ité and Tamarinto Río Cimatarrá, ca. 38 km W of Barrancabermeja, 06°55'N, 74°15'W, (♂), *Bruijn 1526* (F, MBM, MO, NY, S, U, US, VEN); Santo Domingo, Corrego Santiago, Sector La Negra, 9 km de Santiago, (♀), *Callejas et al. 2396* (NY); Municipio de Campamento, vereda La Llanada, El Mango, 13 km NO de Campamento, 07°05'N, 75°18'W, (♀), *Callejas et al. 8214* (MO, NY, US); Puerto Berrio, Vereda Alicante, Finca Penja no Quebrada Penjano, en la vía San Juan de Bedout-La Cabaña, 06°39'N, 74°31'W, (♀), *Callejas et al. 9373* (MO, NY); San Luís Antonio, Cañon del Río Claro, 05°53'N, 74°39'W, (♀), *Cogollo et al. 1807* (COL); San Rafael, Morro Pan de Ázúcar, (♀), *Orozco et al. 795* (COL); La Pedrera, resguardo indígena Camaritagua, 01°20'S, 69°35'W, (♀), *B. R. Ramírez 1* (COAH); 26 km S & 23 km W of Zaragoza, (♀), *Shepherd 379* (COL); Anori, Vereda "Puerto Rico", 07°08'20"N, 75°08'20"W, (♀), *Tuberquia et al. 1010* (COL).—CAQUETÁ: Araracuara, (♀), *D. Cardenas et al. 4399* (COL); Puerto Rico, finca La Lindosa, (♀), *S. Castro et al. 976* (COAH); Solano, río Mesay, raudal Masaca, 00°33'33"S, 72°33'33"W, (♂), *A. Duque et al. 5044* (COAH); Solano, (♂), *Eusse 516* (COAH); Solano, Araracuara, CEA, El Inchi, (♀), *Garzón et al. 152* (COAH); Solano, Sabana casmófita ubicada en el cerro a 2 km de la estación, 00°04'13"N, 72°26'50"W, (♀), *N. Hernández et al. 1362* (COAH).—CUNDINAMARCA: Yacopi, Insp. De polia de Guadualito, (♂), *Lozano C. et al. 7316* (COL); Yacopi, Insp. De polia de Guadualito, (♀), *Lozano C. et al. 7319* (COL).—GUAVIARE: San José del Guaviare, inspección Puerto Nuevo, camino de Puerto Nuevo a Cachicamo, 02°19'08"N, 73°18'19"W, (♀), *R. López et al. 2128* (COAH); San José del Guaviare, inspección Puerto Nuevo, camino de Puerto Nuevo a Cachicamo, 02°19'08"N, 73°18'19"W, (♀), *R. López et al. 2178* (COAH); El Retorno, vereda El Trueno, estación experimental El Trueno, SINCHI, 02°37'44"N, 72°59'59"W, (♀), *Zarate et al. 1*

(COAH).—META: Footpath between Rio Giiejar and Cana Guapayita, Caño Yerli, (♀), *Idrobo & Schultes* 786 (COL, F, IAN, MO, NY, US); margen derecha del río Duda, (♀), *Idrobo* 8492 (COL, F, IAN, MO, NY, US); San Juan de Arama, 03°28'33"N, 73°51'58"W, (♀), *Manjarrez et al.* 36 (COAH); Parque Nacional Natural La Macarena, Río Duda, margen derecha parte media del río, (♀), *Nishimura* 3 (COL); Sierra de la Macarena, Caño Ciervo, (♀), *Philipson et al.* 2086 (COL, S, US); Uribe, PNN Tinigua, sierra Chamusa, centro de investigación primatólogicas La Macarena, (♀), *Stevenson* 90 (COAH); Uribe, PNN Tinigua, sierra Chamusa, centro de investigación primatólogicas La Macarena, (♀), *Stevenson* 111 (COAH); San Martin, (♀), *Triana* 1846A (F).—NARIÑO: Carretera a Termales "Espiritu Santo", (♀), *Fonnegra* 5245 (MO).—PUTUMAYO: Mocoa, Trocha entre Mocoa y Puerto Limón, (♂), *Garcia-Barriga* 3629 (COL); Mocoa, serranía del Churumbelo, sector comprendido entre la bocana del río Ponchayaco hasta las cabeceras, (♀), *C. Marín et al.* 2227 (COAH); Santa Rosa on Rio Guamfies, (♀), *Pinkley* 556 (S); Mocoa, inspección Santa Marta, vereda Diamante Alto, 01°23'33"N, 76°59'57"W, (♀), *B. R. Ramírez et al.* 15800 (COAH); Mocoa, en cercanía a la población de Puerto Lleras, 00°01'21"N, 73°33'00"W, (♀), *N. Rodríguez et al.* 1196 (COAH).—SANTANDER: Colombia, Santander, 7 km al NE de Capote, (♀), *Diazgranados et al.* 9 (COL); Region Carare-Opón (Capote), nr. Rio Magdalena, (♀), *Garcia et al.* 9 (US); Santander, Puerto Wilches, La Gómez y el kilometro 80 del ferrocarril del Atlántico, (♀), *Romero-Castañeda* 8355 (COL).—VAUPES: Taraira, estación Biológica Mosiro Itajura, 01°04'21"N, 69°31'29"W, (♀), *Clavijo-R. & Tanimuka* 753 (COL); Taraira, estación biológica Mosiro Itajura (Caparú), bosque de rebalse sobre el lago Taraira, 01°04'48"S, 69°31'04"W, (♀), *Cordero-P. et al.* 263 (COAH); Taraira, Estación Biológica Caparú, within 3 km of north bank of Lago Taraira, 01°00'S, 69°49'W, (♀), *Defler* 372 (COAH, MO); Taraira, Estación Biológica Caparú, within 3 km of north bank of Lago Taraira, 01°00'S, 69°49'W, (♀), *Defler* 373 (COAH, MO); Taraira, Estación Biológica Caparú, within 3 km of

north bank of Lago Taraira, 01°00'S, 69°49'W, (♂), *Defler 374* (COAH, MO); Taraira, Estación Biológica Caparú, within 3 km of north bank of Lago Taraira, 01°00'S, 69°49'W, (♀), *Defler 375* (COAH, MO); Taraira, estación biológica Mosiro Itajura, Caparú, 3 km N del lago Taraira, 01°00'S, 69°49'W, (♀), *Defler 386* (COAH); Taraira, estación biológica Mosiro Itajura, Caparú, 3 km N del lago Taraira, 01°00'S, 69°49'W, (♂), *Defler 387* (COAH); Taraira, Estación Biológica Caparú, within 3 km of north bank of Lago Taraira, 01°00'S, 69°49'W, (♂), *Defler 389* (MO); Alto Vaupes, río Vaupes, (♀), *Garcia-Barriga 14987* (COL).—VICHADA: Parque Nacional Natural "El Tuparro", ca. 2 km S of La Línea Roja, just south of Río Tomo, (♀), *Zarucchi et al. 3720* (BG, MO, NY). **Ecuador.** NAPO: Aguarico, Reserva Etnica Huacrani, 00°51'S, 76°26'W, (♀), *Aulestia & Andi 924* (MO, NY); Aguarico, Reserva Etnica Huacrani, 00°49'S, 76°22'W, (♀), *Aulestia et al. 1398* (MO, NY); Aguarico, Reserva Etnica Huacrani, 00°59'S, 76°12'W, (♀), *Aulestia & Quihuiñamo 3120* (MO); 6 km SE of Los Sachas, (♀), *Baker 6017* (BG); La Joya de Los Sachas, Parque Nacional Yasuni, Carretera y oleoducto de Maxus em construcción, 00°48'S, 76°28'W, (♂), *A. Dik 137* (MO, QCNE); La Joya de Los Sachas, Parque Nacional Yasuni, Carretera y oleoducto de Maxus em construcción, 00°48'S, 76°28'W, (♀), *A. Dik 649* (F, NY, QCNE); Aguarico, Reserva Etnica Huaorani, Carretera y oleoducto de Maxus em construcción, 01°00'S, 76°11'W, (♀), *A. Dik 1564* (NY, QCNE); Pozo Petrolero Shiripuno 1, (♀), *J. Jaramillo et al. 15946* (NY); Puerto Morona, este río Morona, 02°52'S, 77°41'W, (♀), *E. L. Little Jr. et al. 513* (COL); Parque Nacional Yasuní, Pozo Petrolero Conoco, 00°57'S, 76°13'W, (♀), *Neill et al. 8163* (NY); Reserva Florística El Chunchu, Payamino, 5 km al N. Coca, 00°25'S, 77°00'W, (♀), *E. Palacios & Neill 1234* (MO); Estación Experimental INIAP-Payamino, 00°26'S, 77°01'W, (♀), *Zaruma 630* (MO, NY).—ORELLANA: Parque Nacional Yasuní, 00°40'03"S, 76°23'26"W, (♂), *Perez et al. 4281* (F); Estación Científica Yasuní, Rio Tiputini, al noroeste de la confluencia con el Rio Tivacuno, 00°38'S, 76°30'W, (♀), *Villa &*

Alvia 567 (F, QCA); Estación Científica Yasuní, Río Tiputini, al noroeste de la confluencia con el R. Tivacuno, 00°38'S, 76°30'W, (♀), *Villa & Velez* 801 (F, QCA).—PASTAZA: Pozo Petrolero Namoyacu de UNOCAL, 30 km al sur del pueblo de Curaray, 01°40'S, 76°57'W, (♀), *Espinoza & Coba* 626 (NY); Pastaza Canton Pozo petrolero, 01°34'S, 77°25'W, (♀), *Gudiño et al.* 1075 (NY); Vía Auca, 110 km al sur de Coca, del Río Tigüino, Sector Cristal, 01°15'S, 76°55'W, (♀), *W. Palacios et al.* 3421 (NY); Pozo Petrolero Villano 2 de Arco, 01°25'S, 77°20'W, (♂), *F. Hurtado* 2871 (MO).—ZAMORA-CHINCHIPE: Pachicutza 70 km NE. de Zamora, (♀), *E. L. Little Jr.* 350 (COL). **French Guiana.** UNKNOWN DISTRICT: unknown locality and date, (♀), Lénson s.n. (P).—CAYENNE: Sinnamary Crique Plomb, Bassin du Sinnamary, (♀), *Loubry* 1552 (CAY, NY, U); Crique Plomb, Bassin du Sinnamary, (♀), *Loubry* 1560 (CAY, NY, U); On Route de Belizon north of Eaux Claires, 03°57'N, 53°00'W, (♀), *Mori et al.* 21560 (CAY, NY, U).—SAINT-LAURENT-DU-MARONI: S of Saül, (♀), *Leeuwenberg* 11784 (U). **Guyana.** UPPER TAKUTU-UPPER ESSEQUIBO: área 4 km N of Konashen Rapids & Mt. Zibingatzako, (♀), *Clarke* 3233 (NY, U). **Peru.** AMAZONAS: Río Santiago, 3 km atrás de comunidad Caterpiza, (♀), *Huashikat* 1241 (MO, U); Río Santiago, banda oeste de Caterpiza, (♀), *Tunqui* 149 (U); Condorcanqui, Región Nororiental del Marañón, Río Comaina, 04°25'S, 78°16'W, (♀), *R. Vásquez et al.* 18863 (MIN, MO).—LORETO: Río Momón, (♀), *Croat* 19997 (MO); Río Manítí, afluente derecho do río Amazonas, (♀), *Encarnación E-1037* (NY); Maynas, Yaguasyacu, tributary of Río Ampiyacu, below Borro Indian village of Brilla Nueva, (♀), *Gentry et al.* 20356 (F, MO); Río Ucayali, Jenaro Herrera, (♀), *Gentry et al.* 21193 (MO, U); Río Javari, between Río Curaçá and Tambaqui, (♀), *G. T. Prance et al.* 24188 (INPA, MG, NY, R, U); Requena, Centro Florestal Jenaro Herrera, margen derecha Río Ucayali, (♀), *Spichiger & Encarnación* 1085 (G, MBM, NY); Requena, Centre de Recherche Jenaro Herrera, (♀), *Spichiger & Loizeau* 4008 (F); Maynas, Iquitos-Nauta, 04°29'S, 73°35'W, (♀), *R. Vásquez & N. Jaramillo* 10378 (NY); Maynas, Iquitos,

km 44, sarretera Iquitos-Nauta, 04°10'S, 73°20'W, (♀), *R. Vásquez & N. Jaramillo 11443* (MO).—MADRE DE DIOS: 0,8 km down the Main Trail from Explorer's Inn, near the confluence of Rio Tambopata and Rio La torre, 12°29'S, 69°20'W, (♀), *A. C. Smith et al. 695* (F, NY, F).

Suriname. BROKOPONDO: Forest Reserve Zanderij 1, (♀), *Boswezen (B. W.) 3376* (MO, IAN, U); Hab. Bosreservaat Watramiri, Boomnummer, (♀), *Boswezen (B. W.) 4033* (NY, RB, U); Hab. Bosreservaat Watramiri, Boomnummer, (♀), *Boswezen (B. W.) 5036* (GUA, U).—NICKERIE: Sectie 0, (♀), *Stahel 166* (A, F, NY, U, UC).

Venezuela. AMAZONAS: Reserva Forestal "El Sipapo", Rio Sipapo, (♀), *Blanco 1149* (NY, US, VEN); Río Cuao, entre Caño Grulla y Raudal Murciélago, 04°54'N, 67°34'W, (♀), *C. V. Castilho 5623* (M); Vicinity of Cerro Neblina, 00°50'N, 66°10'W, (♀), *Croat 59353* (MO); Antures, Río Coro-Coro, W of Serrania de Yataje, 8 km N of settlement of Yutaje, (♂), *Holst & Liesner 3195* (MO, NY); Departamento Rio Negro, close to Cerro de La Neblina Base Camp, on Río Mawarinuma, 00°50'N, 66°10'W, (♀), *Liesner 16299* (MO, BG); Amazonas, Rio Metacuni, (♀), *Stergios & Velazco 14055* (MO, NY); Depto. Atures, along north side of Rio Cataniapo, 45 km SE of Puerto Ayacucho, 05°35'N, 67°15'W, (♀), *Steyermark et al. 122390* (F, MO, NY, U); Departamento Atabapo, Río Cunucunuma, entre las Comunidades de Culebra y Huachamacari, 03°40'N, 65°45'W, (♀), *Steyermark et al. 125857* (BG, NY); Rio Negro, Vinicity of base Camp, along Río Marawinuma, 00°50'N, 66°09'W, (♂), *Thomas 3370* (BG, MO, NY).—BOLÍVAR: región de los ríos Icabaru, Rio Hacha, (♀), *Bernardi 2657* (G, NY); Cedeño, Along tributary of the Río Erebató, 05°20'N, 64°45'W, (♀), *Boom 10488* (MO, NY); Cedeño, Maigualida, 05°22'N, 64°56'W, (♀), *Elcoro 302* (MO); Municipio de Raul Leoni, 25 km al Norte del Macizo Ichún, Alto Rio Paragua, 06°34'N, 66°23'W, (♂), *A. Fernandez 4494* (MO, NY); Municipio de Raul Leoni, cabeceras Río Túriba y Caño La Miel, 06°34'N, 66°23'W, (♀), *A. Fernandez & Delgado 5773* (MO, NY, PORT, VEN); Boca Carun, 05°16'N, 63°19'W, (♀), *E. Marin 178* (NY, PORT, VEN); a la cuenca media del Río Paragua,

06°21'36"N, 63°45'20"W, (♀), *Stergios 10735* (MO, NY); Cerro Venamo, Sierra de Lema, lowland between Río Chicanán and Río Ayaiche, between Puerta Lema and base of the Sierra, (♀), *Steyermark 89457* (NY, VEN); Rio Caura, near Salto Pará, (♀), *Steyermark et al. 113096* (U).

Pourouma bicolor was classified by Martius (1843: 34) in the “classis V: acida” (class V: acid) within of Urticaceae. Martius described the fruits of *P. bicolor* as acid-sweet, mucilaginous, with good flavor, invigorating.

Miquel (1853: 129) based on the Martius 's collection (M0174080, M0174081, M0174082, M0174083, M0174084) classified *P. bicolor* in the group “3 Folia omnia integra” (leaves always entire). Also, Miquel designated the type material “Crescit in silvis fluvis Japurá ad Porto dos Miranhas provinciae Rio Negro, Jan 1820, Martius s.n. (M)”. The materials M0174082, M0174083, M0174084, might be probably isotypes, but the date label is December 1819.

According to Spix & Martius (1831), Martius left São Joao do Principe (currently São Joao Japura, Amazonas, Brazil) on January 1 to Porto dos Miranhas (Amazonas, Colombia). We consider therefore that collections Martius s.n., dated December 1819, with uncertain locality (Brazil or Colombia).

Only the material M0174081 is dated of January 1820, as designated by Miquel. The material M0174081 is a probable isotype and presents the information on the label "icon to confecta Martius", a likely reference to the illustration “Tabula 39 of the Flora brasiliensis” (Miquel 1853). Nevertheless, this material does not show date and information "ad Porto dos Miranhas".

Berg & Heusden (1988: 106) described five synonyms (*P. aspera*, *P. crassivenosa*, *P. camaratana*, *P. lawrancei* and *P. schultesii*) and four new combinations (*P. bicolor* subsp.

chocoana, *P. bicolor* subsp. *digitata*, *P. bicolor* subsp. *scobina* and *P. bicolor* subsp. *tessmannii*) for *P. bicolor*, but they did not remark anything about these species.

Our molecular analyses results (Chapter 1, Fig. 5) from two accessions (Gaglioti et al. 175 and J. S. B. Silva et al. 2167) of *Pourouma bicolor* included within of the clade V, which they were more closely to *P. velutina* and *P. amacayacuensis* with moderate support (BP = 80, PP = 0.90). Morphologically, these species belong to the group of species with adaxial lamina surface usually scabrous, lamina often entire, staminate inflorescences in fascicles, staminate flowers with tepals free or basally connate.

Pourouma scobina arose within of the clade VI, which was more closely to *P. guianensis* with a strong support (BP = 91, PP = 1.00).

Pourouma bicolor distinguished from *P. scobina* by lamina usually entire (versus palmatilobed with 5–7 lobes), abaxial lamina with tertiary and quaternary veins plane to slightly prominent (versus prominent), and pistillate inflorescence with up to 28 flowers (versus up to 66 flowers). Moreover, these species are allopatric.

The others three subspecies proposed by Berg & Heusden (1988: 106) are morphologically distinct from *P. bicolor*, as well as *Pourouma scobina*. For example: *Pourouma chocoana* is characterized by leaf twigs with indument hirsute to villous (versus with indument sericeous to strigose), stipules often persistent (versus always caducous), petiole with indument hirsute to hispid (versus with indument sericeous to strigose), and staminate flowers up to 0.5 mm long (versus more than 1 mm long). *Pourouma tessmannii* can be recognized by stipules glabrous inside (versus velutinous to sericeous in *P. bicolor*).

Pourouma digitata differentiates from *P. bicolor* by palmatifid to palmatipartite lamina with 3–9 lobes (versus usually entire), abaxial lamina surface with arachnoid indument covering to the

areoles, staminate flowers up to 1 mm long (versus up to 2 mm), and pistillate inflorescence up to 62 flowers (versus up to 28 flowers).

For these reasons, we considered the four combinations (subspecies) proposed by Berg & Heusden (1988) as synonymous of its respective species.

Moreover, we consider that the five synonyms proposed by Berg & Heusden (1988) are included within the morphological plasticity of *Pourouma bicolor*.

7. *Pourouma bolivarensis* C.C. Berg, *Brittonia* 34(1): 39, Fig. 3. 1982; Berg & Heusden, *Proc. Kon. Ned. Akad. Wetensch., Ser. C.*, 91(2): 110. 1988; Berg, Akkermans & Heusden, *Fl. Neotrop. Monogr.* 51: 186. 1990; Berg, *Fl. Guianas* 11(22): 116. 1992; Berg, *Fl. Venez. Guayana* 4: 186. 1998; Berg, *Fl. Venez.*: 245. 2000.—TYPE: VENEZUELA. Bolívar: Cerro Venamo (parts Sur-Oeste), a lo largo del afluente izquierdo (Este) subiendo el Río Venamo, desde el campamento cerca de la unión con el afluente derecho (Oeste) del Río Venamo, 10 Jan 1964 (♀), *Steyermark et al.* 92936 (holotype: VEN!; isotypes: NY! U!).

Tree, 15–18 m tall, d.b.h. unknown, with stilt roots. Leafy twigs 5–8 mm in diameter, with indument whitish, sericeous; internode 3–12 mm long. Lamina entire, 5–19 cm long, 3–14 cm wide, length:width ratio 1.1–1.8, ovate, obovate to broadly elliptic, coriaceous; base acute to obtuse; margin usually repand, with indument sparse, whitish, sericeous or glabrous; apex shortly acuminate or rounded to emarginate; adaxial surface smooth, indument of primary vein sparse, yellowish, sericeous or glabrous; abaxial surface smooth, indument of veins whitish, sericeous; venation brochidodromous; secondary veins 6–12 pairs per leaf, basal pair unbranched, diverging from the midrib at an 35°–50°; tertiary and quaternary veins slightly prominent, with indument

minutely whitish, puberulous and whitish, arachnoid indument in the areoles and sometimes extending to the tertiary and quaternary; petiole 3–6.5 cm long, with indument sparse, yellowish, sericeous, domatia absents; stipules 4.5–10 cm long, with indument yellowish, sericeous outside, glabrous inside, caducous. Staminate inflorescences unknown. Pistillate inflorescences unknown. Infructescences 5.5–6.5 cm long, 1.5–2 cm wide; peduncle 2.5–3 cm long, peduncle and branches with indument yellowish, sericeous on the ultimate branches; fruits 7–12, fruits organized in 2 cymes; fruiting pedicel 2–10 mm long; stigma bilobed, 2–4 mm in diameter. Fruiting perianth 1.5–1.8 cm long, 8–10 mm wide, ovoid to ellipsoid, brownish to vinaceous, with indument whitish, puberulous. Achene 1.2–1.5 cm long, 3–6 mm wide. Seed 4–8 mm long, 2–4 mm wide, ovoid to ellipsoid, vinaceous. Fig. 13 A.

Additional illustrations. Berg & Kooy (1982: 39).

Phenology. Collected in fruits from December to January

Distribution (Fig. 34). Endemic from the southeast of Venezuela (Bolívar), in pre-montane moist areas, at altitudes of about 900 to 1350 m above sea level.

Vernacular Name. Cay-wari-cay-yek (Venezuela, Bolívar)

Etymology. The epithet is a tribute to type locality, the Department of Bolívar.

IUCN conservation status. According to the IUCN Red list categories (IUCN 2014), *Pourouma bolivarensis* is considered Critically Endangered, CR B1a,b(iii), because of the small extent of occurrence (ca. 480 km²), number of locations (2) and known from only three collections, made between 1964 and 1970.

ADDITIONAL SPECIMENS EXAMINED. **Venezuela.** BOLÍVAR: Cerro Venamo (parts Sur-Oeste), Río Venamo, entre la ladera principal escarpada de arenisca y el salto en el Río Venamo, (♀),

Steyermark et al. 92850 (U, VEN); en el drenaje del Río Cuyuní, a lo largo del Río Anawaray-parú, vecindades del km 134 y campamento 134 al sur de Eldorado, (♀), *Steyermark et al.* 104466 (NY, VEN).

Pourouma bolivarensis belongs to a group of species with lamina leaf entire and basal secondary veins branched. It displays similarities with *P. mollis*, due to the shape of the lamina and adaxial lamina surface smooth, but distinguished by abaxial lamina surface with indument sericeous on the veins (versus hirtellous) and stigma bilobed (versus entire). *P. bolivarensis* also shows resemblances with *P. melinonii* by adaxial lamina surface smooth, abaxial lamina surface with indument sericeous on the veins and stipules glabrous inside, but distinguished by lamina broadly elliptic to obovate (versus ovate) and stigma bilobed (versus entire).

All collections of this species were carried out by the same group of botanical collectors, under the number of the great botanical Julian Alfred Steyermark.

Berg (1998) described *Pourouma bolivarensis* as endemic to the Sierra de Lema (Bolívar). However, the labels of Steyermark et al. 92850 and Steyermark et al. 92936 to describe that these collections were made near the Cerro Venamo (south-western part). This mountainous formation borders with Guyana (Cuyuni-Mazaruni), as also indicated on the labels of these collections.

The label of Steyermark et al. 104466 is the unique to describe the habit as "parasitic tree" for *Pourouma*. Probably due to the fact that Steyermark has confused this specimen with a *Coussapoa*, as shown on the identification label. The same material (Steyermark et al. 104466) is described in Berg et al. (1990) as sterile, however the material deposited in the herbarium NY, presents fruits inside the envelope pasted the voucher specimen.

8. *Pourouma cecropiifolia* Mart., Reise Bras. (Spix & Mart.) 3: 1130. 1831, described as *Puruma cecropiaefolia*; Martius, Syst. mat. med. bras. 34. 1843; Miquel in Martius, Fl. bras. 4(1): 123, tab. 36. 1853; Macbride, Publ. Field Mus. Nat. Hist., Bot. Ser., 13(2.2): 291. 1937; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 144. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 85. 1993; Berg, Fl. Venez. Guayana 4: 186. 1998; Berg, Fl. Venez.: 236. 2000; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1664. 2010.—TYPE: BRAZIL. “In silvis prov. Paraensis et Rio Negro”, Dec 1819 (st), *Martius s.n.* (holotype: M0174086!).

Pourouma multifida Trécul, Ann. Sci. Nat., Bot., Sér. 3, 8: 107. 1847; Miquel in Martius, Fl. bras. 4(1): 123, 1853; Macbride, Publ. Field Mus. Nat. Hist., Bot. Ser., 13(2.2): 291. 1937; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 144. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 85. 1993.; Berg, Fl. Venez.: 236. 2000.—TYPE: Brazil, unknown locality and date, (♀), *unknown collector* (A. R. Ferreira?) (holotype: P00757093!; isotypes: P00757094! P00757095!).

Pourouma sapida H. Karst., Fl. Columb. 2: 19, t. 110. 1862; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 144. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 85. 1993; Berg, Fl. Venez.: 236. 2000.—TYPE: NEW GRANADA. Villavicencio, prope Jiramene, Oct 1872 (♀ and ♂), *Karsten s.n.* (holotype: GOET007930!; isotypes: F! LE image!).

Pourouma edulis Duf., Ill. Hort. 20: 70. 1873; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop.

Monogr. 51: 144. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 85. 1993; Berg, Fl. Venez.: 236. 2000.—TYPE: Based on cultivated from Colombia, collected by Linden.

Pourouma uvifera Rusby, Mem. New York Bot. Gard. 7: 231. 1927; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 144. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 85. 1993; Berg, Fl. Venez.: 236. 2000.—TYPE: BOLIVIA. Beni: Rurrenabaque, Oct 1921 (♀), *Rusby 1599* (holotype: NY!; isotypes: B image! BKL image! K! F! GH image! US!).

Tree, 3–25 (–28) m tall, 10–30 cm d.b.h., with stilt roots. Leafy twigs 5–30 mm in diameter, with indument whitish, puberulous and brownish, multicellular trichomes; internode 5–15 mm long. Lamina palmatifid to palmatipartite with 7–11 lobes, rarely with 5 lobes (juvenile), (8.5–) 9.5–40.5 (–42.5) cm long, (10–) 12–57.5 (–61.5) cm wide, length:width ratio 0.6–1.1, coriaceous; base deeply cordate; margin palmatifid, with indument sparse, whitish, sericeous; apex acuminate to acute; adaxial surface smooth, indument of primary sparse, yellowish to whitish, sericeous and sometimes with sparse, brownish, multicellular trichomes; abaxial surface smooth, indument of veins whitish, sericeous and brownish, multicellular trichomes; venation palmate; secondary veins in the free part of the midsegment 12–30 pairs per leaf, basal pair branched; tertiary and quaternary veins slightly prominent, with dense whitish, arachnoid indument covering to the areoles; petiole (6–) 8–45.5 (–55) cm long, with indument sparse, whitish,

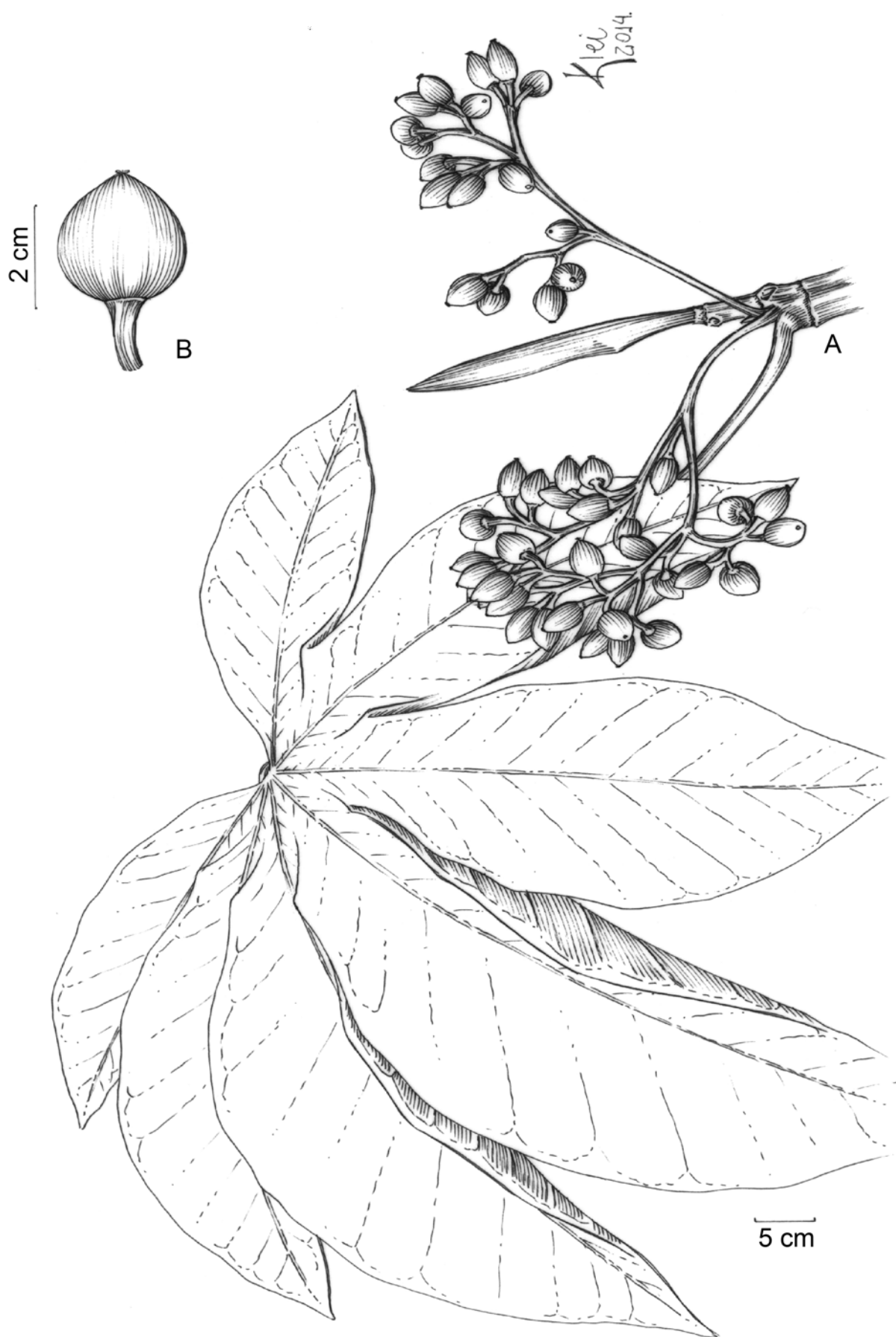


FIG. 32. *Pourouma cecropiifolia*. A. Leafy twig with infructescences. B. Fruiting perianth and pedicel. [A-B: from Gaglioti & Pederneira 149 (SP)].

puberulous and rarely with brownish, multicellular trichomes to glabrous, domatia absents; stipules (3–) 6–18.5 (–22) cm long, with indument yellowish to whitish, sericeous and brownish to brownish-red, multicellular trichomes outside, with indument dense, yellowish, velutinous and sometimes with brownish, multicellular trichomes inside, caducous. Staminate inflorescences (6.5–) 8.5–25.5 (–29.5) cm long, (3.5–) 3.5–18 cm wide, primary branched 3–4; peduncle 2.5–15.5 cm long, peduncle and branches yellowish, with indument sericeous and brownish to brownish-red, multicellular trichomes on the ultimate branches; flowers ca. 320–2450, flowers organized in 25–105 fascicles, diffusely distributed along the ultimate branches; fascicle 4–8 mm in diameter, ca. 5–40 flowers per fascicle. Staminate flowers 2–2.5 mm long, 2–2.8 mm wide; subsessile to pedicelate; tepals 4, 2–2.5 mm long, lanceolate, tepals free or sometimes basally connate, with indument sparse, yellowish to whitish, hirtellous to strigulose; stamens 4; filaments 0.5–1 mm long, free, filaments shorter than the tepals. Pistillate inflorescences 6–12.5 cm long, 2.5–7.5 cm wide; peduncle 2–7.5 cm long, peduncle and branches with indument yellowish, sericeous and brownish to brownish-red, multicellular trichomes on the ultimate branches; flowers 20–185, flowers organized in 4–15 cymes. Pistillate flowers 3–5 mm long, 2–3 mm wide; pedicel 2.5–4.5 mm long; perianth 2–4 mm long, with indument yellowish to whitish, strigulose to hirtellous and sometimes with brownish to brownish-red, multicellular trichomes; stigma 1.5–2 mm in diameter, peltate, and sometimes with indument yellowish to whitish, hirtellous. Infructescences (10–) 11.5–25 (–26.5) cm long, 8.5–23.5 (–25.5) cm wide; peduncle 6.5–15.5 (–17.5) cm long; fruiting pedicel 1.5–2 cm long. Fruiting perianth 2–3.8 cm long, 1.2–3.2 cm wide, ovoid to globose, vinaceous to black, with indument yellowish to whitish, strigulose. Achene 1.2–2.5 cm long, 8–20 mm wide. Seed 8–15 mm long, 4–10 mm wide, ovoid, vinaceous. Fig. 1 A; Fig. 2 D; Fig. 7 D; Fig. 13 B; Figs. 32–33.

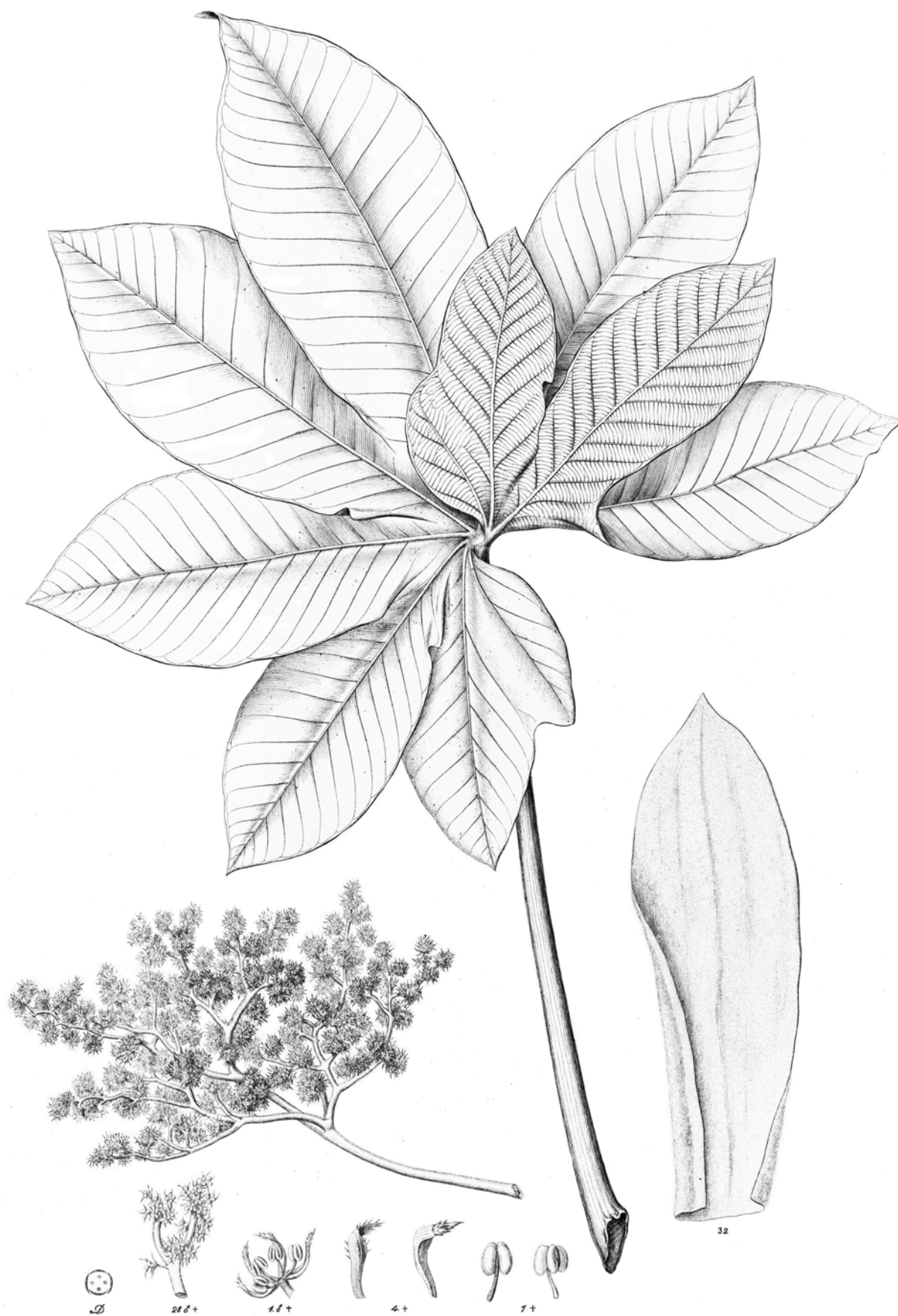


FIG. 33. *Pourouma cecropiifolia*. Leaf and staminate inflorescence. 32. Stipule. D. Whorls of the staminate flower. 28. Part of staminate inflorescence. 1. Staminate flower. 4. Tepals of the staminate flower. 7. Stamens. From Martius, *Flora brasiliensis*, 4(1). 1853: Tab. 39 (modified).

Phenology. Staminate flowers, pistillate flowers and fruits collected along all the year. Additional information in Restrepo E. (1870), Falcão et al. (1980) and Sanchez et al. (2005).

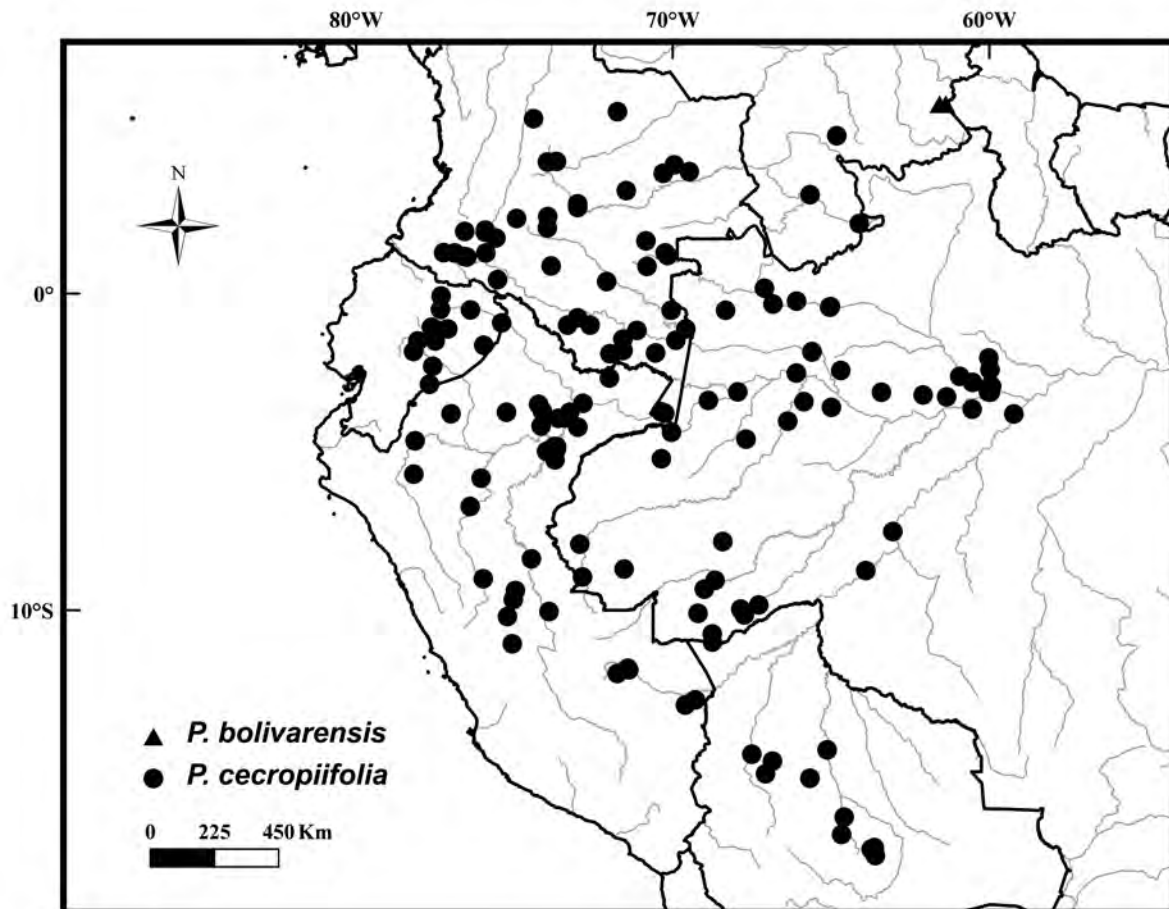


FIG. 34. Distribution of *Pourouma bolivarensis* and *P. cecropiifolia*.

Distribution (Fig. 34). Northwest of Brazil (Acre and Amazonas), southwest of Venezuela (Amazonas and Bolívar), Colombia (Amazonas, Antioquia, Caquetá, Guaviare, Meta, Putumayo and Vaupes), east of Ecuador (Morona-Santiago, Napo, Orellana and Pastaza), east of Peru (Amazonas, Huánuco, Junin, Loreto, Madre de Dios, Pasco, San Martin and Ucayali) and Bolivia (Beni, La Paz, Pando and Santa Cruz), often in “terra firme” forest of the Amazonian region,

often in lowland moist areas, sometimes in riparian forest, at an elevation of about 100 to 1200 m above sea level. Cultivated in the southeast of Brazil (Bahia and Rio de Janeiro).

Vernacular Name. Ambaibillo, guitarrero (Bolivia, Santa Cruz); ambaibillo, uva del monte, uvilla (Bolivia, Beni); Imbaúba branca (Brazil, Amapá); mapati, uva (Brazil, Amazonas); imbaúba branca, imbaúba de cheiro, uvilha (Brazil, Pará); uva caimaroná, uva de monte, uvilla (Colombia, Amazonas); caimarón, cucuva, uva (Colombia, Vaupes); ubilla de monte (Ecuador, Orellana); ubillas (Ecuador, Pastaza); sachá uvilla, ubilla (Peru, Loreto); uvilla, sachá uvilla (Peru, Huánuco); shiwantoqui, urilla (Peru, Pasco).

Etymology. The epithet refers to morphological similarity with *Cecropia*.

Use. The fruits are edible, sweets when mature to slightly acid when immature. They are used in producing a type of wine and sold in some regions of the Amazon (Falcão et al. 1980, Yánes 1999). They can be eaten fresh or processed into jams, jellies, marmalades and wine (Lopes-Lutz et al. 2010). This species is used also as firewood (Yánez 1999). The ash of the leaves is used by Tukanos indians to neutralize the effects of coca “ipadú” (label information of J. E. Paula s.n., MG32126).

IUCN conservation status. *Pourouma cecropiifolia* is widely distributed with the extent of occurrence of ca. 2,095,00 Km². Also, *P. cecropiifolia* is well represented in herbaria. For these reasons *P. cecropiifolia* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Bolivia.** BENI: Provincia Yacuma, San Sorja, cerca del río Cuvareno, (♀), *Beck & Seidel 16721* (MO, NY); Ballivian, Concesión Ballivian Mahogany, 14°46'S, 66°51'W, (♀), *Killeen et al. 7* (NY); Ballivian Province, 14°46'S, 66°51'W, (♀), *Killeen et al. 3311* (NY); Carrasco, Estación Experimental "Valle de Sacta", 17°05'S, 64°40'W, (♀),

Killeen et al. 3570 (NY); Prov. Moxos, 8 km al sud de Pto. Palomo, (♀), *Meneces & Terceros 338* (MG, MO, NY).—LA PAZ: Iturralde, en Parque Nacional Madidi, 14°33'00"S, 67°30'06"W, (♀), *A. Arujo et al. 1473* (NY).—PANDO: Province of Nicolas Suarez, Mukden, (♀), *Izawa 21* (U).—SANTA CRUZ: Parque Nacional Amboró, 17°45'S, 63°36'W, (♀), *Israel et al. 1185* (F, MO); Parque Nacional Amboró, 17°45'S, 63°36'W, (♀), *Nee 41885* (NY); Provincia de Ichilo, Reserva Forestal Choré, 16°32'S, 64°35'W, (♀), *Neill & Quevedo. 9433* (NY); Buena Vista Tacana, (♀), *Serrato AS0026* (F); Ichilo, Parque Nacional Amboró, Río Yapojé y Saguayo, (♀), *I. Vargas et al. 1185* (NY). **Brazil.** ACRE: Mun. Xapuri, Rio Acre, 3 hours by boat downstream from Xapuri, 04°59'12"S, 73°59'04"W, (♂), *Daly et al. 7296* (INPA, MO, NY); Mun. Marechal Thaumaturgo, Basin of Rio Juruá, Rio Bagé, tributary of Rio Tejo, 08°57'00"S, 72°51'00"W, (♀), *Daly et al. 10449* (NY); Highway Abunã to Rio Branco, km 242–246, vicinity of Campinas, (♀), *Forero et al. 6419* (COL, INPA, K, MG, NY, R, S, U); Senador Guiomard, Reserva Experimental Catuaba, (♀), *Gaglioti et al. 154* (SP); mouth of Rio Macauhan, 09°20'S, 69°00'W, (♀), *Krukoff 5327* (A, F, G, K, LE, M, MO, NY, S, U, UC, US); mouth of Rio Macauhan, 09°20'S, 69°00'W, (♂), *Krukoff 5332* (A, F, G, K, M, MO, NY, S, U, UC); Rio Branco, Parque Zoobotânico da Univ. Fed., 10°S, 67°50'W (♀), *B. W. Nelson 705* (BG, MG, NY, P, RB); Rio Branco, Parque Zoobotânico, (♀), *Paula et al. 50* (INPA); Tarauacá, (♀), *G. T. Prance & J. F. Ramos 7503* (F, INPA, K, M, MG, NY, P, R, S, U, US); Mun. Marechal Thaumaturgo, Rio Alto Juruá, margem esquerda, Reserva Extrativista do Alto Juruá, igarapé Ceará, (♀), *Silveira et al. 513* (NY); Sena Madureira, Bacia do Rio Purus, Fazenda Nova Olinda, Carreador dos Palmares, 10°06'S, 69°12'W, (♀), *Silveira et al. 569* (INPA, NY); Rio Médio Tarauacá, Seringal Universo, 08°25'23"S, 71°18'53"W, (♀), *Silveira et al. 867* (INPA); Brasília, Serigal Montevideo, (♀), *N. T. Silva 3524* (IAN); São Francisco, (♀), *Ule 9314* (G, K, MG).—AMAZONAS: Rio Curicuriari between Rio Negro and Igarapé Arabú Rio Javari, 00°20'S, 66°50'W, (♀), *Alencar 497* (MG,

NY); Atalaia do Norte, Rio Javari, margem direita, 6 horas depois de Atalaia do Norte (♀), *Braga et al.* 3178 (INPA); Manaus, BR-17, km 9, (♀), *Chagas INPA962* (INPA, U); Marco, (♀), *Croat* 7633 (MO); Rio Japurá, mouth of Rio Apaporis, (♂), *A. Ducke MG12366* (MG); Manaus, Campus do INPA, estrada do Aleixo, Sede do INPA, atrás da casa do Diretor, (♂), *Falcão* 215 (INPA); Rio Solimões, Fonte Boa, (♀), *Fróes* 21048 (IAN, NY, SP, US); Caiari, afl. do Rio Negro, (♀), *Fróes & Addison* 28583 (IAN, SP); Fonte Boa, Rio Solimões, (♀), *Fróes* 34881 (IAN, SP); Manaus, IFAM, campus zona leste, (♂), *Gaglioti & Pederneira* 130 (EAFM, SP); Manaus, IFAM, campus zona leste, (♀), *Gaglioti & Pederneira* 131 (EAFM, SP); Benjamin Constant, (♀), *Gaglioti & Pederneira* 149 (EAFM, SP); Tefé, (♀), *Krieger et al.* 12268 (INPA); Near mouth of Rio Embira, tributary of Rio Tarauaca, 07°50'S, 68°25'W, (♀), *Krukoff* 5109 (A, F, G, M, MO, NY, S, UC, US); Municipality São Paulo de Olivença, near Palmares, (♀), *Krukoff* 8332 (BR, F, G, K, LE, MO, P, S, U, US); Municipality São Paulo de Olivença, near Palmares, (♀), *Krukoff* 8469 (A, B, BR, F, G, K, LE, MO, NY, P, S, U, US); Manaus, Estrada Rosa de May, Armando, (♂), *Lisbôa* 27 (INPA); Rio Papori, Trindade, (♀), *Luetzelburg* 23887 (M, R); Rio Negro, boca do rio Curicuriari, (♀), *Maia et al.* 497 (INPA); Manaus, Próximo do Sitio Canafé, (♀), *Pena* 445 (IAN); Município de Maraã, Rio Japurá, environs of town of Maraã, (♀), *Plowman et al.* 12208 (F, INPA); Ponte de Guariba near Tapuruquara, (♀), *G. T. Prance et al.* 15791 (INPA, K, NY, U); São Gabriel da Cachoeira, Rio Içana (♀), *Rosa* 399 (IAN); Ipixuna, margem do Rio Cróa, 07°44'43"S, 72°33'24"W, (♀), *Quinet et al.* 1558 (RB, SP); Tapuruquara, (♀), *Schultes* 24547 (IAN, INPA); Santo Antonio do Iça, Rio Solimões, (♂), *M. Silva* 2116 (MG); Santo Antonio do Iça, Rio Solimões, Fonte Boa, (♂), *M. Silva* 2179 (MG); Santo Antonio do Iça, Rio Solimões, Vila Militar, (♀), *M. Silva* 7115 (MG); between Barcellos and São Gabriel da Cachoeira, (♀), *Spruce* 2023 (B, BR, CGE, K, P); Novo Airão, Km 41 da estrada Manaus-Caracará, roçado da Agricultura Ecológica, (♂), *Terada* 5 (INPA); Novo Airão, Km 41 da

estrada Manaus-Caracarái, roçado da Agricultura Ecológica, (♂), *Terada 6* (INPA); Novo Airão, Km 41 da estrada Manaus-Caracarái, roçado da Agricultura Ecológica, (♂), *Terada 7* (INPA); Novo Airão, Km 41 da estrada Manaus-Caracarái, roçado da Agricultura Ecológica, (♀), *Terada 9* (INPA); Rio Juruá, Bom Fin, (♀), *Ule 5265* (B, F, G, H, HBG, K, MG, NY); Rio Juruá, Marary, (♂), *Ule 5266* (HBG, MG); Rio Negro, (♀), *Ule 9314* (MG).—BAHIA: Município de Ilheus, km 22 da rodovia Ilhéus/Itabuna, BR-415, (♀), *Hage & Brito 1406* (GUA); Município de Una, Reserva Biologica de Una, (♀), *D. Lopes et al. 16* (GUA); Município de Ilheus, km 22 da rodovia Ilhéus/Itabuna, BR-415, area do CEPEC, (♀), *Mori 10408* (K, NY, RB).—RIO DE JANEIRO: Jardim Botânico, (♀), *Nadruz 144* (GUA). **Colombia.** UNKNOWN DEPARTMENT: unknown locality, (♀), *Triana 862* (E, NY, P); unknown locality, (♀), *Triana 1846* (NY).—AMAZONAS: Mpio. Letícia, 8-10 km carretera Letícia-Tarapacá, 04°03'S, 69°57'W, (♀), *Betancur et al. 2823* (COL, NY); Puerto Nariño, Río Loretoyacú (♀), *I. Cabrera E. 3051* (COL); La Pedrera, Resguardo Indígena Curare-Los Ingleses, comunidad indígena Curare, 01°28'33"S, 69°53'59"W, (♀), *Z. Cordero P. 679* (COAH); Desembocadura del río Boiouassú al Amazonas, (♀), *Duque-Jaramillo 2261* (COL, NY); Rio Loretoyacu, Barracon, (♂), *Duque-Jaramillo 2446* (COL, NY); Rio Apaporis, entre los Rio Kananari y Rio Pacoa, (♂), *Garcia-Barriga 13871* (COL, US); Rio Apaporis, Jino-Gojé; entre los ríos Piraparaná y Popeyaká, (♀), *Garcia-Barriga 14451* (COL); Comisaria Putumayo, (♀), *Garcia-Barriga et al. 18697* (COL); Puerto Nariño, Rio Loreto Yacu, (♀), *Glenboski C-164* (COL); El Encanto, río Igara Paraná, Milán, chagra de Avelino Kuiru, (♂), *Henao & Kuiru 73* (COL, NY); Mpio. Letícia, camino hacia Tarapacá, (♀), *Lozano et al. 518* (COL); Pto. Milan Chorrera, (♀), *Pozmin & Medina 29* (COL); Miriti-Paraná Santa Isabel, reserva indígena Miraña, (♀), *La Rotta et al. 486* (COAH); Rio Igara-Parana, La Chorrera, (♀), *Sastre 2274* (COL, G, P); Rio Caraparana, El Encanto, (♀), *Schultes et al. 3862* (F); Rio Igara-Parana, La Chorrera, (♀), *Schultes 3901* (F); Trapecio amazónico, Boiauassú River, (♀), *Schultes*

6805 (F, US); Letícia, Trapecio amazónico, Amazon River, (♀), *Schultes 8175* (F, US); Leticia, km 11, finca Pablo Morales, (♀), *Torres et al. 28* (COAH); Leticia, km 11, finca Pablo Morales, (♀), *Torres & Morales 114* (COAH).—ANTIOQUIA: Municipio de San Luis Quebrada La Cristalina, 06°00'N, 74°45'W, (♀), *J. G. Ramirez & D. Cárdenas L. 711* (COL).—CAQUETÁ: Finca La Lindosa, (♀), *S. Castro et al. 979* (COAH); unknown locality, (♂), *Claes 26* (P); Florencia, Corregimiento Santo Domingo, vereda Alto Caldas, finca El Aguila 01°59'59"N, 75°54'51"W, (♀), *M. Correa et al. 2757* (COAH); Florencia, vereda Bajo Caldas, finca La Turbina, 01°55'59"N, 75°54'51"W, (♀), *J. Díaz et al. 114* (COAH); Las Guacamayas, (♀), *E. L. Little Jr. 7756* (US); Solano, medio Caquetá, chagras, (♀), *Vélez & Castro 174* (COAH); chagras, (♀), *Vélez & Castro 243* (COAH); medio Caquetá, chagras, (♀), *Vélez & Castro 244* (COAH); chagras, (♀), *Vélez & Castro 248* (COAH) —GUAVIARE: San José del Guaviare, (♀), *Idrobo & Medina 11755* (COAH, COL); San José del Guaviare, vereda Las Orquídeas, 01°59'59"N, 75°54'51"W, (♀), *R. López & Giraldo-C. 755* (COAH).—META: Cumaral, carretera Guacabiapica, (♀), *Acosta-Malpica et al. s.n.* (COL000219370); Villavicencio, Buenavista, (♀), *Arbelaez et al. 10108* (COL); Solano, Los Monos alrededores (♂), *Pablón E. 573* (COAH).—PUTUMAYO: Río Putumayo entre Puerto Asis y Puerto Leguísamo, (♀), *Garcia-Barriga et al. 5525* (COL); Municipio Villa Garzón, carretera a Puerto de Assis, (♀), *Franco-Rosseli et al. 5525* (COL); Puerto Asis, Resguardo de Buenavista, (♂), *Giraldo & Pinto et al. 20* (COL); Mocoa, Vereda Caliyaco, (♀), *Hurtado et al. 6* (COL); Mocoa, serranía del Churumbelo, 01°16'58"N, 76°53'05"W, (♀), *C. Marin 2244* (COAH); Rio Putumayo, (♀), *Pinkley 405* (S).—VAUPES: Municipio de Mitú, Gran Resguardo Indígena del Vaupes, 01°39'44"N, 70°50'44"W, (♀), *D. Cárdenas L. et al. 18894* (COAH); Yavarate, huerto de la Misión Salesiana, (♂), *Romero-Castañeda 3647* (COL, NY); Mitú, (♀), *Cuatrecasas et al. 6737* (COL, F); Río Guaviare, (♂), *Cuatrecasas 7602* (COL, F, US); Alto Vaupes, alrededores de Miraflores, (♂),

Gutierrez V. & Schultes 827 (COL); Mitú, (♀), *Humbert & A. Fernandez 27221* (P, U, US); Mitú and vicinity, lower Rio Kubiyú, (♂), *Zarucchi 2145* (INPA). Mitú and vicinity, lower Rio Kubiyú, (♀), *Zarucchi 2145A* (INPA). **Ecuador.** MORONA-SANTIAGO: 5 km SW of Macas, (♂), *Berg 1223* (BG, U); río de Rio Morona, 02°52'S, 77°41'W, (♀), *E. L. Little Jr. et al. 577* (COL).—NAPO: San Pablo de los Secoyas, (♀), *Asanza 32929* (AAU); San José Payamino, (♀), *Irvine et al. 543* (F); Anangu, Río Napo, 00°31'S, 76°23'W, (♀), *Lawesson et al. 39648* (NY); sur del río Napo, 11 km al E of Puerto Napo, 01°49'52"S, 78°11'00"W, (♀), *Neill & Zaruma 7044* (BG, MBM, MO, NY); a 2 km Reserva Biológica Jatun Sacha, 01°08'00"S, 77°30'00"W, (♀), *W. Palacios 2780* (NY); Reserva Biológica Jatun Sacha, 01°04'00"S, 77°37'00"W, (♂), *W. Palacios 3137* (NY); Dureno on Río Aguarico, (♀), *Pinkley 108* (COL); Campanacocha, 01°30'S, 77°29'W, (♀), *Rios et al. 315* (NY).—ORELLANA: Nuevo Rocafuerte, río Braga, 01°30'S, 77°30'W, (♀), *J. Jaramillo & Coello 4586* (COL).—PASTAZA: Pastaza Canton, Pozo petrolero "Villano", 01°30'S, 77°30'W, (♀), *Gudiño & Gualinga 1635* (COL); Lorocachi, en margen derecha del Río Curaray, 01°38'S, 75°58'W, (♀), *J. Jaramillo et al. 31516* (AAU, F, NY, U) Shell-Mera, 01°30'S, 78°03'W, (♀), *Neill et al. 6177* (NY). **Peru.** AMAZONAS: N of Quebrada Huampami, 700–800 feet, (♀), *Berlin 523* (F, GH, NY); Huampami, Rio Cenepa, (♀), *Berlin 1999* (NY); Bagua Province, Distrito Imaza, Comunidad Aguaruna de Yamayakat, (♀), *C. Díaz et al. 6871* (F).—HUÁNUCO: Tingo Maria, (♀), *Asplund 12933* (S, US); Prov. Leoncio Prado, Aucayacu, (♀), *Lao M. & Ramirez TM-1446* (F, G, US); Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'00"S, 75°02'00"W, (♂), *Kröll et al. 310* (NY); Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'00"S, 75°02'00"W, (♂), *Kröll et al. 448* (NY); Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'00"S, 75°02'00"W, (♂), *Kröll 463* (NY); Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'00"S, 75°02'00"W, (♂), *Kröll 501* (NY); Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'00"S, 75°02'00"W, (♂), *Kröll 552* (NY); Dtto. Yuyapichis, Prov. Puerto Inca, Bosque Nacional de

Iparia, (♀), *J. Schunke* V. 2824 (F, G, GH, NY, US).—JUNIN: Chanchamayo, La Merced, (♀), *Macbride* 5446 (F, GH, US).—LORETO: Iquitos, (♀), *Asplund* 14124 (G, S); Rio Ampiac, Puca Urquilla, (♀), *Croat* 20662 (DUKE, MO, NY, U); Prov. Requena, Basin of Río Ucayali, Jenaro Herrera and vicinity, 04°59'12"S, 73°59'04"W, (♂), *Daly et al.* 5765 (MO, NY); Iquitos, (♀), *A. Ducke* MG7581 (G, MG); Rio Manití, afluente derecho do rio Amazonas, (♀), *Encarnación et al.* E-1032 (NY); Rio Nanay, 03°43'00"S, 74°07'00"W, (♂), *Fine & Mecenes* 1032 (F, HAP, UNAP); Prov. Puerto Inca, 09°40'00"S, 75°02'00"W, (♀), *Flores & Tello* 1914 (NY); Prov. Puerto Inca, 09°40'00"S, 75°02'00"W, (♂), *Flores & Tello* 1965 (NY); Maynas Province, Mishana, Rio Nanay, (♂), *Gentry et al.* 26288 (F, NY); Yanamono, Explorama Tourist Camp, halfway between Indiana and Mouth of Río Napo, 03°28'S, 72°50'W, (♀), *Gentry et al.* 60901 (F, MO, NY); Maynas, Río Corrientes, Convenio IIAP Petroperu, 03°45'S, 75°15'W, (♂), *Grández & Chiquispama* 867 (MO); Iquitos, (♀), *Killip & A. C. Smith* 27381 (NY, US); Puerto Arturo, lower Río Huallaga below Yurimaguas, (♀), *Killip & A. C. Smith* 27932 (F, NY, US); Iquitos, (♀), *Killip & A. C. Smith* 29839 (F, NY, US); Mishuyacu, near Iquitos, (♂), *Klug* 1185 (F, NY, US); Mishuyacu, near Iquitos, (♀), *Klug* 1326 (F, NY, US); Perseveranca, Rio Marañon, (♀), *Kuhlman* 1337 (F, RB); Pongo de Manseriche, (♀), *Mexia* 6257 (F, G, GB, NY, S, U, UC, US); Prov. Requena, Iricahua near Jenaro Herrera, (♀), *Peters* 76 (NY, BG); Prov. Requena, Iricahua near Jenaro Herrera, (♀), *Peters* 187 (NY, BG); Prov. Maynas, Rio Yaguasyacu, Brillo Nuevo, 02°40'S, 72°00'W, (♀), *Plowman et al.* 6903 (F, GH); Prov. Puerto Dantas, 09°40'00"S, 75°02'00"W, (♀), *Tello* 486 (NY); Prov. Puerto Dantas, 09°40'00"S, 75°02'00"W, (♀), *Tello* 515 (NY); Prov. Puerto Dantas, 09°40'00"S, 75°02'00"W, (♀), *Tello* 740 (NY); Rio Yucayali, (♂), *Tessmann* 3054 (G, S); Requena, Sapuena, Jenaro Herrera, 04°50'S, 73°45'W, (♀), *R. Vásquez & N. Jaramillo* 10101 (MO, NY); Rio Itaya, Paraiso, (♀), *Ll. Williams* 3347 (F, US); Yurimaguas, lower Rio Huallaga, (♀), *Ll. Williams* 3984 (F); Lower Rio Huallaga, (♀), *Ll. Williams* 4627

(F).—MADRE DE DIOS: Provincia Tambopata, 12°50'S, 69°17'W, (♀), *Alexiades & C. Díaz 179* (NY); Provincia Tambopata, 12°59'S, 69°36'W, (♀), *Alexiades & Pesha 213* (MO, NY); Provincia Tambopata, 12°50'S, 69°17'W, (♀), *Alexiades & Pesha 1110* (NY); Rio Manu, Cocha Cashu Station, 12°00'S, 71°45'W, (♀), *R. B. Foster 5903* (F); Prov. Manu, Parque Nacional del Manu, 12°00'S, 71°45'W, (♀), *R. B. Foster 11438* (F); Tambopata, Junction of Rio Latorre and Rio Tambopata, 12°49'S, 69°17'W, (♂), *Gentry et al. 45660* (F, NY).—PASCO: Province of Oxapampa, Iscozacín, 10°12'S, 75°13'W, (♀), *D. N. Smith et al. 2089* (BG, NY, MO); Province of Oxapampa, Iscozacín, 10°12'S, 75°13'W, (♀), *D. N. Smith et al. 5300* (F, MO, NY).—SAN MARTIN: Puerto Pizana, (♀), *J. Schunke V. 6485* (F, GH, MO, NY).—UCAYALI: Province of Coronel Portillo, Lago Yarinacocha, Povenir, (♀), *Maas et al. 6201* (MO, U); Province of Coronel Portillo, km 13 of rd. from Campo Verde, km 34 of rd. Pucallpa-Tingo Maria, (♀), *Maas et al. 6225* (U). **Venezuela.** AMAZONAS: Depto. Atures, 35 km SE of Puerto Ayacucho, (♀), *Guanchez 239* (VEN); Rio Orinoco, between Caño Grulla and Grulla, (♀), *Morillo et al. 7384* (VEN); Depto. Antures, Comunidad San Antonio del Sipapo, 04°36'S, 67°41'W, (♀), *Melnyk & Melgueiro et al. 7* (NY).—BOLÍVAR: Municipio de Sucre, Santa Maria de Erebató, 04°59'N, 64°49'W, (♀), *Sandja 2551* (MO).

Martius (1831: 1130) remarked that *Pourouma cecropiifolia*, *Ambauva mansa* or of Vine, has great similarity with the genuine *Ambauva* (*Cecropia*), but differs by its fruit. Also, Martius commented about flavor of the fruits, uses, phenology and cultivation of this species. In 1843, Martius classified *Pourouma cecropiifolia* in the “classis V: acida” within of Urticaceae.

Miquel (1853: 123) based on the Martius 's collection (M0174085, M0174086, M0174087, M0174088, M0174089, M0174090, M0174091, M0174092, M0174093) classified *P. cecropiifolia* in the group “1. Folia palmato- vel umbellato-partita, subtus albo-tomentosa”

(leaves palmatilobed or umbellate-partite, abaxial lamina surface white-tomentose). Moreover, Miquel designated the type material of *P. cecropiifolia* “Crescit in silvis provinciae Paraensis et Rio Negro, December 1819, Martius s.n. (M)”. Only the material M0174086 provide the information as cited by Miquel and the others materials might be probably isotypes. The material M0174089 was used to make the staminate inflorescence and stipule of the tabula 36 (Miquel 1853).

Pourouma multifida was described by Trécul (1847: 107) from pistillate specimen and synonymized by Miquel (1853: 123). Trécul did not mention *P. cecropiifolia*.

Berg & Heusden (1988: 107) added more three synonyms (*P. edulis*, *P. sapida* and *P. uvifera*) for *Pourouma cecropiifolia*, although they did not remark anything about this species.

Pourouma sapida and *P. uvifera* were described from pistillate specimen and all morphological characters match with the materials of *P. cecropiifolia*. Furthermore, the authors of the both species did not mention *P. cecropiifolia*.

Pourouma edulis was described by Dufresne (1873: 70) based on cultivated specimen from Colombia, collected by Linden.

Berg et al. (1990: 144) designated as lectotype the same material mentioned by Miquel, which we consider a misconception.

Pourouma cecropiifolia presents the largest fruiting perianth of *Pourouma* with up to 3.8 cm long (when mature) and number of pistillate flowers with up to 185 per inflorescence. It shows leaves similar to the *Cecropia*, but distinguished by lamina not peltate. Also, *P. cecropiifolia* displays similarities to *P. digitata*, due to lamina palmatifid to palmatipartite with 3–9 lobes and stipules with indument hirsute inside, but it may be distinguished adaxial lamina surface smooth, palmatifid to palmatipartite with up to 11 lobes, number of pistillate flowers with up to 185 per

inflorescence (versus with up to 62 flowers), fruiting perianth with up to 3.8 cm (versus with up to 1.8 cm).

Our results of molecular analyses (Chapter 1, Fig. 5) provide a moderate support (BP = 85, PP = 0.90) to *Pourouma cecropiifolia* within clade V (*P. amacayacuensis*, *P. bicolor*, *P. cecropiifolia*, *P. cucura*, *P. velutina*, and *P. villosa*). This clade is characterized by staminate inflorescences in fascicles and staminate flowers with tepals free or basally connate. In fact, the moderate support might be associated to *Pourouma cecropiifolia*, which presents the largest fruits of *Pourouma*, distinguishing from other species of the clade V.

According to the label of herbarium materials (Mori 10408 and Nadruz 144) *Pourouma cecropiifolia* is cultivated in Bahia (Botany Reserve of the CEPEC) and Rio de Janeiro (Botanical Garden).

The material Hayes 862 (NY) from Panama matches probably to Triana 862 from Colombia, as marked on the exsiccate.

9. *Pourouma chocoana* Standl., Publ. Field Mus. Nat. Hist., Bot. Ser., 22: 73. 1940; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 106. 1988; Berg & Franco-Rosselli, Fl. Ecuador 27A: 85. 1993.—TYPE: COLOMBIA. Chocó: Dense forest near junction of Rio Condoto and Rio San Juan, 20 Apr 1939 (♀), Killip & A. C. Smith 35095 (holotype: F!; isotypes: COL! NY! US image!).

Pourouma johnstonii Woodson, Ann. Missouri Bot. Gard 47: 166. 1960; Burger, Fieldiana Bot. 40: 201. 1977; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 141. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 85. 1993.—TYPE: PANAMA. Panama: Canal Zone,

Northwestern part of Canal Zone, area west of Limón Bay, Gatun Locks and Catun Lake, 27 Mar 1956 (♀), *Johnston 1714* (holotype: MO!; isotypes: A image!).

Pourouma bicolor Mart. subsp. *chocoana* (Standl.) C.C. Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 141. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 85. 1993.

Tree, 5–30 m tall, 10–40 (–50) cm d.b.h., with stilt roots. Leafy twigs 5–20 mm in diameter, with indument yellowish to whitish, hirsute to villous, or at least on the scars of the stipules and brownish, multicellular trichomes; internode 5–40 mm long. Lamina palmatifid to palmatipartite with 3–5 lobes, (5–) 8.5–38.5 (–41.5) cm long, (3.5–) 8–40 (–43.5) cm wide, length:width ratio 0.7–1.1, coriaceous; base deeply cordate to cordate, sometimes with overlapping lobes; margin palmatifid, with indument yellowish, hirsute to hirtellous; apex acuminate to acute; midsegment broadly elliptic to oblong; adaxial surface scabrous, with indument whitish, strigose, indument of veins yellowish, hirtellous to hirsute; abaxial surface smooth, indument of veins yellowish to whitish, sericeous to strigose and brownish, multicellular trichomes; venation palmate; secondary veins in the free part of the midsegment 6–20 pairs per leaf, basal pair branched; tertiary and quaternary veins plane to slightly prominent, with dense, whitish arachnoid indument covering to the areoles; petiole (5–) 8–36.5 (–38.5) cm long, with indument yellowish to whitish, hirsute to hispid and brownish, multicellular trichomes, domatia absents; stipules (6–) 10–18.5 (–22) cm long, with indument yellowish to whitish, villous to hirsute, and brownish, multicellular trichomes outside, with indument sparse, yellowish, hirsute to glabrous inside, often persistent or caducous. Staminate inflorescences (5.5–) 6.5–14.5 (–16.5) cm long, (2–) 3.5–10.5 (–12.5) cm wide, primary branched 2–5; peduncle 3.5–8.5 cm long, peduncle and branches with indument yellowish, hirsute to velutinous and dense, brownish to brownish-red,



FIG. 35. *Pourouma chocoana*. A. Leafy twig with staminate inflorescences. B. Palmatifid leaf, abaxial surface. C. Strigose indument of the adaxial lamina surface. D. Staminate flower. E. Pistillate flower and pedicel. F. Fruiting perianth and pedicel. [A-D: from Cuatrecasas 17357 (F); E: from Zarucchi 3273 (MO); F: from Killip & A. C. Smith 35095 (F)].

multicellular trichomes on the ultimate branches; flowers ca. 250–950, flowers organized in 20–55 fascicles, diffusely distributed along the ultimate branches; fascicle 4–6 mm in diameter, ca. 4–42 flowers per fascicle. Staminate flowers 0.4–0.5 mm long, 0.8–1.2 mm wide; sessile; tepals 4, 0.4–0.5 mm long, ovate, free or basally connate, with indument yellowish, hirtellous to strigulose; stamens 4; filaments 0.3–0.4 mm long, free, usually shorter than the tepals. Pistillate inflorescences 6.5–12.5 cm long, 4.5–7.5 cm wide; peduncle 2.5–6.5 cm long, peduncle and branches with indument yellowish, hirsute to hirtellous and brownish, multicellular trichomes on the ultimate branches; flowers (15–) 25–60 (–68), flowers organized in 4–10 cymes. Pistillate flowers 3–5 mm long, 2–3 mm wide, pedicel 2–5 mm long; perianth 2.5–4.5 mm long, with indument whitish, strigulose and dense, brownish to brownish-red, multicellular trichomes; stigma peltate, 1–1.5 mm in diameter. Infructescences (11–) 12–19.5 (–22.5) cm long, 8–15.5 (–18.5) cm wide; peduncle 6–10.5 (–12.5) cm long; fruiting pedicel 8–15 mm long. Fruiting perianth 1–1.5 cm long, 5–12 mm wide, ovoid to ellipsoid, brownish to vinaceous, with indument whitish, strigulose and brownish to brownish-red, multicellular trichomes. Achene 8–12 mm long, 3–10 mm wide, glabrous. Seed 3–6 mm long, 1.5–3 mm wide, ovoid, vinaceous. Fig. 5 C–D; Fig. 9 B; Fig. 13 C; Fig. 35.

Phenology. Staminate flowers collected from September to May, pistillate flowers from July to September and fruits along all the year.

Distribution (Fig. 36). Northwest of Ecuador (Esmeralda), west of Colombia (Antioquia, Chocó, Nariño and Valle del Cauca), central-south of Panama (Cocle, Colon and Panama), in “terra firme” forest of the Amazonian region, often in lowland moist areas, sometimes in riparian forest, at an elevation of about 10 to 850 m above sea level.

Ecological observation. Ant infested (Croat 8097).

Vernacular Name. Sirpo (Colombia, Antioquia); uva (Colombia, Chocó); guaguay, uva pipa (Colombia, Nariño); uva, uva de monte (Colombia, Valle del Cauca); uva de monte (Ecuador, Esmeralda).

Etymology. The epithet is a tribute to type locality, department of Chocó.

Use. Edible fruits.

IUCN conservation status. *Pourouma chocoana* is widely distributed with the extent of occurrence of ca. 244,000 Km². Also, *P. chocoana* is well represented in herbaria. For these reasons *P. chocoana* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** ANTIOQUIA: Municipio Tarazá, corregimiento El 12, 210 kms, NE de Medellín, vía El 12-Barroblanco, 07°30'N, 75°20'W, (♀), *Callejas et al.* 5508 (NY); Municipio de Anorí, corregimiento de Providencia, (♀), *Soejarto* 3385 (F, NY); Valley of Río Anorí between dos Bocas and Anorí, 07°21'N, 75°03'W, (♀), *Zarucchi* 3273 (MIN, MO).—CHOCÓ: Municipio de Quibdó, Sector Puente de Cabí, (♀), *Arias et al.* 115 (COL); Región del Río Saudó, (♀), *Fuchs et al.* 21918 (COL); 48 km S of Quibdó on Quibdó-Istmina road, near Certegui, (♀), *Gentry & Renteria* 23835 (BG, MO); Quibdó, 1 km E of Tutunendo, 05°46'N, 75°20'W, (♂), *Gentry et al.* 30062 (COL); La Mojarra, just upriver from Istmina, (♀), *Juncosa* 1253 (MO).—NARIÑO: Municipio de Barbacoas, en la carretera entre Barbacoas y Junin, (♀), *Mora-Osejo* 2295 (US); Municipio de Iscuande, Río Sequión, (♂), *Romero-Castaneda* 5484 (AAU, COL).—VALLE DEL CAUCA: Río Yurumangui, Veneral, (♂), *Cuatrecasas* 15876 (F); Río Calima, región del Chocó, La Trojita, (♀), *Cuatrecasas* 16315 (F); La Esperanza, (♂), *Cuatrecasas* 16755 (F); río Cajambre, San Isidro, Costa del Pacífico, (♂), *Cuatrecasas* 17357 (F); Municipio de Boa Ventura, San Isidro, bosque INDERENA-CONIF,

(♀), *Devia A. 2658* (MO, US); Reserva Natural Escalerete, 03°49'41"N, 76°52'10"W, (♀), *Devia A. 5333* (MO); Bajo Calima, road to Juanchaco Palmeras, 03°55'N, 77°02'W, (♀), *Gentry et al. 48303* (BG, MO); Bajo Calima, road to Juanchaco Palmeras, 03°55'N, 77°02'W, (♀), *Gentry et al. 53662* (MO); Bajo Calima, road to Juanchaco Palmeras, 03°59'N, 77°05'W, (♀), *Gentry et al. 56825* (MO); Bajo Calima, road to Juanchaco Palmeras, 03°56'N, 77°08'W, (♀), *Gentry et al. 56928* (MO); Bajo Calima, road to Juanchaco Palmeras, 03°56'N, 76°59'W, (♂), *Gentry et al. 59553* (MO); Pulpapel Headquartes Camp, 18 Km N of Buenaventura, (♂), *Gentry et al. 59636* (MO); Bajo Calima, Concesión Pulpapel-Buenaventura, 03°55'N, 77°W, (♀), *Monsalve B. 129* (MO); Bajo Calima, Concesión Pulpapel-Buenaventura, 03°55'N, 77°W, (♂), *Monsalve B. 596* (F); Bajo Calima, Concesión Pulpapel-Buenaventura, 03°55'N, 77°W, (♀), *Monsalve B. 1356* (MO); Bajo Calima, Concesión Pulpapel-Buenaventura, 03°55'N, 77°W, (♀), *Werff 9694* (MO).

Ecuador. ESMERALDA: San Lorenzo Canton, Reserva Etnica Awá, Centro Guadualito, 01°15'N, 78°40'W, (♀), *Aulestia et al. 172* (MO, NY, QCNE); Paroquia Mataje, 01°08'N, 78°33'W, (♀), *Aulestia et al. 311* (MO, QCNE); Community of La Union, 01°00'N, 78°33'W, (♀), *Beck et al. 2283* (NY); Cañon del Rio Mira, 10 km al oeste de Alto Tambo, 1°02'N, 78°26'W, (♀), *Rubio et al. 1150* (NY). **Panama.** UNKNOWN PROVINCE: (♀), *Hayes 348* (NY).—COCLE: Above El Cope and Barrigon, 08°38'N, 80°35'W, (♀), *McPherson 12163* (MO).—COLON: Donese district, Camp Batija, (♀), *Holdridge 6254A* (MO); Distrito Donoso, 06°54'52"N, 80°39'41"W, (♂), *McPherson 21209* (MO).—PANAMA: Canal Zone, Fort Clayton, Cut the pipe line rd 15 mi ffom Gamboa, (♀), *Blum 2039* (MO); Barro Colorado Island, Snyder-Molino Trail, 50 m north of trail, (♂), *Croat 8097* (F, MO, NY); Barro Colorado Island, Canal Zone, Snyder-Molino Trail, 50 m north of trail, (♀), *Croat 8100* (F, MO); Barro Colorado Island, (♀), *Garwood 1280A* (F); Pipeline road, 5–6 miles N of Gamboa, (♂), *Gentry et al. 6679* (MO); railroad relocation between Gorgona and Gatun, (♀), *Pittier 2286* (NY, US); Barro Colorado Island, (♂), *Shattuck 522* (F,

MO, US); Barro Colorado Island, (♂), *Shattuck 525* (F, MO); Fort Sherman, 09°22'N, 79°57'W, (♂), *Weiblen GW 1442* (MIN).

Pourouma chocoana belongs to the group of species with lamina palmatifid to palmatipartite with 3–5 lobes. It is morphologically most similar to *P. digitata* and *P. scobina* due to the adaxial lamina surface scabrous and stipules with indument hirsute inside. It is distinguished by leaf twigs with indument hirsute to villous (versus with indument sericeous to strigose), stipules often persistent (versus always caducous), petiole with indument hirsute to hispid (versus with indument sericeous to strigose), midsegment broadly elliptic to oblong (versus narrow elliptic to elliptic) and staminate flowers up to 0.5 mm long (versus more than 1 mm long).

Berg & Heusden (1988: 106) proposed a new combination *Pourouma bicolor* subsp. *chocoana* synonymizing *Pourouma chocoana* and *Pourouma johnstonii*, but they did not comment anything about this species.

Pourouma chocoana distinguished from *P. bicolor* by lamina palmatifid to palmatipartite with 3–5 lobes (versus usually entire), leaf twigs with indument hirsute to villous (versus with indument sericeous to strigose), stipules often persistent (versus always caducous), petiole with indument hirsute to hispid (versus with indument sericeous or glabrous), staminate flowers up to 0.5 mm long (versus more than 1 mm long) and pistillate inflorescence up to 68 flowers (versus up to 35 flowers). Furthermore, these species are allopatric.

Burger (1977) considered *Pourouma johnstonii* as synonym of *P. aspera* (= *P. bicolor*). However, the morphological characters of *P. johnstonii* match with *P. chocoana*. Also, the author of *P. johnstonii* did not remark about *P. chocoana*. For this reason, we recognize it as synonym of *P. chocoana*.

10. *Pourouma cordata* C.C. Berg, *Brittonia* 56: 255. 2004; Romaniuc-Neto & Gaglioti, *Catálogo de plantas e fungos do Brasil* 2: 1664. 2010.—TYPE: PERU. Amazonas: Province of Bagua, Yamayakat, 04°55'S, 78°19'W, 25 Feb 1996 (♀), *N. Jaramillo et al.* 1284 (holotype: UMS!; isotypes: BG! MO! NY!).

Tree, 9–15 m tall, 26.5 cm d.b.h. Leafy twigs 5–10 mm in diameter, with indument yellowish, villous and sparse, whitish, arachnoid indument; internode 5–35 mm long. Lamina entire, (9–) 13.5–31 (–41) cm long, (6.5–) 9.5–22.5 (–25) cm wide, length:width ratio 1.3–2.1, ovate, chartaceous to coriaceous; base deeply cordate, sometimes with overlapping lobes; margin usually repand, with indument sparse, yellowish, villous; apex short-acuminate; adaxial surface smooth, indument of veins yellowish to whitish, hirsute to sericeous; abaxial surface smooth, with indument yellowish, hirsute to villous; venation brochidodromous; secondary veins (10–) 12–17 pairs per leaf, basal pair branched, diverging from the midrib at an 30°–50°; tertiary and quaternary veins prominent, with dense, whitish, arachnoid indument covering to the areoles; petiole 3–6.5 cm long, with indument yellowish, hirsute to villous and whitish, arachnoid indument, domatia absents; stipules 4.5–10 cm long, with indument yellowish, hirsute to villous, with dense, whitish, arachnoid indument and sparse, brownish, multicellular trichomes outside, glabrous inside, caducous. Staminate inflorescences unknown. Pistillate inflorescences unknown. Infructescences 16–19.5 cm long, 5.5–10.5 cm wide; peduncle 10–13.5 cm long, peduncle and branches with indument yellowish, hirtellous on the ultimate branches; fruits 15–30, fruits organized in 3–4 cymes; fruiting pedicel 5–15 mm long; stigma peltate, 1–2 mm in diameter. Fruiting perianth 1.5–1.8 cm long, 8–12 mm wide, ovoid to ellipsoid, with indument yellowish,

hirsute and whitish, arachnoid indument. Achene 1.2–1.5 cm long, 6–8 mm wide. Seed 5–10 mm long, 2–5 mm wide, ovoid, vinaceous. Fig. 13 D.

Additional illustrations. Berg (2004: 256).

Phenology. Collected in fruits from October and February.

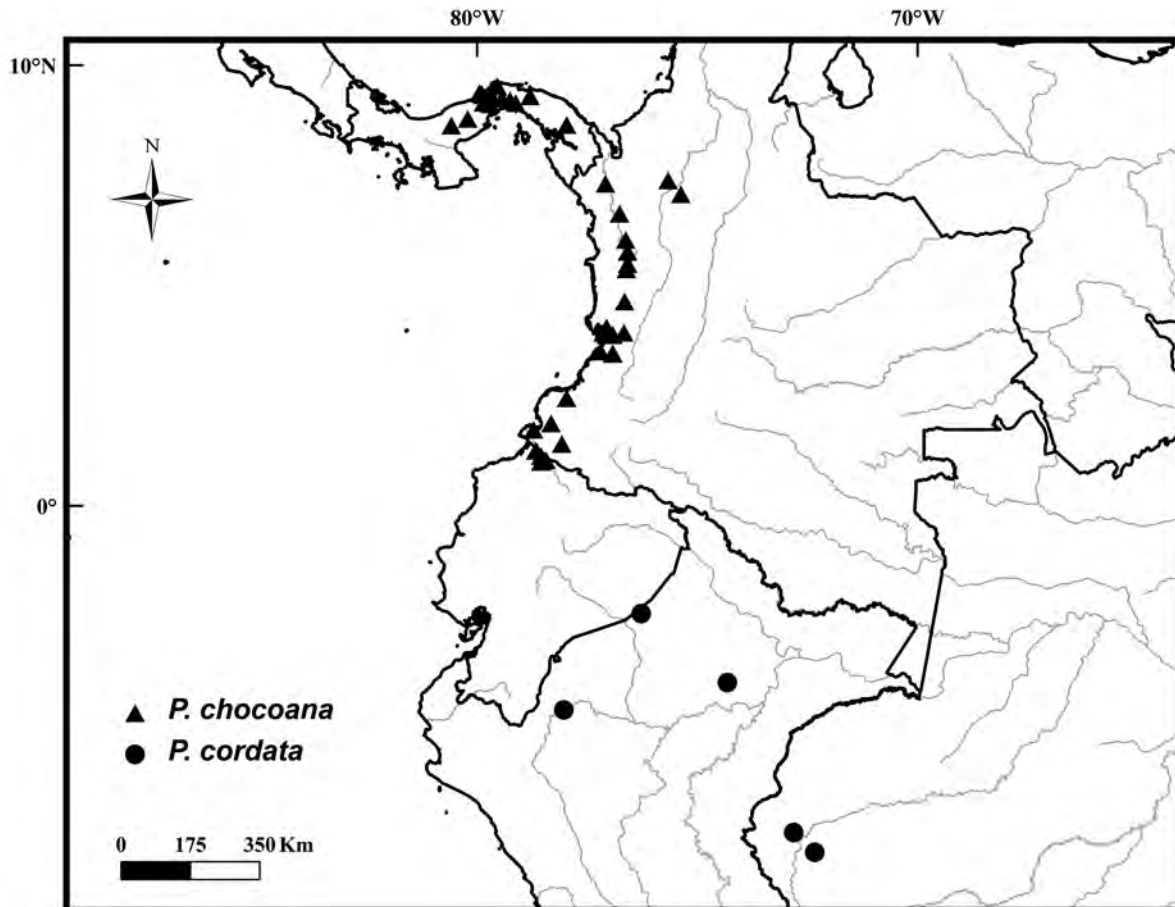


FIG. 36. Distribution of *Pourouma chocoana* and *P. cordata*

Distribution (Fig. 36). North of Peru (Amazonas and Loreto) and northwest of Brazil (Acre), in primary “terra firme” forest of the Amazonian region, in lowland moist areas, at an elevation of about 100 to 350 m above sea level.

Etymology. The epithet refers to deeply cordate base of the leaf.

IUCN conservation status. *Pourouma cordata* is known from only five collections (just two fertile) in the province of Amazonas (Peru) and state of Acre (Brazil), made between 1929 and 1996. Nevertheless, the extent of occurrence of *P. cordata* is ca. 148,540 Km² and the population size is unknown. For these reasons *P. cordata* is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** ACRE: Reserva INCRA "Santa Luzia," rd. BR-364, Km 40, 07°52'S, 72° 20'W, (st), *Campbell et al.* 6820 (NY); Reserva INCRA "Santa Luzia," rd. BR-364, Km 40, 07°52'S, 72° 20'W, (st), *Campbell et al.* 7689 (BG); Rio Juruá, nr. Colônia Rodriguez Alvez, 07°38'S, 72°40'W, (♀), *Campbell et al.* 12816 (BG). **Peru.** LORETO: Río Corrientes at the Ecuador border, between Teniente Lopez and Puesto Avanzado, (st), *Gentry et al.* 19048 (BG); Santa Rosa, lower Río Huallaga below Yurimaguas, (st), *Killip & A. C. Smith* 28800 (F, NY).

Pourouma cordata is easily recognized for its entire lamina, with the base deeply cordate, indument villous on the leafy twigs, stipules, petiole and fruiting perianth with indument hirsute to hirtellous and arachnoid. The infructescence of this species resembles to *P. stipulacea*. However, *P. cordata* distinguished from *P. stipulacea* by entire lamina (versus palmatipartite) and caducous stipules (versus persistent). Moreover, these species are allopatric.

The indument villous of *Pourouma cordata* is similar to *P. villosa*. Nevertheless, *P. cordata* differentiates from *P. villosa* by entire lamina (versus palmatifid to palmatipartite lamina), withish, arachnoid indument on the stipules, petiole and fruiting perianth (versus withish, arachnoid indument absent) and multicellular trichomes absent (versus multicellular trichomes present).

During field trip to Acre (Brazil), we did not find this species and probably it is rarely found in the nature.

11. *Pourouma cucura* Standl. & Cuatrec. in Cuatrec., *Fieldiana Bot.* 28(1): 211. 1951; Berg & Heusden, *Proc. Kon. Ned. Akad. Wetensch., Ser. C.*, 91(2): 107. 1988; Berg, Akkermans & Heusden, *Fl. Neotrop. Monogr.* 51: 147. 1990; Berg & Franco-Rosselli, *Fl. Ecuador* 27A: 87. 1993; Berg, *Fl. Venez. Guayana* 4: 187. 1998; Berg, *Fl. Venez.*: 237. 2000; Romaniuc-Neto & Gaglioti, *Catálogo de plantas e fungos do Brasil* 2: 1664. 2010.—
TYPE: VENEZUELA. Amazonas: Capihuara, Alto Casiquiare, 5 Jun 1942 (♀), *LI. Williams 15812* (holotype: F-1192556!; isotypes: F-1167320! G image! NY! RB! US!).

Pourouma garciana Cuatrec., *Caldasia* 7: 298. 1956; Berg & Heusden, *Proc. Kon. Ned. Akad. Wetensch., Ser. C.*, 91(2): 107. 1988; Berg, Akkermans & Heusden, *Fl. Neotrop. Monogr.* 51: 147. 1990; Berg & Franco-Rosselli, *Fl. Ecuador* 27A: 87. 1993; Berg, *Fl. Venez. Guayana* 4: 187. 1998; Berg, *Fl. Venez. Guayana* 4: 187. 1998; Berg, *Fl. Venez.*: 237. 2000.—TYPE: Colombia. Amazonas-Vaupés: Río Apaporis, entre los ríos Kananarí y Pacoa, 1–15 Dec 1951(♀), *García-Barriga 14002* (holotype: US00090350!; isotypes: BAF image! COAH! COL49999! COL108944! ECON image! NY!).

Tree, 8–30 (–35) m tall, 10–40 (–50) cm d.b.h., with stilt roots. Leafy twigs 4–12 mm in diameter, with indument yellowish, hirsute, at least on the scars of the stipules, often minutely whitish, puberulous; internode 4–35 (–40) mm long. Lamina usually entire, (4–) 5.5–21.5 (–23.5) cm long, (1.5–) 2.5–13.5 (–15) cm wide, length:width ratio 1.2–2.4, ovate to elliptic; or palmatifid to palmatipartite with 3 lobes, rarely with 5 lobes (juvenile), (8.5–) 10–25.5 (–27.5)

cm long, (9.5–) 11–26.5 (–28.5) cm wide, length:width ratio 0.8–1, coriaceous to chartaceous; base obtuse to rounded or truncate to cordate; margin usually entire, repand or palmatifid, with indument yellowish to whitish, hirtellous to strigose; apex acuminate to acute or sometimes obtuse to rounded to emarginate; adaxial surface scabrous to scabridulous, with indument whitish, strigose to strigulose and sometimes with indument sparse, yellowish, hirsute to hirtellous, indument of veins yellowish, hirsute to hirtellous; abaxial surface smooth, with indument yellowish to whitish, hirsute to hirtellous and sometimes with whitish, arachnoid on the veins; venation brochidodromous or palmate; secondary veins (6–) 8–18 (–20) pairs per leaf, basal pair branched, diverging from the midrib at an 35°–70°; tertiary and quaternary veins slightly prominent to prominent, with whitish, arachnoid indument covering to the areoles; petiole (2.5–) 4–18 (–19.5) cm long, with indument yellowish, hirsute to hirtellous and often minutely whitish, puberulous, domatia absents; stipules (2–) 3.5–13.5 cm long, with indument yellowish, hirsute and sometimes with indument whitish, strigose outside, glabrous inside, caducous. Staminate inflorescences (3–) 4–13.5 (–15) cm long, (1.5–) 2.5–5.5 (–6.5) cm wide, primary branched 3–4; peduncle 2–8.5 cm long, peduncle and branches with indument yellowish, hirsute to hirtellous and sometimes with sparse, brownish, multicellular trichomes on the ultimate branches; flowers ca. 220–1250, flowers organized in 10–35 fascicles, diffusely distributed along the ultimate branches; fascicle 4–7 mm in diameter, ca. 5–45 flowers per fascicle. Staminate flowers 1–1.2 mm long, 1–1.5 mm wide; sessile to subsessile; tepals 3–4, lanceolate, 0.8–1.2 mm long, free or basally connate, with indument yellowish to whitish, sericeous to puberulous; stamens 3–4; filaments 0.8–1 mm long, free, usually shorter than the tepals. Pistillate inflorescences 2.5–5.5 cm long, 1–2.5 cm wide; peduncle 1–3 cm long, peduncle and branches with indument yellowish, hirsute to hirtellous and sometimes with brownish, multicellular trichomes on the ultimate branches; flowers 10–26 (–30), flower organized in 2–5 cymes.

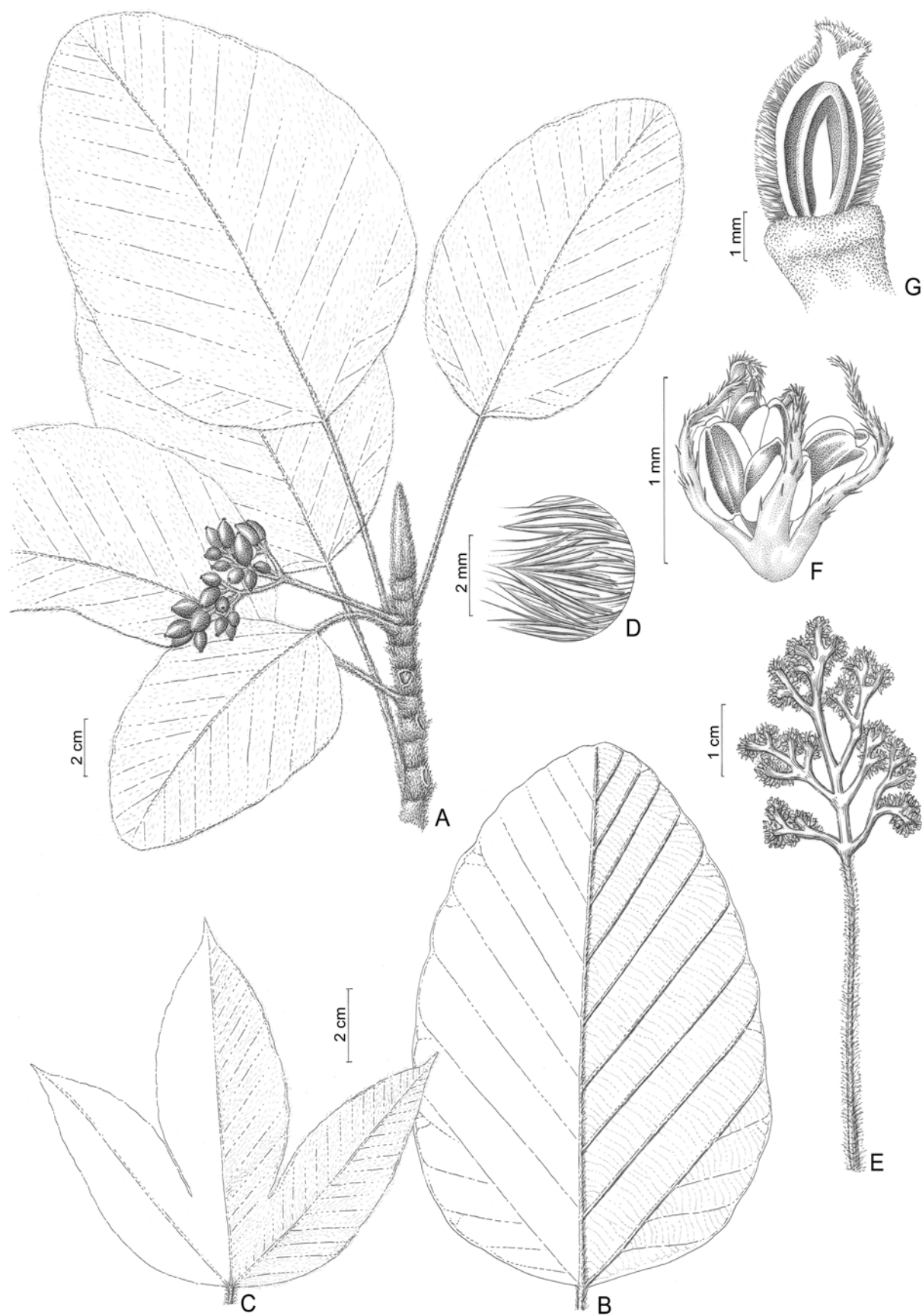


FIG. 37. *Pourouma cucura*. A. Leafy twig with infructescence. B. Entire leaf, abaxial surface. C. Palmatipartite leaf, abaxial surface. D. Hirsute indument of the leafy twigs. E. Staminate inflorescence. F. Staminate flower. G. Pistillate flower, longitudinal section and pedicel [A-B, D: from *Williams 15812* (F); C, E-F: from *Acosta-Malpica 12* (F); G: from *Arellano et al. 559* (MO)].

Pistillate flowers 3–5 mm long, 2–3 mm wide; pedicel 2.5–5 mm long; perianth 2–4 mm long, with indument yellowish, hispidulous to hirsute; stigma peltate, 1–1.8 mm in diameter. Infructescences 5.5–20.5 (–22) cm long, 3–12 (–13.5) cm wide; peduncle 3–12.5 cm long; fruiting pedicel 6–12 mm long. Fruiting perianth 8–15 mm long, 4–8 mm wide, ellipsoid to ovoid, or oblongoid to globose, ferruginous to vinaceous to black, scabrous, yellowish, hispidulous to hirsute and often whitish, strigose. Achene 6–12 mm long, 3–6 mm wide, ellipsoid to ovoid; pericarp crustaceous to woody. Seed 4–8 mm long, 2–4 mm wide, ovoid to reniform, vinaceous. Fig. 13 E; Fig. 37.

Phenology. Staminate flowers collected from July to November, pistillate flowers from August to December and fruits along all the year.

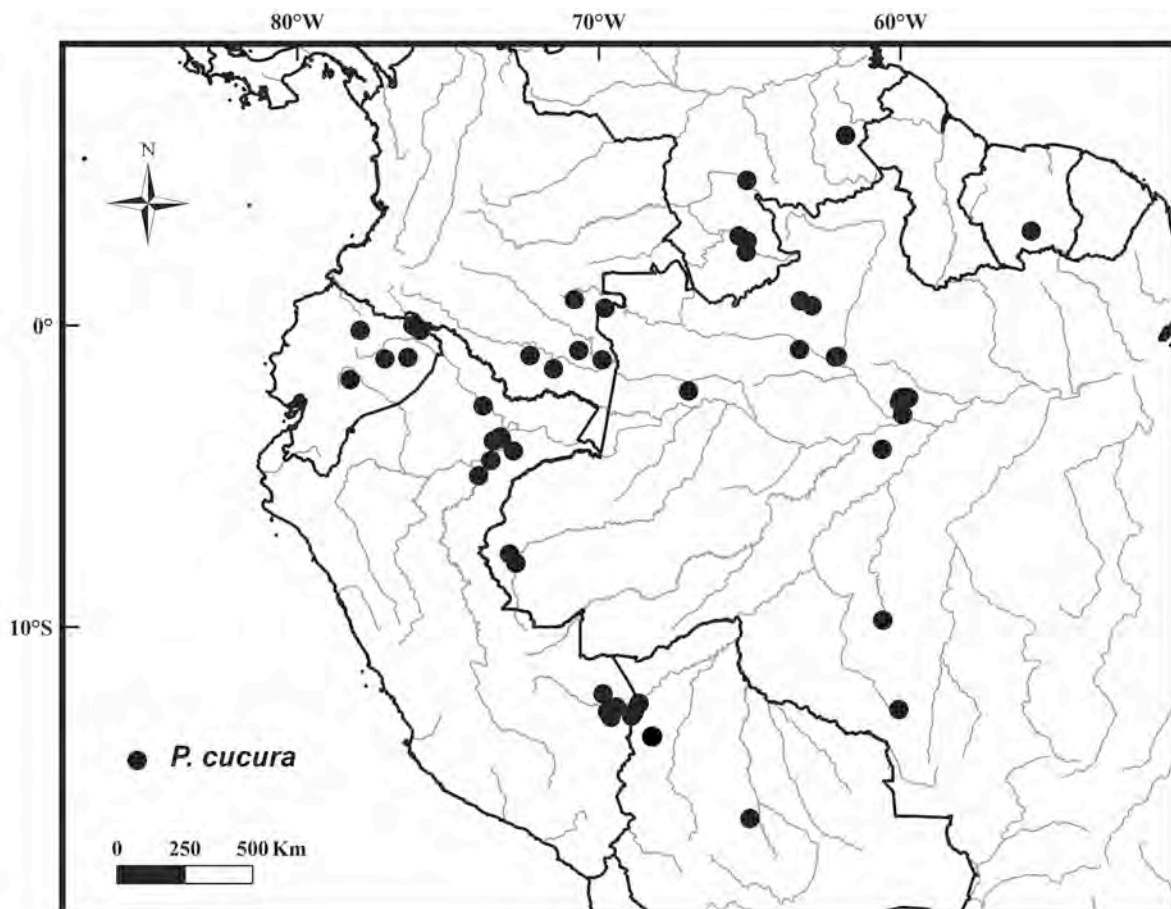


FIG. 38. Distribution of *Pourouma cucura*.

Distribution (Fig. 38). Northwest of Brazil (Acre, Amazonas, Mato Grosso, Rondônia and Roraima), south of Suriname (Sipaliwini), south of Venezuela (Amazonas and Bolívar), south of Colombia (Amazonas, Meta and Vaupes), east of Ecuador (Morona-Santiago, Napo and Sucumbios), east of Peru (Amazonas, Loreto and Madre de Dios) and Bolivia (Cochabamba and La Paz) in “terra firme” forest of the Amazonian region, frequently in lowland moist areas, sometimes in riparian forest, at an elevation of about 10 to 1500 m above sea level.

Vernacular Name. Ambaibo, ambaibo lija (Bolivia, Cochabamba); Imbaubarana branca (Brazil, Amazonas); imbaúba, imbaúbarana (Brazil, Mato Grosso); chiricoñoy, unocigña (Colombia); guarumo colorado (Ecuador); sacha uvilla, ubilla, uvilla, uvilla de monte (Peru, Madre de Dios); cucura, cucura de monte (Venezuela, Amazonas); kaibarikei, sarasara (Venezuela, Bolívar).

Etymology. The epithet is derived of the vernacular name from type locality (Venezuela, Amazonas).

IUCN conservation status. *Pourouma cucura* is widely distributed with the extent of occurrence of ca. 2,696,000 Km² and is well represented in herbaria. For these reasons *P. cucura* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Bolivia.** LA PAZ: Franz Tamayo, en Parque Nacional Madidi, 14°43'34"S, 68°49'49"W, (♀), *Arellano et al.* 559 (MO); Franz Tamayo, en Parque Nacional Madidi, 14°43'34"S, 68°49'49"W, (♀), *Arellano et al.* 606 (MO); Franz Tamayo, Región Madidi, Santo Domingo, sector arroyo Tintaya, 14°47'23"S, 68°35'60"W, (♀), *Chapi et al.* 1 (MO).—COCHABAMBA: Carrasco Prov., Estacion Experimental Valle del Sajta, 17°00'S, 64°46'W, (♀), *Mendoza & Arroyo* 836 (NY); Carrasco Prov., Estacion Experimental Valle del

Sajta, 17°00'S, 64°46'W, (♀), *Mendoza & Arroyo 1092* (NY); km 240 Santa Cruz-Cochabamba, 17°00'S, 64°46'W, (♀), *Pariona & Quevedo 1182* (MO). **Brazil.** ACRE: Mun. Cruzeiro do Sul, BR 307, road to ranch of Sr. Ildefonso, 60 km from the city, 07°53'S, 72°45'W, (♀), *C. A. Cid Ferreira et al. 10670* (INPA, MO, NY); Municipio de Mancio Lima, BR 307 Ramal Feijão Inosso km 15, 07°35'00"S, 72°57'53"W, (♀), *P. J. M. Maas et al. 9062* (UFACPZ).—AMAZONAS: Vila Bittancourt, rio Japurá, (♂), *Amaral et al. 604* (BG, INPA, K, MG, MO, NY); Jutai, 5°13'S, 69°19'W, (♀), *Assunção & Zartman 1553* (INPA); Município de Manaus, Distrito Agropecuário da SUFRAMA, rodovia BR-174, Km 0 depois da fazenda, (♀), *A. J. C. Ferreira et al. INPA/WWF3209.776* (INPA); Maraã, Amanã Sustainable Development Reserve, Trilha do Tambaqui, 02°56'45"S, 64°32'37"W, (♀), *Julião & A. S. Nascimento 67* (INPA); Maraã, Amanã Sustainable Development Reserve, Trilha do Tambaqui, 02°56'45"S, 64°32'37"W, (♀), *Julião & A. S. Nascimento 68* (INPA); Manaus, Escola Agrotécnica Federal de Manaus, area do manejo florestal próximo ao viveiro, (♀), *Kinupp et al. 3491* (EAFM); Manaus, Escola Agrotécnica Federal de Manaus, area do manejo florestal próximo ao viveiro, (♀), *Kinupp et al. 3976* (EAFM); Distrito Agropecuário, 90 km NEW de Manaus, 02°24'26"S, 59°43'40"W, (♀), *A. C. A. Oliveira et al. 451* (INPA, NY); Distrito Agropecuário da SUFRAMA Rodovia BR-174, Km 64 depois Km 23 Leste na Fazenda Esteio, (♂), *M. J. R. Pereira INPA/WWF1301.5236* (INPA); Tarumã Alta, 14 km NW of Manaus, (♀), *Plowman et al. 12636* (INPA, MG, MO, NY, RB); Basin of Rio Demini, Vicinity of Tototobí, (♀), *G. T. Prance et al. 10231* (INPA, K, MG, MO, NY, R, U, US); Rio Cuieiras, Jauari, at foot of Serra Aracá, 00°48'N, 63°21'W, (♀), *G. T. Prance et al. 29447* (INPA, MIRR, MO, MG, NY, R, SP).—MATO GROSSO: Comodoro, Fazenda Dolce Vitta, 12°44'19"S, 60°03'04"W, (♂), *Árbocz et al. 4485* (ESA, MT, UEC); Aripuanã, near Humboldt Centre, on road to Rio Juruena, 10°12'S, 59°21'W, (♀), *G. T. Prance et al. 18240* (F, INPA, K, MG, MO, NY, P, R, S, U, US); Alta Floresta, Parque Estadual do Cristalino, (♀),

Sasaki et al. 1295 (K); Alta Floresta, Parque Estadual do Cristalino, em curva acentuada do Rio Cristalino, (♀), *Sasaki et al. 1298* (INPA, MO).—RONDÔNIA: Porto Velho, UHE de Samuel, Rio Jamari, (♀), *Maciel et al. 1528* (MG, F).—RORAIMA: Caracaraí, Parque Nacional do Viruá, (♀), *Cabral et al. 182* (INPA); Ecological Reserve, Ilha de Maracá, 3°19'N, 61°54'W, (♀), *Milliken et al. 694* (K). **Colombia.** AMAZONAS: Rio Apaporis, entre los rios Rio Kananari y Pacoa Soratama, (♀), *Garcia-Barriga 14106* (NY, US); Rio Apaporis, Soratama, above mouth of Rio Kananari and vicinity, 00°05'N, 70°40'W, 900 ft, (♀), *Schultes & Cabrera 15973* (F, MO, NY); Rio Apaporis, Soratama, above mouth of Rio Kananari and vicinity, 00°05'N, 70°40'W, 900 ft, (♂), *Schultes et al. 19835* (US).—AMAZONAS-VAUPES: Rio Apaporis, entre las confluencias de los rios Pacoa y Cananari Soratama, (♀), *Mora-Osejo & Hammen 369* (COAH, COL); Alto Vaupés, (♀), *Roa T. 251* (INPA).—META: Sierra La Macarena, Guapayita, (♂), *Idrobo 4944* (COL).—VAUPES: Estación Biológica Caparú, 01°08'33"S, 69°53'33"W, (♀), *E. Palacios & Rodríguez 284* (COAH). **Ecuador.** MORONA-SANTIAGO: Huamboya, Reg. Oriental, (♀), *Acosta-Solis 7570* (F).—NAPO: Rio Cuyabeno, 00°10'S, 75°55'W, (♂), *Berg & Akkermans 1041* (SP, MO, NY, U); Rio Cuyabeno, 00°10'S, 75°55'W, (♀), *Berg & Akkermans 1042* (NY, U); Rio Cuyabeno, 00°10'S, 75°55'W, (♂), *Berg & Akkermans 1045* (NY, U); Rio Cuyabeno, 00°10'S, 75°55'W, (♀), *Berg & Akkermans 1053* (F, MO, NY, U).—SUCUMBOS: Reserva Faunistica Cuyabeno, 00°00'S, 76°10'W, (♀), *Balslev et al. 97123* (AAU, MO, NY, QCA). **Peru.** LORETO: Río Ucayali, Jenaro Herrera, (♂), *Bernardi s.n.* (U); Prov. Requena, Basin of Río Ucayali, Jenaro Herrera and vicinity, 04°59'04"S, 73°59'04"W, (♂), *Daly et al. 5706* (MO, NY); Fundo Acosta, rio Maniti, afluente derecho del rio Amazonas, (♀), *Encarnación et al. E-1017* (MO, NY); Río Yaguasyacu, tributary of Río Ampiyacu, (♂), *Gentry et al. 20515* (MO, U); Maynas, Río Yaguasyacu, tributary of Río Ampiyacu, below Borro Indian Village of Brilla Nueva, (♂), *Gentry & Revilla 20813* (MO); Maynas, quebrada E of Tamshiyacu, below Serafin Filomeno,

04°10'S, 72°50'W, (♀), *Gentry et al. 25854* (F, MO, U); Province Maynas, Río Nanay, between Iquitos and Santa Maria de Nanay, 03°50'S, 73°30'W, (♀), *Gentry et al. 31655* (MO, U); Provincia Maynas, Distrito Iquitos, Río Nanay, cerca a Santa Clara, (♀), *Revilla 1818* (MO, U); Dtto. Iquitos, carretera de Peña Negra, 25 km from Iquitos, (♀), *Rimachi Y. 2724* (DUKE, F, MO, NY); Dtto. Iquitos, Río Nanay, above Bella Vista, (♀), *Rimachi Y. Y. 2765* (F, MO); rd. from Orellana to Sta. Catalena, km 5, (♀), *C. R. Rodrigues 944* (BG); Prov. Maynas, Nauta, carretera a Iquitos, 04°29'S, 73°35'W, (♀), *R. Vásquez & N. Jaramillo 8476* (F, MO); Prov. Maynas, Nauta, carretera Saragosa, 04°29'S, 73°35'W, (♀), *R. Vásquez & N. Jaramillo 8576* (F).—MADRE DE DIOS: Prov. Tambopata, Distrito Tambopata, km 12.5 carretera Maldonado-Quincemil, (♂ and ♀), *Acosta-Malpica 12* (BG, DUKE, F, MO, NY, P); Tambopata Province, Santuario Nacional Pampas del Heath, 12°57'10"N, 68°54'49"W, (♀), *M. Aguilar & Castro 559* (MO); Tambopata Province, Santuario Nacional Pampas del Heath, 12°39'20"N, 69°25'09"W, (♀), *M. Aguilar et al. 1138* (F, MO); Prov. Tambopata, Rio Heath, Comunidad Nativa Sonene, 12°32'00"S, 68°40'00"W, (♀), *Alexiade et al. 1237* (NY); Parque Nacional "Bahuaaja-Sonere", Ex Santuario Nacional "Pampa de Heath", (♀), *C. Díaz & H. Ramírez 9390* (F, MO). **Suriname.** SIPALIWINI: Vicinity of Ulemari River, 03°13'17"N, 54°15'31"W, (♀), *Evans & Peckham 2822* (MO, NY, U). **Venezuela.** AMAZONAS: Dpto. Atabapo, Alto do Río Orinoco, 35 km al SE de la Esmeralda, 02°58'N, 65°21'W, (♀), *Aymard et al. 7973* (MO, NY); Dpto. Atures, Rio Ocamo 31 km de su desembocadura en el Orinoco, 02°48'N, 65°05'W, (♂), *A. Fernandez 7264* (MO, NY); Misión Río Mavaca, 02°26'N, 65°07'W, (♀), *Stergios & Yánez 14899* (MO, NY).—BOLÍVAR: camino a La Gran Sanbana por la cabederras del rio Tiricá, (♀), *Cardona 2170* (MO, VEN).

Pourouma cucura was described from type collection with entire lamina by Standley & Cuatrecasas (1951). However, *P. cucura* belongs to the group of species with heterophyllous,

with entire and palmatilobed lamina in adult specimens. This fact was observed during field trips and in some collections of herbaria (e.g., Acosta-Malpica 12, F). Furthermore, Berg et al. (1990) considered the heterophyllous for *P. cucura*.

Our molecular analyses results (Chapter 1, Fig. 5) provide a moderate support (BP = 85, PP = 0.90) to *Pourouma cucura* within clade V, which was more closely related to *P. bicolor*, *P. velutina* and *P. amacayacuensis* (BP = 83, PP = 0.99).

The materials Rosa 1091 (MG) and Rosa 1159 (MG) cited by Berg et al. (1990) for the Serra do Navio (Amapá, Brazil) represent only leaves with adaxial lamina surface smooth, which is not possible identify. Moreover, *P. cucura* was not found during field trip for Serra do Navio.

Berg et al. (1990: 193) described the material Roa 251 (INPA) as unnamed collection. Nevertheless, the leaf twigs with hirsute indument, adaxial lamina surface strigulose, stipules glabrous inside and fruiting perianth scabrous of this collection match with materials of *Pourouma cucura*.

Berg & Heusden (1988:107) synonymized *Pourouma garciana* in *P. cucura*, but they did not remark anything about this species. The type collection of *P. garciana* (Garcia-Barriga 14002) shows only a variation in density of hirsute indument, which we considered a phenotypic variation of *P. cucura*. Moreover, in the protologue of *P. garciana*, Cuatrecasas (1956: 298) did not mention *P. cucura*.

12. *Pourouma cuspidata* Mildbr., Notizbl. Bot. Gart. Berlin-Dahlem 10: 417. 1928; Warburg in Ule, Bot. Jahrb. Syst. 40: 150. 1907, name; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 149. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 88. 1993; Romaniuc-

Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1664. 2010.—TYPE: BRAZIL. Amazonas: Juruá Miry, Rio Juruá, Aug 1901 (♂), *Ule 5719* (lectotype, designated by Berg et al. 1990: B!; isoelectotypes: F! G image! GH image! K! L image! MG!).

Pourouma tergoscabra Cuatrec., *Caldasia* 7: 304. 1956; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 149. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 88. 1993.—TYPE: COLOMBIA. Caquetá: Solano, 8 km SE. of Tres Esquinas, on Río Caquetá, below mouth of Río Orteguzaza, Comissária de Caquetá, 4 Mar 1945 (♀), *E. L. Little Jr. & R. R. Little 9527* (holotype: F!; isotypes: NY! US!).

Tree, 8–30 m tall, 8–18 cm d.b.h. Leafy twigs 5–15 cm in diameter, with indument whitish, strigose to sericeous and brownish, multicellular trichomes; internode 5–18 mm long. Lamina palmatifid to palmatipartite with 3–5 lobes, (10–) 12–33.5 (–37.5) cm long, (12–) 15–42.5 (–46.5) cm wide, length:width ratio 0.7–1, coriaceous; base deeply cordate to cordate, usually with overlapping lobes; margin palmatifid, with indument whitish, strigose; apex long acuminate; adaxial surface smooth, indument of primary vein yellowish, hirtellous and sometimes with brownish, multicellular trichomes; abaxial surface scabrous, with indument whitish, strigose, indument of veins whitish, strigose to hispidulous and sometimes with brownish, multicellular trichomes; venation palmate; secondary veins in the free part of the midsegment 12–30 pairs per leaf, basal pair branched; tertiary and quaternary veins prominent, with whitish, arachnoid indument confined to the areoles; petiole 10–35.5 (–40) cm long, with indument whitish, sericeous to strigulose and sometimes with brownish, multicellular trichomes, domatia absents; stipules 5–11.5 (–13.5) cm long, with indument whitish, sericeous to puberulous, with sparse, brownish, multicellular trichomes and sometimes with indument yellowish, hirsute outside,

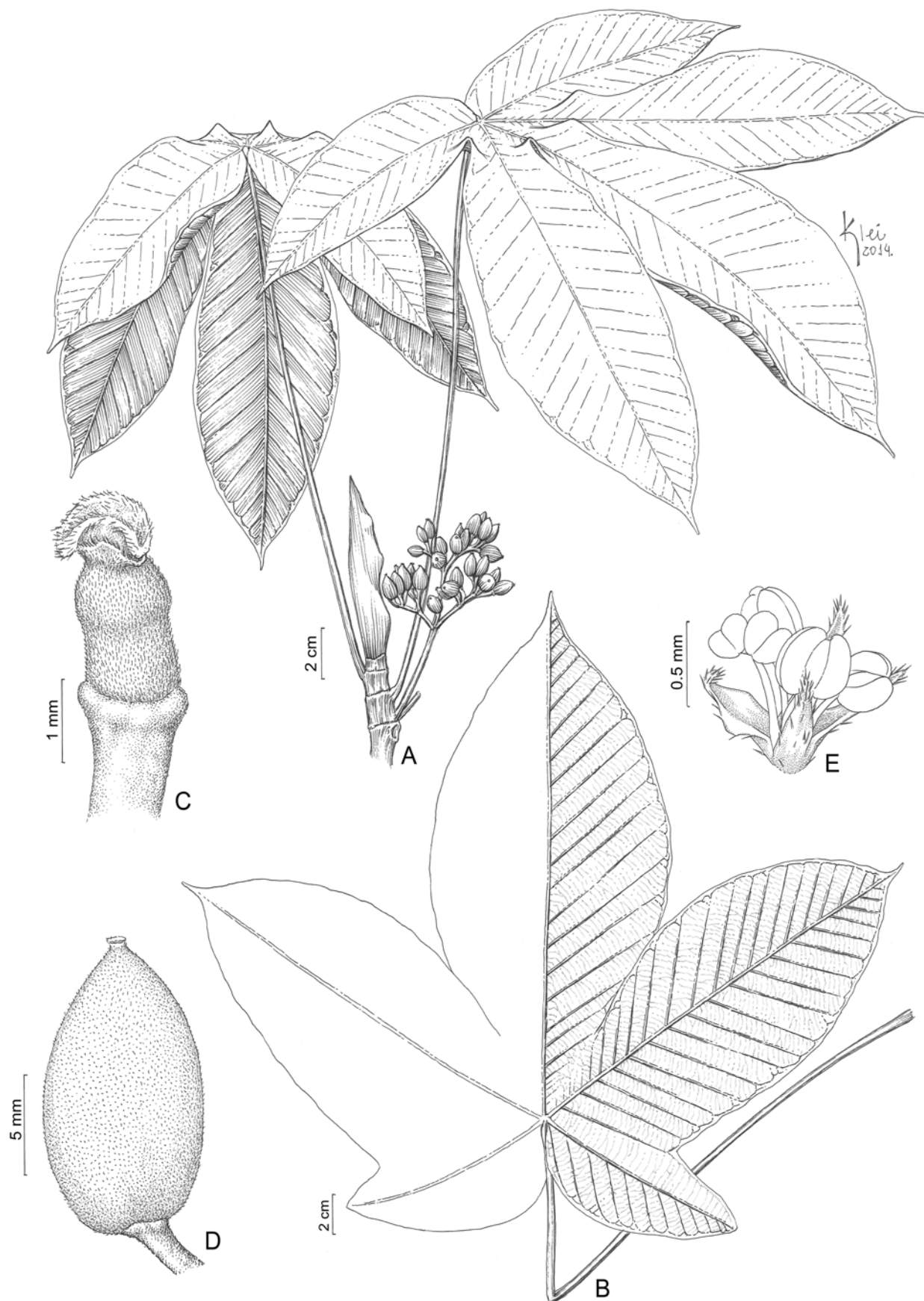


FIG. 39. *Pourouma cuspidata*. A. Leafy twig with infructescence. B. Leaf, abaxial surface. C. Pistillate flower and pedicel D. Fruiting perianth and pedicel. E. Staminate flower. [A, D-E: from *Krukoff* 8373 (F, mix collection ♀ and ♂); B: from *E. L. Little & R. R. Little* 9527 (F); C: from *Vásquez et al.* 18356 (MO)].

glabrous inside, caducous. Staminate inflorescences 8–12.5 cm long, 2.5–5.5 cm wide, primary branched 2–3; peduncle 3.5–7.5 cm long, peduncle and branches with indument whitish, sericeous and brownish, multicellular trichomes on the ultimate branches; flowers ca. 250–950, flowers organized in 12–30 fascicles, diffusely distributed along the ultimate branches; fascicle 4–7 mm in diameter, ca. 15–45 flowers per fascicle. Staminate flowers 1–1.2 mm long, 1–1.5 mm wide; sessile; tepals 4, 0.8–1 mm long, lanceolate, free or basally connate, with indument whitish, strigulose; stamens 4; filaments 0.5–1 mm long, free, usually shorter than the tepals. Pistillate inflorescences 6–7.5 cm long, 1.5–2.5 cm wide; peduncle 2.5–6.5 cm long, peduncle and branches with indument yellowish, hirsute to hirtellous and brownish to brownish-red, multicellular trichomes on the ultimate branches; flowers 10–45, flowers organized in 6–8 cymes. Pistillate flowers 3–5 mm long, 1.5–2 mm wide, pedicel 1.5–2 mm long; perianth 2.5–4.5 mm long, with indument whitish, strigose and dense, brownish, multicellular trichomes; stigma peltate, 1–1.5 mm in diameter. Infructescences 8–13.5 cm long, 4.5–7.5 cm wide; peduncle 3.5–6.5 cm long; fruiting pedicel 5–10 mm long. Fruiting perianth 1.2–1.5 cm long, 5–10 mm wide, ovoid to ellipsoid, vinaceous to black, with indument whitish, strigose and brownish, multicellular trichomes. Achene 8–12 mm long, 3–8 mm wide, glabrous. Seed 2–5 mm long, 1–2.5 mm wide, ovoid, vinaceous. Fig. 13 F; Fig. 39.

Phenology. Staminate flowers collected from August, pistillate flowers from September to October and fruits from October to March.

Distribution (Fig. 41). Northwest Brazil (Acre and Amazonas), southwest of Colombia (Amazonas and Caquetá) and northeast of Peru (Loreto), in “terra firme” forest of the Amazonian region, in lowland moist area, at an elevation of about 100 to 200 m above sea level.

Vernacular Name. Uvilla, momebabacueba (Colombia, Amazonas); ubo (Colombia, Caquetá).

Etymology. The epithet refers to the long acuminate apex of the leaf.

IUCN conservation status. *Pourouma cuspidata* is known from only six collections, made between 1980 and 1994. However, the extent of occurrence of *P. cuspidata* is ca. 99,350 Km² and the population size is unknown. For these reasons *P. cuspidata* is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAZONAS: São Paulo de Olivença, (♀ and ♂), *Krukoff* 8373 (A, F, K, NY, S, U); Juruá Miry, Rio Juruá (♀), *Ule* 5719 (B, L). **Colombia.** AMAZONAS: Miriti-Paraná Santa Isabel, reserva indígena Miraña, (♀), *La Rotta & Miraña* 541 (COAH, COL). **Peru.** LORETO: Maynas Province, Distrito Iquitos, Allpahuayo, estación IIAP, 04°10'S, 73°30'W, (♀), *R. Vásquez et al.* 18356 (F, MO).

Pourouma cuspidata belongs of the species palmatifid to palmatipartite with 3–5 lobes, with adaxial lamina surface smooth, staminate flowers organized in fascicles, with tepals free and fruiting perianth strigose. It displays morphological similarities to *P. scobina*, of which distinguished by adaxial lamina surface smooth (versus scabrous) and stipules glabrous inside (versus with indument dense, yellowish, hirsute). Additionally, these species are allopatric.

The name of *Pourouma cuspidata* is provided by Warburg (1907: 150). In the protologue, Mildbraed (1926: 417) designated as type collection Ule 5719 (B). However, this collection mix leafy twigs of staminate inflorescences, pistillate inflorescences and fruits.

Berg et al. (1990: 149) designated as lectotype the staminate material (Ule 5719, B). Nevertheless, these authors described the year of the protologue as being 1926, but the correct is 1928.

The sterile and juvenile material Gentry 41890 (BG) cited by Berg et al. (1990: 150) as *Pourouma cuspidata*, does not show the diagnostic characters of the species. In 1992, Berg identified the material deposited in the herbarium Gentry 41890 (MO), without specific epiteto "*Pourouma spec.*". This situation reflects the difficulties of including sterile materials for some taxa of *Pourouma*.

Pourouma cuspidata was mentioned by Ribeiro & Berg (1999: 212) for the guide about Adolfo Ducke Forest Reserve, but the voucher of this species was not found during visits to the INPA herbarium or field trips for the Reserve. Moreover, the authors showed a photo of the leaf with palmatisect lamina and only vegetative characters for identify to specimen. For these reasons, we consider that *Pourouma cuspidata* does not occur in the Reserve.

13. *Pourouma digitata* Trécul, Ann. Sci. Nat. Bot., Sér. 3, 8: 106. 1847; Miquel in Martius, Fl. bras. 4(1): 124. 1853; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 137. 1990; Berg, Fl. Guianas 11(22): 116. 1992; Berg, Fl. Venez. Guayana 4: 186. 1998; Berg, Fl. Venez.: 235. 2000.—TYPE: FRENCH GUIANA. Unknown locality and date (♀), *Poiteau s.n.* (lectotype, designated by Berg et al. 1990: P00753657!; isolectotype: B image!).

Pourouma bicolor Mart. subsp. *digitata* (Trécul) C.C. Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C, 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 137. 1990; Berg, Fl. Guianas 11(22): 116. 1992; Berg, Fl. Venez. Guayana 4: 186. 1998; Berg, Fl. Venez.: 235. 2000; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1664. 2010.

Tree, 8–25 m tall, 10–35 cm d.b.h., with stilt roots. Leafy twigs 6–15 mm in diameter, with indument yellowish, sericeous to strigose and brownish to vinaceous, multicellular trichomes; internode 5–25 (–40) mm long. Lamina palmatifid to palmatipartite with 3–7 (–9) lobes, (9.5–) 13.5–35.5 (–38.5) cm long, (11.5–) 14.5–40 (–42.5) cm wide, length:width ratio 0.8–1, coriaceous; base deeply cordate to cordate, sometimes overlapping lobes; margin palmatifid, with indument yellowish to whitish, hirtellous to sericeous; apex acuminate to acute; midsegment lanceolate to oblong or obovate; adaxial surface scabrous to scabridulous or sometimes smooth, with indument whitish, strigose to strigulose, indument of veins yellowish to whitish, sericeous to hirtellous; abaxial surface smooth, indument of veins whitish to yellowish, sericeous to hirtellous and sparse, brownish to vinaceous, multicellular trichomes; venation palmate; secondary veins in the free part of the midsegment 14–25 (–28) pairs per leaf, basal pair branched; tertiary and quaternary veins plane to slightly prominent, with dense, whitish, arachnoid indument covering to the areoles; petiole (5.5–) 7.5–28.5 (–32.5) cm long, with indument whitish, sericeous to strigulose and brownish to vinaceous, multicellular trichomes, domatia absents; stipules 3–11.5 (–12.5) cm long, with indument whitish, sericeous to strigulose and dense, brownish to brownish-red, multicellular trichomes outside, with indument dense, yellowish, hirsute and sometimes with brownish, multicellular trichomes inside, caducous. Staminate inflorescences (5.5–) 7.5–10.5 (–12.5) cm long, (2–) 3.5–9.5 (–11.5) cm wide, primary branched 2–5; peduncle 3.5–7.5 cm long, peduncle and branches with indument yellowish, hirsute to velutinous and dense, brownish to brownish-red, multicellular trichomes on the ultimate branches; flowers ca. 450–1350, flowers organized in 25–55 fascicles, diffusely distributed along the ultimate branches;

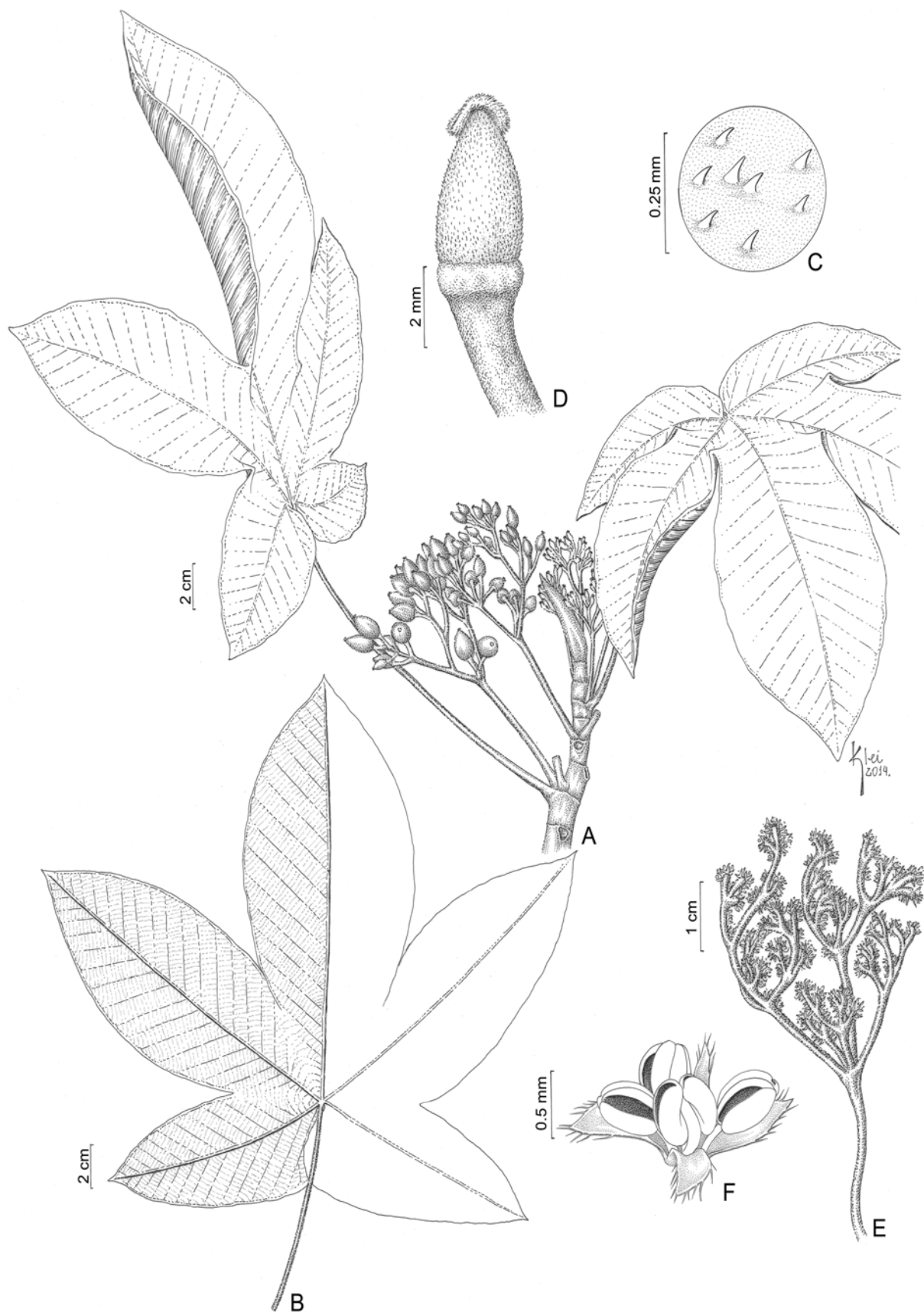


FIG. 40. *Pourouma digitata*. A. Leafy twig with pistillate inflorescences and infructescences. B. Palmatipartite leaf, abaxial surface. C. Strigose indument of the abaxial lamina surface. D. Pistillate flower and pedicel. E. Staminate inflorescence. F. Staminate flower. [A-D: from *Cavalcante* 2297 (MG); E-F: from *Irwin* 48755 (MO)].

fascicle 4–7 mm in diameter, ca. 15–40 flowers per fascicle. Staminate flowers 0.8–1 mm long, 1.2–1.5 mm wide; sessile; tepals 4, 0.8–1 mm long, lanceolate to ovate, free or basally connate, with indument yellowish hirtellous to strigulose; stamens 4; filaments 0.5–0.8 mm long, free, usually shorter than the tepals. Pistillate inflorescences 4.5–10.5 (–11.5) cm long, 1.5–5.5 cm wide; peduncle 2.5–7.5 cm long, peduncle and branches with indument yellowish, hirsute to hirtellous and brownish, multicellular trichomes on the ultimate branches; flowers 20–55 (–62), flowers organized in 4–8 cymes. Pistillate flowers 3–5 mm long, 2–3 mm wide, pedicel 2–5 mm long; perianth 2.5–4 mm long, strigulose and dense brownish to vinaceous, multicellular trichomes; stigma bilobed, 1–1.5 mm in diameter. Infructescences 10–18.5 (–19.5) cm long, 8–15.5 (–18.5) cm wide; peduncle 2.5–8.5 cm long; fruiting pedicel 8–15 mm long. Fruiting perianth 1.2–1.8 cm long, 5–15 mm wide, ovoid to ellipsoid, brownish to vinaceous, strigulose and brownish to vinaceous, multicellular trichomes. Achene 10–15 mm long, 3–10 mm wide, glabrous. Seed 3–6 mm long, 1.5–3 mm wide, ovoid, vinaceous. Fig. 14 A; Fig. 40.

Phenology. Staminate flowers collected from October to December, pistillate flowers from October to November and fruits from October to April.

Distribution (Fig. 41). Northeast Brazil (Amapá and Pará), French Guiana (Cayenne and Saint-Laurent-du-Maroni), Suriname (Brokopondo, Marowijne and Sipaliwini) and south of Guyana (Upper Takutu-Upper Essequibo), in “terra firme” forest of the Amazonian region, in lowland moist area, at an elevation of about 30 to 400 m above sea level.

Vernacular Name. Mapatirama vermelha (Brazil, Pará); sirpo (Colombia, Antioquia); uva de monte, uva (Colombia, Valle del Cauca); chircaba, guaumoutoynac (Colombia, Vaupes); gaugai, shuiña, uva, uva de monte (Ecuador, Morona-Santiago); kulumã, maponia (French Guiana, Cayenne); bospapaja, boroma, poeroema, kulumã (Suriname).

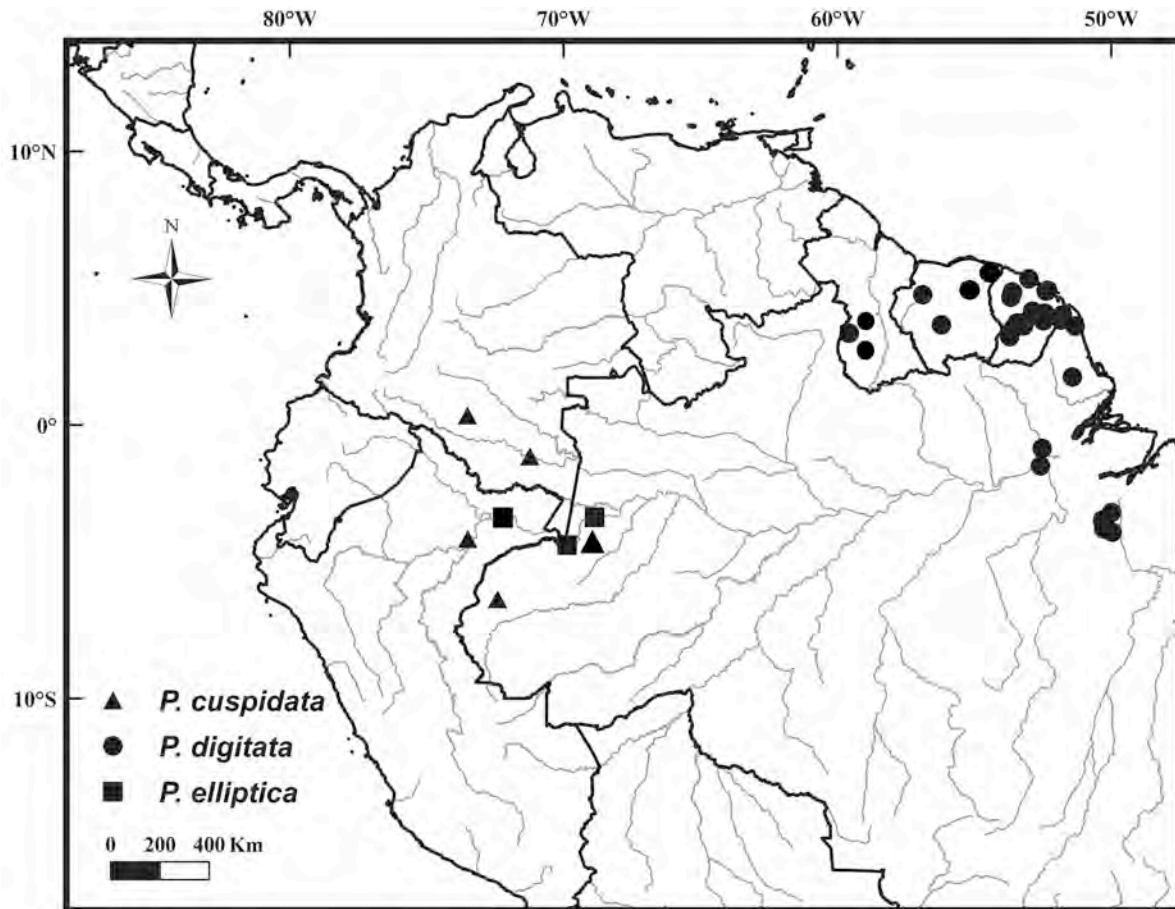


FIG. 41. Distribution of *Pourouma cuspidata*, *P. digitata*, and *P. elliptica*.

Etymology. The epithet probably refers to palmatilobed lamina.

IUCN conservation status. *Pourouma digitata* is widely distributed with the extent of occurrence of ca. 498,430 Km². Also, *P. digitata* is well represented in herbaria. For these reasons *P. digitata* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAPÁ: Serra do Navio, (♀), *Aubréville 144* (P, U, US); road to Clevelândia, (♀), *Fróes 26631* (IAN); Oiapoque, lower slopes and base of Mt. Tipac. Common, 03°36'N, 51°19'W, (♂), *Irwin 48682* (GH, IAN, K, MG, NY, U, US);

Oiapoque, cachoeira on Rio Iaue, 3km. east od confluence with Rio Oiapoque, 03°36'N, 51°19'W, (♂), *Irwin 48755* (IAN, MG, MO, NY); Pracuúba, Rio Araguari, 01°45'N, 51°25'W, (♂), *Pires et al. 51624* (F, MG, NY, R, UC, US).—PARÁ: Almeirim, Rio Jarí, Castanhal do Escondido, (♀), *Cavalcante 2297* (MG); Tucuruí, 25–35 km of Tucuruí near road which serves fazendas, 03°36'S, 49°19'W, (♀), *Daly et al. 1208* (BG, IAN, INPA, K, MG, MO); Approx. 70 km from Tucuruí; 65 km SSW on old BR-422, 04°11'N, 49°44'W, (♀), *Daly et al. 1474* (BG, IAN, INPA, K, MG, MO, NY); Tucuruí, Estrada de acesso à base aos 550m do alojamento, à esquerda, (♀), *Lins 285*(GUA); Tucuruí, Estrada de acesso à base aos 550m do alojamento, à esquerda, (♀), *Lins GUA35637* (GUA); Belém, Rod. Belém-Brasília Km 62, (♂), *E. Oliveira 322* (NY, U); Tucuruí, Próximo ao lago Cagancho, (♀), *J. Ramos 1083* (INPA); Tucuruí, PA-263, ramada massa falida, km 10, (♀), *J. Ramos 1124* (GUA, INPA, NY); Rio Jari, Monte Dourado, (♀), *N. T. Silva 1411* (IAN, NY, U, US); Almeirim, Rio Jarí, Planalto B, Pilão, (♂), *N. T. Silva 1412* (NY, U); Rio Jarí, Estrada entre Planalto A e Tinguelin km 21, (♀), *N. T. Silva 2852* (IAN); Altamira, Margem direita do rio Xingu, Confluência com o rio Pardo, (♀), *Vasconcelos et al. 256* (MG, R). **French Guiana.** UNKNOWN DISTRICT: unknown locality and date, (♀), *Martin s.n.* (P).—CAYENNE: Cayenne, (♀), *BAFOG 1050* (CAY, F, U); Nouragues Field Station, Chemin Bleu Trail, 04°05'N, 52°40'W, (♀), *Mori et al. 25499* (NY, US); Cayenne, Village abandonné d'Eau Claire, env. 7 km norte de Bélizon, (♀), *Oldeman 2030* (CAY, MG, P, U); Nouragues Field Station, Bassin de l'Arataye, 04°03'N, 52°42'W, (♀), *Riera 1611* (NY, P, U); Nouragues Field Station, Bassin de l'Arataye, 04°03'N, 52°42'W, (♀), *Riera et al. 1996* (CAY, P, U); Station des nouragues, Bassin de L'Arataye, Quadrat L 16, 04°03'N, 52°42'W, (♀), *Riera 2037* (CAY, NY, P, U, US); Fleuve Oyapock Camopi, (♀), *Sastre 4350* (P, U); St. Marcel, Haut Oyapock, Mt. St. Marcel, Layon Camp Couleuvre; (♀), *Sastre 4579* (NY, P).—SAINT-LAURENT-DU-MARONI: Saül, Monts La Fumée, 03°37'N, 53°12'W, (♀), *Boom & Mori 2205* (NY); Saül, Monts La Fumée,

03°37'N, 53°12'W, (♀), *Mori & Boom 15350* (BG, CAY, MG, MO, NY, P, U); Saül, Route de Belizon, between entrance to Grand Boeuf Mort Trail and village of Saül, 03°37'N, 55°12'W, (♀), *Mori & Gracie 21106* (NY, P, U); Saül, Route de Bélizon, 0–4 km N of Eaux Claires, between Eaux Claires and third log bridge, 03°37'N, 53°12'W, (♂), *Mori & Gracie 23862* (NY). **Guyana.** UPPER TAKUTU-UPPER ESSEQUIBO: Upper Essequibo River, Greenheart Forest, 03°31'32"N, 58°14'43"W, (♀), *Chanderbali et al. 474* (U); Kanuku Mts., Nappi-head, 03°21'N, 59°34'W, (♀), *Jansen-Jacobs et al. 749* (NY, U); Northwestern slopes of Kanuku Mountains, drainage of Moku-Moku Creek, Takutu tributary, (♀), *A. C. Smith 3564* (B, F, LE, MO, NY, P, S, U, US). **Suriname.** BROKOPONDO: Brownsberg, (♂), *Boswezen (B. W.) 6292* (U).—MAROWIJNE: Nassau Mts., at km 0.2 on terrace of Marowijne R., (♀), *Lanjouw & Lindeman 2213* (F, NY, RB, U).—SIPALIWINI: Vicinity of Blanche Marie Waterfall on Nickerie River, 04°45'30"N, 56°52'50"W, (♀), *Evans et al. 2436* (IAN, INPA, MO, NY, P, RB); Sipaliwini savanna area on Brazilian frontier, (♀), *Oldenburger et al. 1120* (RB, U); Section 0, (♂), *Stahel 123A* (U); Section 0, (♂), *Stahel 166B* (U).

Trécul (1847) described *Pourouma digitata* from the materials Leprieur s.n. (P) and Poiteau s.n. (P). In the protologue, he described the adaxial lamina surface as “glabris, laevigatis” (glabrous, smooth), but these collections have the adaxial lamina surface scabrous, with strigose indument, as well all collections of *P. digitata* examined for us.

Miquel (1853) classified *Pourouma digitata* in the group “1. Folia palmato- vel umbellato-partita, subtus albo-tomentosa” (leaves palmatilobed or umbellate-partite, abaxial lamina surface white-tomentose).

Berg & Heusden (1988: 106) proposed a new combination *Pourouma bicolor* subsp. *digitata* synonymizing *Pourouma digitata*, but they did not remark anything about this species.

Pourouma digitata distinguished from *P. bicolor* by palmatifid to palmatipartite lamina with 3–9 lobes (versus usually entire), abaxial lamina surface with arachnoid indument covering to the areoles, staminate flowers up to 1 mm long (versus up to 2 mm) and pistillate inflorescence up to 62 flowers (versus up to 28 flowers).

14. *Pourouma elliptica* Standl., Publ. Field Mus. Nat. Hist, Bot. Ser., 17: 181. 1937; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 110. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 184. 1990; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1664. 2010.—TYPE: BRAZIL. Amazonas: Municipality de São Paulo de Olivença, near Palmares, 11 Sep-26 Oct 1936 (♂), *Krukoff* 8388 (holotype: NY!; isotypes: A image! BM! BR image! F fragment! G image! LE image! LP image! MICH image! MO! P! S image! U!).

Tree, 10–15 m tall, 11.5 cm d.b.h. Leafy twigs 5–10 mm in diameter, with indument yellowish, hirsute to hispidulous, with brownish to vinaceous, multicellular trichomes and whitish, arachnoid indument; internode 4–25 mm long. Lamina entire, (10.5–) 12–31 (–32) cm long, (5–) 6.5–20 (–22.5) cm wide, length:width ratio 1.4–2.4, elliptic to oblong, coriaceous; base acute, rounded to truncate; margin usually repand, with indument sparse, whitish, sericeous; apex short-acuminate to acute; adaxial surface smooth, indument of veins yellowish, hirtellous to sericeous; abaxial surface smooth, indument of veins yellowish, hirtellous and sparse, whitish, arachnoid indument; venation brochidodromous; secondary veins 10–20 pairs per leaf, basal pair unbranched or branched, diverging from the midrib at an 45°–60°; tertiary and quaternary veins plane to slightly prominent, with whitish, arachnoid indument covering to the areoles;

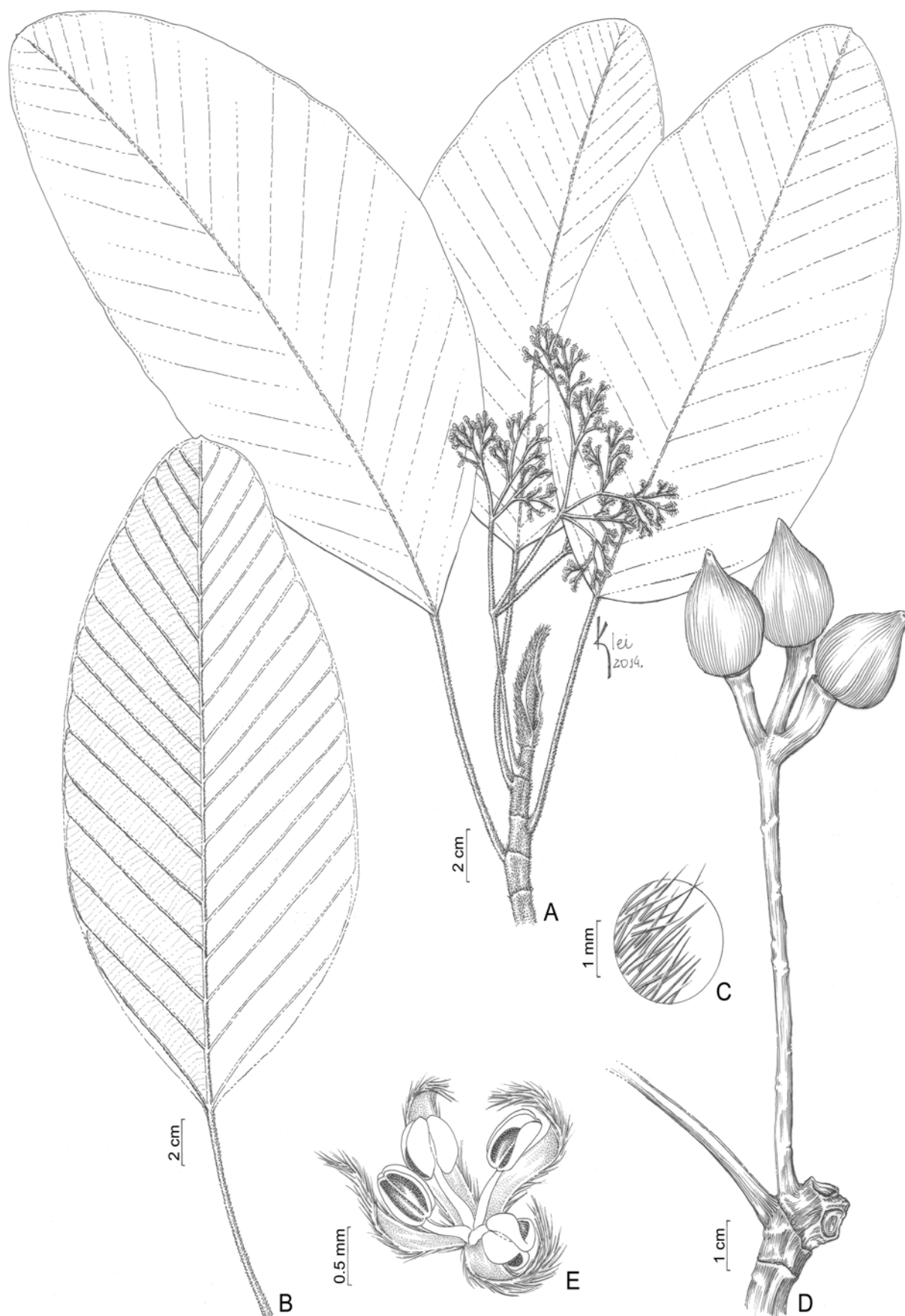


FIG. 42. *Pourouma elliptica*. A. Leafy twig with staminate inflorescence. B. Leaf, abaxial surface. C. Hirsute indument of the leafy twig. D. Staminate flower. E. Leafy twig with infructescence. [A-D: from Krukoff 8388, (F); E: from Barrier 1175, (P)].

petiole 4.5–15.5 cm long, with indument yellowish, hirsute and whitish, arachnoid indument, domatia absents; stipules 3–9 cm long, with indument yellowish, hirsute and sparse, whitish, arachnoid indument outside, glabrous inside, caducous. Staminate inflorescences 7–20 cm long, 3–15 cm wide, primary branched 3–4; peduncle 3–8.5 cm long, peduncle and branches with indument yellowish, hirsute to hispidulous and sparse, whitish, arachnoid indument on the ultimate branches; flowers ca. 450–1750, flowers organized in 22–84 fascicles, diffusely distributed along the ultimate branches; fascicle 4–7 mm in diameter, ca. 4–28 flowers per fascicle. Staminate flowers 1.2–1.8 mm long, 1.5–2.5 mm wide; sessile; tepals 4, 1.2–1.8 mm long, lanceolate, free or basally connate, with indument yellowish, hispidulous; stamens 4; filaments 0.5–0.8 mm long, free, filaments shorter than the tepals. Pistillate inflorescences unknown. Infructescences 10–13 cm long, 3–4 cm wide; peduncle 2.5–3 cm long, peduncle and branches with indument yellowish, sericeous on the ultimate branches; fruits 4, fruits organized in 1 cyme; fruiting pedicel 1.5–2 cm long. Fruiting perianth 2.5–2.8 cm long, 1.2–1.5 cm wide, ovoid, apiculate, with sparse, whitish, arachnoid indument. Achene 1.8–2.2 cm long, 1–1.2 cm wide. Seed 5–10 mm long, 3–6 mm wide, ovoid to ellipsoid, brownish. Fig. 14 B; Fig. 42.

Phenology. Staminate flowers collected from September to November and fruits from June.

Distribution (Fig. 41). Northwest Brazil (Amazonas) and northeast of Peru (Loreto) in primary “terra firme” forest of the Amazonian region, in lowland moist area, at an elevation of about 100 to 150 m above sea level.

Vernacular Name. Mapaty (Brazil).

Etymology. The epithet refers to elliptic shape of the lamina.

IUCN conservation status. According to the IUCN Red list categories (IUCN 2014), *Pourouma elliptica* is considered Endangered, EN B1a,b(iii,iv), because of the small extent of

occurrence (ca. 8,490 km²), number of locations (3) and known from only three collections, made between 1931 and 1978.

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAZONAS: Esperança, “boca” do Rio Javari, 21 Sep 1931 (♂), *A. Ducke RB25246* (RB). **Peru.** LORETO: Maynas, Rio Zumun affluent du rio Yahuas-Yacu, affluent du rio Ampi-Yacu afflent de l'Amazone à Pebas - commune de Colonia Territoire des indies Bora, (♀), *Barrier 1175* (P).

Pourouma elliptica belong to the group of species with entire lamina, staminate flowers organized fascicles, with tepals free or basally connate. It distinguished from all *Pourouma* species by with indument hispidulous on the tepals of the staminate flowers and fruiting perianth apiculate, with 2.5–2.8 cm long.

The pistillate material (*Barrier 1175*, P) is described for the first time.

15. *Pourouma essequiboensis* Standl., *Lloydia* 2: 175. 1939; Berg & Dewolf, *Fl. Suriname* 5(1): 276. 1975; Berg & Heusden, *Proc. Kon. Ned. Akad. Wetensch., Ser. C.*, 91(2): 109. 1988; Berg, Akkermans & Heusden, *Fl. Neotrop. Monogr.* 51: 169. 1990; Berg, *Fl. Guianas* 11(22): 122. 1992.—TYPE: GUYANA. Basin of Essequibo River, near mouth of Onoro Creek, lat. about 01°35'N, 15–24 Dec 1937 (♂), *A. C. Smith 2731* (holotype: F! isotypes: A image! G image! K! MO! NY! P! S image! WIS image! U image! US image!).

Pourouma tomentosa Miq. subsp. *essequiboensis* (Standl.) C.C. Berg & Heusden, *Proc. Kon. Ned. Akad. Wetensch. C* 91(2): 109. 1988; Berg, Akkermans & Heusden, *Fl. Neotrop.*

Monogr. 51: 169. 1990; Berg, Fl. Guianas 11(22): 122. 1992; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.

Tree, 10–30 m tall, 15–30 cm d.b.h., with stilt roots. Leafy twigs 5–15 mm in diameter, with indument whitish, sericeous and whitish, arachnoid indument; internode 4–25 mm long. Lamina palmatifid to palmatipartite with 3–5 (–7) lobes, (8.5–) 10–32.5 (–34.5) cm long, (9.5–) 11.5–34.5 (–36.5) cm wide, length:width ratio 0.7–1.1, coriaceous; base deeply cordate to cordate; margin palmatifid, with indument sparse, whitish, sericeous; apex acuminate; adaxial surface smooth, indument of primary veins yellowish, hirtellous to sericeous; abaxial surface smooth, indument of veins yellowish, hirtellous to sericeous and whitish, arachnoid indument; venation palmate; secondary veins in the free part of the midsegment 14–24 pairs per leaf, basal pair branched, diverging from the midrib at an 35°–50°; tertiary and quaternary veins slightly prominent, with dense, whitish, arachnoid indument covering to the areoles; petiole 4.5–18 (–22.5) cm long, with whitish, arachnoid indument, domatia absents; stipules (3.5–) 4.5–20 (–23) cm long, with whitish, arachnoid indument and sometimes with indument yellowish, hirsute outside, glabrous inside, caducous. Staminate inflorescences 3.5–10 (–12.5) cm long, 3.5–7 (–8) mm wide, primary branched 3–4; peduncle 2.5–5.5 cm long, peduncle and branches with indument yellowish, hirtellous and whitish, arachnoid indument on the ultimate branches; flowers ca. 450–1350, flowers organized in 20–84 glomerules; glomerule 2–3 mm in diameter, ca. 15–30 flowers per glomerule. Staminate flowers 1.2–1.8 mm long, 0.8–1.2 mm wide; sessile or subsessile; perianth 0.6–0.8 mm long, 0.4–1 mm wide, urceolate, tepals connate, with whitish, arachnoid indument; stamens 4; filaments 1–1.5 mm long, free, filaments exceeding the perianth. Pistillate inflorescences 5.5–7.5 cm long, 1.5–3.5 cm wide; peduncle 2–4.5 cm long, peduncle and branches with indument yellowish, velutinous to hirtellous on the ultimate branches;



FIG. 43. *Pourouma essequiboensis*. A. Leafy twig with staminate inflorescences. B. Part of the staminate inflorescence. C. Staminate flower. D. Leaf, abaxial surface. E. Pistillate flower and pedicel. F. Fruiting perianth and pedicel. [A-C: from *Smith 2731*, (F); D-E: from *Gaglioti et al. 137*, (SP)].

flowers 10–30, flowers organized in 2–4 cymes. Pistillate flowers 5–8 mm long, 2–4 mm wide; pedicel 3–5 mm long; perianth 3–6 mm long, with indument yellowish, velutinous, apex papillose and sometimes with dense, whitish, arachnoid indument; stigma peltate, 1–2 mm in diameter, with indument whitish, sericeous. Infructescences 6.5–14.5 (–16.5) cm long, 3.5–8.5 (–10.5) cm wide; peduncle 3–9.5 (–10.5) cm long; fruiting pedicel 5–10 mm long. Fruiting perianth 1.5–2.2 cm long, 5–12 mm wide, ovoid to ellipsoid, vinaceous to black, with indument sparse, yellowish, velutinous to hirtellous. Achene 1.2–2 cm long, 3–8 mm wide. Seed 5–15 mm long, 3–5 mm wide, ovoid to ellipsoid, vinaceous. Fig. 2 E; Fig. 9 C; Fig. 14 C; Fig. 43.

Phenology. Staminate flowers collected from October to December, pistillate flowers from August to October and fruits from September to April.

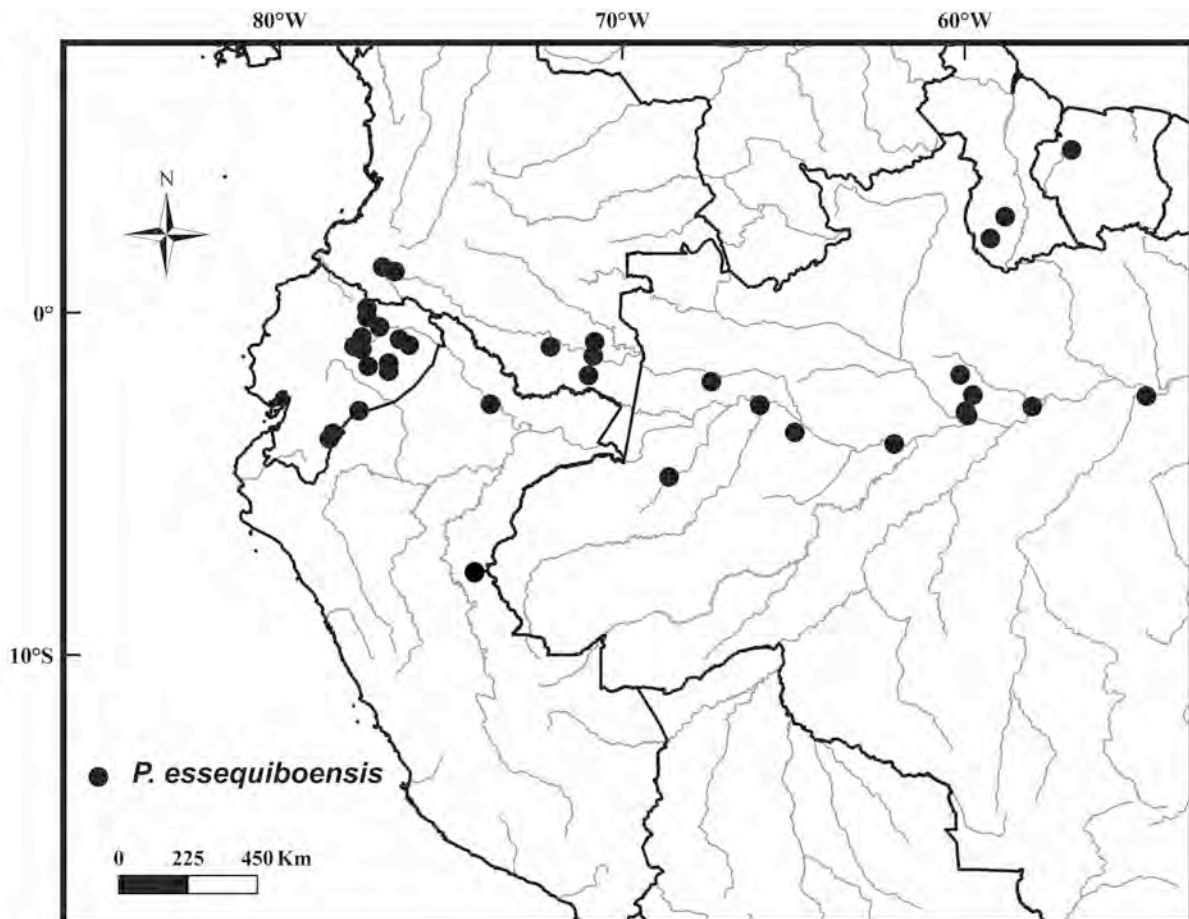


FIG. 44. Distribution of *Pourouma essequiboensis*.

Distribution (Fig. 44). Northwest of Brazil (Amazonas and Pará), west of Suriname (Sipaliwini), south of Guyana (Upper Takutu-Upper Essequibo), south of Colombia (Amazonas, Putumayo and Vaupes), northeast of Peru (Loreto and Ucayali) and Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Sucumbios and Zamora-Chinchipe), often in “terra firme” forest of the Amazonian region, usually in lowland moist areas, sometimes in riparian forest, at an elevation of about 50 to 1400 m above sea level.

Vernacular Name. Uva de monts, chiviconi (Colombia, Amazonas); chiricaba, guaumoutoynac (Colombia, Vaupes); uva, shuiña (Ecuador, Morona-Santiago); consin tsaja, uva de mono (Ecuador, Sucumbios); aido kwiyaí (Peru, Loreto).

Etymology. The epithet is a tribute to type locality, Basin of Essequibo River (Guyana).

Use. Edible fruits and fuel stuff.

IUCN conservation status. *Pourouma essequiboensis* is widely distributed with the extent of occurrence of ca. 1,496,550 Km². *P. essequiboensis* is also, well represented in herbaria. For these reasons *P. essequiboensis* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAZONAS: Manaus-Itacoatiara, km 26, Reserva Florestal Ducke, 02°53’S, 59°58’W, (♂), Brito *et al.* 36 (BG, INPA, K, MG, MO, NY, RB, SP, U); Rio Jurua, seringal Santa Rosa, lago Curapé, Saracura, (♀), Coêlho & Aniceto INPA52383 (INPA, U); Fonte Boa, Uará, Igarapé Uará, south tributary of Rio Solimões, (♀), Daly *et al.* 4250 (INPA, K, MO, NY); Itapiranga, Rio Uatumã, margem esquerda, em frente a boca do rio Pitinga, (♂), C. A. Cid Ferreira *et al.* 847 (BG, HB, INPA, MG, MO, NY, R); Codajas, Rio Capitari, (♂), Fróes 26520 (IAN, SP, US); Reserva Florestal Adolpho Ducke, trilha

Vermelha 200 m. do começo da trilha, (♀), *Gaglioti & Pederneiras 137* (SP); Manaus-Itacoatiara, km 26, Reserva Florestal Adolpho Ducke, trilha de acesso a Torre de Observação, 02°55'47"S, 59°58'34"W, (♂), *Gaglioti et al. 173* (SP); Manaus, Estação Experimental de Silvicultura Tropical-ZF2, (♀), *Lemos 33* (INPA); Estrada Manaus-Caracará, BR-174, Km 57, (♂), *Mota 646* (INPA); Maraã, Rio Japurá, Sítio Fortaleza, approx. 7 km NW of town of Maraã, 01°50'S, 65°38'W, (♂), *Plowman et al. 12299* (INPA, NY, RB); Itacoatiara, Madeireira Itacoatiara Ltda, (♂), *Souza et al. 718* (BG, IAN).—PARÁ: Cuiabá-Santarém highway, BR 163, km 1180, (♀), *A. S. L. Silva et al. AS215* (BG, COL, K, MO, MG, NY, U). **Colombia.** AMAZONAS: Río Caquetá, (♀), *Roa T. 585* (COL); Puerto Arica, río Cahuinarí, 31.5 km al W de sus bocas, (♀), *M. Sánchez et al. 1069* (COAH); Puerto Santander, margen izq. río Caquetá, frente a la isla Mariñame, (♂), *Urrego et al. 773* (COAH).—PUTUMAYO: Mocoa, corregimiento San Antonio, vereda Alto Campucana, finca La Mariposa, 01°12'N, 76°38'W, (♀), *Betancur et al. 5050* (COAH); Mocoa, Corregimiento de San Antonio, Vereda Alto Campueana, finca la Mariposa quebrada, 01°12'N, 76°38'W, (♀), *Franco-Rosselli et al. 5326* (COAH, COL).—VAUPES: La gos del Paso, (♂), *Roa T. 252* (INPA). **Ecuador.** MORONA-SANTIAGO: Sucua, Centro Shuar Yukutais, 8 km SW of Sucua, 02°30'S, 78°08'W, (♀), *P. G. Andrade 562* (NY); Este río Morona, 02°52'S, 77°41'W, (♂), *E. L. Little Jr. et al. 532* (COL).—NAPO: 8 km SE of Tena, (♀), *Grubb et al. 1681* (NY); Parque Nacional Yasuni, Pozo Petrolero Conoco, (♀), *Neill et al. 8158* (BG, MO); Vía Payamino-Loreto, 3 km de Estación Experimental de INIAP, 00°25'S, 77°05'W, (♀), *W. Palacios & Neill 1284* (NY); Reserva Biologica Jatun Sacha, 8 km de Puerto Misahualli, margen derecha del Rio Napo, 01°04'S, 77°37'W, (♂), *W. Palacios 2914* (MO); Reserva Biologica Jatun Sacha, 01°04'S, 77°37'W, (♂), *W. Palacios 3111* (MO, NY); Reserva Biologica Jatun Sacha, 8 km de Puerto Misahualli, margen derecha del Rio Napo, 01°04'S, 77°36'W, (♂), *W. Palacios 4288* (MO); Archidona, Faldas al sur del Volcán Sumaco, Carretera Hollin-Loreto,

km 40 Huamaní, (♀), *W. Palacios 4738* (MO); El Chaco, Codo Sinclair, en el valle del Río Quijos, 00°08'S, 77°27'W, (♀), *W. Palacios 5761* (MO).—ORELLANA: Parque Nacional Yasuní, Carretera y Oleoducto de Maxus, 00°47'S, 76°30'W, (♂), *Aulestia et al 467* (MO, NY, QCNE); Parque Nacional Yasuní, Carretera y Oleoducto de Maxus, 00°47'S, 76°30'W, (♂), *Aulestia & Andi 626* (MO, QCNE).—PASTAZA: Pozo Petrolero Corrientes de UNOCAL, 35 km al sureste de Curaray, 01°43'S, 76°49'W, (♀), *Gudiño 682* (MO); Pastaza Canton Pozo petrolero, (♂), *Gudiño 1027* (MO, NY).—SUCUMBIOS: Gonzalo Pizarro, San Pedro Confanesi, 00°08'S, 77°27'W, (♀), *Cerón & Montalvo 20966* (MO).—ZAMORA-CHINCHIPE: Pachicutza, 70 km NE de Zamora, 1000 m, (♂), *E.L. Little Jr. et al. 353* (COL). **Guyana.** UPPER TAKUTU-UPPER ESSEQUIBO: Rupununi District, Kuyuwini Landing, Kuyuwini River, 02°10'N, 59°15'W, (♀), *Jansen-Jacobs 2494* (MO, NY, U, US). **Peru.** LORETO: Norte de la comunidad de Tierra Blanca, lado este del Río Morona, 04°16'S, 77°14'W, (♂), *Fine 709* (F, HAP, UNAP); Maynas, río Yubineto, affluent du río Putamayo, (♀), *Haxaire 818* (NY, P).—UCAYALI: Pucallpa, Estacion Experimental Alexander Von Humboldt, (♀), *Trucio 19* (INPA). **Suriname.** SIPALIWINI: Vicinity of Blanche Marie Waterfall on the Nickerie River, 04°45'30"N, 56°52'50"W, (♂), *Evans et al. 2515* (IAN, INPA, MO, P, RB).

Standley (1939: 175) remarked the resemblance between *Pourouma essequiboensis* and *P. cuspidata*. However, *P. essequiboensis* is distinguished from *P. cuspidata* by staminate flowers organized in glomerules (versus in fascicles), with tepals connate (versus free or basally connate), pistillate flowers with velutinous indument (versus strigose indument), arachnoid indument on the leafy twigs, stipules and petiole (versus strigose to sericeous indument).

Berg & Dewolf (1975: 276) synonymized *Pourouma essequiboensis* in *P. maroniensis*. Nevertheless, *P. essequiboensis* can be differentiated from *P. maroniensis* by pistillate flowers

with velutinous indument (versus arachnoid indument), staminate flowers with 1.2–1.8 mm long (versus with 0.8–1 mm long), palmatifid to palmatipartite lamina with 3–7 lobes (versus lamina usually entire or palmatifid with 2–3 lobes), with base deeply cordate to cordate (versus truncate, rounded to subcordate).

Berg & Heusden (1988: 109) proposed a new combination *Pourouma tomentosa* subsp. *essequiboensis* synonymizing *P. essequiboensis*, but they did not remark anything about this species.

Pourouma essequiboensis is distinguished from *P. tomentosa* by palmatifid to palmatipartite lamina with 3–7 lobes (versus entire lamina), staminate glomerule with 2.5–3 mm in diameter (versus 5–8 mm in diameter).

Moreover, *Pourouma essequiboensis* is included by the molecular analyses (Chapter 1, Fig. 5) within of the clade IV (*P. essequiboensis*, *P. maroniensis*, *P. melinonii*, *P. mollis*, and *P. ovata*) with a strong support (BP = 92, PP = 0.96), in which is more closely related to *P. melinonii*.

For these reasons, we proposed the reestablishment of *Pourouma essequiboensis*.

16. *Pourouma ferruginea* Standl., Publ. Field Mus. Nat. Hist., Bot. Ser., 17: 181. 1937; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 109. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 177. 1990; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1664. 2010.—TYPE: BRAZIL. Amazonas: Municipality São Paulo de Olivença, basin of creek Belem, 26 Oct-11 Dec 1936 (♂), *Krukoff 8807* (holotype: NY!; isotypes: A image! F!).

Tree, 3–10 m tall, 10–30 cm d.b.h., with stilt roots. Leafy twigs 8–25 mm in diameter, with indument whitish, sericeous, with dense, vinaceous, multicellular trichomes and often with whitish, arachnoid indument, rarely with indument yellowish, hirsute; internode 5–20 mm long. Lamina usually entire, (8.5–) 10–33.5 (–37.5) cm long, (5–) 6.5–22.5 (–24) cm wide, length:width ratio 1.2–2.1, ovate; or sometimes palmatifid to palmatipartite with 3–5 lobes, (29.5–) 32.5–38.5 (–42.5) cm long, (30.5–) 33.5–40 (–44.5) cm wide, length:width ratio 0.8–1, coriaceous, sometimes plicate; base cordate to truncate; margin usually repand or palmatifid, with indument sparse, whitish, sericeous; apex acuminate or rounded; adaxial surface smooth, indument of veins yellowish to whitish, sericeous to hirsute; abaxial surface smooth, tomentose, with dense, whitish, arachnoid indument, indument of veins yellowish, sericeous and sometimes with sparse, brownish-red to vinaceous, multicellular trichomes; venation brochidodromous or palmate; secondary veins 8–18 pairs per leaf, basal pair branched, diverging from the midrib at an 35°–50°; tertiary and quaternary veins plane to slightly prominent, with dense, whitish, arachnoid indument covering to the areoles; petiole (4–) 6.5–28.5 (–30) cm long, tomentose, with whitish, arachnoid indument and brownish-red to vinaceous, multicellular trichomes, domatia absent; stipules (3.5–) 4.5–10.5 (–14.5) cm long, with indument whitish, hispid to strigose, with dense, brownish-red to vinaceous, multicellular trichomes and often with whitish, arachnoid indument outside, glabrous inside, caducous. Staminate inflorescences (4–) 5.5–24.5 (–28.5) cm long, (2–) 3.5–14.5 (–18) mm wide, primary branched 3–4; peduncle 2–8.5 (–10.5) cm long, peduncle and branches with dense, brownish-red to vinaceous, multicellular trichomes and usually with whitish, arachnoid indument the ultimate branches; flowers ca. 950–2600, flowers organized in ca. 65–165 fascicles, diffusely distributed along the ultimate branches; fascicle 4–12 mm in diameter, ca. 4–25 flowers per fascicle. Staminate flowers 1.2–1.8 mm long, 1.5–2.5 mm wide; sessile; tepals 4, 1.2–1.8 mm long, free or basally connate, with indument yellowish, hirtellous to

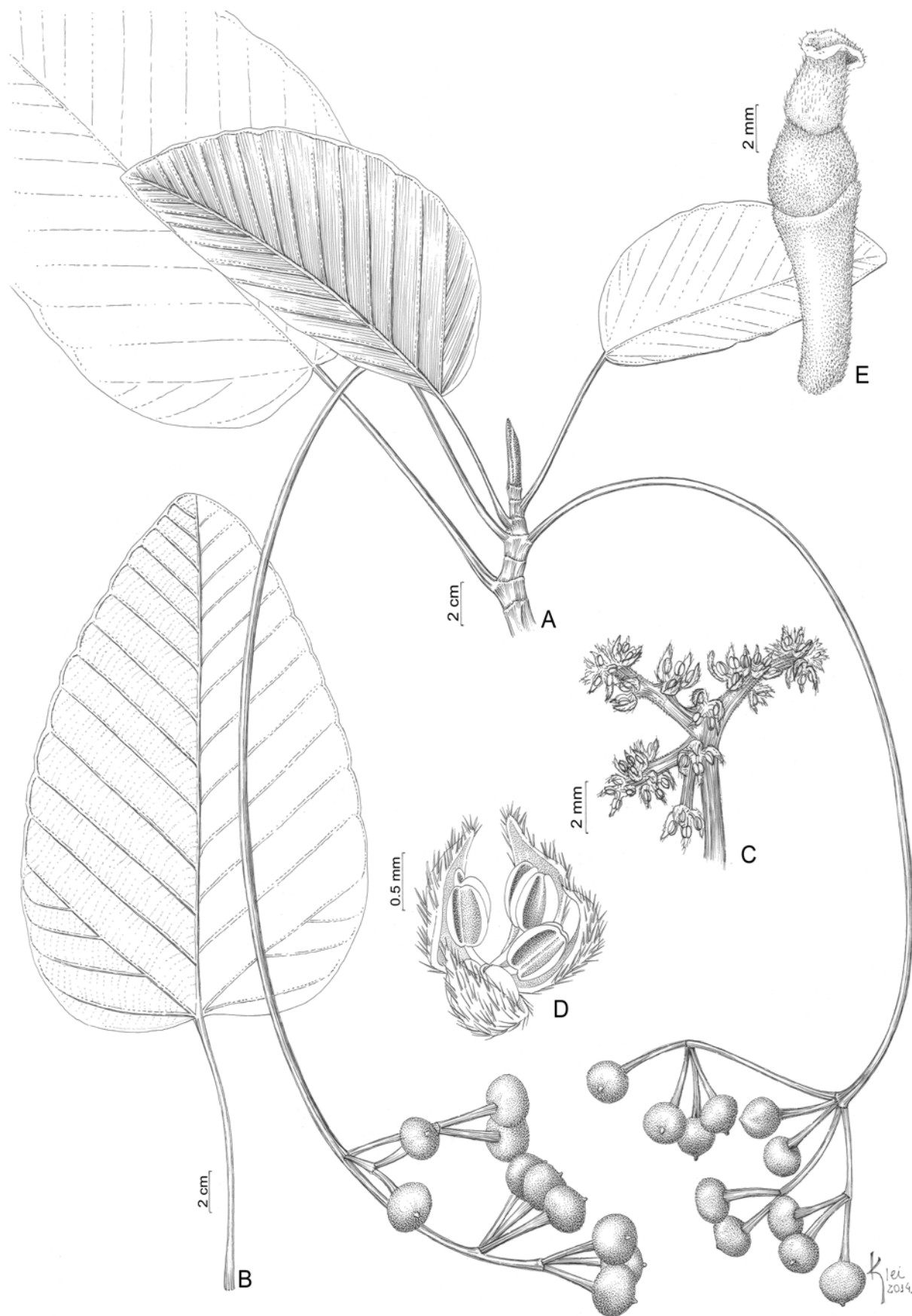


FIG. 45. *Pourouma ferruginea*. A. Leafy twig with infructescences. B. Leaf, abaxial surface. C. Part of the staminate inflorescence. D. Staminate flower. E. Pistillate flower and pedicel. [A-B: from *Ducke 1527*, (F); C-D: from *Krukoff 8807*, (F); E: from *Coelho et al. 339*, (INPA)].

hispidulous; stamens 4; filaments 0.5–10 mm long, free, filaments shorter than the tepals. Pistillate inflorescences 17.5–25 cm long, 2.5–4.5 cm wide; peduncle 15–18.5 cm long, peduncle and branches with dense, brownish-red to vinaceous, multicellular trichomes and whitish, arachnoid indument on the ultimate branches; flowers 6–15 (–20), flowers organized in 1–3 cymes. Pistillate flowers 8–10 mm long, 4–6 mm wide, pedicel 6–10 mm long; perianth 6–8 mm long, 4–6 mm wide, with indument yellowish, hirtellous and strigulose; stigma 2.5–3 mm in diameter, peltate, bilobate, whitish, strigulose. Infructescences 26.5–64.5 (–72) cm long, 6.5–12.5 (–16.5) cm wide; peduncle 21.5–52 cm long; fruiting pedicel 1.5–4.5 cm long. Fruiting perianth 1.5–2 cm long, 1.5–2 cm wide, globose, reddish, with indument yellowish, hirtellous and indument whitish, strigulose. Achene 1–1.5 cm long, 1–1.5 cm wide, globose. Seed 8–12 mm long, 6–10 mm wide, globose, vinaceous. Fig. 5 F; Fig. 14 D; Fig. 45.

Phenology. Staminate flowers collected from September to December, pistillate flowers from October and fruits from September to February.

Distribution (Fig. 46). Northwest of Brazil (Amazonas) and northeast of Peru (Loreto) in “terra firme” forest of the Amazonian region, in lowland moist areas, often in riparian forest, at an elevation of about 50 to 400 m above sea level.

Vernacular Name. Mapatí-rana (Brazil).

Etymology. Probably the epithet refers to coloring of the indument.

IUCN conservation status. *Pourouma ferruginea* is known from only sixteen collections, made between 1931 and 1996. However, the extent of occurrence of *P. ferruginea* is ca. 278,550 Km² and the population size are unknown. For these reasons *P. ferruginea* is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAZONAS: Coari, margem da estrada do RUC-21, 23 e 124, (♀), *Aguiar et al. 183* (INPA); Rio Solimões, rio Biá, afluente do Rio Jutaí, (♀), *L. Coêlho et al. 339* (INPA, U); São Paulo de Olivença, Rio Jandiatuba, upstream from confluence, Rio Solimões, east bank, (♂), *Daly et al. 4457* (INPA); São Paulo de Olivença, 10 Oct 1931 (♂), *A. Ducke RB25244* (RB, SP); Tonantins, Rio Solimões, atrás da Villa Nova, (♀), *A. Ducke 1527* (A, F, IAN, MG, NY, R, UC, US); Rio Solimões, São Antônio de Iça, (♀), *Fróes 23693* (IAN); Manaus-Porto Velho road, BR-319, km 380, 2 km of Rio Jutaí, (♂), *G. T. Prance et al. 22859* (INPA, MG, U). **Peru.** LORETO: Prov. de Maynas, rio Zumun, afluente do rio Yahuas-Yacu, (♀), *Barrier 1204* (P); Prov. of Requena, Dtto. Sapuena, Basin of Río Ucayali, Jenaro Herrera and vicinity, 04°55'S, 73°45'W, (♀), *Daly et al. 5796* (MO, NY, US); Jenaro Herrera, Río Ucayali, 04°55'S, 73°45'W, (♀), *Gentry et al. 56324* (MO); Vicinity of Iquitos, (♀), *Revilla 4261* (MO, NY); Maynas Province, Santa Maria de Nanay, Mishana, 03°55'S, 73°45'W, (♀), *Pipoly et al. 12643* (MO); Requena, Centro Florestal Jenaro Herrera, 04°55'S, 73°45'W, (♂), *Spichiger & Loizeau 3018* (NY).

Pourouma ferruginea is characterized by its pistillate inflorescences up to 25 cm long, infructescences with peduncle up to 52 cm long, pistillate flowers with perianth up to 10 mm long, fruiting perianth globose, staminate flower with tepals free or basally connate and brownish-red to vinaceous, multicellular trichomes on many parts of the plant. The long peduncle of the pistillate inflorescence is also found only in *P. ovata* and might be related to dispersion of fruits by the bats (personal communication from Tucuna Indians of the Amacayacu National Park for *P. ovata*). Sterile materials of *P. ferruginea* resemble *P. melinonii* by brownish-red to vinaceous, multicellular trichomes and lamina shape.

In the protologue, Standley (1937: 181) remarked about observation from Boris A. Krukoff, who collected the type material of *Pourouma ferruginea*. "Perhaps one of the most interesting plants recently identified by you is No. 8807, *Pourouma ferruginea*. It is apparently quite rare and although its leaves (reddish underneath) can be seen at a distance, a thorough search of the immediate vicinity failed to produce another individual. The tree provided material for only three sets. I have not seen this tree in any other region except the type locality."

We could not find *Pourouma ferruginea* during field trips and the last collection for the species was held in 1996. These facts reinforce Krukoff's comment.

Pourouma ferruginea was cited by Ribeiro & Berg (1999: 212) for the guide about Adolfo Ducke Forest Reserve, but the voucher (Ribeiro 1775, INPA) of this species was not found during visits to the INPA herbarium or field trips for the Ducke Reserve. Also, the authors described only vegetative character for identification of specimen. For these reasons, we consider that *P. ferruginea* does not occur in the Reserve.

The materials Barrier 1204 (P) and Pipoly et al. 12643 (MO) from Peru show hirsute indument. However, the fertile characters, ecologic and geographic distribution match with *Pourouma ferruginea*.

17. *Pourouma floccosa* C.C. Berg, Fl. Ecuador 48: 89. 1993.—TYPE: ECUADOR. Napo: Cantón Tena. Estación Biológica Jatun Sacha, 8 km al este de Misahualli, 01°04'S, 77°36'W, 20 Jan 1990 (♀), *Cerón et al.* 8349 (holotype: QCNE!; isotypes: BG! MO! NY!).

Tree 17–35 m tall, 45 cm d.b.h., with stilt roots; bark smelling of menthol. Leafy twigs 4–10 mm in diameter, with indument whitish, sericeous to strigillose and dense, floccose, brownish,

arachnoid indument; internode 5–20 mm long. Lamina entire, 10.5–32 (–35) cm long, 7–18.5 (–21) cm wide, length:width ratio 1.3–1.9, oblong to elliptic, coriaceous, discolorous; base rounded to obtuse; margin entire to slightly repand, with indument sparse, whitish, sericeous; apex rounded to emarginate, or rarely acute; adaxial surface smooth, indument of primary vein sparse, yellowish, sericeous; abaxial surface smooth, indument of veins whitish, sericeous and brownish, arachnoid indument; venation brochidodromous; secondary veins 10–18 pairs per leaf, basal pair unbranched, or sometimes branched, diverging from the midrib at an 30°–45°; tertiary and quaternary veins plane to slightly prominent, with dense, whitish, arachnoid indument covering to the areoles; petiole 3–8 cm long, with indument whitish, puberulous and dense, floccose, brownish, arachnoid indument, domatia absents; stipules 2–8.5 cm long, with dense, floccose, brownish, arachnoid indument outside, glabrous inside, caducous. Staminate inflorescences unknown. Pistillate inflorescences unknown. Infructescences 8–12.5 cm long, 3.5–8 cm wide; peduncle 4.5–8 cm long, peduncle with dense, floccose, brownish, arachnoid indument and indument whitish, puberulous; branches with dense, brownish, multicellular trichomes and indument whitish, puberulous; fruits 5–22, fruits organized in 2-4 cymes; fruiting pedicel 5–10 cm; stigma peltate, 1–1.5 mm in diameter. Fruiting perianth 1.5–2 cm long, 1–1.5 mm wide, ovoid to ellipsoid, black, with indument yellowish, hispidulous. Achene 12–18 mm long, 8–12 mm wide, ovoid to ellipsoid. Seed 5–10 mm long, 3–8 mm wide, ovoid, dark-vinaceous. Fig. 5 E; Fig. 14 E.

Additional illustrations. Berg & Franco-Rosselli (1993: 90).

Phenology. Collected in fruit from October and January.

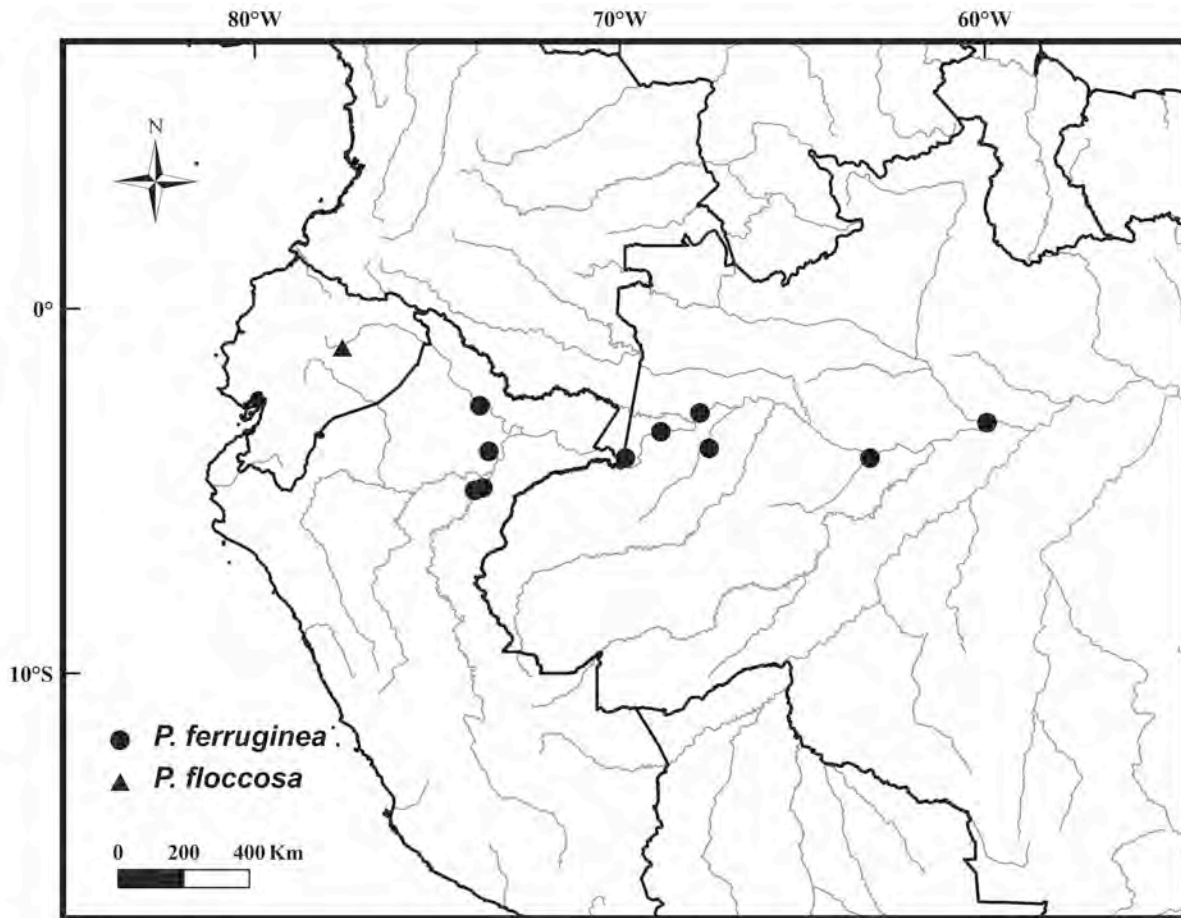


FIG. 46. Distribution of *Pourouma ferruginea* and *P. floccosa*.

Distribution (Fig. 46). Endemic from the northeast of Ecuador (Napo), in primary “terra firme” forest of the Amazonian region, in lowland moist areas, at an elevation of about 400 m above sea level.

Etymology. The epithet refers to the floccose indument.

IUCN conservation status. According to the IUCN Red list categories (IUCN 2014), *Pourouma floccosa* is considered Critically Endangered, CR B1a,b(iii,iv), because of the small extent of occurrence (ca. <math><100\text{ km}^2</math>), number of locations (1) and known from only five collections (just one fertile), made between 1989 and 1990.

ADDITIONAL SPECIMENS EXAMINED. **Ecuador.** NAPO: Canton Tena, Estación Biológica Jatun Sacha, 8 km al este de Misahualli, 01°04'S, 77°36'W, (st), *Céron et al. 6131* (BG, MO); Jatun Sacha Biological Station, 01°04'S, 77°36'W, (st), *Gentry et al. 59876* (BG, MO); Jatun Sacha Biological Station, 8 km E of Misahualli, 01°04'S, 77°36'W, (st), *Gentry et al. 60139* (MO, BG); Canton Tena, Estación Biológica Jatun Sacha, Río Napo, 8 km al este de Misahualli, 01°04'S, 77°36'W, (st), *W. Palacios & Iguago 4674* (QCNE, MO).

Only the type collection was found fertile. All other collections of this species cited by Berg (1993) are sterile. However, *Pourouma floccosa* distinguished from other species by dense, floccose, brownish, arachnoid indument, adaxial lamina surface smooth, and stipules with dense, floccose, brownish, arachnoid indument outside.

It belongs to a group of species with basal secondary veins unbranched, which have lamina usually entire. *Pourouma floccosa* shows similarities with *P. amacayacuensis*, due to the dense, brownish, floccose arachnoid indument in the leafy twigs and abaxial lamina surface with whitish arachnoid indument, but distinguished by foliar lamina with apex rounded to emarginate, adaxial lamina surface smooth, stipules with dense, floccose, brownish, arachnoid indument outside, and fruiting perianth with indument yellowish, hispidulous.

18. *Pourouma formicarum* Ducke, Trop. Woods 90: 9. 1947; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 184. 1990; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.—TYPE: BRAZIL. Amazonas: Tonantins, Rio Solimões, 7 Feb 1944 (♀), *A. Ducke 1917* (holotype: R!; isotypes: F! IAN! NY image! RB!).

Tree or shrub, 3–10 m tall, 7–35 cm d.b.h., myrmecophilous. Leafy twigs 4–6 mm in diameter, with indument yellowish to brownish, hirsute and sparse, brownish, multicellular trichomes; internode 3–10 mm long. Lamina entire, (10–) 16.5–34.5 (–43.5) cm long, (5.5–) 7–15.5 (–19) cm wide, length:width ratio 1.5–2.6, obovate, chartaceous; base obtuse to cuneate; margin entire to slightly repand, with indument yellowish, hirsute; apex acuminate to acute; adaxial surface scabrous to scabridulous, with indument whitish, strigose to strigulose and indument yellowish, hirsute; abaxial surface scabridulous, with indument whitish, strigulose, indument of veins yellowish, hirsute to hirtellous; venation brochidodromous; secondary veins 10–20 pairs per leaf, basal pair unbranched, diverging from the midrib at an 25°–45°; tertiary and quaternary veins plane to slightly prominent, with whitish, arachnoid indument covering to the areoles; petiole 1–1.8 cm long, with indument yellowish, hirsute, domatia present; stipules (2.5–) 3–6.5 cm long, with indument yellowish, hirsute outside, glabrous inside, caducous. Staminate inflorescences 3.5–10.5 (–12) cm long, (1.5–) 2.5–7 (–8.5) cm wide, primary branched 3–4; peduncle 1.5–5.5 cm long, peduncle and branches with indument yellowish, hirsute; flowers ca. 450–1650, flowers organized in ca. 18–72 glomerules; glomerule 2–4 mm in diameter, flowers ca. 20–35 per glomerule. Staminate flowers 1–1.2 mm long, 1–1.2 mm wide; sessile to subsessile; tepals 3–4, 1–1.2 mm long, 0.2–0.4 mm wide, ovate to lanceolate, free or basally connate, with indument yellowish, hirsute; stamens 3–4; filaments 0.5–0.8 mm long, free, shorter than the perianth. Pistillate inflorescence unknown. Infructescences 5.5–8.5 cm long, 2.5–6.5 cm wide; peduncle 2–4.5 cm long; peduncle and branches with indument yellowish, hirsute and dense, brownish, multicellular trichomes; fruits 5–8, fruits organized in 2–3 cymes, fruiting pedicel 4–6 mm long; stigma peltate, 1–1.2 mm in diameter, with indument yellowish, hirsute. Fruiting perianth 1.2–1.5 cm long, 6–10 mm wide, ovoid to ellipsoid, black to blue-black,

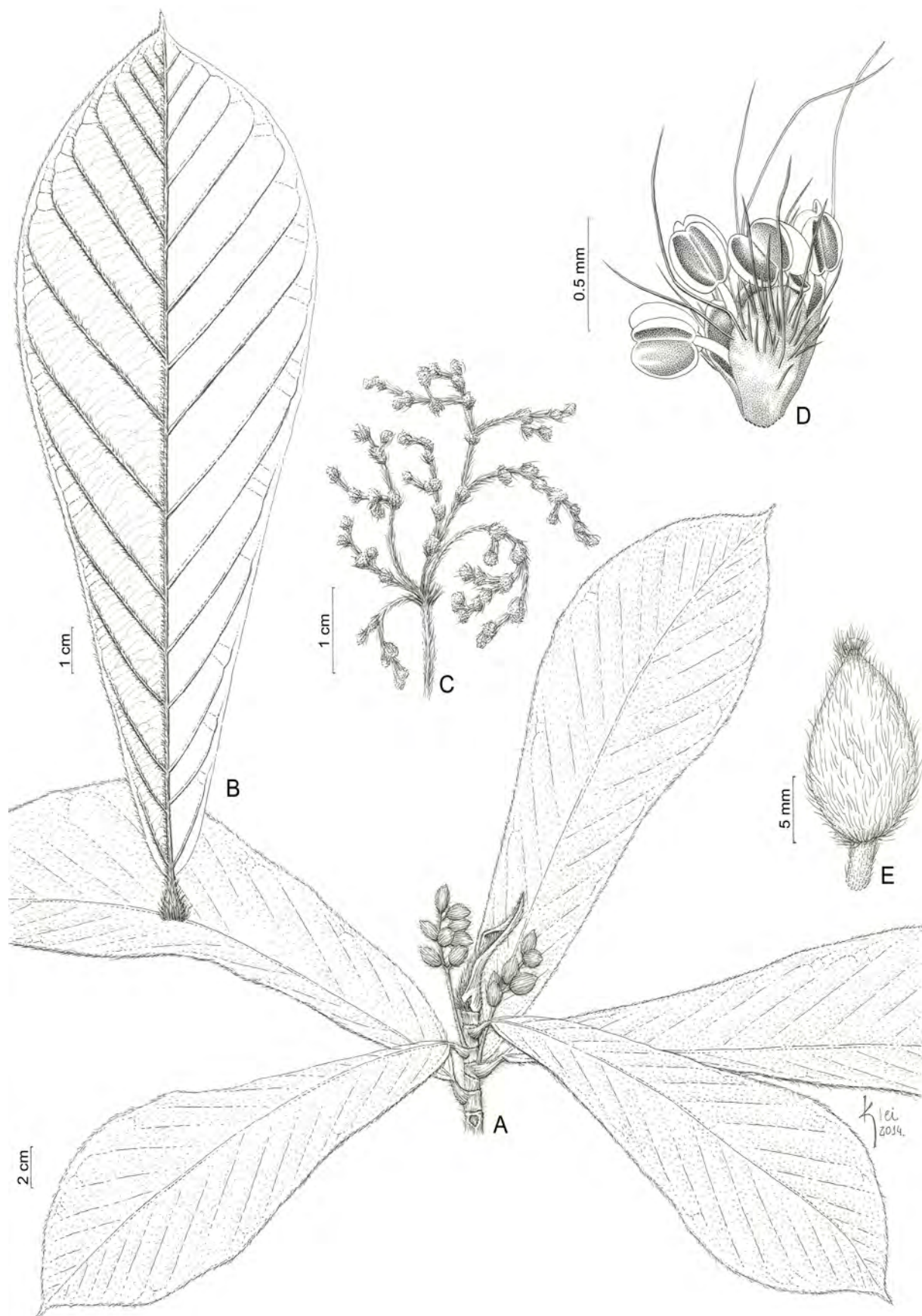


FIG. 47. *Pourouma formicarum*. A. Leafy twig with infructescences. B. Leaf, abaxial surface. C. Staminate inflorescence. D. Staminate flower. E. Fruiting perianth. [A-B, E: from *Ferreira et al 12201*, (INPA); C-D: from *Lleras et al. P17411*, (INPA)].

with indument yellowish, hirsute. Achene 10–12 mm long, 3–8 mm wide, ovoid to ellipsoid. Seed 2–5 mm long, 2–4 mm wide, ovoid, brownish to vinaceous. Fig. 14 F; Fig. 47.

Phenology. Staminate flowers collected from August to December and May; fruits collected from October to February.

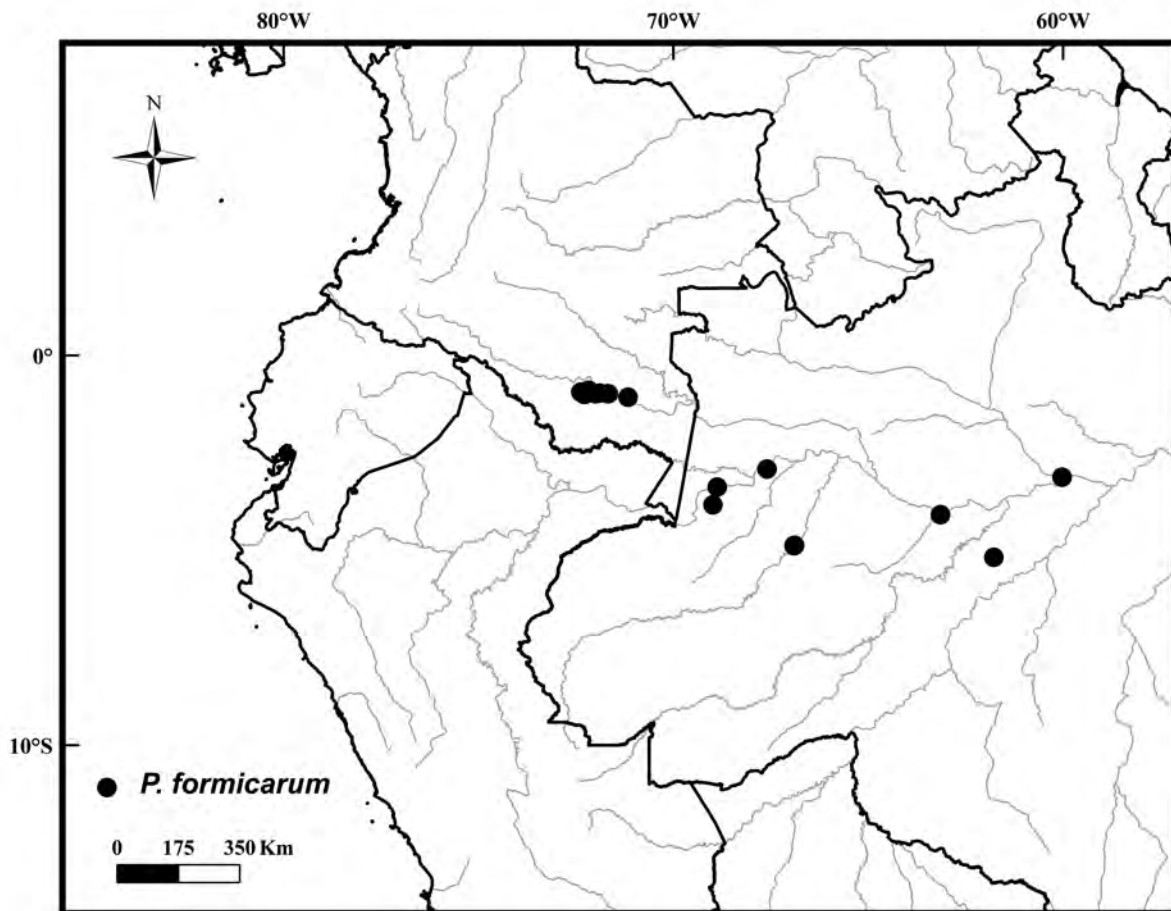


FIG. 48. Distribution of *Pourouma formicarum*.

Distribution (Fig. 48). Northwest of Brazil (Amazonas) and south of Colombia (Amazonas), in “terra firme” forest of the Amazonian region, in lowland moist area, sometime in riparian forest, at an elevation of about 200 to 300 m above sea level.

Vernacular Name. Imbaúbinha, imbaubarana de formiga, mapatí (Brazil, Amazonas).

Etymology. The epithet refers to the myrmecophilous association.

IUCN conservation status. *Pourouma formicarum* is known from only twenty collections, made between 1944 and 2001. However, the extent of occurrence of *P. formicarum* is ca. 288,430 km² and the population size are unknown. For these reasons *P. formicarum* is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAZONAS: São Paulo de Olivença, Rio Jandiatuba, (♀), *Daly et al. 4456* (BG, INPA, K, NY); próximo à São Paulo de Olivença, 03°30'00"S, 68°59'00"W, (♂), *Daly et al. 4485* (BG, K, MO, NY); Coari, margem direita do Rio Solimões, Rio Urucu, Base Petrolífera de Urucu, estrada para o Porto Evandro, entre quilômetros 10 e 40 (♀), *C. A. Cid Ferreira et al. 12201* (INPA); São Antonio de Iça, (♂), *Fróes 20870* (IAN, K, NY, US); São Antonio de Iça, Rio Solimões, (♂), *Fróes 34863* (IAN, NY, US); Carauari, poço Munguba1, MG-1, (st), *Lisboa et al. 1903* (MG); São Antonio de Iça, between Rio Solimões and Rio Iça, (♂), *Lleras et al. P.17411* (F, INPA, K, MG, MO, NY, R, S, U, US); Coari, 0,5 Km de Porto Urucuru, (♀), *Miralha et al. 122* (BG, INPA, MBM); Carauari, Poço Juruá I, (♂), *A. S. L. Silva et al. 476* (BG, INPA, MG); Carauari, Poço Juruá I, (st), *A. S. L. Silva et al. 842* (MG). **Colombia.** AMAZONAS: Puerto Santander, Araracuara, río Caquetá, margen izquierda, 00° 39' S, 72° 08' W, (st), *E. Alvarez et al. 1165* (COAH, COL); Puerto Santande, Araracuara, Río Caquetá, margen derecha, frente a Villa Azul, (st), *Andel et al. 398* (COAH); Cuenca del río Caquetá, 00°50'S, 71°50'W, (st), *Duivenvoorden et al. 1330* (COAH); cuenca del río Caquetá, 00°50'S, 71°50'W, (st), *Duivenvoorden et al. 2044* (COAH); cuenca del río Caquetá, 00°50'S, 71°50'W, (st), *Duivenvoorden et al. 2281* (COAH); Araracuara, Villa Azul, 00°32'00"S, 72°06'00"W, (st), *Duque et al. 796* (COAH); margen derecha del Río Caquetá 1.8 km abajo de la

boca del Quebradón de La Culebra, 00°58'23"S, 71°43'56"W, (♂), *Sánchez et al.* 5468 (COAH); margen izquierda del Quebradón del Metá, 00°54'16"S, 71°36'14"W, (♂), *Sánchez et al.* 5911 (COAH).

This species is easily recognized because of the domatia presence at the base of petiole and the association with ants. The trichomes, domatia, ants and area of occurrence observed in this species are similar to those observed in *Pourouma myrmecophila*, from which it differs in its entire lamina and petiole with up to 1.8 cm long.

The type collection (Ducke 1916) indicated by Ducke (1947: 9) was not found, which was also reported by Berg et al. (1990).

In the protologue, Ducke reported that one specimen was found at the local, with only two fertile branches "arbor unica observata duobus fertilibus solis", that might reflect the difficulty in finding this species. In fact, we did not find this species during the field trips. Moreover, the last record of this species was collected in October 2001 (Ferreira et al. 12201), and all other collections are of the XX century.

These data indicated that the species is probably rare in nature, and might be included in the IUCN Red List, although, the extent of occurrence is ca. 288,430 km² and the population size is unknown. The occurrence of *P. formicarum* in Colombia is reported for the first time.

19. *Pourouma guianensis* Aubl., Hist. pl. Guiane 2: 892, t. 341. 1775; Miquel in Martius, Fl. Bras. 4(1): 127. 1853; Berg & Dewolf, Fl. Suriname 5(1): 267. 1975; Croat, Flora Barro Colorado Island 360. 1978; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 105. 1988; Spichiger et al., Boissiera 1: 66. 1989; Berg, Akkermans & Heusden, Fl.

Neotrop. Monogr. 51: 123. 1990; Berg, Fl. Guianas 11(22): 116. 1992; Berg & Franco-Rosselli, Fl. Ecuador 27A: 90. 1993; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez.: 230. 2000; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.—TYPE: FRENCH GUIANA. “Cayenne, sylvis prope fluvium Sinemari”, unknown date (♀) *Aublet s.n.* (holotype: BM000993430!; isotypes: LE image! S image!).

Pourouma palmata Poepp. & Endl., Nov. gen. sp. pl. 2: 29, t. 141. 1838; Trécul, Ann. Sci. Nat. Bot., Sér. 3, 8: 104. 1847; Miquel in Martius, Fl. bras. 4(1): 126. 1853; Macbride, Publ. Field Mus. Nat. Hist., Bot. Ser., 13(2.2): 293. 1937; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 123. 1990; Berg, Fl. Guianas 11(22): 117. 1992; Berg & Franco-Rosselli, Fl. Ecuador 27A: 91. 1993; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez.: 230. 2000.—TYPE: PERU. San Martin: Tocache, Aug 1830 (♂ and ♀), *Poeppig s.n. or 1881* (holotype: W, destroyed; lectotype, designated by Berg et al. 1990: G specimen ♀!; isolectotypes: B image! LE image! F! P!).

Pourouma acutiflora Trécul, Ann. Sci. Nat. Bot., Sér. 3, 8: 105. 1847; Miquel in Martius, Fl. bras. 4(1): 126. 1853; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 105. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 123. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 91. 1993; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez.: 230. 2000.—TYPE: BRAZIL. Rio de Janeiro, 1839 (♂), *Guillemin 1024* (holotype: P00757090!).

Pourouma cinerascens Mart. ex Miq. in Mart., Fl. bras. 4(1): 125, t. 37. 1853; Miquel in Martius, Fl. bras. 4(1): 126, tab. 37. 1853; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 105. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 123. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 91. 1993; Berg, Fl. Venez.: 230.

2000.—TYPE: BRAZIL. “Provinciae Rio Negro, sylvis ad Maribi in ripa fluminis Japurá”, Dec 1819 (♂), *Martius s.n.* (holotype: M0174099!; isotypes: M0174097! M0174098! U0004759 fragment from M image!).

Pourouma heterophylla Mart. ex Miq. in Mart., Fl. bras. 4(1): 125. 1853; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 123. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 91. 1993; Berg, Fl. Venez.: 230. 2000.—TYPE: BRAZIL. Amazonas: Rio Japurá, Dec 1819 (st, juv), *Martius s.n.* (holotype: M0174095; isotypes: M0174096! U0004761 fragment from M image!).

Pourouma fuliginea Miq. in Mart., Fl. bras. 4(1): 129. 1853; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 105. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 123. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 91. 1993; Berg, Fl. Venez.: 230. 2000.—TYPE: BRAZIL. “Terra Amazonica”, without date (♂), *Martius s.n.* (holotype: M0174094!; isotype: U0004757 fragment from M image!).

Pourouma scabra Rusby, Bull. New York Bot. Gard. 6: 498. 1910; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 123. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 91. 1993; Berg, Fl. Venez.: 231. 2000.—TYPE: BOLIVIA. Pando: Santa Barbara, 30 Aug 1902 (♀), *R. S. Williams 1560* (holotype: NY!; isotypes: K! US image!).

Pourouma radula Benoist, Bull. Mus. Hist. Nat. (Paris) 28: 320. 1922; Woodson, Ann. Missouri Bot. Gard. 47: 166. 1960; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 123. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 91. 1993; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez.: 231. 2000.—TYPE: COLOMBIA. Unknown locality and date (♂),

Triana 860 (holotype: P00756793!; isotypes: E image! K! NY!).

Pourouma subtriloba Rusby, Mem. New York Bot. Gard. 7: 232. 1927; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 123. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 91. 1993; Berg, Fl. Venez.: 231. 2000.—TYPE: BOLIVIA. La Paz: Vic. Tumapasa, 1500 ft., 12 Oct 1921 (♀), *Cardenas 1990* (holotype: NY!; isotypes: BKL image! GH image! K! US image!).

Pourouma substrigosa Mildbr., Notizbl. Bot. Gart. Berlin-Dahlem 10: 192. 1927; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 123. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 91. 1993; Berg, Fl. Venez.: 231. 2000.—TYPE: PERU. Ost-Peru Stromgebiet des Maranon von Iquitos aufwärts bis zur Santiago-Mündung am Pongo de Manseriche, ca. 77°30' West, 26 Nov 1924 (♂), *Tessmann 4642* (holotype: B100245454!; isotypes: B100245455! F-609550 fragment!, F-869671 fragment! G image! NY image!).

Pourouma mildbraediana Standl., Publ. Field Mus. Nat. Hist., Bot. Ser., 17: 183. 1937; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 123. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 91. 1993; Berg, Fl. Venez.: 231. 2000.—TYPE: BRAZIL. Amazonas: Municipality São Paulo de Olivença, near Palmares, 11 Sep-26 Oct 1936 (♂), *Krukoff 8386* (holotype: NY!; isotypes: A image! BM! BR image! F-894105 fragment! F-929039!, F-929060! G image! K! LE image! LP image! MICH image! MO! P! S image! U image! US image!).

Tree, 5–35 (–40) m tall, 10–40 (–50) cm d.b.h., with stilt roots. Leafy twigs 4–25 mm in diameter, with indument yellowish to whitish, hirsute to hirtellous or velutinous and brownish,

multicellular trichomes; internode 4–35 (–40) mm long. Lamina usually palmatifid to parmatipartite with 3–7 lobes, (7.5–) 9.5–38.5 (–46.5) cm long, (8.5–) 10–40 (–48.5) cm wide, length:width ratio 0.7–1.1; or entire, (4.5–) 6.5–20 (–22) cm long, (3.5–) 5–12.5 (–14.5) cm wide, length:width ratio 1.2–1.9, ovate to elliptic to oblong, coriaceous to chartaceous; base cordate, truncate to rounded; margin palmatifid to entire, usually repand, with indument yellowish to whitish, hirtellous to strigose; apex acuminate to acute; adaxial surface scabrous, with indument whitish, strigose and sometimes with indument yellowish, hirsute to hirtellous, indument of veins yellowish, hirsute to hirtellous; abaxial surface smooth, indument of veins yellowish to whitish, hirtellous to velutinous and sometimes with sparse, brownish, multicellular trichomes; venation palmate or brochidodromous; secondary veins in the free part of the midsegment 10–26 pairs per leaf, basal pair branched, diverging from the midrib at an 35°–60°; tertiary and quaternary veins slightly prominent to prominent, with whitish, arachnoid indument confined to the areoles, rarely extending to the tertiary and quaternary veins; petiole (2.5–) 4–28.5 (–42.5) cm long, with indument yellowish to whitish, hirsute to hirtellous and brownish, multicellular trichomes, domatia absent; stipules (2–) 3.5–16.5 (–18) cm long, with indument yellowish to whitish, hirsute to velutinous and brownish, multicellular trichomes outside, glabrous inside, caducous. Staminate inflorescences (3–) 4–22.5 (–24) cm long, (1.5–) 2.5–13.5 (–14.5) cm wide, primary branched 3–4; peduncle 1.5–8.5 cm long, peduncle and branches with indument yellowish to whitish, hirsute to hirtellous and dense, brownish, multicellular trichomes on the ultimate branches; flowers ca. 280–1950, flowers organized in 20–106 fascicles, diffusely distributed along the ultimate branches; fascicle 4–12 mm in diameter, ca. 4–42 flowers per fascicle. Staminate flowers 1.5–3 mm long, 1.2–2.5 mm wide; sessile to subsessile; tepals 3–4, lanceolate, 1.5–3 mm long, free or basally connate, with indument yellowish to whitish, sericeous to puberulous; stamens 4; filaments 0.8–1 mm long, free, usually shorter than the tepals.

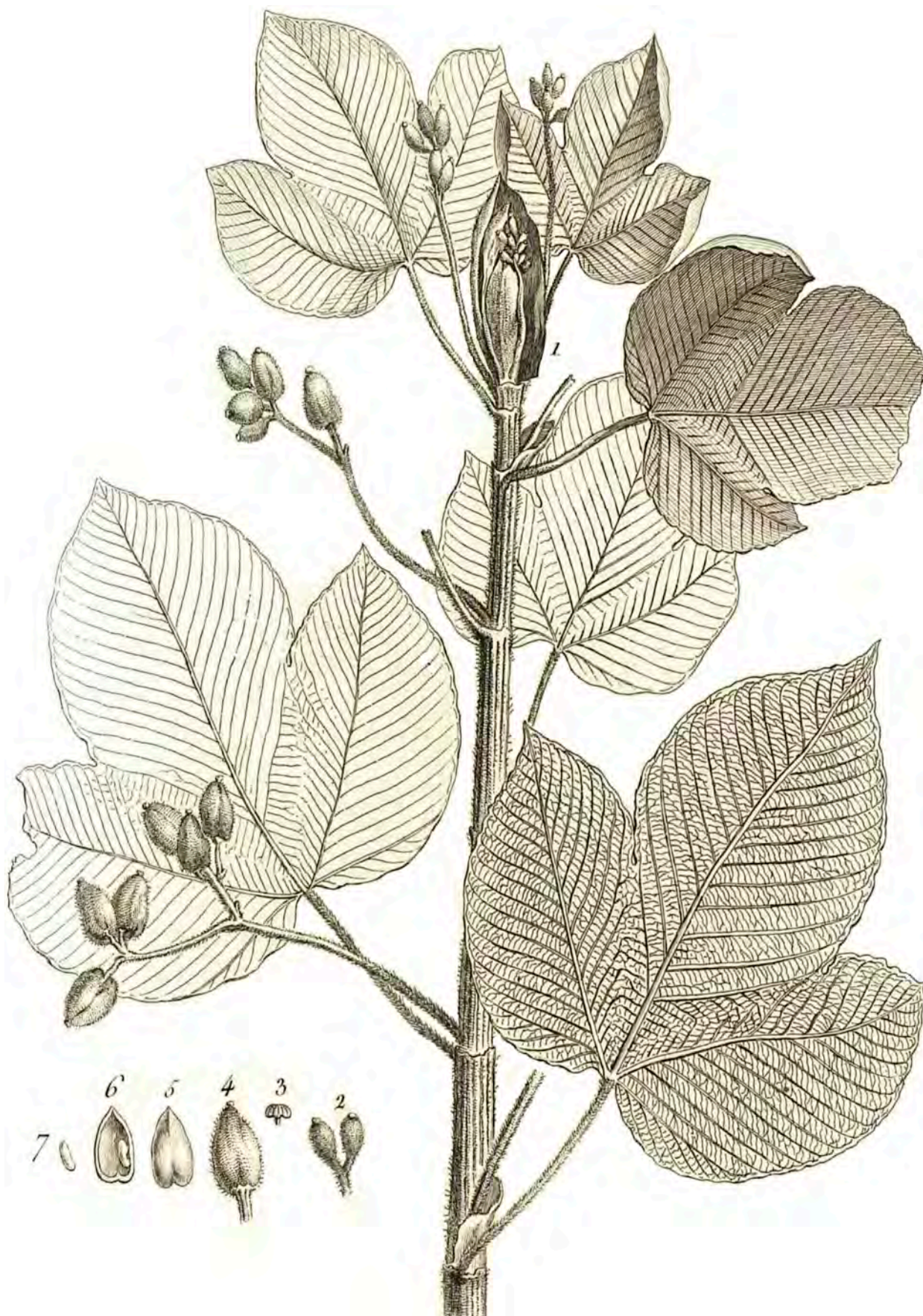


FIG. 49. *Pourouma guianensis*. A. Leafy twig with pistillate inflorescence and infructescences. 1. Stipule. 2. Pistillate flowers and pedicels. 3. Stigma. 4. Fruiting perianth. 5. Fruit. 6. Fruit and seed, longitudinal section. 7. Seed. From Aublet, *Histoire des plantes de la Guiane françoise*, 4: Tab. 341. 1775 (modified).

Pistillate inflorescences 2.5–6.5 cm long, 1.5–4.5 cm wide; peduncle 1.5–4.5 cm long, peduncle and branches with indument yellowish to whitish, hirsute to hirtellous and dense, brownish, multicellular trichomes on the ultimate branches; flowers 6–30 (–35), flower organized in 2–5 cymes. Pistillate flowers 3–5 mm long, 2–3 mm wide; pedicel 2–5 mm long; perianth 1.5–4 mm long, with indument yellowish to whitish, velutinous to hirtellous; stigma peltate, 1.5–2 mm in diameter. Infructescences 5.5–22 (–24.5) cm long, 4.5–14 (–16.5) cm wide; peduncle 3–16.5 cm long; fruiting pedicel 5–15 mm long. Fruiting perianth 1–1.8 cm long, 5–8 mm wide, ovoid to ellipsoid, vinaceous, with indument yellowish to whitish, velutinous to strigose. Achene 8–16 mm long, 3–6 mm wide. Seed 4–8 mm long, 2–4 mm wide, ovoid, vinaceous. Fig. 1 B; Fig. 2 A, Fig. 3 F; 4 C-D; Fig. 9 F; Fig. 15 A; Fig. 49.

Phenology. Staminate flowers, pistillate flowers and fruits collected along all the year.

Distribution (Fig. 50). North, east and southeast of Brazil (Acre, Alagoas, Amapá, Amazonas, Bahia, Ceará, Espírito Santo, Maranhao, Mato Grosso, Minas Gerais, Pará, Parana, Pernambuco, Rio de Janeiro, São Paulo, Santa Catarina, Rondônia, and Roraima), French Guiana (Cayenne and Saint-Laurent-du-Maroni), Suriname (Sipaliwini and Marowijne), Guyana (Barima-Waini, Cuyuni-Mazaruni, Essequibo Islands-West Demerara, Upper Demerara-Berbice, and Upper Takutu-Upper Essequibo), south of Venezuela (Amazonas and Bolívar), central-south of Colombia (Amazonas, Meta, and Vaupes), east of Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Sucumbios, and Zamora-Chinchipe), Peru (Amazonas, Cajamarca, Cuzco, Huánuco, Loreto, Madre de Dios, Pasco, and San Martin) and central-northeast of Bolivia (Beni, Cochabamba, La Paz, Pando, and Santa Cruz), often in secondary “terra firme” forest of the Amazonian region and in dense ombrophilous forest of the Atlantic forest, often in lowland moist areas, sometimes in riparian forest, at an elevation of about 50 to 1400 m above sea level. This species is pioneer and commonly found in open and disturbed areas of the forest.

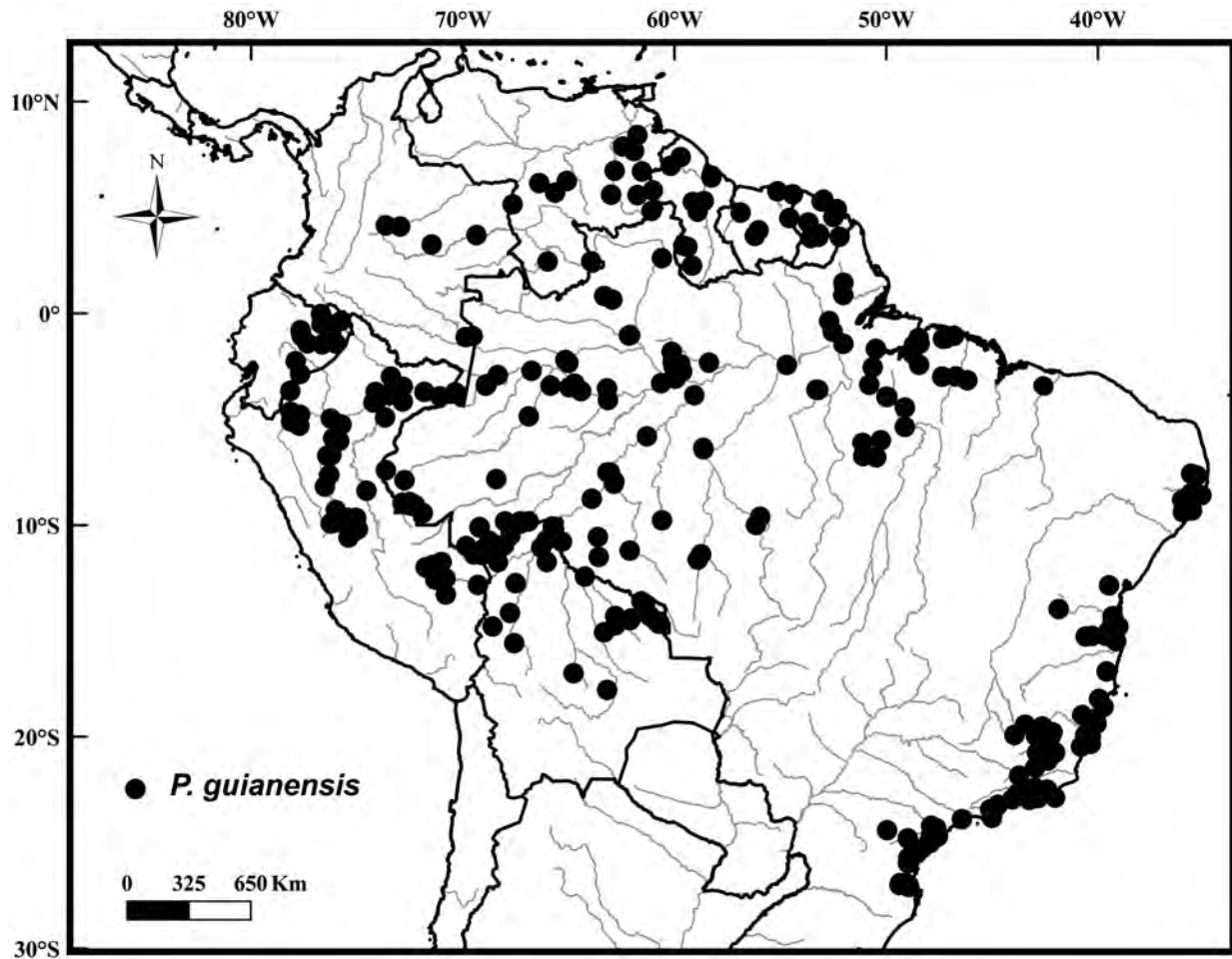


FIG. 50. Distribution of *Pourouma guianensis*.

Vernacular Name. Ambaibillo (Bolivia, Santa Cruz); ambaybauba (Bolivia, Santa Cruz); torém, torém lixeira, torém-folha-de-lixá, embaúba (Brazil, Acre); imbaubarana (Brazil, Amazonas); itararanga, tararanga, tararanga branca (Brazil, Bahia); uva de macaco (Brazil, Espírito Santo); kaymbe'y (Brazil, Maranhao); imbaubarana, imbauba torem (Brazil, Mato Grosso); uva-da-mata (Brazil, Minas Gerais); imbaúba-de-igapó, mapati, mapatirana (Brazil, Pará); embaubarana, pau-de-jacu (Brazil, Parana); embauba-da-mata (Brazil, Pernambuco); amapati, uva da mata (Brazil, Rio de Janeiro); pitinga (Brazil, São Paulo); papaquillo (Colombia, Meta); sacha uvilla, shuiña, uva (Ecuador, Morona-Santiago); bois canon, kuluma, kalate (French

Guiana, Cayenne); buruma, mahoe, sandpaper (Guyana); sugkama, sairam shuiya, shuiya, shuiya, shumiya, tsakap suiya (Peru, Amazonas); papaya del monte (Peru, Huánuco); uvilla (Peru, Loreto); tacona blanca, uvilla de monte real (Peru, Pasco); uvilla, uvilla blanca (Peru, San Martín); manbospapaja (Suriname, Sipaliwini); amía-yek, chaparro de agua (Venezuela, Bolívar).

Etymology. The epithet is a tribute to the country of type locality, French Guiana.

Uses. Edible fruits; leaf for sandpaper; wood for post and fuel stuff; wood used construction; pulp paper; comestible for the night monkeys.

IUCN conservation status. *Pourouma guianensis* is most widely distributed with the extent of occurrence of ca. 6,983,230 Km². Also, *P. guianensis* is well represented in herbaria. For these reasons *P. guianensis* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Bolivia.** BENI: Vaca Diez, Alto Ivón, 11°45'S, 66°02'W, (♀), *Bergeron et al.* 464 (M); Itenez, El Puente del Picacho, 14°25'S, 62°03'W, (♀), *Quevedo et al.* 1056 (NY).—COCHABAMBA: Carrasco, Estación Experimental Valle de Sacta, 17°00'S, 64°46'W, (♀), *Ledesma et al.* 263 (F).—LA PAZ: 16 km N of Carrasco, 15°35'S, 67°34'W, (♀), *Solomon & Nee* 12655 (BG, MBM, NY).—PANDO: Manuripi, Trocha entre el campamento Bay y curichón, (♀), *Beck* 19401 (MG); Nicolas Suarez, Mukden, 11°10'S, 69°04'W, (♀), Izawa 9 (MO, U); Madre de Dios, Concesión de Mobil Oil, 12°10'S, 67°15'W, (♀), *Killeen* 4418 (NY); Province of N. Suarez, (♀), *Meneces* 759 (MG); 4 Km SW Cobija, Puerto Oro, 11°25'S, 69°05'W, (♂), *R. T. Pennington et al.* 88 (F, NY); W bank of Rio Madeira, 2 km above Abunã, (♀), *G. T. Prance et al.* 6253 (B, INPA, MG, NY, R, S, U, UC, US); West bank of Río Madeira, near Abuña, (♀), *G. T. Prance et al.* 8670 (F, INPA, MG, NY, S, U); Province of N. Suarez, San Pedro (♀), *Terceros* 1400 (INPA).—SANTA CRUZ: Velasco, Parque Nacional Noel Kempff

Mercardo, 14°37'S, 60°42'W, (♀), *P. F. Foster et al. 494* (F); Velasco, 14°18'S, 61°09'W, (♀), *P. F. Foster et al. 720* (MO, NY); Velasco, Parque Nacional Noel Kempff Mercado, Serrania de Huanchaca, 14°37'S, 60°42'W, (♀), *R. B. Foster et al. 13955* (F); Velasco, Parque Nacional Noel Kempff Mercado, 13°36'14"S, 61°33'16"W, (♂), *Guillén & Soliz 3869* (F); Velasco, Parque Nacional Noel Kempff Mercado, 13°36'14"S, 61°33'16"W, (♂), *Guillén et al. 3967* (F); Velasco, P, 14°34'00"S, 60°49'50"W, (♀), *Killeen et al. 5930* (NY); Velasco, 32 km de la laguna Bella Vista, 13°44'02"S, 61°23'17"W, (♀), *Menacho et al. 655* (NY); Velasco, 17°47'22"S, 63°10'50"W (♀), *Mostacedo et al. 2083* (MO); Guarayos, 4 km NE of Perseverancia, 14°43'00"S, 62°46'00"W (♀), *Nee 38664* (NY); Velasco, Parque Nacional Noel Kempff Mercado, 14°34'56"S, 60°50'01"W, (♀), *A. Rodrigues & R. B. Foster 724* (NY); Velasco, Parque Nacional Noel Kempff Mercado, 14°40'00"S, 60°44'00"W, (♀), *Saldias et al. 2791* (NY); Guarayos, Reserva de Vida Silvestre Rios Blanco y Negro, 40 km al SW de Rio San Martin, 14°30'00"S, 62°06'00"W, (♀), *Vargas C. et al. 1741* (NY); Prov. Guarayos, Reserva de Vida Silvestre Rios Blanco y Negro, 14°18'11"S, 62°47'49"W, (♀), *Vargas C. et al. 2673* (F); Guarayos, Reserva de Vida Silvestre Rios Blanco y Negro, Campamento a 8 km al NE del Río Blanco en la zona de los Tutumos, 14°18'11"S, 62°47'49"W, (♂), *Vargas C. et al. 2818* (NY); Guarayos, Reserva de Vida Silvestre Rios Blanco y Negro, 15°3.68'S, 63°19,24'W, (♀), *Vargas C. et al. 2843* (NY). **Brazil.** ACRE: Rio Branco, Parque Zoobotânico, bloco 01, (♂), *Claros et al. 112* (INPA); Rio Branco, Parque Zoobotânico, bloco 01, (♂), *Claros et al. 158* (INPA); Rio Branco, Parque Zoobotânico, (♂), *Claros & Charles 195* (INPA); Rio Branco, BR 317, Estrada Rio Branco-Brasiléia, 10°30'S, 67°45'W, (♂), *Daly et al. 6938* (INPA, MO, NY); Brasiléia, Seringal Porongaba, Colocação São José, 25 Km N of Km 4 Brasiléia-Assis Brasil road, 10°45'S, 68°45'W, (♀), *Daly et al. 6957* (INPA, MO, NY); Brasiléia, Seringal Porongaba, 25 Km of Km 4 Brasiléia-Assis Brasil road, 10°45'S, 68°45'W, (♀), *Daly et al. 7097* (INPA, MO, NY); Sena

Madureira, Basin of Rio Purus, Rio Iaco, right bank, 10°07'S, 69°13'W, (♀), *Daly et al. 7864* (MO, NY); Assis Brasil, Basin of Rio Acre, tributary of Rio Purus, 10°59'40''S, 69°50'00''W, (♀), *Daly et al. 9605* (MO, NY); Marechal Thaumaturgo, Basin of Rio Juruá, Rio Tejo, 09°02'52''S, 72°15'59''W, (♂), *Daly et al. 10342* (NY); Marechal Thaumaturgo, Rio Juruá, right bank, (♀), *Daly et al. 10519* (MO, NY); Xapurí, Reserva Extrativista Chico Mendes, Seringal Dois Irmãos, 10°56'S, 68°30'W, (♂), *Ehringhaus et al. 1011* (NY); Município de Rio Branco, estrada para Rio Branco-Porto Acre, km 33, (♀), *C. A. Cid Ferreira & Nelson 2870* (INPA, NY, MG, RB, U); Município de Mancio Lima, 07°25'S, 73°38'W, (♀), *C. A. Cid Ferreira et al. 10024* (INPA, NY); Mâncio Lima, Estrada do Isac a 18 km da cidade, 07°53'S, 72°45'W, (♀), *C. A. Cid Ferreira et al. 10735* (UFACPZ); Rio Branco, Universidade Federal do Acre, Parque Zoobotânico, (♂), *Figueiredo et al. 4* (UFACPZ); Rio Branco, Parque Zoobotânico da Universidade Federal do Acre, (♂), *Gaglioti & Pederneiras 150* (SP); Senador Guiomard, Reserva Experimental Catuaba, Trilha próximo ao acampamento, (♀), *Gaglioti et al. 155* (SP); Brasília, Serrungal Poromgaba, 25 km of km 4 Brassiléia-Assis road, 10°45'S, 68°45'W, (♀), *Henicka et al. 128* (INPA); Cruzeiro do Sul, (♀), *Marinho 273* (IAN); Cruzeiro do Sul, (♀), *O. P. Monteiro & C. Damião 477* (INPA, MG); estrada Rio Branco-Porto Acre, km 33, 09°58'S, 67°50'W, (♀), *Nelson 681* (BG, INPA, MG, MO, NY, R, RB); road Sena Madureira-Rio Branco, nr. km 7, (♂), *G. T. Prance et al. 7670* (A, GH, INPA, K, MG, M, NY, P, R, S, U, US) Jordão, Tarauaca. Seringal Fortaleza, Rio Tarauaca, foz do rio Jordão, (♀), *J. F. Ramos & C. Peres 2681* (INPA); Marechal Thaumaturgo, Reserva Extrativista do Alto Juruá, (♀), *Rivero et al. 620* (UFACPZ); Acrelândia, BR-364, km 85, fazenda do Sr. Natalício Gomes Silva, 09°57'27''S, 63°24'00''W, (♀), *Rivero et al. 270* (NY); Porto Acre, Bacia do Rio Purus, Reserva Florestal de Humaitá, (♂), *Silveira et al. 711* (NY, MO); Tarauacá, Bacia do Alto Juruá, Rio Tarauacá, margem esquerda, seringal Pacujá, colocação Jardim, 08°35'40''S, 71°08'36''W, (♀), *Silveira et*

al. 1180 (NY).—ALAGOAS: Murici, trilha da Grota da Russa, (♀), *Lyra-Lemos* 2725 (ALCB, MAC); Murici, Reserva de Murici, 09°14'S, 35°48'W, (♀), *Lyra-Lemos & Bayma* 5564 (MAC, RB).—AMAPÁ: Serra do Navio, Parque Natural Municipal do Canção, trilha de acesso para cachoeira, 00°54'13"S, 52°00'35"W, (♀), *Gaglioti et al.* 163 (SP); Macapá, Serra do Navio, (♀), *Rabelo* 332 (HAMAB, MG).—AMAZONAS: estrada de acesso, (♀), *Assunção* 87 (IAN, INPA, K); Manaus, Reserva Florestal Duke, (♀), *Assunção & A. C. Oliveira* 774 (INPA, K, MBM, MG); Manaus, Colosso, Fazenda Esteio, Km 23, (♀), *R. M. G. Cardoso & Setz* 70 (INPA); Manaus, Reserva Florestal Ducke, Manaus-Itacoatira, km 26, (♀), *M. A. S. Costa et al.* 7 (IAN, INPA, K, MG, MO, NY, RB, SP); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR 174, Km 64 depois 27 Km Leste na ZF3, Fazenda Esteio, (♀), *A. J. C. Ferreira et al.* INPA/WWF3209.958 (INPA); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR 174, (♀), *A. J. C. Ferreira et al.* INPA/WWF3209.2217 (INPA); Município de Jutai, Rio Solimões, margem direita, 02°43'S, 66°45'W, (♀), *C. A. Cid Ferreira* 8295 (F, HAMAB, INPA, JPB, K, NY); Manaus, Distrito Agropecuário, Reserva 1501, Km 41 da Smithsonian/INPA, 02°24'26"S, 59°43'40"W, (♀), *Freitas et al.* 319 (INPA); Município de São Paulo de Olivença, Igarapé Jandiatuba, (♀), *Fróes* 23873 (IAC, IAN); Manaus, Reserva Ducke, no começo da trilha do Portal, (♀), *Gaglioti & Pederneiras* 138 (EAFM, SP); Humaitá, near Calama, Madeira River region, (♀), *Krukoff* 1297 (G, K, NY, P, S, U); Basin of Rio Jurua, near mouth of Rio Embira, 07°50'S, 70°18'W, (♀), *Krukoff* 4817 (A, F, G, K, MO, NY, S, U, US); Municipality Humayta, near Tres Casas, (♀), *Krukoff* 6238 (B, BR, F, K, LE, MO, NY, RB, S, U, US); São Paulo de Olivença, Basin of Rio Solimões, near Palmares, (♀), *Krukoff* 8369 (A, B, BR, F, G, K, LE, MO, NY, P, U); São Paulo de Olivença, Creek Belem, (♀), *Krukoff* 8652 (A, BR, F, G, K, LE, MO, NY, P, S, U, US); Manaus, Estação Experimental de Silvicultura Tropical-ZF2, (♀), *Lemos* 35 (INPA); Município de Manaus, Distrito Agropecuário da SUFRAMA, BR-174, Km 72, 02°19'S, 60°05'W, (♀),

Mackenzie et al. INPA/WWF2206.2849 (INPA); Município de Manaus, Distrito Agropecuário da SUFRAMA, BR-174, Km 72, 02°19'S, 60°05'W, (♀), *Mackenzie et al. INPA/WWF2206.3005* (INPA); Município de Manaus, Distrito Agropecuário da SUFRAMA, BR-174, Km 72, 02°19'S, 60°05'W, (♂), *Mackenzie et al. INPA/WWF2206.3038* (INPA); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR 174, Km 64, Fazenda Porto Alegre, (♂), *Mars et al. INPA/WWF3304.3636* (INPA); Estação Ecológica de Mamirauá, (♀), *Mesquita 390* (INPA); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR 174, Fazenda Esteio, 02°26'S, 59°48'W, (♀), *J. R. M. Nascimento et al. INPA/WWF1302.541* (INPA); Manaus, Distrito Agropecuário da SUFRAMA, Rodovia BR 174, Fazenda Esteio, 02°26'S, 59°48'W, (♀), *J. R. M. Nascimento et al. INPA/WWF1302.2511* (INPA); rd. Humaitá to Labrea, km 80, between Rios Ipixuna and Itaparana, (♀), *G. T. Prance et al. 3260* (F, INPA, K, MG, NY, R, S, U, US); basin of Rio Demeni, nr. Totobi, (♀), *G. T. Prance et al. 10233* (C, G, INPA, K, MG, MO, NY, R, S, U, US); Manaus-Pôrto Velho rd. BR-319, km 175, between Rio Tupana and Rio Igapo-Açu, (♀), *G. T. Prance et al. 22803* (INPA, MG, MO, NY, R, U); Manaus, Ca 90 Km de Manaus, Distrito Agropecuário da SUFRAMA, Rodovia BR 174, Km 64, Fazenda Esteio, (♀), *A. P. Silva INPA/WWF1301.471.2* (INPA, NY); Manaus, Ca. 90 km N de Manaus, Distrito Agropecuário da SUFRAMA, Rodovia BR-174, km 64, Fazenda Esteio, (♀), *A. P. Silva INPA/WWF1301.473.2* (INPA); Manaus, 90 Km N de Manaus. Distrito Agropecuário da SUFRAMA, Rodovia BR 174, Km 64, depois 7 Km Leste na ZF3, Fazenda Porto Alegre, 02°22'S, 59°57'W, (♀), *C. F. Silva INPA/WWF3304.3867.2* (INPA); Manaus, Km 41, 02°24'26''S, 59°45'40''W, (♂), *Weiblen GW 1512* (MIN).—BAHIA: Una, Reserva Biológica do Mico-Leao (IBAMA), Ubaitaba, Ramal a esquerda na estrada Ubaitaba/Itacaré (♂), *Amorim et al. 426* (NY, GUA, NY); Fazenda Jaqueiral, (♂), *Amorim et al. 1999* (MBM, NY); Wenceslau Guimarães, Estação Ecológica, 13°34'45''S, 39°41'29''W, (♂), *Aona et al. 2374* (HUEFS, HURB); Ilhéus, Rodovia Camacan-Canavieira, (♀),

Belém & Magalhães 733 (HB, IAN, M, NY); unknown locality, (♀), *Bondar 238* (F); Água Preta, (♀), *Bondar 2161* (F); Água Preta, (♀), *Bondar 2169a* (SP); Água Preta, 13 Oct 1937 (♂), *Bondar s.n.* (GUA, SP40306); Rio das Contas, (♂), *Curran 19* (C, F, MO, NY, US); Mun. Itamarajú, Faz. Nova Pau-Brasil located on dirt road turning W at ca. 4 km N of junction of BR-101, 16°55'S, 39°35'W, (♀), *Kallunki et al. 580* (NY, SP, SPF); Litoral Sul, Ituberá, Assentamento Limoeiro, 13°57'13"S, 39°15'59"W, (♀), *Loureiro et al. 416* (ALCB); Itapetinga, estrada de Camacã para Canavieiro, (♀), *Magalhães & E. Pereira 733* (HB, M); Uruçuca, nova estrada que liga Uruçuca a Serra Grande, 14 km de Uruçuca, (♀), *Mori et al. 10046* (RB, U); Santa Terezinha, Serra da Jibóia, 12°52'10"S, 39°28'18"W, (♂), *M. L. C. Neves et al. 159* (HUEFS, SPF); Serra da Pedra Lascada, 13,7 Km de Barro Preto, 14°46'13"S, 39°12'10"W, (♀), *Paixão et al. 781* (HUEFS); Esplanada, Algodão, 12°10'S, 37°58'W, (♀), *Popovkin et al. 1517* (HUEFS); Litoral Sul, Wenceslau Guimarães, 13°41'S, 39°28'W, (♂), *Santana et al. 699* (ALCB); Uruçuca, 7.3 km N of Serra Grande on rd to Itacaré, (♀), *Thomas 7014* (NY); Porto Seguro, Parque Nacional Monte Pascoal, along road from park entrance to nature/conference center, 15°15'53"S, 40°34'29"W, (♀), *Thomas et al. 11345* (NY); Ilhéus, (♀ and ♂), *Velloso 723* (R).—CEARÁ: Serra de Baturité, (♀), *Huber MG238* (MG).—ESPIRITO SANTO: Conceição da Barra, Rod. BR 55Km de Morro Dantas, (♀), *Belém 1471* (IAN, MG, NY, U); Santa Teresa, Estação Biológica de Santa Lúcia, 25 Feb 1994 (♀), *Chamas & R. R. Santos 061.94* (GUA, MBML); Linhares, Reserva Florestal da CVRD, (♀), *Folli 2181* (GUA); Cariacica, Floresta na beira da estrada para a localidade de Alegre, 20°18'09"S, 40°28'55"W, (♀), *Forzza et al. 5049* (CEPEC, MBML, RB, UPCB); Cariacica, Localidade de Duas Bocas, Trilha do Pescador, 20°16'44"S, 40°28'42"W, (♂), *Fraga et al. 2293* (CEPEC, MBML, RB, UPCB); Município de Linhares, Reserva da Companhia Vale do Rio Doce, 19°15'29"S, 40°01'09"W, (♂), *Freire et al. 55* (ESA, SP); rd. BR-5 (BR-101), Morro-Danta, (♀), *Lanna-Sobrinho 1011* (GUA, IAN, K, U);

Santa Teresa, EBSL, trilha do Indaiá-açu, (♀), *A. F. P. Machado* 596 (R); Conceição da Barra, Distrito de Itaúnas, Faz. Boa Vista, 6-8 Km. de Itaúnas, (♀), *Martinelli & Soderstrom* 9705 (RB, SP); nr. Linhares, (♂), *T. S. Santos* 2035 (MG, NY, U); Santa Teresa, Estação Biológica de Santa Lúcia, (♀), *L. D. Thomaz* A2P63N1525 (SP); Estação Biol. Santa Lúcia, Sta. Teresa, (♀), *L. D. Thomaz* A1P72N1703 (SP).—MARANHÃO: Carutapera, Gurupiuna, Ka'apor Indian Reserve, affluent of Rio Gurupi. Forest inventory 6km from village, 02°43'S, 46°26'W, (♀), *Balée & B. Ribeiro* 2688 (K, NY); Carutapera, Mun. Carutapera. Gurupiuna, Ka'apor Indian Reserve, affluent of Rio Gurupi, affluent of Rio Gurupi, 02°43'S, 46°24'W, (♀), *Balée & B. Ribeiro* 2690 (K, MO); Carutapera, Gurupiuna, Ka'apor Indian Reserve, affluent of Rio Gurupi, 02°43'S, 46°24'W, (♀), *Balée & B. Ribeiro* 2759 (NY); Carutapera, Gurupiuna, Ka'apor Indian Reserve, affluent of Rio Gurupi, 02°43'S, 46°24'W, (♀), *Balée & B. Ribeiro* 2763 (NY).—MATO GROSSO: Alta Floresta, Adjacências do Hotel Floresta Amazônica, (♀), *Árbocz et al.* 3992 (ESA, MT, SP, UEC); Aripuanã, estrada para Fontanilha, 500 m do núcleo, (♀), *M. Gomes & Miranda* 326 (INPA); Novo Mundo, Reserva Particular do Patrimônio Natural, Lote Cristalino, 09°36'43"S, 55°57'07"W, (♀), *Henicka et al.* 128 (INPA, K); Sararé, (♀), *Pires & M. R. Santos* 16547 (MG, NY); Núcleo de Humboldt, (♀), *Roth* 36 (INPA); Novo Mundo, Reserva Particular do Patrimônio Natural (RPPN), trilha do Teles Pires, 09°36'40"S, 55°57'03"W, (♂), *Sasaki et al.* 1780 (INPA); Rio Juruena, Fontanilha, estrada para Aripuana, (♂), *M. G. Silva & Maria* 3236 (IAN, MG); Rio Juruena, estrada para Aripuana, km 5, (♂), *M. G. Silva & Maria* 3305 (IAN, MG, MO); Aripuanã, BR174, estrada para o aeroporto, (♂), *M. G. Silva & Rosário* 4750 (MG, NY).—MINAS GERAIS: Caratinga, Estação Ecológica de Caratinga, (♂), *P. M. Andrade & L. Lopes* 367 (BHCB, GUA); Carangola, Fazenda Santa Rita, (♂), *Carauta et al.* 7084 (GUA); Caratinga, Estação Biológica de Caratinga, (♂), *L. V. Costa et al.* 211 (GUA, MBM); Marliéria, Parque Florestal Estadual Rio Doce, (♀), *L. V. Costa* GUA42816 (GUA); Timóteo (♀), *França*

436 (HUEFS, UFMG); Descoberto, Reserva Biológica de Represa do Grama, (♀), *B. K. S. Franco et al.* 68 (CESJ, GUA); Belo Horizonte, Parque Estadual Rio Doce, Lagoa dos Aníbal, (♀), *J. P. Lanna-Sobrinho & Castellanos* 376 (GUA); Carangola, Fazenda Santa Rita, (♀), *Leoni & Berg* 3115 (HB); Marliéria, Parque Estadual do Rio Doce, Região do Vinhático Região do Vinhático, (♀), *W. P. Lopes* 536 (FUEL, VIC); Caratinga, Fazenda Montes Claros, (♂), *Nishimura* 24 (GUA); Caratinga, Fazenda Montes Claros, (♀), *Nishimura* 39 (GUA, U); Viçosa, (♀), *J. G. Kuhlmann* 2075 (US, VIC); Viçosa, 1936 (♀), *J. G. Kuhlmann RB2200* (RB); Muriaé, perto do Córrego Alegre, (♀), *Pirani et al.* 2524 (MBM, SP, SPF); Caratinga, Estação Biológica de Caratinga, 19 Nov 1987 (♂), *Rimoli GUA42698* (BHCB, GUA); Itambé do Mato Dentro, Distrito de Santana do Rio Preto, APA do Parque Nacional da Serra do Cipó, (♀), *M. F. Santos & L. M. Borges* 216 (SPF); Itambé do Mato Dentro, Distrito de Santana do Rio Preto, APA do Parque Nacional da Serra do Cipó, 19°25'54"S, 43°25'58"W, (♀), *M. F. Santos & Serafim* 234 (BHCB, SPF); Araugovic, Ad Riberæ bf. Arango, (♀), *Schwacke* 10393 (B, F, MO, P); Viçosa, Sítio Bomsucesso, (♂), *J. J. Souza* 262 (VIC); Belmiro Braga, Fazenda Nossa Senhora; borda do Rio do Peixe, 21°52'58"S, 43°25'33"W, (♀), *M. C. Souza et al.* 628 (RB).—PARÁ: Serra dos Carajás, Serra Norte, ca. 20 km N of Amza Exploration camp, 6°00'S, 50°15'W, (♀), *Berg et al.* 598 (K, MG, NY, U); km 1183 on the road Cuiabá-Santarém, (♀), *Berg et al.* BG772 (F, MG, MO, RB, S, U); Belém, Terreno do IPEAN, Beira da estrada que vai para o Cafezal, (♀), *E. Oliveira* 3141 (IAN); Breves, (♂), *Pires & N. T. Silva* 6663 (IAN, U); Belém, IPEAN, (♀), *Pires & N. T. Silva* 10822 (IAN); Belém, Reserva APEG, Q 183-6, (♀), *Pires & N. T. Silva* 11157 (IAN); Belém, IPEAN, Reserva Mocambo. Embrapa, (♀), *Pires & N. T. Silva* 11394 (IAN); Rio Itacaiunas, affluent of Rio Tocantins, Serra Buritirama, (♀), *Pires et al.* 12570 (IAN); Capanema-Maranhão rd . BR-22, km 96, (♀), *G. T. Prance & T. D. Pennington* 1777 (F, GH, IAN, K, NY, P, S, U, US); Tucuruí, Área de Desmatamento, margem direita PA-149, (♂), *J. Ramos* 824

(GUA, INPA, NY); Marabá, margem da estrada para o Rio Itacaiunas, Serra dos Carajás, (♀), *Rosa et al. 4649* (MG); Marabá, Reserva Florestal da Floresta Rio Doce CVRD, (♀), *Rosa et al. 4905* (MG); Marabá, Rio Doce, (♀), *Rosa et al. 5182* (MG); Santarém, km 70 da estrada do Palhao, ramal do Caetetu, (♂), *M. Silva et al. 2623* (G, K, MG, NY, S, U, US); Marabá, Serra Norte-Pojuca floresta com cipoal e tabocarana, Serra Dos Carajás, (♀), *M. F. F. Silva et al. 1547* (MG, R, UEC); Peixe-Boi, (♀), *Stone 58* (IAN).—PARANA: Guaraqueçaba, Reserva Natural de Salto Morato, (♂), *Cervi 6554* (UPCB); Jacarehy, (♀ and ♂), *Dusén 17345* (F, GH, K, NY, S); Município de Guaratuba, Pedra Branca do Araraquara, (♀), *Hatschbach 7411* (HB, MBM, R, U); Município de Guaratuba, Pedra Branca do Araraquara, (♂), *Hatschbach 7466* (MBM, US); Município de Guaratuba Rio da Divisa, (♂), *Hatschbach 12049* (F, K, MBM, UPCB); above Antonia, (♀), *Hatschbach et al. 13537* (F, K, MBM, NY, P, RB, U, US); Município de Guaraqueçaba, Rio Bananal, (♀), *Hatschbach 25765* (C, MBM, MO, NA, S, UC); Município de Guaraqueçaba, Rio Bananal, (♀), *Hatschbach 29129* (COL, MBM); Antonina, (♂), *Hatschbach 41736* (MBM); Guaraqueçaba, Serra Negra, (♂), *Ziller & Svolenski 578* (MBM); Guaraqueçaba, Serra Negra, (♀), *Ziller & Mashio 1391* (HSJRP, MBM).—PERNAMBUCO: Vicência, Serra do Jundiá, (♀), *Andrade-Lima 57–2834* (INPA, SP); Quipapá, Engenho Brejinho, (♀), *Andrade-Lima 67–4983* (F, NY, SP); São Vicente Férrer, (♂), *Ferraz et al. 750* (RB).—RIO DE JANEIRO: Horto Florestal, subindo a trilha a direita do Solar da Imperatriz, em direção ao Rio dos Macacos, (♀), *Botelho & Marquete 18* (F, IBGE, K, RB, SP); Tingua, (♂), *Brade et al. 18619* (GUA, RB, U); Mangaratiba, Vale do Rio Bugre, Base da Serra das Lages, 22°30'S, 42°15'W, (♀), *Carauta et al. 6303* (GUA, RB); Silva Jardim, Rebio Poço das Antas, trilha Rodolfo Norte, (♀), *C. M. B. Correia 393* (RB); Nova Iguaçu, Catanudo, picada para a Serra do Beco, (♀), *Farág et al. 167* (BR, RB); Parque Nacional da Tijuca, próximo a Escola Nacional de Botânica Tropical, (♂), *Gaglioti et al. 109* (SP); Serra da Estrella, nr. Mandioca, (♂), *Glaziou 12174* (C, E, K, P); Serra

da Estrella, nr. Mandioca, (♂), *Glaziou 20408* (C, P); Rio de Janeiro, (♂), *Glaziou 90488* (K, P); Paraty, Laranjeiras, Cachoeira das Pedras, caminho da Praia do Sono, (♀), *Konno et al. 397* (RB, SP); Angra dos Reis, Fazenda Japubyba, (♀), *M. Kuhlmann 2623* (SP); Silva Jardim, Reserva Biológica de Poço das Antas, Estr. Pará Juturnaiba, (♀), *H. C. Lima et al. 4862* (RB, SP); Silva Jardim, Reserva Biológica Poço das Antas, estrada para Juturnaiba, 22°33'00"S, 42°19'00"W, (♀), *H. C. Lima et al. 4974* (MG, RB, SPF); Mangaratiba, Vale do Rio do Bugre, base da Serra das Lajes, (♂), *C. Lopes & D. Lopes GUA45137* (GUA, RB); Silva Jardim, Reserva Biológica de Poço das Antas, estrada para Juturnaiba, 22°30'S, 42°15'W, (♀), *Luchiari et al. 26* (RB); Silva Jardim, Reserva Biológica de Poço das Antas, estrada para Juturnaiba, 22°30'S, 42°15'W, (♀), *Luchiari et al. 94* (RB); Silva Jardim, Reserva Biológica de Poço das Antas, estrada para Juturnaiba, 22°30'S, 42°15'W, (♀), *Luchiari et al. 297* (RB); Silva Jardim, Reserva Biológica de Poço das Antas, estrada para Juturnaiba, 22°30'S, 42°15'W, (♀), *Luchiari et al. 298* (RB); Silva Jardim, Reserva Biológica de Poço das Antas, estrada para Juturnaiba, 22°30'S, 42°15'W, (♀), *Luchiari et al. 299* (RB); Horto Florestal, subindo a trilha Solar da Imperatriz, (♀), *Macedo & Marquete 18* (F, IBGE, K, RB, SP); Paraty, Morro da Varzea, acesso pela Negra, (♀), *Marques et al. 311* (RB, SP); Silva Jardim, Poço das Antas, (♂), *Pessoa et al. 838* (RB); Mata do Teixeira Borges, Mata das Trez Barras na Gavea, (♀), *Pessoal do Horto Florestal 650* (RB); Mata dos Três Barros, Mata das Trez Barras na Gavea, (♀), *Pessoal do Horto Florestal 651* (RB); Mata do Teixeira Borges, perto da Sede do Horto Florestal, (♀), *Pessoal do Horto Florestal 1648* (RB); Rio de Janeiro, (♂), *Riedel 160* (P); Nova Iguaçu, Macuco, (♀), *Somner et al. 789* (GUA, R, RB); Silva Jardim, Reserva Biol. de Poços das Antas, caminho para a posse do Sr. Aristides, 22°38'S, 42°15'W, (♀), *Sylvestre et al. 1028* (RB).—RONDÔNIA: Rio Madeira, Calama, (♀), *Goulding 1407* (MG); Costa Marques, Resex do Caltário, terreno do Sr. Cuiabano, (♀), *Lobato et al. 1155* (MG); Presidente Médici, RO 429, Km 110, (♀), *M. G. Silva 6571* (IAN, INPA, MG,

RB); Mineração Campo Novo, 100 km SW of Ariquemes, 10°34'S, 63°32'W, (♀), *Zarucchi et al.* 2744 (INPA, NY).—RORAIMA: Rio Catrimani, (♀), *Pires 15088* (IAN); Serra Tepequem, on upper west facing slopes, (♀), *G. T. Prance et al. 4438* (G, INPA, K, M, NY, P, R, S, U, US); Indian trail Surucucu-Uaicá, near Uaicá airstrip, Rio Uraricoeira, 02°53'N, 63°36'W, (♀), *G. T. Prance et al. 10836* (F, GH, INPA, K, M, MG, NY, P, R, S, U); between Botamatatedi and Maitá, 05°33'N, 63°36'W, (♀), *G. T. Prance et al. 13579* (F, INPA, NY, U, US).—SANTA CATARINA: Brusque, (♀), *Klein 89* (US); Blumeneau, (♀), *Klein & L. B. Smith 1110* (NY, S, UC, US); Ascurra, Ilze Grande, 27°00'00"S, 49°19'14"W, (♀), *Korte & Kniess 2473* (FURB, SP); Brusque, (♀), *Velloso 89* (RB); nr. Blumeneau, (♀), *Ule 991* (F, HGB, P, US); Blumeneau, Parque Natural Municipal São Francisco de Assis, (♀), *Verdi 3615* (FURB, SP).—SÃO PAULO: Sete Barras, Parque Estadual Carlos Botelho, (♀), *Custódio-Filho 26879* (SP); Mun. Ubatuba, P. Est. Serra do Mar, Picinguaba, estrada da Farinha, (♂), *Furlan et al. 910* (HRCB, SP); Mun. Ubatuba, P. Est. Serra do Mar, Picinguaba, estrada da Farinha, (♂), *Furlan et al. 1037* (GUA, HRCB, SP, UEC); Mun. Ubatuba, Picinguaba, estrada da Farinha, (♂), *F. C. P. Garcia et al. 253* (GUA, HRCB, SP); Mun. Ubatuba, Picinguaba, trilha ao lado do Rio Picinguaba, (♀), *F. C. P. Garcia et al. 328* (HRCB, SP); Estação Ecológica Juréia-Itatins, trilha para a cachoeira do Salto, (♀), *R. J. F. Garcia et al. 1892* (PMSP, SP); Ubatuba, (♀), *Gentry et al. 49346* (BG); Pariquera-Açu, Parque Estadual Pariquera-Açu, (♂), *Godoy et al. 57* (ESA, MBM, SPSF, SP, UEC); Estação Experimental do Instituto Agrônomo, 24°36'30"S, 47°52'37"W, (♂), *Ivanauskas 471* (ESA, HRCB, UEC); Sete Barras, bairro Rio Preto, 24°12'11"S, 47°52'12"W, (♀), *Ivanauskas et al. 5004* (ESA, SPSF); Ubatuba, Parque Estadual da Serra do Mar, Núcleo Picinguaba, Trilha do Corisco, (♀), *Kurt 13* (SP, SPF); Ubatuba, Picinguaba, trilha da Casa da Farinha, 23°21'09"S, 44°51'10"W, (♀), *Leitão-Filho et al. 34726* (ESA, SP, UEC); Ubatuba, Patrimônio, (♀), *Leitão-Filho et al. 34775* (SP, UEC); Cananéia, Ilha do Cardoso, Ipanema, Morro das Pedras, (♀), *M. M.*

R. F. Melo 593 (SP); Ubatuba, Picinguaba, trilha do Carrasco, (♀), *Morais et al. 29316* (PMSP, SP, UEC); Ubatuba, Núcleo Picinguaba, margens do Rio da Fazenda, (♀), *Pedroni et al. 31191* (UEC); Ubatuba, Picinguaba, Trilha do Palmital, Atrás do alojamento, (♀), *Romero-Castañeda et al. 389* (HRCB, SP); Iguape, (♀), Estação Ecológica Juréia-Itatins, trilha para o pocinho, (♀), *Rossi et al. 805* (SPSF, SP); Pariquera-Açu, Estação do IAC, 24°36'30"S, 47°53'06"W, (♀), *Sakai et al. 33375* (ESA, HRCB, PMSP, SP, SPF, UEC); Ubatuba, Estação Experimental do Inst. Agrônômico de Campinas, (♂), *A. F. Silva 9173* (UEC); Ubatuba, Estação Experimental do Inst. Agrônômico de Campinas, (♀), *A. F. Silva 9174* (UEC); Pariquera-açu, Parque Estadual do Pariquera, Morro do Carrapato, (♂), *Sztutman 54* (ESA, SP); Ubatuba, Picinguaba, trilha do Corisco, 23°20'S, 44°49'W, (♂), *Toniato et al. 30149* (HRCB, SP, UEC). **Colombia.** UNKNOWN DEPARTMENT: without date (♂ and ♀), *Triana s.n.* (E, P).—AMAZONAS: Leticia, Parque Nacional Natural Amacayacu, Parcela permanente de Amacayacu, (♀), *J. S. B. Silva et al. 2163* (COAH, SP); Município Leticia, corregimiento Palmeiras, 03°47'N, 70°18'W, (♀), *Santafé F. et al. 553* (COL).—META: Villavicencio, Vereda de Puerto Colombia, (♂), *H. Garcia et al. 168* (COL); La Macarena, margen derecha del Río Guayabero, (♀), *Idrobo et al. 8641* (COL); Villavicencio, vereda Puerto Colombia, Agrícola El Naranjal, (♀), *L. Sanchez et al. 262* (COL).—VAUPES: Taraira, estación Biológica Mosiro Itajura, 01°04'21"S, 69°31'29"W, (♀), *Clavijo-R. et al. 1082* (COAH, COL). **Ecuador.** MORONA-SANTIAGO: Puerto Morona, en río Morona, 02°52'S, 77°41'W, (♂), *Little Jr. et al. 503* (COL, LOJA, QAME, US).—NAPO: Lago Agrio, Dureno, Comunidad Indígena Cofán, 00°02'S, 76°42'W, (♀), *Cerón 261* (MO); Río Pucino, first major tributary of Rio Aguarico, above bridge at Aguarico, (♀), *Gentry 9824* (MO, NY, U); La Joya de los Sachas Canton Pompeya, Carretera MAXUS Km 3.9, 00°25'S, 76°37'W, (♀), *Gudiño et al. 2150* (COAH, MO, NY, QCNE); La Joya de Los Sachas, Pompeya, 00°25'S, 76°37'W, (♀), *Gudiño et al. 2195* (COL); La Joya de Los Sachas, Parque Nacional Yasuni, Río Indillama, entre

la desembocadura al Río Napo, 00°25'S, 76°37'W, (♀), *Gudiño et al. 2308* (NY); Río 8 km below Puerto Mishualli, (♀), *Neill & Palacios 7082* (BG, NY).—ORELLANA: Parque Nacional Sumaco, 00°24'S, 77°23'W, (♂), *A. Dik et al. 1745* (NY); Parque Nacional Yasuni, Pozopetrolero Amo 2, 00°57'S, 76°13'W, (♀), *Palacios 2340* (BG, NY, QAME, QCNE); El Chaco Canton, margen derecha del Río Quijos, 00°08'S, 77°30'W, (♂), *Palacios 6101* (F, MO, QCNE); Yasuni National Park, forest along the Tiputini river, (♀), *Pitman & Delinks 26244* (MO); Estación Científica Yasuní, Río Tiputini, 00°38'S, 76°30'W, (♂), *Villa & Alvia 893* (F).—PASTAZA: Pastaza, Pozo Villano 2 de Arco, 2 km del Pueblo de Villeno, 01°25'S, 77°20'W, (♀), *Tipaz et al. 436* (MO).—SUCUMBIOS: Lago Agrio, Reserva Cuyabeno, 00°22'S, 75°45'W, (♂), *Palacios et al. 9499* (NY).—ZAMORA-CHICHIPE: Nangaritza Cantón, Miazi, flood plain forest along Rio Nangaritza. Transect, 04°18'S, 78°40'W, (♂), *Gentry 80659* (F, MO). **French Guiana.** UNKNOWN DISTRICT: unknown locality and date, (♀), *Martin F639189* (F); unknown locality and date, (♀), *Richard s.n.* (P); unknown locality and date, (♀), *Triana s.n.* (P).—CAYENNE: Cayenne, Paul Isnard region, 5 km of Citron, (♀), *Granville 5284* (P, U); Rivière Comté, à Cacao, (♀), *Hallé 1132* (P, U); Piste de St Elie ECEREX, Parcelle PSE3B, (♀), *Prévost 4783* (BG, CAY, U).—SAINT-LAURENT-DU-MARONI: nr. Saül, (♀), *Granville et al. B5071* (P, U); Saül, Monts La Fumée, (♂), *Keller & Boeke 14940* (P); nr. Saül, (♀), *Moretti 102* (CAY); Saül, Vicinity of Eaux Claires, on the Sentier Botanique, 03°37'S, 53°12'W, (♂), *S. A. Mori et al. 22035* (NY, P); Comté R., ca. 60 km S of Cayenne, (♀), *Oldeman 1179* (CAY, P, U); Saül, (♀), *Oldeman B4108* (CAY, NY, P, U); Kourou, without date (♀), *Richard s.n.* (P); Saül, envon du village Layon da Reservar, (♀), *Riera 983* (CAY); Mont Galbao W-WSW Saül, 03°37'N, 53°12'W, (♀), *Wallnöfer & Tarin 13488* (NY). **Guyana.** UNKNOWN REGION: unknown locality, without date (♀), *Richard s.n.* (P).—BARIMA-WAINI: Barama River, North-West District, 07°22'30"N, 59°42'30"W, (♂), *Andel 589* (U).—CUYUNI-MAZARUNI: Pakaraima Mts., just N of Paruima Mission, 05°48'N, 61°01'W, (♀),

Maas et al. 5858 (NY, U).—ESSEQUIBO ISLANDS-WEST DEMERARA: Kurumaikabra Creek, Essequibo R., (♀), *Forest Department British Guyana (FD) 1011* (FHO); Boerasirie area, 5-25 miles West Georgetwn, S. bank of Bonasika River, (♀), *E. L. Little Jr.* 16953 (NY); basin of Shodikar Creek, tributary of Essequibo R., (♀), *A. C. Smith* 2845 (A, F, G, MO, NY, P, S, U, US).—UPPER DEMERARA-BERBICE: between Demarara R. and Berbice R., (♀), *Cruz* 1657 (F, MO, NY, US).—UPPER TAKUTU-UPPER ESSEQUIBO: Takutu Creek to Puruni R., Mazaruni River, (♂), *Fanshawe F2050* (A, F, NY, U, US); Iramaipang, Kanuku Mts, (♂), *Forest Department British Guyana (FD) 5936* (NY); Essequibo River, W Bank, 02°20'N, 58°22'W, (♂), *Henkel et al.* 3251 (NY, U); Kanuku, High forest along creek, 03°08'N, 59°23'W, (♀), *Jansen-Jacobs et al.* 339 (NY); Marudi, along trail from Norman Mines camp to Aishalton, (♂), *Stoffers* 265 (U); Marudi Mts., along trail from Norman Mines, 02°15'N, 59°10'W, (♀), *Stoffers et al.* 311 (F, MG, NY, RB, P, U); Marudi Mts., 02°15'N, 59°10'W, (♀), *Stoffers et al.* 312 (NY, U). **Peru.** AMAZONAS: Quebrada Kayamas, Lugar Cenepa, 720 ft, (♀), *Ancuash* 178 (F, GH, MO); Río Santiago, 3 km atrás de la comunidad Caterpiza, (♀), *Huashikat* 1136 (MO); Río Santiago, nr. Caterpiza, (♀), *Huashikat* 1216 (BG, MO); Río Cenepa, (♂), *Kayap* 268 (F, GH, MO); Río Cenepa, (♀), *Kayap* 393 (F, GH); Quebrada Huampami, (♀), *Kayap* 1057 (F, GH, MO, NY); Bagua, Imaza, Comunidad de Yamayakat, 05°03'24''S, 78°20'17''W, (♀), *R. Vásquez et al.* 24800 (F); between Monzón and Rio Huallaga, (♀), *Weberbauer* 3639 (F, G).—CAJAMARCA: San Ignacio, Huarango, Localidad de Pisaguas, 05°14'52''S, 78°38'03''W, (♀), *J. Campos et al.* 6561 (F); Yanomono, Explorama Tourist Camp, 03°28'S, 72°50'W, (♀), *Gentry et al.* 61624 (NY).—CUZCO: Quispicanchi Province, Quamanti, Maniri, 13°17'S, 70°48'W, (♀), *Timaná* 1032 (MO).—HUÁNUCO: Tingo Maria, (♀), *Asplund* 13020 (A, G, R, S, US); Pachita, Codo de Pozuzo, 09°40'S, 75°25'W, (♂), *R. B. Foster* 9373 (BG, F, NY); Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'00''S, 75°02'00''W, (♀), *Kröll* 764 (NY); Distr. Churubamba, Rio Cayumba, (♀), *Mexia*

8172 (F, G, GB, GH, MO, NA, NY, S, U, UC, US); Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'00"S, 75°02'00"W, (♂), *Tello 278* (MO, NY).—LORETO: Prov. de Maynas, rio Yuvineto, affluent du rio Putumayo, (♀), *Barrier 112* (NY, P, US); Province of Coronel Portillo, Dist. Calleria, rd. Pucallpa-Huánucok, km 34, (♂), *Castillo S. 11* (DUKE, F, P, US); Quebrada Shanuce, above Yurimaguas, (♀), *Croat 18016* (F, MO, NY); Río Napo, Caserio Bella Vista, (♂), *Croat 20616* (C, DUKE, F, GH, MO, MIN, NA, NY); Río Manítí, afluyente derecho do rio Amazonas, (♀), *Encarnación E-1038* (NY); Río Manítí, afluyente derecho do rio Amazonas, (♀), *Encarnación E-1062* (NY); Maynas, Mishana, Río Nanay halfway between Iquitos and Santa Maria de Nanay, (♀), *Gentry & Emmens 39001* (MO); Maynas, Negro Urco, Río Napo, (♀), *Gentry & Emmens 39663* (MO); Pongo de Manseriche, nr. mouth of Río Santiago, (♂), *Mexia 6201* (F, G, GB, GH, MO, NY, S, U, UC, US); Alto Amazonas, Yurimaguas, carretera del caserio Munich, (♂), *Rimachi Y. 2986* (NY); Alto Amazonas, Manseriche, Pongo de Manseriche, (♀), *Rojas et al. 640* (F); Calleria, Km 34 Carretera Pucallpa-Huánuco, distr. Calleria, prov. Cnl. Portillo, (♂), *Sallas 11* (MO, NY, P); Alto Amazonas, Shucushuyacu, Río Huallaga, (♀), *R. Vásquez & N. Jaramillo 2396* (MO); Maynas, Pto Almendras, Río Nanay, (♀), *R. Vásquez & N. Jaramillo 3627* (MO, NY).—MADRE DE DIOS: Tabuamanu, Iberia, (♀), *Alfaro 1696* (MO); Manu, Cerro de Pantiacolla, Rio Palotoa 10-15 km NNW of Shintuya, 12°35'S, 71°18'W, (♀), *R. B. Foster et al. 10674* (F); Manu, Parque Nacional del Manu, above Rio Sotileja, 11°38'S, 71°54'W, (♀), *R. B. Foster et al. 11758* (F); km 34 de la carretera Pucallpa-Huánuco, (♀), *Salas s.n.* (MO-2980772); Manu, Cocha Casho, (♂), *Nunêz 1846* (F); Manu, Cocha Casho, (♂), *Vargas C. et al. 1846* (F); Cocha Cashu, Manu National Park, 12°00'41"S, 71°45'42"W, (♀), *Weiblen GW 1462* (INPA, MIN).—PASCO: Quebrada Alcantarilla, 09°50'S, 68°00'W, (♀), *Hartshorn et al. 2684* (F); Oxapampa, Palcazu Valley, Iscozacín, 10°12'S, 75°15'W, (♀), *R. B. Foster 7995* (F, NY); Oxapampa, Valle del Pichis, Reserva Musmuqui Nuevo Hoboken, Puerto Bermudez, (♀), *R. B.*

Foster & Wright 8033 (F, MO, NY); Central Selva, Cerro de Pasco Department, 09°50'S, 68°00'W, (♀), *Hartshorn et al. 2862* (F, MO); Oxapampa, Dist. Palcazú Estación Biológica Paujil, 10°20'19"S, 75°15'16"W, (♀), *Revilla N. et al. 334* (NY).—SAN MARTIN: Rioja-Pomacochas road, below Venceremos, ca. 20 km of Rioja, 05°45'S, 77°38'W, (♀), *Gentry & D. N. Smith 45160* (BG, MO, NY); Maynas Alto, without date (♀), *Poeppig s.n.* (B, OXF); unknown locality and date (♂), *Poeppig s.n.* (LE, P); San Martin, Laguna Sauce, (♀), *L. Ramírez V. & Sotero N. 52* (F); Prov. Mariscal Caceres, Dtto. Tocache, en el camino al caserío de Almendras, (♀), *J. Schunke V. 3309* (F, G, US); Mariscal Caceres, Campanilla, (♀), *J. Schunke V. et al. 3552* (F); rd. to Shunthé, E of Puente de Palo Blanco, (♀), *J. Schunke V. et al. 7415* (MO, NY, U). **Suriname.** SIPALIWINI: Vicinity of Blanche Marie Waterfall on Nickerie River, 04°45'30"N, 56°52'50"W, (♀), *Evans et al. 2438* (COL, INPA, IAN, RB); Vicinity of Blanche Marie Waterfall on the Nickerie River, along the entrance road to the Blanche Marie Guest House, (♀), *Miller et al. 9236* (U).—MAROWIJNE: Raleigh falls, base of Voltzberg, Nature Reserve on the Coppename R., (♀), *Mori & Boom 8662* (NY, U). **Venezuela.** AMAZONAS: 60 km al NE de el Palmar, (♂), *Aymard et al. 5390* (NY); Río Orinoco, cerca márgens del río, (♂), *Cruxent et al. 306* (NY); Río Orinoco, cerca márgens del río, (♂), *Cruxent 307* (NY); Río Orinoco, cerca márgens del río, (♂), *Cruxent 308* (NY); Rio Negro, 7 km aguas arriba del río Orinoco, 02°26'N, 65°59'W, (♀), *C. Marín 1463* (NY); Sierra Parima, (♀), *Steyermark 106086* (NY); Parima Mts., nr. Simarawochi, Río Matacuni, (♂), *Steyermark 107154* (F, U, VEN); between Amazonas and Bolívar, 04°45'30"N, 65°52'50"W, (♀), *Zent 1489* (MO).—BOLÍVAR: Raul Leoni, 64 km al SE de Piliguaos, 06°09'N, 66°23'W, (♀), *Delgado 363* (NY); Piar, SW slope of Amaruay-tepui, (♀), *Holst & Liesner 27191* (COL); slopes of Quebrada O-paru-má, between Santa Teresita de Kavanayén and Rio Pacairao, (♀), *Steyermark 60407* (F, VEN); Río Nichare, near the confluence with Río Cicuta, (♀), *Steyermark & Gibson 95711* (NY, VEN);

Roscio, 32,5 km NE of Santa Klena de Uairén, (♂), *Steyermark & Liesner 127608* (MO).—
DELTA AMACURO: Delta Amacuro, Este de Rio Grande, Este-Noreste de El Palmar, (♀), *Berti 471* (NY, VEN); Delta Amacuro, Este de Rio Grande, Este-Noreste de El Palmar, (♀), *Berti 611* (F, NY, VEN).

The first taxonomic confusion in *Pourouma guianensis* (type species of the genus) might be attributed to Aublet (1775: 892) that described the leaves with adaxial lamina surface smooth "laevis" from staminate material.

During our visit to the herbarium of the Natural History Museum (BM), we verified that the holotype (Aublet s.n.) presents the adaxial lamina surface scabrous, as well as, all specimens of *Pourouma guianensis* investigated in this revision.

From the information of Aublet (1775: 892), other authors (e.g., Trécul 1847) described new species (e.g., *P. acutiflora*) with adaxial lamina surface scabrous.

Furthermore, the great number of synonyms (ten) included in *Pourouma guianensis* might be associated to the heterophyllous, dioecious character, wide distribution, and phenotypic plasticity within populations of this species, mainly by density of indument.

Our molecular analyses results (Chapter 1, Fig. 5) of three accessions (Gaglioti et al. 109, Gaglioti et al. 163, and Weiblen 1512) from three different places (Amapá, Amazonas, and Rio de Janeiro) of *Pourouma guianensis* indicated that these specimens belong to the same species (BP = 100, PP = 1.00). These results corroborated with the diagnostic character of this species, which are: adaxial lamina surface scabrous, staminate inflorescence in fascicles, staminate flowers with tepals free or basally connate, and fruiting perianth with indument velutinous to strigose. Furthermore, the molecular analyses provided a strong support to *Pourouma guianensis* more closely related to *P. scobina* (BP = 91, PP = 1.00).

Morphologically, these species show similarities, due to the staminate inflorescences in fascicles, staminate flowers with tepals free or basally connate, adaxial lamina surface scabrous, and usually palmatilobed lamina, but *Pourouma guianensis* distinguished from *P. scobina* by leafy twigs with indument hirsute to hirtellous or velutinous (versus sericeous to strigose), abaxial lamina surface with indument hirtellous to velutinous, (versus sericeous to strigulose), and stipules glabrous inside (versus with indument dense, yellowish, hirsute).

Pourouma venezuelensis was considered by Berg & Heusden (1988: 107) as a subspecies of *P. guianensis*. However, *Pourouma guianensis* is distinct from *P. venezuelensis* by leafy twigs with indument hirsute to hirtellous or velutinous (versus with indument villous), stipules glabrous inside (versus with indument dense, yellowish, sericeous to hirsute), and fruiting perianth 1–1.8 cm long (versus fruiting perianth 2–2.5 cm long).

20. *Pourouma herrerenis* C.C. Berg, *Candollea* 44(2): 513. 1989; Berg, Akkermans & Heusden, *Fl. Neotrop. Monogr.* 51: 190. 1990.—TYPE: PERU. Loreto: Province of Requena, Jenaro Herrera, Reserva Forestal, Spécimen récolté dans le cadre de la convention CJBG-IC-IIAP au Centre de Recherche de Jenaro Herrera, tree 4/122, 04°55'S, 73°45'W, 2 Oct 1985 (♂), *Spichiger & Loizeau 1995 (=3034)* (holotype: G!; isotypes: BG! F! NY!).

Tree, 9–25 (–28) m tall, 15–30 cm d.b.h. Leafy twigs 3–8 mm in diameter, with indument yellowish, hirtellous to hirsute, and whitish, strigose; internode 5–20 mm long. Lamina entire, (5.5–) 6.5–20 (–21.5) cm long, (2.5–) 3.5–12 (–13.5) cm wide, length:width ratio 1.3–2.4, elliptic, oblong to ovate, coriaceous; base acute, obtuse to rounded; margin usually repand, with

indument yellowish, hirsute to hirtellous; apex acuminate; adaxial surface scabrous to scabridulous or smooth, with indument yellowish to whitish, hirsute to strigose to strigulose, indument of veins yellowish to whitish, hirsute to hirtellous; abaxial surface smooth, yellowish to whitish, hirsute to hirtellous; venation brochidodromous; secondary veins 9–14 pairs per leaf, basal pair unbranched or branched, diverging from the midrib at an 30°–50°; tertiary and quaternary veins slightly prominent to prominent, with whitish, arachnoid indument confined to the areoles; petiole (3–) 4–16.5 (–18.5) cm long, with indument yellowish, hirsute and whitish, strigulose, domatia absents; stipules 3.5–13.5 cm long, with indument yellowish, hirsute, minutely whitish, puberulous to strigose and brownish, multicellular trichomes outside, with indument whitish to yellowish, sericeous to puberulous inside, caducous. Staminate inflorescences (5.5–) 7–10 (–11.5) cm long, 2.5–8.5 (–9.5) cm wide, primary branched 3–4; peduncle 2–6.5 cm long, peduncle and branches with indument yellowish to whitish, strigulose to hispidulous to velutinous on the ultimate branches; flowers ca. 250–950, flowers organized in 12–58 glomerules; glomerule 5–8 mm in diameter, ca. 20–60 flowers per glomerule. Staminate flowers 1.8–2 mm long, 0.8–1 mm wide; sessile or subsessile; perianth 1–1.2 mm long, 0.8–1 mm wide, urceolate, tepals connate, with indument dense, yellowish, hirsute and whitish, arachnoid indument; stamens 4, filaments 1.2–1.5 mm long, free, filaments exceeding the perianth. Pistillate inflorescences 4.5–7 (–8) cm long, 1.5–2.5 (–3.5) cm wide; peduncle 2–4.5 (–6) cm long, peduncle and branches with indument yellowish to whitish, strigulose to hispidulous to velutinous and brownish, multicellular trichomes on the ultimate branches on the ultimate branches; flowers (6–) 8–20 (–25), flowers organized in 2–6 cymes. Pistillate flowers 4–6 mm long, 2–4 mm wide; pedicel 2–4 mm long; perianth 3–5 mm long, with indument yellowish, velutinous; stigma peltate, 1.2–2 mm in diameter, with indument yellowish, velutinous. Infructescences (7–) 8.5–16.5 (–18) cm long, (3.5–) 4.5–10 (–11.5) cm wide; peduncle 4–9 cm

long; fruiting pedicel 5–12 mm long. Fruiting perianth 1.2–2 cm long, 8–12 mm wide, ovoid to ellipsoid, vinaceous to black, with indument yellowish, velutinous. Achene 1–1.5 cm long, 5–10 mm wide. Seed 6–10 mm long, 3–5 mm wide, ovoid, vinaceous. Fig. 8 E; Fig. 15 B.

Additional illustrations. Berg (1989: 514); Spichiger *et al.* (1989: 71).

Phenology. Staminate flowers collected from July to November, pistillate flowers from August to September and fruits from September to April.

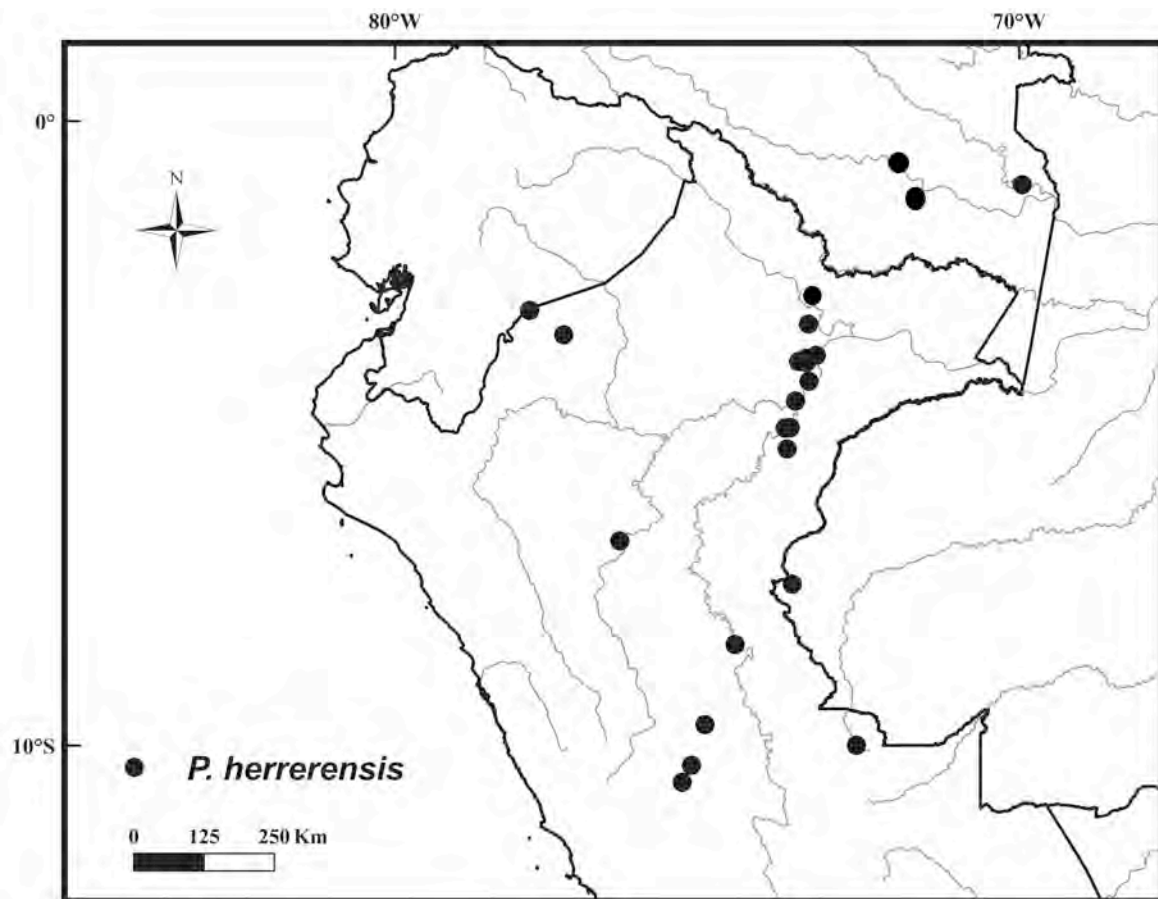


FIG. 51. Distribution of *Pourouma herrerensis*.

Distribution (Fig. 51). Northwest of Brazil (Acre), south of Colombia (Amazonas, Caquetá and Vaupes), central-east and northeast of Peru (Amazonas, Huánuco, Junin, Loreto, Pasco, San

Martin and Ucayali), in primary “terra firme” forest of the Amazonian region, often in riparian forest, in lowland moist area, at an elevation of about 120 to 400 m above sea level.

Vernacular Name. Sirpo (Colombia, Antioquia); chirocai (Colombia, Caquetá); sirpo (Colombia, Santander); suir shuina (Peru, Amazonas); sacha uvilla (Peru, Huánuco); shiwantoqui (Peru, Junin); sacha uvillas (Peru, Loreto); tacona blanca (Peru, Pasco); uvilla (Peru, San Martin).

Etymology. The epithet is a tribute to type locality, Jenaro Herrera District (Peru, Loreto).

Use. Edible fruits.

IUCN conservation status. *Pourouma herrerensis* is widely distributed with the extent of occurrence of ca. 546,820 Km². *P. herrerensis* is also, well represented in herbaria. For these reasons *P. herrerensis* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** ACRE: Mâncio Lima, Margem direita do Rio Moa, Fazenda Arizona, (♀), *C. A. Cid Ferreira et al. 5318* (INPA, NY). **Colombia.** AMAZONAS: Araracuara, Carretera CEA-Puerto Arturo, Paso de la Frijolara, (♂), *Brand 1573* (COAH).—CAQUETÁ: Solano, río Caquetá, Araracuara, rastrojo de 11 años, (♀), *Vester 143* (COAH).—VAUPES: Taraira, estación biológica Mosiro Itajura, Caparú, 01°00’S, 69°00’W, (♂), *D. Cárdenas L. et al. 6104* (COAH). **Peru.** AMAZONAS: Río Santiago, near Caterpiza, 03°50’S, 77°40’W, (♀), *Tunqui 296* (BG, MO); Río Santiago, 2 km atrás de la comunidad Caterpiza, (♀), *Huashikat 944* (MO, U); Río Santiago, 1 km atrás de la comunidad Caterpiza, (♀), *Huashikat 1027* (BG, MO).—HUÁNUCO: Dtto. Yuyapichis, Prov. Puerto Inca, 09°40’S, 75°02’W, (♂), *Tello 713* (NY).—JUNIN: Satipo Prov., Gran Pajonal, trail to Pajonal Panquerete, south of Chequitavo, 10°45’S, 74°23’W, (♂), *D. N. Smith 5134* (F, MO, NY).—LORETO: Maynas, Alpahuayo, Iquitos, (♀), *Ayala 4464* (NY); Province of Requena, Jenaro Herrera, Aug-Sep 1976 (♂), *Bernardi s.n.*

(BG); Province of Maynas, Rio Nanay, Puerto Almendras, (♂), *Gentry et al. 15621* (BG, MO); Province of Requena, Jenaro Herrera, Río Ucayali below Requena, (♀), *Gentry et al. 21346* (F, MO, NY, U); Maynas Province, Puerto Almendras, Nuevo San Juan, Quebrada Tamshiyacu, 04°10'S, 73°22'W, (♂), *Grández et al. 1917* (MO); Carretera Nauta-Iquitos, 04°29'S, 73°35'W, (♂), *Grández & Ruíz 2164* (MO); Maynas Province, Distrito Iquitos, Puerto Almendras-UNAP, 03°48'S, 73°25'W, (♂), *Grández et al. 2863* (MO); Maynas Province, Distrito Iquitos, Aucayo, Caserio Unión, 03°41'S, 72°49'W, (♀), *Grández et al. 2916* (MO); Maynas, Distrito Iquitos, Puerto Almendras-UNAP, 03°48'S, 73°25'W, (♂), *Grández et al. 4585* (F, MO, NY); Maynas Province, Distrito Iquitos, Puerto Almendras-UNAP, 03°48'S, 73°25'W, (♂), *Grández et al. 4607* (MO); Prov. Maynas, Puerto Almendras, W. of Iquitos, (♀), *P. J. M. Maas et al. 6267* (BG, U); 6 km al NE del Centro Florestal Jenaro Herrera, margen derecha rio Ucayali, (♀), *Spichiger & Encanación 1029* (G, MO, NY); 6 km al NE del Centro Florestal Jenaro Herrera, margen derecha rio Ucayali, (♂), *Spichiger & Loizeau 1996* (BG, G); 6 km al NE del Centro Florestal Jenaro Herrera, margen derecha rio Ucayali, (♂), *Spichiger & Loizeau 1997* (BG, G); 6 km al NE del Centro Florestal Jenaro Herrera, margen derecha rio Ucayali, 04°55'S, 73°45'W, (♂), *Spichiger & Loizeau 1998 (=3033)* (BG, G, NY); 6 km al NE del Centro Florestal Jenaro Herrera, margen derecha rio Ucayali, (♀), *Spichiger & Loizeau 1999* (BG, G); Prov. Maynas, Pto. Almendras, Río Nanay, above Iquitos, 03°50'S, 73°25'W, (♂), *R. Vásquez & N. Jaramillo 167* (BG, F, NY); Prov. Maynas, Pto. Almendras, Río Nanay, above Iquitos, 03°45'S, 73°15'W, (♀), *R. Vásquez & N. Jaramillo 2623* (BG, MO); Prov. Maynas, Mishana, Rio Nanay, 03°51'S, 73°32'W, (♀), *R. Vásquez et al. 7535* (BG, F, MO, NY); Prov. Maynas, Iquitos, Puerto Almendras, Río Nanay, 03°45'S, 73°25'W, (♀), *R. Vásquez & N. Jaramillo 8676* (MO, NY); Maynas, Iquitos, Pto. Almendras, 03°48'S, 73°25'W, (♂), *R. Vásquez & N. Jaramillo 9490* (MO, NY); Maynas Province, Puerto Almendras, Río Nanay, 03°48'S, 73°25'W, (♀), *R. Vásquez et al. 13030* (MO);

Manay, Allpahuayo reserve of IIAP, ca. 30 km outside Iquitos along road Iquitos-Nauta, (♀), Werff & Vásquez 13845 (MO); Lower Rio Huallaga, (♂), LI. Williams 4688 (F).—MADRE DE DIOS: Manu, Parque Nacional del Manu, (♀), R. B. Foster 5791 (F).—PASCO: Oxapampa, Parque Nacional Yanachaga Chemillén, Estación Biológica Paujil, (♂), Monteagudo et al. 4158 (F); Oxapampa, Iscozacín, (♂), Pariona & Quijano 992 (F, MO).—SAN MARTIN: Province of Mariscal Cáceres, Rio Uchiza, (♀), J. Schunke V. 7729 (MO, NY, U); Dist. Tocache Nuevo, Quebrada de Ischichini, (♀), J. Schunke V. 10650 (BG, MIN, MO).—UCAYALI: Province of Coronel Portillo, Estacion Experimental Alexander von Humboldt, Pucallpa-Tingo Maria rd., (♀), Trucios 9 (BG, INPA).

Pourouma herrerensis belongs to the group of species with entire lamina, staminate inflorescence in glomerules, and staminate flowers with tepals connate.

Our molecular analyses results (Chapter 1, Fig. 5) provided a strong support (BP = 95, PP = 0.99) to *Pourouma herrerensis* within clade II (*P. tomentosa*, *P. persecta*, *P. triloba*, *P. apiculata*, and *P. herrerensis*), which was more closely related to *P. apiculata* with support (BP = 85, PP = 1.00).

In fact, *Pourouma herrerensis* displays similarities with *P. apiculata*, due to the staminate inflorescence in glomerules, and staminate flowers with tepals connate, but distinguished from *P. apiculata* by whitish, arachnoid indument confined to staminate perianth, areoles, tertiary and quaternary veins of the abaxial lamina surface (versus on the leafy twigs, stipules, petioles), glomerule 4–8 mm in diameter (versus glomerule 3–4 mm in diameter), and staminate flowers 1.8–2 mm long (versus staminate flowers 1.2–1.5 mm long).

21. *Pourouma hirsutipetiolata* Mildbr., Notizbl. Bot. Gart. Berlin-Dahlem 10: 420. 1928; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 108. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 162. 1990.—TYPE: COLOMBIA. Bolívar: Norosi-Tiquiso trail, lands of Loba, Apr-May 1916 (♀), *Curran 116* (holotype: US!; isotype: B image! F fragment from US! WIS image!).

Tree, (6–) 10–30 (–32) m tall, 20–30 (–45) cm d.b.h. Leafy twigs 6–20 mm in diameter, with indument yellowish, hirsute, and usually with sparse, brownish, multicellular trichomes; internode 5–20 mm long. Lamina entire, (6–) 12–23.5 (–25.5) cm long, (4–) 7.5–15.5 (–17) cm wide, length:width ratio 1.3–1.8, ovate to elliptic, chartaceous to coriaceous; base obtuse, rounded, truncate to subcordate; margin usually repand, yellowish, hirtellous; apex acuminate; adaxial surface smooth, with indument of primary vein yellowish, hirtellous; abaxial surface smooth, indument of veins yellowish, hirtellous and sometimes with whitish, arachnoid indument; secondary veins (5–) 10–16 pairs per leaf, basal pair branched, diverging from the midrib at an 30°–65°; tertiary and quaternary veins slightly prominent, with whitish, arachnoid indument covering to the areoles; petiole (3–) 4–16.5 (–18.5) cm long, with indument yellowish to whitish, hirsute to minutely, puberulous, domatia absents; stipules 4–16.5 (–18.5) cm long, with indument yellowish to whitish, hirsute to sericeous outside, glabrous inside, caducous. Staminate inflorescences 6–14 (–15.5) cm long, 2.5–8.5 (–10) cm wide, primary branched 3–4; peduncle 3–6 cm long, peduncle and branches with indument yellowish,



FIG. 52. *Pourouma hirsutipetiolata*. A. Leafy twig with infructescence. B. Leaf, abaxial surface. C. Staminate inflorescence. D. Staminate flower. [A-B: from *Bruijn 1547*, (US); C-D: from *Callejas et al. 8574*, (NY)].

hirsute to hirtellous on the ultimate branches; flowers ca. 650–1550, flowers organized in 14–62 glomerules; glomerule 5–10 mm in diameter, ca. 40–70 flowers per glomerule. Staminate flowers 2–2.5 mm long, 0.5–0.8 mm wide; sessile or subsessile; perianth 1.2–1.8 mm long, 0.4–0.8 mm wide, infundibuliform, tepals connate, with indument whitish, strigulose; filaments 1.5–2 mm long, free, filaments exceeding the perianth. Pistillate inflorescences unknown. Infructescences 8.5–18.5 (–22) cm long, (3.5–) 4.5–11 (–12.5) cm wide; peduncle 4–13 cm long; fruits 6–17, fruits organized in 2–3 cymes, fruiting pedicel 5–10 mm long; stigma peltate, 1–1.5 mm in diameter, with indument whitish, strigulose and sometimes with whitish, arachnoid indument. Fruiting perianth 1.5–2.2 cm long, 8–18 mm wide, ovoid to ellipsoid, vinaceous to black, with indument yellowish, velutinous. Achene 1.2–1.8 cm long, 5–14 mm wide. Seed 8–10 mm long, 3–8 mm wide, ovoid to ellipsoid, vinaceous. Fig. 15 C; Fig. 52.

Phenology. Staminate flowers collected from March to May and October; fruits collected along all the year.

Distribution (Fig. 53). North of Colombia (Antioquia, Bolívar and Santander), often in “terra firme” forest of the Amazonian region, often in lowland moist areas, sometimes in riparian forest, at an elevation of about 150 to 1240 m above sea level.

Vernacular Name. Sirpo (Colombia, Antioquia); sirpo, urumo-blanco, uva (Colombia, Santander).

Etymology. The specific epithet refers to the hirsute indument.

Use. Edible fruits.

IUCN conservation status. According to the IUCN Red list categories (IUCN 2014), *Pourouma hirsutipetiolata* is considered Near Threatened (NT), because of the small extent of occurrence (ca. 59,840 Km²), number of locations (13) and known from only twenty one collections, made between 1916 and 1997.

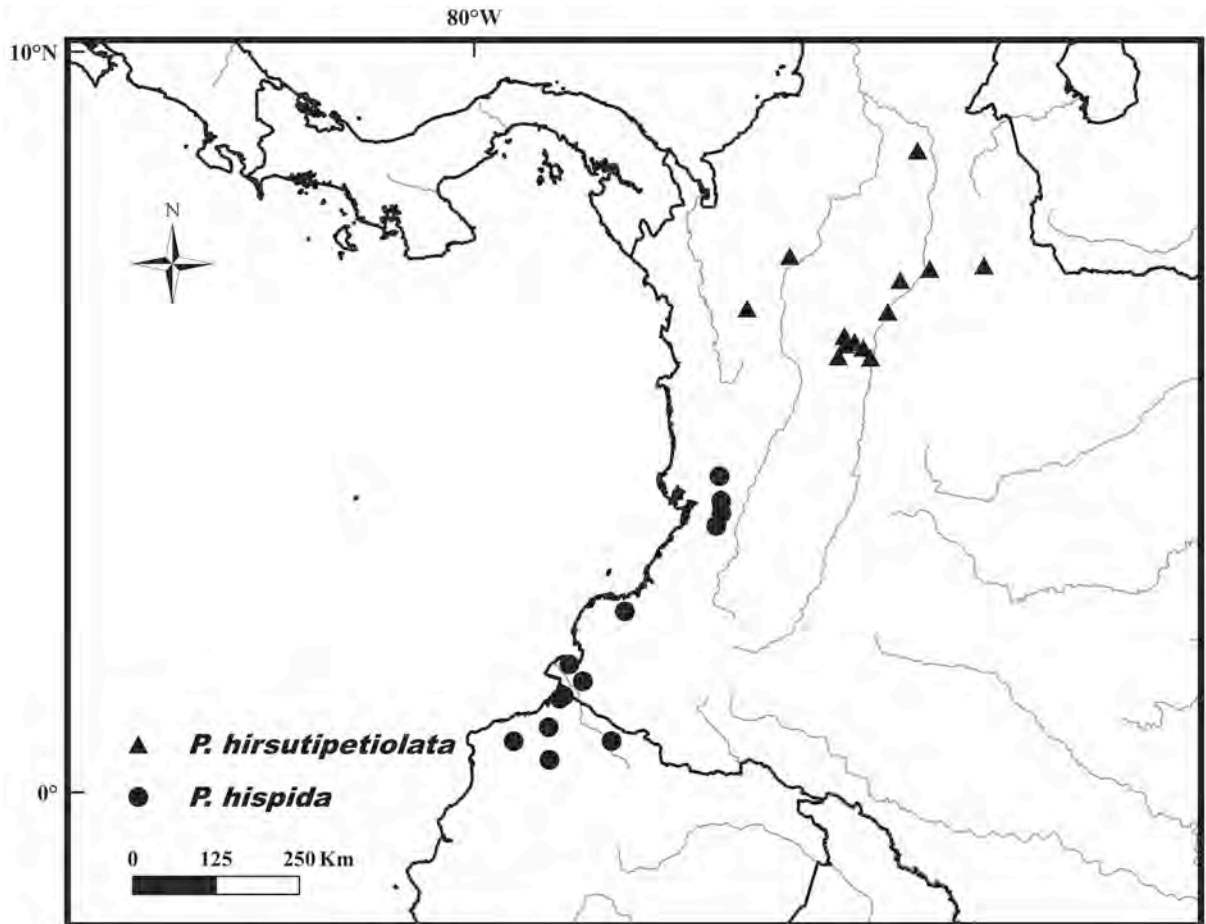


FIG. 53. Distribution of *Pourouma hirsutipetiolata* and *hispida*.

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** ANTIOQUIA: 38 km W of Barrancabermeja, Border between departamentos Antioquia and Bolívar, 06°55'N, 74°15'W, (♀), *Bruijn 1547* (F, M, MO, NY, S, U, US, WAG, VEN); São Carlos, corregimiento Alto Samaná, Vereda Miraflores, finca "El Desespero" de Ramon Giraldo, 06°05'N, 74°52'W, (♂), *Callejas et al. 8574* (HUA, NY); Puerto Triunfo, corregimiento de Doradal, 05°53'N, 74°51'W, (♂), *Cardenas et al. 2795* (JAUM, MO); San Luis, autopista Medellín-Bogotá, sector Río Samaná-Río Claro, (♀), *Cogollo & Estrada 271* (JAUM, MO); Parque nacional Natural Las Orquídeas, Las Orquídeas, Sector Venados arriba, margen derecha del río Venados, 06°34'N, 76°19'W, (♀), *Cogollo et al.*

3615 (JAUM, MO); San Luis, vereda "La Josefina", Finca Palmira, 05°53'N, 75°05'W, (♀), *Fonnegra et al.* 6363 (F); vereda La Josefina, la quebrada La Salada, (♀), *Hoyos & Hernandez* 836 (JAUM, MO); camino hacía Filo Estrecho y Santa Elena, (♀), *Hoyos & Hernandez* 994 (JAUM, MO); Municipio de Frontino, Parque nacional Natural Las Orquídeas, Las Orquídeas, Vereda Venados, 06°32'N, 76°19'W, (♀), *Pipoly et al.* 8574 (JAUM, MO); Alto Bonito, margen izquierda río Venados, 06°32'N, 76°19'W, (♀), *Pipoly et al.* 18263 (JAUM, MO); Municipio de San Luis, quebrada "La Cristalina", 06°00'N, 74°45'W, (♀), *J. G. Ramirez & D. Cárdenas* L. 309 (COL, JAUM, MO); Municipio de San Luis, quebrada "La Cristalina", 06°00'N, 74°45'W, (♂), *J. G. Ramirez & D. Cárdenas* L. 791 (JAUM, MO); Municipio de San Luis, quebrada "La Cristalina", 06°00'N, 74°45'W, (♀), *J. G. Ramirez & D. Cárdenas* L. 1149 (JAUM, MO); Municipio de San Luis, quebrada "La Cristalina", 06°00'N, 74°45'W, (♀), *J. G. Ramirez & D. Cárdenas* L. 1302 (JAUM, MO); Municipio de San Luis, quebrada "La Cristalina", 06°00'N, 74°45'W, (♀), *J. G. Ramirez & D. Cárdenas* L. 1808 (JAUM, MO).—SANTANDER: Río Guabito, abajo de Landázuri, (♂), *R. Jaramillo N. et al.* 670 (COL); Carare Opón, (♂), *Saavedra et al.* COL309590 (COL); Bucaramanga, Agua Blanca, (♀), *Renteria et al.* 45 (MO); road to Citimarra, (♀), *Renteria et al.* 2093 (COL, HUA); 10 leguas al SE de Barranca Bermeja, 8 km margen izquierda del río Opón, (♀), *Romero-Castañeda* 4715 (COL, MO, US).

Pourouma hirsutipetiolata belongs to the group of species with entire lamina, basal pair of secondary veins branched, adaxial lamina surface smooth, staminate inflorescences in glomerules, and staminate flowers with perianth connate.

This species is similar to *Pourouma melinonii*, but distinguished by leafy twigs with indument yellowish hirsute (versus whitish, sericeous to strigose), glomerule 5–10 mm in

diameter (versus glomerule 3–5 mm in diameter), and 40–70 flowers per glomerule (versus 10–30 flowers)

Berg & Heusden (1988: 108) described *Pourouma hirsutipetiolata* subsp. *hispida* as a new combination of *P. hirsutipetiolata*.

However, *Pourouma hirsutipetiolata* is distinguished from *Pourouma hispida* by entire lamina (versus palmatilobed lamina with 3 lobes), and indument hispid absent (versus on the peduncles, and leafy twigs).

Additionally, the molecular results from all subspecies sampled (Chapter 1, Fig. 5) did not corroborate with proposed by Berg & Heusden (1988: 137), although *P. hispida* and *P. hirsutipetiolata* did not sample.

22. *Pourouma hispida* Standl. & Cuatrec. in Cuatrec., *Caldasia* 7: 299. 1956; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 108. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 162. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 92. 1993.—
TYPE: COLOMBIA. Valle del Cauca: Cordillera Occidental, vertiente occidental; Río Anchicayá, lado derecho, bosque bajando a La Planta, 5 Aug 1943 (♀), *Cuatrecasas 14881* (holotype: F!; isotype: WIS image!).

Pourouma hirsutipetiolata Mildbr. subsp. *hispida* (Standl. & Cuatrec.) C.C. Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 162. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 92. 1993.

Tree, (10–) 15–30 (–35) m tall, 20–40 (–45) cm d.b.h., with buttresses. lvs. 6–25 mm in diameter, with indument yellowish, hispid to hirsute; internode 5–30 mm long. Lamina palmatifid to palmatipartite with 3 lobes, (9–) 13.5–40 (–45) cm long, (8.5–) 10.5–38.5 (–42.5) cm wide, length:width ratio 0.8–1.1, coriaceous; base cordate to deeply cordate; margin palmatifid, with indument yellowish, sericeous to hirtellous; apex acuminate; adaxial surface smooth, indument of veins sparse, yellowish, hirtellous; abaxial surface smooth, with indument yellowish to whitish, sericeous; venation palmate; secondary veins in the free part of the midsegment 10–18 pairs per leaf, basal pair branched, diverging from the midrib at an 45°–65°; tertiary and quaternary veins slightly prominent to prominent, sometimes with dense, whitish, arachnoid indument covering to the areoles, extending on the secondary veins; petiole (6–) 10–35 (–40) cm long, with indument yellowish, hirsute, domatia absents; stipules (3.5–) 9–14.5 (–16) cm long, with indument yellowish, hirsute outside, glabrous inside, caducous. Staminate inflorescences 6.5–15.5 (–16.5) cm long, 2–6.5 (–8.5) cm wide, primary branched 3–4; peduncle 2–4 cm long, peduncle and branches with indument yellowish, hispid on the ultimate branches; flowers ca. 120–480, flowers organized in ca. 10–40 glomerules; glomerule 5–10 mm in diameter, flowers ca. 8–25 per glomerule. Staminate flowers 2–3 mm long, 1–1.2 mm wide; sessile; perianth 1–1.2 mm long, 0.8–1 mm wide, urceolate, tepals connate, with indument yellowish, hirtellous; filaments 1.5–2.2 mm long, free, filaments exceeding the perianth. Pistillate inflorescences 9.5–10.5 (–15) cm long, 1.5–4 (–6.5) cm wide; peduncle 5.5–7 (–12) cm long, peduncle and branches with indument yellowish, hispid on the ultimate branches; flowers 10–18 (–22), flowers organized in 4–6 cymes. Pistillate flowers 5–8 mm long, 2–4 mm wide; pedicel 2–4 mm long; perianth 3–5 mm long, with indument yellowish, velutinous and strigulose, apex papillose, sometimes with brownish, multicellular trichomes;



FIG. 54. *Pourouma hispida*. A. Leafy twig with pistillate inflorescences and infructescences. B. Palmatifid leaf, abaxial surface. C. Fruiting perianth and pedicel. D. Staminate inflorescence. E. Staminate flower. [A-C: from Cuatrecasas14881, (F); D-E: from Játiva et al. 2033, (NY)].

stigma peltate, 1.2–2 mm in diameter, sometimes whitish puberulous. Infructescences 15–25.5 (–28.5) cm long, 6.5–12.5 (–14.5) cm wide; peduncle 6–13 cm long; fruiting pedicel 5–15 mm long. Fruiting perianth 1.5–2.5 cm long, 8–15 mm wide, ovoid to ellipsoid, vinaceous to black, with indument yellowish, velutinous. Achene 1.2–2.2 cm long, 5–12 mm wide. Seed 5–10 mm long, 3–6 mm wide, ovoid to ellipsoid, vinaceous to brownish. Fig. 3 A-B; Fig. 15 D; Fig. 54.

Phenology. Staminate flowers collected from June to October, pistillate flowers from June to July and fruit from August to March.

Distribution (Fig. 53). Southwest of Colombia (Nariño and Valle del Cauca) and northwest of Ecuador (Carchi and Esmeralda), in primary “terra firme” forest of the Amazonian region, often in riparian forest, in lowland moist area, at an elevation of about 50 to 500 m above sea level.

Vernacular Name. Uva (Colombia, Nariño); cugumbe pagum (Ecuador, Carchi); uva, uva de monte (Ecuador, Esmeralda).

Etymology. The specific epithet refers to the hispid indument.

Use. Edible fruits and wood used in construction.

IUCN conservation status. *Pourouma hispida* is known from only eighteen collections in the department of Nariño, Valle del Cauca (Colombia), province of Carchi and Esmeralda (Ecuador), made between 1943 and 1993. However, the extent of occurrence of *P. hispida* is ca. 89,610 Km² and the population size is unknown. For these reasons *P. hispida* is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** NARIÑO: Municipio de la Espriella, finca Palmas del Caunapí, (♂), León *et al.* 1460 (F); Tumaco, Vereda de Santa María, río Rosario, (♀), Romero-Castañeda 5172 (COL); Tumaco, al sur Tumaco, Monte Alto, (♀), Romero-Castañeda

5409 (COL); Nariño, Iscuandé, río Sequión, (♂), *Romero-Castañeda 5494* (COL).—VALLE DEL CAUCA: Río Calima, región del Chocó, La Trojita, (♀), *Cuatrecasas 16826* (F); Río Dagua, between Las Cascadas and Alto de Yundo, (♀), *Gentry & Monsalve B. 48341* (BG, MO). **Ecuador.** CARCHI: Tulcan Canton, Parroquia Tobar Donoso, 01°00'N, 78°24'W, (♀), *Tipaz et al. 1402* (MO).—ESMERALDAS: Río Pambil, Estero Bravo, (♂), *Játiva et al. 303* (NY); Río Pambil, Estero Bravo, (♂), *Játiva & Epling 1079* (NY, UC, US); Panadero, 5 km from the river, (♂), *Játiva & Epling 2033* (MO, NY, US); Panadero, 5 km from the river, (♀), *Játiva & Epling 2037* (NY, U, UC, US); Río Hoja Blanca and Río Hualpi, (♂), *E. L. Little Jr. & Dixon 21070* (F, MO, NY, US); Río Guayllabamba, 10 km E. de Quinindé, (♂), *E. L. Little Jr. & Dixon 21225* (MO, NY, US); Reserva Ecológica Cotacachi-Cayapas, Charco Vicente, 00°43'N, 78°55'W, (♀), *Méndez et al. 30* (MO, QCNE); San Lorenzo, new road to “Proyecto NO”, km 4–5, (♀), *Sparre 18252* (MO, NY); Eloy Alfaro, Reserva Ecológica Cotacachi-Cayapas, 00°43'N, 78°53'W, (♀), *Tirado et al. 313* (MO, NY); Eloy Alfaro, Reserva Ecológica Cotacachi-Cayapas, Charco Vicente, Río San Miguel, 00°49'N, 78°45'W, (♀), *Tirado 576* (MO).

Cuatrecasas (1956: 299) characterized *Pourouma hispida* by palmatilobed lamina with 3 lobes, lobes wide and obtuse, adaxial surface smooth, and indument hispid on the peduncle of the inflorescence, petiole, and terminal branches.

Nevertheless, Berg & Heusden (1988: 108) considered *Pourouma hispida* as a subspecies of *P. hirsutipetiolata*, but they did not comment anything about these species.

Pourouma hispida is distinguished from *P. hirsutipetiolata* by palmatilobed lamina with 3 lobes (versus entire lamina), and peduncle with indument hispid (versus hirsute to hirtellous). The hispid indument of the peduncle, when it is pressured can penetrate the skin.

Moreover these species are allopatric, in which *Pourouma hispida* occurs in the southwest of Colombia and northwest of Ecuador, while *P. hirsutipetiolata* is distributed in the north of Colombia.

The collection Juncosa (1253) from Chocó (Colombia) is cited as *Pourouma herrerensis* by Berg et al. (1990) is a misidentification. In fact, this collection matches to *Pourouma chocoana*.

23. *Pourouma maroniensis* Benoist, Bull. Mus. Hist. Nat. (Paris) 28: 319. 1922; Berg & Dewolf, Fl. Suriname 5(1): 276. 1975; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 109. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 170. 1990; Berg, Fl. Guianas 11(22): 122. 1992.—TYPE: FRENCH GUIANA. Godeberg, 23 Jun 1921 (♂), *Wachenheim 392* (holotype: P!; isotype: K!).

Pourouma tomentosa Miq. subsp. *maroniensis* (Benoist) C.C. Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 109. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 170. 1990; Berg, Fl. Guianas 11(22): 122. 1992; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.

Tree, 8–30 (–35) m tall, 20–40 (–55) cm d.b.h., with stilt roots. Leafy twigs 3–10 mm in diameter, with indument sparse, whitish, sericeous and dense, whitish, arachnoid indument; internode 4–20 mm long. Lamina usually entire, (4.5–) 6–20.5 (–22) cm long, (2.5–) 3–15 (–16.5) cm wide, length:width ratio 1.2–2.2, ovate to elliptic, or palmatifid with 2–3 lobes, 10–24.5 (–26.5) cm long, 12–23.5 (–25.5) cm wide, length:width ratio 0.8–1, coriaceous; base truncate, rounded to subcordate; margin usually repand or palmatifid, sericeous to sparse sericeous; apex acuminate; adaxial surface smooth, indument of veins sparse, yellowish, hirtellous;

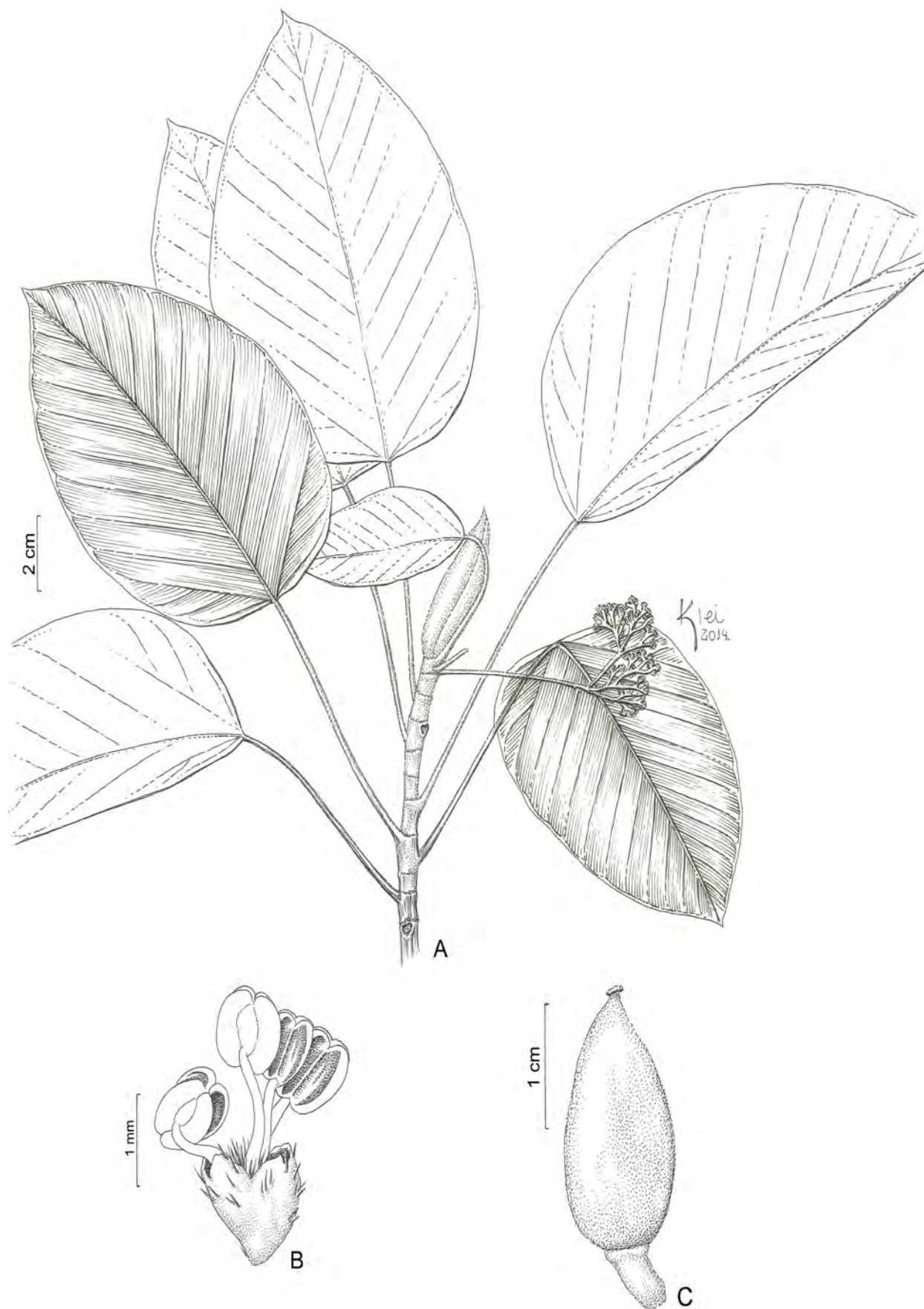


FIG. 55. *Pourouma maroniensis*. A. Leafy twig with staminate inflorescence B. Staminate flower. C. Fruiting perianth and pedicel. [A-B: from Pires *et al.* 51193 (INPA); C: from Gaglioti *et al.* 161 (SP)].

abaxial surface smooth, with whitish, arachnoid indument; venation brochidodromous to palmate; secondary veins (5–) 6–16 (–22) pairs per leaf, basal pair branched, diverging from the midrib at an 35° – 55° ; tertiary and quaternary veins slightly prominent, with dense, whitish, arachnoid indument covering to the areoles; petiole (3–) 4–15.5 (–18) cm long, tomentose, with dense, whitish, arachnoid indument and sometimes yellowish sericeous, domatia absents; stipules (3–) 4.5–10.5 (–14.5) cm long, with indument yellowish, sericeous to hirsute and dense, whitish, arachnoid indument outside, glabrous inside, caducous. Staminate inflorescences (5.5–) 6–13.5 (–15) cm long, (2.5–) 3–10 (–11.5) cm wide, primary branched 3–4; peduncle 2.5–5.5 cm long, peduncle and branches tomentose, with dense, whitish, arachnoid indument and indument yellowish, sericeous on the ultimate branches; flowers ca. 320–970, flowers organized in 24–78 glomerules; glomerule 2–3 mm in diameter; flowers ca. 10–25 per glomerule. Staminate flowers 0.8–1 mm long, 0.5–0.8 mm wide; sessile or subsessile; perianth 0.5–0.8 mm long, 0.4–0.8 mm wide, urceolate, tepals connate, with indument sparse, yellowish, hirtellous and sparse, whitish, arachnoid indument; stamens 3–4; filaments 0.8–1 mm long, free, filaments usually exceeding the perianth. Pistillate inflorescences 2.5–4.5 (–5.5) cm long, 1–2.5 (–3) cm wide; peduncle 1–3 cm long, peduncle and branches with indument yellowish, velutinous to hirtellous on the ultimate branches; flowers (5–) 6–12 (–15), flowers organized in 1–3 cymes. Pistillate flowers 4–6 mm long, 2–4 mm wide; pedicel 2–4 mm long; perianth 3–5 mm long, with dense, whitish, arachnoid indument; stigma peltate, 1–1.8 mm in diameter, sometimes with indument yellowish, hirtellous. Infructescences 6.5–12.5 (–14.5) cm long, 3.5–8.5 (–10.5) cm wide; peduncle 3–8.5 cm long; fruiting pedicel 6–10 mm long. Fruiting perianth 2–2.3 cm long, 8–12 mm wide, ovoid to ellipsoid, vinaceous to black, with whitish, arachnoid indument. Achene 2–2.2 mm long, 5–10 mm wide, ovoid to ellipsoid. Seed 5–12 mm long, 2–8 mm wide, ovoid, vinaceous to brownish. Fig. 10 D; Fig. 15 E; Fig. 55.

Phenology. Staminate flowers collected from June to January, pistillate flowers from June to July and fruits from September to March.

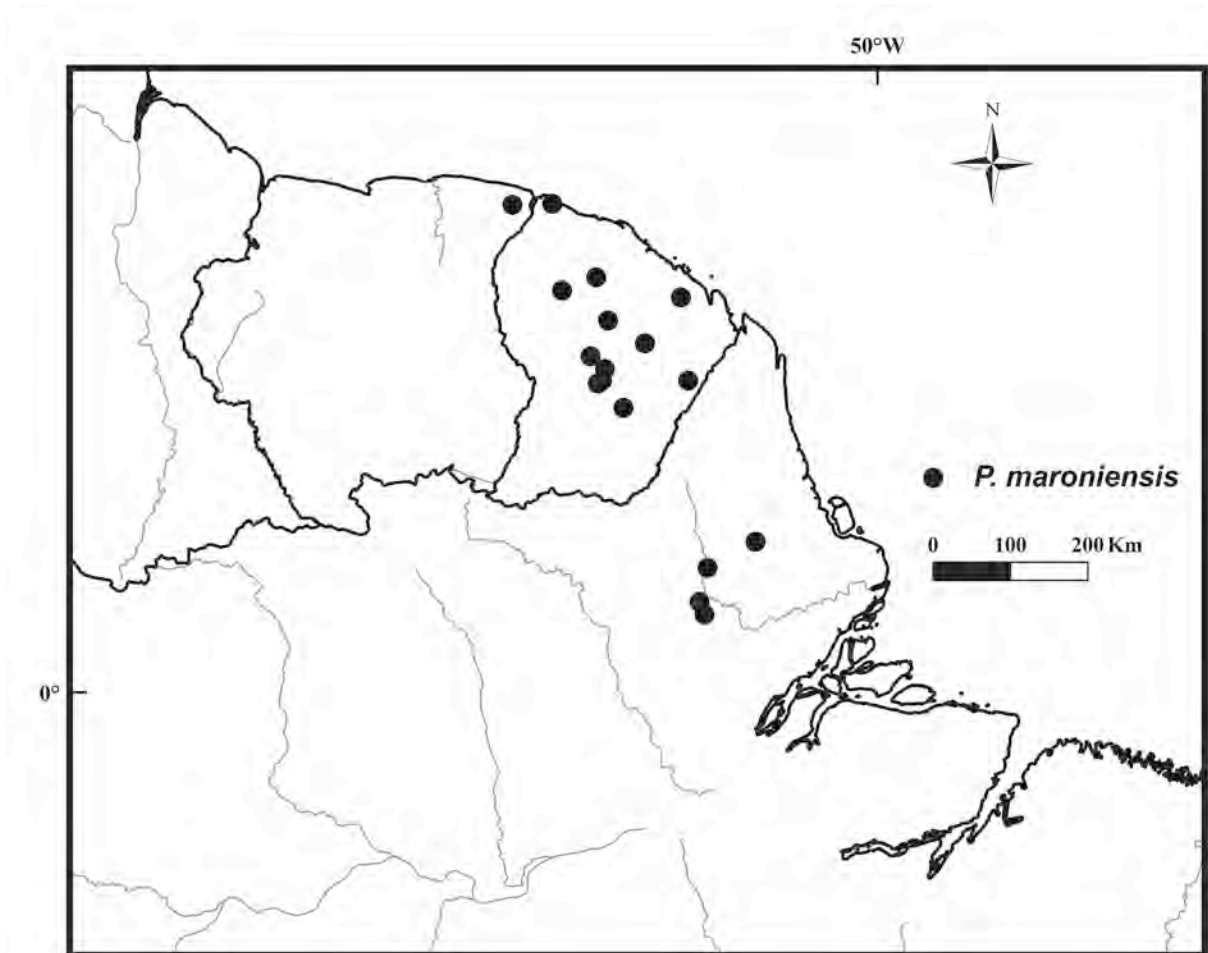


FIG. 56. Distribution of *Pourouma maroniensis*.

Distribution (Fig. 56). North of Brazil (Amapá), French Guiana (Cayenne and Saint-Laurent-du-Maroni) and northeast of Suriname (Marowijne), in primary “terra firme” forest of the Amazonian region, often in riparian forest, in lowland moist area, at an elevation of about 50 to 500 m above sea level.

Vernacular Name. Boesipapja, bouchi-papaye, kukuma, wilaupiyua (French Guiana, Saint-Laurent-du-Maroni); boroma (Suriname, Marowijne).

Etymology. The epithet is a tribute to the arrondissement of type locality, Saint-Laurent-du-Maroni (French Guiana).

Pourouma maroniensis is relatively widely distributed with the extent of occurrence of ca. 97,560 Km². *P. maroniensis* is also, well represented in herbaria. For these reasons *P. maroniensis* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAPÁ: Serra do Navio, Parque Natural Municipal do Canção, 00°54'12"N, 52°00'34"W, (♀), *Gaglioti et al. 161* (SP); Serra do Navio, (♂), *S. A. Mori et al. 17672* (BG, HAMAB, K, MG, NY); Serra do Navio, (♂), *Pires et al. 51193* (B, FHO, IAN, INPA, MG, NY, P, U, US); Rio Araguari, 01°45'N, 25°00'W, (♂), *Pires et al. 51625* (F, IAN, NY, MG, U, US). **French Guiana.** CAYENNE: Station des Nouragues; Bassin de l'Arataye, 04°03'N, 52°42'W, (♀), *Poncy 1801* (NY, P); Station des nouragues, Bassin de l'Arataye, Quadrat L 16, 04°03'N, 52°42'W, (♀), *Riera 1972* (CAY, NY, P, U); Bassin de l'Arataye, Station des Nouragues, 04°03'N, 52°42'W, (♂), *Riera et al. 1973* (P, CAY, NY, P, U, US); Bassin de l'Arataye, Station des Nouragues, 04°03'N, 52°42'W, (♀), *Riera 1995* (P, NY, U); Bassin de l'Arataye, Station des Nouragues, 04°03'N, 52°42'W, (♀), *Riera 3676* (P).— SAINT-LAURENT-DU-MARONI: St. Laurent, (♀), *BAFOG 7228* (NY, P, U); Mana, (♀), *BAFOG 7330* (NY, P); Saül, Monts La Fumée, (♂), *Boom et al. 1988* (NY); Saül, Mont Galbao, 03°36'N, 53°16'W, (♂), *Boom et al. 10832* (NY); Saül, Monts La Fumée, (♂), *S. A. Mori & Boom 15127* (MG, NY, P); Charvein, (♂), *Benoist 465* (P); Sabbat, (♀), *Granville 465* (P); Mana R., Saut Sabbat, (♀), *Granville 4531* (BG, P); Trois Saut, Zidockville, (♀), *Grenand 688* (CAY); Kaw

Mts, Trésor Reserve, (♂), *Jansen-Jacobs et al. 1805* (NY); Mana R., Saut Saül, mounts La Fumée, 03°37'N, 53°12'W, (♀), *S. A. Mori & Boom 15342* (MG, NY, US); Saül, route de Belizon, within 1 km S of Eaux Claires, 03°37'N, 53°12'W, (♂), *S. A. Mori & Gracie 21125* (NY, P, US); Saül, On Route de Belizon north of Eaux Claires, 03°37'N, 53°00'W, (♀), *S. A. Mori et al. 21535* (CAY, NY). **Suriname.** MAROWIJNE: Via secta ab Moengo tapoe ad Grote Zwiebelzwamp, (♀), *Lanjouw & Lindeman 432* (F, NY, U).

Pourouma maroniensis was considered by Berg & Heusden (1988: 109) as a subspecies of *P. tomentosa*. However, *P. maroniensis* can be differentiated from *P. tomentosa* by lamina with apex acuminate (versus apex rounded, emarginate to obtuse), glomerules 2–3 mm in diameter (versus 5–8 mm in diameter), and pistillate perianth with dense, whitish, arachnoid indument (with yellowish, velutinous indument).

Moreover, our molecular analyses results (Chapter 1, Fig. 5) included *Pourouma maroniensis* within clade IV (*P. essequiboensis*, *P. maroniensis*, *P. melinonii*, *P. mollis*, and *P. ovata*) with a strong support (BP = 92, PP = 0.96). It was more closely related to *P. mollis* with support (BP = 80, PP = 0.98). For these reasons, we proposed the reestablishment of *Pourouma maroniensis*.

Kincaid et al. (1998) verified that the leaf variation in *P. tomentosa* subsp. *maroniensis* (= *P. maroniensis*) was correlated with the position of leaf in the plant and phenology.

During to the field trip to Amapá (Brazil), we observed some specimens of *Pourouma maroniensis* with the most part of the entire lamina. The palmatilobed lamina appears concentrated on the top tiers of the trees, as reported by Kincaid et al. (1998).

24. *Pourouma melinonii* Benoist, Bull. Mus. Hist. Nat. (Paris) 28: 318. 1922; Berg, Fl. Suriname 5(1): 274, t. 15a. 1975; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 159. 1990; Berg, Fl. Guianas 11(22): 117. 1992; Berg & Franco-Rosselli, Fl. Ecuador 27A: 88. 1993; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez.: 239. 2000; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.—TYPE: FRENCH GUIANA. La Mana, au village indien, Sep 1846 (♀), *Sagot 990* (lectotype, designated by Berg et al. 1990: P06855173!; isolectotypes: B image! K!).

Tree, 5–30 (–35) m tall, 15–40 (–60) cm d.b.h., with stilt roots. Leafy twigs 4–18 mm in diameter, with indument whitish, sericeous to strigose, with brownish to vinaceous, multicellular trichomes; internode 4–40 (–45) mm long. Lamina usually entire, (6–) 8–28.5 (–30) cm long, (3.5–) 6.5–20 (–23.5) cm wide, ovate, length:width ratio 1.2–2.1; or sometimes palmatifid to palmatipartite with 3 lobes, rarely with 5 lobes (juvenile), (11–) 12.5–30.5 (–34.5) cm long, (12–) 13.5–31.5 (–35.5) cm wide, length:width ratio 0.8–1.1, coriaceous; base rounded to truncate, or subcordate; margin usually repand or palmatifid, with indument whitish to yellowish, sericeous to puberulous; apex acuminate; adaxial surface smooth, indument of veins sparse, whitish, sericeous; abaxial surface smooth, with indument whitish to yellowish, sericeous and sometimes with brownish to brownish-red, multicellular trichomes; venation brochidodromous or palmate; secondary veins 11–16 (–20) pairs per leaf, basal pair branched, 1/6 to 1/3 the length of the lamina, diverging from the midrib at an 40°–65°; tertiary and quaternary veins slightly prominent to prominent, with dense, whitish, arachnoid indument covering to the areoles; petiole 3–16.5 (–18.5) cm long, with indument sparse, whitish, sericeous or glabrous, domatia absents;

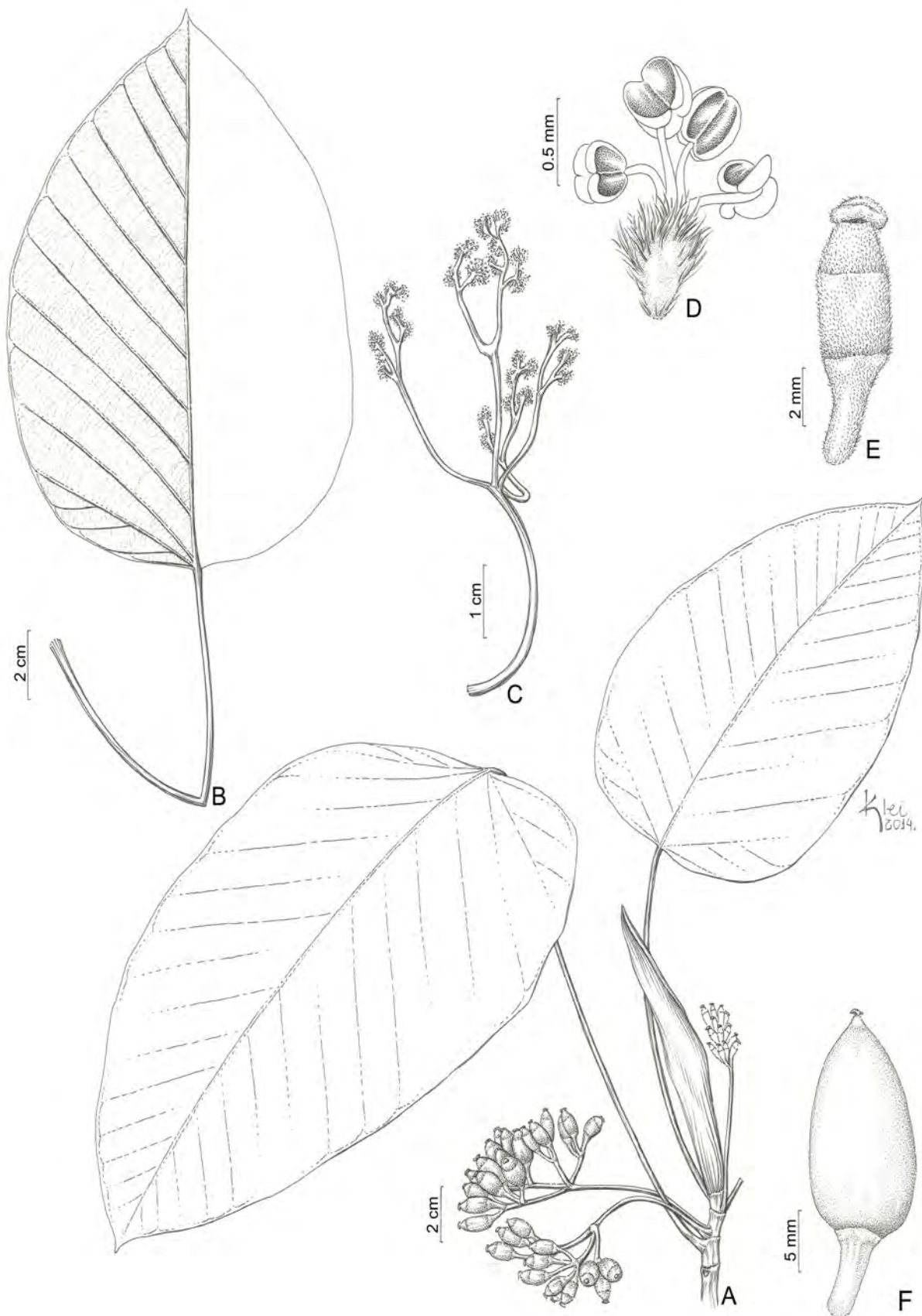


FIG. 57. *Pourouma melinonii*. A. Leafy twig with inflorescence and infructescences. B. Entire leaf, abaxial surface. C. Staminate inflorescence. D. Staminate flower. E. Pistillate flower and pedicel. F. Fruiting perianth and pedicel. [A-B, E: from Granville 7152 (INPA); C-D: from N. T. Silva et al. 949 (IAN); F: from Irwin 47832 (IAN)].

stipules 3–13.5 (–15) cm long, with indument whitish to yellowish, sericeous to strigose outside, glabrous inside, caducous. Staminate inflorescences 4.5–14.5 (–16.5) cm long, 2.5–8.5 (–9.5) cm wide, primary branched 3–4; peduncle 2–8.5 cm long, peduncle and branches with indument yellowish to whitish, sericeous to hirtellous and sometimes with brownish to vinaceous, multicellular trichomes on the ultimate branches; flowers ca. 480–1850, flowers organized in 18–96 glomerules; glomerule 3–5 mm in diameter, ca. 10–30 flowers per glomerule. Staminate flowers 1.2–1.5 mm long, 0.5–1 mm wide; sessile to subsessile; perianth 0.5–1 mm long, urceolate, tepals connate, with indument yellowish, hirtellous; stamens 4; filaments 0.8–1.2 mm long, free, filaments exceeding the perianth. Pistillate inflorescences 3.5–7.5 cm long, 1.5–3.5 cm wide; peduncle 1.5–3 cm long, peduncle and branches with indument yellowish to whitish, sericeous to hirtellous and sometimes with brownish to brownish-red, multicellular trichomes; flowers (8–) 10–30 (–35), flowers organized in 2–4 cymes; pedicel 1–3 mm long; perianth 4–6 mm long, 2–3 mm wide, with indument yellowish, velutinous and brownish multicellular trichomes, apex papillose; stigma peltate, 1.5–2 mm in diameter, sometimes with indument yellowish, velutinous. Infructescences 6–15.5 (–16.5) cm long, 4.5–11.5 (–12.5) cm wide; peduncle 4.5–8.5 (–9.5) cm long; fruiting pedicel 6–12 mm long. Fruiting perianth 1.5–2.5 cm long, 8–15 mm wide, ovoid to ellipsoid, vinaceous to black, with indument whitish to yellowish, puberulous to velutinous. Achene 1.2–2.2 cm long, 6–12 mm wide, ovoid to ellipsoid. Seed 5–12 mm long, 2–8 mm wide, ovoid to ellipsoid, vinaceous. Fig. 15 F; Fig. 57.

Phenology. Staminate flowers collected from June to September, pistillate flowers from July to September and fruits throughout the year.

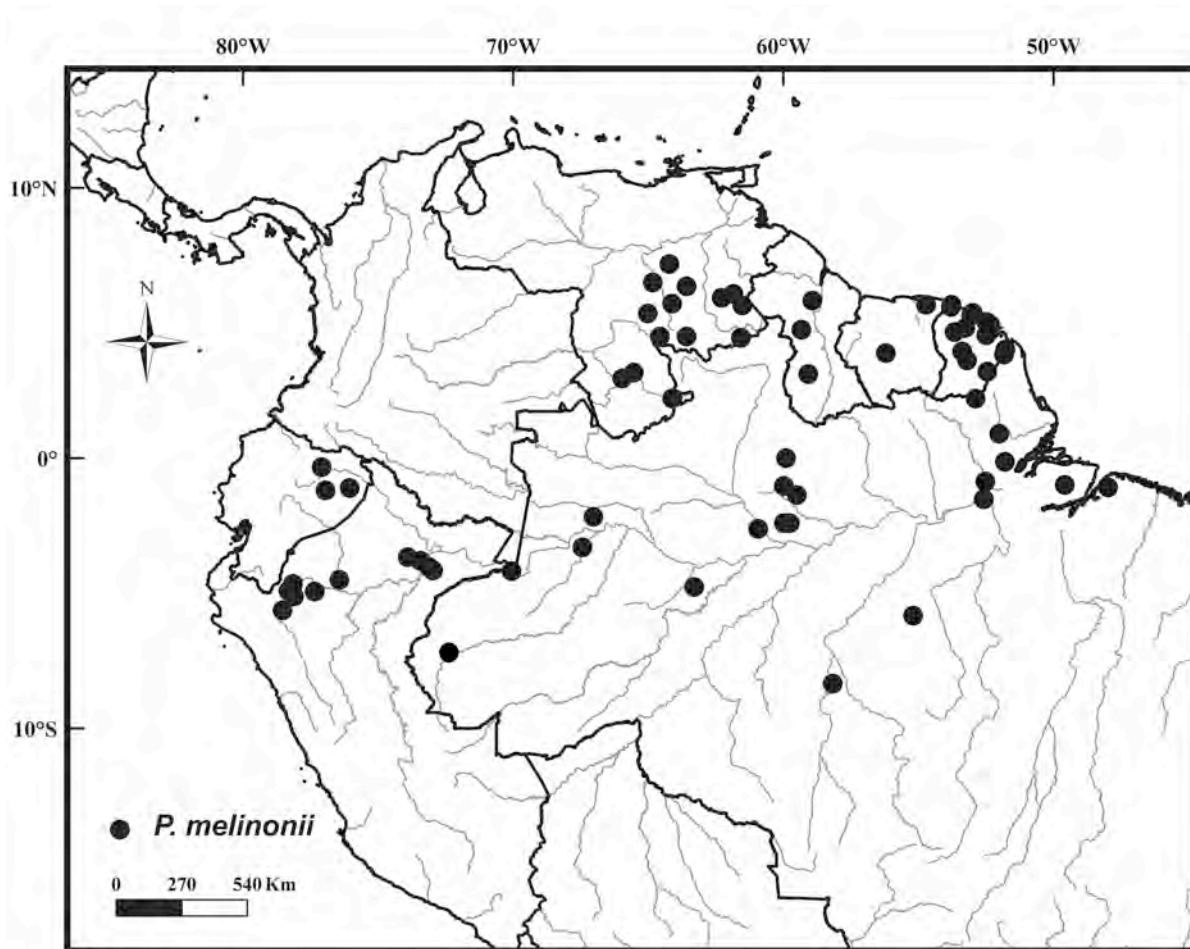


FIG. 58. Distribution of *Pourouma melinonii*.

Distribution (Fig. 58). North of Brazil (Acre, Amapá, Amazonas, Mato Grosso, Pará and Roraima), French Guiana (Cayenne and Saint-Laurent-du-Maroni), Suriname (Marowijne and Sipaliwini), Guyana (Cuyuni-Mazaruni, Potaro-Siparuni and Upper Takutu-Upper Essequibo), south of Venezuela (Amazonas and Bolívar), east of Ecuador (Napó and Orellana), north of Peru (Amazonas, Loreto and Madre de Dios), in “terra firme” forest of the Amazonian region, often in lowland moist areas, usually in riparian forest, at an elevation of about 100 to 650 m above sea level.

Vernacular Name. Imbaúbarana, uva (Brazil, Amazonas); mapatirana (Brazil, Pará); bois-canon, papaye-apici, kulupi (French Guiana, Cayenne); dakamtazshuiya, mimpashuiyá, shuiya-pau, wáshi-shuina (Peru, Amazonas); sacha uvilla, uvilla, ubilla (Peru, Loreto); boroma, bospapaja, granboesipapaja, puruma, yarayara (Suriname, Sipaliwini); kaiwarikai, moisi, yagrumo-sunsun (Venezuela, Bolívar).

Etymology. The epithet honors M. Mélinon, a botanical collector.

IUCN conservation status. *Pourouma melinonii* is widely distributed with the extent of occurrence of ca. 2,375,740 Km². *P. melinonii* is also, well represented in herbaria. For these reasons *P. melinonii* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** ACRE: Cruzeiro do Sul, Igarapé Humaitá, afluente da margem direita do Rio Juruá, 08°19'S, 72°47'W, (♀), *C. A. Cid Ferreira et al.* 10467 (INPA, MO, NY).—AMAPÁ: Serra do Navio, Parque Natural Municipal do Canção, (♂), *Gaglioti et al.* 166 (SP); Rio Iaue, 3 km east of confluence with Rio Oiapoque, 02°53'N, 52°22'W, (♀), *Irwin et al.* 47832 (GH, IAN, K, NY, U, US); About 3km east of mouth of Rio Mutura, 02°34'N, 52°31'W, (♀), *Irwin et al.* 48439 (IAN, NY, U, US); Município de Mazagão, BR156, 81 km SW of Macapá, ca. 11 km SW of Rio Preto, 00°08'S, 51°48'W, (♀), *Mori & Cardoso* 17478 (BG, HAMAB, K, MG, NY); Piaçacá, Igarapé do Lago, Macapá, (♀), *Rabelo* 677 (HAMAB, MG).—AMAZONAS: Tefé, Rio Solimões, margem direita, lago Tefé, Vila Nogueira, (♀), *Amaral et al.* 101 (BG, INPA, F, K, MG, MO, NY, RB); Vila Bittencourt, margem esquerda rio Japurá, margem esquerda, igarapé Patoá, (♀), *Amaral et al.* 595 (BG, INPA, K, MG); Município de Presidente Figueiredo, margem direita do Uatumã, (♀), *Amaral et al.* 2075 (INPA, F); Manaus-Caracarai road, km 148, (♀), *Berg et al.* *P.* 18136 (F, INPA, K, MO, NY, P, R, S, U, US);

Município de Anori, rd. Amori-Anama, (♂), *D. Coêlho & C. Mota* 672 (INPA, U); Rio Solimões, Belém, (♂), *Fróes* 23725 (IAC, IAN); Benjamin Constant, (♀), *O. P. Monteiro & J. Lima* 148 (INPA); Presidente Figueiredo, Reserva ZF-3, BR 174, km 64, (♀), *A. C. A. Oliveira et al.* 234 (INPA); Manaus-Itacoatiara highway, Reserva Florestal Ducke, km 26, (♂), *G. T. Prance et al.* 2180 (F, GH, INPA, K, NY, P, R, S, U, US); unknown locality and date, (♂), *Saldanha s.n.* (R58220); Presidente Figueiredo, Lago da Rebio Uatumã, Balbina, (♀), *M. C. R. Silva et al.* 44 (INPA); Jutaí, Reserva Extrativista do Rio Jutaí, Igarapé do Recreio, 03°19'20"S, 67°26'15"W, (♂), *M. A. D. Souza et al.* 1938 (INPA); Presidente Figueiredo, no entorno do Lago da Rebio Uatumã, Balbina, (♀), *M. C. R. Silva et al.* 44 (INPA).—MATO GROSSO: Brasília-Acre highway, 215 km west of Rio Juruena, (♂), *Maguire et al.* 56511 (F, K, NY, RB, U, US).—PARÁ: Instituto Agronomico do Norte, (♂), *Duarte* 9785 (IAN, HB, RB, U); Região do Igarapé Pitoró, (♀), *Fróes* 34691 (IAN); Região do Igarapé Pitoró, (♀), *Fróes* 34691a (IAN); Rio Guamá, São Miguel, (♀), *Goeldi* MG7732 (F, G, MG); Tucuruí, Desmatamento II, variante a direita da PA-149, (♀), *Miranda et al.* 477 (INPA); Rodovia Belém-Brasília km 62,5, (♀), *E. Oliveira* 265 (IAN); Rio Jarí, Monte Dourado, (♀), *E. Oliveira* 3736 (IAN); Rio Jarí, Planalto de Monte Dourado, (♀), *E. Oliveira* 3936 (NY); Rio Jarí, Monte Dourado, Planalto, (♀), *E. Oliveira* 4047 (IAN, NY); Fazenda Santa Catarina, Vila do Ananim, (♀), *J. Oliveira et al.* 220 (MG); Belém, IAN, (♀), *Pires* 4187 (IAN); Breves, (♀), *Pires & N. T. Silva* 6646 (IAN); Belém, Mata da Cia. Pirelli, Fazenda Uriboça, (♂), *Pires* 6887 (IAN); Belém, IPEAN, Reserva APEC, (♀), *Pires & N. T. Silva* 11165 (IAN); Belém, IPEAN, (♀), *Pires & N. T. Silva* 11171 (IAN); Belém, IPEAN, Reserva APEC, (♀), *Pires & N. T. Silva* 11175 (IAN); Reserva Aurá, (♀), *Pires & N. T. Silva* 11390 (IAN); Rio Jarí, Monte Dourado, Planalto A, (♀), *N. T. Silva* 921 (IAN, NY, U); Rio Jarí, Monte Dourado, Planalto A, (♂), *N. T. Silva* 949 (IAN, NY, U); Rio Jarí, Monte Dourado, Planalto A, (♀), *N. T. Silva* 995 (IAN, NY); Anajás, Ilha de Marajó, Rio Jipuru, afluyente Rio

Anajas, (♀), *Tavares & Cardoso 237* (INPA, MO, NY).—RORAIMA: Caracaráí, próximo a Vila de Caicubi, 01°01'43"S, 62°05'21"W, (♀), *Soler A. & Barbosa 19* (IAN, INPA, RB, SP).

Ecuador. NAPO: Parque Nacional Yasuni, Pozo Daimi 2, 00°55'S, 76°11'W, (♀), *Cerón & Hurtado 4092* (MO, NY); Aguarico, Reserva Etnica Huaorani, Carretera y oleoducto de Maxus em construcción, 00°56'S, 76°13'W, (♀), *Dik 1472* (MO, NY, QCNE); Aguarico, Reserva Etnica Huaorani, Carretera y oleoducto de Maxus em construcción, (♀), *Dik & Ahue 1601* (MO, QCNE); Aguarico, Reserva Etnica Huaorani, 00°53'S, 76°14'W, (♂), *Pitman & Delinks 407* (MO).—ORELLANA: Sector Huashito, 20 km al norte de Coca, 00°20'S, 77°05'W, (♀), *Gudiño 65* (MO).—PASTAZA: Pastaza Canton, Pozo petrolero "Masaramu" de UNOCAL, 40 km de Montalvo, 00°44'S, 76°52'W, (♂), *Gudiño 312* (F, MO). **French Guiana.** UNKNOWN DISTRICT: unknown locality and date, (♀), *Aublet 1835* (BM, MO, S); unknown locality, (♀), *Martin F639240* (BR, F, MO, U); unknown locality, (♂), *Mélinon 448* (P); unknown locality, (♂), *Mélinon 457* (A, G, P, U); unknown locality, 1864 (♀), *Mélinon s.n. (P06855175)*; unknown locality, (♂), *Mélinon s.n. (NY, P06855176)*; unknown locality, (♀), *Mélinon s.n. (P06855194)*; unknown locality, (♀), *Mélinon s.n. (P06855206)*; unknown locality, (♀), *Mélinon s.n. (P06855209)*; unknown locality, (♂), *Mélinon s.n. (P06855210)*; unknown locality, (♂), *Mélinon s.n. (NY, P06855211)*; unknown locality, (♂), *Mélinon P06855212* (NY, P); unknown locality and date, (♂), *Poiteau s.n. (LE)*.—CAYENNE: Cayenne, Haute Camopi, bord de la rivière au pied du versant nord, (♀), *Granville 7152* (CAY, INPA, MO, NY, P); Trois Sauts-Chemin de YU-NI, (♀), *Lescure 343* (CAY, P); Trois Sauts-Chemin, (♀), *Lescure 342* (CAY, P, U). Station de Recherche Experimentale de Paracou, 05°15'N, 52°56'W, (♀), *Poncy et al. 1725* (CAY, P); Piste de St Elie, 05°17'N, 53°03'W, (♀), *Prévost 4265* (CAY, MO, P); Cacao, chantier B. D. O. env 60 km S. de Cayenne, (♂), *Oldeman 1243* (CAY, IAN, MO, NY, P).—SAINT-LAURENT-DU-MARONI: Saül, Monts La Fumée, (♂), *Boom & Mori 2411* (NY); Maroni, Commne de Saint

Laurent, Crique Voltaire, (♀), *Halle 4501* (U); Saül, On Route de Belizon north of Eaux Claires, 03°37'N, 53°00'W, (♀), *S. A. Mori et al. 21578* (CAY, NY); Saül, Vicinity of Eaux Claires, on the Sentier Botanique, 03°37'N, 53°12'W, (♀), *S. A. Mori et al. 22117* (NY, U); Acarouany, (♂), *Sagot 517bis* (P); La Mana, (♀), *Sagot 990bis* (G); Godebert, (♀), *Wachenheim 232* (P); Godebert, 13 Jul 1921 (♀), *Wachenheim s.n.* (P00685517). **Guyana.** CUYUNI-MAZARUNI: upper Mazaruni R., Kako R., (♂), *Tillett et al. 45495* (U).—POTARO-SIPARUNI: Southern Pakaraima Mountains, Kamana falls, (♂), *Maguire et al. 45945A* (MG, NY, US).—UPPER TAKUTU-UPPER ESSEQUIBO: Rupununi, (♂), *Jansen-Jacobs et al. 2860* (F, MO, NY, P, U). **Peru.** AMAZONAS: Monte Chichijam, (♀), *Ancuash et al. 290* (F, GH, MO); Bagua, Comunidad Aguaruna de Putuim, (♀), *C. Díaz et al. 7061* (MO); Distrito Imaza, Comunidad Aguaruna de Wanás, (♀), *C. Díaz et al. 8051* (F); Rio Santiago, nr. Caterpiza, (♀), *Huashikat 431* (BG, MO); Rio Santiago, Caterpiza, (♀), *Huashikat 966* (BG); Rio Santiago, Caterpiza, (♀), *Huashikat 1432* (U); Rio Santiago, Caterpiza, (♀), *Huashikat 1482* (BG); Rio Santiago, Caterpiza, (♀), *Huashikat 1525* (MO); Distrito Imaza, Región Nororiental del Marañon, 04°55'S, 78°19'W, (♀), *N. Jaramillo & Peas 557* (MIN, MO); Rio Cenepa, Quebrack Yutai-entsa, (♀), *Kayap 201* (F, GH, NO); Camino de Kusu, Rio Cusu, Yucui, (♀), *Kayap 571* (GH); Huambisa, Shuiya, Valle del Río Santiago, Quebrada Caterpiza, 03°50'S, 77°40'W, (♀), *Tunqui 173* (MO, U); Rio Santiago, Quebrada Caterpiza, (♀), *Tunqui 217* (BG); Alto Amazonas, Pongo de Manseriche, (♀), *R. Vásquez & Chavez 25027* (F).—LORETO: Rio Tacsha, Curaray, (♂), *Croat 20447* (C, DUKE, F, GH, MO, MIN, NY); Maynas, Dtto. Fernando Lores, Rio Amazonas, Isla de Aguajal, aprox. 2 horas de Tamshiyacu, (♀), *Rimachi Y. 8770* (F, MO, NY, US); Maynas, San Antonio; Rio Pintuyacu, 03°40'S, 73°54'W, (♂), *R. Vásquez et al. 7469* (F, MO, NY); Maynas, Distrito Sargento Lores, Constancia, 04°09'24"S, 72°57'41"W, (♀), *R. Vásquez et al. 22745* (MO).—MADRE DE DIOS: Manu, Parque Nacional del Manu, Pakitsa Station, 11°56'S, 71°16'W, (♀), *R. B. Foster &*

Baldeon 12685 (F, US). **Suriname.** MAROWIJNE: Marowijne R., (♂), *Kappler 1272* (LE, M, P).—SIPALIWINI: Grote Zwiebelzwamp, (♀), *Lanjouw & Lindeman 399* (NY, U). **Venezuela.** AMAZONAS: Upper Rio Orinoco, (♀), *Croizat 962* (F, US); Atabapo, Cabeceras del Río Yudi, 05°21'N, 65°01'W, (♀), *Delgado 1625* (NY); Río Caiquiare, Río Vaciva and Río Yatua, (♂), *Spruce 3176* (C, CGE, E, GH, GOET, MG, NY, OXF, P, TCD).—BOLÍVAR: Mpio Raúl Leoni, a 3 km de la base el Cerro Camarón, 05°43'N, 64°07'W, (♀), *Aymard & A. Fernandez 7188* (F, MO, NY); Merida, Río Icabaru and Río Hacha, (♀), *Bernardi 2808* (G, NY); Municipio Raul Leoni, Río Ariza, a 55 km al NE de San Francisco de la Paragua, 07°11'N, 64°13'W, (♀), *Delgado 191* (MO, NY, US); Municipio de Urdaneta, Río Chinarok, (♀), *Hernández 317* (BG); Roscio, El Abismo, 2-3 km upstream to the E on the Rio Samay from Samay Camp, 04°27'N, 61°34'W, (♀), *Holst & Liesner 2421* (MO, NY); Boca Nichara, Rio Nicharo, afluente izquierdo del río Coura, (♀), *Knab-Vispo 312* (MO); 5 km S of El Paujl, El Abismo, Río Samay, 04°23'N, 61°38'W, (♂), *Liesner & Holst 18836* (MO); Cuadrícula de Investigación, campamento Dedemai, Rio Tabaro, 06°21'30"N, 63°34'50"W, (♂), *Salas 135* (MO, VEN); between Río Chicanan and Río Ayaiche, 06°05'N, 62°00'W, (♂), *Steyermark 89452* (NY, VEN); Sierra Ichun, Salto Maria Espuma, 04°46'N, 63°18'W, (♂), *Steyermark 90408* (NY); Plar, Guadaquen, Budaquenú, río Acanán affluent of rio Carrao, 05°56'N, 62°17'W, (♀), *Steyermark et al. 131962* (MO, NY); El Tigre, Bajo Caura, (♀), *LI. Williams 12008* (F, S, US, VEN).

Benoist (1922: 318) described *Pourouma melinonii* with lamina always entire “limbus saepius integer” and base truncate. In fact, the most part of collections of this species shows only entire lamina, but some collections has palmatilobed lamina with 3 lobes (e.g., Mori & Cardoso 17478, MG), which we also verified during the field trips.

This species belongs to the group of species with adaxial lamina surface smooth, basal secondary veins branched, staminate inflorescences in glomerules, and staminate perianth connate.

Our molecular analyses (Chapter 1, Fig. 5) provided a strong support (BP = 92, PP = 0.96) to *Pourouma melinonii* within clade IV (*P. essequiboensis*, *P. maroniensis*, *P. melinonii*, *P. mollis*, and *P. ovata*), in which was more closely related to *P. essequiboensis* (BP = 90, PP = 0.97).

Morphologically, *Pourouma melinonii* presents similarities with *P. essequiboensis*, due to the adaxial lamina surface smooth, staminate inflorescences in glomerules, and staminate perianth connate, but distinguished from *P. essequiboensis* by whitish, arachnoid indument restrict to the tertiary, quaternary veins and areoles (versus on many parts of the plant), lamina usually entire (versus palmatifid to palmatipartite lamina with 3–7 lobes), and glomerule 3–5 mm in diameter (versus glomerule 2–3 mm in diameter).

Berg & Heusden (1988: 108) synonymized *Pourouma apaporiensis* and *P. apaporiensis* forma *macrophylla* in *P. melinonii*. Furthermore, these authors proposed *Pourouma melinonii* subsp. *glabrata* as a new subspecies, distinguishing from *P. melinonii* subsp. *melinonii* by the lamina 3–5 parted with base more or less deeply cordate and the subglabrous fruiting perianth.

Nevertheless, *Pourouma melinonii* is distinguished from *P. apaporiensis* by lamina usually entire (versus palmatifid to palmatipartite with 3–7 lobes) with base obtuse, rounded to truncate, or subcordate (versus cordate to deeply cordate), glomerule glomerule 3–5 mm diameter with 10–30 flowers (versus glomerule 5–12 mm in diameter with 30–50 flowers).

Furthermore, the collections of *Pourouma melinonii* subsp. *glabrata* match with the diagnostic characters of *P. apaporiensis*. For this reason, we synonymized of *P. melinonii* subsp. *glabrata* in *Pourouma apaporiensis*.

25. *Pourouma minor* Benoist, Bull. Mus. Nat. Hist. (Paris) 30: 103. 1924; Berg & Dewolf, Fl. Suriname 5(1): 278. 1975; Burger, Fieldiana Bot. 40: 202, t. 22. 1977; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 110. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 186. 1990; Berg, Fl. Guianas 11(22): 119. 1992; Berg & Franco-Rosselli, Fl. Ecuador 27A: 95. 1993; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez.: 248. 2000; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.—TYPE: FRENCH GUIANA. Saint Jean de Maroni, 17 Mar 1914 (♀), *Benoist 960* (lectotype, designated by Berg 1975: P00756800!; isolectotype: P00756799!).

Pourouma aurea Ule ex Mildbr., Notizbl. Bot. Gart. Berlin-Dahlem 10: 418. 1928; Berg & Dewolf, Fl. Suriname 5(1): 278. 1975; Berg, Fl. Venez.: 248. 2000.—TYPE: BRAZIL. Amazonas: Rio Jurua Miry, Aug 1901 (♂), *Ule 5718* (holotype: B!; isotypes: G image! K! MG!).

Pourouma folleata J.F. Macbr., Publ. Field Mus. Nat. Hist., Bot. Ser., 8(2): 114. 1930; Berg, Fl. Venez.: 248. 2000.—TYPE: PERU. Junin: Chanchamayo valley, 1924–1927 (♂), *C. Schunke 416* (holotype: F!; isotype: B image!).

Pourouma isophlebia Standl., Publ. Field Mus. Nat. Hist., Bot. Ser., 17: 182. 1937; Berg & Dewolf, Fl. Suriname 5(1): 278. 1975; Berg, Fl. Venez.: 248. 2000.—TYPE: BRAZIL. Amazonas: Municipality São Paulo de Olivença, near Palmares, 11 Sep–26 Oct 1936 (♀), *Krukoff 8073* (holotype: NY!; isotypes: A image! BM! BR image! F! G image! K! LE image! MICH image! MO! P! S image! U! US image!).

Pourouma subplicata Standl., Publ. Field Mus. Nat. Hist., Bot. Ser., 17: 184. 1937; Berg & Dewolf, Fl. Suriname 5(1): 278. 1975; Berg, Fl. Venez.: 248. 2000.—TYPE: BRAZIL.

Acre: Basin of Rio Purus, near mouth of Rio Macauhan, tributary of Rio Yaco, 09°20'S, 69°00'W, 4 Aug 1933 (♀), *Krukoff 5282* (holotype: F!; isotypes: A image! BM! G image! LE image! LP image! M! MO! NY! S image! U! UC image! US!).

Pourouma umbellata Standl., Publ. Field Mus. Nat. Hist., Bot. Ser., 17: 185. 1937; Berg & Dewolf, Fl. Suriname 5(1): 278. 1975; Berg, Fl. Venez.: 248. 2000.—TYPE: BRAZIL. Amazonas: Municipality Humayta, on plateau between Rio Livramento and Rio Ipixuna, 7–18 Nov 1934 (♀), *Krukoff 7071* (holotype: F-874043!; isotypes: A image! BR image! F-874049! G image! GB image! K! LE image! MO! NY! RB! S image! U! US!).

Coussapoa emarginata Killip ex J.F. Macbr., Publ. Field Mus. Nat. Hist., Bot. Ser., 13(2.2): 296. 1937; Berg, Fl. Venez.: 248. 2000.—TYPE: PERU. Loreto: Mishuyacu, near Iquitos, 24–28 Sep 1929 (♀), *Killip & A. C. Smith 29955* (holotype: US!; isotypes: B image! F! NY!).

Pourouma cuatrecasii Standl. in Cuatrec., Revista Acad. Colomb. Ci. Exact. 9(36/37): 339. 1956; Berg, Fl. Venez.: 248. 2000.—TYPE: COLOMBIA. Vaupes: Mandi, near Mitú, 24 Oct 1939 (♀), *Cuatrecasas 7299* (holotype: US!; isotypes: COAH! COL! F!).

Pourouma umbellifera Burger, Phytologia 26(6): 430. 1973; Berg, Fl. Venez.: 248. 2000.—TYPE: COSTA RICA. Heredia: Istarú Farm, Tirimbina, Sarapiquí, 21 Jan 1972 (♀), *Lent 2327* (holotype: F-1706528!; isotypes: B image! BM! COL! CR image! EAP image! F-1725363! GH image! LE image! MEXU image! MO! NY! U image! UC image! US image!).

Tree, 10–35 (–40) m tall, 10–40 (–50) cm d.b.h., with stilt roots. Leafy twigs 3–20 mm in diameter, with indument yellowish, sericeous, hirtellous to hirsute or sometimes with indument sparse, whitish, puberulous or glabrous; internode 4–25 (–40) mm long. Lamina entire, (2.5–) 4–

35 (–45) cm long, (1.5–) 2.5–15 (–17.5) cm wide, length:width ratio 1.4–2.7, elliptic to obovate to oblong, rarely ovate, coriaceous; base acute to obtuse to rounded; margin usually repand, with indument sparse, whitish, sericeous; apex acuminate to acute to mucronate or rounded to emarginate; adaxial surface smooth, indument of veins yellowish, sericeous to hirtellous and sometimes with brownish, multicellular trichomes; abaxial surface smooth, indument of veins dense, yellowish, sericeous to velutinous; venation brochidodromous; secondary veins (6–) 8–22 (–24) pairs per leaf, basal pair unbranched, diverging from the midrib at an 25° – 50° ; tertiary and quaternary veins slightly prominent to plane, with whitish, arachnoid indument confined to the areoles, tertiary and quaternary veins; petiole 2–8.5 (–9.5) cm long, with indument yellowish, sericeous to velutinous to hirsute, domatia absents; stipules 1–13.5 (–17.5) cm long, with indument yellowish, sericeous to velutinous to hirsute outside, glabrous inside, caducous. Staminate inflorescences 3–14 (–16.5) cm long, 2.5–8.5 (–11.5) cm wide, primary branched 3–4; peduncle 1–7.5 cm long, peduncle and branches with indument yellowish, sericeous to velutinous; flowers ca. 250–950, flowers organized in 14–48 fascicles, diffusely distributed along the ultimate branches; fascicle 3–8 mm in diameter, ca. 4–28 flowers per fascicle. Staminate flowers 1–2 mm long, 1–2 mm wide; subsessile to pedicellate; tepals 3–4, 1–2 mm long, 0.2–0.4 mm wide, lanceolate to oblong, free or basally connate, glabrous or with indument sparse, yellowish, sericeous; filaments 0.5–1 mm long, free, shorter than the perianth. Pistillate inflorescences 2.5–5.5 (–7.5) cm long, 1–2.5 (–4.5) cm wide; peduncle 1–3.5 cm long, peduncle and branches glabrous or with indument sparse, yellowish, sericeous to velutinous; flowers 2–11, flower organized in 2–3 cymes. Pistillate flowers 3–8 mm long, 2–3 mm wide; pedicel 2–4 mm long; perianth 2–6 mm long, with indument yellowish, velutinous to sericeous; stigma multilobed, 2.8–6 mm in diameter, oblate to globose. Infructescences (4.5–) 6–12.5 (–14.5) cm long, 3–8.5 (–9.5) cm wide; peduncle 2.5–8 cm long; fruiting pedicel 1–3.5 cm long.



FIG. 59. *Pourouma minor*. A. Leafy twig with staminate inflorescence B. Staminate flower. [A-B: from Gaglioti et al. 160 (SP)]

Fruiting perianth 1.2–2.3 cm long, 1–1.5 cm wide, ovoid, apiculate, red to vinaceous, glabrous or with indument sparse, yellowish, velutinous to sericeous. Achene 1–2.5 mm long, 8–12 mm wide. Seed 5–15 mm long, 5–10 mm wide, ovoid to elliptic, vinaceous. Fig. 2 C; Fig. 8 A; Fig. 10 B; Fig. 16 A; Fig. 59.

Phenology. Staminate flowers collected throughout the year, pistillate flowers from June to October and fruits along all the year.

Distribution (Fig. 60). North of Brazil (Acre, Amapá, Amazonas, Maranhao, Mato Grosso, Pará, Rondônia and Roraima), French Guiana (Cayenne and Saint-Laurent-du-Maroni), Suriname (Marowijne, Nickerie and Sipaliwini), south of Guyana (Upper Takutu-Upper Essequibo), south of Venezuela (Amazonas and Bolívar), Colombia (Amazonas, Caquetá, Meta, Valle del Cauca and Vaupes), central of Panama (Cocle), Costa Rica (Alajuela, Guanacaste, Heredia, Limon and San Jose), east of Ecuador (Morona-Santiago, Napo, Orellana, Pastaza and Zamora-Chinchipe), east of Peru (Amazonas, Huánuco, Loreto, Madre de Dios, Pasco, Pucallpa and San Martin), central-northeast of Bolivia (Beni, Cochabamba, La Paz, Pando and Santa Cruz), often in “terra firme” forest of the Amazonian region and moist forests of the Central America, frequently in lowland moist areas, usually in riparian forest, at an elevation of about 50 to 1500 m above sea level.

Vernacular Name. The epithet refers probably to the smaller size of the leaf.

Etymology. Ambaibo lija (Bolivia, Cochabamba); palo blanquillo (Bolivia, La Paz); ambaibochi, ambaibillo (Bolivia, Pando); torém, torém-abacate (Brazil, Acre); mapatirana (Brazil, Amapá); embaubarama, imbaúbarana, puruma, tourém (Brazil, Amazonas); ama'y-rary-tuwyr (Brazil, Maranhao); caramuri, imbaubarana, torena (Brazil, Mato Grosso); mapati (Brazil,

Amapá); blanquesino, caimarón de monte (Colombia, Amazonas); uva caimarona (Colombia, Caquetá); uva silvestre (Colombia, Vaupes); kulumasi (French Guiana, Cayenne); bois-canon, bois-canon-male, bouchi-papaie, papaye (French Guiana, Saint-Laurent-du-Maroni); sacha uvilla, sacha uvilla chica, shuvija (Peru, Amazonas); uvilla, uvilla blanca (Peru, Huánuco); uvilla lanuda (Peru, Loreto); boromang, bospapaja, granboesipapaja (Suriname, Marowijine); cay-waricay-yek, coiwaricoi-yek, kai-wa-rei-kei-yek, majagua, sarasaradek (Venezuela, Bolívar).

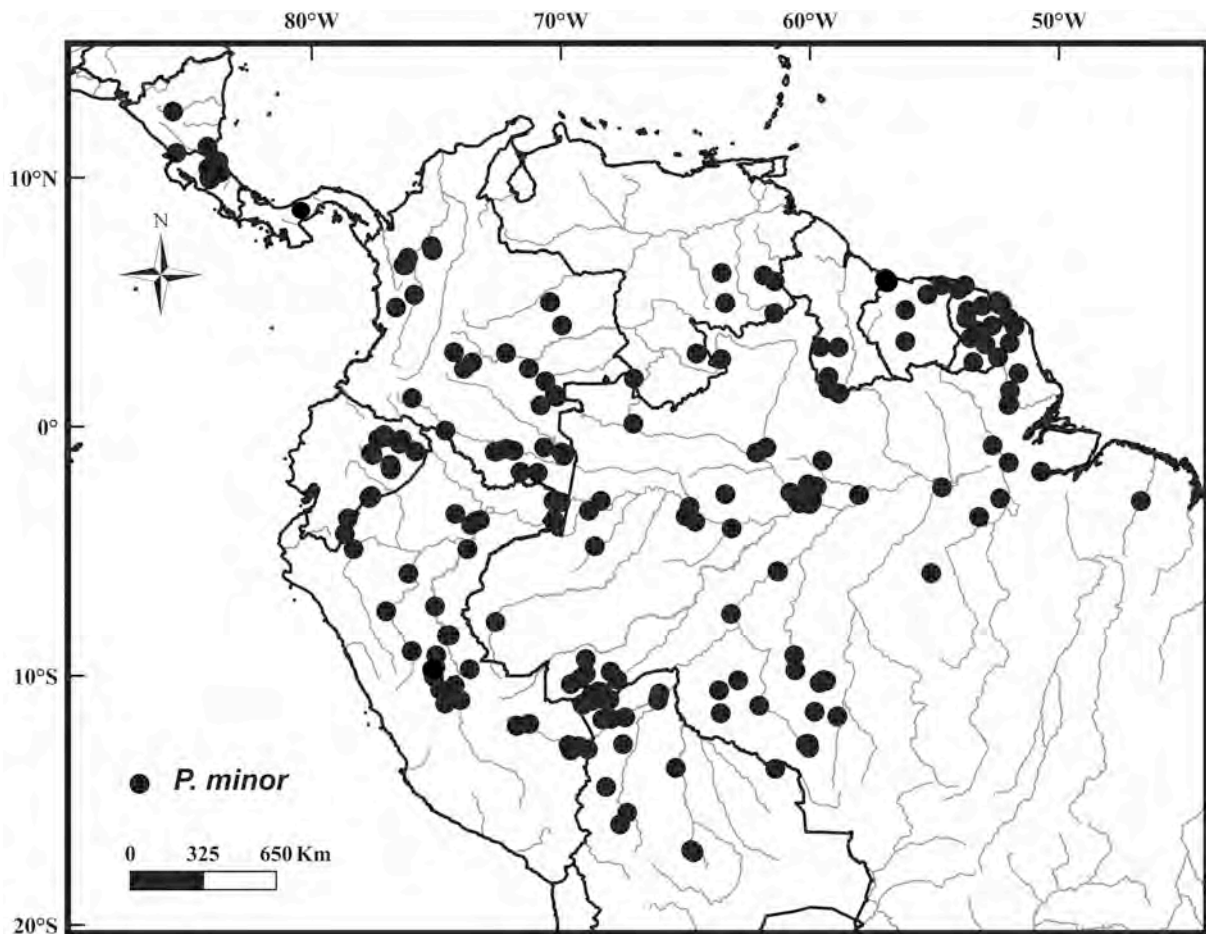


FIG. 60. Distribution of *Pourouma minor*.

Use. Fruits edible for man and monkeys; fuel stuff (wood); pulp paper.

IUCN conservation status. *Pourouma minor* is widely distributed with the extent of occurrence of ca. 6,198,870 Km². Also, *P. minor* is well represented in herbaria. For these reasons *P. minor* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Bolivia.** BENI: Vaca Diez, Santa Maria, 5 km southeast of Riberalta, 10°59'S, 66°06'W, (♀), *Chatrou et al.* 412 (NY); Ballivian, san Borja cerca a la Embocada, (♀), *Meneces & Hartshorn* 2203 (NY).—COCHABAMBA: Carrasco, Estacion experimental Valle del Sajta, 17°00'S, 64°46'W, (♂), *Mendoza & Arroyo* 500 (NY); Carrasco, Estacion Experimental Valle del Sajta, 17°00'S, 64°46'W, (♂), *Mendoza & Arroyo* 1227 (NY).—LA PAZ: Abel Iturralde, Parque Nacional Madidi, sobre el camino de Apolo a San Jose, 14°27'48"S, 60°11'00"W, (♀), *Seidel et al.* 9350 (NY); Nor Yungas Provincia, NW of San Pedro on road through Incahuara-Mejillones and along trail to 12 de Octubre, 15°58'S, 67°37'W, (♂), *Solomon et al.* 9254 (NY, MBM); Sud Yungas, Alto Beni, Serrania de Marimonos, 15°30'S, 67°20'W, (♂), *Steidel & Humadai* 4871 (NY).—PANDO: Nicolas Solaris, (♀), *Beck et al.* 19066 (MG); Manuripi, Trocha entre el campamento Bay y curichón, (♀), *Beck et al.* 19507 (MG); Manuripi, 35 km al norte de Puerto América, 11°44'S, 67°59'W, (♀), *Jardim* 892 (F); Madre de Dios, 30 km al Sur del Río Madre de Dios, Concesión de Mobil Oil, 11°40'S, 67°25'W, (♂), *Killeen* 3899 (NY); Madre de Dios, 32 km al Sur del Río Madre de Dios, G. Moreno, Concesión de Mobil Oil, 12°45'S, 67°30'W, (♀), *Killeen* 3954 (F); Nicolas Suarez, Carretera Bobija, (♀), *Meneces* 725 (INPA); Triunfo, 54 km SW Cobija, 11°10'S, 69°07'W, (♀), *R. T. Pennington et al.* 25 (F); Triunfo, 54 km SW Cobija, 11°10'S, 69°07'W, (♂), *R. T. Pennington et al.* 29 (F); Triunfo, 54 km SW Cobija, 11°25'S, 69°05'W, (♂), *R. T. Pennington et al.* 87 (F); Triunfo, 54 km SW Cobija, 11°25'S, 69°05'W, (♀), *R. T. Pennington et al.* 95 (F); W. Bank of Rio Madeira,

3 Km above Abuña, (♀), *G. T. Prance et al.* 8378 (INPA, MG, NY); Nicolas Suarez, Southwest of Cobija on the Rio Naraueda, (♂), *Sperling & King* 6430 (NY).—SANTA CRUZ: Velasco, Parque Nacional Noel Kemff, 13°44'02"S, 61°23'17"W, (♂), *Guillén et al.* 4009 (F); Velasco, Parque Nacional Noel Kemff, 13°44'02"S, 61°23'17"W, (♂), *Guillén et al.* 4014 (F). **Brazil.** ACRE: Mun. Braziléia, Serrigal Poromgaba, 10°51'S, 68°48'W, (♂), *Daly et al.* 6740 (INPA, MO, NY); Mun. Braziléia, Serrigal Poromgaba, 10°51'S, 68°48'W, (♀), *Daly et al.* 6741 (INPA, MO, NY); Mun. Braziléia, Serrigal Poromgaba, 10°51'S, 68°48'W, (♀), *Daly et al.* 6743 (INPA, MO, NY); Mun. Braziléia, Serrigal Poromgaba, 10°45'S, 68°45'W, (♀), *Daly et al.* 6995 (INPA, NY); Mun. Braziléia, Serrigal Poromgaba, 10°45'S, 68°45'W, (♀), *Daly et al.* 7095 (INPA, MO, NY); Brasiléia, Reserva Extrativista Chico Mendes, Seringal Poromgaba, (♂), *C. A. Cid Ferreira et al.* 10151A (INPA, MO, NY); Abuna-Rio Branco hwy., km 242–246, (♂), *Forero et al.* 6367 (C, INPA, K, MO, NY, R, S, UC, US); Senador Guimard, Reserva Experimental Catuaba, (♂), *Gaglioti et al.* 153 (SP); Brasiléia, Km 16 from Brasileia to Assis Brasil, (♀), *Lowrie et al.* 710 (INPA, MG, MO, NY, R, RB, U); Sena Madureira, (♀), *G. T. Prance et al.* 7792 (A, F, GH, INPA, K, M, MG, NY, P, R, S, U, US); Senador Guimard, Area de Estudos Florestais, BR-317, km 68, (♀), *Rego et al.* 735 (NY); Area de Estudos Florestais, BR-317, (♂), *Saraiva* 1454 (UFACPZ); Brasiléia, Serigal Montevideo, (♀), *N. T. Silva* 3498 (IAN); Senador Guimard, Area de Estudos Florestais, BR-317 km 68, (♂), *Walthier et al.* 38 (NY).—AMAPÁ: unknown locality, (♀), *Basto* 2220 (RB); Serra do Navio, Parque Nacional Municipal do Canção, 00°53'N, 52°22'W, (♂), *Gaglioti et al.* 160 (SP); about 2 km east of Confluence of Rio Oiapoque and Rio Iaue, 00°54'16"N, 52°00'39"W, (♂), *Irwin et al.* 47874 (F, FHO, GH, IAN, MG, NY, RB, SP, US); Oiapoque, Rio Oiapoque, 2,5 km south of Rio Yaroupi, 02°47'N, 52°27'W (♂), *Irwin et al.* 48468 (IAN, K, M, MG, NY, P, RB, UC); Calçoene, Rio Araguari, Cachoeira Santa Maria, 01°26'N, 51°58'W, (♂), *Pires et al.* 50419 (FHO, G, IAN, MG, NY, S, US); 40 min up Rio

Falcino, 00°57'N, 51°29'W, (♂), *Pires et al. 50941* (F, IAN, MO, NY, SP); Serra do Navio, (♀) *Pires et al. 51247* (GH, IAN, MG, MO, NY, U, US).—AMAZONAS: Alvarães, Rio Solimões, margem direita, lago de Alvarães, 03°13'S, 64°50'W, (♂), *Amaral et al. 666* (F, INPA, NY, RB); Reserva Florestal Ducke, Manaus-Itacoatiara, km 26, 02°53'S, 59°58'W, (♂), *Assunção et al. 559* (BG, INPA, K, MG, MO, NY, RB, SP, U); Uaupés, flancos da Serra São Gabriel, (♀), *Cavalcante 606* (HB, MG); Distrito Agropecuário, Reserva 1501, Distrito Agropecuário, ZF3, 02°24'26''S, 59°43'40''W, (♂), *N. M. L. Cunha et al. 343* (INPA, NY); Manaus-Itacoatiara rd., Reserva Florestal Ducke, (♂), *Duarte 7194* (HB, INPA, M, RB, SP, U); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR 174, Km 64 depois 27 Km Leste na ZF3, Fazenda Esteio, Distrito Agropecuário, ZF3, (♂), *A. J. C. Ferreira et al. INPA/WWF1201.872* (INPA); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR 174, Km 64 depois 27 Km Leste na ZF3, Fazenda Esteio, Distrito Agropecuário, ZF3, (♀), *A. J. C. Ferreira et al. INPA/WWF3209.910* (INPA); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR 174, Km 64 depois 27 Km Leste na ZF3, Fazenda Esteio, Distrito Agropecuário, ZF3, (♀), *A. J. C. Ferreira et al. INPA/WWF3209.1212* (INPA); Itapiranga, Rio Uatumã, margem esquerda, em frente a boca do Rio Pitinga, Rio Uatumã-Rio Pitinga, (♂), *C. A. Cid Ferreira et al. 721* (HB, INPA, MG, MO, NY); Tefé, Lago Tefé, (♀), *C. A. Cid Ferreira et al. 10102* (NY); Coari, margem direita do Rio Solimões, (♀), *C. A. Cid Ferreira et al. 12227* (INPA); Novo Airão, Rio Capitarí, margem esquerda, (♂), *R. L. Fróes 26488* (IAN); Humaitá, Fazenda de Arlindo Marmentini, estrada 319 km 686, Campo para Leste da Estrada 2 Km, (♂), *Janssen 477* (INPA); Manicoré, near Santa Fé, (♀), *Krukoff 6041* (A, B, BR, F, K, LE, MO, NY, S, U, US); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR 174, Km 72 depois 6 Km Oeste da BR, Fazenda Esteio, (♂), *Mackenzie et al. INPA/WWF2206.1564* (INPA); Distrito Agropecuário, Reserva 1501, Distrito Agropecuário, ZF3, 02°24'26''S, 59°43'40''W, (♂), *Mori et al. 20192* (K,

NY); Presidente Figueiredo, Reserva ZF-3, BR 174, Km 64, (♂), *A. C. A. Oliveira et al.* 232 (INPA); Manaus, Distrito Agropecuário, 90 Km NNE de Manaus, Reserva 1501, Km 41 of Distrito Agropecuário, 02°24'26"S, 59°43'40"W, (♂), *A. C. A. Oliveira et al.* 241 (INPA, NY); Manaus, Reserva 1501, Km 41 do PDBFF, 90 Km NNE de Manaus, Distrito Agropecuário, ZF3, 02°24'26"S, 59°43'40"W, (♀), *A. C. A. Oliveira & Assunção* 1080 (INPA, NY, SPF); Manaus, Estrada do Acará, lado esquerdo no sentido aloj.-torre, Reserva Florestal Ducke, (♀), *J. E. L. S. Ribeiro et al.* 1795 (IAN, INPA, MG, MO, NY, RB, SP); Serra de S. Gabriel-Vaupes, Rio Negro, (♀), *J. S. Rodrigues et al.* 84 (IAN); upper Rio Negro Uaupes, (♀), *W. A. Rodrigues* 884 (U); Manaus-Itacoatiara rd., Reserva Florestal Ducke, (♂), *W. A. Rodrigues* 7532 (INPA); Tefé, Lago de Tefé, margem esquerda, Ponta de Catuiri, (♂), *W. A. Rodrigues et al.* 10182 (INPA); Manaus, Distrito Agropecuário da Suframa - Rodovia BR 174, Km 64, Fazenda Esteio, (♂), *Setz* 946 (INPA, UEC); Manaus, Distrito Agropecuário da Suframa, BR 174, Km 64, Fazenda Esteio, (♂), *Setz* 1211 (INPA, UEC); Manaus, Rio Candeias, (♀), *J. F. Silva* 126 (IAN); estrada Manaus-Porto Velho, entre os rios Castanho e Tapuna, (♂), *M. F. Silva et al.* 903 (INPA); Manaus, (♀), *Sothers & E. C. Pereira* 773 (INPA, K); Manaus, Projeto Dinâmica Biológica de Fragmentos Florestais, Km 37, 02°45'S, 59°49'W, (♂), *Zartman* 6034 (INPA).—MARANHÃO: Mun. Carutapera, Gurupiuna, Ka'apor Indian Reserve, affluent of rio Gurupi, (♀), *Balée & B. Ribeiro* 2710 (K, MO); Carutapera, Gurupiuna, Ka'apor Indian Reserve, affluent of Rio Gurupi, (♀), *Balée* 2804 (NY); Carutapera, Gurupiuna, Ka'apor Indian Reserve, affluent of Rio Gurupi, (♀), *Balée & Ribeiro* 2823 (NY).—MATO GROSSO: Aripuanã, 27 km da cidade em direção sudoeste, 10°16'57"S, 59°36'20"W, (♀), *Árbocz et al.* 4237 (ESA, MT, UEC, UNIP); Aripuanã, Rio Arapuanã, Dardalenos, (♂), *M. R. Cordeiro* 140 (IAN, US); Aripuanã, (♂), *M. Gomes & Mota* 2170 (INPA); Comodoro, Fazenda Dolce Vitta, 12°44'19"S, 60°03'04"W, (♂), *Ivanauskas et al.* 2196 (ESA, MT, UEC); Aripuanã, (♂), *O. P. Monteiro & Leite* 1119 (INPA, MO); Aripuanã,

Road from Humboldt Centre to airport, 10°12'S, 59°21'W (♀), *G. T. Prance et al. 18204* (F, INPA, MG, MO, NY, P, R); Aripuanã, (♀), *Rylands 25* (INPA); Aripuanã, INPA-Humboldt, Núcleo de Pesquisa INPA/ARIPUANÃ, (♀), *Rylands 66* (INPA); Aripuanã, Rio Juruena, arredores do aeroporto, (♂), *M. G. Silva & Maria 3379* (IAN, INPA, MG, NY); Aripuanã, Km 245, BR 174, (♀), *M. G. Silva & Pinheiro. 4326* (F, HAMAB, MG, NY, RB); Aripuanã, BR 174, estrada para o aeroporto (♂), *M. G. Silva & Rosário 4738* (MAC, MG, NY); Município de Vila Bela da Santíssima Trindade, 4 km S of border with Rondônia, 12°54'S, 60°02'W (♀), *Thomas et al. 4794* (BG, F, INPA, K, MO, NY, SPF).—PARÁ: Santarém, Santa Rosa, Planalto de Santarém, (♀), *Fróes 31486* (IAN); Almeirim, Monte Dourado, Gleba S. Militão, Reserva Genética do Jari, (♂), *Pires & N. T. Silva 1413* (INPA, MG, NY); BR-163-Cuiabá-Santarém highway; km 919, (♀), *G. T. Prance et al. P25336* (F, K, MG, MO, NY, RB, U, UEC); Melgaço, localidade Vitória comarca de Breves, (♂), *Rosário & Graça 1266* (MG).—RONDÔNIA: Município de Presidente Medici, rd. Cuiaba-Pôrto Velho, km 300, (♂), *C. A. Cid Ferreira et al. 4798* (BG, INPA, MG, RB); Município de Ouro Preto, BR 364, estrada Cuiabá-Porto Velho, Km 353, (♂), *C. A. Cid Ferreira et al. 4919* (BG, INPA, MG, RB); Porto Velho, Estrada da Serra do Balateiro, 10°35'S, 63°39'W, (♂), *C. A. Cid Ferreira 8887* (F, INPA, K, MO, NY); Presidente Médici, RO 429, km 110, (♀), *M. G. Silva 6595* (IAN, INPA, NY); Município de Pimenta Bueno, estrada do Rio Pimenta Bueno, 12°45'S, 60°10'W, (♀), *Vieira et al. 985* (INPA, MO, NY, R, RB, U).—RORAIMA: Serra dos Surucucus, 02°47'N, 63°36'W, (♀), *G. T. Prance et al. 10089* (G, INPA, K, NY, R, S, U, US); Serra dos Surucucus, 02°47'N, 63°36'W, (♀), *G. T. Prance et al. 10124* (HB, INPA, K, MG, NY, S, SP, U, US); Rio Negro, left bank of Parana do Marara, (♀), *M. R. Santos 172* (MG, U); Caracará, próximo a Vila de Caicubi, 01°01'43"S, 62°05'21"W, (♂), *Soler A. 36* (RB, SP). **Colombia.** AMAZONAS: Río Cuaviaro, (♀), *Acoro & R. Rodríguez 158* (COL); Aracuara, comunidad indígena de Villazul, tierra firme, (♀), *Duque et*

al. 730 (COAH); Município de Leticia, Parque Nacional Natural Amacayacu, parcela permanente, 03°48'33"S, 70°16'4"W, (♂), *J. S. B. Silva 2164* (COAH, SP); Município de Leticia, Parque Nacional Natural Amacayacu, parcela permanente, 03°48'33"S, 70°16'4"W, (♂), *J. S. B. Silva 2177* (COAH, SP).—AMAZONAS-VAUPES: Rio Apaporis, between Rio Kananari and Rio Pacoa, (♀), *Garcia-Barriga 13836* (NY); Rio Apaporis, between Rio Kananari and Rio Pacoa, (♀), *Schultes & Cabrera 14148* (COL, U).—ANTIOQUIA: Anorí, Vereda El Carmen, 07°15'N, 75°12'W, (♀), *Callejas et al. 8811* (NY); Urrao, Parque nacional Natural Las Orquideas, Las Orquídeas, Vereda Calles, 06°29'N, 76°14'W, (♀), *Pipoly et al. 17222A* (MO); Urrao, Parque nacional Natural Las Orquideas, Las Orquídeas, Vereda Calles, (♀), *Pipoly 17717* (MO); Frontino, corregimiento Nutinara, cuenca alta del Rio Cuevas, (♀), *D. Sanchez et al. 1547* (MO, NY); Anorí, 26 km S, 23 km W of Zaragoza, 07°13'N, 75°03'W, (♂), *Shepherd et al. 197* (COL); Anorí, Corr. Providencia, (♀), *Soejario 2917* (COL); Anorí, Corr. Providencia, (♀), *Soejario 3489* (COL); Between Dos Bocas and Anorí, (♂), *Soejarto et al. 4063* (A, COL, MO).—CAQUETÁ: Solano, río Peneya, Puerto Tokio, (♀), *Idrobo 8539* (COAH, COL); Milán, inspección de San Antonio de Jetuchá, resguardo indígena Gorgonia, (♀), *Trujillo WT228* (COAH).—CHOCÓ: Novita, Cerro Torra, (♀), *Forero et al. 3145* (RB, U).—META: Sierra La Macarena, Cerro El Castillo, (♀), *Idrobo 4940* (COL); Sierra de la Macarena, (♂), *Philipson et al. 2134* (COL, US); Uribe, PNN Tinigua, sierra Chamusa, (♀), *P. Stevenson 323* (COAH).—VALLE DEL CAUCA: Rio Anchicaya, Alto Yunda, (♀), *Hilty M-86* (MO).—VAUPES: Taraira, estación biológica Mosiro Itajura, Caparú, 3 km N del lago Taraira, 01°00'S, 69°49'W, (♀), *Defler 378* (COAH); San Joaquin, riberas del Río Inírída, (♂), *A. Fernandez 2019* (COL, US); Taraira, estación biológica Mosiro Itajura, Caparú, SE del departamento de Vaupes, 01°09'S, 69°52'W, (♀), *A. Rodríguez 8* (COL, COAH, NY). **Costa Rica.** ALAJUELA: along the Sarapiquí road, about 100m northeast of Corazon de Jesús, (♀), *Hartshorn 1431* (F, MO).—GUANACASTE: La Cruz,

Cordillera de Guanacaste, Estación Pitilla, 10°59'18"N, 85°25'39"W, (♀), *Moraga 140* (MO).—
 HEREDIA: along Cubujuqui road, 4 km south Horquetas, (♀), *Hartshorn 1224* (F, MO); Along
 Sarapiquí road, about 1/2 km northeast of Corazon de Jesus, (♂), *Hartshorn 1295* (F); Finca La
 Selva, OTS Field Station on the Río Puerto Viejo, (♀), *A. C. Smith 60* (MO); Finca la Selva, (♀),
D. N. Smith 346 (F); 4 km SW of La Virgen, 10°22'N, 84°09'W, (♂), *Stevens 13340* (F, MO).—
 LIMON: Pococi, Barra del Colorado, 10°38'39"N, 83°44'10"W, (♀), *Araya 712* (MO).—SAN
 JOSE: 5 km from Siquirres Turrialba, (♀), *Holdridge 6818* (F, MO). **Ecuador.** MORONA-
 SANTIAGO: Puerto Morona, Este río Morona, 02°51'N, 77°41'W, (♀), *Little Jr. et al. 539* (COL,
 NY); El Centro Shuar Pampants, Río Kankaim, (♀), *Warush 2072* (NY).—NAPO: La Joya de Los
 Sachas, Parque Nacional Yasuni, Carretera y oleoducto de Maxus em construcción, 00°41'S,
 76°28'W, (♂), *Dik 340* (F); Reserva Biológica Jatun Sacha, 8 Km río abajo de Puerto Miashualli,
 por el Río Napo, (♀), *Neill & Cerón 7570* (MO, NY); Estación Experimental INIAP, Reserva
 Florística El Chunchu, Payamino, 5 km al N. Coca, 00°25'S, 77°00'W, (♀), *W. Palacios & Neill*
1246 (MO, NY); Reserva Biológica 'Jatun Sacha', Río Napo, 8 km río abajo de Misahuallí,
 01°08'S, 77°33'W, (♂), *W. Palacios 1354* (NY); Reserva Biologica Jatun Sacha, 01°04'S,
 77°37'W, (♀), *W. Palacios 3133* (MO, NY); Añangu, (♂), *SEF 9159* (NY, U).—ORELLANA:
 Sector Huashito, 20 km al norte de Coca, 00°20'S, 77°05'W, (♀), *Espinoza 108* (NY); Estación
 Experimental INIAP-Payamino 5 km al N de Coca, 00°25'S, 77°24'W, (♂), *Neill et al. 7346*
 (NY).—PASTAZA: Pastaza, Pozo Petrolero Corrientes de UNOCAL, 35 km al sur del pueblo de
 Curaray, 01°43'S, 76°49'W, (♂), *Espinoza 283* (NY); Pastaza, Pozo Petrolero Corrientes de
 UNOCAL, 35 km al sur-sureste de Curaray, 01°43'S, 76°49'W, (♂), *Gudiño 712* (NY); Pastaza,
 Pozo petrolero "Ramirez", 20 km al sur de la población de Curaray, 01°32'S, 76°51'W, (♀), *Tak*
& Espinoza 4856 (MO).—ZAMORA-CHINCHIPE: along Río Nangaritza, 04°18'06,3"S,
 78°41'01,9"W, (♀), *Clark et al. 6501* (US). **French Guiana.** CAYENNE: Camp Eugène, Bassin du

Sinnamary, 04°51'N, 55°04'W, (♀), *Cremers & Granville 13605* (CAY); Route de Bélizon, between Eaux Claires and entrance to Layon Biche, 03°37'N, 55°12'W, (♀), *S. A. Mori et al. 23973* (NY, P).—SAINT-LAURENT-DU-MARONI: St. Laurent, (♀), *BAFOG 5042* (CAY, P); St. Laurent, (♀), *BAFOG 7152* (CAY, NY, P, U); St. Laurent, (♀), *BAFOG 7173* (CAY, NY, P, U); St. Laurent, (♀), *BAFOG 7261* (NY, P); St. Laurent, (♀), *BAFOG 7268* (CAY, NY, P, U); Saint Jean de Maroni, (♀), *Benoist 978* (P); Saül sur le tracé de la Crique Douille, (♀), *Granville B5441* (P); Trois Sauts, (♀), *Lescure 422* (CAY, P); S of Saül, (♀), *Leeuwenberg 11789* (U); Mont Galbao trail, near second creek, 03°37'N, 55°12'W, (♂), *S. A. Mori et al. 20881* (CAY, NY, P); Station des Nouragues; Bassin de l'Arataye, parcelle M 12, (♀), *Poncy 1015* (CAY, P); Station des Nouragues; Bassin de l'Arataye, parcelle M 12, (♀), *Poncy 1812* (CAY, K, MO, NY, P, U, US); Saint-Laurent-du-Maroni, (♀), *Service Forestier 5042* (P); Godebert, (♂), *Wachenheim 467* (P); Godebert, without date (♂), *Wachenheim U0157655* (A, E, U, US).

Guyana. UPPER TAKUTU-UPPER ESSEQUIBO: Acarai Mts, 0-1 km W of Chodikar Mountain, 01°20'N, 58°50'W, (♂), *Clarke 2942* (NY, U); Eastern Kanuku Mts, 5 km W of Kwitaro R, 03°11'N, 58°51'W, (♂), *Clarke et al. 6373* (NY, U); Wassarai Mts, summit of unnamed peak, 12,5 km S of S. Kassikaityu R, 01°32'19"N, 59°15'04"W, (♂), *Clarke et al. 8565* (NY, U); Iramaipang, Kanuku Mts, (♂), *Forest Department British Guyana (FD) 5948* (NY); Rupununi, Kuyuwini Landing, Kuyuwini River, (♂), *Jansen-Jacobs et al. 3018* (F, NY, P, U). **Nicaragua.** Castilho, Rio San Juan, en el caño Chontaleño, 11°09'N, 84°11'W, (♀), *Rueda et al. 6039* (MO).

Panama. COCLE: El Copé, (♂), *Berg 400* (U). **Peru.** AMAZONAS: Rio Santiago, nr. Caterpiza, (♂), *Huashikat 1150* (U); Bagua, Imaza, Región Nororiental del Marañon, Comunidad de Kampaenza, 04°55'S, 78°19'W, (♂), *N. Jaramillo et al. 408* (F, MO); along Río Santiago 3-5 km above mouth, (♂), *Wurdack 2169* (F, G, GH, NY, P, S, UC).—HUÁNUCO: Rio Pachitea, Tournavista, Bosque Nacional de Iparia, (♂), *J. Schunke V. 2139* (F, G, GH, NY, US); Dtto.

Yuyapichis, Prov. Puerto Inca, 09°40'S, 75°02'W, (♂), *Kröll et al.* 252 (NY); Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'S, 75°02'W, (♂), *Flores & Tello* 1120 (NY); Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'S, 75°02'W, (♂), *Tello* 24 (NY); Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'S, 75°02'W, (♂), *Tello* 71 (NY); Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'S, 75°02'W, (♂), *Tello* 88 (NY); Puerto Inca, Unidad Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'S, 75°02'W, (♀), *Tello* 509 (NY).—JUNIN: San Ramón, (♂), *Schunke* V. A95 (F, NY, US).—LORETO: Requena, Sapuena, Basin of Río Ucayali, Jenaro Herrera, (♀), *Daly et al.* 5801 (NY); Coronel Portillo, Bosque Nacional de von Humboldt, region of San Alejandro, (♀), *Gentry & Revilla* 16181 (NY); Maynas, Allpahuayo, km 20 Iquitos-Nauta, ca. 35 km Southwest of Iquitos, 03°50'S, 73°25'W, (♀), *Gentry et al.* 56009 (F); Requena, Jenaro Herrera, Río Ucayali, 04°55'S, 73°45'W, (♀), *Gentry et al.* 56117 (F); Maynas, Distrito Las Amazonas, 03°25'S, 72°33'W, (♂), *Grandez & Jaramillo* 2848 (MO); Alto Amazonas, Dist. Yurimaguas, Carretera Yurimaguas-Tarapoto, (♀), *Soria* 21 (F); Alto Amazonas, Shucushuacu, Río Huallaga, (♂), *R. Vásquez & N. Jaramillo* 2491 (NY); Maynas, Puerto Almendra, 03°45'S, 73°15'W, (♀), *R. Vásquez* 2861 (F); Maynas, Pto. Almendras, 03°48'S, 73°25'W, (♀), *R. Vásquez & N. Jaramillo* 6110 (NY).—MADRE DE DIOS: Tambopata, Santuario Nacional Pampas del Heath, 12°39'S, 68°44'W, (♂), *M. Aguilar & Castro* 669 (F); Tambopata, Zona Reservada de Tambopata, confluence of rivers Tambopata and La Torre, 12°50'S, 68°44'W, (♀), *Alexiade* 945 (F, MG, MO, NY); Prov. Manu, Parque Nacional del Manu, Río Palotoa, (♀), *R. B. Foster & Terborgh* 6747 (F); Parque Nacional del Manu, (♂), *R. B. Foster et al.* 7199 (F); Manu, Parque Nacional del Manu, Pakitsa Station, Tachigali trail N to marker 50, 11°56'S, 71°16'W, (♀), *R. B. Foster & Baldeon* 12563 (F, US); Tambopata, Campamento Explorers, 12°47'00''S, 69°41'00''W, (♀), *R. Vásquez et al.* 25749 (F).—PASCO: Oxapampa Dist. Pulcazu, Estación Biológica Paulil, 10°33'00''S, 75°34'00''W, (♀), *Revilla N. et al.* 296 (MO).—PUCALLPA: Arboreto Adolfo Salazar Carrero, (♂), *A. C. A. Oliveira*

36 (INPA).—SAN MARTIN: Mariscal Cáceres, Quebrada de Cachiyacu, afluente de la Quebrada de Huaquisha, (♀), *J. Schunke V. 8487* (MG, F, MO). **Suriname**. MAROWIJINE: In montibus, qui dicuntur Nassau, (♀), *Lanjouw & Lindeman 2114* (IAN, NY, U).—NICKERIE: area of kabalebo dam project, distr kickerie, rain forest 2 km south of road camp, ca. 20 km sw of Avamarero, (♀), *Heyde & Lindeman 39* (RB, NY, RB, U).—SIPALIWINI: Boven-Suriname Rivier bij Goddo, Expeditie near het Wilhelminagebergte, (♀), *Stahel 2* (U); Sipaliwini, Boven-Suriname Rivier bij Goddo, (♀), *Stahel 82* (F). **Venezuela**. AMAZONAS: Dpto Atabapo, Río Putaco, 19 km antes de desembocadura en el Río Ocamo, 02°56'S, 64°33'W, (♂), *A. Fernandez et al. 7154* (NY); Río Negro, (♀), *Liesner 16238* (NY); Sierra Parima, Vecindades de Simarawochi, (st), *J. A. Steyermark 107064* (F).—BOLÍVAR: Merida, Sur de El Dorado, km 79, La Macana, carretera de Sta. Elena, (♀), *Bernardi 7250* (F); Gran Sabana, Zona Minner El Polaco, (♀), *W. Diaz & Elcoro 1535* (NY); Raul Leoni, 11 km aguas arriba de su desembocadura en el Río Paragua, 05°05'S, 63°31'W, (♂), *A. Fernandez 4541* (NY); Quebrada O-paru-má, between Santa Teresita de Kavanayén an Rio Pacairo, (♂), *J. A. Steyermark 60399* (F); Quebrada O-paru-má, (♀), *J. A. Steyermark 60414* (F); Sierra de Lema, Río Chicanán in valley lowland above Puerta Lema, (♀), *J. A. Steyermark 89506* (NY).

Pourouma minor belongs to a group of species with basal secondary veins unbranched and entire lamina, and adaxial lamina surface smooth. It can be recognized from among all species of *Pourouma* by stigma multilobed with 2.8–6 mm in diameter. It shows similarities with *Pourouma acuminata*, due to the adaxial lamina surface smooth and stipules glabrous inside, but distinguished by primary vein with indument dense, yellowish, sericeous to velutinous in the abaxial lamina surface (versus sparse, whitish, sericeous to glabrous), staminate flowers with

tepals free or basally connate (versus connate), and stigma multilobed with 2.8–6 mm in diameter (versus peltate, with up to 2 mm in diameter).

In the molecular analyses (Chapter 1, Fig. 5), this species arose with a strong support (BP = 95, PP = 1.00) in a clade with adaxial lamina surface smooth (III and IV), that included five species (*Pourouma minor*, *P. essequiboensis*, *P. maroniensis*, *P. melinonii*, *P. mollis*, and *P. ovata*).

We considered eight synonyms for *Pourouma minor* as reported by Berg et al. (1990). The morphological variation of these synonyms matches with morphological plasticity of the species.

The leaves of the lower tiers of the trees are often larger than upper tiers, which might be a strategy for gathering light. Also, the juveniles specimens have usually leaves larger than adult specimens.

26. *Pourouma mollis* Trécul, Ann. Sci. Nat. Bot., Sér. 3, 8: 102, 1847; Miquel in Martius, Fl. bras. 4(1): 127. 1853; Berg & Dewolf, Fl. Suriname 5(1): 272. 1975; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 155. 1990; Berg, Fl. Guianas 11(22): 120. 1992; Berg & Franco-Rosselli, Fl. Ecuador 27A: 88. 1993; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez. Guayana 4: 187. 1998; Berg, Fl. Venez.: 237. 2000; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.—TYPE: FRENCH GUIANA. Unknown locality and date, (♀), *Leprieur 141* (lectotype, designated by Berg 1975: P0075085!; isolectotypes: F! G image!).

Tree, 8–30 m tall, 15–40 (–50) cm d.b.h., with stilt roots. Leafy twigs 4–15 mm in diameter, with indument whitish to yellowish, hirsute to velutinous and sometimes with brownish to brownish-red, multicellular trichomes; internode 4–40 (–50) mm long. Lamina usually entire, (4.5–) 6.5–24.5 (–26) cm long, (3–) 4.5–18.5 (–20) cm wide, length:width ratio 1.3–1.9, ovate to elliptic; or palmatifid to palmatipartite with 3 lobes, rarely with 5 lobes (juvenile), (10–) 12.5–28.5 (–30) cm long, (11–) 13.5–29.5 (–32) cm wide, length:width ratio 1.3–1.9, coriaceous; base obtuse, rounded to truncate, or subcordate; margin usually repand or palmatifid, with indument yellowish, hirtellous; apex acuminate; adaxial surface smooth, indument of veins sparse, yellowish to whitish, hirtellous; abaxial surface smooth, indument of veins yellowish, velutinous to hirtellous; venation brochidodromous or palmate; secondary veins (6–) 10–22 (–25) pairs per leaf, basal pair branched, diverging from the midrib at an 35°–60°; tertiary and quaternary veins slightly prominent to prominent, with whitish, arachnoid indument covering to the areoles; petiole 2.5–20 (–24) cm long, with indument yellowish to whitish, sericeous to hirtellous to velutinous, domatia absents; stipules 3–13.5 (–15) cm long, with indument yellowish, sericeous to hirtellous to velutinous outside, glabrous or sometimes sparse, yellowish, sericeous inside, caducous. Staminate inflorescences 3.5–10 (–12.5) cm long, 2.5–8.5 cm wide, primary branched 3–4; peduncle 1.5–7.5 cm long, peduncle and branches with indument yellowish to whitish, velutinous to hirtellous on the ultimate branches; flowers ca. 380–1650, flowers organized in ca. 20–70 glomerules; glomerule 3–4 mm in diameter, ca. 15–30 flowers per glomerule. Staminate flowers 1.2–1.8 mm long, 0.5–1 mm wide; sessile to subsessile; perianth 0.5–1 mm long, 0.5–0.8 mm wide, urceolate, tepals connate, with indument yellowish, hirtellous to velutinous; filaments 0.8–1.2 mm long, free, filaments exceeding the perianth. Pistillate inflorescences 3.5–5.5 cm long, 1.5–3.5 cm wide; peduncle 1.5–2.5 cm long, peduncle and branches with indument yellowish, velutinous to hirtellous on the ultimate branches; flowers (5–) 8–28 (–32),

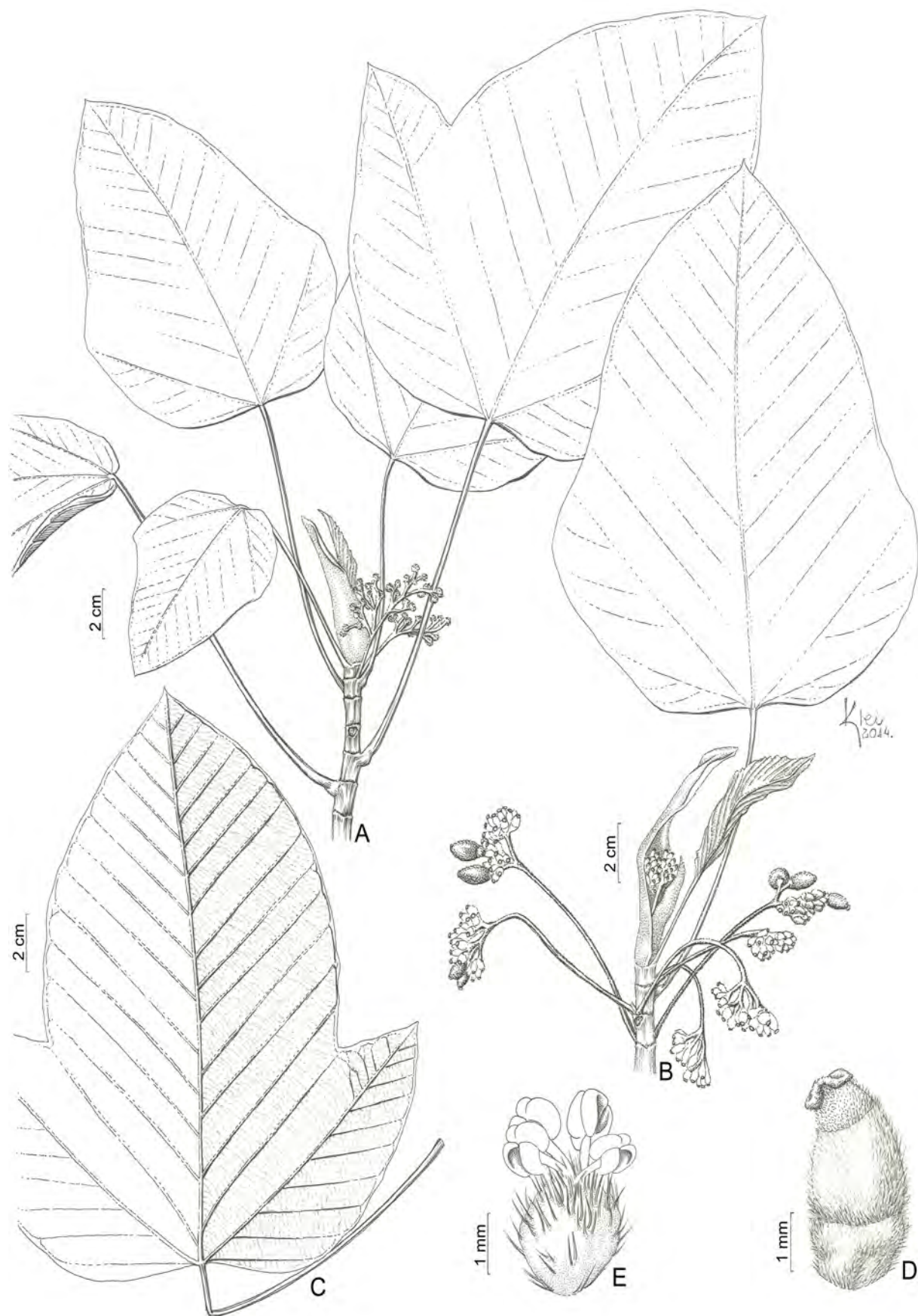


FIG. 61. *Pourouma mollis*. A. Leafy twig with staminate inflorescences. B. Leafy twig with pistillate inflorescences. C. Palmatifid leaf, abaxial surface. D. Pistillate flower. E. Staminate flower. [A, E: from Gaglioti *et al.* 115 (SP); B-D: from Gaglioti *et al.* 113 (SP)].

flowers organized in 1–3 cymes; pedicel 1–2 mm long; perianth 4–6 mm long, 2–3 mm wide, with indument yellowish, velutinous and brownish multicellular trichomes, apex papillose; stigma peltate, 1.5–2 mm in diameter, sometimes with indument yellowish, velutinous. Infructescences 6–13.5 (–15.5) cm long, 4.5–10.5 (–11.5) cm wide; peduncle 4.5–8.5 (–9.5) cm long; fruiting pedicel 6–12 mm long. Fruiting perianth 1.2–2 cm long, 5–10 mm wide, ovoid to ellipsoid, vinaceous to black, with indument yellowish, velutinous. Achene 1–1.8 cm long, 3–8 mm wide. Seed 5–12 mm long, 2–6 mm wide, ovoid to ellipsoid, vinaceous. Fig. 1 B; Fig. 8 C; Fig. 10 E; Fig. 16 B; Fig. 61.

Phenology. Staminate flowers collected from June to February, pistillate flowers from July to October and fruits along throughout the year.

Distribution (Fig. 62). Northeast and east of Brazil (Amapá, Bahia, Espírito Santo, Pará, Pernambuco), French Guiana (Cayenne and Saint-Laurent-du-Maroni), Suriname (Brokopondo, Sipaliwini and Marowijne), Guyana (Upper Takutu-Upper Essequibo), in “terra firme” forest of the Amazonian region and in dense ombrophilous forest of the Atlantic forest, in lowland moist areas, often in riparian forest, at an elevation of about 25 to 400 m above sea level.

Vernacular Name. Imbaúba, imbaubarana vermelha, uva de macaco (Brazil, Amapá); itararanga, tararanga, tararanga vermelha (Brazil, Bahia); uva de macaco (Brazil, Espírito Santo); ama'yrary (Brazil, Maranhao); amaparana, imbaúba, imbaúbarana vermelha, mapatirana, mapatirama vermelha, kamoyuwa, sa-ouro (Brazil, Pará); baruma, bois canon mâle, bois canon, kamoyowa, saouro, sauvage (French Guiana, Cayenne); boroma, bospapaja, granboesipapaja, yarayara (Suriname).

Etymology. The epithet might be attributed to the softwood.

IUCN conservation status. *Pourouma mollis* is widely distributed with the extent of occurrence of ca. 2,198,930 Km² and well represented in herbaria. For these reasons *P. mollis* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAPÁ: Serra do Navio, Parque Nacional Municipal do Canção, 00°54'16"N, 52°00'32"W, (♀), *Gaglioti et al. 165* (SP).—BAHIA: Porto Seguro, saída de Itabela para Queimado, (♂), *J. Almeida & T. S. Santos 71* (K, NY, U); unknown locality, (♂), *Blanchet 94* (P); unknown locality, (♂), *Blanchet 2361* (FHO, G, LE, P); unknown locality, (♂), *Moricand 2361* (P); Água Preta, (♀), *Bondar 2169* (GUA, SP); Amargosa, Serra do Timbó, 12°52'S, 39°28'W, (♀), *D. Cardoso et al. 1538* (HUEFS, SP); Una, Re. Bio. de Una, (♀), *R. M. Castro et al. 1054* (HUEFS); Rio das Contas, (♂), *Curran 21* (C, F, NY, US); Litoral Sul, Wenceslau Guimarães, 13°41'S, 39°28'W, (♂), *Guedes et al. 9450* (ALCB); Una, Ca. 5 km na estrada da BA 001, Rod. Ilhéus/Una, para a Reserva Biologica de Una, (♀), *D. Lopes et al. 15* (NY); Município de Una, estrada para Ecopark de Una, 15°10'01"S, 39°03'48"W, (♀), *Lucas et al. 1099* (ESA, K, SP); Ilheus, (♂), *Luschnath s.n.* (BR); Ilheus, (♂), *Riedel 2* (LE); Una, Ca. 5 km no ramal que liga o km 46 da Rod. BA-001 Ilhéus/Una para a Rebio de Una, (♀), *Sant'Ana et al. 633* (NY); Una, Reserva Florestal da Estação de Canavieiras, (♂), *E. B. Santos & M. C. Alves 98* (GUA); Una, Km 17 da estrada que liga a Rod. BR-101, São José à Rod. BA-215, (♀), *S. A. Mori & Thompson 11025* (NY, RB); Ilhéus, Castelo Novo, (♀), *Velloso 1083* (R).—ESPIRITO SANTO: Município de Linhares, Reserva Florestal de Linhares, (♂), *DAF 27* (GUA, RB); Reserva de Linhares, (♂), *J. G. Kuhlmann 446* (RB, SP, U); Conceição da Barra, Área 135 da Aracruz Celulose S. A, (♂), *O. J. Pereira 3957* (GUA, VIES); Conceição da Barra, Área 135 da Aracruz Celulose S. A, (♂), *O. J. Pereira 4922* (GUA, VIES); Reserva de Linhares, Docemade, (♀), *Sucre 8303* (RB); Conceição da Barra, distrito de Dunas de Itaúnas, Fazenda Boa Vista, (♂),

Martinelli et al. 9705 (RB, SP).—PARÁ: Ilha de Marajó, Rio Anajás, (♀), *Beck & Souza 203* (EAC, INPA, MG, MO, NY); unknown locality, (♂), *Burchell 9792* (K, P); Município de Belém, nas proximidades do aeroporto, (♀), *L. S. Coêlho et al. 272* (INPA); Belém, Parque Ambiental do Utinga, 01°26'40"S, 48°26'29"W, 25 Nov 2001 (♀), *M. R. Cordeiro MC-08-04* (IAN); Faro, (♂), *A. Ducke RB13058* (RB); Obidos, (♀), *A. Ducke MG15261* (MG); Belém, (♂), *A. Ducke RB19455* (RB); Belém, Campus da Embrapa, estrada principal da FICAP, 01°26'40"S, 48°26'29"W, (♀), *Gaglioti et al. 113* (IAN, SP); Belém, Campus da Embrapa, estrada principal da FICAP, 01°26'40"S, 48°26'29"W, (♂), *Gaglioti et al. 115* (IAN, SP); Belém, Campus da Embrapa, estrada principal da FICAP, 01°26'40"S, 48°26'29"W, (♀), *Gaglioti & Pederneiras 117* (IAN, SP); Belém, Campus da Embrapa, estrada principal da FICAP, 01°26'40"S, 48°26'29"W, (♀), *Gaglioti & Pederneiras 119* (IAN, SP); Reserva da APEG, 01°25'47"S, 48°25'11"W, (♂), *Gaglioti & Pederneiras 121* (IAN, SP); Rio Guama; São Miguel, (♀ and ♂), *Goeldi MG7731* (G, MG, MO, P, S, U); Município de São Domingos do Capim, Vila Pedreira, (♂), *Nave 24* (ESA, SP); Belém, (♂), *E. Oliveira 2597* (IAN); Belém, (♀), *E. Oliveira 3071* (IAN); Almeirim, Rio Jarí, serra, 3km. da margem, (♀), *E. Oliveira 3691* (IAN); Belém, IAN, (♀), *Pires & Black 1437* (IAN); Belém, Mata do Catú, (♂), *Pires 4546* (IAN); Breves, Local onde foi feito um levantamento florestal, (♀), *Pires & N. T. Silva 6662* (IAN); Belém, (♀), *Pires 10123* (IAN); Belém, (♂), *Pires et al. 10578* (IAN); Belém, IPEAN, Reserva Mocambo. Embrapa, (♂), *Pires & N. T. Silva 10760* (IAN); IPEAN, Reserva Mocambo, Embrapa, (♀), *Pires & N. T. Silva 10795* (IAN); Belém, IPEAN, Reserva Mocambo, (♂), *Pires & N. T. Silva 10808* (IAN); Belém, (♂), *Pires et al. 10809* (IAN); Belém, IPEAN Reserva de Mocambo L.14-4, (♂), *Pires & N. T. Silva 10889* (IAN); Belém, EMBRAPA; Reserva Mocambo, (♂), *Pires & N. T. Silva 10890* (IAN); Belém, EMBRAPA; Reserva Mocambo, (♂), *Pires & N. T. Silva 11045* (IAN); Belém, IPEAN, Reserva Mocambo, Embrapa, (♂), *Pires 12183* (IAN); Belém, IPEAN,

Reserva Mocambo, Embrapa, (♂), *Pires 12184* (IAN); IPEAN, (♀), *J. M. Pires 51676* (F, NY, US); Santarém, Cuiabá-Santarém, km 919, BR 163, (♀), *G. T. Prance et al. 25337* (F, K, MG, MO, RB, U, UEC); Pará, Moju, Campo experimental da Embrapa Amazônia Oriental, (♀), *Procópio & Mesquita 347* (IAN); Rio Anajas, Ilha do Marajó, 00°42'S, 50°09'W, (♀), *Rabelo & Rosa 3646* (EAC, INPA, HAMAB, MO, NY); Tucuruí, PA-263, km 10, (♀), *J. Ramos 1117* (INPA, GUA, NY); Tucuruí, Rio Tocantins, Foz do Rio Pitinga, (♀), *J. Ramos & E. F. Lima 1520* (INPA); Tucuruí, PA-149, área de desmatamento da massa fálida, (♀), *Revilla et al. 8551* (INPA, NY); Bragança, (♀), *J. S. Rodrigues 1355* (IAN, INPA); Município de Almeirim, Monte Dourado, (♂), *M. R. Santos 455* (MG, NY, U); Belém, (♂), *M. Silva 354* (MG); Belém, (♂), *M. B. Silva 130* (IAN, NY, US); Almeirim, (♀), *N. T. Silva 219* (MG); Almeirim, Área do Perimetral, (♀), *N. T. Silva 5270* (INPA, MG).—PERNAMBUCO: Mata da Usina São José, 07°50'20"S, 35°00'10"W, (♂), *Freire et al. 69* (NY). **French Guiana.** CAYENNE: Massif des Emerillons, source of Approuage R., (♂), *Cremers 6726* (CAY, P, U); Nayãpi, Wilaupys a (Kulumã), (♀), *Grenand 723* (CAY); L'Auberge des Orpailleurs, (♀), *S. A. Mori et al. 25743* (NY) Station des Nouragues, Bassin de L'Arataye, Quadrat L 16, (♀), *Riera 1799* (P).—SAINT-LAURENT-DU-MARONI: Chantier Fourgassié, Orapu, km 8 route Kaw, (♀), *Oldeman B644* (CAY, P, U). **Guyana.** UPPER TAKUTU-UPPER ESSEQUIBO: Acarai Mts., Tarwini, (♂), *Forest Department British Guyana (FD) 7671* (NY); Essequibo R., nr. Rockstone, (♀), *Maas et al. 3938* (U). **Suriname.** BROKOPONDO: Brokopondo, Brownsberg, (♀), *Andel et al. 4526* (NY); unknown locality, (♀), *Boswezen (B. W.) 813* (F, P, U).—NICKERIE: Sectie 0, (♀), *Boswezen (B. W.) 4494* (NY, U); Sectie 0, (♀), *Boswezen (B. W.) 5048* (COL, U, UC); Sectie 0, (♀), *Boswezen (B. W.) 5440* (A, RB, U, US); Sectie 0, (♀), *Boswezen (B. W.) 5581* (MO, U); Sectie 0, (♀), *Boswezen (B. W.) 5992* (F, U).—SIPALIWINI: Mapane Creek, (♀), *Elburg 9843* (MO, NY, U); Suriname River, (♂ and ♀), *Hostmann & Kappler 1272* (B, CGE, F, G, GH, LE, NY, OXF, P, S, U);

Jodensavanne Mapane Kreek area, (♀), *L. B. B.* (=’s Lands Bosbeheer Suriname) 9424 (NY, U); Jodensavanne Mapane Kreek area, (♀), *L. B. B.* (=’s Lands Bosbeheer Suriname) 9843 (COL, NY).—MAROWIJINE: in montibus, qui dicuntur Nassau, (♀), *Lanjouw & Lindeman* 2106 (NY, U).

Our molecular analyses results (Chapter 1, Fig. 5) included *Pourouma mollis* within clade IV (*P. essequiboensis*, *P. maroniensis*, *P. melinonii*, *P. mollis*, and *P. ovata*) with a strong support (BP = 92, PP = 0.96). It was more closely related to *P. maroniensis* with support (BP = 80, PP = 0.98). Some morphological evidence supports this relationship: adaxial lamina surface smooth, staminate inflorescence in glomerules, and staminate flowers with tepals connate.

However, *Pourouma mollis* is distinguished from *P. maroniensis* by leafy twigs without whitish, arachnoid indument (versus with dense, whitish, arachnoid indument), abaxial surface with yellowish, hirtellous indument (versus whitish, arachnoid indument), and pistillate perianth with yellowish, velutinous indument (versus whitish, arachnoid indument). The leaves of the lower tiers of the trees of *Pourouma mollis* are often palmatilobed and larger than upper tiers, which might be a strategy for gathering light.

Pourouma triloba was considered by Berg & Heusden (1988: 107) as subspecies of *P. mollis*, which was not corroborated in the molecular analyses (see more in *P. triloba*).

27. *Pourouma montana* C.C. Berg, *Brittonia* 56: 258. 2004.—TYPE: PERU. Cajamarca: Province of San Ignacio, San José de Lourdes, 04°78’25’’S, 78°54’15’’W, 1 Dec 1998 (♂), *C. Díaz & S. Fernández* 10161 (holotype: HUT!; isotypes: BG!, F!, MO!).

Tree, 15–18 m tall, d.b.h. unknown. Leafy twigs 3–8 mm in diameter, with indument yellowish to whitish, sericeous; internode 4–12 mm long. Lamina entire, (6.5–) 9.5–19.5 (–21.5) cm long, (4–) 8.5–16.5 (–18.5) cm wide, length:width ratio 1.1–1.8, ovate to elliptic, coriaceous; base truncate, rounded to subcordate; margin usually repand, with indument yellowish, sericeous; apex acuminate to acute; adaxial surface smooth, indument of veins sparse, yellowish, hirtellous; abaxial surface smooth, indument of veins sparse, yellowish, hirtellous to sericeous; venation brochidodromous; secondary veins 9–12 pairs per leaf, basal pair branched, up to ca. 1/2 the length of the lamina, diverging from the midrib at an 30°–50°; tertiary and quaternary veins slightly prominent to plane, with whitish, arachnoid indument confined to the areoles; petiole (3–) 4–11 cm long, with indument yellowish to whitish, sericeous, domatia absent; stipules 4.5–10 cm long, with indument yellowish, sericeous outside, glabrous inside, caducous. Staminate inflorescences 4.5–12.5 (–14.5) cm long, 3–8 (–9.5) cm wide, primary branched 3; peduncle 3–6.5 cm long, peduncle and branches with indument yellowish, sericeous to velutinous on the ultimate branches; flowers ca. 320–1250, flowers organized in ca. 25–70 glomerules; glomerule 3–5 mm in diameter; ca. 10–30 flowers per glomerule. Staminate flowers 1.2–1.5 mm long, 0.8–1.2 mm wide; sessile or subsessile; tepals 4, 1.2–1.5 mm long, 0.3–0.4 mm wide, ovate to oblong, free or basally connate, with indument whitish, sericeous; stamens 4; filaments 0.5–0.8 mm long, free, shorter than the perianth. Pistillate inflorescences unknown. Infructescences 10.5–12.5 cm long, 4.5–7.5 cm wide; peduncle 7–8 cm long; fruits 8–12, fruits organized in 2–3 cymes, fruiting pedicel 5–20 mm long; stigma peltate, 1–1.5 mm in diameter, bilobed. Fruiting perianth 1.2–2 cm long, 8–15 mm wide, ovoid to ellipsoid, vinaceous, with indument yellowish, sericeous. Achene 1–1.8 cm long, 5–12 mm wide. Seed 5–10 mm long, 3–8 mm wide, ovoid, vinaceous. Fig. 16 C.

Additional illustrations. Berg (2004: 257).

Phenology. Staminate flowers collected from December and fruit from January.

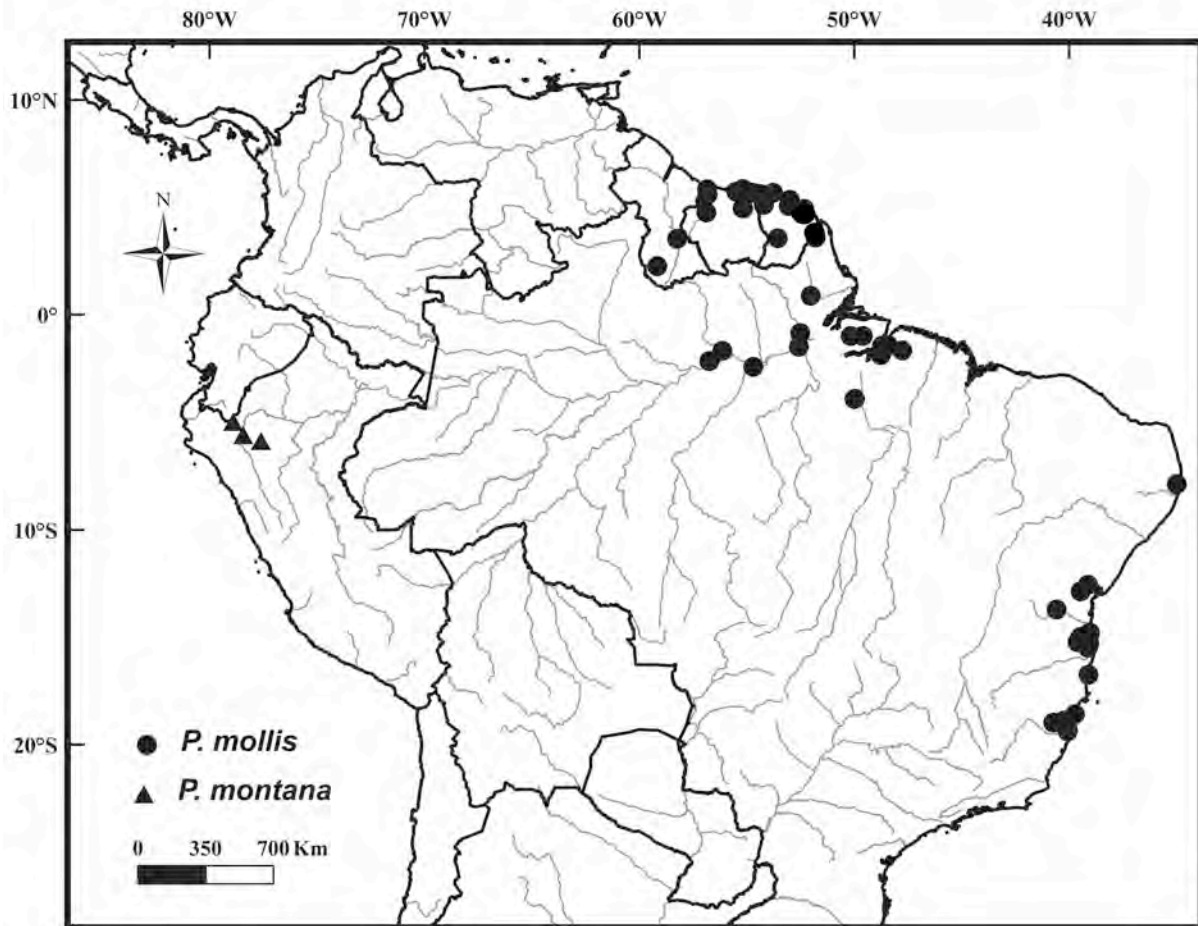


FIG. 62. Distribution of *Pourouma mollis* and *P. montana*.

Distribution (Fig. 62). Endemic from the northwest of Peru (Amazonas and Cajamarca), in montane moist forest, at an elevation of about 1800 to 2010 m above sea level.

Etymology. The specific epithet refers to montane area, in which the species inhabits.

IUCN conservation status. According to the IUCN Red list categories (IUCN 2014), *Pourouma montana* is considered Endangered, EN B1a,b(iii), because of the small extent of occurrence (ca. 2,150 Km²), number of locations (3) and known from only five collections (just three fertile), made between 1978 and 2000.

ADDITIONAL SPECIMENS EXAMINED. **Peru.** AMAZONAS: ca. 12–18 trail km E of La Peca in Serrania de Bagua, (♂), *Gentry et al.* 22866 (F, MO).—CAJAMARCA: San José de Lourdes, base del Cerro Picorana, 04°58'25"S, 78°54'05"W, (♀), *C. Díaz et al.* 10265 (BG, F, HUT, MO).

28. *Pourouma myrmecophila* Ducke, Bull. Mus. Hist. Nat. (Paris), Ser. 2, 4: 723. 1932; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 150. 1990; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.—TYPE: BRAZIL. Amazonas: Manaus, perto da Cachoeira do Mindú, 8 Jul 1929 (♂), *A. Ducke RB23607* (lectotype, designated by Berg et al. 1990: RB!, isolectotypes, G image! K! P! S image! US image!).

Tree, 4–20 m tall, 10–20 (–30) cm d.b.h., with stilt roots. Leafy twigs 6–12 mm in diameter, with indument dense, yellowish, hirsute and brownish-red, multicellular trichomes; internode 5–20 mm long. Lamina palmatifid to palmatipartite with 3–5 lobes, (10–) 12.5–39.5 (–42.5) cm long, (11.5–) 13.5–41 (–44.5) cm wide, length:width ratio 0.8–1.1, coriaceous; base deeply cordate to cordate, sometimes with overlapping lobes; margin palmatifid with indument yellowish, hirtellous to hirsute; apex acuminate; midsegment lanceolate or oblong to elliptic; adaxial surface scabrous, with indument whitish to yellowish, strigose to hirsute; abaxial surface smooth, with indument yellowish, hirtellous to sericeous; venation palmate; secondary veins in the free part of the midsegment 12–18 pairs per leaf, basal pair branched; tertiary and quaternary veins slightly prominent to proeminent, with whitish, arachnoid indument confined to the areoles, or sometimes also on the tertiary and quaternary veins; petiole 6.4–28.5 cm long,

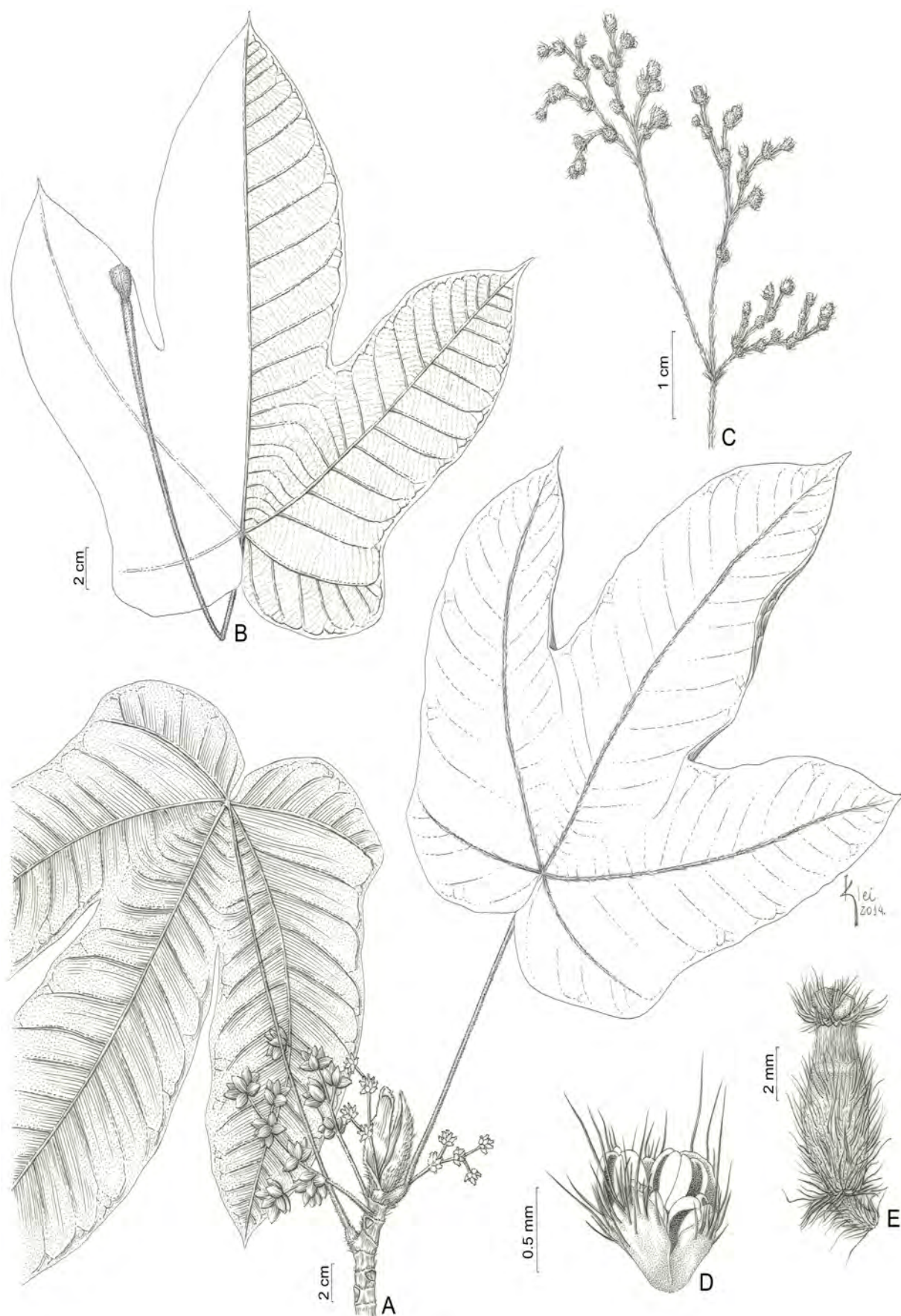


FIG. 63. *Pourouma myrmecophila*. A. Leafy twig with pistillate inflorescences and infructescences. B. Palmatifid leaf, abaxial surface. C. Staminate inflorescence. D. Staminate flower. E. Pistillate flower and pedicel. [A-B, E: from Gaglioti et al. 168, (SP); D-E: from Prance et al. 14795, (MG)].

with indument yellowish to whitish, hirsute to hirtellous or hispid, domatia present; stipules 2–7.5 (–8.5) cm long, with indument yellowish, hirsute and dense, brownish to brownish-red, multicellular trichomes outside, with indument sparse, yellowish, hirsute and sometimes with brownish, multicellular trichomes inside, caducous or persistent. Staminate inflorescences (3.5–) 5.5–14.5 (–16.5) cm long, 2.5–8.5 (–10) cm wide, primary branched 2–5; peduncle 1.5–5.5 cm long, peduncle and branches with indument yellowish, hirsute to hirtellous on the ultimate branches; flowers ca. 380–1150, flowers organized in ca. 38–118 glomerules; glomerule 2–3 mm in diameter; ca. 6–15 flowers per glomerule. Staminate flowers 0.5–1 mm long, 0.5–1 mm wide; sessile; 4–tepals, 0.5–1 mm long, lanceolate to ovate, basally connate, with indument yellowish, hirsute to hirtellous; 4–stamens; filaments 0.5–0.8 mm long, free, usually shorter than the tepals. Pistillate inflorescences 3.5–5.5 (–6.5) cm long, 1.5–3.5 cm wide; peduncle 1–2 cm long, peduncle and branches with indument yellowish, hirsute to hirtellous and brownish, multicellular trichomes on the ultimate branches; flowers 8–40 (–42), flowers organized in 4–8 cymes. Pistillate flowers 4–6 mm long, 2–3 mm wide, pedicel 1–2 mm long; perianth 3–5 mm long, with indument yellowish to whitish, hirsute to hirtellous; stigma peltate, 1–1.5 mm in diameter, with indument yellowish, hirsute. Infructescences 5.5–10.5 (–13.5) cm long, 3–9.5 (–11.5) cm wide; peduncle 1.5–4.5 cm long; fruiting pedicel 2–5 mm long. Fruiting perianth 1–1.8 cm long, 5–15 mm wide, ovoid to ellipsoid, brownish to vinaceous, with indument whitish, strigulose and brownish to vinaceous, multicellular trichomes. Achene 8–15 mm long, 3–8 mm wide. Seed 3–8 mm in diameter, ovoid, vinaceous. Fig. 7 A; Fig. 16 D; Fig. 63.

Phenology. Staminate flowers collected from March to December, pistillate flowers from July to October and fruits along the year.

Distribution (Fig. 64). Northwest of Brazil (Amazonas), south of Colombia (Amazonas and Caquetá), in primary or secondary “terra firme forest”, in lowland moist area, at an elevation of about 100 to 300 m above sea level.

Vernacular Name. Embaúbarana, imbaúbarana (Amazonas, Brazil); penoatu (Colombia, Amazonas); jiti-chirucona (Colombia, Caquetá); sachá uvilla (Peru, Loreto).

Etymology. The specific epithet refers to the myrmecophilous association.

Use. Fruits edible; the root used with aguacomo as contraceptive (Sastre & Raichel 4961, COL)

IUCN conservation status. *Pourouma myrmecophila* is widely distributed with the extent of occurrence of ca. 698,790 Km². *P. myrmecophila* is also, well represented in herbaria. For these reasons *P. myrmecophila* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** UNKNOWN STATE: unknown locality, (♀), *J. G. Kuhlmann RB150082* (RB, SP).—AMAZONAS: Município de Tefé, Lago de Tefé, (♂), *Amaral et al. 761* (BG, INPA, MG, MO, NY, RB); Río Cuieras, mouth of Río Branchinho, (st), *Berg 276* (MO, U); Tefé, (♀), *Black 47–1571* (IAC, IAN); Manaus, Distrito Agropecuário, Reserva 1501, Km 41, Distrito Agropecuário, 02°24'26"S, 59°43'40"W, (♀), *Boom et al. 8566* (INPA, MO, NY); Novo Airão, Upper Alalau river, (♀), *Boyan 267* (INPA); Manaus, Distrito Agropecuário da Suframa, Km 90, 02°24'26"S, 59°43'40"W, (♀), *M. T. V. A. Campos 6* (INPA, NY, US); Manaus, Rodovia Manaus-Itacoatiara, km 26, Reserva Florestal Adolpho Ducke, (♀), *Castilho et al. 567* (INPA); BR-17, km 11, (♂), *Chagas INPA1564* (INPA, U); Manaus, estrada do Mindú, (♀), *L. Coêlho INPA2265* (IAN, INPA); Manaus, Reserva Florestal Ducke, Igarapé do Acará, 02°53'S, 59°58'W, (♀), *M. A. S. Costa et al. 727* (INPA); Município de Jutai, Copessú, nr. Porto

Alfonso, 02°43'S, 66°42'W, (♀), *Daly et al. 4129* (BG, INPA MG, NY); Jutaí, Copessu, near Porto Afonso, (♂), *Daly et al. 4135* (NY); Manaus, Estrada do Aleixo, (♀), *A. Ducke 1149* (IAN, K, MG, MO, NY, R, US); Manaus, Estrada do Aleixo, (♂), *A. Ducke 1764* (A, F, IAN, K, MG, NY, R, US); Manaus, perto da Cachoeira do Mindú, *A. Ducke RB23606* (RB, US); Manaus, BR-17, km 3, (♂), *Francisco INPA2186* (INPA); Presidente Figueiredo, Estrada do Canteiro de Obras da Usina Hidrelétrica de Balbina, (♂), *C. A. Cid Ferreira 7585* (INPA, MG, MO, NY); Manaus, Arquipelago de Anavilhanas, Ilha Ibitirama, (♀), *Gaglioti & Pederneiras 148* (EAFM, SP); Manaus-Itacoatiara km 26, Reserva Florestal Adolpho Ducke, trilha próximo ao alojamento, 02°55'14"S, 59°58'44"W, (♀), *Gaglioti et al. 168* (EAFM, SP); Manaus, Reserva Florestal Ducke, estrada Manaus-Itacoatiara km 26, (♀), *Groppo Jr. et al. 920* (INPA, F); próximo a Porto Velho, (♂), *J. G. Kuhlmann 395* (B, RB, U); Porto Velho, Rio Madeira, (♂), *J. G. Kuhlmann RB19843* (U); Manaus, Estrada do Mindú, (♂), *Luiz 2265* (IAN); Manaus, Km 3 da BR 17, (♂), *F. C. Mello INPA2186* (INPA); Presidente Figueiredo, Reserva Biológica de Uatumã, São Sebastião do Uatumã e Urucará, (♂), *F. F. Melo et al. 380* (INPA); Amazonas, Distrito Agropecuário, Reserva 1501, km 41, 02°24'26"S, 59°43'40"W, (♀), *S. A. Mori et al. 20193* (NY, MO); Manaus, Reserva Florestal Ducke, (st), *J. R. Nascimento & Damião INPA66396* (INPA); Manaus-Itacoatiara rd., km 192, (♂), *T. D. Pennington & O. P. Monteiro P22647* (INPA, NY); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR 174, Fazenda Esteio, (♂), *M. J. R. Pereira et al. INPA/WWF1301.3992* (INPA); Road Humaitá to Labrea, km 80, between Rios Ipiaxuna and Itaparana, (♀), *G. T. Prance et al. 3253* (F, INPA, K, NY, R, S, U, US); Rio Cuieras, below mouth of Rio Brancinho, (♂), *G. T. Prance et al. 14795* (F, INPA, MG, NY, U); Rio Javari, Attalaia, (♀), *G. T. Prance et al. 23776* (G, INPA, K, MG, NY, U); Santa Antonio de Abonari, Manaus-Caracará, km 220, (♀), *G. T. Prance et al. 24313* (IAC, INPA, MG, MO, NY, S, U, US); Município de Pauíni, Floresta Nacional do Purus, km 10 em direção a vila São João,

08°18'30.4"S, 67°33.8'48"W, (♂), *Quinet 1124* (MG, RB); Estrada AM-1, km 79, picada IV, (♂), *W. A. Rodrigues & A. Loureiro 7069* (INPA, U); Estrada AM-1, Km 74, (♂), *W. A. Rodrigues & A. Loureiro 7076* (INPA); Manaus, Reserva Florestal Ducke, próximo Igarapé Barro Branco, (♀), *Vicentini et al. 767* (INPA, MG, MO, NY, RB, SP); trilha a esquerda do km 1,15 da estrada alojamento-torre, (♂), *Vicentini & C. F. Silva 1050* (INPA, MO, SP). **Colombia.** AMAZONAS: Puerto Santander, resguardo indígena Nonuya de Villazul, comunidad indígena de Peña Roja, (♀), *Castaño-A. & Moreno 1403* (COAH); Araracuara, comunidad indígena de Villazul, resguardo indígena Muinane, 00°53'33"S, 72°10'18"W, (♂), *Duque et al. 999* (COAH); Caño Aduche, trocha a las bocana de la quebrada de Aguas Negras, (♀), *La Rotta 101* (COAH, COL); Caño Aduche, (♀), *La Rotta 139* (COAH); Araracuara, comunidad indígena de Villazul, margen izq. río Caquetá, 00°34'S, 72°08'W, (♂), *Londoño et al. 832* (COAH, NY); Araracuara, comunidad indígena de Villazul, margen izq. río Caquetá, 00°34'S, 72°08'W, (♂), *Londoño & E. Moreno 879* (NY, COAH); Rio Caquetá, en frente de la punta de la Isla del Guadual, 01°06'37"S, 71°35'23"W, (♀), *M. Sánchez et al. 4288* (COAH); Araracuara, Rio Caquetá, (♀), *Sastre & Raichel 4961* (COL, P); Araracuara, Rio Caquetá, (♂), *Vester 257* (COAH); Araracuara, Rio Caquetá, (♀), *Vester & Matapi 334* (COAH).—CAQUETÁ: Solano, río Yarí, km 10 de la desembocadura, (♂), *D. Cárdenas & Andoque 4327* (COAH); Solano, Araracuara, vía aeropuerto, 1 km de la carretera, Villa Nueva, (st), *Cárdenas et al. 4423* (COAH); Solano, río Caquetá, colina, (st), *Toro & Oscar 721* (COAH); Solano, Araracuara, terraza baja, bosque maduro, (st), *Vester 236* (COAH) Solano, Araracuara, terraza baja, bosque maduro, (♀), *Vester 334* (COAH).—VAUPES: Taraira, estación biológica Mosiro Itajura, Caparú, 3 km N del lago Taraira, (st), *Defler 384* (COAH). **Peru.** LORETO: Basin of Río Ucayali, Jenaro Herrera, 04°55'S, 73°45'W, (♀), *Daly et al. 5810* (NY); Maynas, (♀), *Gentry et al. 15876* (U); Puerto Almendras, (♀), *Maas et al. 6249* (U); Maynas, Dtto. Iquitos, Rio Nanay, Nina Rumi, between Lago

Llanchama an Puerto Almendro, (♀), *McDaniel & Rimachi Y. 20436* (MO, U); Río Nanay, Puerto Almendras, (♀), *Revilla 1966* (U); Prov. Maynas, Pto. Almendras, 03°45'S, 73°15'W, (♀), *R. Vásquez & N. Jaramillo 2636* (MO); Quebrada Saragosa, carretera Nauta-Iquitos, 08°18'30.4"S, 67°33.8'48"W, (♀), *R. Vásquez et al. 4201* (F); Requena, Sapuena Jenaro Herrera, 04°50'S, 73°45'W, (♀), *R. Vásquez & N. Jaramillo 9612* (MO, NY).

Pourouma myrmecophila is easily recognized because of domatia presence at the base of the petiole, which it is associated with ants. It displays similarities with *Pourouma formicarum*, due to the presence of domatia at the base and the indument hirsute on the many parts of the plant, but distinguished by palmatilobed lamina (versus entire lamina), and petiole 6.4–28.5 cm long (versus petiole 1–1.8 cm long).

Berg & Dewolf (1975: 266) considered *Pourouma myrmecophila* as a synonym of *P. heterophylla* (= *P. guianensis*). During the revision of herbarium collections of *Pourouma myrmecophila*, we verified that most part of this material was identified by C.C. Berg & Heuden (1986) as *P. heterophylla*.

Benson (1985: 250) described the ecological relationship between *Allomerus* ants with the domatia of *Pourouma myrmecophila*, in which the ants use the domatia as shelter. Nevertheless, Benson (1985: 250) identifies this species as *P. heterophylla*, probably based on the herbarium identification of C.C. Berg & Heuden (1986) or in the publication of Berg & Dewolf (1975: 266).

Berg & Heusden (1988) synonymized *Pourouma heterophylla* in *P. guianensis*. These authors presented *Pourouma myrmecophila* as a distinct species from *P. heterophylla*, but they did not comment anything about the synonymization made by Berg & Dewolf (1975: 266).

During the multiple field trips to Rio de Janeiro (Brazil), we did not find specimens of this species. Only the collections of Kuhlmann (RB150082, SP441685) reported the occurrence of

Pourouma myrmecophila in Rio de Janeiro, which is probably misguided or made from specimens cultivated.

Our molecular analyses results (Chapter 1, Fig. 5) included *Pourouma myrmecophila* within clade I and more closely related to clade II with a strong support (BP = 95, PP = 0.98). Morphologically, these clades show as synapomorphies the staminate inflorescence in glomerules.

29. *Pourouma napoensis* C.C. Berg, Brittonia 42: 59–65. 1990; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 190. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 100. 1993.—TYPE: ECUADOR. Napo: Reserva Biología Jatun Sacha, 8 Km de Puerto Misahualli, margen derecha del Río Napo, 01°04'00"S, 77°37'00"W, 14 Aug 1987 (♂), W. Palacios 1874 (holotype: QCNE!; isotypes: AAU image! BG! MO! NY! QAME image!).

Tree, 15–30 m tall, 35–55 cm d.b.h. Leafy twigs 1–2.5 cm in diameter, with indument yellowish, hirsute; internode 8–20 mm long. Lamina palmatifid to palmatipartite with 5–7 lobes, (23.5–) 25–40 (–42.5) cm long, (23.5–) 25–43.5 (–45) cm wide, length:width ratio 0.8–1.1, coriaceous; base deeply cordate, sometimes with overlapping lobes; margin palmatifid, with indument yellowish, hirsute; apex acuminate; midsegment broadly elliptic to oblong; adaxial surface smooth or scabrous, with indument yellowish, hirsute over the whole surface and sometimes with indument whitish, strigose to strigulose; abaxial surface smooth, with indument yellowish, hirsute; venation palmate; secondary veins in the free part of the midsegment 16–28 pairs per leaf, basal pair branched; tertiary and quaternary veins prominent, with whitish,

arachnoid indument confined to the areoles; petiole (19–) 22–40 (–42) cm long, with indument yellowish, hirsute, domatia absents; stipules 10–20 cm long, with indument yellowish, hirsute outside, glabrous inside, caducous. Staminate inflorescences 12–22 cm long, 8–14 cm wide, primary branched 3–4; peduncle 4–6 cm long, peduncle and branches with indument yellowish, hirsute to hirtellous and sometimes with indument whitish, strigose on the ultimate branches; flowers ca. 1150–2150, flowers organized in 26–53 glomerules; glomerule 7–15 mm in diameter, ca. 40–75 flowers per glomerule. Staminate flowers 4–6 mm long, 0.8–1 mm wide; sessile; perianth 1.2–2 mm long, infundibuliform, tepals connate, with indument yellowish, hirtellous; stamens 3–4; filaments 4–6 mm long, connate, filaments exceeding the perianth. Pistillate inflorescences 5.5–10 cm long, 4.5–11.5 cm wide; peduncle 2–5 cm long, peduncle and branches with indument yellowish, hirsute to hispidulous on the ultimate branches; flowers (10–) 20–50 (–70), flowers organized in 4–10 cymes. Pistillate flowers 4–6 mm long, 3–4 mm wide, pedicel 4–7 mm long; perianth 3–5 mm long, with indument yellowish, hirsute to hirtellous, sparse in the apex; stigma peltate, 1.5–2 mm in diameter. Infructescences 9.5–15 (–16.5) cm long, 8–12 (–13.5) cm wide; peduncle 2.5–8.5 cm long; fruiting pedicel 8–15 mm long. Fruiting perianth 1.5–2 cm long, 8–12 mm wide, ovoid to ellipsoid, brownish to vinaceous, with indument yellowish, hirsute to hirtellous and brownish to brownish-red, multicellular trichomes. Achene 1.2–1.8 cm long, 5–10 mm wide. Seed 4–10 mm long, 2–5 mm wide, ovoid, vinaceous. Fig. 5 E; Fig. 8 F; Fig. 16 E.

Additional illustrations. Berg (1990: 64).

Phenology. Staminate flowers collected from August, pistillate flowers from November and fruits from September to April.

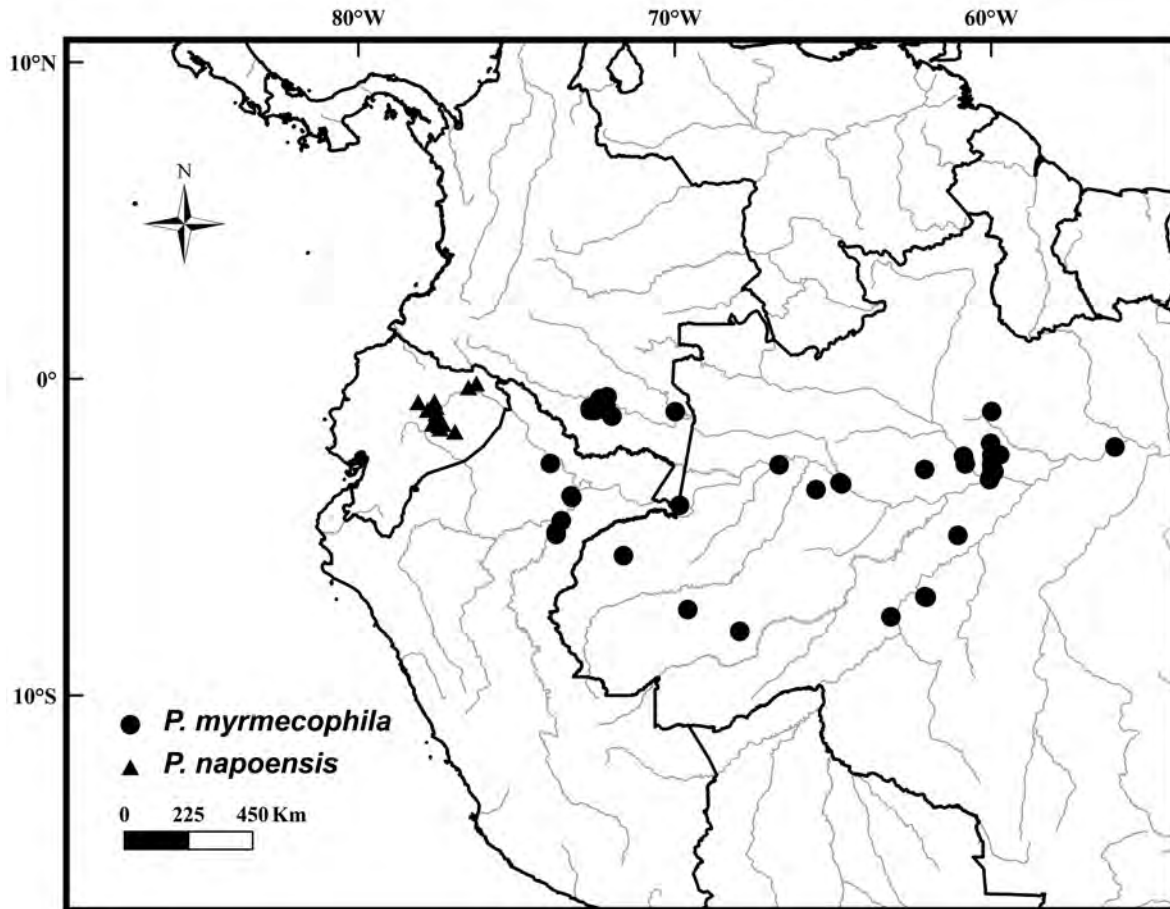


FIG. 64. Distribution of *Pourouma myrmecophila* and *P. napoensis*.

Distribution (Fig. 64). Endemic from the northeast of Ecuador (Napo, Pastaza and Sucumbios), often in primary “terra firme” forest of the Amazonian region, usually in riparian forest, at an elevation of about 50 to 1450 m above sea level.

Vernacular Name. The epithet is a tribute to province of type locality, Napo (Ecuador).

Etymology. Sacha uvilla (Ecuador, Napo); gungayohue, toruga villas (Ecuador, Pastaza).

Use. Edible fruits (Yánes 1999).

IUCN conservation status. According to the IUCN Red list categories (IUCN 2014), *Pourouma napoensis* is considered Vulnerable, VU B1a,b(iii), because of the small extent of

occurrence (ca. 19,980 Km²) and known from only thirteen collections, made between 1960 and 1998. Moreover, the labels from four collections (Espinoza *et al.* 589, 800; Gudiño 1084; Hurtado 2879) reported trees cut by petroleiras works “Arboles cortados por las obras petroleiras”.

ADDITIONAL SPECIMENS EXAMINED. **Ecuador.** NAPO: Reserva Biologica Jatun Sacha, Rio Napo, 8 km below Puerto Misahualli, 01°04'00"S, 77°36'00"W, (♀), *Cerón M. et al.* 2019 (BG, MO, QCNE); 8 km SE of Tena, (♀), *Grubb et al.* 1545 (K, NY); Carretera Hollín-Loreto, km 40–50, between Guamani and Rio Pucuno, 00°43'00"S, 77°36'00"W, (♀), *Hurtado* 645 (MO); Archidona, Parque Nacional Sumaco Napo-Galeras, 00°53'00"S, 77°33'00"W, (♀), *Neill et al.* 10590 (MO, QCNE); Reserva Biologica Jatun Sacha, Rio Napo, 8 km below Puerto Misahualli, 01°08'00"S, 77°30'00"W, (♀), *W. Palacios* 1337 (BG, MO, NY, QAME).—PASTAZA: Pastaza Canton, Villano. Pozo Villano 2 de ARCO, al sur del Río Lliquino, 01°28'00"S, 77°27'00"W, (♂), *Alvarez et al.* 2164 (MO); Pozo Petrolero "Namoyacu" de UNOCAL, 30 km al sur del pueblo de Curaray, 01°40'00"S, 76°57'00"W, (♀), *Espinoza & Coba* 589 (MO, QAME); Parroquia Villano, 01°25'00"S, 77°20'00"W, (♀), *Espinoza & Gualinga* 800 (MO, QAME); Arajuno Canton, Km 32 noroeste del pozo Villano-CPF por Arco, 01°25'00"S, 77°39'00"W, (♀), *Freire et al.* 3475 (MO); Pastaza Canton, Pozo Petrolero "Moretecocha" de Arco, 01°34'00"S, 77°25'00"W, (♀), *Gudiño et al.* 1084 (MO); Pozo Petrolero Villano 2 de Arco, 01°25'00"S, 77°20'00"W, (♀), *Hurtado* 2879 (F, MO, QAME).—SUCUMBIOS: Lumbaqui, (♂), *T. D. Pennington & Monteiro* 12244 (BG, K, QAME, QCA).

Pourouma napoensis and *P. apaporiensis* can be distinguished from all other species of *Pourouma* by the staminate flowers with filaments completely connate, resembling flowers of *Coussapoa*. It is distinguished from *P. apaporiensis* by the leafy twigs with indument yellowish,

hirsute (versus whitish, sericeous), adaxial lamina surface with indument hirsute to hirtellous over the whole surface (versus sericeous to hirsute on the veins), pistillate inflorescence with up to 70 flowers (versus up to 35 flowers) and pistillate perianth with indument hirsute to hirtellous (versus sericeous to velutinous). Furthermore, these species are allopatric.

During to the revision of herbarium collection, we verified the presence of many ants on the materials (e.g., Palacios 1337), which seem to use the indument as shelter. The presence of ants in *Pourouma napoensis* is reported in the material label of Hurtado 2879.

The hispidulous indument of the peduncle, when it is pressured can penetrate the skin.

30. *Pourouma oraria* Standl. & Cuatrec. in Cuatrec., *Caldasia* 7: 301. 1956; Woodson, *Ann. Missouri Bot. Gard.* 47: 168. 1960; Berg & Heusden, *Proc. Kon. Ned. Akad. Wetensch., Ser. C.*, 91(2): 109. 1988; Berg, Akkermans & Heusden, *Fl. Neotrop. Monogr.* 51: 180. 1990.—TYPE: COLOMBIA. Departamento del Cauca: Costa del Pacífico, Río Yurumagui, Veneral, 28 Jan 1944 (♀), *Cuatrecasas 15720* (holotype: F!).

Tree, 12–20 m tall, d.b.h. unknown. Leafy twigs 1.5–2 cm in diameter, with indument yellowish to brownish, hirsute to hirtellous and dense, brownish, multicellular trichomes; internode 5–10 mm long. Lamina palmatifid to palmatipartite with 5–7 lobes, (26–) 28–42.5 (–45) cm long, (28–) 30–43.5 (–46.5) cm wide, length:width ratio 0.8–1.1, coriaceous; base deeply cordate, sometimes with overlapping lobes; margin palmatifid, glabrous or with indument sparse, yellowish sericeous; apex acuminate; midsegment broadly ovate, elliptic to oblong; adaxial surface smooth, indument of primary veins yellowish to whitish, sericeous;

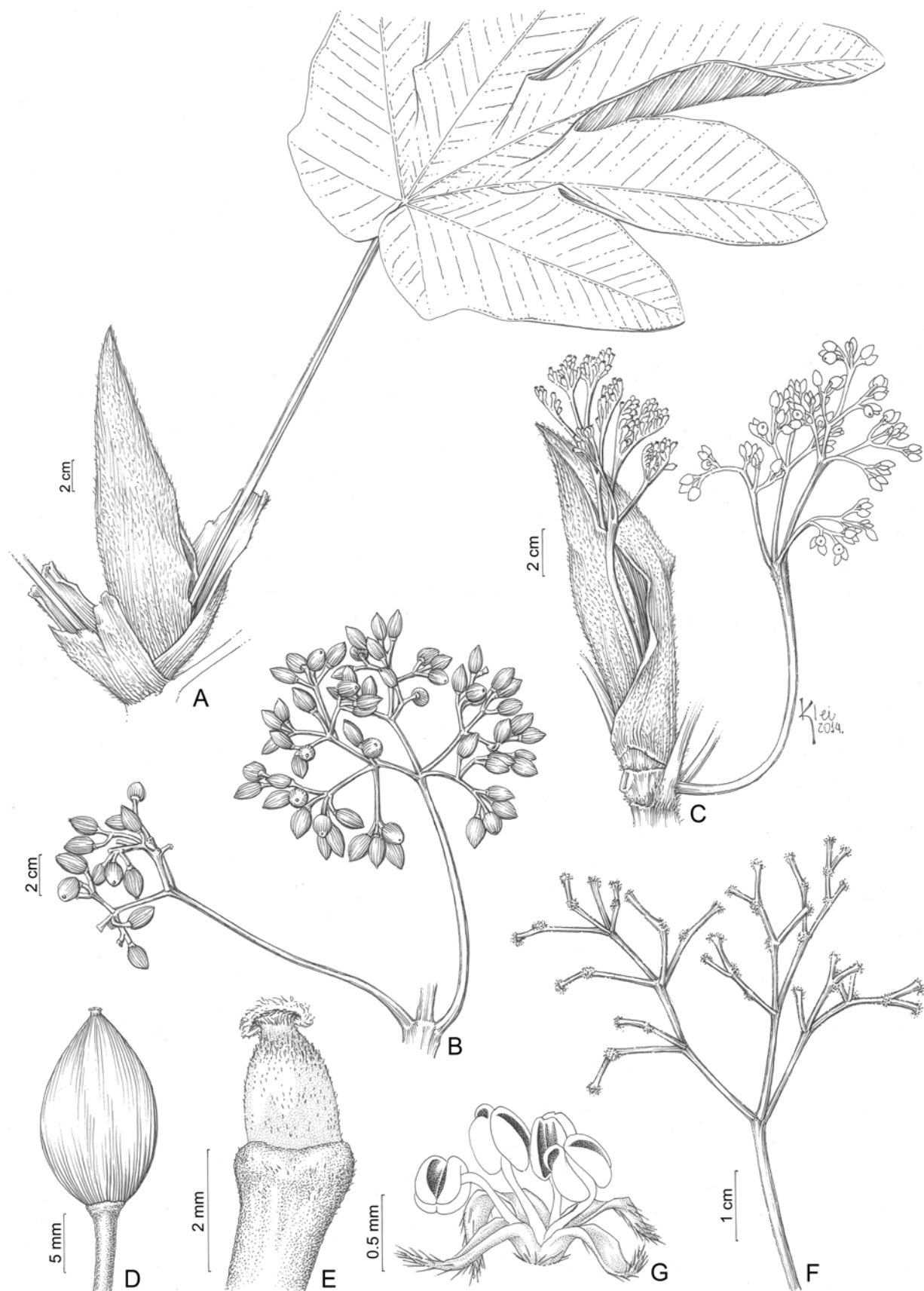


FIG. 65. *Pourouma oraria*. A. Leafy twig with stipules persistent. B. Leafy twig with infructescences. C. Leafy twig with inflorescences. D. Fruiting perianth and pedicel. E. Pistillate flower and pedicel. F. Staminate inflorescence. G. Staminate flower. [A-C: from Cuatrecasas 15720 (F); D-E: from Gentry et al. 17804 (MO); F-G: from Gentry et al. 36797 (MO)].

abaxial surface smooth or scabrous, with indument yellowish to whitish, sericeous and sometimes with indument whitish, strigose to strigulose; venation palmate; secondary veins in the free part of the midsegment 28–32 pairs per leaf, basal pair branched; tertiary and quaternary veins prominent, with whitish, arachnoid indument confined to the areoles; petiole 26–38.5 (–40) cm long, with indument yellowish, hirsute, domatia absents; stipules 10–18.5 cm long, with indument yellowish, hirsute and brownish, multicellular trichomes outside, with indument yellowish, hirsute and brownish, multicellular trichomes inside, persistent. Staminate inflorescences 25–32 cm long, 12–15 cm wide, primary branched 3; peduncle 12–15 cm long, peduncle and branches, with indument yellowish, sericeous and dense, brownish, red-brownish to dark-brownish, multicellular trichomes on the ultimate branches; flowers ca. 850–1950, flowers organized in 242–294 glomerules; glomerule 2–3.5 mm in diameter; flowers ca. 3–10 per glomerule. Staminate flowers 0.8–1.2 mm long, 1–1.5 mm wide; tepals 4, 0.8–1.2 mm long, 0.2–0.4 mm wide, lanceolate, free or basally connate, with indument yellowish, hirsute; stamens 4; filaments 0.5–0.8 mm long, free, shorter than the perianth. Pistillate inflorescences 17–19.5 cm long, 4.5–6.5 cm wide; peduncle 10–12 cm long, peduncle and branches with indument yellowish, hirsute and dense, brownish, red-brownish to dark-brownish, multicellular trichomes on the ultimate branches; flowers ca. 50–100 (–120), flowers organized in 5–15 cymes. Pistillate flowers 4–6 mm long, 2–3 mm wide, pedicel 2–4 mm long; perianth 3–5 mm long, with indument whitish, puberulous and dense, red-brownish to dark-brownish, multicellular trichomes; stigma peltate, 1–1.5 mm in diameter. Infructescences 20–26.5 (–28.5) cm long, 11.5–16.5 (–18.5) cm wide; peduncle 2.5–8.5 cm long; fruiting pedicel 8–15 mm long. Fruiting perianth 1.5–1.8 cm long, 6–10 mm wide, ovoid to ellipsoid, brownish to vinaceous, with red-brownish to dark-brownish, multicellular trichomes, multicellular trichomes. Achene 1.2–1.5 cm long, 4–8 mm wide. Seed 4–8 mm long, 2–4 mm wide, ovoid, vinaceous. Fig. 16 F; Fig. 65.

Phenology. Staminate flowers collected from June, pistillate flowers from August and fruits from February.

Distribution (Fig. 67). Endemic from the Pacific Coastal of southwestern Colombia (Chocó and Valle del Cauca), in lowland moist forests, often at an elevation of about 50 to 150 m above sea level.

Etymology. The epithet refers probably to type locality, the Pacific Coastal (Colombia, Valle del Cauca).

Use. Edible fruits; seed with purple ink usable (Cuatrecasas 1956: 302)

IUCN conservation status. According to the IUCN Red list categories (IUCN 2014), *Pourouma oraria* is considered Endangered, EN B1a,b(iii), because of the small extent of occurrence (ca. 2,980 Km²), number of locations (3) and known from only three collections, made between 1944 and 1982.

ADDITIONAL SPECIMENS EXAMINED. **Colombia.** CHOCÓ: Halfway between Certeguí and Las Animas, roadside, (♀), *Gentry & Fallen 17804* (BG, MO, U); Quibdo-Istmina road, Km 28–55 S of Quibdo, north of Certegui, 05°30'N, 76°38'W, (♂), *Gentry & Brand M. 36797* (JUAM, MO, NY).

Pourouma oraria belongs to a group of species with stipules persistent and palmatilobed lamina with adaxial surface smooth. It is distinguished from all *Pourouma* species by staminate inflorescence with greater number of glomerules (up to 294). It resembles *P. villosa* and *P. chocoana*, due to the leafy twigs with indument hirsute to hirtellous, stipules persistent, and palmatilobed lamina, but distinguished by adaxial lamina surface smooth (versus scabrous in *P. chocoana*), staminate inflorescence in glomerules (versus in fascicles), and pistillate

inflorescence with up to 120 flowers (versus up to 40 in *P. villosa* and 68 in *P. chocoana*).

Furthermore, these species are allopatric.

31. *Pourouma ovata* Trécul, Ann. Sci. Nat. Bot., Ser. 3, 8: 101. 1847; Miquel in Martius, Fl. Bras. 4(1): 132. 1853; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 110. 1988; Spichiger et al., Boissiera 1: 72. 1989; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 181. 1990; Berg, Fl. Venez.: 245. 2000; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.—TYPE: BRAZIL. Pará: Locality and date unknown, (♂), *Ferreira s.n.* (holotype: P00757087!; isotype: P00757088!).

Pourouma longipendula Ducke, Notizbl. Bot. Gart. Berlin-Dahlem 11: 581. 1932; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 110. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 181. 1990; Berg, Fl. Venez.: 245. 2000.—TYPE: BRAZIL. Amazonas: Manaus, falls of Rio Tarumã; 7 Oct 1929 (♀), *A. Ducke RB23608* (holotype: RB!; isotypes: B image! G image! K! S image! US!).

Tree, 10–30 m tall, 15–60 (–65) cm d.b.h., with stilt roots. Leafy twigs 3–10 mm in diameter, with indument sparse, whitish, sericeous to puberulous; internode 4–25 (–35) mm long. Lamina entire, (3.5–) 5–27.5 (–30) cm long, (2–) 3–13.5 (–15) cm wide, length:width ratio 1.6–2.4, ovate to elliptic, coriaceous; base acute to obtuse to rounded; margin usually repand, with indument sparse, whitish, sericeous; apex acuminate; adaxial surface smooth, indument of primary vein sparse, whitish, sericeous; abaxial surface smooth, with indument whitish, sericeous and sometimes with brownish, multicellular trichomes on the veins; venation brochidodromous;

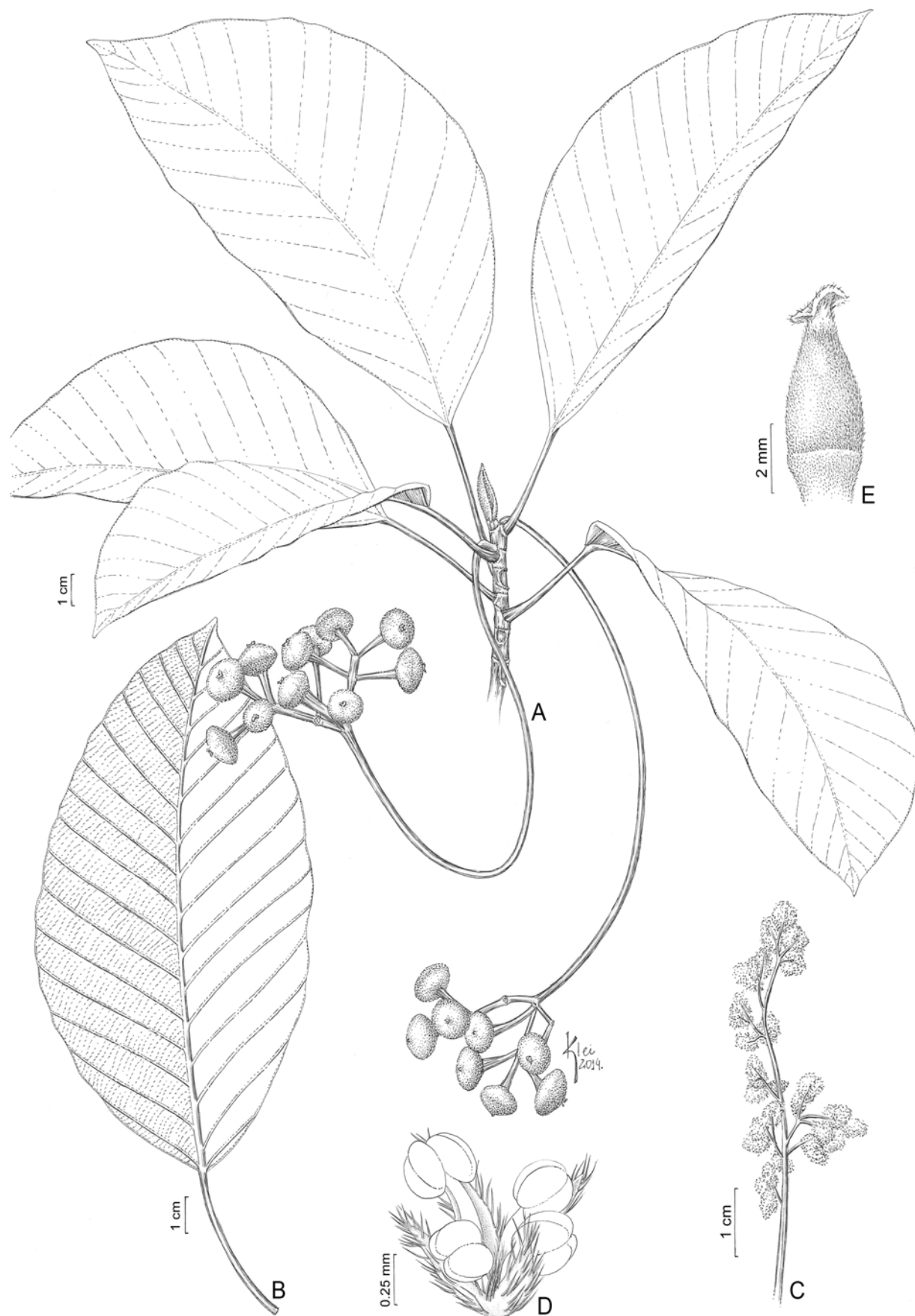


FIG. 66. *Pourouma ovata*. A. Leafy twig with infructescences. B. Entire leaf, abaxial surface. C. Staminate inflorescence. D. Staminate flower. E. Pistillate flower and pedicel. [A-B: from Gaglioti & Pederneiras 144, (SP); C-D: from Silva et al. 742, (INPA); E: Prance et al. 15393, (MO)].

secondary veins 9–22 pairs per leaf, basal pair unbranched, diverging from the midrib at an 30°–55°; tertiary and quaternary veins slightly prominent, with dense, whitish, arachnoid indument in the areoles, sometimes extending to the veins; petiole 2–8.5 (–9.5) cm long, glabrous or with indument sparse, whitish, sericeous, domatia absents; stipules 1–3 cm long, with indument yellowish, velutinous to sericeous outside, with indument yellowish to orange, velutinous to sericeous inside, caducous. Staminate inflorescences 3–11 (–12.5) cm long, 1.5–10 (–11.5) cm wide, primary branched 3–4; peduncle 1–6.5 cm long, peduncle and branches glabrous or with indument sparse, whitish, puberulous on the ultimate branches; flowers ca. 220–1680, flowers organized in 27–96 glomerules; glomerule 3–8 mm in diameter, flowers ca. 5–20 per glomerule. Staminate flowers 1–1.5 mm long, 1–1.5 mm wide; sessile to subsessile; tepals 3–4, 1–1.5 mm long, 0.2–0.4 mm wide, lanceolate to oblong, basally connate, with indument whitish, sericeous; filaments 0.5–0.8 mm long, free, shorter than the perianth. Pistillate inflorescences 3–8.5 (–10) cm long, 5–20 (–35) mm wide; peduncle 1–6.5 cm long, peduncle and branches glabrous or sparse whitish, sericeous to puberulous on the ultimate branches; flowers 6–22, flower organized in 2–5 cymes. Pistillate flowers 2–5 mm long, 2–3 mm wide; pedicel 2–4 mm long; perianth 1.5–4 mm long, with indument yellowish, velutinous to sericeous; stigma bilobed, 1.5–2 mm in diameter. Infructescences (16–) 18–39.5 (–42) cm long, 4.5–12.5 (–14.5) cm wide; peduncle 12–33.5 cm long; fruiting pedicel 1–2.5 cm long. Fruiting perianth 1–1.5 cm long, 1–1.5 cm wide, globose to oblate, reddish to vinaceous, glabrous or with indument sparse, yellowish, velutinous to sericeous. Achene 8–12 mm long, 8–12 mm wide. Seed 5–10 mm long, 5–10 mm wide, globose, vinaceous. Fig. 2 F; Fig. 17 A; Fig. 66.

Phenology. Staminate flowers collected from May to November, pistillate flowers from May to October and fruits from August to March.

Distribution (Fig. 67). Northwest of Brazil (Acre, Amazonas, western Pará, and Roraima), south of Venezuela (Amazonas and Bolívar), south of Colombia (Amazonas, Caquetá, and Vaupes), in “terra firme” forest of the Amazonian region, often in lowland moist areas, usually in riparian forest, at an elevation of about 100 to 1800 m above sea level.

Vernacular Name. Imbaubarana, puruma (Amazonas, Brazil); mapati (Acre, Brazil); sachavilla, chullachaqui blanco (Peru, Loreto).

Etymology. The epithet refers probably to the shape ovate of the lamina.

IUCN conservation status. *Pourouma ovata* is widely distributed with the extent of occurrence of ca. 2,198,230 Km² and is well represented in herbaria. For these reasons *P. ovata* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

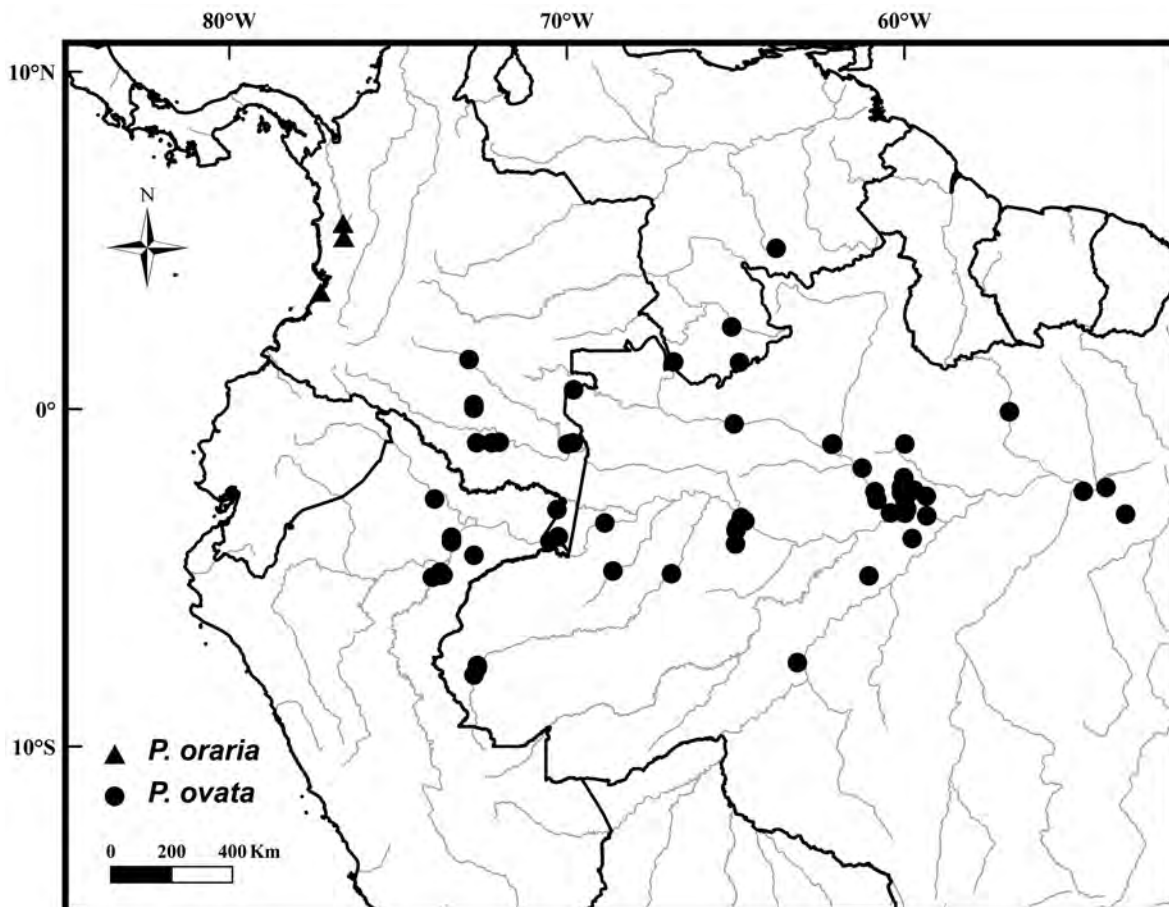


FIG. 67. Distribution of *Pourouma oraria* and *P. ovata*.

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** UNKNOWN STATE: unknown locality, (♂), *A. R. Ferreira et al.* 428 (K); ACRE: Cruzeiro do Sul, Br 307 Estrada a 60 Km da cidade, 07°53'S, 72°45'W, (♀), *C. A. Cid Ferreira et al.* 10692 (INPA, MO, NY); Cruzeiro do Sul, Projeto RADAM, (♀), *Marinho* 124 (IAN); Cruzeiro do Sul, Projeto RADAM, (♀), *Marinho* 338 (IAN); Cruzeiro do Sul, (♀), *O. P. Monteiro & C. Damião* 309 (INPA, MG); Cruzeiro do Sul, Sub-base do Projeto RADAM Brasil, aeroporto, (♀), *J. Ramos & G. Mota* 204 (INPA).—AMAZONAS: Presidente Figueiredo, Margem direita do Uatumã, (♀), *Amaral et al.* 2071 (INPA); Manaus, estrada Manaus-Boa Vista, Km 45, BR 174, Ramal ZF-2, Km 34, 02°00'S, 60°00'W, (♀), *Amaral et al.* 2594 (INPA); Rio Urucu, base da Petrobras, estrada do Papagaio, Km 40, 02°00'S, 60°00'W, (♀), *Amaral et al.* 2820 (INPA); Tefé, (♀), *Black* 47–1484 (IAC, IAN); Manaus, Distrito Agropecuário, Reserva 1501, Km 41, 02°24'26"S, 59°43'40"W, (♀), *Boom et al.* 8536 (INPA, MO, NY); Rio Urubú, Iracema waterfall and nearby stream, (♂), *Calderón et al.* 2940 (EAFM, INPA); Manaus, 90 km NEW de Manaus, Distrito Agropecuário da Suframa, 02°24'26"S, 59°43'40"W, (♀), *H. T. Campos* 11 (NY); rd. Manaus-Itacoatiara, Km 26, trilha L–08, Km 1.5, 02°59'16"S, 59°56'47"W, (♀), *Castilho et al.* 273 (INPA); Manaus, Rodovia Manaus-Itacoatiara, km 26, Reserva Florestal Adolpho Ducke, 02°59'16"S, 59°56'47"W, (♀), *Castilho et al.* 299 (INPA); Manaus, Rodovia Manaus-Itacoatiara, km 26, Reserva Florestal Adolpho Ducke, 02°59'16"S, 59°56'47"W, (♀), *Castilho et al.* 314 (INPA); Manaus, Cachoeira Baixa do Tarumã, (♂), *L. Coêlho* INPA5808 (INPA, MG, U); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR-174, (♀), *A. J. C. Ferreira et al.* INPA/WWF3209.161 (INPA); Tefé, Rio Solimões, margem direita do Paraná Tefé, estrada do Projeto Dendê, Km 6, (♀), *C. A. Cid Ferreira & J. Lima* 3297 (INPA, MBM, MG, NY, R, RB); Presidente Figueiredo, estr. da UHE de Balbina, próx. ao Igarapé do Barreto, (♀), *C. A. Cid Ferreira et al.* 7031 (INPA, NY); Alvarães,

Rio Solimões, estrada que liga a cidade de Alvarães à Vila Nogueira, (♀), *C. A. Cid Ferreira et al.* 8432 (INPA, JPB, K, MBM, MO, NY); Tefé, west of air strip, (♀), *Fosberg et al.* 38836 (NY); Reserva Florestal Adolpho Ducke, trilha de acesso do acampamento do Bolivia, (♀), *Gaglioti & Pederneiras* 144 (EAFM, SP); Reserva Florestal Adolpho Ducke, ao lado do Igarapé do Acará, 02°55'51"S, 59°57'55"W, (♀), *Gaglioti et al.* 172 (EAFM, SP); Manaus, (♀), *Killip & A. C. Smith* 30139 (F); Humaitá, (♀), *Krukoff* 7073 (A, B, BR, F, G, GB, K, LE, MO, NY, RB, S, U, US); São Paulo de Olivença, (♀), *Krukoff* 8695 (A, B, BR, F, G, K, MO, NY, P, R, S, U, US); Road Manaus-Porto Velho, km 240, (♀), *Lleras et al.* P19586 (F, INPA, K, MO, NY, P, R, S, U, US); Manaus, Reserva Florestal Ducke, (♀), *Loureiro INPA*16568 (INPA, U); Torquato-Tapajós rd., km 118, (♀), *Loureiro et al.* INPA50623 (INPA, U); INNovo Airão, área indígena Waimiri Atroari, Rio Camanaú, 01°45'S, 61°15'W, (♀), *Miller* 689 (INPA, NY); Novo Airão, Área Indígena Waimiri Atroari, Rio Camanaú, Vicinity of Aldeia Maré, (♀), *Miller* 691 (INPA); Distrito Agropecuário, Reserva 1501, Km 41, (♀), *S. A. Mori et al.* 20069 (MO, NY); Estrada Manaus-Caracará, BR 174, km 57, (♀), *Mota* 680 (EAFM, INPA); Distrito Agropecuário, 90 Km NNE de Manaus, Reserva 1501, Km 41, 02°24'26"S, 59°43'40"W, (♀), *A. C. A. Oliveira & Assunção* 159 (ESA, INPA, NY, SPF, UNIP); Manaus, Reserva 1501, Km 41, (♂), *A. C. A. Oliveira & Assunção* 161 (INPA, NY); Manaus, Reserva 1501, Km 41, (♀), *A. C. A. Oliveira & Assunção* 829 (INPA, NY); Manaus, Reserva 1501, Km 41, 02°24'26"S, 59°43'40"W, (♀), *A. C. A. Oliveira & Assunção* 1108 (INPA); Manaus, Distrito Agropecuário, Fazenda Dimona, 72 Km N of Manaus, (♀), *Pacheco & Palheta* 44 (INPA, NY); Manaus, Distrito Agropecuário da SUFRAMA, Rodovia BR 174, Km 64, Fazenda Esteio, (♀), *M. J. R. Pereira et al.* INPA/WWF3304.4024 (INPA); Manaus, Distrito Agropecuário da SUFRAMA, Rodovia BR 174, Km 64, Fazenda Esteio, (♀), *M. J. R. Pereira et al.* INPA/WWF1301.5124 (INPA); Tefé, (♀), *Pires* 1359 (IAN); North of Rio Negro 2 km, above Tapuruquara, (♀), *G. T. Prance et al.* 15393

(F, GH, INPA, MG, MO, NY, P, S, U, US); Manaus-Porto Velho road, BR 319, km 245, 3 km South of Igapó Açu, (♀), *G. T. Prance et al. 20454* (INPA, MG, MO, NY, P, S, U, US); Manaus-Porto Velho road, BR 319, km 380, 2 km, south of Rio Jutai, (♀), *G. T. Prance et al. 22864* (INPA, MG, MO, NY, P, S, U, US); Manaus, Reserva Florestal Ducke, 02°53'S, 59°58'W, (♀), *Pruski et al. 3239* (INPA, IAN, MO, NY, R); Manaus, Reserva Florestal Ducke, Igarapé Barro Branco, 02°53'S, 59°58'W, (♀), *Ribeiro et al. 1466* (INPA, MG, MO, RB, SP); Manaus, Reserva Florestal Ducke, (♀), *W. A. Rodrigues 5449* (INPA, NY, U); Estrada AM-I, ao lado da estrada, Km 74, (♀), *W. A. Rodrigues & Loreiro 7081* (INPA, U); Estrada AM-I, ao lado da estrada, Km 74, (♀), *W. A. Rodrigues & Loreiro 7091* (UFACPZ); Estrada Manaus-Itacoatiara, Km 170, (♀), *W. A. Rodrigues & D. Coêlho 7292* (INPA, U); Estrada Manaus-Caracará, km 60, Reserva Biológica do INPA, (♂), *Shima et al. 14* (INPA, RB); Presidente Figueiredo, No entorno do Lago da Rebio Uatumã, Balbina, (♀), *M. C. R. Silva et al. 36* (INPA); Estrada Manaus-Porto Velho, entre Rio Castanho e Rio Tupana, (♂), *M. F. Silva et al. 742* (INPA, EAFM, U); Estrada Manaus-Porto Velho, entre Rio Castanho e Rio Tupana, (♀), *M. F. Silva et al. 869* (INPA); Manaus-Porto Velho rd., km 250, (♀), *Steward & J. F. Ramos P20156* (INPA, MG, MO, NY, U).—PARÁ: Trecho Ramal Perimetral Norte, km 24, BR163, (♀), *L. S. Coêlho et al. 62* (INPA); Cuiabá-Santarém rd., km 1230, (♀), *G. T. Prance et al. 25530* (F, K, MG, MO, NY, RB, S, U, UEC); Rio Trombetas, Cachoeira Porteira, a 1 km do aeroporto, (♂), *N. T. Silva & M. R. Santos 4740* (MBM, MG, NY, SPF, U).—RORAIMA: Manaus-Caracará rd., km 343, (♀), *Steward et al. 107* (INPA, MO, NY, U). **Colombia.** AMAZONAS: Araracuara, río Caquetá, comunidad indígena de Villazul, (♀), *Duque & Posada 1621* (COAH); Amazonas, Rio Negro, Serrania de Tapirapeco, 01°12'S, 64°01'W, (♂), *Marin 1893* (MO); Tarapacá, río Alegría, cñ. Mery, 3 km E de la desembocadura, bosque maduro, 02°23'52"S, 70°02'34"W, (♀), *Navarro 669* (COAH); Municipio de Leticia, Parque Nacional Natural Amacayacu, 03°47'S, 70°15'W, (♀), *Pipoly et al.*

15947 (COL, US).—CAQUETA: Solano, estación biológica Puerto Abeja, sector SE PNN serranía de Chiribiquete, 00°04'27"S, 72°27'05"W, (♀), *Eusse et al. 531* (COAH); Solano, estación biológica Puerto Abeja, 00°04'27"S, 72°27'05"W, (♀), *Eusse & Montes 673* (COAH); Solano, estación biológica Puerto Abeja, 00°04'27"S, 72°27'05"W, (♀), *Eusse & Montes 678* (COAH); Solano, estación biológica Puerto Abeja, 00°04'27"S, 72°27'05"W, (♀), *Eusse & Montes 783* (COAH); Solano, estación biológica Puerto Abeja, 00°04'27"S, 72°27'05"W, (♀), *Eusse & Montes 858* (COAH); Araracuara, alrededores de la pista aérea, meseta de areniscas, (♀), *Restrepo 418* (COAH); Estación Puerto Abeja, (♀), *P. Rodríguez 108* (COAH); Estación Puerto Abeja, (♀), *P. Rodríguez 115* (COAH).—VAUPES: Taraira, Estación Biológica Caparú, within 3 km of north bank of Lago Taraira, 01°00'S, 69°49'W, (♀), *Defler 379* (COAH); Monfort, Yavaraté, (♂), *Romero-Castañeda 3840* (COL); Monfort, Yavaraté, (♂), *Romero-Castañeda 3848* (COL). **Peru.** LORETO: Requena, Sapuena, Basin of Río Ucayali, Jenaro Herrera, 04°55'S, 73°45'W, (♀), *Daly et al. 5691* (NY); Requena, Sapuena, Basin of Río Ucayali, Jenaro Herrera, 04°55'S, 73°45'W, (♂), *Daly et al. 6217* (NY); Requena, Sapuena, Arboretum Jenaro Herrera, (♀), *M. Diaz 68-A* (IAN); Maynas, Jenaro Herrera, (♀), *Encarnación 26371* (NY); Maynas, Carretera Iquitos-Nauta, km 7,5, rolling hills over clay, (♀), *McDaniel & Rimachi Y. 29726* (F, MBM, NY); J. Herrera-Angamos, quebrada Sapuena, margen derecha R. Ucayali, (♀), *Spichiger & Encarnación 1184* (MBM, NY); Centre de Recherche de Jenaro Herrera, (♀), *Spichiger & Loizeau 3031* (NY); Centre de Recherche de Jenaro Herrera, (♀), *Spichiger & Loizeau 3032* (NY); Requena, Jenaro Herrera, (♀), *R. Vásquez et al. 1004* (F); Maynas, Mishana, Río Nanay, 03°55'S, 73°25'W, (♀), *R. Vásquez & Jaramillo 6156* (NY); Maynas, Estación Biológica, 04°20'S, 72°45'W, (♂), *R. Vásquez et al. 6762* (F); Requena, Saquena, Jenaro Herrera, 04°50'S, 73°45'W, (♂), *R. Vásquez & Jaramillo 9575* (NY); Maynas, Pto. Almendras, 03°48'S, 73°25'W, (♀), *R. Vásquez & Jaramillo 9684* (NY); Caballococha, carretera a Cashillo-Cocha, 03°55'S,

70°30'W, (♂), *R. Vásquez & Jaramillo 12773* (MO). **Venezuela.** AMAZONAS: Rio Metacuni, (♀), *Stergios & Velazco 13918* (NY); Misión Rio Mavaca, 02°26'N, 65°07'W, (♀), *Stergios & Yánez 14893* (NY); Rio Negro, 01°23'N, 64°03'W, (♀), *Valera et al. 90* (NY).—BOLÍVAR: Sierra Ichún, (♂), *J. A. Steyermark 90368* (NY).

Pourouma ovata belongs to a group of species with basal secondary veins unbranched. It displays similarities with *Pourouma ferruginea*, due to the peduncle of the infructescence reaching more than 50 cm long and adaxial lamina surface smooth, but distinguished by basal secondary veins unbranched (versus branched), stipules 1-3 cm long (versus 3.5–14.5 cm long), stipules with indument velutinous to sericeous inside (versus glabrous), and fruiting perianth 1–1.5 cm long (1.5–2 cm long).

In the molecular analyses (Chapter 1, Fig. 5), this species arose within of the clade IV (*P. essequiboensis*, *P. maroniensis*, *P. melinonii*, *P. mollis*, and *P. ovata*) with a strong support (BP = 92, PP = 0.96), which might show as synapomorphies: adaxial lamina surface smooth, staminate inflorescence in glomerules, and staminate flowers with tepals connate (basally connate in *P. ovata*). Within of the clade IV, *Pourouma ovata* was more closely related to *P. maroniensis* and *P. mollis*, within of a clade strongly supported (BP = 96, PP = 0.97).

Ducke (1932: 581) described *Pourouma longipendula* based in the pistillate collection (A. Ducke RB23608, B, RB, G, K, S, US) of *P. ovata*, which was described by Trécul (1847: 101) from staminate collection (Ferreira s.n., P).

32. *Pourouma persecta* (C.C. Berg & Heusden) Gaglioti & Romaniuc, *stat. nov.*—TYPE:

BOLIVIA. La Paz: Province of Larecaja, Copacabana (about 10 km south of Mapiri), 8

Oct-15 Nov 1939 (♀), *Krukoff 11062* (holotype: U!; isotypes: A image! F! G image! MO! NY! S image! WIS image! UC image! US!).

Pourouma tomentosa Miq. subsp. *persecta* C.C. Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C, 91(2): 108. 1988; Berg & Franco-Rosselli, Fl. Ecuador 27A: 104. 1993; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.

Tree, 12–30 m tall, (12–) 15–28 cm d.b.h., with stilt roots. Leafy twigs 8–15 mm in diameter, with indument yellowish, hirsute and whitish, arachnoid indument; internode 5–15 mm long. Lamina palmatipartite to palmatisect with 5–9 lobes (10.5–) 16.5–40.5 (–43) cm long, (10–) 15.5–39.5 (–40.5) cm wide, length:width ratio 0.8–1.2; or 5–9 segments; pseudo-petiолules 2–4 mm long; segments (8.5–) 16.5–40.5 (–43) cm long, (2.5–) 4.5–11.5 (–12.5) cm wide, length:width ratio 3.2–3.8, obovate, oblong to lanceolate, coriaceous; base truncate to cordate; margin palmatifid, with indument sparse, yellowish, sericeous; apex acuminate; adaxial surface smooth, indument of primary vein sparse, yellowish, sericeous; abaxial surface smooth, with indument yellowish, sericeous and whitish, arachnoid indument; venation palmate; secondary veins in the free part of the midsegment (18–) 20–28 (–32) pairs per leaf, basal pair branched to unbranched, diverging from the midrib at an 30°–45°; tertiary and quaternary veins slightly prominent, with whitish, arachnoid indument covering to the areoles; petiole (7–) 10–30.5 (–37) cm long, with indument yellowish, hirsute and whitish, arachnoid indument, yellowish, comose in the insertion with the lamina, domatia absents; stipules (3–) 4.5–10.5 (–14.5) cm long, with indument yellowish, hirsute and dense, whitish, arachnoid indument outside, with indument sparse, yellowish, hirsute inside, caducous. Staminate inflorescences (4.5–) 6.5–15.5 cm long, (1.5–) 2.5–9.5 mm wide, primary branched 2–3; peduncle 1.5–2.5 cm long, peduncle and branches with indument yellowish, velutinous to hirtellous on the ultimate branches;

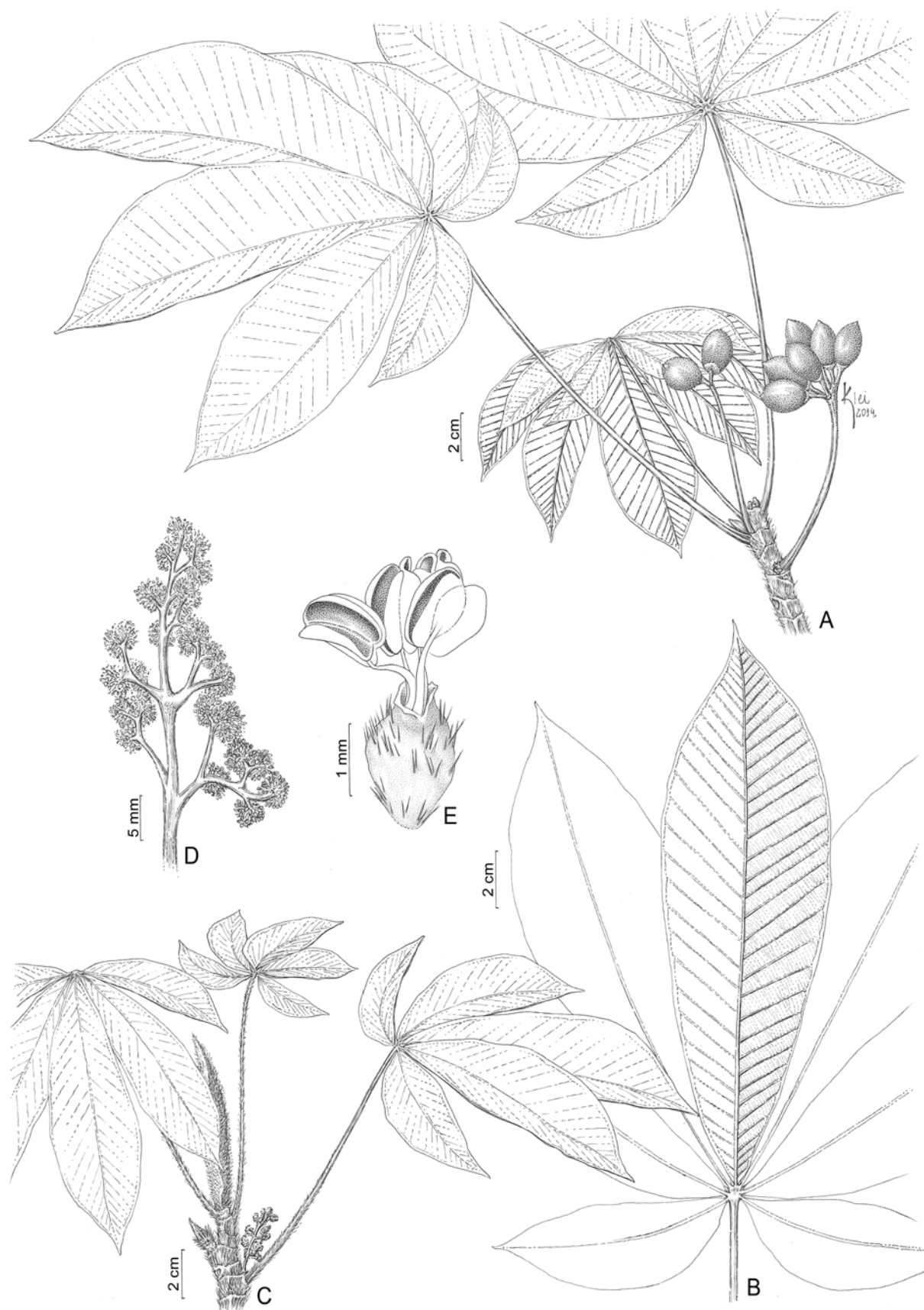


FIG. 68. *Pourouma persecta*. A. Leafy twig with infructescences. B. Palmatisect leaf, abaxial surface. C. Leafy twig with staminate inflorescence. D. Part of the staminate inflorescence. E. Staminate flower. [A: from Krukoff 11062, (US); B-E: from Krukoff 10861, (MO)].

flowers ca. 360–1050, flowers organized in 12–68 glomerules; glomerule 4–6 mm in diameter, ca. 22–30 flowers per glomerule. Staminate flowers 1.5–2 mm long, 0.8–1.2 mm wide; sessile; perianth 0.8–1 mm long, 0.5–0.8 mm wide, urceolate, tepals connate, with indument sparse, yellowish to whitish, hirtellous to sericeous; stamens 4; filaments 0.8–1.2 mm long, free, filaments exceeding the perianth. Pistillate inflorescences 9.5–14.5 cm long, 3.5–4.5 cm wide; peduncle 6–8.2 cm long, peduncle and branches with indument yellowish, hirsute to velutinous and sometimes with whitish, arachnoid indument; flowers 25–56, flowers organized in 2–4 cymes; pedicel 2–4 mm long; perianth 3–5 mm long, 2–3 mm wide, yellowish, velutinous, apex papillose, sparse yellowish, velutinous; stigma peltate, 1.5–2 mm in diameter, sometimes with indument yellowish, hirtellous. Infructescences (10–) 11.5–18.5 (–20) cm long, 3.5–11.5 (–13.5) cm wide; peduncle 5.5–9.5 (–10.5) cm long, peduncle and branches with indument yellowish, velutinous to hirtellous on the ultimate branches; fruiting pedicel 5–10 mm long. Fruiting perianth 1.2–2.5 cm long, 8–15 mm wide, ovoid to ellipsoid, brownish to vinaceous, with indument yellowish, velutinous. Achene 1–2.2 mm long, 6–12 mm wide. Seed 5–12 mm in diameter, ovoid to ellipsoid, brownish to vinaceous. Fig. 17 B; Fig. 68.

Phenology. Staminate flowers collected from August to September, pistillate flowers from June to August and fruits from September to December.

Distribution (Fig. 69). Northwest of Brazil (Acre and Amazonas), south of Colombia (Amazonas), central and northwest of Bolivia (Cochabamba and La Paz), in primary “terra firme” forest of the Amazonian region, often in lowland moist areas, usually in riparian forest, at an elevation of about 50 to 500 m above sea level.

Vernacular Name. Ambaibillo, ambaivo uva, uva de monte (Bolivia, Cochabamba); mapaty (Brazil, Amazonas); imbaubarana (Brazil, Mato Grosso).

Etymology. The epithet refers probably to palmatisect lamina.

IUCN conservation status. *Pourouma persecta* is known from only seven collections, made between 1936 and 2011. Nevertheless, the extent of occurrence of *P. persecta* is ca. 159,860 Km² and the population size are unknown. For these reasons *P. persecta* is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Bolivia.** COCHABAMBA: Jungas of Jana Maya, (♀), *Cardenas 3973* (US); Prov. Carrasco, senda Dendrológica-Campamento 2, 17°20'S, 64°50'W, (♀), *V. Garcia et al. 383* (MIN); Estación Experimental Valle del Sajta, 17°00'S, 64°46'W, (♀), *C. Mendoza & Arroyo 1422* (NY); Province Carrasco, km 240 en carretera Santa Cruz Villa, 17°00'S, 64°46'W, (♀), *D. N. Smith et al. 13673* (LPB, MO); Estación de Valle Sacta, 4,5 km entrando a la comunidad Pukara, 17°05'21"S, 64°46'10"W, (♀), *Zárate & Zurita MZ 2750* (BOLV, MO).—LA PAZ: Province of Sud Yungas, Alto Beni, subida de la serranía de Marinomos, a 4 km arriba de Palos Blancos, (♂), *E. García 2009* (F, LPB); Province of Larecaja, Tuirí, near Mapiri, on left bank of Rio Mapiri, (♂), *Krukoff 10861* (A, F, G, MO, NY, S, U); Sud Yungas, Alto Beni, serranía de Marinomos, colonia Tarapara, (♀), *Seidel et al. 7590* (MO, LPB). **Brazil.** ACRE: Bujarí, Riozinho do Andirá, margem ao longo do rio, (♀), *H. Medeiros et al. 316* (SP).—AMAZONAS: São Paulo de Olivença, (♀), *Krukoff 8325* (A, BR, F, G, K, LE, NY, P, S, U). **Colombia.** AMAZONAS: Município de Leticia, Parque Nacional Natural Amacayacu, parcela permanente, 03°48'33,2"S, 70°16'4,29"W, (♀), *J. S. B. Silva et al. 2170* (COAH, SP).

Berg & Heusden (1988: 108) described *Pourouma persecta* as a new subspecies of *P. tomentosa*. Nevertheless, our molecular analyses results (Chapter 1, Fig. 5) provided a strong support to *Pourouma persecta* more closely related to *P. triloba* (BP = 92, PP = 0.97) within clade II.

Pourouma persecta is distinguished from *P. tomentosa* by leafy twigs with indument hirsute (versus with indument sericeous), and palmatisect lamina (versus entire). It displays similarities with *Pourouma bergii*, due to the palmatisect lamina, but distinguished by leafy twigs with indument hirsute (versus glabrous), urceolate staminate perianth (versus perianth infundibuliform), four stamens (versus two) and velutinous pistillate perianth, without whitish arachnoid indument (versus tomentose with whitish arachnoid indument).

For these reasons above, we proposed a new status for *Pourouma persecta*.

33. *Pourouma petiolulata* C.C. Berg, Fl. Ecuador 48: 100. 1993.—TYPE: ECUADOR. Napo: Reserva Biología Jantun Sacha, 8 km río abajo de Misahualli, 01°08'S, 77°30'W, 2 Oct 1986 (♂), W. Palacios et al. 1298 (holotype: QAME!; isotypes: BG image! MO! QCA image!)

Tree, 12–25 m tall, 12–30 cm d.b.h., with stilt roots. Leafy twigs 8–15 mm in diameter, with indument dense, yellowish, hirsute to hirtellous and sparse, brownish, multicellular trichomes; internode 8–15 mm long. Lamina palmatisect, (8.5–) 10–35 (–36.5) cm long, (6.5–) 10–35 (–34.5) cm wide, length:width ratio 0.8–1.2; (5–) 7–9 (–13) segments; pseudo-petiолules 5–20 mm long; segments (3.2–) 5.5–40.5 (–43) cm long, (2.5–) 4.5–11.5 (–12.5) cm wide, length:width ratio 1.2–3.6, oblong to lanceolate, coriaceous; base acute; margin palmatifid, with indument sparse, whitish, sericeous; apex acuminate; adaxial surface scabrous, with indument whitish, strigose, indument of primary veins sparse, yellowish, hirtellous to sericeous; abaxial surface scabrous to scabridulous, with indument whitish, strigose to strigulose, indument of veins yellowish to whitish, hirtellous to strigulose; venation palmate; secondary veins in the free part of

the midsegment (12–) 15–30 (–32) pairs, basal pair unbranched, diverging from the midrib at an 60°–70°; tertiary and quaternary veins slightly prominent to prominent, with whitish, arachnoid indument in the areoles; petiole (4.5–) 6–30 (–31.5) cm long, with indument dense, yellowish, hirsute to hirtellous and brownish, multicellular trichomes, domatia absents; stipules (3–) 4.5–18 (–20) cm long, with indument dense, yellowish, hirsute and dense, brownish, multicellular trichomes outside, with indument sparse, yellowish, hirsute to glabrous inside, caducous. Staminate inflorescences 6–12 (–13.5) cm long, 2.5–6.5 (–7.2) cm wide, primary branched 3–4; peduncle 4–7.5 cm long, peduncle and branches with indument yellowish, hirtellous and dense, brownish, multicellular trichomes; flowers ca. 280–850, flowers organized in 10–35 fascicles, diffusely distributed along the ultimate branches; fascicle 4–10 mm in diameter, ca. 12–28 flowers per fascicle. Staminate flowers 1.2–1.8 mm long, 1–1.2 mm wide; sessile to subsessile; tepals 3–4, 1–1.5 mm long, 0.2–0.4 mm wide, lanceolate, free, with indument sparse, yellowish, hirtellous to sericeous; filaments 0.5–1 mm long, free, shorter than the perianth. Pistillate inflorescence 5.5–7.5 (–9.5) cm long, 3.5–5.5 (6–) cm wide; peduncle 3.5–5.5 cm long; peduncle and branches with indument yellowish, hirtellous and dense, brownish, multicellular trichomes; flowers 12–35, flowers organized in 3–6 cymes, pedicel 2–4 mm long; perianth 3–5 mm long, 2–3 mm wide, with indument whitish, hispidulous; stigma peltate, 1.2–1.5 mm in diameter. Infructescences 10–25 cm long, 8–12 (–15) cm wide; peduncle 5–12 cm long; fruiting pedicel 1–1.5 cm long, with indument whitish, hispidulous. Fruiting perianth 1–1.8 cm long, 5–10 mm wide, ovoid to ellipsoid, brownish to vinaceous, with indument whitish, hispidulous. Achene 8–15 mm long, 3–8 mm wide. Seed 2–5 mm long, 2–4 mm wide, ovoid, brownish to vinaceous.

Fig. 17 C.

Additional illustrations. Berg & Franco-Rosselli (1993: 101).

Phenology. Staminate flowers collected from September to October, pistillate flowers from June to September and fruits from September to March.

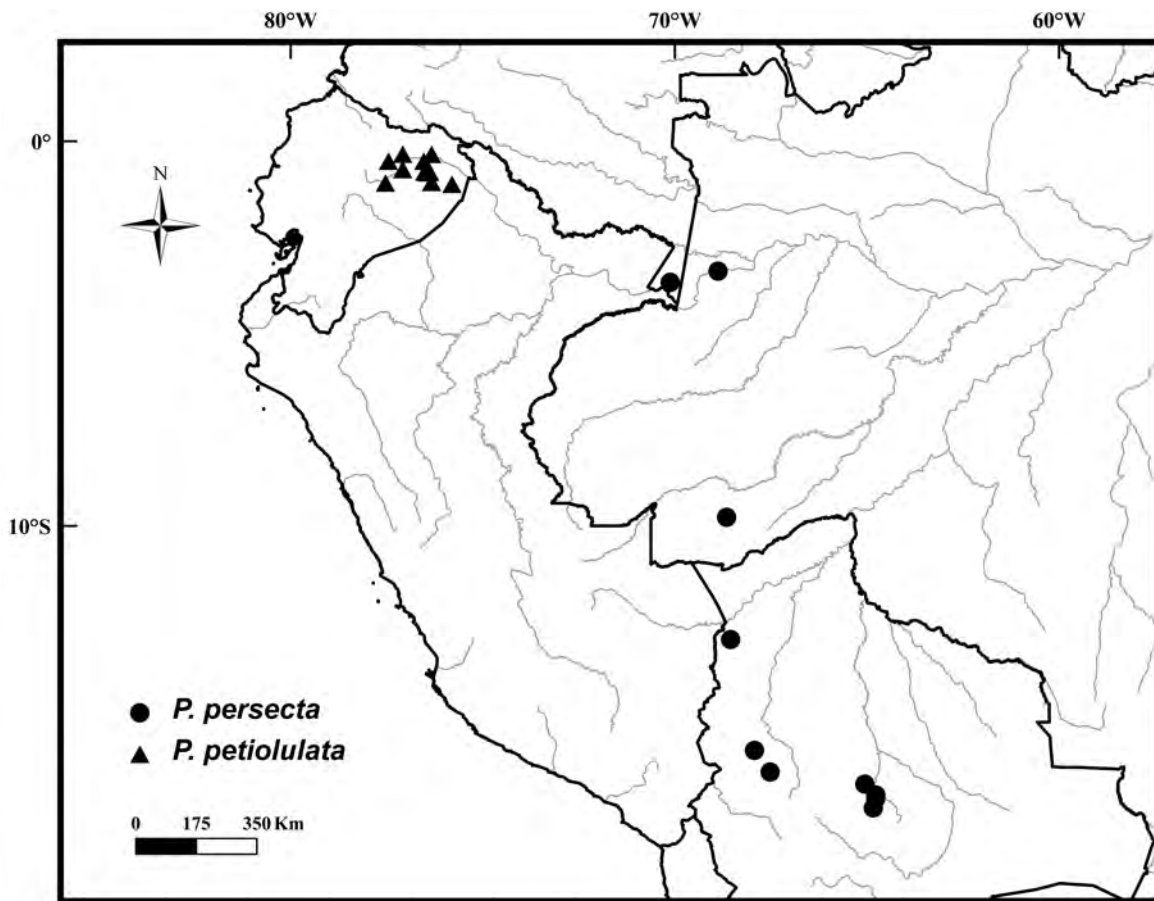


FIG. 69. Distribution of *Pourouma persecta* and *P. petiolulata*.

Distribution (Fig. 69). Endemic from the northeast of Ecuador (Napó, Pastaza and Sucumbios), in primary “terra firme” forest of the Amazonian region, in lowland moist areas, at an altitudes of about 250 to 450 m above sea level.

Vernacular Name. Airo kwiyaí, uvillas (Ecuador, Napó).

Etymology. The epithet refers probably to palmatisect lamina with pseudo-petiolules.

Use. Edible fruits.

IUCN conservation status. According to the IUCN Red list categories (IUCN 2014), *Pourouma petiolulata* is considered Vulnerable, VU B1a,b(iii), because of the small extent of occurrence (ca. 18,560 Km²) and known from only fourteen collections, made between 1974 and 2002.

ADDITIONAL SPECIMENS EXAMINED. **Ecuador** NAPO: Orellana, Parque Nacional Yasuni, Carretera y oleoducto de Maxus en construcción, Km 46–52, 00°47'08"S, 76°30'00"W, (♀), *Aulestia & Andi* 399 (MO, NY, QCNE); Orellana, Parque Nacional Yasuni, Carretera y oleoducto de Maxus en construcción, Km 54–58, 00°48'00"S, 76°30'00"W, (♀), *Aulestia & Andi* 681 (MO, QCNE); Orellana, Parque Nacional Yasuni, 00°48'00"S, 76°30'00"W, (♀), *Aulestia & Andi* 715 (MO, QCNE); Aguarico, Reserva Etnica Huaorani, 00°48'S, 76°23'W, (♂), *Aulestia et al.* 1030 (MO, QCNE); Aguarico, Reserva Etnica Huaorani, 00°48'S, 76°23'W, (♀), *Aulestia et al.* 1190 (MO, QCNE); Aguarico, Reserva Etnica Huaorani, Carretera y oleoducto de Maxus en construcción, 00°49'S, 76°26'W, (♀), *Dik* 755 (MO, NY, QCNE); La Joya de los Sachas, Comunidad Indillamam, 00°25'S, 76°36'W, (♀), *Grijalva & Grefa* 402 (MO, QCNE); Sector Huashito, 20 km al norte de Coca, 00°20'S, 77°05'W, (♂), *Gudiño* 175 (BG, MO); Coca, concession de Palm Oriente, (♀), *Lescure* 2027 (CAY, P, QCA, U); Coca, concession de Palm Oriente, (♀), *Lescure* 2043 (CAY); Rio Aguarico, Shushufindi, (♀), *Vickers* 86 (F); Orellana, Parque Nacional Yasuni, Carretera de Maxus en construcción, 00°31'S, 76°32'W, (♀), *Zuleta et al.* 231 (NY).—PASTAZA: Pozo petrolero "Ramirez", 01°32'00"S, 76°51'00"W, (♀), *Zak & Espinoza* 5086 (MO, QCNE).—SUCUMBOS: Shushufindi, comunidad San Isla, 00°20'15"S, 76°20'01"W, (♂), *Freire & Suárez* 5054 (MO).

Pourouma petiolulata belongs to the group of species with palmatisect lamina. It shows

similarities to *Pourouma bergii* and *P. persecta* by palmatisect lamina with segments usually pseudo-petiolules. It may be distinguished from *P. bergii* and *P. persecta* adaxial lamina surface scabrous (versus smooth), staminate perianth with tepals free (versus tepals connate) and pistillate perianth with hispidulous indument (versus velutinous or tomentose).

The herbarium material (Vickers 86, F) was identified by Berg *et al.* (1990) as *Pourouma cucura*. This material is distinguished from *Pourouma cucura* by palmatisect lamina with pseudo-petiolules with up to 1.8 cm long. The label of this collection brings information about fruits edible.

In the protologue, most collections are marked for the province of Napo. However, the geographic coordinates of the labels are the province of Orellana (segregated in 1998 from province of Napo). Also, the locality "Coca" refers to Francisco de Orellana, capital of the province of Orellana.

The collection Lescure 2027 (CAY, P, QCA, U) is indicated in protologue as Lescure 2097, which probably corresponds to a typographical error.

34. *Pourouma phaeotricha* Mildbr., Notizbl. Bot. Gart. Berlin-Dahlem 10: 193. 1927; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 107. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 152. 1990; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.—TYPE: PERU. Loreto: Iquitos, 20 Aug 1925 (♀), *Tessmann 5364* (holotype: B!; isotypes: S image! US!).

Tree 5–10 (–15) m tall, 10–25 cm d.b.h. Leafy twigs 4–8 mm in diameter, with indument yellowish, sericeous to hirtellous to hirsute and dense, brownish, multicellular trichomes;

internode 5–35 mm long. Lamina entire, (5–) 7.5–27.5 (–29.5) cm long, (2–) 3.5–12.5 (–14) cm wide, length:width ratio 1.9–2.6, elliptic, oblong to obovate, coriaceous to chartaceous; base acute to obtuse to rounded; margin entire to slightly repand, with indument yellowish, hirtellous to sericeous; apex acuminate; adaxial surface scabrous to scabridulous or rarely smooth, glabrous or with indument whitish, strigose; abaxial surface smooth, with indument yellowish, hirtellous to hirsute, indument of veins yellowish, hirtellous to hirsute and brownish, multicellular trichomes; venation brochidodromous; secondary veins 8–10 pairs per leaf, basal pair unbranched, diverging from the midrib at an 25° – 45° ; tertiary and quaternary veins prominent, with whitish, arachnoid indument confined in the areoles; petiole 2–12 (–13.5) cm long, with indument yellowish, sericeous to hirtellous to hirsute and dense, brownish, multicellular trichomes, domatia absents; stipules 1.5–7.2 cm long, with indument yellowish, sericeous to hirsute and dense, brownish, multicellular trichomes outside, with indument sparse, yellowish, sericeous inside, caducous. Staminate inflorescences 3–12.5 cm long, 1.5–7.5 cm wide, primary branched 3–4; peduncle 1–4.5 cm long, peduncle and branches with indument yellowish, sericeous to velutinous to hirtellous and dense, brownish, multicellular trichomes; flowers ca. 120–580, flowers organized in ca. 15–60 glomerules; glomerule 1.5–2.5 mm in diameter, ca. 5–12 flowers per glomerule. Staminate flowers 0.5–0.8 mm long, 0.8–1 mm wide, sessile; tepals 4, 0.6–0.8 mm long, free or basally connate, with indument yellowish to whitish, sericeous to strigose; stamens 4; filaments 0.3–0.5 mm long, free, usually shorter than the tepals.

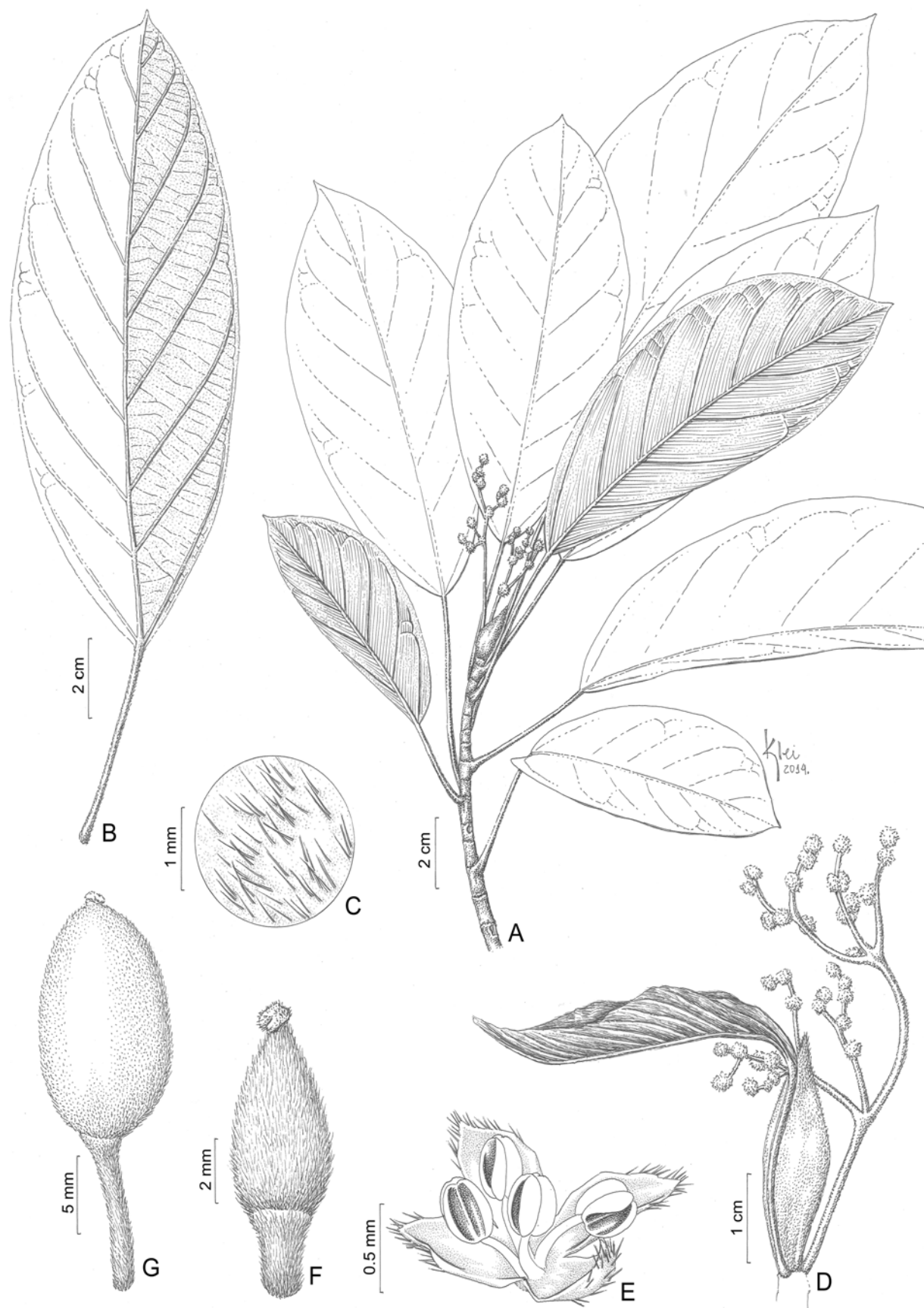


FIG. 70. *Pourouma phaeotricha*. A. Leafy twig with staminate inflorescences. B. Entire leaf, abaxial surface. C. Hirsute indument of the Leafy twig. D. Leafy twig with staminate inflorescence. E. Staminate flower. F. Pistillate flower and pedicel. G. Fruiting perianth and pedicel. [A-D: from Grández & Criollo 1759, (MO); E-F: from Revilla 1542, (MO); G: from Haxaire et al. 5009, (P)]

Pistillate inflorescences unknown. Infructescences 5.5–10.5 cm long, 1.5–8.5 cm wide; peduncle 2.5–6 cm long, peduncle and branches with indument yellowish, sericeous to velutinous to hirtellous and dense, brownish, multicellular trichomes; fruits 11–15, fruits organized in 2–4 cymes; fruiting pedicel 3–12 m long; stigma peltate, 1–1.5 mm in diameter. Fruiting perianth 1–1.5 cm long, 5–10 mm wide, ovoid to ellipsoid, reddish, with indument yellowish, velutinous to puberulous. Achene 8–12 mm long, 3–8 mm wide. Seed 3–6 mm long, 2–5 mm wide, ovoid, brownish to vinaceous. Fig. 17 D; Fig. 70.

Phenology. Staminate flowers collected from August to September and fruits throughout the year.

Distribution (Fig. 71). Northwest of Brazil (Amazonas), south of Colombia (Amazonas) and northeast of Peru (Loreto), often in “terra firme” forest of the Amazonian region, in lowland moist areas, usually in riparian forest, at an elevation of about 100 to 200 m above sea level.

Vernacular Name. Sacha uvilha, uvilha (Peru, Loreto).

Etymology. The epithet probably derives from the Greek, “phaios” mean dark and “tricha” mean three, maybe a reference to the branches and / or inflorescences.

IUCN conservation status. *Pourouma phaeotricha* is known from only seven collections, made between 1830 and 2006. Nevertheless, the extent of occurrence of *P. phaeotricha* is ca. 166,970 km² and the population size is unknown. For these reasons *P. phaeotricha* is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAZONAS: Jutuí, estrada de Breu, a 4 km da cidade, (♀), C. A. *Cid Ferreira* 8321 (HAMAB, INPA, JPB, K, NY); Rio Javari, Estirão de Equador, (♂), *Lleras et al.* P17242 (F, INPA, K, MG, MO, NY, R, U, US); Estirão do Equador,

Rio Javari, (♀), *G. T. Prance et al. 23966* (G, IAC, INPA, K, MG, NY, R, U). **Colombia.** AMAZONAS: Tarapacá, cuenca del río Putumayo, río Porvenir Grande, 02°31'10"S, 70°12'35"W, (♀), *D. Cárdenas et al. 11077* (COAH); Tarapacá, km 2, vía Leticia, a orilla de camino, (♂), *Navarro 902* (COAH). **Peru.** LORETO: Maynas, Iquitos, Mishana, ca. 45 km from Iquitos, up Rio Nanay, (♀), *Davidson 5203* (MO, U, US); Maynas, Río Nanay, Puerto Almendrez, (♀), *Gentry et al. 21141* (MO); Maynas Province, Puerto Almendras, Río Nanay, 03°48'S, 73°25'W, (♂), *Grández & Criollo 1759* (MO); Maynas, Trocha de UNAP, Zungarococha, a Nina Rumi, (♀), *McDaniel 27801* (MO, NY); Prov. de Maynas, rio Yuvinetto afluente du Putumayo, territoire des indiens Secoya, (♀), *Haxaire 5009* (P, NY); Maynas Province, Vicinity Rio Amazonas-Rio Nanay, (♀), *Revilla 1542* (F, MO, NY); Rio Nanay, (♀), *Rimachi Y. 2725* (DUCKE, F, MO, NY); Maynas, Nauta, (♀), *R. Vásquez & Jaramillo 5111* (F, MO, NY); Maynas, Pto Almendras, Río Nanay, 03°45'S, 73°25'W, (♀), *R. Vásquez & Jaramillo 5853* (F, MO, NY); Requena, Sapuena, Jenaro Herrera, 04°50'S, 73°25'W, (♂), *R. Vásquez & Jaramillo 9518* (MO); Maynas, Allpahuayo reserve of IIAP, ca. 26 km outside Iquitos along road Iquitos-Nauta, (♂), *Werff et al. 10245* (MO, NY).

Pourouma phaeotricha belongs to a group of species with basal secondary veins unbranched and lamina entire. It resembles to *Pourouma amacayacuensis*, due to adaxial lamina surface scabrous, apex of the lamina acuminate, and staminate flowers with tepals free or basally connate, but distinguished by leaf twigs with indument sericeous to hirsute (versus with dense, floccose, brownish, arachnoid indument), lamina with indument hirsute to hirtellous on the primary veins of the abaxial lamina surface (versus with whitish arachnoid indument), and staminate inflorescence in glomerules (versus in fascicles).

Berg et al. (1990) remarked that only two collections from the Brazilian bank of Rio Javari have leaves with adaxial lamina surface scabrous. However, the most part of collections from Peru and Colombia have the adaxial lamina surface scabrous to scabridulous, although in the type collection (Tessmann 5364, B) the adaxial lamina surface is smooth.

The occurrence of *P. phaeothicha* in Colombia is reported for the first time

35. *Pourouma saulensis* C.C. Berg, *Brittonia* 34(1): 36, t.1. 1982; Berg & Heusden, *Proc. Kon. Ned. Akad. Wetensch., Ser. C.*, 91(2): 109. 1988; Berg, Akkermans & Heusden, *Fl. Neotrop. Monogr.* 51: 181. 1990; Berg, *Fl. Guianas* 11(22): 120. 1992.—TYPE: FRENCH GUIANA. Saül: km 2.7 on trail of Montagne Belvédère Sud, 21 Oct 1971 (♀), *Oldeman B4132* (holotype: U!; isotypes: CAY image! P! VEN image!).

Tree, 11–30 m tall, 15–40 cm d.b.h., with stilt roots. Leafy twigs 3–5 mm in diameter, glabrous or with indument sparse, whitish, puberulous; internode 2–8 mm long. Lamina entire, 5.5–14 cm long, 3–9.5 cm wide, length:width ratio 1.3–2.1, ovate to elliptic or oblong, coriaceous; base rounded to obtuse; margin usually repand; apex acuminate to acute; adaxial surface smooth, indument of primary vein whitish, sericeous and sometimes with brownish, multicellular trichomes; abaxial surface smooth, glabrous or with indument sparse, whitish, sericeous; venation brochidodromous; secondary veins 7–12 pairs per leaf, basal pair unbranched, diverging from the midrib at an 40°–55°; tertiary and quaternary veins plane, with whitish, arachnoid indument confined in the areoles; petiole 2–10.5 cm long, glabrous or with indument sparse, whitish, sericeous, domatia absents; stipules 1–4.5 cm long, with indument yellowish, sericeous outside, glabrous inside, caducous. Staminate inflorescences unknown. Pistillate

inflorescences 4.5–5.5 cm long, 1–2.5 cm wide; peduncle 2–4 cm long, peduncle and branches with indument yellowish, puberulous to sericeous and brownish, multicellular trichomes on the ultimate branches; flowers 7–12 flowers, organized in 2–3 cymes. Pistillate flowers 5–8 mm long, 1–2 mm wide, pedicel 2–4 mm long; perianth 2.5–4 mm long, with indument yellowish, sericeous and brownish, multicellular trichomes; stigma bilobed, 1.5–2.5 mm in diameter. Infructescences 6.5–9.5 (–12) cm long, 3.5–7 (–8.5) cm wide; peduncle 3–5.5 cm long; fruits pedicel 1–4 mm long. Fruiting perianth 1.5–2.2 cm long, 6–10 mm wide, ovoid to ellipsoid, red, glabrous or with indument minutely, whitish, puberulous. Achene 1.2–2 cm long, 4–8 mm wide. Seed 5–8 mm long, 2–5 mm wide, ovoid to ellipsoid, vinaceous. Fig 17 E.

Additional illustrations. Berg & Kooy (1982: 37).

Phenology. Pistillate flowers collected from October and fruits from November to February.

Distribution (Fig. 71). Northeast of Brasil (Amapá) and Guiana (Cayenne and Saint-Laurent-du-Maroni), in “terra firme” forest of the Amazonian region, in lowland moist areas, usually in riparian forest, at an elevation of about 100 to 200 m above sea level.

Vernacular Name. Mapaty (Brazil, Amazonas); sachu ubilla, uvilla (Peru, Loreto); uva de monte (Colombia, Puerto Santander)

Etymology. The epithet is a tribute to type locality, the commune of Saül (French Guiana).

IUCN conservation status. According to the IUCN Red list categories (IUCN 2014), *Pourouma saulensis* is considered Vulnerable, VU B1a,b(iii), because of the small extent of occurrence (ca. 18,380 Km²), number of locations (5) and known from only five collections, made between 1971 and 2002.

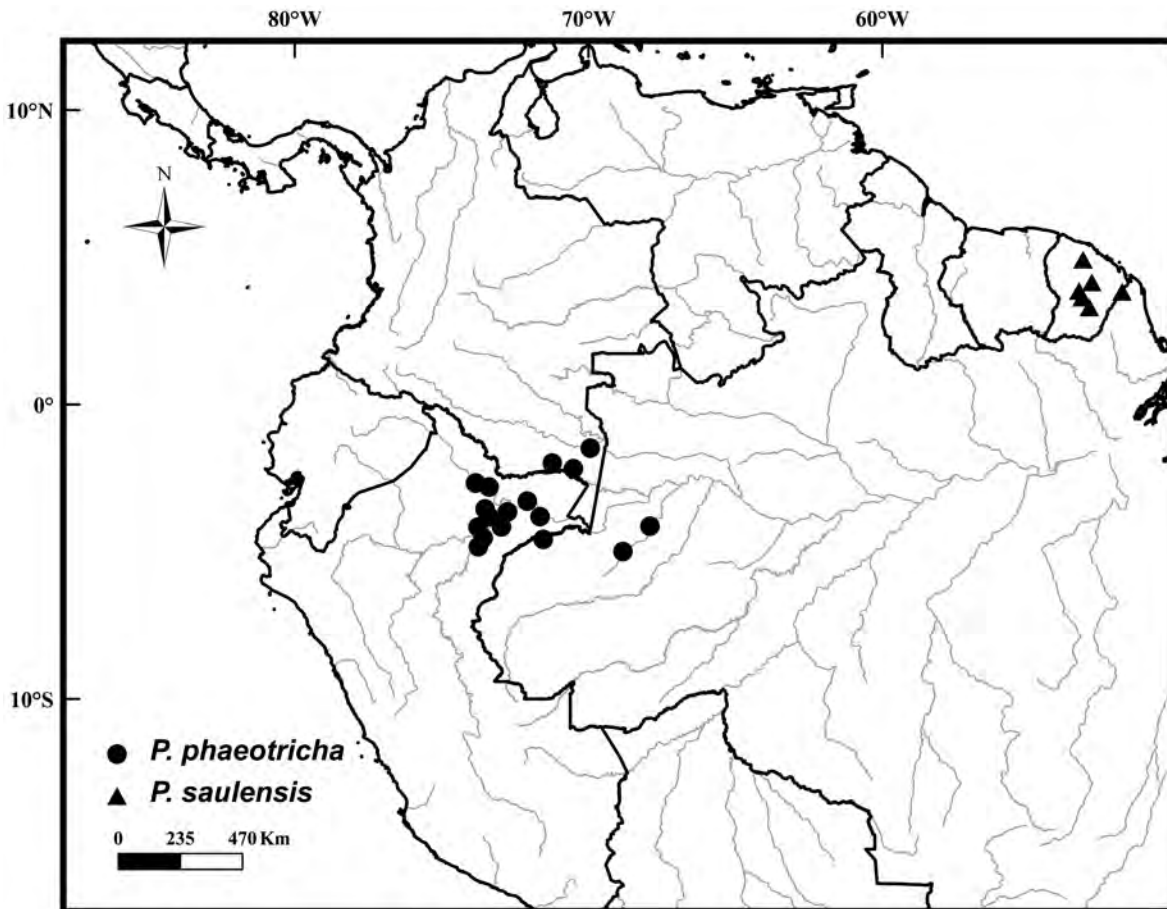


FIG. 71. Distribution of *Pourouma phaeotricha* and *P. saulensis*.

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAPÁ: Município de Oiapoque, BR 156, 109 km SSE of Oiapoque, 03°00'N, 51°30'W, (♀), *Mori et al.* 17185 (BG, F, HAMAB, K, MO, NY).

French Guiana. CAYENNE: Nouragues Field Station, Chemin Bleu Trail, 04°05'08"N, 52°52'09"W, (♀), *Mori et al.* 25476 (U, US).—SAINT-LAURENT-DU-MARONI: Saül Monts Bakra, (♀), *Granville* 2744 (CAY); Montagne La Fsée, 03°38'N, 53°12'W, (♀), *Sabatier D.* 2301 (CAY).

Pourouma saulensis belongs to a group of species with basal secondary veins unbranched and entire lamina, and adaxial lamina surface smooth. It shows similarities with *Pourouma minor*

and *P. ovata*, due to the foliar and stipules characteristics, but distinguished from *P. minor* by stigma bilobed with 1.5–2.5 mm in diameter (versus stigma multilobed with 2.8–6 mm in diameter). Also, it is distinct from *P. ovata* by stipules glabrous inside (versus with indument yellowish to orange, velutinous to sericeous), and peduncle of the infructescence with 3–5.5 cm long (versus with 12–33.5 cm long).

The label of the collection of Mori et al. 17185 reported a specimen with 30 m tall. However, Berg (1990: 181) described this species with only 11 m tall, although he cited the collection of Mori et al. 17185.

36. *Pourouma scobina* Benoist, Bull. Mus. Hist. Nat. (Paris) 28: 320. 1922; Woodson, Ann. Missouri Bot. Gard. 47: 167. 1960; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 139. 1990; Berg, Fl. Venez.: 235. 2000.—TYPE: Costa Rica. San José: Tucurrique, Dec 1898 (♂), *Tonduz 12930* (holotype: P00753655!; isotypes: F! GH image! K! M! NY image! P00753655! S image! US image!).

Pourouma crassivenia Cuatrec., Revista Acad. Colomb. Ci. Exact. 9(36/37): 340. 1956; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C 91(2): 106. 1988; Berg, Fl. Venez.: 235. 2000.—TYPE: Colombia. Valle del Cauca: Río Digua, Piedrad e Moler, 24 Aug 1943 (♀), *Cuatrecasas 15071* (holotype: F-1166912!; isotypes: COL! F-1166946! GH image! NY!).

Pourouma bicolor Mart. subsp. *scobina* (Benoist) C.C. Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C 91(2): 106. 1988; Berg, Fl. Venez.: 235. 2000.

Tree, 10–35 (–40) m tall, 10–40 (–50) cm d.b.h., with stilt roots. Leafy twigs 5–15 mm in diameter, with indument yellowish to whitish, sericeous to strigose and sometimes with sparse, brownish, multicellular trichomes; internode 5–20 mm long. Lamina palmatifid to palmatipartite with 3–7 (–9) lobes, (9.5–) 12.5–42.5 (–45.5) cm long, (10.5–) 14–44.5 (–47.5) cm wide, length:width ratio 0.8–1.1, coriaceous; base deeply cordate to cordate, sometimes with overlapping lobes; margin palmatifid, with indument whitish to yellowish, hirtellous to sericeous; apex acuminate to acute; midsegment lanceolate to oblong; adaxial surface scabrous, with indument whitish, strigose, indument of veins whitish to yellowish, sericeous to hirtellous; abaxial surface smooth or scabridulous, with indument whitish to yellowish, sericeous to strigulose; venation palmate; secondary veins in the free part of the midsegment 12–22 pairs per leaf, basal pair branched; tertiary and quaternary veins prominent, with whitish, arachnoid indument confined to the areoles; petiole (4.5–) 5.5–30 (–32.5) cm long, with indument whitish, sericeous to strigulose, domatia absents; stipules 4–15.5 (–17.5) cm long, with indument whitish, sericeous to strigulose and dense, brownish to brownish-red, multicellular trichomes outside, with indument dense, yellowish, hirsute and sometimes with brownish, multicellular trichomes inside, caducous. Staminate inflorescences (6.5–) 7.5–16.5 (–18.5) cm long, 3.5–12 (–13.5) cm wide, primary branched 2–5; peduncle 3.5–9.5 cm long, peduncle and branches yellowish, hirsute to velutinous and brownish, multicellular trichomes on the ultimate branches; flowers ca. 620–1850, flowers organized in 25–65 fascicles, diffusely distributed along the ultimate branches; fascicle 4–7 mm in diameter, ca. 15–45 flowers per fascicle. Staminate flowers 1.2–1.5 mm long, 1.5–2 mm wide; sessile; tepals 4, 1.2–1.5 mm long, lanceolate to ovate, free or basally connate, yellowish, hirtellous to strigulose; stamens 4; filaments 0.5–1 mm long, free, usually shorter than the tepals. Pistillate inflorescences 6.5–14.5 (–17.5) cm long, 1.5–8.5 cm wide; peduncle 3.5–8.5 (–12) cm long, peduncle and branches with indument yellowish, hirsute to hirtellous

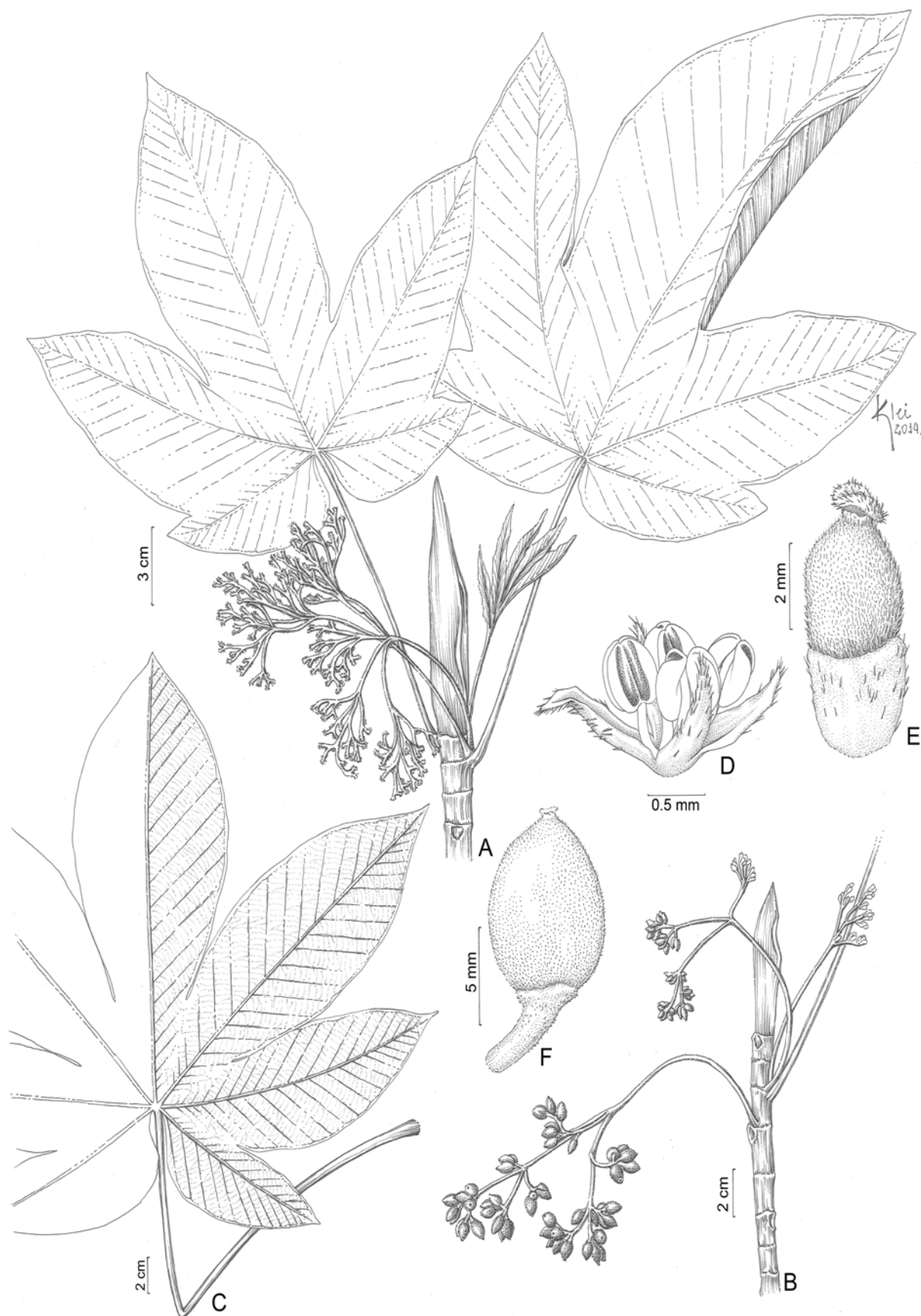


FIG. 72. *Pourouma scobina*. A. Leafy twig with staminate inflorescences. B. Leafy twig with pistillate inflorescences and infructescences. C. Staminate flower. D. Palmatipartite leaf, abaxial surface. E. Pistillate inflorescence. F. Pistillate flower. G. Perianth fruiting. [A, C-D: from *Tonduz et al.* 12930 (F); B-E: from *Revilla* 1542 (MO); F: from *Haxaire* 5009 (P)].

and brownish, multicellular trichomes on the ultimate branches; flowers 20–60 (–66), flowers organized in 4–8 cymes. Pistillate flowers 3–5 mm long, 2–3 mm wide, pedicel 2–5 mm long; perianth 2.5–4 mm long, whitish, strigulose and dense, brownish to brownish-red, multicellular trichomes; stigma bilobed, 1–1.5 mm in diameter. Infructescences 12–20 (–22.5) cm long, 8–15.5 (–18.5) cm wide; peduncle 2.5–9.5 cm long; fruiting pedicel 8–15 mm long. Fruiting perianth 1–1.8 cm long, 5–10 mm wide, ovoid to ellipsoid, brownish to vinaceous, with indument yellowish, hirsute and sometimes with brownish, multicellular trichomes. Achene 8–15 mm long, 3–8 mm wide, ovoid to ellipsoid. Seed 3–5 mm in diameter, ovoid, vinaceous. Fig. 8 B; Fig. 9 A; Fig. 17 F; Fig. 72.

Phenology. Staminate flowers collected from May to December, pistillate flowers from February to March and August to October; fruits collected along the year.

Distribution (Fig. 73). Southeast of Mexico (Veracruz), Belize (Cayo and Toledo), east of Honduras (Atlantida, Cortes, Gracias a Dios, Intibuca and Yoro), Nicaragua (Atlantico Norte, Atlantico Sur, Matagalca and Rio San Juan), Costa Rica (Alajuela, Guanacaste, Heredia, Limon and San Jose), Panama (Cocle, Colon, Darien, Herrera, Panama and San Blas), north of Colombia (Antioquia, Caquetá, Risaralda, Valle del Cauca and Zelaya), northwest of Venezuela (Barinas, Mérida, Táchira and Zulia) and west of Ecuador (Carchi, Esmeralda, Los Rios, Napo and Santo Domingo de los Tsachilas), in tropical moist evergreen forest, usually in lowland moist areas, often in riparian forest, at an elevation of about 50 to 1600 m above sea level.

Vernacular Name. Trumpet tree (Belize, Cayo); fruta de indio (Colombia, Antioquia); uva (Colombia, Chocó); chumico (Costa Rica, Cartago); guarumo de montaña, lija (Costa Rica, San José); uva (Ecuador, Carchi); guagay, guarumo de montanha, uva, uva del monte (Ecuador, Esmeraldas); guarumo de montaña (Guatemala, Izabal); guarumo de montaña (Honduras, Atlantida); mano de león (Honduras, Cortes); guarumo macho, pacica, yahal (Nicaragua,

Atlantico Norte); guarumon, pacica or pasica (Nicaragua, Zelaya); ubilla (Panama, Cocle); guarumo macho, piraejo (Panama, Darien); cuabar (Panama, San Blas); tinajero (Venezuela, Barinas); orumo de monte (Venezuela, Bolívar).

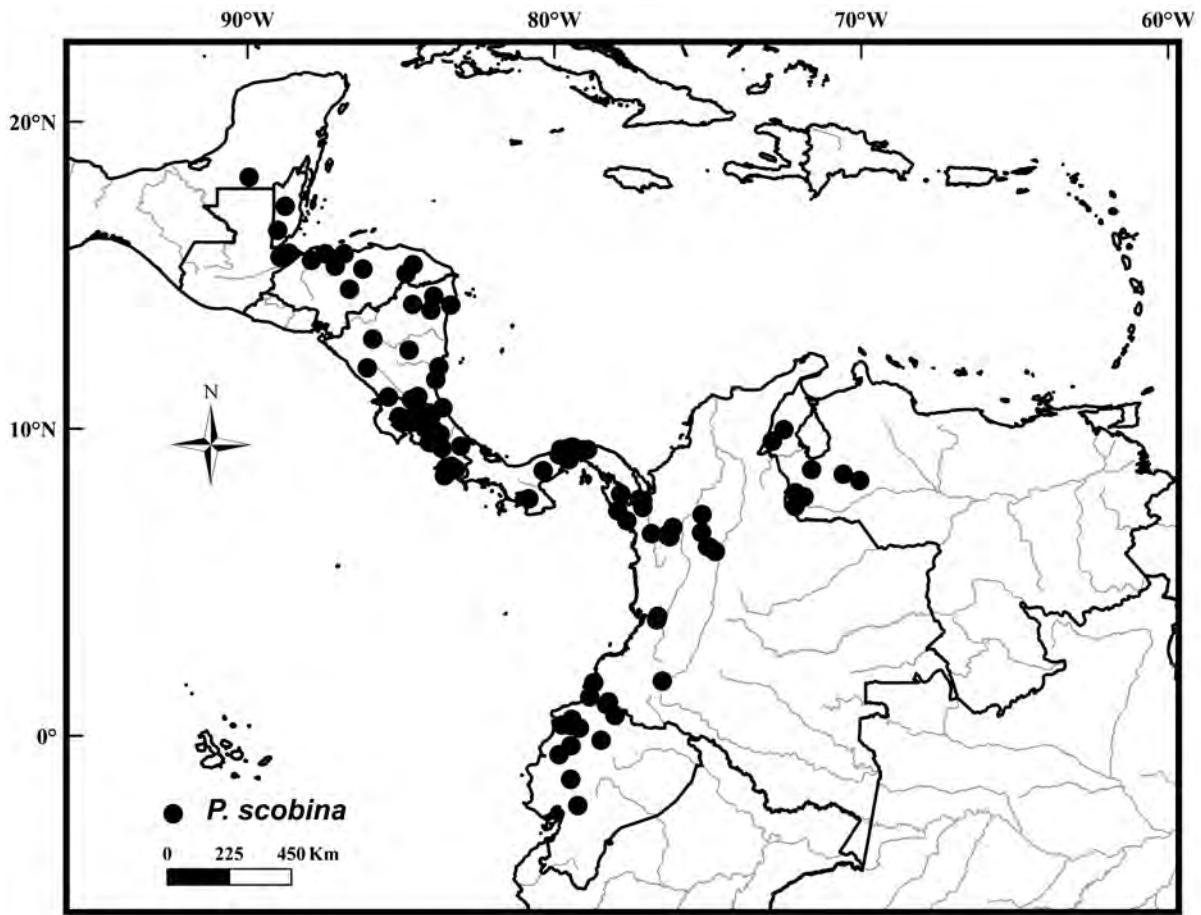


FIG. 73. Distribution of *Pourouma scobina*.

Etymology. The epithet *scobina* means “rasp”, refers probably to the indument strigose and scabrous of the adaxial lamina surface.

Use. Edible fruits for man and monkeys; leaf for sandpaper; wood for fuel stuff.

IUCN conservation status. *Pourouma scobina* is widely distributed with the extent of occurrence of ca. 847,990 Km². Also, *P. scobina* is well represented in herbaria. For these

reasons *P. scobina* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Belize.** CAYO: along Hummingbird Highway south of Belmopan, (♂), *Croat 24831* (MO); Stann Creek district, Middlesex, (♀), *Gentle 2787* (A, F, NA, NY, US); Stann Creek valley, (♀), *Gentle 3265* (A, NY); Monkey R., (♂), *Gentle 4211* (DUKE); El Cayo district, Hummingbird Hwy., (♀), *Gentle 8675* (F, NY, S, US); Maya Mts., (♀), *Schipp 5127* (A, F, G, GH, MO, NY, S); Stann Creek District, Mountain Trumpet, (♀), *Tentle 2917* (NY).—TOLEDO: Southern Maya Mountains, Bladen Nature Reserve, 16°27'50"N, 89°01'04"W, (♀), *Holland 31* (MO). **Colombia.** ANTIOQUIA: Frontino, Corregimiento de Murrí, (♀), *Bernal & Galeano 258* (COL); Carlos, Corregimiento Alto Samaná da Miraflores 4 horas SO de Alto Samaná, (♀), *Callejas et al. 8642* (NY); Vereda El Carmen, Km 12-16, NO Amorí en la vía a Dos Bocas, (♂), *Callejas et al. 8778* (MO); San Luíz Antonio, Autopista Medellín-Bogotá, sector Río Samaná - Río Claro, (♀), *Cogollo & Brand M. 401* (MO); Parque Nacional Natural Las Orquideas, (♀), *Cogollo et al. 2954* (COL); Urrao, Parque nacional Natural Las Orquideas, Las Orquídeas, Vereda Calles, 06°29'N, 76°34'W, (♀), *Pipoly et al. 16940* (MO); Urrao, Parque nacional Natural Las Orquideas, Las Orquídeas, Vereda Calles, 06°32'N, 76°19'W, (♂), *Pipoly et al. 18135* (MO); San Luiz, Quebrada La Cristalina, 06°00'N, 74°45'W, (♀), *J. G. Ramírez & D. Cárdenas L. 898* (MO); San Luiz, Quebrada La Cristalina, 06°00'N, 74°45'W, (♀), *J. G. Ramírez & D. Cárdenas L. 1214* (MO); San Luiz, Quebrada La Cristalina, 06°00'N, 74°45'W, (♀), *J. G. Ramírez & D. Cárdenas L. 1308* (MO); Frontino, corregimiento Nutinara, cuenca alta del Rio Cuevas, (♀), *D. Sanchez et al. 1543* (MO, NY).—CAQUETÁ: Sucre, Cordillera Oriental; vertiente oriental, Sucre, Quebrada de La Cabaña, (♀), *Cuatrecasas 9187* (COL).—CHOCÓ: Frontera Colombo-panameña, Alto del Limón, (♀), *Barbosa 1208* (COL); Riosucio, Zona de Urabá,

Cerros del Cuchillo Camino Cuchillo Negro a Cumbre Noroeste, (♀), *D. Cárdenas L. 1793* (MO); San José del Palmar, hoya del Río Torito, afluente del Río Hábita, Finca Los Guadales, (♀), *Forero et al. 6648* (MO); Alto río Baudó, Reguardo Indígena Emberá, (♀), *La Rotta & Martínez 702* (COL); Riosucio, alrededores del Salto de Tilupo, (♀), *Romero-Castañeda 6251* (COL); Trail between R. Curiche and Camp Curiche, (♀), *J. A. Ducke 11599* (MO, NY, US); Parque Nacional Natural Los Katíos, (♂), *Zuloaga R. 43* (COL).—RISARALDA: Mistrató, corregimiento de Puerto de Oro, (♀), *Orozco et al. 2257* (COL).—VALLE DEL CAUCA: Río Sanquinini, La Laguna, (♂), *Cuatrecasas 15520* (COL, F, GH, NY); Río Sanquinini, La Laguna, (♀), *Cuatrecasas 15534* (F, GH, NY).—ZELAYA: Caño Montecristo al Este del campamento Germán Pomares, 11°36'N, 83°52'W, (♀), *Moreno 15142* (MO). **Costa Rica.** ALAJUELA: San Carlos, Río Samen hacia Upala, 10°41'05"N, 84°30'25"W, (♂), *Aguilar & Zamora 5202* (MO); Upala dos Ríos, margen izquierda del Río Cucaracho, 10°55'N, 85°20'W, (♀), *Herrera 1103* (MO); San Ramón, Reserva de San Ramón, 10°12'40"N, 84°36'20"W, (♀), *Herrera 6619* (F, MO); San Carlos, Santa Clara, quebrada Villegas, Finca Bahía, 10°22'10"N, 84°30'50"W, (♀), *Jimenez 1513* (F, MO); Cariblanco, Quebrada Arrayanes, 10°15'N, 84°11'W, (♂), *Lent 3547* (DUKE, F, MO, U); El Platanar, Open place below road, steep slopes of San Pablo, (♀), *Molina R. et al. 18227* (F, NY, US).—CARTAGO: Quebrada Villegas, Finca Bahía, (♀), *Jiménez et al. 573* (F); Turrialba, (♀), *León 3501* (NA).—GUANACASTE: Parque Nacional Guanacaste, Estación Fitilla, 11°02'00"N, 85°24'30"W, (♀), *Rios 84* (MO).—HEREDIA: Sarapiquí, Puerto Viejo, Finca La Selva, 10°26'N, 84°01'W (♀), *Hartshorn 1539* (F, U); Finca La Selva, OTS Field Station on the Río Puerto Viejo, (♀), *B. Jacobs 2125* (MO, NY); Istarú Farm, Tirimbina, Sarapiquí, (♂), *Lent 2004* (F, G, MO, NY, U, US); Río Sarapiquí, La Virgen, (♀), *W. D. Stevens 13341* (F, MO, U); La Selva Biological Station, 10°25'19"N, 84°00'54"W, (♀), *Weiblen GW 1413* (A, CR, INB, K, MIN); Pueblo Nuevo de Sarapiquí, Sardinal, (♀), *Wiemann 81.2* (NY).—LIMÓN: Bratai, Alto

Lari, Siquiendo la fila entre Rio Dapari, 09°25'50"N, 83°03'20"W, (♀), *R. Aguilar & Schmidt 1013* (MO); Madre de Dios, (♀), *Holdridge 2514* (US); Rio Hondo, (♀), *Pittier 16163* (G, US).—PUNTARENAS: Sierpe, Reserva Florestal Golfo Dulce, Mongos, a 20 km de Chacaritas, 8°46'43"N, 83°21'10"W, (♀), *R. Aguilar 11178* (NY); Cantón de Osa, 8°43'50"N, 83°27'17"W, (♀), *R. Aguilar 5138* (F); Fila before Rancho Quemada, near Rincon, Osa Peninsula, 8°42'N, 83°33'W, (♀), *Gentry et al. 78747* (F, MO); Parque Nacional Corcovado Sirena, Corcovado Basin Trail, 08°28'N, 83°35'W, (♀), *Kernan 958* (F, MO); Aguirre, Cuenca del Naranjo y Paquita, Faja Costeña de Quepos, cabeceras Río Cotos, 09°33'25"N, 84°04'48"W, (♂), *Morales 6067* (MO).—SAN JOSÉ: San Pablo, (♀), *Jiménez 3816* (F); Plaine entre La Union et le Lan Pedro, vallee du Diquis, (♀), *Pittier 12105* (BR, P, US); Tarrazu, Faldas de Cerro Diamante, 09°32'30"N, 84°01'20"W, (♂), *J. Sanchez 882* (MO); Vicinity of El General, (♂), *Skutch 4083* (A, MO, NY, S, US); Vicinity of El General, (♀), *Skutch 4225* (A, MO, NY, S); Vicinity of El General, (♂), *Skutch 4883* (NY). **Ecuador.** CARCHI: Maldonado, (♂), *Gentry et al. 26530* (U); Trail along Awá border, 00°58'N, 78°16'W, (♀), *Hoover et al. 2564* (MO); Awá Indigenous Territory, 01°01'N, 78°18'W, (♀), *Ortiz et al. 815* (NY); Tulcan, Reserva Indigena Awá, Comunidad San Marcos, 01°06'N, 78°14'W, (♀), *Rubio et al. 1048* (NY).—ESMERALDAS: Santo Domingo de los Colorados-Quininde rd., (♂), *Acosta-Solis 13605* (F); Quininde, Bilsa Biological Station, 00°21'N, 79°44'W, (♀), *Clark et al. 249* (COL); Fila de Bilsa, 7 km E of San Jose de Bilsa, 00°37'N, 79°51'W, (♂), *Gentry & Josse 72790* (F, MO); unknown locality (♀), *Janse 276* (NY); 3 km E. of Quininde, (♀), *E. L. Little Jr. 6241* (F, US); 7 km E. up Rio Blanco, (♀), *E. L. Little Jr. 6258* (F, US); San Lorenzo, (♀), *E. L. Little Jr. 6301* (F, U, UC, US).—LOS RIOS: Rio Palenque Biological Station, (♂), *Dodson & Gentry 6327* (GB, MO, U); Rio Palenque Biological Station, (♀), *Gentry 9552* (MO, U).—NAPO: Cantón Tena, Estación Biológica Jatun Sacha, 8 km al este de Misahualli, 01°04'N, 77°36'W, (♀), *W. Palacios 4162* (NY).—SANTO DOMINGO DE

LOS TSACHILAS: Santo Domingo, (♂), *Benoist 3003* (P, S, U); Santo Domingo de los Colorados, (♀), *Cazalet & Pennington 5037* (FHO, NY, UC, US); Santo Domingo de los Colorados, (♂), *Cazalet & Pennington 5072* (FHO, NY, UC, US). **Guatemala.** ALTA VERAPAZ: Finca Cubilguitz, (♀), *Tuerckheim 4082* (US).—IZABAL: Puerto Mendez, (♀), *Contreras 10026* (DUKE, F, U, US); El Estor, (♀), *Contreras 11195* (DUKE, P, S, US); Santo Tomás de Castilla, on road approx 15 beyond Las Escobas, 15°43'N, 88°39'W, (♀), *Marshall et al. 352* (MO, NY). **Honduras.**—ATLANTIDA: Campamento Quebrada Grande, ca 10 km south west of La Ceiba, 15°42'N, 86°51'W, (♀), *Liesner & Mejía 26057* (MO); Lancetilla Valley, near Tela, (♀), *Standley 53951* (F, US).—CORTES: Agua Azul, (♀), *Allen 6401* (F, GH, US).—GRACIAS A DIOS: Río Platano, 15°30'N, 84°40'W, (♀), *Clewell & Cruz 4142* (MO); Cerro de Wimpi, 40 min al sur de Krausirpe, 15°03'N, 84°50'W, (♀), *House 2057* (MO); 30 min al sur de Krausirpe, Río Patuca, 15°03'N, 84°50'W, (♀), *House & Cubas 2802* (MO).—INTIBUCA: Río Esperanza, (♂), *Wilson 606* (NY, US).—YORO: Cordillera Nombre de Dios, Cerro Aguacatales, along road between El Guaymon and San José de Texiguat, (♂), *Davidse et al. 34520* (MO). **Mexico.** VERACRUZ: 33 km al W del vertice del Río, en zona Marquez de Comillas, (♀), *Martínez S. 15961* (F, MO, NY, US). **Nicaragua.** ATLANTICO NORTE: Puerto Cabezas, (♀), *Englesing 50* (F); sur de Río Wawa, 14°19'N, 83°56'W, (♀), *E. L. Little Jr. et al. 25204* (F, MO, US); Plantel El Salto along road to Bonanza, slope above Río Pis Pis, 14°03'N, 84°37'W, (♂), *W. D. Stevens 18826* (MO).—ATLANTICO SUR: El Zapote, 40 km NE de Nueva Guinea, (♀), *Sandino 4909* (MO); ca. 14.3 km N of El Enpalme, along new rd. to Mina Nueva America, (♀), *Stevens 8323* (BG, MO); Río Bravo, Río Nawawas, 9 km NE of El Ayote, (♀), *W. D. Stevens & Duarte M. 28153* (MO).—MATAGALCA: NW del cerro Musún, (♀), *Araquistain & Moreno 2480* (MO); Cerro Musun west and northwest side above the Salto Grande of Qubreda Negra, Valley of Río Rilampi, (♂), *D. Neill 1709* (MO); Cerro Musun west and northwest side above the Salto Grande of Quebrada

Negra, Valley of Rio Rilampi, (♂), *D. Neill 1792* (MO).—RIO SAN JUAN: en el Caño Sarnoso, Puesto de Marena, 10°57'N, 84°40'W, (♀), *Rueda et al. 1990* (MO). **Panama.** COCLE: Valley of Rio Anton, (♀), *Allen 3742* (BR, E, F, G, MO, P).—COLON: Santa Rita, (♀), *Gomez-Pompa et al. 3385* (MO).—DARIEN: Cerro Pirre, (♀), *J. A. Duke 6588* (MO); Hills near Pidiaque, (♀), *J. A. Ducke 8035* (MO); Forest trail through Milpa, Ensenada del Guayabo, 18 km SE Jaqué, (♂), *Garwood et al. 277* (MO); Summit of Cerro Pirre, (♀), *Gentry & Clewell 5903* (F, MO); Cerro Pirre, (♀), *Gentry & Clewell 6997* (F, MO); Trail along ridge S of Río Setigandi, near Colombian border, (♀), *Gentry et al. 28609* (MO, U); Manene, (♀), *Hartman 12176* (MO, U); between Paya and Pucro, (♀), *Steam et al. 423* (G, GH, LE, US); Pediaque Hill, nr. Rio Sabana and Rio Lara, (♀), *Tyson et al. 4734* (DUKE, GH, MO); Cana, (♀), *R. S. Williams 983* (NY, US).—HERRERA: Las Minas, Chepo, Loma el Montuoso, 07°43'N, 80°50'W, (♀), *Galdames et al. 1657* (NY).—PANAMA: Camino de Llano a Cartí, (♀), *M. D. Correa et al. 1854* (F, MO); between Cerro Azul and Cerro Jefe, (♀) *Dressler 3579* (DUKE, GH, MO); El Llano-Cartí road, 8 mi from Pan American Hwy, (♀), *Sytsma 4018* (MO, U).—SAN BLAS: El Llano-Carti road, km 19.1, 09°19'N, 78°55'W, (♂), *Nevers et al. 6157* (MO); El Llano-Carti road, km 19.1, 09°24'N, 79°24'W, (♂), *Nevers et al. 7542* (MO). **Venezuela.** BARINAS: Pedreza, (♀), *Bernardi 1986* (NY, VEN); Distrito Pedraza, trail from Alto de La Aguada, 08°32'N, 70°40'W, (♀), *Dorr et al. 4909* (NY); rd. Barinitas-El Cacao, (♀), *Marcano-Berti et al. 982–154* (U).—MÉRINA: Caño Amarillo, (♀), *Bernardi 1919* (F, NY, VEN); El Vigía, (♂), *Marcano-Berti et al. 238–979* (U).—TÁCHIRA: La Fria, (♀), *Breteler 4920* (MO, U); 35 km SSE of San Cristobal, 07°28'N, 72°09'W, (♀), *Liesner & González 10944* (BG, MO, NY); Cerro of Cuchilla La Pabellana, 07°37'30"N, 71°47'00"W, (♀), *Stevermark et al. 119396* (MO, NY, U).—ZULIA: Dtto. Colon, nr. Casigua El Cubo, (♀), *Bunting 6836* (BG, NY); Perijá, alrededores de la Estación Hidrológica Aricuaisá-Pie,

09°35'30"N, 72°53'55"W, (♀), *Bunting et al. 11045* (NY); Sierra de Perija, SW of Machiques, (♀), *Steyermark 99945* (NY, U, VEN).

Pourouma scobina belongs to the group of species with adaxial lamina surface usually scabrous, palmatilobed lamina with usually 5–7 lobes, stipules with indument hirsute inside, staminate inflorescences in fascicles, staminate flowers with tepals free or basally connate.

Berg & Heusden (1988: 106) considered *Pourouma scobina* as a subspecies of *P. bicolor*. Nevertheless, in our molecular analyses results (Chapter 1, Fig. 5), *Pourouma scobina* arose within of the clade VI, which was more closely to *P. guianensis* with a strong support (BP = 91, PP = 1.00).

Morphologically, *Pourouma scobina* is distinguished from *P. bicolor* by lamina usually palmatilobed often with 5–7 lobes (versus usually entire), abaxial lamina with tertiary and quaternary veins prominent (versus plane to slightly prominent), and pistillate inflorescence with up to 66 flowers (versus up to 28 flowers). Moreover, these species are allopatric, in which *Pourouma scobina* occurs mostly in tropical moist evergreen forest of the Central America (except Antilles) up to west of Ecuador, while *P. bicolor* occurs mainly in the “terra firme” forest of the Amazonian region. Furthermore, *Pourouma scobina* was the unique species of *Pourouma* collected in the south of Mexico (Veracruz), which is the register more to the extreme north of *Pourouma*.

For these reasons, we proposed the reestablishment of *Pourouma scobina*.

37. *Pourouma stipulacea* C.C. Berg, *Brittonia* 34(1): 37, t. 2. 1982; Berg & Heusden, *Proc. Kon. Ned. Akad. Wetensch., Ser. C.*, 91(2): 109. 1988; Berg, Akkermans & Heusden, *Fl.*

Neotrop. Monogr. 51: 173. 1990; Berg, Fl. Guianas 11(22): 121. 1992.—TYPE: GUYANA. Bartica-Potaro Rd., 25 Jan 1943 (♀), *Fanshawe 1105 = FD 3851* (holotype: K!).

Tree, 6–25 m tall, 10–30 cm d.b.h., without stilt roots. Leafy twigs 1–2.5 cm in diameter, with indument yellowish, hirsute; internode 5–15 mm long. Lamina palmatipartite with 5 lobes, 25–63 cm long, 35–75 cm wide, length:width ratio 0.7–0.9, coriaceous; base deeply cordate, often with overlapping lobes; margin palmatifid, with indument sparse, yellowish, hirsute to hirtellous; apex acuminate; midsegment broadly elliptic to oblong; adaxial surface smooth, indument of primary veins sparse, yellowish, hirsute to hirtellous; abaxial surface smooth, with indument whitish to yellowish, sericeous and sparse, orange, multicellular trichomes; venation palmate; secondary veins in the free part of the midsegment 18–30 pairs per leaf, basal pair branched; tertiary and quaternary veins prominent, with whitish, arachnoid indument confined to the areoles; petiole 20–65 cm long, with indument yellowish, hirsute, domatia absents; stipules 15–20 cm long, with indument yellowish, hirsute and whitish, arachnoid indument outside, with indument yellowish, hirsute inside, persistent. Staminate inflorescences unknown. Pistillate inflorescences unknown. Infructescences 15–25 cm long, 4–11.5 cm wide; peduncle 10–19 cm long, peduncle and branches surface with indument yellowish, hirsute and whitish, arachnoid indument on the ultimate branches; fruits 15–42, flowers organized in 3–6 cymes; fruiting pedicel 5–15 mm long; stigma peltate, 1–2 mm in diameter. Fruiting perianth 1.2–2 cm long, 5–10 mm wide, ovoid to ellipsoid, with indument yellowish, hirsute and dense, whitish, arachnoid indument. Achene 10–18 mm long, 3–8 mm wide. Seed 5–10 mm long, 2–6 mm wide, ovoid, vinaceous. Fig. 18 A.

Additional illustrations. Berg & Kooy (1982: 38).

Phenology. Collected in fruits from January to March and August.

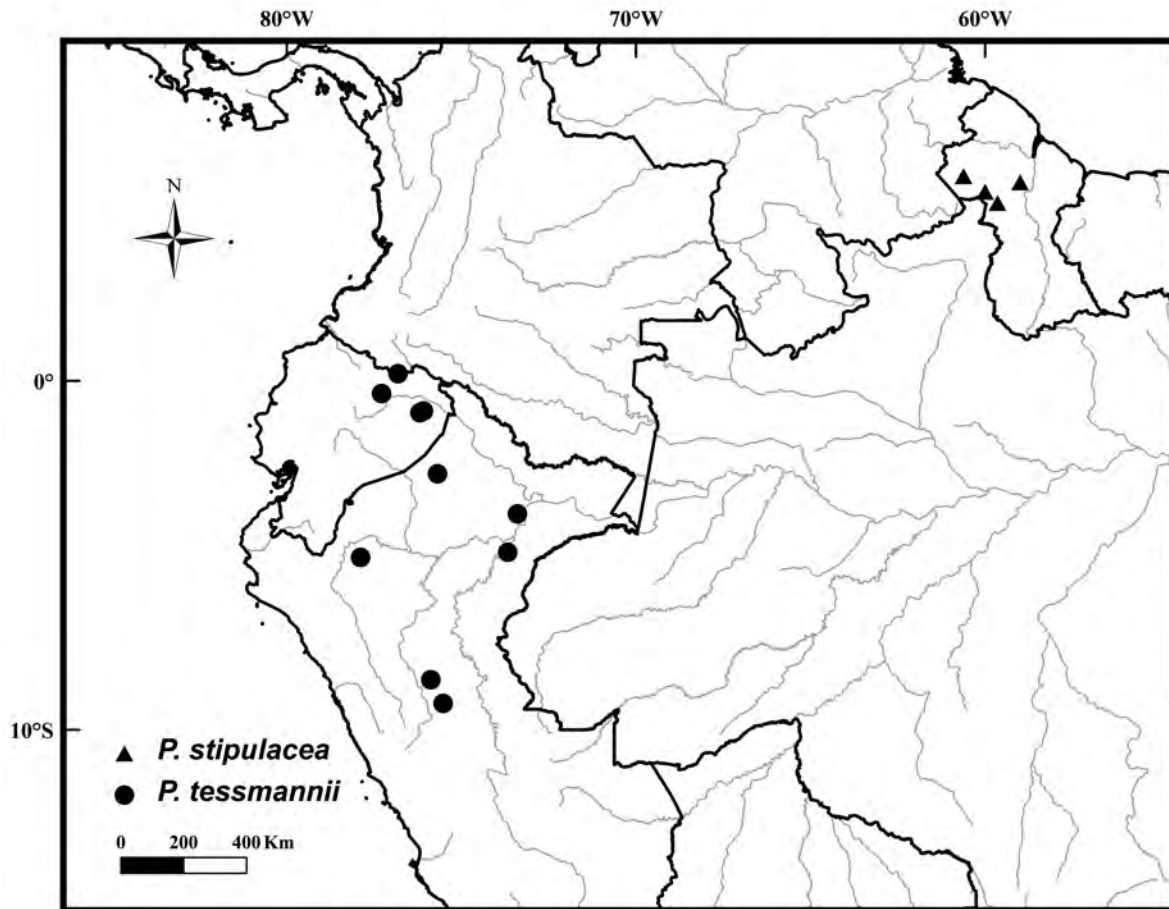


FIG. 74. Distribution of *Pourouma stipulacea* and *P. tessmannii*.

Distribution (Fig. 74). Endemic from the northwest of Guyana (Cuyuni-Mazaruni), in “terra firme” forest of the Amazonian region, often in pre-montane or lowland moist areas, at an altitudes of about 115 to 1000 m above sea level.

Etymology. The epithet refers to persistent stipules.

IUCN conservation status. According to the IUCN Red list categories (IUCN 2014), *Pourouma stipulacea* is considered Endangered, EN B1a,b(iii), because of the small extent of

occurrence (ca. 7,580 Km²), number of locations (4), and known from only four collections, made between 1943 and 1987.

ADDITIONAL SPECIMENS EXAMINED. **Guyana.** CUYUNI-MAZARUNI: Nr. Kamerang, (st), *Boom et al.* 8102 (BG); 1–6 km W of Kamarang, Mazaruni River, (♀), *P. J. M. Maas & H. Maas* 2592 (U); Mt. Ayanganna, Pakaraima Mountains, (♀), *Maguire et al.* 40596 (NY); Cuyuni-Mazaruni region, headwaters of kangu, 4 km NW of E peak of Mt. Ayanganna, 05°25'N, 60°00'W, (♀), *Pipoly et al.* 11088 (F, US).

Pourouma stipulacea can be recognized for its palmatipartite lamina with 5 lobes, adaxial surface smooth, stipules persistent, and fruiting perianth with indument hirsute and arachnoid. The infructescence of this species resembles to *P. cordata*, of which it distinguished from *P. cordata* by palmatipartite lamina (versus entire) and stipules caducous (versus persistent).

Also, this species displays similarities with *P. oraria* by palmatipartite lamina with adaxial surface smooth, stipules persistent, and leafy twigs with indument hirsute, but distinguished by stipules with abaxial surface with arachnoid indument (versus without arachnoid indument) and fruiting perianth with dense, arachnoid indument (versus without arachnoid indument). Moreover, these species are allopatric, in which *Pourouma stipulacea* is endemic from the northwest of Guyana, while *P. oraria* is endemic from the Pacific Coastal of southwestern Colombia.

The label of the collection of Maguire et al. 40596 described a specimen with 25 m tall, which is cited by first time here, as well as Pipoly 11088. Berg (1990: 37) described this species with only 6 m tall from label of Maas et al. 2592.

38. *Pourouma tessmannii* Mildbr., Notzibl. Bot. Gart. Berlin-Dahlem 10: 192. 1927.—TYPE:

PERU. Ost-Peru, Stromgebiet des Maranon von Iquitos aufwärts bis zur Santiago-Mündung am Pongo de Manseriche, ca. 77°30' West, 8 Oct 1924 (♂), *Tessmann* 4236 (holotype: B-100248459!; isotypes: B-100248460! NY! S image! US image!).

Pourouma bicolor Mart. subsp. *tessmannii* (Mildbr.) C.C. Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C 91(2): 106. 1988.

Tree, 5–25 m tall, 15–40 cm d.b.h., with stilt roots. Leafy twigs 3–12 mm in diameter, with indument sparse, whitish, sericeous to strigose and brownish, multicellular trichomes; internode 4–35 (–40) mm long. Lamina entire, (5.5–) 6.5–22.5 (–24) cm long, (2.5–) 4–13.5 (–15.5) cm wide, length:width ratio 1.4–2.2, ovate to elliptic; or palmatifid with 3 lobes, (10.5–) 12.5–26.5 (–28) cm long, (11.5–) 13.5–28 (–29.5) cm wide, length:width ratio 0.8–1.1, coriaceous; base rounded to obtuse or truncate to cordate; margin usually repand or palmatifid, with indument sparse, yellowish, sericeous; apex acuminate to acute; adaxial surface scabrous, with indument whitish, strigose, indument of veins yellowish to whitish, sericeous; abaxial surface smooth or scabridulous, with indument whitish, sericeous to strigulose and sometimes with sparse, brownish, multicellular trichomes on the veins; venation brochidodromous or palmate; secondary veins 10–20 pairs per leaf, basal pair branched, diverging from the midrib at an 30°–50°; tertiary and quaternary veins plane to slightly prominent, with whitish, arachnoid indument covering to the areoles; petiole (2.5–) 4–14.5 (–16.5) cm long, with indument sparse, yellowish, sericeous to hirtellous and sometimes with sparse, brownish, multicellular trichomes, domatia absents; stipules (2.5–) 3.5–12.5 (–14) cm long, with indument yellowish to whitish, sericeous to hirtellous and sometimes with sparse, brownish, multicellular trichomes outside,

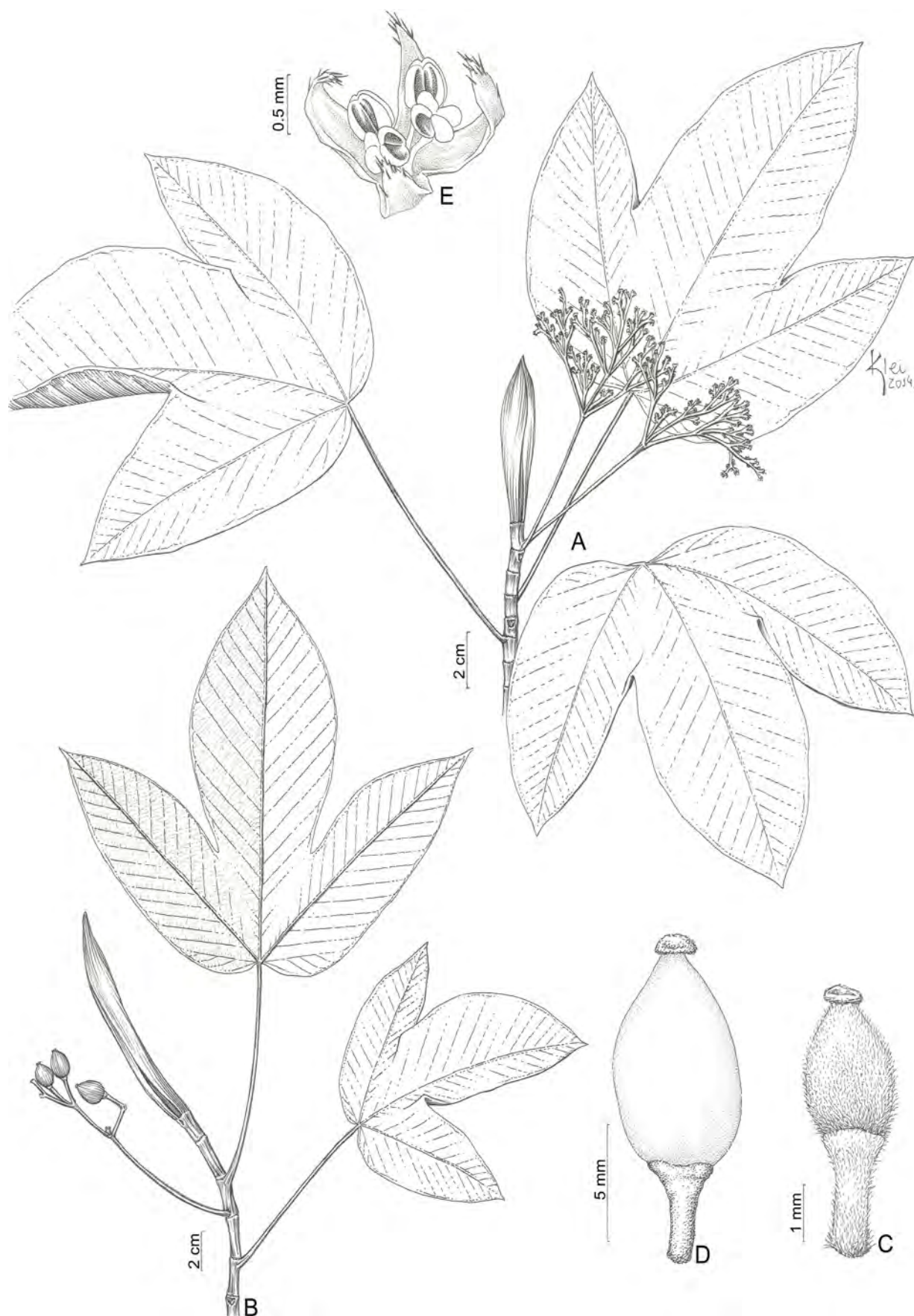


FIG. 75. *Pourouma tessmannii*. A. Leafy twig with staminate inflorescences. B. Leafy twig with infructescence. C. Pistillate flower and pedicel. D. Fruiting perianth and pedicel. E. Staminate flower. [A, E: from Cerón & Hurtado 4126 (MO); B-D: from Tunqui 94 (U); C: from Gentry *et al.* 16041 (HAMAB)].

glabrous inside, caducous. Staminate inflorescences 10–14.5 cm long, 6.5–9 (–10) cm wide, primary branched 3; peduncle 4.5–7.5 cm long, peduncle and branches with indument yellowish to whitish, sericeous and dense, brownish, multicellular trichomes on the ultimate branches; flowers ca. 220–560, flowers organized in 12–26 fascicles, diffusely distributed along the ultimate branches; fascicle 4–6 mm in diameter, ca. 15–25 flowers per fascicle. Staminate flowers 0.5–1 mm long, 0.5–1 mm wide; sessile; tepals 4, lanceolate to ovate, 0.5–1 mm long, free or basally connate, with indument whitish, strigulose; stamens 4; filaments 0.3–0.5 mm long, free, usually shorter than the tepals. Pistillate inflorescences 3.5–5.5 cm long, 1–2 cm wide; peduncle 1.5–3 cm long, peduncle and branches with indument yellowish to whitish, hirtellous and dense, brownish, multicellular trichomes on the ultimate branches; flowers 3–22, flower organized in 2–5 cymes. Pistillate flowers 3–4 mm long, 1.5–2.5 mm wide; pedicel 2–4 mm long; perianth 2–3 mm long, with indument yellowish to whitish, hirtellous and dense, brownish, multicellular trichomes; stigma peltate, 1–1.8 mm in diameter. Infructescences 10–17.5 (–18.5) cm long, 4.5–10 (–12.5) cm wide; peduncle 4.5–9 (–13) cm long; fruiting pedicel 1–1.8 cm long. Fruiting perianth 1–1.5 cm long, 5–10 mm wide, ovoid to ellipsoid, vinaceous to black, scabrous to scabridulous, with indument whitish, strigose to strigulose. Achene 8–12 mm long, 3–8 mm wide. Seed 4–8 mm long, 2–5 mm wide, ovoid, vinaceous. Fig. 18 B; Fig. 75.

Phenology. Staminate flowers collected from May to June and October, pistillate flowers from July and fruits from October to January.

Distribution (Fig. 75). North of Peru (Amazonas, Huánuco, Loreto, Madre de Dios and Pasco) and northeast of Ecuador (Napó and Sucumbios), in “terra firme” forest of the Amazonian region, usually in lowland moist areas, sometimes in riparian forest, at an elevation of about 200 to 900 m above sea level.

Etymology. The epithet honors G. Tessmann, a botanical collector.

IUCN conservation status. *Pourouma tessmannii* is known from only seven collections, made between 1924 and 2007. Nevertheless, the extent of occurrence of *P. tessmannii* is ca. 288,470 Km² and the population size is unknown. For these reasons *P. tessmannii* is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Ecuador.** NAPO: Parque Nacional Yasuní, Pozo Amo 2, trocha hacia el Río Daymi, 00°52'S, 76°05'W, (♀), *Cerón* 3356 (BG, MO); Parque Nacional Yasuní, Pozo petrolero Daimi 2, 00°55'S, 76°11'W, (♂), *Cerón & Hurtado* 4126 (BG, MO, QCNE); Parque Nacional Yasuní, Pozo Amo 2, trocha hacia el Río Daymi, 00°52'S, 76°05'W, (♀), *Cerón & Yánez* 59605 (MO, QAP).—SUCUMBIOS: Cantón Nueva Loja, Lago Agrio, Pozo Charapa 1, 00°12'07"N, 76°48'52"W, (♀), *Cerón & Yánez* 59605 (MO); Zona de amortiguamiento del Parque Nacional Sumaco, 00°22'S, 77°17'W, (♀), *Tirado & Grefa* 1972 (MO). **Peru.** AMAZONAS: Río Santiago, 65 km N of Teniente Pinglo, Quebrada Caterpiza, (♀), *Huashikat* 912 (U); Río Santiago, 65 km N of Teniente Pinglo, Quebrada Caterpiza, (♀), *Huashikat* 1872 (U); Huambisa, Monte virgem, 1 km atrás de La Poza, Río Santiago, (♀), *Tunqui* 7 (BG, MO, US); Huambisa, Shuiya, Valle del Río Santiago, Quebrada Caterpiza, 03°50'S, 77°40'W, (♀), *Tunqui* 94 (MO, U).—HUÁNUCO: Leoncio Prado, 80 km northeast of Tingo Maria toward Aguayatia near La Divisoria, (♀), *Gentry et al.* 16041 (DUKE, F, MO, NY).—LORETO: 22 km S of km 86 on Pucallpa-Tingo Maria wy., (♀), *Gentry et al.* 31197 (U).—MADRE DE DIOS: Distrito Tambopata, Rio Tambopata, 12°50'S, 69°17'W, (♀), *Monteagudo et al.* 5993 (MO). PASCO: Quebrada Alcantarilla, near second demonstration strip, 09°50'S, 68°00'W, (♀), *Hartshorn et al.* 2863 (MO); Oxapampa, Dist. Palcazú, Estación Biológica Paujil, 10°19'S, 75°15'W, (♂), *Monteagudo et al.* 4197 (F, MO).

Pourouma tessmannii belongs to the group of species with entire or palmatifid lamina with basal pair of secondary veins branched, and stipules glabrous inside. It was considered by Berg & Heusden (1988: 137) as a subspecies of *P. bicolor*, but they did not comment anything about this combination.

This species is distinguished from *P. bicolor* by stipules glabrous inside (versus with indument dense, yellowish to whitish, velutinous to sericeous) and staminate inflorescences 10–14.5 cm long (versus 3.5–8.5 cm long). Additionally, the molecular results from all subspecies sampled (Chapter 1, Fig. 5) did not corroborate with proposed by Berg & Heusden (1988: 137), although *P. tessmannii* did not sample.

39. *Pourouma tomentosa* Mart. ex Miq. in Mart., Fl. bras. 4(1): 128, tab. 38. 1853; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 108. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 164. 1990; Berg, Fl. Guianas 11(22): 121. 1992; Berg & Franco-Rosselli, Fl. Ecuador 27A: 103. 1993; Berg, Fl. Venez. Guayana 4: 188. 1998; Berg, Fl. Venez.: 243. 2000; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.—TYPE: COLOMBIA. M. Araracoara, Dec 1819 (♀), *Martius s.n.* (holotype: M!; isotype: U0004776 fragment from M image!).

Pourouma albistipulata Cuatrec., Bol. Soc. Venez. Ci. Nat. 17: 92. 1956; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 108. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 166. 1990; Berg & Franco-Rosselli, Fl. Ecuador 27A: 103. 1993; Berg, Fl. Venez. Guayana 4: 190. 1998; Berg, Fl. Venez.: 243. 2000.—TYPE: VENEZUELA. Amazonas: Rio Guainia, Victorino, 22 Mar 1942 (♀), *LI. Williams*

14833 (holotype: F-1187191!; isotypes: F-1187201! G image! NY! RB! S image! US image! VEN image!).

Tree, 10–32 m tall, (11–) 15–36 (–40) cm d.b.h., with stilt roots. Leafy twigs 4–15 mm in diameter, with indument whitish to yellowish, sericeous and whitish, arachnoid indument; internode 4–25 mm long. Lamina entire, (6–) 8.5–24.5 (–58) cm long, (3.5–) 3–17.5 (–25) cm wide, length:width ratio 1.4–2.6, ovate to elliptic, coriaceous, sometimes plicate; base truncate, rounded to cordate; margin usually repand, with indument sparse, whitish, sericeous; apex rounded, emarginate to obtuse; adaxial surface smooth, indument of veins whitish, sericeous; abaxial surface smooth, with dense, whitish, arachnoid indument, indument of veins whitish, sericeous and dense, whitish, arachnoid indument; venation brochidodromous; secondary veins (8–) 11–20 (–22) pairs per leaf, basal pair branched, diverging from the midrib at an 55°–70°; tertiary and quaternary veins slightly prominent, tomentose, with dense, whitish, arachnoid indument covering to the areoles; petiole 5.5–20 (–22) cm long, with indument whitish, sericeous and whitish, arachnoid indument, domatia absents; stipules (3–) 4.5–10.5 (–14.5) cm long, with indument whitish, sericeous and dense, whitish, arachnoid indument outside, glabrous inside, caducous. Staminate inflorescences 4–10.5 (–11.5) cm long, (2–) 3.5–8.5 mm wide, primary branched 3–4; peduncle 2–6.5 cm long, peduncle and branches with indument yellowish, velutinous to hirtellous on the ultimate branches; flowers organized in ca. 22–65 glomerules; glomerule 5–8 mm in diameter, ca. 20–35 flowers per glomerule. Staminate flowers 1.2–1.8 mm long, 0.8–1.2 mm wide; sessile to subsessile; perianth 0.8–1 mm long, 0.6–0.8 mm wide, urceolate, tepals connate, with indument yellowish to whitish, hirtellous to sericeous, usually with whitish, arachnoid indument; filaments 0.8–1.2 mm long, free, filaments exceeding the perianth. Pistillate inflorescences 3.5–6.5 (–7.5) cm long, 1.5–3.5 (–4.5) cm wide;

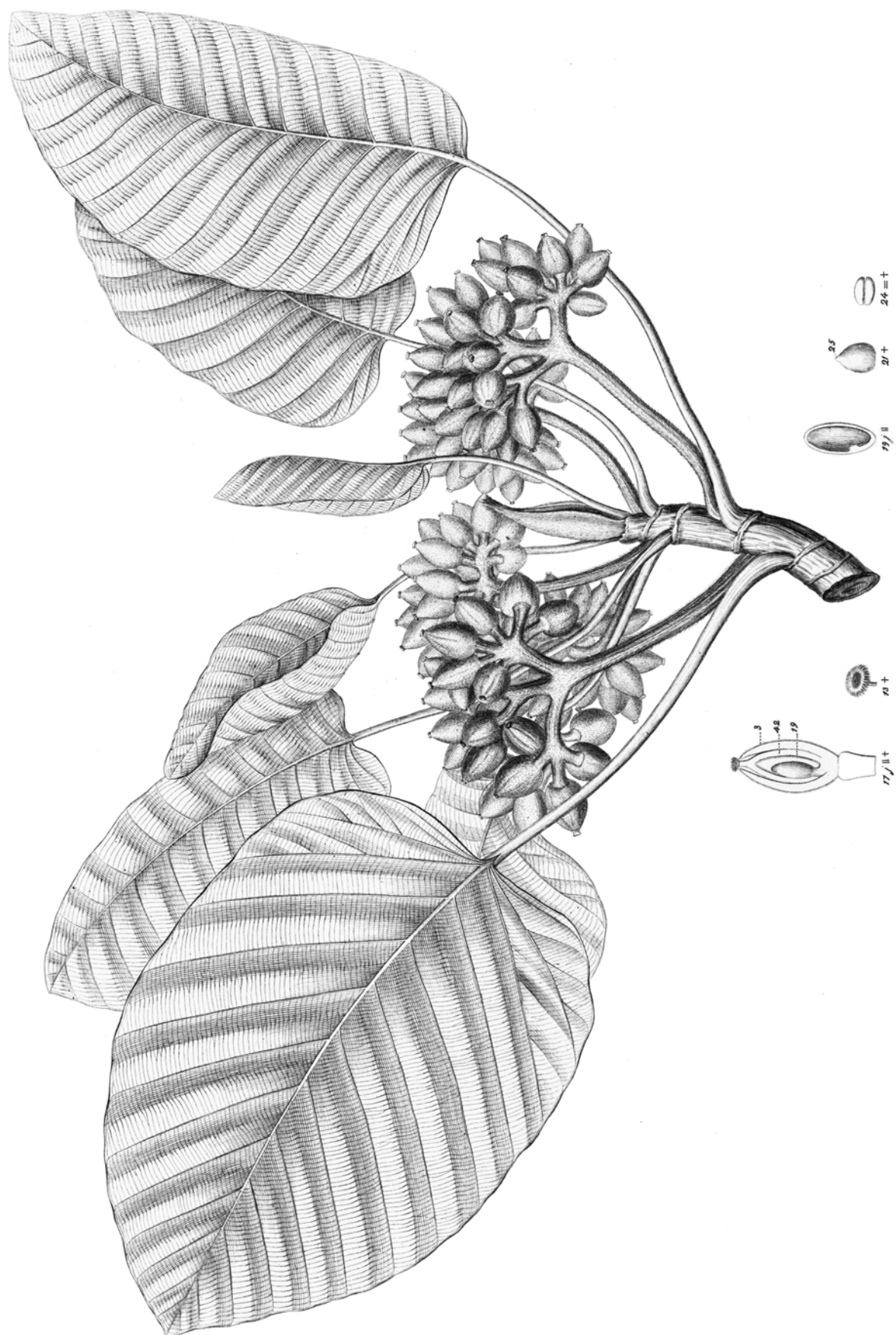


FIG. 76. *Pourouma tomentosa*. A. Leafy twig with infructescences. 17 j II. Fructing perianth, pedicel and fruit. 42. Pericarp. 13. Stigma. 19 j II. Seed. 21. Seed. 24. Seed. From Martius, *Flora brasiliensis*, 4(1). 1853: Tab. 38 (modified).

peduncle 2–4 (–5.5) cm long, peduncle and branches with indument yellowish, velutinous to hirtellous on the ultimate branches; flowers (8–) 10–25 (–30), flowers organized in 1–4 cymes; pedicel 1–2 mm long; perianth 6–10 mm long, 4–6 mm wide, with indument yellowish, velutinous, apex papillose; stigma peltate, 1.2–2 mm in diameter, sometimes with indument yellowish, velutinous. Infructescences 6–15.5 (–18.5) cm long, 4.5–12.5 (–13.5) cm wide; peduncle 4.5–8.5 (–9.5) cm long, peduncle and branches with indument yellowish, velutinous to hirtellous on the ultimate branches; fruiting pedicel 5–12 mm long. Fruiting perianth 1.5–2.3 cm long, 1.2–1.8 cm wide, ovoid to ellipsoid, vinaceous to black, with indument yellowish, velutinous. Achene 1.2–2 cm long, 1–1.5 cm wide. Seed 5–12 mm in diameter, ovoid to ellipsoid, vinaceous. Fig. 1 C; Fig. 4 E-F; Fig. 5 A; Fig 7 B; Fig. 18 C; Fig. 76.

Phenology. Staminate flowers collected from April to November, pistillate flowers from May to August and fruits from August to April.

Distribution (Fig. 77). Northeast of Brazil (Amazonas), south of Venezuela (Amazonas), south of Colombia (Amazonas and Caquetá), and northeast of Peru (Amazonas and Loreto), in “terra firme” forest of the Amazonian region, in lowland moist areas, sometimes in riparian forest, at an elevation of about 50 to 400 m above sea level.

Vernacular Name. Embaúba da mata (Brazil, Amazonas); ambaúva do vinho (Colombia, Amazonas); sacha uvilla (Peru, Amazonas); cocora, cocora montañera, cucura, chaparro guanero (Venezuela, Amazonas).

Etymology. The epithet refers to the arachnoid indument.

Use. Edible fruits; wood for fuel stuff.

IUCN conservation status. *Pourouma tomentosa* is widely distributed with the extent of occurrence of ca. 647,650 Km². Also, *P. tomentosa* is well represented in herbaria. For these

reasons *P. tomentosa* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

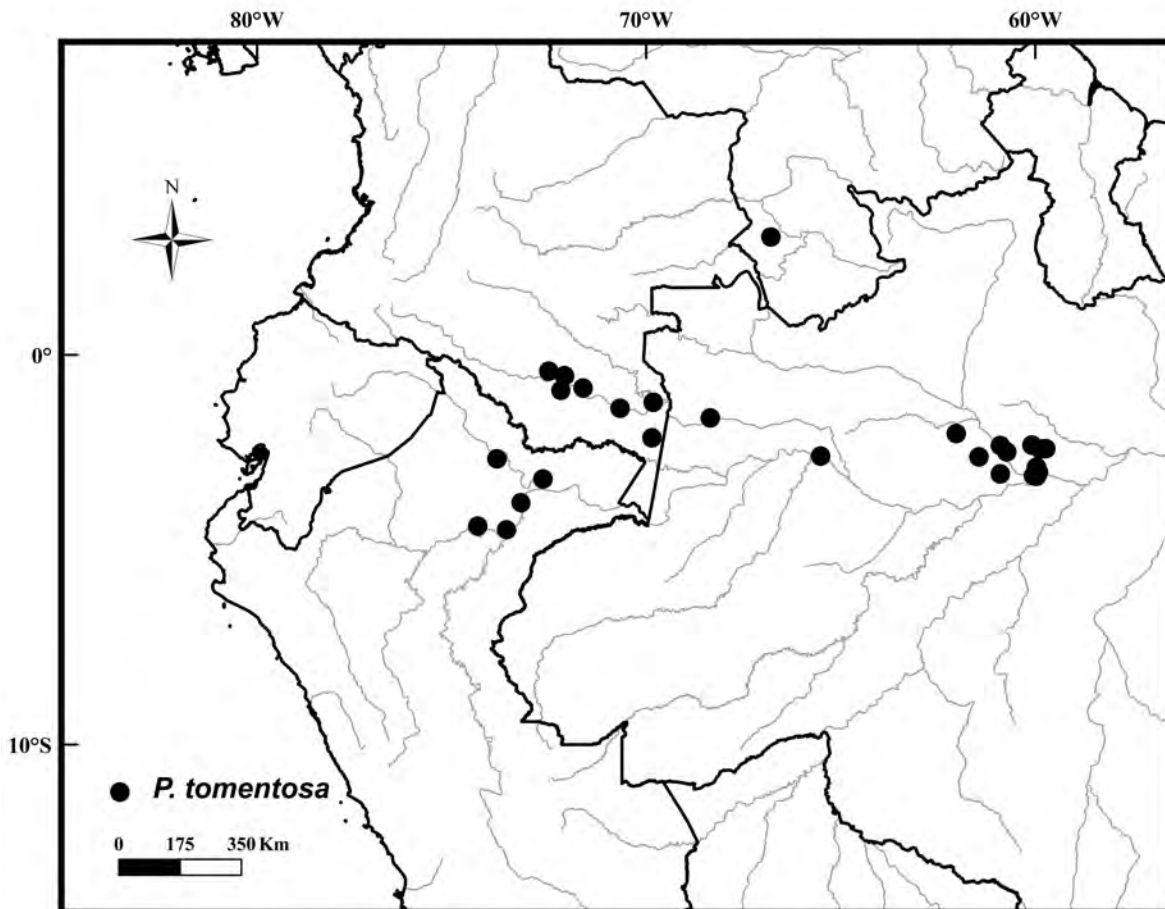


FIG. 77. Distribution of *Pourouma tomentosa*.

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAZONAS: Manaus-Itacoatiara road, km 26, Reserva Florestal Ducke, 02°53'S, 59°58'W, (♂), *P. A. C. L. Assunção et al.* 754 (BG, INPA, K, MG, MO, NY, RB, SP, U); Japurá, 1°55'40"S, 67°06'20"W (♀), *J. S. B. Silva et al.* 2240 (COAH); Manaus, Distrito Agropecuário, Reserva 1501, 02°24'26"S, 59°52'00"W, (♀), *Cunha et al.* INPA871 (INPA); Reserva Florestal Ducke, no começo da trilha do jardim, (♀), *Gaglioti & Pederneiras* 136 (EAFM, SP); Reserva Florestal Ducke, trilha leste oeste, (♂), *Gaglioti &*

Pederneiras 143 (EAFM, SP); Manaus, Distrito Agropecuário da Suframa, 02°24'26"S, 59°43'40"W, (♀), *Kukle & Boom 50* (INPA, MBM, MO, NY, SP); Reserva Florestal Ducke, próximo ao plantio de pinho, (♂), *W. Loureiro INPA16461* (INPA); Manaus, Distrito Agropecuário, Reserva 1501 (km 41), 02°24'26"S, 59°43'40"W, (♂), *S. A. Mori & C. F. Silva 19804* (INPA, NY); Manaus, Distrito Agropecuário, Reserva 1501 (km 41), 02°24'26"S, 59°43'40"W, (♂), *J. R. M. Nascimento et al. INPA/WWF2206.2529* (INPA); Manaus-Itacoatiara road, km 26, Reserva Florestal Ducke, 02°53'S, 59°58'W, (♂), *J. E. L. S. Ribeiro et al. 1450* (BG, INPA, K, MG, MO, NY, RB, SP, U); Manaus-Itacoatiara road, km 26, Reserva Florestal Ducke, 02°53'S, 59°58'W, (♂), *W. A. Rodrigues et al. 7375* (INPA); Manaus-Itacoatiara road, km 26, Reserva Florestal Ducke, 02°53'S, 59°58'W, (♂), *M. A. D. Souza et al. 423* (BG, BM, INPA, K, MG, MBM, G, UB, US); Manaus, Distrito Agropecuário da Suframa, 02°25'00"S, 59°52'00"W, (♂), *Setz 384* (INPA); Manaus, (♀), *Spruce 951* (M); In vicinibus Barra, Prov. Rio Negro (Manaus), 1850–51 (♀), *Spruce s.n. or 1219* (B, CGE, E, F, G, GOET, K, LE, M, NY, OXF, P, TCD). **Colombia.** AMAZONAS: Araracuara, Villa Azul, 00°32'S, 72°06'W, (♀), *A. Duque & Matapi 215* (COAH); correg. La Pedrera, río Mirití, 1 km arriba de centro Providencia, 01°13'S, 69°49'W, (♂), *D. Cárdenas et al. 5926* (COAH); alrededores de la pista aérea, 00°25'S, 72°30'W, (♂), *Restrepo et al. 201* (COAH, COL).—CAQUETÁ: Solano, Estación Puerto Abeja, 00°04'27"N, 72°27'05"W, (♀), *Eusse & Pérez 1157* (COAH); Chiribiquete, río Sararamano, 00°10'55"N, 72°36'31"W, (♀), *Mendoza et al. 10416* (COAH, FMB); Chiribiquete, río Sararamano, 00°10'55"N, 72°36'31"W, (♂), *Mendoza et al. 10417* (COAH, FMB); Parque Nacional Serranía Chiriquete, 00°4'16"N, 72°26'48"W, (♀), *Phillips B. et al. 303* (COAH). **Peru.** AMAZONAS: Zungaro Cocha near Iquitos, (♂), *Dodson & Torres 2906* (MO).—LORETO: Dist. Iquitos, Zungaro Cocha, (♀), *N. Reyna R. 37* (BG, F, MO); Maynas, carretera Iquitos-Nauta, (♀), *J. Ruíz 1169* (MO); km 6 carretera Nauta-Iquitos, 04°29'S, 73°35'W, (♀), *R. Vásquez*

4186 (NY); Yanayacu, afluyente derecho del río Manatí, 03°45'S, 72°55'W, (♂), *R. Vásquez & N. Jaramillo 11157* (MO). **Venezuela.** AMAZONAS: Cerro Yapacana, 03°45'N, 66°45'W, (♂), *Steyermark & Bunting 103026* (NY, U, VEN).

Miquel (1853:128) classified this species in the group 3. "Folia omnia integra" (leaves always entire). When we examined the illustration (XXXVIII) cited in the protologue, it is evident that the holotype of the species corresponds to the herbarium material collected by Martius s.n. (M), with fruit "Ambauva do Vinho", December 1819, M. Araracoara (currently Araracuara district, the border between the departments of Amazonas and Caquetá, Colombia).

However, according to Spix & Martius (1831), this locality was achieved by Martius, on January 28, 1820, being cited by Martius as the westernmost point that he could extend the trip. These authors report that Martius departed on January 1, 1820 from São Joao do Principe (currently Miriti Parana, Amazonas, Colombia), causing a conflict between the information contained in the label of the holotype and reports of Spix & Martius (1831), about the exact type locality of the species, which probably corresponds to the department of Amazonas, Colombia.

The other two materials cited in the protologue, correspond respectively, at a gathering Martius s.n., collected sterile, during the return to Brazil from Colombia (February 1820), province of Rio Negro (currently Amazonas state, Brazil), and a collection of Spruce s.n. (M) in the city of Barra do Rio Negro (currently Manaus, Amazonas, Brazil), identified as *Pourouma retusa* Benth. (label name).

Berg & Heusden (1988: 108 and 109) proposed a combination of the three species (*Pourouma apiculata*, *P. essequiboensis* and *P. maroniensis*) as subspecies of *P. tomentosa*, and described the *P. tomentosa* subsp. *persecta* as a new subspecies of *P. tomentosa*. However, these authors did not explain synapomorphies, which were used in the combinations.

Berg et al. (1990) described *Pourouma tomentosa* with wide morphological variation, diverging from protologue and type collection. For example, the lamina entire to palmatibobed with up to 9 lobes (versus only entire).

Moreover, our molecular analyses results (Chapter 1, Fig. 5) did not provide support for subspecies proposed by Berg & Heusden (1988: 108 and 109). *Pourouma tomentosa* arose within clade II (Chapter 1, Fig. 5) with a strong support (BP = 95, PP = 0.99) and it was more closely related to the clade, which included four species (*P. herrerensis*, *P. apiculata*, *P. triloba*, and *P. persecta*).

Based on molecular analyses, revision of the herbarium collections and multiple field trips, we proposed the reestablishment of *Pourouma apiculata*, *P. essequiboensis*, *P. maroniensis*, and *P. persecta*.

Pourouma tomentosa is distinguished from subspecies by lamina always entire (versus entire to palmatilobed) with apex rounded, emarginate to obtuse (versus often acute to acuminate), leafy twigs with indument sericeous (versus hirsute in *P. apiculata* and *P. persecta*), stipules glabrous inside (versus hirsute to sericeous in *P. apiculata*), staminate inflorescence with glomerules 5–8 mm in diameter (versus 3–4 mm), and pistillate perianth with indument yellowish, velutinous (versus with dense, whitish, arachnoid indument in *P. maroniensis*).

The leaves of the lower tiers of the trees are often larger than upper tiers, which might be a strategy for gathering light. Also, the juveniles specimens have usually leaves larger than adult specimens, reaching up to 58 cm long.

40. *Pourouma triloba* Trécul, Ann. Sci. Nat. Bot., Sér. 3, 8: 104. 1847.—TYPE: PERU. Unknown locality and date, (♂), *Ruiz & Pavon s.n.* (lectotype, designated by Berg et al. 1990: P00757086!; isolectotypes: G image! OXF image! US image!).

Pourouma jussiaeana Trécul, Ann. Sci. Nat. Bot., Sér. 3, 8: 106. 1847.—TYPE: PERU. Buena Vista, without date (♀), *Anonymus s.n.* (holotype: P!).

Pourouma triloba Klotzsch, Linnaea 20: 526. 1847.—TYPE: PERU. Huánuco: Macora, without date (♀), *Ruiz & Pavon s.n.* (holotype: B!; isotypes: BR image! G image! OXF image!).

Pourouma jaramilloi Cuatrec., Caldasia 7: 300. 1956.—TYPE: COLOMBIA. Meta: Sierra de la Macarena, Caño Ciervo, 19 Jan 1950 (♀), *Philipson et al. 2133* (holotype: BM!; isotypes: BR image! COL! F! US image!).

Pourouma mollis Trécul subsp. *triloba* (Trécul) C.C. Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch. C 91(2): 107. 1988; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.

Tree, (2–) 5–25 m (–30) tall, 20–45 cm d.b.h., with stilt roots. Leafy twigs 4–12 mm in diameter, with indument yellowish, hirsute to hirtellous, usually with sparse, whitish, arachnoid indument and sometimes with sparse, brownish, multicellular trichomes; internode 5–45 mm long. Lamina palmatifid to palmatipartite with 3–5 lobes, (10–) 12.5–32.5 (–35) cm long, (11–) 13.5–34 (–38) cm wide, length:width ratio 0.7–1.1, coriaceous; base rounded, truncate to cordate subcordate; margin palmatifid, with indument yellowish, hirtellous; apex acuminate; adaxial surface smooth, indument of veins sparse, yellowish, hirsute to hirtellous; abaxial surface smooth, with indument yellowish, velutinous to hirtellous on the veins; venation palmate; secondary veins in the free part of the midsegment 12–32 pairs per leaf, basal pair branched,



FIG. 78. *Pourouma triloba*. A. Leafy twig with infructescences. B. Palmatipartite leaf, abaxial surface. C. Staminate inflorescence. D. Staminate flower. E. Pistillate flower. [A-B: from Vásquez & Jaramillo 2719, (F); C-D: from Prance et al. 7907, (R); E: from Valenzuela et al. 9469 (F)].

diverging from the midrib at an 25° – 45° ; tertiary and quaternary veins slightly prominent to prominent, with whitish, arachnoid indument covering to the areoles; petiole 5–30 (–34) cm long, with indument yellowish, velutinous to hirsute and sometimes with dense, whitish, arachnoid indument, domatia absents; stipules (3–) 4.5–18 (–20) cm long, with indument yellowish, velutinous, hirtellous to hirsute and sometimes with dense, whitish, arachnoid indument outside, glabrous or sometimes with indument sparse, yellowish, sericeous inside, caducous. Staminate inflorescences 4.5–12 (–14.5) cm long, 3.5–10 cm wide, primary branched 3–4; peduncle 2–8.5 cm long, peduncle and branches with indument yellowish, velutinous to hirtellous and sometimes with brownish, multicellular trichomes on the ultimate branches; flowers ca. 210–1380, flowers organized in 12–62 glomerules; glomerule 4–8 mm in diameter, ca. 15–30 flowers per glomerule. Staminate flowers 2.2–2.8 mm long, 1–1.2 mm wide; sessile to subsessile; perianth 1.5–1.8 mm long, 0.8–1 mm wide, urceolate, tepals connate, with indument yellowish to whitish, hirtellous and sparse, brownish, multicellular trichomes; filaments 1.8–3 mm long, free, filaments exceeding the perianth. Pistillate inflorescences 3.5–6.5 cm long, 1–2.5 cm wide; peduncle 1.5–3.5 cm long, peduncle and branches with indument yellowish, velutinous to hirtellous on the ultimate branches; flowers 10–35 (–38), flowers organized in 2–5 cymes; pedicel 1–2.5 mm long; perianth 3–5 mm long, 2–3 mm wide, with indument yellowish, velutinous and brownish, multicellular trichomes, apex papillose, with indument sparse, yellowish, velutinous; stigma peltate, 1.5–2 mm in diameter, sometimes with indument yellowish, velutinous. Infructescences 7.5–16.5 (–18.5) cm long, 5.5–13.5 (–14.5) cm wide; peduncle 4.5–8.5 (–9.5) cm long; fruiting pedicel 6–12 mm long. Fruiting perianth 1.5–2 cm long, 1.2–1.8 cm wide, ovoid to ellipsoid, vinaceous to black, with indument yellowish, velutinous to hirtellous. Achene 1.2–1.8 cm long, 1–1.5 cm wide. Seed 5–12 mm in diameter, ovoid to ellipsoid, vinaceous. Fig. 8 D; Fig. 18 D; Fig. 78.

Phenology. Staminate flowers collected from August to February, pistillate flowers from July to October and fruits from August to March.

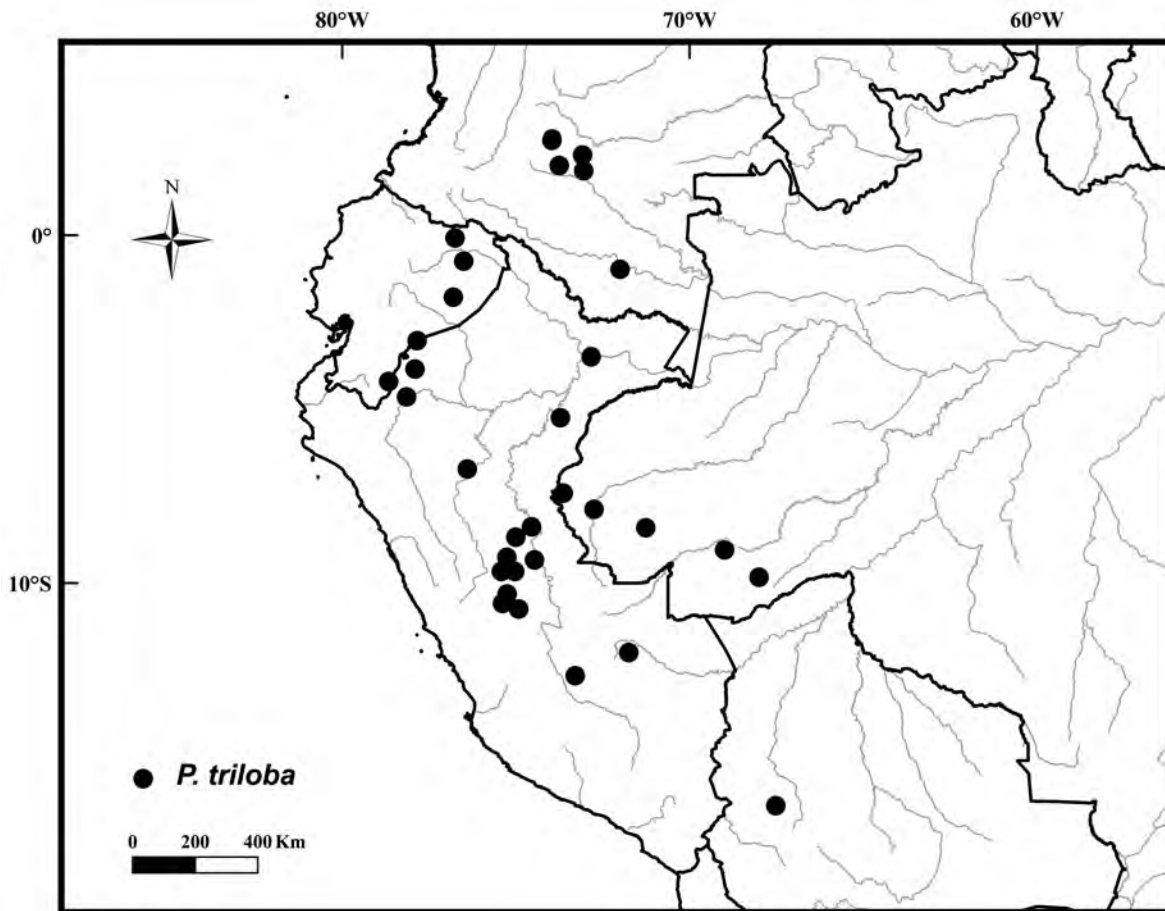


FIG. 79. Distribution of *Pourouma triloba*.

Distribution (Fig. 79). Northeast of Brazil (Acre), north of Bolivia (La Paz) central-south of Colombia (Guaviare and Meta), central-east of Peru (Amazonas, Cuzco, Huánuco, Loreto, Madre de Dios, Pasco and Ucayali), east of Ecuador (Napo, Pastaza and Zamora-Chinchipe) in “terra firme” forest of the Amazonian region, mainly in lowland moist areas, sometimes in riparian forest, at an elevation of about 50 to 1350 m above sea level.

Vernacular Name. Ambaúva vinho, mano de oso (Colombia, Guaviare); yogui (Ecuador, Pastaza); suia, suir shuina (Peru, Huambisa); tacona (Peru, Pasco); uvilla, sacha uvilla (Peru, San Martín).

Etymology. The epithet refers to the palmlobed lamina with 3 lobes.

IUCN conservation status. *Pourouma triloba* is widely distributed with the extent of occurrence of ca. 948,430 Km². Furthermore, *P. triloba* is well represented in herbaria. For these reasons *P. triloba* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Bolivia.** LA PAZ: Sud Yungas, Alto Beni, Colonia Tarapacá, (♀), *Seidel et al.* 7488 (NY). **Brazil.** ACRE: Tarauacá, Rio Tarauacá, Seringal Maceió, left bank of river, 08°15'33"S, 70°59'00"W, (♂), *Daly et al.* 8350 (NY); near mouth of Rio Macauhan, tributary Rio Yaco, 09°20'S, 69°00'W, (♂), *Krukoff* 5309 (F, G, GB, K, M, MO, NY, S, U, UC, US); Municipality of Sena Madureira, Rio Caete, 12 km above mouth (♂), *G. T. Prance et al.* 7907 (F, GH, INPA, K, MG, NY, P, R, S, U, US); Tarauacá, Rio Tarauacá, Bacia do Rio Juruá, margem direita, 8°22'59"S, 71°13'41"W, (♂), *Silveira et al.* 822 (INPA, MO, NY). **Colombia.** GUAVIARE: El Retorno, vereda La Esperanza, (♀), *Galíndez* 343 (COAH); San José del Guaviare, corregimiento El Capricho, vereda el Paraíso, finca El Paraíso, (♂), Trujillo, W. 2114 (COAH).—META: San Juan de Arama, margen izquierda del río Güejar, alrededores del aterrizaje "Los Micos", (♀), *Idrobo et al.* 1316 (COL, US); P.N.N. Tinigua, Rio Duda, Rio Duda, Serrania Chamusa, (♀), *P. Stevenson et al.* 2013 (COL). **Ecuador.** NAPO: Parque Nacional Yasuni, Carretera y oleoducto de Maxus em construcción, (♂), *Dik et al.* 253 (MO, QCNE); Lumbaqui, (♂), *Pennington et al.* 12300 (BG).—PASTAZA: Pastaza Canton, Pozo petrolero "Danta 2" de UNOCAL, 50 km al sur-sureste de Curaray, (♂), 01°47'S, 76°48'W, (♂), *Espinoza*

& *Coba 461* (MO).—ZAMORA-CHINCHIPE: Valle Nangaritza vía a Guaizimi, 27 km N-NE de Zamora, 03°02'S, 78°52'W, (♂), *E. L. Little Jr. et al. 427* (US); Nangaritza, Río Nangaritza. Pachicutza, (♀), *W. Palacios et al. 8225* (COL); Nangaritza Canton Shaimi, SE de Campamento Militar, 04°18'S, 78°43'W, (♂), *W. Palacios et al. 8795* (MO). **Peru.** UNKNOWN PROVINCE: unknown locality, (♀), *Ruiz & Pavon s.n.* (MA811088).—AMAZONAS: Quebrada Cikan inci, N of Rio Cenepa, (♀), *Berlin et al. 746* (F, GH, MO); Bagua District, Dtto. Imaza, Comunidad Aguaruna de Kusú-Listra, (♂), *C. Díaz et al. 8292* (F); Prov. Condorcanqui, Dist. Santiago, Cerro Kampankis, 04°00'56.16"S, 77°35'19.69"W, (♂), *Huamantupa et al. 15625* (F, SP, USM); Rio Huampi, (♂), *Kayap 1306* (MO, US).—CUZCO: La Convención, Distrito Echarate, Kepashiato, 12°39'46"S, 73°17'26"W, (♀), *Valenzuela et al. 9469* (F).—HUÁNUCO: Pampayacu, (♂), *Sawada 21* (F); Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'00"S, 75°02'00"W, (♀), *Tello 520* (NY); Dtto. Yuyapichis, Prov. Puerto Inca, 09°40'00"S, 75°02'00"W, (♀), *Tello 1257* (MO, NY).—LORETO: Maynas Province, Mishana, Distrito Fernando Lores, Caserío Cansdancia, Quebrada Tamshiyacu, (♀), *Grández et al. 4245* (MO); Prov. Maynas, Yanomono, 50 milhas NE de Iquitos, 03°30'S, 72°50'W, (♀), *R. Vásquez & N. Jaramillo 2719* (F, NY); Maynas, Iquitos, Allpahuayo, estación IIAP, Estación Experimental de Investigaciones de la Amazonia Peruana - IIAP, (♂), *R. Vásquez et al. 14371* (MO).—MADRE DE DIOS: Prov. Tambopata, Dtto Tambopata, Reserva de Tambopata, (♀), *Cornejo & Beltran 874* (F).—PASCO: Prov. Oxapampa, Distrito Villa Rica, Cerro el ascensor, Bosque de Proteccion San Matias, 10°45'S, 74°55'W, (♀), *Perea & Mateo 54* (F, NY).—UCAYALI: Coronel Portillo, carretera marginal, 22 km S of km 86 on Pucallpa-Tingo, Maria Highway, 08°41'S, 75°00'W, (♀), *Gentry et al. 31179* (BG, MO).

Pourouma triloba was considered by Berg & Heusden (1988: 107) as a subspecies of *P. mollis*, but they did not comment anything about this combination. Furthermore, the molecular

analyses (Chapter 1, Fig. 5) provided a strong support (BP = 95, PP = 0.99) for *Pourouma triloba* within clade II (*Pourouma tomentosa*, *P. persecta*, *P. triloba*, *P. apiculata*, and *P. herrerensis*), in which *P. triloba* was more closely related to *P. persecta* with support (BP = 92, PP = 0.97).

Morphologically, *Pourouma triloba* is distinguished from *P. mollis* by palmatilobed lamina with 3–5 lobes (versus usually entire or palmatilobed lamina with 3 lobes), leafy twigs usually with whitish, arachnoid indument (versus without arachnoid indument staminate on the leafy twigs), and staminate flowers 2.2–2.8 mm long (versus 1.2–1.8 mm long). Moreover, these species are allopatric. For these reasons, we proposed the reestablishment of *Pourouma triloba*.

Pourouma triloba displays also similarities with *P. persecta*, due to the palmatilobed lamina with adaxial surface smooth, staminate inflorescence in glomerules, and staminate flowers with tepals connate, but it distinguished from *P. persecta* by abaxial lamina surface with indument yellowish, velutinous to hirtellous on the veins (versus whitish, sericeous to strigose on the veins), and staminate flowers 2.2–2.8 mm long (versus staminate flowers 1.2–1.8 mm long).

We considered that the type collections of *Pourouma jussiaeana*, and *P. jaramilloi* match with the pistillate collections of *P. triloba*.

Pourouma triloba Klotzsch is a heterotypic homonym of *P. triloba* Trécul.

41. *Pourouma velutina* Mart. ex Miq. in Mart., Fl. bras. 4(1): 130, tab. 41. 1853; Berg & Dewolf, Fl. Suriname 5(1): 269. 1975; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 129. 1990; Berg, Fl. Guianas 11(22): 123. 1992; Berg, Fl. Venez. Guayana 4: 190. 1998; Berg, Fl. Venez.: 231. 2000; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.—TYPE: BRAZIL. Pará: habitat in sylvis ad

Iguarapes (Canales) et fluv. Circa ostia, Tonantins et Amazonas. Provinciae Paraensis, Aug 1819 (♂), *Martius s.n.* (holotype: M0174100!; isotype: U0004777 fragment from M image!).

Pourouma steyermarkii Standl. & Cuatrec. in Cuatrec., Fieldiana Bot. 28(1): 210. 1951; Berg, Fl. Suriname 5(1): 269. 1975; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 130. 1990; Berg, Fl. Guianas 11(22): 123. 1992; Berg, Fl. Venez. Guayana 4: 190. 1998; Berg, Fl. Venez.: 231. 2000.—TYPE: VENEZUELA. Bolívar: Ptari-tepuí, lower south facing slopes between Río Karuai and first ridge above Río Karuai, 28 Nov 1944 (♀), *Steyermark 60665* (holotype: F!; isotypes: NY image! VEN image!).

Tree 5–20 (–25) m tall, 10–40 cm d.b.h., with stilt roots. Leafy twigs 2–8 mm in diameter, with indument yellowish to whitish, sericeous and often without or rarely with sparse, brownish, multicellular trichomes; internode 5–30 (–35) mm long. Lamina entire, (4–) 5.5–28.5 (–32) cm long, (1.5–) 2.5–17.5 (–21.5) cm wide, length:width ratio 1.5–2.6, elliptic to ovate, chartaceous to coriaceous; base rounded, obtuse to acute; margin entire to slightly repand, with indument sparse, whitish, sericeous; apex acuminate; venation brochidodromous; adaxial surface scabrous, with indument whitish, strigose, indument of veins yellowish to whitish, sericeous and sometimes with orange to brownish, multicellular trichomes; abaxial surface smooth, indument of veins indument whitish to yellowish, velutinous to hirtellous and sometimes with brownish, multicellular trichomes; secondary veins 6–10 (–12) pairs per leaf, with indument sparse, yellowish to whitish, sericeous, with indument yellowish to whitish, sericeous, basal pair usually unbranched or rarely branched, diverging from the midrib at an 25°–50°; tertiary and quaternary veins plane to slightly prominent, with whitish, arachnoid indument confined to the areoles or sometimes extending to



FIG. 80. *Pourouma velutina*. Leafy twig with staminate inflorescence. D. Whorls of the staminate flower. 28. Part of the staminate inflorescence. 1. Staminate flower. 4. Tepals. 7. Stamens. From Martius, *Flora brasiliensis*, 4(1). 1853: Tab. 41 (modified).

the tertiary and quaternary veins; petiole (1.5–) 2–15 (–21) cm long, with indument yellowish to whitish, sericeous to velutinous and sometimes with brownish, multicellular trichomes, domatia absents; stipules 3.5–7.2 cm long, with indument yellowish, sericeous to velutinous and brownish, multicellular trichomes outside, with indument yellowish, sericeous to velutinous inside, caducous. Staminate inflorescences 4–13.5 (–15) cm long, 3.5–8.5 (–9.5) cm wide, primary branched 3–4; peduncle 1.5–8 cm long, peduncle and branches with indument yellowish, sericeous to velutinous and often with brownish, multicellular trichomes; flowers ca. 120–480, flowers organized in 11–32 fascicles, diffusely distributed along the ultimate branches; fascicle 4–6 mm in diameter, ca. 4–22 flowers per fascicle. Staminate flowers 1.5–2 mm long, 1.5–2 mm wide, sessile or subsessile; tepals 4, 1.5–2 mm long, lanceolate to ovate, free or basally connate, with indument whitish, sericeous; stamens 4; filaments 0.8–1.2 mm long, free, usually shorter than the tepals. Pistillate inflorescences 3.5–5.5 cm long, 1.5–2.5 (–3.5) cm wide; peduncle 1.5–3.5 cm long, peduncle and branches with indument yellowish, sericeous to velutinous and often with brownish, multicellular trichomes; flowers 2–10 (–12) pairs, flowers organized in 1–3 cymes. Pistillate flowers 4–6 mm long, 1.5–3 mm wide, pedicel 1–3 mm long; perianth 3–4 mm long, with indument yellowish, velutinous; stigma peltate, 1.5–2.5 mm in diameter, with indument yellowish, velutinous. Infructescences 7.5–12 (–13.5) cm long, 5–5.5 cm wide, peduncle 3–7.5 cm long; fruiting pedicel 5–10 mm; stigma peltate, 1.5–3 mm diameter. Fruiting perianth 1–2.2 cm long, 5–14 mm wide, ovoid to ellipsoid, vinaceous to black, with indument yellowish, velutinous. Achene 8–18 mm long, 3–10 mm wide. Seed 5–10 mm long, 2–8 mm wide, ovoid, brownish to vinaceous. Fig. 3 C; Fig. 18 E; Fig. 80.

Phenology. Staminate flowers collected from April to October, pistillate flowers from June to October and fruits along throughout the year.

Distribution (Fig. 82). North, east and southeast of Brazil (Amapá, Amazonas, Bahia, Espírito Santo, Mato Grosso, Pará and Rondônia), French Guiana (Cayenne and Saint-Laurent-du-Maroni), Suriname (Paramaribo), south of Venezuela (Amazonas and Bolívar), central-south of Colombia (Amazonas and Meta), east of Ecuador (Morona-Santiago, Napo, Orellana, Pastaza, Sucumbios and Zamora-Chinchipe), northeast of Peru (Loreto) and east of Bolivia (Santa Cruz), often in “terra firme” forest of the Amazonian region and in dense ombrophilous forest of the Atlantic forest, often in lowland moist areas, sometimes in riparian forest, at an elevation of about 50 to 400 m above sea level.

Etymology. The epithet probably refers to the velutinous indument of the fruiting perianth.

Vernacular Name. Tararanga, imbaubarana (Brazil, Bahia), imbaúbarana (Brazil, Mato Grosso), mapatirana (Brazil, Pará); Bois canon (French Guiana); sachá uvilla (Peru, Loreto).

IUCN conservation status. *Pourouma velutina* is widely distributed with the extent of occurrence of ca. 6,430,740 Km² and is well represented in herbaria. For these reasons *P. velutina* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Bolivia.** SANTA CRUZ: Velasco Province, Parque Nac. Noel Kempff M., 14°23'21''S, 61°08'47''W, (♂), *Jardim et al.* 3109 (MO); Velasco Province, Parque Nacional Noel Kempff M., 14°20'37''S, 61°09'33''W, (♀), *Killeen et al.* 7566 (NY). **Brazil.** AMAPÁ: Município de Mazagão, BR 156, road toward Monte Dourado, 75–80 km WSW of Macapá, 5–10 km SW of Rio Prato, 00°08'S, 51°48'W, (♀), *Daly & R. Souza* 3936 (BG, HAMAB, K, MG, MO, NY, R). Rio Oiapoque, Estrada de Cricu, about 2 Km s.e. of Clevelandia, 03°48'N, 51° 53'W, (♂), *Westra* 47303 (IAN, MG, NY).—AMAZONAS: Manaus, estrada do Aleixo, (♂), *Black* 47-1156 (IAN); Manaus, arredores da Reserva 1207, 16 Aug 1955 (♀), *Cabra INPA148369* (INPA); Manaus, 9 Aug 1962 (♂), *Chagas INPA1655* (INPA, U); Manaus, (♂), *A.*

Ducke RB25247 (INPA, RB, SP); Itapiranga, Rio Uatumã-Rio Pitinga, (♀), *C. A. Cid Ferreira et al. 849* (INPA, MO, NY, R); Manaus, IFAM, Campus Manaus-Zona Leste, próximo ao herbário EAFM, (♀), *Gaglioti & Pederneiras 128* (EAFM, SP); Manaus-Itacoatiara, Reserva Florestal Adolpho Ducke, trilha da Torre de Observação, 02°55'51"S, 59°57'55"W, (♀), *Gaglioti et al. 170* (EAFM, SP); Manaus, Instituto Federal do Amazonas, campus zona leste, próximo ao barreiro, 03°04'59"S, 59°55'45"W, (♀), *Gaglioti et al. 178* (EAFM, SP); Manaus, IFAM, campus Manaus, zona leste, (♀), *Kinupp et al. 4031* (EAFM); Manaus, Estação Experimental de Silvicultura Tropical - ZF2, (♀), *Lemos 36* (INPA); Rodovia BR 174, Km 64, depois 27 Km Leste na ZF3, Fazenda Esteio, Distrito Agropecuário, ZF3, (♀), *J. R. M. Nascimento et al. INPA/WWF1201.1464* (INPA); Boca do Acre, Rio Purus and Acre, track from Boca do Acre airstrip to Monte Verde, (♀), *G. T. Prance et al. 2469* (INPA, K, MO, NY, R, S, U, UC, US); Manaus, estrada do Aleixo, km 11, (♂), *G. T. Prance & A. E. Prance 21011* (INPA, MG, MO, NY, R, S, U, US); Manaus-Itacoatiara, km 26, Reserva Florestal Adolpho Ducke, 02°53'S, 59°58', (♀), *J. F. Ramos & C. F. Silva 2853* (INPA, K, MG, SP); Manaus, Igarapé do Passarinho, (♂), *W. A. Rodrigues & Chagas 2892* (INPA, MG, MO, RB, U); Manaus, estrada do Igarapé do Passarinho, (♀), *W. A. Rodrigues & Chagas 3267* (INPA, NY, U); Manaus, Igarapé do Passarinho, (♀), *W. A. Rodrigues & Chagas 4585* (INPA, U); Manaus, Igarapé do Bindá, (♀ and ♂), *W. A. Rodrigues & J. Lima 2092* (INPA); Distrito Agropecuário da SUFRAMA, Rodovia BR 174, Km 72, depois 6 Km Oeste da BR, Fazenda Dimona, (♂), *Soares et al. INPA/WWF2303.197* (INPA); Distrito Agropecuário da SUFRAMA, Rodovia BR 174, Km 72, depois 6 Km Oeste da BR, Fazenda Dimona, (♂), *Soares et al. INPA/WWF2303.199* (INPA).—BAHIA: Ubaitaba, Ramal a esquerda na estrada Ubaitaba/Itacaré, a 4 km do loteamento da Marambaia, (♀), *Amorim et al. 452* (GUA, MBM, NY); Una, Reserva Biológica do Mico Leão (IBAMA), Entrada no Km 46 da Rod. BA-001 Ilhéus/Uma, 15°09'S, 39°05'W, (♂), *Amorim et al. 840* (MBM, NY); Cidade

de Ilhéus; entrada a 2 km a partir da antiga ponte do Rio Fundão, 14°46'55"S, 39°04'09"W, (♀), *Carvalho et al. 5465* (CEPEC, NY); Cidade de Ilhéus; entrada a 2 km a partir da antiga ponte do Rio Fundão, 14°46'55"S, 39°04'09"W, (♀), *Carvalho et al. 5597* (CEPEC, NY); São Miguel das Matas, Faz. Engenho da Lama, ca. 4,5 km ao S da cidade, 13°02'49"S, 39°25'56"W, (♀), *Jardim et al. 2863* (ALCB, CEPEC, HUEFS, NY); Una, Ca. 5 km na estrada da BA 001, Rod. Ilhéus/Una, Reserva Biológica de Una, (♀), *D. Lopes et al. 14* (GUA, NY); Itacaré, ramal que leva ao Refúgio dos Anjos, 14°20'06"S, 35°01'06"W, (♀), *M. M. M. Lopes 1074* (NY); Itacaré, Fazenda Boa Paz, trilha Boa Paz, 14°20'05"S, 39°01'54"W, (♀), *Lucas et al. 1054* (ESA, K, RB, SP); Município de Una, km 17 da estrada que liga rod. BR-101 à BA-215, (♀), *S. A. Mori & Thompson 11026* (MG, RB, U); Una, Estação Experimental Lemos Maia, (♀), *Rylands 36* (ALCB, INPA, GUA, RB); Una, ca. 5 km no ramal que liga o km 46 da Rod. BA-001 para a Rebio de Una, (♀), *Sant'Ana et al. 634* (CEPEC, NY); Una, Reserva Biológica do Mico-Leão, IBAMA. BA-001, km 46, Ilhéus/Una, 15°09'S, 39°05'W, (♀), *Sant'Ana 676* (CEPEC, NY); Município de Una, 8 km ao Norte de Comandatuba, (♀), *E. B. Santos et al. 235* (GUA, SP); Ilhéus, Distrito de Castelo Novo, Fazenda Almada, km 4 na estrada para a Estação Experimental do Almada, (♀), *L. A. M. Silva et al. 3360* (ALCB, HUEFS, NY); 7.3 km N of Serra Grande on rd Itacaré, 14°59'S, 39°28'W, (♂), *Thomas et al. 6976* (NY); Mun. Prado, km 18 east of Itamaraju on road to Prado, 8 km from entrance, 17°11'S, 39°20'W, (♀), *Thomas et al. 10159* (ALCB, HALC, MBM, MO, NY, R).—ESPIRITO SANTO: Cariacica, localidade de Duas Bocas Rio Doce, 20°16'44"S, 40°28'42"W, (♀), *Forzza et al. 5370* (CEPEC, MBML, RB, SP, UPCB); Colatina, Rio Doce, Km 8 da Estrada de Pancas, (♂), *J. G. Kuhlmann 382* (RB); Conceição da Barra, Área 135 da Aracruz Celulose S. A., (♂), *O. J. Pereira 3257* (GUA, VIES); Linhares, (♀), *Sucre 8684* (RB, U); Linhares, Reserva Biológica de Sooretama, Mata do Cupido, (♀), *D. Sucre 8684* (RB, U).—MATO GROSSO: Capitão Vasconcelos, ao norte do posto indígena, (♂), *Andrade-*

Lima & Ataíde 58–3185 (INPA, K, SP); Cláudia, rodovia Sinop/Cláudia, próx. a serraria Iracema, 11°35'33"S, 55°09'32"W, (♀), *Árbocz et al. 3122* (ESA, SP, UNIP); Comodoro, Fazenda Dolce Vitta, 10°12'29"S, 59°24'26"W, (♀), *Árbocz et al. 4050* (ESA, MT, UEC, UNIP); Aripuanã, margem MT-420, 5Km da cidade, 12°44'19"S, 60°03'04"W, (♀), *Árbocz et al. 4467* (ESA, MT, UEC); Vila Bela Santíssima Trindade, Km 509–511 Br 174, (♀), *Emmerich & Santos 5885* (R, SP); Sinop, BR 163 Sinop-Itauba, 47 km para Povoado Claudia, 11°12'S, 55°56'W, (♀), *C. A. Cid Ferreira et al. 6200* (F, INPA, MG, NY, SPF); Querência, Fazenda Jaú, (♂), *Goldenberg 440* (ESA, MT, UEC); Capitão Vasconcelos, (♀), *A. Lima 58-3185* (RB); Nova Uiratã, 13°01'12"S, 55°09'67"W, (♂), *Nave et al. 1355* (ESA, SP); Cláudia, estrada da Fazenda Inês Maria, ao Rio Renato, 11°33'39"S, 55°12'25"W, (♀), *Nave et al. 1552* (ESA, SP); Rio Aripuanã, (♀), *Rylands 15* (INPA); Município de Sinop, 6–9 km E of BR-163, on rd. to Fazenda Londrina, (♀), *Thomas et al. 4018* (BG, F, INPA, K, MG, MO, NY, SPF); Município de Sinop-Colider, BR-080, ca. 91 km E of junction with BR-163, Serra Formosa, (♀), *Thomas et al. 4179* (BG, F, INPA, MG, MO, NY); Vila Bela Santíssima Trindade, 4 km S of border of Rondônia, (♀), *Thomas et al. 4810* (BG, INPA, MG, MO, NY, SPF).—PARÁ: Benevides, Reserva da Pirelli, (♀), *S. V. Costa Neto et al. 99* (MG); Belém, Instituto Agronomico do Norte, (♂), *Duarte 9786* (HB); Belém, (♀), *A. Ducke MG15350* (G, MG, P, US); Guaupá, (♂), *A. Ducke MG15935* (IMG); Rio Xingú, Victória estrada, (♀), *A. Ducke MG17187* (MG); Oriximiná, margem direita do Rio Mapuera, próx. a cach. São Marçal, 01°00'S, 57°30'W, (♀), *C. A. Cid Ferreira et al. 7753* (INPA, MBM, MG, MIRR, MO, NY); Belém, Campus Embrapa, estrada principal da FICAP, 01°26'40"S, 48°26'29"W, (♀), *Gaglioti et al. 116* (IAN, SP); Boa Vista, (♀), *Guedes MG1235* (GUA, MG, P, S, U); Belém, (♀), *Huber MG1640* (GUA, MG, R, P, S, U); rodovia Belém-Brasília, km 93, (♂), *M. Kuhlmann & Jimbo 52* (GUA, IAN, MG, R, S, SP, US); terrae Amazonium ad ostia fluv. Tonantins et Amazonas, Aug 1818 (♂), *Martius s.n.* (M0174102,

M0174103, M0174104, M0174105, M0174106); Belém, (♀), *Pires & Black 161* (IAN, RB); Belém, Mata da Cia. Pirelli, Fazenda Uriboça, (♂), *Pires 7015* (IAN); Belém, (♀), *Pires 51882* (NY); Belém, IPEAN, próximo ao Horto da Secretaria de Botânica, (♂), *Pires & N. T. Silva 10384* (IAN); Rios Pacaja and Muirapiranga, 02°33'S–02°50'S, 50°38'W–50°50'W, (♀), *G. T. Prance et al. 1548* (F, GH, IAN, K, NY, P, S, U, US); BR 163, Cuiabá-Santarém rd., Km 885.5 (♀), *G. T. Prance et al. 25167* (F, INPA, MO, RB, U, UEC); BR 163, Cuiabá-Santarém highway, km 941, (♀), *G. T. Prance et al. 25363* (K, MG, MO, NY, RB, S, U, UEC, US); Santarém, margem direita do Rio Curua-una, Reserva Florestal do Curuauna, (♂), *Rosário et al. 1096* (IAN, MG); Santarém, Belterra, (♀), *B. G. S. Ribeiro & I. C. I. Oliveira 2029* (IAN); Santarém, km 35 da estrada do Palhão, arredores do acampamento do Igarapé Curupira, (♀), *M. Silva & R. Souza 2423* (COL, F, K, MG, NY); Tucuruí, Breu Branco, (♂), *M. G. Silva 5463* (INPA, MBM, MG, P); Jari, estrada do Munguba, , (♀), *N. T. Silva 1719* (INPA, K).—RONDÔNIA: Guarajá-Mirim, Chapada dos Pacaás Novos em depressão da Chapada, (♂), *C. A. Cid Ferreira 8783* (F, INPA, K, MO, NY). **Colombia.** AMAZONAS: Municipio Leticia, Parque Nacional Natural Amacayacu, Parcela Permanente, 03°48'33,2"S, 70°16'4,29"W, (♀), *J. S. B. Silva et al. 2350* (COAH, SP).—META: Villavicencio, vereda de Puerto Colombia, Finca el Naranjal, (♂), *H. Garcia et al. 166* (COL); Villavicencio, vereda de Puerto Colombia, Finca el Naranjal, (♂), *H. Garcia et al. 167* (COL). **French Guiana.** CAYENNE: Cayenne, Campoment de Grégoire, (♀), *Deward 138* (NY, P, U); Orapu, (♀), *Oldeman B3786A* (A, CAY, P, U); Sinnamary, Fleuve Sinnamary Petit Saut-Bassin du Sinnamary, (♂), *Sabatier & Prevost 2189* (CAY, NY, U).—SAINT-LAURENT-DU-MARONI: Saint Laurence, Placeau 2, Carreau 18-Région de Crique Margot, (♀), *BAFOG 7562* (NY, P, U); Maroni, (♂), *Gandoger 19* (P); Acarouany, (♂), *Sagot 1163* (BR, F, G, GH, GOET, NY, P, S, U); Saint-Laurent-du-Maroni, (♀), *Service Forestier 5052* (P). **Peru.** LORETO: Mayna, Dtto. Iquitos, Rio Nanay, trail from Astoria to Rio Mazan, (♀), *McDaniel & Rimachi Y. 20403*

(MO, NA); Maynas, Punchana; Río Momón, caserío de Balcón, (♀), *Rimachi Y. 10350* (F, MBM). **Suriname.** PARAMARIBO: Tibiti savanne, In forest near km 33, (♀), *Lanjouw & Lindeman 1761* (IAN, NY, U). **Venezuela.** AMAZONAS: Depto. Atures, 23 km NE of Puerto Ayacucho, 05°51'N, 67°25'W, (♀), *Davidse & Huber 15365* (MO); Base Camaní, S. A. S., (♀), *Foldats 114–1A* (NY).

Miquel (1853:130) classified this species in the group 3. "Folia omnia integra" (leaves always entire). This author indicated in the protologue only one material: "crescit in sylvis ad Iguarapés (Canales) et fluv. Circa ostia, Tonantins et Amazonas in provinciae Paraensis, Aug 1819 (♂), *Martius s.n.* (M)". Also, this material matches with the tabula XLI.

Nevertheless, Berg et al. (1990: 130) designated as lectotype the material: "Brazil. Pará. Mouth of Rio Tocantins, Aug 1819 (♂), *Martius s.n.* (M)", probably referring to the same material cited by Miquel (1853:130).

During the visit to the Botanische Staatssammlung München (M), we examined the type collection, and added the barcode for scanning. This material corresponds to the described by Miquel (1853:130). For this reason, we disregard the lectotype described by Berg et al. (1990: 130).

Our molecular analyses results (Chapter 1, Fig. 5) provide a moderate support to *Pourouma velutina* more closely related to *P. amacayacuensis* (BP = 80, PP = 0.95) within clade V. These species are morphologically related, due to entire lamina with adaxial lamina surface scabrous, basal secondary veins usually unbranched, staminate inflorescence in fascicles, and staminate flowers with tepals free or basally connate, but *Pourouma velutina* distinguished from *P. amacayacuensis* by leafy twigs with indument yellowish to whitish, sericeous (versus with dense, floccose, brownish, arachnoid indument), abaxial lamina surface without whitish, arachnoid

indument on the primary vein (versus without whitish, arachnoid indument), and stipules with indument yellowish, sericeous to velutinous inside (versus glabrous).

42. *Pourouma venezuelensis* Cuatrec., Bol. Soc. Venez. Ci. Nat. 15: 107. 1954; Berg, Fl.

Venez.: 231. 2000.—TYPE: VENEZUELA. Aragua: Parque Nacional Henri Pittier, 20 Nov 1953 (♂), *Aristeguieta 2005* (holotype: F; isotype: VEN!).

Pourouma guianensis Aubl. subsp. *venezuelensis* (Cuatrec.) C.C. Berg & Heusden, Proc.

Kon. Ned. Akad. Wetensch. C 91(2): 106. 1988; Berg, Akkermans & Heusden, Fl.

Neotrop. Monogr. 51: 128. 1990; Berg, Fl. Guianas 11(22): 123. 1992; Berg, Fl.

Venez.: 231. 2000.

Tree, 5–20 (–25) m tall, d.b.h. unknown. Leafy twigs 4–25 mm in diameter, with indument yellowish, villous and dense, brownish, multicellular trichomes; internode 4–35 (–40) mm long. Lamina palmatifid to parmatipartite with 3–5 lobes, (12.5–) 14.5–40 (–42.5) cm long, (13.5–) 15.5–41.5 (–44.5) cm wide, length:width ratio 0.8–1.1, coriaceous; base cordate to deeply cordate; margin palmatifid, yellowish, hirtellous; apex caudate; midsegment broadly obovate to oblong to elliptic; adaxial surface scabrous, with indument whitish, strigose, indument of veins yellowish, hirtellous to hirsute; abaxial surface smooth, indument of veins yellowish, hirtellous to hirsute and sometimes with sparse, brownish, multicellular trichomes; venation palmate; secondary veins in the free part of the midsegment 14–26 pairs per leaf, basal pair branched, diverging from the midrib at an 35°–60°; tertiary and quaternary veins slightly prominent to prominent, with whitish, arachnoid indument confined to the areoles; petiole (8.5–) 12.5–35 cm long, with indument yellowish, hirsute to villous and brownish, multicellular trichomes,

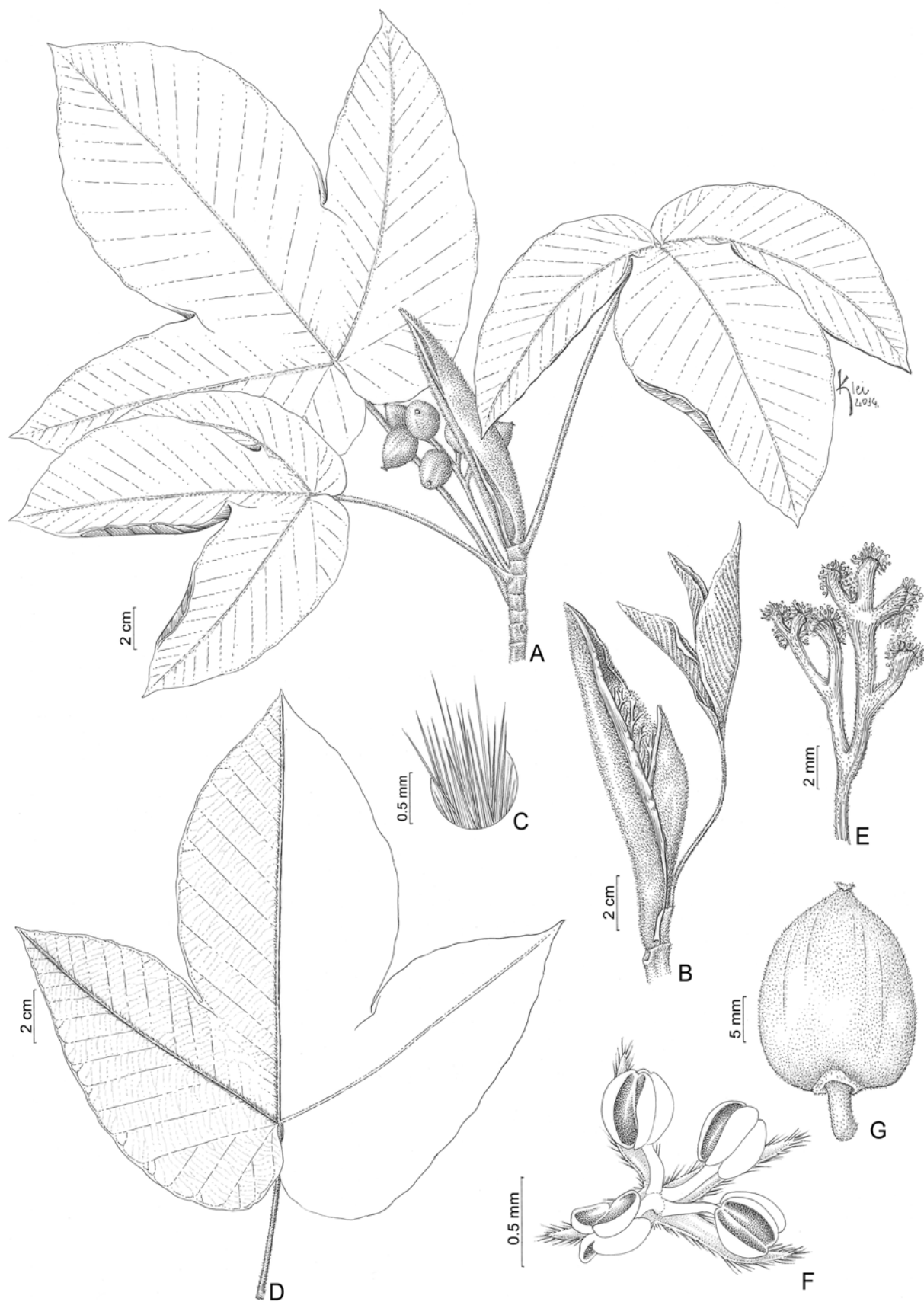


FIG. 81. *Pourouma venezuelensis*. A. Leafy twig with infructescence. B. Leafy twig with stipule persistent covering staminate inflorescence. C. Hirsute indument of the adaxial lamina surface. D. Palmatifid leaf, abaxial surface. E. Part of the staminate inflorescence. F. Staminate flower. G. Fruiting perianth and pedicel. [A, C-D, G: from Williams 9983, (F); B, E-F: from Gonzales & Ortega 1319, (MO)].

domatia absents; stipules 6.5–14.5 (–16.5) cm long, with indument yellowish, hirsute to villous and brownish, multicellular trichomes outside, with indument dense, yellowish, sericeous to hirsute inside, caducous. Staminate inflorescences 4.5–9.5 cm long, 1.5–15.5 cm wide, primary branched 3; peduncle 1.5–5.5 cm long, peduncle and branches yellowish to whitish, hirtellous and dense, brownish, multicellular trichomes on the ultimate branches; flowers ca. 580–1650, flowers organized in 46–102 fascicles, diffusely distributed along the ultimate branches; fascicle 4–6 mm in diameter, ca. 10–25 flowers per fascicle. Staminate flowers 1–1.2 mm long, 1–1.4 mm wide; sessile to subsessile; tepals 4, lanceolate, 0.8–1.2 mm long, free or basally connate, yellowish to whitish, sericeous to strigose; stamens 4; filaments 0.8–1 mm long, free, usually shorter than the tepals. Pistillate inflorescence unknown. Infructescences 10.5–19.5 cm long, 2.5–8.5 cm wide; peduncle 7.5–12.5.5 cm long; peduncle and branches yellowish to whitish, hirtellous and dense, brownish, multicellular trichomes on the ultimate branches; fruits 5–8, fruits organized in 2–3 cymes, fruiting pedicel 4–10 mm long; stigma bilobed, 1–1.2 mm in diameter. Fruiting perianth 2–2.5 cm long, 12–18 mm wide, ovoid to ellipsoid, black to blue-black, yellowish to whitish, hirtellous to estrigullose. Achene 1.8–2.3 cm long, 1–1.6 cm wide; pericarp woody. Seed 8–15 mm long, 4–8 mm wide, ovoid, brownish to vinaceous. Fig. 18 F; Fig. 81.

Phenology. Staminate flowers collected from September to November and fruits from March to April.

Distribution (Fig. 82). Endemic from the northeast of Venezuela (Aragua, Carabobo and Miranda), in montane moist evergreen forest, at altitudes of about 600 to 1100 m above sea level.

Vernacular Name. Tambor (Venezuela, Carabobo), yagrumo negro (Venezuela, Miranda).

Etymology. The epithet is a tribute to the country of type locality, Venezuela.

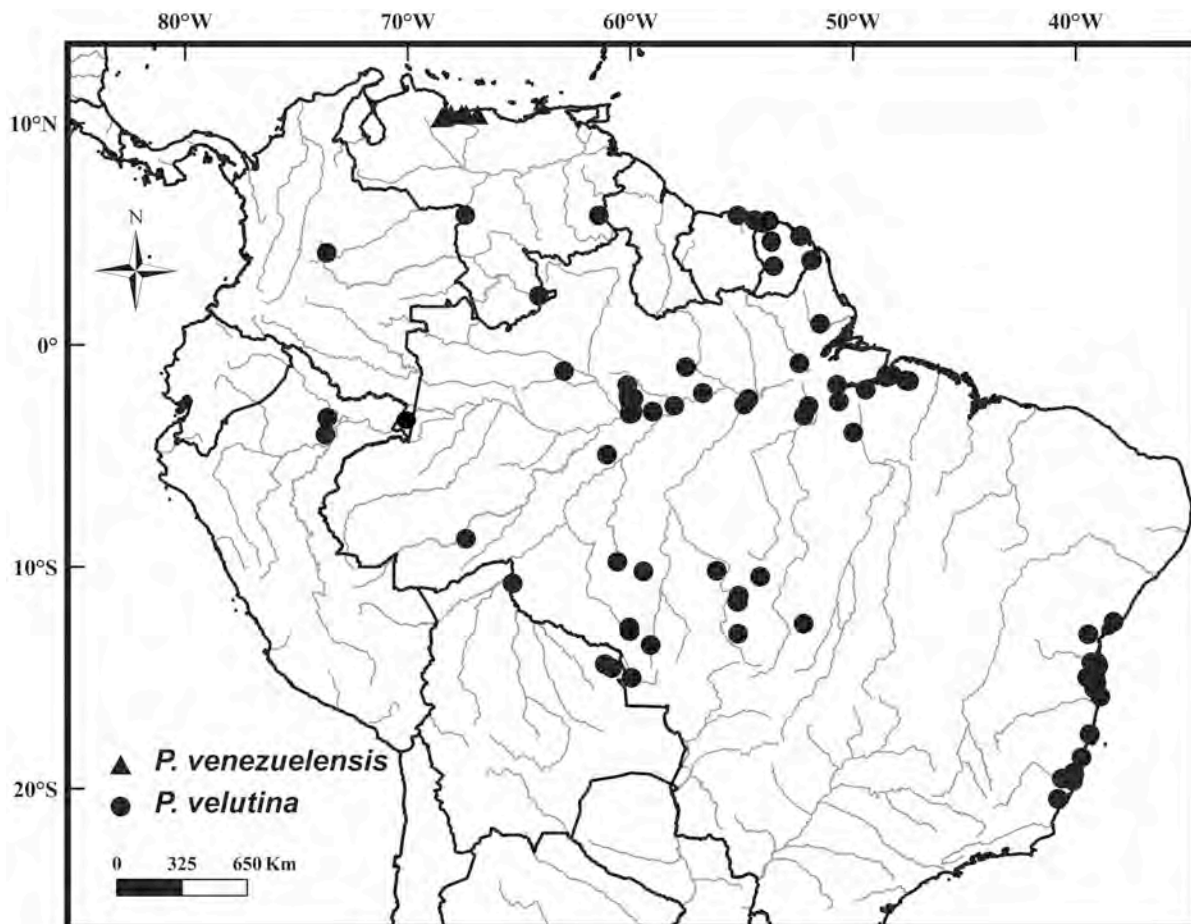


FIG. 82. Distribution of *Pourouma velutina* and *P. venezuelensis*.

IUCN conservation status. According to the IUCN Red list categories (IUCN 2014), *Pourouma venezuelensis* is considered Endangered, EN B1a,b(iii), because of the small extent of occurrence (ca. 4,850 Km²) and known from only seventeen collections, made between 1938 and 2000.

ADDITIONAL SPECIMENS EXAMINED. **Venezuela.** ARAGUA: Parque Nacional Henri Pittier, (♂), *Ijdsz-Madriz* 28 (VEN); Parque Nacional Henri Pittier, (♀), *Lasser* 2202 (VEN); Rancho Grande, (♂), *Lasser* 2267 (VEN); Guamitas, (♂), *Pittier et al.* 15641 (US, VEN); slopes along road to Choroni, between Quebrada Rio Honda and Choroni, (♀), *J. A. Steyermark & Espinoza*

105863 (NY, VEN); Agua Amarilla, (♂), *Tamayo* 3370 (VEN); Rancho Grande, Parque Nacional Aragua, (♀), *Li. Williams* 9983 (A, F, GH, NY, US, VEN).—CARABOBO: Between Valencia and Campanero, (♀), *Fendler* 2420 (G); Cumbre de Valencia, Pt. Cabello, without date (♂), *Karsten s.n.* (LE); ca. 18 km to 20 km south of Puerto Cabello, ca. 9 to 14 km south of San Estaban, 10°23'N, 68°04'W, (♀), *Liesner & Medina* 13728 (MO); Yaracuy, distrito Nirgua 10°19'N, 68°23'W, (♀), *Meier & Flauger* 6865 (M); en las laderas arribas de las cabeceras de río San Gián, este de Los Tanques, al sur de Borburata, (♀), *Steyermark & C. Steyermark* 95378 (NY, U, VEN).—MIRANDA: Guatopo, (♀), *Bernardi* 5696 (VEN); Guatopo, (♀), *Bernardi* 5697 (NY); Dto. Paéz, Fila La Tigra, Qda. San Juan, 18 kms SW de Cupira, 10°04'N, 65°45'W, (♂), *Gonzalez & Ortega* 1319 (BG, MO); Cerros del Bachiller, near east, above Quebrada Corozal, south of Santa Cruz, 10°09'N, 65°48'W, (♀), *Steyermark & Davidse* 116884 (BG, MO); 11 km SSE of El Guapo, (♀), *Steyermark et al.* 116966 (U).

Pourouma venezuelensis was considered by Berg & Heusden (1988: 107) as a subspecies of *P. guianensis*, but they did not comment anything about this combination.

This species distinguished from *P. guianensis* by leafy twigs with indument villous (versus with indument hirsute to hirtellous or velutinous to puberulous), stipules with indument dense, yellowish, sericeous to hirsute inside (versus glabrous), and fruiting perianth 2–2.5 cm long (versus fruiting perianth 1–1.8 cm long). Furthermore, these species are allopatric, in which *Pourouma venezuelensis* is endemic from the northeast of Venezuela, while *P. guianensis* has the most extensive distribution of *Pourouma*, occurring in the north, east and southeast of Brazil.

During to visit to the Field Museum of Natural History (F), we did not find the holotype (Aristeguieta 2005, F) described by Cuatrecasas (1954: 107).

43. *Pourouma villosa* Trécul, Ann. Sci. Nat., Bot., Sér. 3, 8: 103. 1847; Miquel *in* Martius, Fl. Bras. 4(1): 127. 1853; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 109. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 177. 1990; Berg, Fl. Guianas 11(22): 123. 1992; Romaniuc-Neto & Gaglioti, Catálogo de plantas e fungos do Brasil 2: 1665. 2010.—TYPE: FRENCH GUIANA. Unknown locality, 1840 (♂), *Leprieur s.n.* (holotype: P00756786!; isotype: P00756787!).

Pourouma laevis Benoist, Bull. Mus. Hist. Nat. (Paris) 28: 319. 1922; Berg & Dewolf, Fl. Suriname 5(1): 270. 1975; Berg & Heusden, Proc. Kon. Ned. Akad. Wetensch., Ser. C., 91(2): 109. 1988; Berg, Akkermans & Heusden, Fl. Neotrop. Monogr. 51: 177. 1990; Berg, Fl. Guianas 11(22): 123. 1992.—TYPE: FRENCH GUIANA. Acarouany, 1858 (♂), *Sagot 517* (lectotype, designated by Berg et al. 1990: P00756791!; isolectotypes: B image! BR image! F! G image! GH image! GOET image! K! P00756788! P00756789! P00756790! P00756792! S image! SI image! U image! US image! VEN image!).

Tree, 5–30 m tall, 15–40 (–50) cm d.b.h., with stilt roots. Leafy twigs 5–20 mm in diameter, with indument yellowish to whitish, villous to hirsute, at least on the scars of the stipules and brownish, multicellular trichomes; internode 5–45 mm long. Lamina palmatifid to palmatipartite with 3–5 lobes, (5–) 8.5–38.5 (–42) cm long, (3.5–) 9.5–40 (–43.5) cm wide, length:width ratio 0.8–1.5, coriaceous; base deeply cordate to cordate, sometimes with overlapping lobes; margin palmatifid, with indument yellowish, hirsute to sericeous; apex acuminate to acute, rarely rounded to emarginate; midsegment broadly elliptic to oblong; adaxial surface smooth, indument of veins sparse, yellowish to whitish, sericeous to hirtellous; abaxial surface smooth, with whitish, arachnoid indument, indument of veins yellowish to whitish, sericeous to hirtellous and often with brownish, multicellular trichomes; venation palmate; secondary veins in the free part

of the midsegment 6–18 pairs per leaf, basal pair branched; tertiary and quaternary veins plane to slightly prominent, with dense, whitish, arachnoid indument covering to the areoles; petiole (4.5–) 7–36.5 (–38.5) cm long, with indument yellowish to whitish, velutinous to villous to hirsute and brownish, multicellular trichomes, domatia absents; stipules (3–) 4.5–28 (–32) cm long, with indument yellowish to whitish, velutinous to villous to hirsute and brownish, multicellular trichomes outside, glabrous or with indument sparse, yellowish, hirsute inside, caducous or persistent. Staminate inflorescences 5.5–22 (–23.5) cm long, 2.5–12.5 (–14) cm wide, primary branched 3–4; peduncle 3–9.5 cm long, peduncle and branches with indument yellowish, hirsute to velutinous and dense, brownish to brownish-red, multicellular trichomes on the ultimate branches; flowers ca. 280–1650, flowers organized in 20–86 fascicles, diffusely distributed along the ultimate branches; fascicle 4–8 mm in diameter, ca. 10–35 flowers per fascicle. Staminate flowers 1.5–2.2 mm long, 1.2–2.5 mm wide; sessile to subsessile; tepals 3–4, 1–1.5 mm long, lanceolate to ovate, free or basally connate, with indument yellowish to whitish, hirtellous to strigulose; stamens 3–4; filaments 0.5–1.2 mm long, free, usually shorter than the tepals. Pistillate inflorescences 4.5–9.5 cm long, 2–4.5 cm wide; peduncle 2–5.5 cm long, peduncle and branches with indument yellowish, hirsute to hirtellous and dense, brownish to brownish-red, multicellular trichomes on the ultimate branches; flowers 6–40, flowers organized in 4–6 cymes. Pistillate flowers 4.5–7.5 mm long, 2.5–5.5 mm wide, pedicel 2–5 mm long; perianth 3–6 mm long, with indument yellowish, hirtellous and dense, dark brownish to brownish-red, multicellular trichomes; stigma peltate, 1.5–2.5 mm in diameter. Infructescences (7.5–) 9.5–20 (–21.5) cm long, (2.5–) 3.5–13.5 (–15) cm wide; peduncle 2–12 (–13.5) cm long; fruiting pedicel 8–15 mm long. Fruiting perianth 1.2–2.2 cm long, 6–12 mm wide, ovoid to ellipsoid, with indument yellowish, hirtellous and brownish to brownish-red, multicellular trichomes.



FIG. 83. *Pourouma villosa*. A. Leafy twig with staminate inflorescences. B. Leafy twig with pistillate inflorescence. C. Infructescence. D. Pistillate flower. E. Staminate flower. [A, E: from Gaglioti *et al.* 162 (SP); B, D: from Granville *et al.* 8093 (MO); C: from Daly *et al.* 3790 (HAMAB)].

Achene 10–2 mm long, 3–10 mm wide. Seed 3–6 mm long, 1.5–6 mm wide, ovoid, vinaceous.

Fig. 1 E; Fig. 4 A-B; Fig. 7 C; Fig. 18 G; Fig. 83.

Phenology. Staminate flowers collected from May to October, pistillate flowers from June to September and fruits along throughout the year.

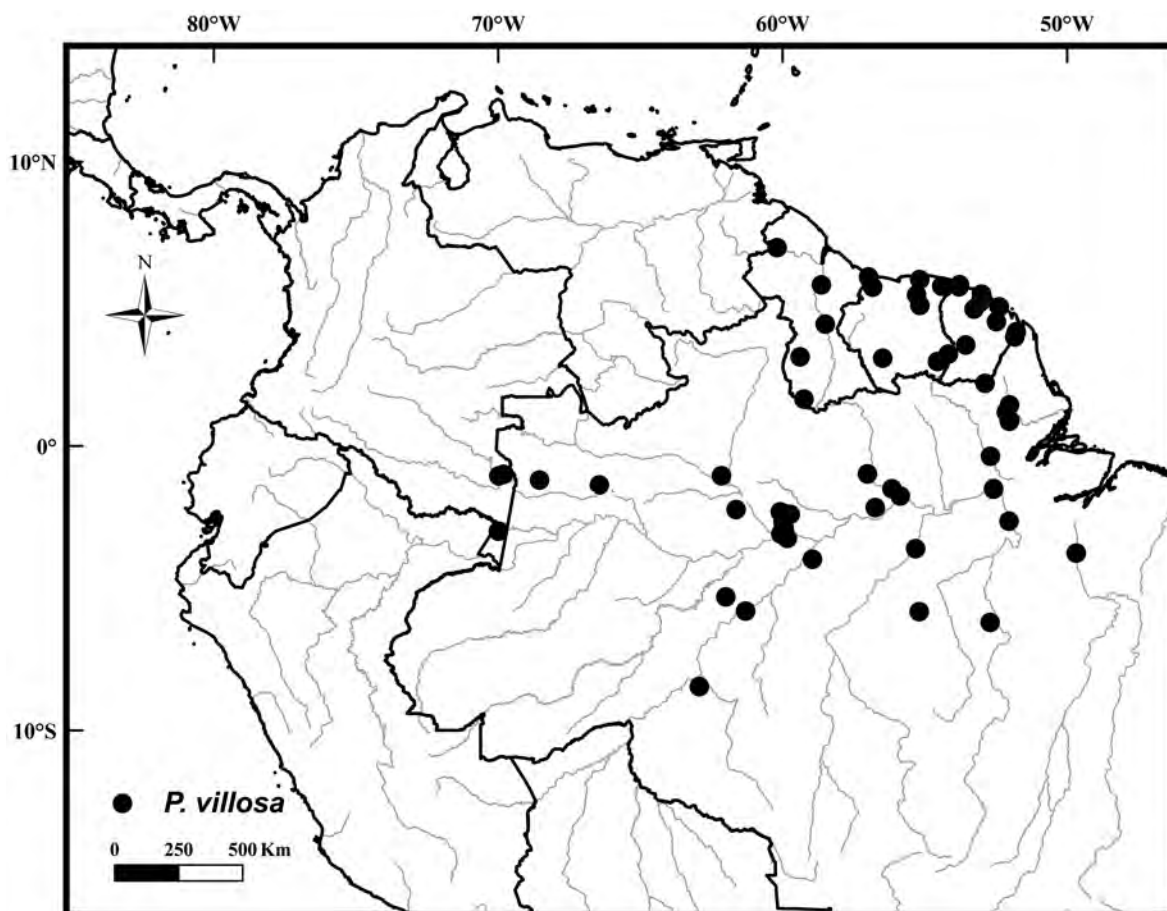


FIG. 84. Distribution of *Pourouma villosa*.

Distribution (Fig. 84). North of Brazil (Amapá, Amazonas, Maranhão, Pará, Rondônia and Roraima), French Guiana (Cayenne and Saint-Laurent-du-Maroni), Suriname (Brokopondo, Nickerie, Paramaribo and Sipaliwini), Guyana (Potato-Siparuni and Upper Takutu-Upper

Essequibo), south of Colombia (Amazonas and Vaupes), often in “terra firme” forest of the Amazonian region or sometimes in varzea forest, in lowland moist areas, usually in riparian forest, at an elevation of about 50 to 400 m above sea level.

Vernacular Name. Imbaúba branca (Brazil, Amapá); embaúba-benguê (Brazil, Amazonas), imbaúba branca, imbaúba de cheiro, mapatirama vermelha, uvilha (Brazil, Pará); bois canon; bouchi-papaye (French Guiana, Cayenne); boroma, kaba, kobé, poeroema (Suriname, Nickerie).

Etymology. The epithet probably refers to the villous indument of the leafy twigs

IUCN conservation status. *Pourouma villosa* is widely distributed with the extent of occurrence of ca. 2,985,560 Km². Also, *P. villosa* is well represented in herbaria. For these reasons *P. villosa* is assessed as Least Concern (LC) according to IUCN Red List criteria (IUCN 2014).

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** AMAPÁ: Oiapoque, 35 km SSE of Oiapoque on BR156, 03°18’N, 51°39’W, (♀), *Daly et al.* 3790 (HAMAB, INPA, K, MG, MO, NY, R); Serra do Navio, Parque Natural Municipal do Canção, 00°54’10’’N, 52°00’32’’W, (♂), *Gaglioti et al.* 162 (SP); Rio Amapari, Rancho Santa Ana, (♂), *Pires et al.* 51390 (FHO, IAN, INPA, MG, MO, NY, US).—AMAZONAS: Distrito Agropecuário da SUFRAMA, Rodovia BR-174, Km 64, Fazenda Esteio, (♂), *Ackerly et al.* INPA/WWF1109.148.2 (INPA); Distrito Agropecuário da SUFRAMA, Rodovia BR-174, Km 64, Fazenda Esteio, (♀), *Ackerly et al.* INPA/WWF1109.575.2 (INPA); Manaus, distrito Agropecuário da SUFRAMA, rodovia BR-174, km 64, 02°25’S, 59°49’W, (♀), *Ackerly* INPA/WWF1109.578.2 (INPA); Distrito Agropecuário da SUFRAMA, Rodovia BR-174, Km 64, Fazenda Esteio, (♂), *Ackerly et al.* INPA/WWF1302.442.2 (INPA); Distrito Agropecuário da SUFRAMA, Rodovia BR-174, Km 64, Fazenda Esteio, (♀), *Ackerly et al.* INPA/WWF1302.1830.2 (INPA); Distrito Agropecuário da

SUFRAMA, Rodovia BR-174, Km 64, Fazenda Esteio, (♂), *Ackerly et al. INPA/WWF1302.1940.2* (INPA); Manaus, Ponta Negra, margem da estrada, (♀), *L. Coêlho 15* (INPA, MO, U); Manaus, Reserva Florestal Ducke, 02°53'S, 59°58'W, (♀), *M. A. S. Costa et al. 2* (INPA, K, NY); Manaus, IFAM, campus zona leste, próximo ao herbário, (♂), *Gaglioti & Pederneiras 126* (EAFM, SP); Manaus, IFAM, campus zona leste, próximo a área florestal, (♂), *Gaglioti & Pederneiras 127* (EAFM, SP); Manaus, próximo ao condomínio Ponta Negra, nas proximidades do Hotel Tropical, (♂), *Gaglioti & Pederneiras 146* (EAFM, SP); Manicoré, Rio Atininga, (♀), *Junqueira & Neto 483* (EAFM); Manaus, IFAM, campus zona leste, área do Manejo Florestal, (♀), *Kinupp 4121* (EAFM); Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR-174, Km 72 depois 6 Km Oeste na ZF3, Fazenda Dímona, 02°19'S, 60°05'W, (♀), *Mackenzie et al. INPA/WWF2206.1426* (INPA); Manaus, Distrito Agropecuário, Reserva 1501, Km 41, 02°24'26''S, 59°45'50W, (♀), *S. A. Mori & Fiedler 20704* (INPA, MO, NY); Manaus-Itacoatiara, km 26, Reserva Florestal Ducke, 02°53'S, 59°58'W, (♀), *J. R. Nascimento 680* (IAN, INPA, K, MG, MO, NY, RB, SP); Manaus, Distrito Agropecuário da SUFRAMA, Rodovia BR-174, Km 72, depois 6 Km Oeste da BR, Fazenda Dimona, (♀), *J. R. M. Nascimento et al. INPA/WWF1109.578* (INPA); Manaus, Distrito Agropecuário da SUFRAMA, Rodovia BR-174, Km 64, Fazenda Esteio, 02°26'S, 59°48'W, (♀), *J. R. M. Nascimento et al. INPA/WWF1302.1467* (INPA); Manaus, Reserva ZF2, BR 174, Km 50, (♀), *A. C. A. Oliveira et al. 270* (INPA); Careiro, Careiro-Castanho, Reserva de Desenvolvimento Sustentável Igapó, 05°18'30''S, 61°59'45''W, (♂), *Prata et al. 620* (INPA); Manaus, Reserva Florestal Ducke, 02°53'S, 59°58'W, (♀), *J. E. L. S. Ribeiro et al. 1955* (INPA, K, MG); Manaus, Hotel Tropical, (♂), *W. A. Rodrigues & D. Coêlho 10082* (INPA, MBM, MO); Manaus, Distrito Agropecuário da SUFRAMA, Rodovia BR-174, Km 64, depois 23 Km leste na ZF3, Fazenda Esteio, Distrito Agropecuário, ZF3, (♀), *R. M. Santos et al. INPA/WWF1202.1203* (INPA); Japurá (♂), *J. S. B. Silva et al. 2248*

(COAH, SP); São Gabriel da Cachoeira (♂), *J. S. B. Silva et al.* 2252 (COAH, SP); Manaus, Reserva Florestal Ducke, (♂), *Vicentini & E. C. Pereira* 752 (INPA, K, MG, MO).—MARANHÃO: Rod. Belém-Brasília, km 380–375, (♀), *A. C. A. Oliveira et al.* 1074 (IAN, NY, SPF).—PARÁ: Município Oriximiná, rio Trombetas, lago Erepecu ao Norte, (♀), *C. A. Cid Ferreira et al.* 1634 (INPA); Oriximiná, Br 163 a 14 km N de Cach. Porteira, 00°59'S, 57°01'W, (♀), *C. A. Cid Ferreira et al.* 7948 (INPA, MG, MIRR, MO, NY); Aveiro, Rio Cupari, (♀), *M. Costa* 92 (F, IAN, K); Faro, (♀), *A. Ducke RB13056* (MG, RB); Entre Rio Branco de Obidos e a Terra de Boa Vista, (♀), *A. Ducke RB15225* (MG, RB); upper Rio Cupary, between Rio Xingu and Rio Tapajós, (♀), *Krukoff* 1197 (A, G, K, NY, P, S, U); Almeirim, Rio Jarí, Estrada de Monte Dourado ao Planalto, (♀), *E. Oliveira* 3915 (IAN, NY); Juruti, estrada Mutum, próximo a fazenda Maçaranduba, (♀), *M. B. Ramos et al.* 480 (INPA); Tucuruí, área de desmatamento, PA-263, ramal da massa falida, km 10, (♀), *J. Ramos* 1177 (NY); Tucuruí, margem direita do Rio Tocantins, (♀), *M. F. Silva et al.* 359 (HAMAB, IAN, INPA, MBM, MG); Rio Jarí, Tinguelin km 17, (♀), *N. T. Silva* 3018 (IAN); Rio Negro, (♀), *Ule* 8839 (K, MG).—RONDÔNIA: Porto Velho to Cuiabá highway, vicinity Santa Barbara, 15 km east of km 117, (♂), *G. T. Prance & J. F. Ramos* 7160 (F, GH, INPA, K, MG, NY, P, R, S, U, US).—RORAIMA: Caracará, Próximo a Vila de Caicubi, (♂), *Soler & Barbosa* 105 (IAN, SP, RB). **Colombia.** AMAZONAS: Tarapacá, camino hacia la pista antigua, 02°54'41"S, 69°44'43"W, (♀), *I. Montero et al.* 2001 (COAH).—VAUPES: Estación Biológica Caparú, within 3 km of the north bank of Lago Taraira, 01°00'S, 69°49'W, (♀), *Defler* 381 (COAH, MO); Estación Biológica Caparú, within 3 km of the north bank of Lago Taraira, 01°00'S, 69°49'W, (♀), *Defler* 382 (MO); Estación Biológica Caparú, within 3 km of the north bank of Lago Taraira, 01°00'S, 69°49'W, (♀), *Defler* 383 (MO). **French Guiana.** CAYENNE: Saint Élie, Piste de St Elie Sw Sinnahary, (♀), *Alexandre* 457 (CAY); Route de Cayenne km 14, côté gauche et à 150 m de la route, (♂), *BAFOG* 7745 (P, NY); Montagne

Bellevue de l'Inini, (♀), *Granville 8093* (U); Sinnamary, Fleuve Sinnamary Petit Saut-Bassin du Sinnamary, (♂), *Sabatier & Prevost 2209* (CAY, NY, P, U).—SAINT-LAURENT-DU-MARONI: Charvein-Acarouany road, (♀), *BAFOG 93-M* (CAY, NY, P, U); Saint Laurent, (♀), *BAFOG 7087* (CAY, NY, P, U); Charvein (♀), *Benoist 341* (P); Montagne Bellevue de l'Inini, zone centrale, (♀), *Granville et al. 8093* (B, BG, BR, CAY, MO, MG, INPA, P, U, VEN); Acarouany, (♀), *Sagot 972* (B, BR, F, G, K, P, S, U); Acarouany, 1856 (♀), *Sagot s.n.* (P, U0157836); Godebert, (♂), *Wachenheim 271* (P). **Guyana.** UNKNOWN DISTRICT: Agricole & Forestier, (♀), *Bureau s.n.* (P).—POTATO-SIPARUNI: Iwokrama Reserve, Essequibo River, Lady Smith Creek transect, 04°17'N, 58°30'W, (♀), *Mutchnick 850* (US).—UPPER TAKUTU-UPPER ESSEQUIBO: South Kassikaityu R, transect from S. Kassikaityu R. to Wassarai Mts, (♂), *Clarke et al. 7907* (NY, U); South Kassikaityu R, transect from S. Kassikaityu R. to Wassarai Mts, (♂), *Clarke et al. 8849* (NY); Kanuku, 03°08'N, 59°23'W, (♀), *Jansen-Jacobs et al. 329* (MO, P, U); Makarapan, trail from abandoned Balata Bleeders' camp to top of Mt. Makarapan, (♀), *P. J. M. Maas et al. 7558* (NY, U). **Suriname.** BROKOPONDO: Bosreservaat Brownsberg, (♂), *Boswezen (B. W.) 3255* (NY, U); Brownsberg, Arbor n° 55, (♂), *Boswezen (B. W.) 3302* (B, F, MO, P, U); Bosreservaat Brownsberg, (♂), *Boswezen (B. W.) 4010* (COL, U, UC); Bosreservaat Brownsberg, (♀), *Boswezen (B. W.) 5390* (F, RB, U); Bosreservaat Brownsberg, (♂), *Boswezen (B. W.) 6509* (U).—PARAMARIBO: Fallawatra, (♀), *Jimenez-Saa 1563 = L. B. B. (= 's Lands Bosbeheer Suriname) 14296* (NY, U).—SIPALIWINI: Vicinity of Ulemari River, 99 km upstream from its confluence with Litani River, 02°58'18"N, 54°33'14"W, (♀), *Evans & Peckham 2858* (MO); Wilhelmina Mts., Zuid Rivier, 03°10'N, 56°29'W, (♀), *Irwin et al. 55576* (B, FHO, GH, M, MO, NY, U, US); Zuid Rivier, 03°10'N, 56°29'W, (♀), *Irwin et al. 55884* (FHO, GH, NY, S, U, US); Kayser Mountains, 330 kms SSW of Paramaribo, (♀), *S. A. Mori & Bolten 8535* (F, NY, U, US); Kayser Mountains, 330 kms SSW of Paramaribo, (♀), *S. A. Mori & Bolten 8589* (F, MO, NY,

U).—NICKERIE: Sectie O, (♀), *Stahel 123B* (U); Sectie O, (♀), *Stahel (Woodherb. Sur.) 166A* (U).

Pourouma villosa belongs to the group of species with palmatilobed lamina with adaxial surface smooth, and staminate inflorescence in fascicles. Our molecular analyses results (Chapter 1, Fig. 5) provide a moderate support to *Pourouma velutina* within clade V (*P. amacayacuensis*, *P. bicolor*, *P. cecropiifolia*, *P. cucura*, *P. velutina*, and *P. villosa*).

This clade displays as synapomorphies the staminate inflorescences in fascicles and staminate flowers with tepals free or basally connate. *Pourouma villosa* arose more closely related to *P. cucura* (BP = 85, PP = 0.95).

Morphologically, this species distinguished from *Pourouma cucura* by adaxial lamina surface smooth (versus scabrous), staminate flowers 1.5–2.2 mm long (versus, 1–1.2 mm long), and fruiting perianth up to 2.2 cm long (versus 1.5 cm long).

Moreover, *Pourouma villosa* shows similarities with *P. triloba*, due to the palmatilobed lamina with 3-5 lobes and adaxial lamina surface smooth, but distinguished by staminate inflorescence in fascicles (versus glomerules), and staminate flowers with tepals free or basally connate (versus connate).

The types collection of *Pourouma villosa* and *Pourouma laevis* are very similar. These collections present leafy twigs with indument sparse, yellowish to whitish, villous to hirsute, concentrated on the scars of stipules, contrasting with many collections (e.g., Gaglioti et al. 162); of *Pourouma villosa* with indument dense, yellowish to whitish, villous to hirsute on the leafy twigs. Nevertheless, during the field trip to Amapá (Brazil), we observed this phenotypic plasticity within populations of this species.

DOUBTFUL AND EXCLUDED NAMES

Pourouma paraensis Huber, label name (= *Pourouma melinonii*); refers to *Goeldi MG7732*.

Pourouma retusa Benthham, label name; syntype collection of *Pourouma tomentosa*; refers to *Spruce s.n.*

Pourouma trianae A. Richter, label name (= *Pourouma cecropiifolia*); refers to *Triana 862*.

Pourouma ulei Warburg ex Ule, nomen nudum, in Ule (132: 1907); (= *Pourouma cecropiifolia*).

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NUMERICAL LIST OF SPECIES

1. *P. acuminata*
2. *P. amacayacuensis*
3. *P. apaporiensis*
4. *P. apiculata*
5. *P. bergii*
6. *P. bicolor*
7. *P. bolivarensis*
8. *P. cecropiifolia*
9. *P. chocoana*
10. *P. cordata*
11. *P. cucura*
12. *P. cuspidata*
13. *P. digitata*
14. *P. elliptica*
15. *P. essequiboensis*
16. *P. ferruginea*
17. *P. floccosa*
18. *P. formicarum*
19. *P. guianensis*
20. *P. herrerensis*
21. *P. hirsutipetiolata*
22. *P. hispida*
23. *P. maroniensis*
24. *P. melinonii*
25. *P. minor*
26. *P. mollis*
27. *P. montana*
28. *P. myrmecophila*
29. *P. napoensis*
30. *P. oraria*
31. *P. ovata*
32. *P. persecta*
33. *P. petiolulata*
34. *P. phaeotricha*
35. *P. saulensis*
36. *P. scobina*
37. *P. stipulacea*
38. *P. tessmannii*
39. *P. tomentosa*
40. *P. triloba*
41. *P. velutina*
42. *P. venezuelensis*
43. *P. villosa*

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1. Pourouma acuminata Mart. ex Miq.

Venezuela. BOLÍVAR: Município de Foráneo Aripao, Caño Fatua, (st), *Aymard et al.* 6778 (BG).

3. Pourouma apaporiensis Cuatrec.; cited as *Pourouma melinonii* Benoist subsp. *glabrata* C. C. Berg & Heusden

Colombia. ANTIOQUIA: Border between departamentos Antioquia an Bolívar, 38 km W of Barrancabermeja, 6°55'N, 74°15'W, (st), *Bruijn 1546* (F, M, MO, NY, S, U, US, VEN); Border between departamentos Antioquia an Bolívar, 38 km W of Barrancabermeja, 6°55'N, 74°15'W, (st), *Bruijn 1555* (F, M, MO, NY, S, U, US, VEN).

4. Pourouma apiculata Spruce ex Benoist; cited as *Pourouma tomentosa* Miq. subsp. *apiculata* (Benoist) C.C. Berg & Heusden

Brazil. AMAZONAS: Manaus, Estação Experimental de Silvicultura Tropical, ZF2, (st), *M. C. Lemos 263* (INPA); Tefé, (st), *W. A. Rodrigues & L. Coêlho 1434* (INPA).—MATO GROSSO: Aripuanã, (st), *M. Gomes & Mota 826* (INPA); Aripuanã, (st), *M. Gomes & Mota 1517* (INPA); Aripuanã, (st), *M. Gomes & Mota 1540* (INPA); Aripuanã, (st), *M. Gomes & Mota 1588* (INPA); Aripuanã, (st), *M. Gomes & Mota 1598* (INPA); Aripuanã, (st), *M. Gomes & Mota 1604* (INPA);

Aripuanã, (st), *M. Gomes & Mota 1610* (INPA); Aripuanã, (st), *M. Gomes & Mota 1679* (INPA).

Peru. LORETO: Province of Maynas, Rio Nanay, Mishana, (st), *Gentry et al. 39264* (BG, MO).

6. *Pourouma bicolor* Mart.; cited as *Pourouma bicolor* Martius subsp. *bicolor*

Brazil. ACRE: Upper Rio Moa, Fazenda Arizona, (st), *Campbell et al. 6650* (BG).—AMAZONAS: Manaus, Distrito Agropecuário da SUFRAMA Rodovia BR-174, Fazenda Dímona, 02°19'S, 60°05'W, (st), *J. R. M. Nascimento et al. INPA/WWF2206.3265* (INPA); Manaus, Reserva Florestal Ducke, (st), *W. A. Rodrigues 9206* (INPA).—MATO GROSSO: Aripuanã, Núcleo do Aripuanã, 4–7–2, (st), *J. P. L. Damião et al. 1805* (INPA); Aipuanã, (st), *M. Gomes & Mota 786* (INPA); Aipuanã, (st), *M. Gomes & Mota 843* (INPA); Aipuanã, (st), *M. Gomes & Mota 966* (INPA); Aipuanã, (st), *M. Gomes & Mota 979* (INPA); Aipuanã, (st), *M. Gomes & Mota 1052* (INPA); Aipuanã, (st), *M. Gomes & Mota 1072* (INPA); Aipuanã, (st), *M. Gomes & Mota 1079* (INPA); Aipuanã, (st), *M. Gomes & Mota 1088* (INPA); Aipuanã, (st), *M. Gomes & Mota 1123* (INPA); Aipuanã, (st), *M. Gomes & Mota 1176* (INPA). **Colombia.** ANTIOQUIA: Confluence of Ríos Ité and Tamar into Río Cimatarrá, ca. 38 km W of Barrancabermeja, 06°55'N, 74°15'W, (st), *Bruijn 1516* (F, M, MO, NY, S, U, US, VEN). **Ecuador.** NAPO: 5 km N of Coca, on Coca-Lago Agrio rd., 00°24'S, 76°59'W, (st), *Brandbyge et al. 30194* (AAU, MBM, MO, NY); El Chunchu, Estación INIAP, (st), *Palacios 2059* (BG). **Suriname.** NICKERIE: area of Kabalebo Dam project, (st), *Lindeman & Roon 842b* (U). **Venezuela.** AMAZONAS: cerro Neblina, projecto base camp, just east of camp along "Bongo Trail, 00°50'N, 66°10'W, (st), *Croat 59353* (MO); Departamento Rio Negro, close to Cerro de La Neblina Base Camp, on Río Mawarinuma, 00°50'N, 66°10'W, (st), *Liesner 15681* (BG, MO, NY).—BOLÍVAR: Región de Cermón, Río Chizca, Urimán, (st), *Bernardi 910* (NY, VEN); slopes of Quebrada O-poru-má, between Santa

Teresita de Kavanayen and Rio Pacairao, tributary of Rio Mouak, (st), *Steyermark 60401* (F); Cerro Venamo, lower SW slopes of Chimanta-tepui, Torono-tepui, nr. Rio Tirica, (st), *Steyermark 75540* (F, NY, VEN); frontier Venezuela-Brazil, NE of Serrania Pia-soi, (st), *Steyermark 90644* (VEN).

8. *Pourouma cecropiifolia* Mart.

Colombia. PUTUMAYO: Alta cuenca del Río Uchupayaco, al suroeste de Puerto Limón, (st), *Schultes 3343* (F). **Peru.** HUÁNUCO: Tingo Maria, (st), *Ellenberg 2288* (U).— MADRE DE DIOS: Rio Manu, Cocha Cashu Station, (st), *R. B. Foster 7001* (F). **Venezuela.** AMAZONAS: Cerro Duida, base of Duida, (st), *Fariñas et al. 347* (NY, VEN, U); Depto. Atapabo, nr. Culebra, Rio Cunucunuma, (st), *Steyermark et al. 129163* (BG, VEN)

9. *Pourouma chocoana* Standl.; cited as *Pourouma bicolor* Mart. subsp. *chocoana* (Standl.) C.C. Berg & Heusden

Colombia. ANTIOQUIA: Quibdó-Tutunendo road ca. 3 km W of Tutunendo, (st), *Gentry et al. 30278* (MO, U).— VALLE DEL CAUCA: Rio Caiambre, Silva, (st), *Cuatrecasas 17451* (F); Rio Caiambre, Silva, (st), *17479* (F), Bajo Calima, ca. 15 km N of Buenaventura, 03°54'N, 77°08'W, (st), *Gentry et al. 40479* (BG, MO). **Panama.** UNKNOWN PROVINCE: (st), *Hayes s.n.* (NY).— PANAMA: Armour Trail, (st), *Croat 8648* (MO); Barbour Trail, (st), *Croat 10343* (MO); Sannon Trail, (st), *Croat 10830* (MO); Gamboa, off Navy Pipeline Rd. beyond tower, (st), *R. B. Forster & Haines 584* (NY); Barro Colorado Island, (st), *Kenoyer 312* (US); Barro Colorado Island, (st),

Shattuck 260 (A, F, MO); N of Frijoles, (st), *Standley 27479* (US); N of Frijoles, (st), *Standley 27502* (US).

11. *Pourouma cucura* Standl. & Cuatrec.

Brazil. ACRE: Reserva INCRA Santa Luzia, km 40, BR-364, (st), *Campbell et al. 6927* (BG).—AMAPÁ: Serra do Navio, Pôrto Platon, (st), *Rosa 1091* (MG); Serra do Navio, Pôrto Platon, (st), *Rosa 1159* (MG).—AMAZONAS: Reserva Florestal Ducke, estrada Manaus-Itacoatiara km 26, (st), *A. A. Oliveira INPA60534* (INPA); estrada Manaus-Itacoatiara, km 135, (st), *W. A. Rodrigues 8066* (INPA).—MATO GROSSO: Aripuanã, (st), *M. Gomes et al. 614* (INPA); Aripuanã, (st), *M. Gomes et al. 844* (INPA); Aripuanã, (st), *M. Gomes et al. 1040* (INPA). **Ecuador.** NAPO: Rio Cuyabeno, 00°10'S, 75°55'W, (st), *Berg & Akkermans 1070* (U). **Peru.** LORETO: Río Nanay, Puerto Almendras, (st), *Gentry et al. 24900* (U); Río Nanay, halfway between Iquitos and Santa Maria de Nanay, (st), *Gentry et al. 25050* (MO, U); Río Nanay, halfway between Iquitos and Santa Maria de Nanay, (st), *Gentry et al. 25100* (U); Río Yaguasyacu, nr. Brillo Nuevo, (st), *Plowman et al. 6906* (F, GH).—MADRE DE DIOS: Tambopata, (st), *Gentry et al. 45922* (BG); Tambopata, Tourist Camp at junction of Rios Tambopata and La Torre, 12°49'S, 69°43'W, (st), *Gentry et al. 51177* (MO).

12. *Pourouma cuspidata* Mildbr.

Brazil. ACRE: Reserva INCRA Santa Luzia, km 40, BR-364, (st), *Campbell et al. 6834* (BG).—**Ecuador.** NAPO: Añangu, (st), *SEF 8532* (U). **Peru.** Pasco: Prov. Oxapampa, Rio Iscozacin, Cabeza de Mono, (st), *Gentry et al. 41890* (BG, MO).

13. *Pourouma digitata* Trécul; cited as *Pourouma bicolor* Mart. subsp. *digitata* (Trécul) C.C. Berg & Heusden

French Guiana. CAYENNE: upper Oyapock R., Zidock ville, (st), *Grenand 1442* (CAY, U); Rive G. du Yaroupi, env. 8 Km em aval de Sault Tainoua, (st), *Oldeman 3115* (CAY, P, U); Cayenne, Piste de St Elie, Km 15,7 Chabilis, (st), *Riera 206* (CAY, U). **Suriname.** BROKOPONDO: Watramiri, (st), *Boswezen (B. W.) 2030* (U); Bosreservaat Kaboerie Boomnummer, (st), *Boswezen (B. W.) 4866* (U); 2 km S of Gansee, (st), *Donselaar 1262* (U); W bank of Marowijne Creek, near Gran Dam, (st), *Donselaar 3333* (U); Lely Mts., E rd. on plateau 1, (st), *Lindeman et al. 539* (U); Distr. Nickerie, area of Kabalebo Dam project, 4 km NW of rd., km 39.5, (st), *Lindeman & Roon 750* (U); Distr. Saramacca, nr. Groningen, (st), *Lindeman 5468* (U); Rikanau prope Moengo, (st), *Lindeman 6123* (U); Rikanau prope Moengo (st), *Lindeman 6166* (U); Jodensavanne Mapane Kreek area, Suriname R., (st), *Lindeman 6765* (U); Sipaliwini area, Brazilian frontier, 2.5 km S of Sipaliwini R., (st), *Oldeburger et al. 1406* (U). **VENEZUELA.** AMAZONAS: Near Cerro de La Neblina Base Camp, 19 Abr 1984 (st), *Gentry et al 46752* (BG).

15. *Pourouma essequiboensis* Standl.; cited as *Pourouma tomentosa* Miquel subsp. *essequiboensis* (Standley) C.C. Berg & van Heusden

Brazil. AMAZONAS: Manaus, Estrada Manaus-Itacoatiara, Km 190, Km 190, (st), *W. A. Rodrigues 8065* (INPA).

19. Pourouma guianensis Aubl.; cited as *Pourouma guianensis* Aublet subsp. *guianensis*

Brazil. AMAPÁ: unknown locality, (st), *Bastos 2051* (IAN, RB).—AMAZONAS: Rio Antimari, (st), *Huber MG4244* (MG); Município de Coari, Rio Coari, (st), *Magnago et al. INPA58046* (INPA); Manaus-Itacoatiara rd., km 27, Reserva Florestal Ducke, (st), *Mello INPA57509* (INPA); Nova Olinda do Norte, Rio Canumã, (st), *O. P. Monteiro 1295* (INPA); Manaus, Rodovia BR 174, Km 57. Reserva Biológica do INPA, BR174, km 44, EEST, (st), *C. D. A. Mota 740* (INPA); km 26, (st), *J. R. Nascimento 303* (INPA); Reserva Florestal Ducke, (st), *J. R. Nascimento 387* (INPA); Manaus, Reserva Florestal Ducke, Reserva Florestal Ducke, (st), *W. A. Rodrigues 9204* (INPA); Reserva Florestal Ducke, (st), *W. A. Rodrigues 9219* (INPA).—BAHIA: unknown locality and date, (st), *Allemão et al. 446* (R).—PARÁ: Belém, (st), *Huber 4244* (MG); Rio Pacaja and Muirapiranga, Km 1,5 line SW of Ilha do Breu, (st), *G. T. Prance et al. 1379* (IAN, NY); Gleba Bacaja, just below mouth of Rio Bacaja, (st), *G. T. Prance et al. 26375* (MG, NY, U).—PARANÁ: Pôrto de la Cima, (st), *Dusén 11942* (S); Jacarehy, (st), *Dusén 17239* (F, NY, S); Morretes, 1904 (st), *Dusén s.n.* (S); Morretes, 14 Jul 1911 (st), *Dusén s.n.* (F-145967, GH, NY-00402096, S).—RIO DE JANEIRO: Palmeiras, (st), *Glaziou 8935* (E, P); Serra dos Orgãos, Tabuinha, (st), *Glaziou 12173* (P). **Colombia.** AMAZONAS: Puerto Lopez, (st), *Little Jr. et al. 8423* (F). **Ecuador.** ORELLANA: Along the Río Indillama, a southern tributary of the Río Napo, 00°30'S, 76°40'W, (st), *Neill et al. 10205* (NY). **French Guiana.** CAYENNE: Oyapock R., Trois Sauts, (st), *Grenand 445* (CAY); Zidock Ville, (st), *Grenand 1352* (CAY). **Guyana.** CUYUNI-MAZARUNI: Kartabo region, Kartabo, (st, juv), *Bailey 18* (GH); Kartabo region, Kartabo, (st, juv), *Bailey 19* (GH); Kartabo region, Kartabo, (st, juv), *Bailey 20* (GH); Kartabo region, Kartabo, (st, juv), (st), *Bailey 146* (GH); Kartabo region, Kartabo, (st, juv), *Bailey 147* (GH); Mazaruni Station, (st, juv), *Forest Department British Guyana (FD) 4970* (U); Mazaruni Station, (st), *Forest Department British*

Guyana (FD) 5011 (U); 11/2 mile along Bartica-Potaro rd., (st, juv), *Forest Department British Guyana (FD) 6914 (U)*.—POTARO-SIPARUNI: Tumatumari, (st), *Gleason 174 (GH, NY)*.—POMEROON-SUPENAAM: Pomeroon district, Kamwatta, (st), *Cruz 1175 (NY)*. **Peru.** LORETO: Requena, Genaro Herrera, Río Ucayali below Requena, (st), *Gentry et al. 21205 (MO, U)*; Maynas, Quebrada Tamshiyacu E of Tamshiyacu below Serafin Filomeno, (st), *Gentry et al. 27799 (MO)*; Province of Maynas, Yanamono Explorama Tourist Camp, (st), *Gentry et al. 43066 (BG)*; Parque Nacional del Manu, Río Manu, Cocha Cashu Station, (st), *R. B. Foster et al. 6568 (F)*; Río Tambopata, at mouth of Rio D'Orbigny, (st), *Gentry et al. 31816 (U)*; Río Tambopata, at mouth of Rio D'Orbigny, (st), *Gentry et al. 31933 (U)*.—PASCO: Province of Oxapampa, Vivero, Puerto Bermudez, (st), *Gentry et al. 42029 (BG, MO)*. **Venezuela.** AMAZONAS: Rio Manavicke, Indian village "Kalchi-Teri," without date (st, juv), *Lizot s.n. (VEN)*.—BOLÍVAR: Reserva Florestal La Paragua, Río Asá, (st, juv), *Blanco 810 (VEN)*; east of Cerro El Picacho, N of Las Nieves and Las Chicharras, (st), *Steyermark 89134 (NY, VEN)*.—DELTA AMACURO: Río Amacuro, Venezuela-Guyana frontier, Imataca Mts., downstream from San Victor, (st), *Steyermark 87307 (NY, VEN)*.

23. *Pourouma maroniensis* Benoist

Brazil. AMAPÁ: Serra do Navio, (st), *W. A. Rodrigues 2986 (INPA)*; Serra do Navio, (st), *W. A. Rodrigues 2987 (INPA)*. **French Guiana.** CAYENNE: Cayenne, (st), *Forest Department British Guyana (FD) 526 (U)*.—SAINT-LAURENT-DU-MARONI: Saül, Lararé, Aratraye. Chablis, (st), *Riera 723 (CAY, P, U)*. **Suriname.** MAROWIJNE: Moengo, (st), *'s Lands Bosbeheer (B. B. S.) 298 (U)*; Gansee, (st), *Donselaar 1226 (U)*; Lely Mts., (st), *Lindeman et al. 701 (U)*.

24. *Pourouma melinonii* Benoist; cited as *Pourouma melinonii* Benoist subsp. *melinonii*

Brazil. AMAZONAS: Estrada Manaus-Itacoatiara, Reserva Ducke, (st), *F. Mello INPA55444* (INPA).—PARÁ: Mocambo, Embrapa Forest Reserve, ca. 10km from Belém, 01°30'S, 47°59'W, (st), *Gentry 49026* (MO); Mocambo, Embrapa Forest Reserve, ca. 10km from Belém, 01°30'S, 47°59'W, (st), *Gentry 49127* (IAN, MO). **French Guiana.** Bolateé Creek, (st), *BAFOG 4272* (CAY, P, U). piste de St. Elie, (st), *Sabatier 51* (CAY). **Suriname.** SIPALIWINI: Jodensavanne, (st), *L. B. B. (= 's Lands Bosbeheer Suriname) 8976* (F, U). **Venezuela.** AMAZONAS: Merida, Río Chirea Urimán, (st), *Bernardi 902* (NY, VEN); Base of Cerro Duida, (st), *Farinas et al. 490* (NY, U, VEN).

25. *Pourouma minor* Benoist

Brazil. ACRE: Upper Rio Moa, Fazenda Arizona, (st), *Campbell et al. 6250* (BG). Serra do Navio, Contagem entre Porto Platon e Serra do Navio, (st), *Rosa 1265* (MG).—AMAPÁ: **Peru.** PANDO: Nicolas Suarez, km 17 carretera Cobija a Campoana, (st), *Meneces 613* (MG, MO).—AMAZONAS: Manaus-Itacoatiara rd., Reserva Florestal Ducke, 6 Aug 1976 (st), *Aluisio INPA70809* (INPA); Rio Jurua, Sta. Rosa, (st), *D. Coelho et al. INPA51350* (INPA); Rio Jurua, Sta. Rosa, (st), *D. Coelho & Aniceto INPA52381* (INPA); Tefé, (st), *W. A. Rodrigues & L. Coelho 1424* (INPA).—MATO GROSSO: Aripuanã, (st), *M. Gomes et al. 547* (INPA), *593* (INPA), *632* (INPA), *635* (INPA), *646* (INPA), *655* (INPA), *673* (INPA), *690* (INPA), *759* (INPA), *789* (INPA), *810* (INPA), *813* (INPA), *838* (INPA), *872* (INPA), *891* (INPA), *924* (INPA), *926* (INPA), *931* (INPA), *933* (INPA), *955* (INPA), *1033* (INPA), *1118* (INPA), *1120* (INPA), *1129* (INPA), *1156* (INPA), *1175* (INPA), *1255* (INPA), *1319* (INPA), *1336* (INPA), *1338* (INPA),

1356 (INPA), 1378 (INPA), 1419 (INPA), 1423 (INPA), 1425 (INPA), 1444 (INPA), 1446 (INPA), 1534 (INPA), 1568 (INPA), 1570 (INPA), 1577 (INPA), 1584 (INPA), 1593 (INPA), 1594 (INPA), 1595 (INPA), 1636 (INPA), 1640 (INPA), 1641 (INPA), 1692 (INPA), 1731 (INPA), 1745 (INPA), 1769 (INPA), 1822 (INPA), 1823 (INPA), 1867 (INPA), 1893 (INPA), 1917 (INPA), 1983 (INPA). **Ecuador.** MORONA-SANTIAGO: nr. Bomboiza, (st), *Shakaim RBAE-26* (BG, NY).—NAPO: Rd. Coca-Lago Agrio, 9 km NE of Rio Coca, (st), *Brandbyge et al. 30252* (AAU); Guayusa, 2 hr upstream Rio Coca from Coca, (st), *Brandbyge et al. 30327* (AAU); San José de Payamino, 40 km W of Coca, (st), *Irvine et al. 829* (F); Añangu, (st), *SEF 8617* (U); Añangu, (st), *SEF 9033* (U).—ZAMORA-CHINCHIPE: Pachicutza, 70 km NE de Zamora, (st), *Little Jr. et al. 349* (COL). **French Guiana.** CAYENNE: Cayenne, (st), *Feuillet 1070* (U); between Saut Emerillon and Etats-Unis, (st), *Granville 581* (CAY, P, U); Cayenne, Riv. Arartaye, Saut Pararé, Station Muséum, (st), *Granville 5642* (U); upper Approuage R., Creek Parépou, (st), *Oldeman 2504* (CAY, NY, P, U); Approuage R., Pierrette, (st), *Oldeman 2821* (CAY, P).—SAINT-LAURENT-DU-MARONI: Saint Jean de Maroni, (st), *Garnier 112* (CAY); Godebert, (st), *Wachenheim 18* (P). **Nicaragua.** Matagalpa, near Caño Chontaleno, 20 km northeast of El Castillo, (st), *Neill 3389* (MO). **Panama.** COCLE: El Copé, (st), Folsom et al. 6469 (U). SAN BLAS: Cerro San José, Yar Birea, (st), *Nevers et al. 6997* (MO). **Peru.** Leoncio Prado, Dist. Rupa Rupa, Bosque Estacion Experimental Agricola-Tingo Maria, (st), *Vasquez A. et al. 17* (F). **Suriname.** NICKERIE: area of Kabalebo dam project, distr. Nickerie, ca. 20 km sw of Avanavero, (st), *Heyde & Lindeman 32* (RB, MG, U); 4 km NW van monding Paris Jacobkreek, Nickerie rivier, (st), *Maas et al. (LBB) 11027* (U); Tapanahony R, bij Paloemeu-mond, (st), *Schulz 8161* (U). **Venezuela.** BOLÍVAR: Río Karuai, at base of Sororopán-tepui, west of La Laja, (st), *J. A. Steyermark 60800* (F);

26. *Pourouma mollis* Trécul; cited as *Pourouma mollis* Trécul subsp. *mollis* (Berg et al. 1990: 156).

Brazil. AMAPÁ: Município de Serra do Navio, (st), *W. A. Rodrigues 2984* (INPA); between Pórto Platon and Serra do Navio, (st), *Rosa 1158* (MG).—PARÁ: Santa Isabel, (st), *Goeldi MG7773* (MG). **French Guiana.** Cayenne, ENE du Grand Croissant, Haute Crique Nouciri affluent de l'Cyapock, N de Camopi, (st), *Cremers 8271* (P, U); Cayenne, piste de St. Elie, km 16, (st), *Riera 573* (CAY, U). **Guyana.** UPPER TAKUTU-UPPER ESSEQUIBO: Essequibo R., nr. Rockstone, (st, juv), *Gleason 670* (GH, NY, US). **Suriname.** BROKOPONDO: Peninica Creek, (st), 's Lands Bosbeheer (*B. B. S.*) *1128* (U); Brokopondo, 1,5 km W of village Gansee, (st), *Donselaar 1373* (U); Brokopondo, 8 km ESE of village Brownsweg, (st), *Donselaar 1681* (U); Brokopondo, 4 km ESE of village Brownsweg, (st), *Donselaar 2924* (U); Brokopondo, W bank of Marowijne Creek, near Gran Dam, (st), *Donselaar 3788* (U).—NICKERIE: Sectie 0, (st), *Boswezen (B. W.) 2410* (NY, U).—SIPALIWINI: Jodensavanne Mapane Kreek area, (st), *Lindeman 3631* (U); Jodensavanne Mapane Kreek area, (st), *Lindeman 3989* (U); Jodensavanne Mapane Kreek area, (st), *Lindeman 6923* (U); Nickerie, area of Kabalebo Dam project, (st), *Lindeman (LBB) 9199* (U).

31. *Pourouma ovata* Trécul

Brazil.—AMAZONAS: Manaus, Reserva Florestal Ducke, 27 Nov 1957 (st), *D. Coêlho & Aniceto INPA5979* (INPA).

36. *Pourouma scobina* Benoist; cited as *Pourouma bicolor* Martius subsp. *scobina* (Benoist)
C.C. Berg & van Heusden

Costa Rica. HEREDIA: Puerto Viejo, Rio Sarapiquí, (st), *Hartshorn 1348* (F). **Ecuador.** EL ORO: Piedras, (st), *E. L. Little Jr. 6640* (F, US).—ESMERALDAS: Quinde, trip 7 km e up Rio Blanco, (st), *E. L. Little Jr. 6258* (F, UC, US).—IMBABURA: Collapi, (st), *Acosta-Solis 12884* (F).—LOS RIOS: Rio Palenque Biological Station, (st), *Dodson 6156* (MO); Rio Palenque Biological Station, (st), *Dodson & Gentry 6312* (MO). **Guatemala.** IZABAL: Entre Rios, (st), *Standley 72667* (F); Virginia and Lago Izabal, Montaña del Mico, (st), *Steyermark 38916* (F). **Honduras.** ATLANTIDA: San Alejo, near Río San Alejo, (st), *Standley 7878* (F); Lancetilla Valley, near Tela, (st), *Standley 52900* (A, F, US). **Nicaragua.** ATLÂNTICO NORTE: Puerto Cabezas, (st), *Englesing 52A* (F).—ATLÂNTICO SUR: between Bluefields and Ginney Point, (st), *Molina R. 1963* (F, GH); El Recreo-El Pijibaye rd., (st), *Standley 19904* (F); rd. to Colonia Manantiales, S of ridge of Serranias de Yolania, (st), *Stevens 4839* (BG). **Panama.** COLON: between Cerro Pierre and Piji Vasal, (st), *Folsom 6377* (MO); 5 km N.W. of Cocalito, (st), *Garwood 759* (F).—PANAMA: Cerro Azul, (st), *Croat 11591* (F, MO); Cangandi, 09°24'N, 75°24'W, (st), *Nevers & Herrera 7178* (BG, MO); Cangandi, Hills near Village, 09°24'N, 75°24'W, (st), *Nevers et al. 7542* (BG, MO). **Peru.** LORETO: Province of Maynas, Yanamono Explorama Tourist Camp, (st), *Gentry et al. 42168* (BG).

39. *Pourouma tomentosa* Mart. ex Miq.; cited as *Pourouma tomentosa* Miquel subsp. *tomentosa*

Brazil. AMAZONAS: Manaus-Itacoatiara road, km 26 (st), *L. Coelho INPA5223* (INPA); Reserva Florestal Ducke, trilha leste oeste, (st), *Haroldo INPA57512* (INPA); Manaus, Distrito Agropecuário, Reserva 1501 (km 41), 02°24'26"S, 59°43'40"W, (st), *F. Mello INPA55388*

(INPA). **Peru.** PASCO: Oxapampa, Cabreza de Mono, Río Iscozacín, (st), *Gentry et al.* 41894 (MO). **Venezuela.** AMAZONAS: Conuco, 01°56'N, 67° 04'W, (st), *Liesner* 4105 (MO, U).

40. *Pourouma triloba* Trécul; cited as *Pourouma mollis* Trécul subsp. *triloba* (Trécul) C.C. Berg & van Heusden

Brazil. ACRE: Upper Rio Moa, nr. Fazenda Arizona, (st), *Campbell et al.* 8383 (BG). **Peru.** LORETO: Yanamono Explorama Tourist Camp, (st), *Gentry et al.* 42232 (BG); Yanamono Explorama Tourist Camp, (st), *Gentry et al.* 42793 (BG).—MADRE DE DIOS: Rio Manu, Cocha Cashu Station, (st), *R. B. Foster et al.* 6569 (F).—HUÁNUCO: Tingo Maria, (st), *Ellenberg* 2297 (U).

41. *Pourouma velutina* Mart. ex Miq.

Brazil. AMAZONAS: Manaus-Itacoatiara rd., km 26, (st), *J. R. Nascimento* 262 (INPA).—BAHIA: Una, Rod. São Jose-Buerarema to Una, km 19, (st, juv.), *Berg* 1143 (NY, U).—MATO GROSSO: Aripuanã, (st), *M. Gomes et al.* 1021 (INPA); Aripuanã, Núcleo do Aripuanã, (st), *M. Gomes et al.* 1196 (INPA); Aripuanã, INPA, Humboldt, Núcleo de Pesquisa INPA/ARIPUANÃ, (st), *Rylands* 59 (INPA). **Suriname.** PARAMARIBO: Bosreservaat Sectie O, (st), *Bureau* 1368 (U); Jodensavanne Mapane Kreek area, (st), *Lindeman* 4057 (U); Jodensavanne Mapane Kreek area, (st), *Lindeman* 4794 (U); hoog bos op Kreekhelling achter basis kamp van Suruco, (st), *Lindeman* 6418 (U).

42. *Pourouma venezuelensis* Cuatrec.; cited as *Pourouma guianensis* Aublet subsp. *venezuelensis* (Cuatrecasas) C.C. Berg & van Heusden (Berg et al. 1990: 128).

Venezuela. ARAGUA: Parque Nacional Henri Pittier, (st), *R. F. Smith V-3321* (VEN).—
YARACUNY: 7.5 km north of Salom, 10°15'N, 68°29'W, (st), *Liesner & Steyermark 12394* (MO,
U).

43. *Pourouma villosa* Trécul

Brazil. AMAPÁ: Serra do Navio, Contagem entre Porto Platon e Serra do Navio, (st), *Rosa 1126* (MG). estrada Manaus-Itacoatiara, km 26, (st), *Macedo INPA55753* (INPA). **French Guiana.** CAYENNE: Piste de St Elie, Km 16 zone de 50 ha Cayo B, (st), *Riera 301* (CAY, U); Piste de St Elie, Km 16 Chabilis WAC, Cayo B, (st), *Riera 571* (CAY, U).—SAINT-LAURENT-DU-MARONI: Marudi, Along trail from Norman Mines camp to Aishalton, Between camp & abandoned airstrip, (st), *Stoffers et al. 319* (NY, U). **Guyana.** Marudi, along trail from Norman Mines camp to Aishalton, 02°15'N, 59°10'W, (st), *Stoffers 244* (NY, U). **Peru.** LORETO: Provincia Maynas, Mishana, Río Nanay hallway between Iquitos and Santa Maria de Nanay, (st), *Gentry et al. 22460* (MO). **Suriname.** Moengo, (st), *'s Lands Bosbeheer (B. B. S.) 297* (U); Bosreservaat Brownsberg, (st), *Boswezen (B. W.) 2095* (U); Brownsweg, (st), *Donselaar 1888* (U); Lely Mts., (st), *Lindeman et al. 540* (U); Lely Mts., (st), *Lindeman et al. 790* (U); Paris Jacob Creek, (st), *P. J. M. Maas & Tawjoeran 11017* (U); Mapane Creek Area, Suriname R., (st), *Schulz 8000* (F, RB, U).

Chapter 3

**Pattern of biogeographic regionalization and biogeographical history of *Pourouma*
with comments about other genus of Cecropieae (Urticaceae)**

For submission to the journal *Journal of Biogeography*

1 **Gaglioti & Romaniuc-Neto • Biogeography of *Pourouma***

2

3 **Pattern of biogeographic regionalization and biogeographical history of *Pourouma***
4 **with comments about other genus of Cecropieae (Urticaceae)**

5

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11

1 **ABSTRACT**

2

3 **Aim** *Pourouma* is a Neotropical genus comprising 43 species, with greatest diversity of
4 species occurs within the Amazon region, mainly in lowland tropical moist forest. The
5 genus is a monophyletic lineage included in the tribe Cecropieae (Urticaceae). It is an
6 interesting model for biogeography and evolutionary studies, due to its phylogenetic
7 relationship, geographic distribution, and remarkable morphological diversity. We used
8 a time-calibrated molecular phylogeny to perform ancestral-area reconstructions for the
9 terminals analyzed, in order to: (1) infer its area of origin; (2) test whether vicariance
10 played a role in the history of lineages occupying the Neotropical region; (3) infer the
11 ages of lineages diversification.

12 **Locations** South and Central America.

13 **Methods** We analysed 24 terminals from *Pourouma* using the plastid (pt) *psbA-trnH*
14 and nuclear (nr) 26S and *FA16180b* markers. Moreover, were investigated all genera of
15 the tribe Cecropieae and four genera of other tribes of Urticaceae. Sequence data were
16 analysed using Bayesian inference and divergence time estimation method implemented
17 in the program BEAST 2.1.0. Ancestral areas were reconstructed through statistical
18 dispersal–vicariance analysis (S-DIVA) and Bayesian binary Markov chain Monte
19 Carlo (BMM) using the program RASP 3.0.

20 **Results and main conclusions** Our analyses suggest that *Pourouma* originated in
21 Boreal Brazilian region (Amazon rainforest), during Oligocene (ca. 32–35 Mya). The
22 Andean uplift has probably played a central role in the diversification of the major
23 lineages in *Pourouma* by several likely ways, during the Late Oligocene and Miocene
24 (ca. 25–10 Mya). Geologic and environmental change during Pliocene and Pleistocene

1 (ca. 5.3–0.8 Mya) might have driven to diversification of recent lineages of the genus.
2 Divergence time estimation and biogeographical reconstructions are also provided for
3 all accession of Cecropieae analyzed.

4 **Keywords** Amazon rainforest, biogeography, Cecropieae, *Cecropia*, *Coussapoa*,
5 *Myrianthus*, *Musanga*, Neotropical flora, Tropical America, Urticaceae.

8 INTRODUCTION

9
10 The Neotropical region (tropical America) is the most species rich region on Earth
11 (Antonelli & Sanmartín, 2011). This region comprises about 90,000 plant species,
12 representing 37% of the world's total (Richardson *et al.*, 2001). Many mechanisms have
13 been proposed to have played a role in the historical assembly and evolution of
14 Neotropical biodiversity (Antonelli & Sanmartín, 2011).

15 Four major geologic events were indicated by Burnham & Graham (1999) as the
16 high diversity thrusters in Neotropics: isolation between South America and Africa,
17 uplift and physiograph change, closure of the Isthmus of Panama, and quaternary climate
18 fluctuations. These events were corroborated for many botanical studies suggesting that
19 the Andean uplift was crucial for the evolution of Amazonian landscapes and
20 ecosystems, and that current biodiversity patterns were rooted deep in the pre-
21 Quaternary (Vuilleumier, 1971; Muller, 1972; Gentry, 1982; Granville, 1982; Prance,
22 1982; Frailey *et al.*, 1988; Colinvaux, 1989; Hildebrand *et al.*, 1991; Coates *et al.*, 1992;
23 Pitman *et al.*, 1993; Romaniuc-Neto, 1998; Tada *et al.*, 2003; Iturralde-Vinent, 2006;
24 Hoorn *et al.*, 2010; Rossetti *et al.*, 2013).

1 Biogeography and evolutionary studies, through of methods of time-calibrated
2 molecular phylogeny and ancestral-area reconstructions, have provided models for infer
3 events of dispersal, vicariance, extinction, diversification and occupation of lineages in
4 the Neotropics (Machado *et al.*, 2001; Datwyler & Weiblen, 2004; Sytsma *et al.*, 2004;
5 Rønsted 2005; Zerega *et al.*, 2005; Antonelli, 2009; Misiewicz & Zerega, 2012; Cruaud
6 *et al.*, 2012; Xu *et al.*, 2011; Lohmann *et al.*, 2013; Chao *et al.*, 2014; Honorio
7 Coronado *et al.*, 2014; Pederneiras, 2014).

8 Hughes (2013) remarked that future studies of Neotropical diversification will be
9 facilitated by taxonomically and genetically better sampled phylogenetic analyses, their
10 integration with paleontological, geological and ecological data.

11 Biogeography studies in Urticaceae are scarce and centered in pattern and/or
12 geographical distribution (Trécul, 1847; Weddell, 1856; Berg *et al.*, 1990; Chew, 1963;
13 Franco-Rosselli & Berg, 1997; Berg & Franco-Rosselli, 2005; Wu *et al.*, 2013;
14 Romaniuc-Neto & Gaglioti, 2010, 2014a; Pederneiras *et al.*, 2014).

15 *Pourouma* Aubl. is an interesting model for biogeography and evolutionary studies,
16 due to its phylogenetic relationship with Afrotropical genus *Myrianthus* (Chapter 1),
17 patterns of biogeographic regionalization in Neotropical region, and remarkable
18 morphological diversity.

19 *Pourouma* is a monophyletic lineage strongly supported (Bootstrap [BP] = 100 and
20 Bayesian posterior probability [PP] = 1.0) within of tribe Cecropieae included in
21 Urticaceae (Chapter 1). The genus includes 43 species (Chapter 2), occurring in
22 rainforests of Central and South America, but is absent from the Antilles. The greatest
23 diversity of species occurs within the Amazon region, mainly in lowland tropical moist
24 forest. Most of the *Pourouma* species are associated with “terra firme” (non-inundated)

1 secondary forest at elevations up to 1000 m. Some species, e.g. *P. guianensis* Aubl., are
2 pioneer and commonly found in areas disturbed of the forest. Others species, e.g. *P.*
3 *elliptica* Standl., are only found in undisturbed forest (Gaglioti & Romaniuc-Neto,
4 2014b, 2014c).

5 This is the first study in Cecropieae to provide a time-calibrated molecular
6 phylogenetic tree and ancestral area reconstructions to evaluate historical biogeography
7 of the tribe, with a focus in *Pourouma*.

8

9

10 MATERIALS AND METHODS

11

12 Taxon sampling

13 We included 42 accessions (36 taxa) in this study. The ingroup comprised all genera
14 that have been placed in Cecropieae in the most recent circumscriptions (Datwyler &
15 Weiblen, 2004; Clement & Weiblen, 2009; Wu *et al.*, 2013). Thus, the ingroup two
16 accessions each of *Musanga* (1 taxon), and *Myrianthus* (2 taxa), three of *Cecropia* (3),
17 six of *Coussapoa* (4) and 24 of *Pourouma* (20). Although 47% of *Pourouma* species
18 were sampled, remaining species were not included because fresh material was
19 unavailable and DNA extraction from herbarium material was unsuccessful.
20 Additionally, within *Pourouma* six subspecies were analysed from 24 accessions.

21 Outgroup taxa belong to four other tribes of Urticaceae and one taxon each of
22 *Boehmeria* (Boehmerieae), *Parietaria* (Parietarieae), *Pilea* (Elatostemateae), and
23 *Poikilospermum* (Urticeae) as recognized in the most recent accounts of the tribes of
24 Urticaceae (Conn & Hadiah, 2009; Wu *et al.*, 2013).

1 Taxa sampled, voucher information, and GenBank accession numbers for the three
2 data sets are listed in Appendix 1.

3 4 **DNA extraction, sequencing and editing**

5 Leaf samples were collected either in silica gel or from herbarium sheets (Appendix 1).
6 Genomic DNA was extracted from 15–20 mg of dried leaf tissue using the Qiagen
7 DNeasy plant extraction kit (Quiagen, Inc., Valencia, California, USA); or using a
8 modified CTAB (cetyltrimethylammonium bromide) method (Weiblen, 2000).

9 DNA amplification was performed in a thermocycler (Mastercycler®, Eppendorf,
10 USA). Polymerase chain reaction (PCR) amplification of the *ptpsbA-trnH* DNA region
11 was achieved in one fragment using *psbA* forward (5'-
12 GTTATGCATGAACGTAATGCTC-3') and *trnH* reverse (5'-
13 CGCGCATGGTGGATTCAACAATC-3') primers from Tian *et al.* (2009). PCR
14 amplification of the *psbA-trnH* comprised about 20 ng genomic DNA, 1 x Biolase™
15 Buffer with 1.5 mM MgCl₂ (Bioline, London, UK), 10 μM of each primer, 0.2 mM each
16 dNTPs, and 1.25 unit of Biolase™ DNA polymerase (Bioline). The reaction was
17 adjusted with ddH₂O final volume of 20 μL. The amplification profiles included an
18 initial denaturing at 94° C for 5 min, 25 cycles of 45 s at 94° C (denaturation), 45 s at
19 50° C (annealing), and 50s at 72° C extension, with a final extension of 72°C at 4 min.

20 PCR amplification of the nr26S DNA region was achieved in one fragment using
21 S26A forward (5'-GGAGGAAAAGAACTAAC-3') and 26S reverse (5'-
22 AATGGCCCACTTGGAGCTC-3') primers designed for Moraceae from Zerega *et al.*
23 (2005). Amplification of 26S included about 20 ng genomic DNA, 1x Taq buffer
24 (Qiagen) with 2 mM MgCl₂, 10 μM of each primer, 0.2 mM each dNTPs, and 1.25 unit

1 Taq polymerase (Qiagen). Thermal cycling conditions were 95°C for 1 min (initial
2 denaturing), followed by 35 cycles of 95°C for 1 min (denaturation), 48°C for 1 min
3 (annealing), and 72°C for 1 min 30 s, with a final extension of 72°C for 5min. The
4 reaction was adjusted with ddH₂O final volume of 25 µL.

5 PCR amplification of the nr*FA16180b* DNA region was achieved in one fragment
6 using *FA16180b* forward (5'-CGGACTTATGGAACCAGAGTAATTC-3') and
7 *FA16180b* reverse (5'-GATGCTTCCAGTACAATGACAACAT-3') an exon-primed
8 intron-crossing (EPIC) marker designed specifically for *Ficus* from Yao *et al.* (2013).
9 Amplification of *FA16180b* included about 20 ng genomic DNA, 1x Taq buffer with
10 1.5 mM MgCl₂ (Qiagen), 5 µM of each primer, 0.2 mM each dNTPs, and 1.25 unit Taq
11 polymerase (Qiagen). The amplification profiles included an initial denaturing at 94°C
12 for 5 min; followed by 35 cycles of 50 s at 94°C, 50 s at 55°C, and 1 min at 72°C, with
13 a final extension of 10 min at 72°C.

14 PCR products were cleaned with the QIAquick or MinElute PCR purification spin
15 columns (Qiagen). Cleaned PCR products were quantified using the NanoDrop 2000
16 spectrophotometer with the software NanoDrop 2000/2000c (Thermo Fisher Scientific,
17 Inc.); or using Pico Green fluorescent dye designed for quantification of dsDNA
18 (Molecular Probes, Oregon, USA) in a Turner Quantech Xuorometer (Barnstead-
19 Thermolyne, Iowa, USA).

20 Sequencing was performed in 10 µl reactions using BigDye Terminator sequencing
21 reagents and protocols (Applied Biosystems, Foster City, California, USA), and data
22 were collected on an ABI 3730xl automated sequencer (Applied Biosystems) by the
23 BioMedical Genomics Center core facility at the University of Minnesota. The *ptpsbA*-
24 *trnH*, nr26S, and nr*FA16180b* were sequenced in both directions using the primers

1 above. All sequences will be deposited in GenBank.

2 Complementary DNA sequences were assembled for each accession using
3 Geneious® 8.0.2 (Kearse *et al.*, 2012; Biomatters, 2013). Multiple-sequence alignment
4 was performed using Clustal W (Chenna *et al.*, 2003) followed by manual optimization.
5 Manual alignment and optimization were performed in Se-AI v2.0a11 (Rambaut, 2002).

6 7 8 **Pattern of biogeographic regionalization**

9 The data matrix of geographic distribution was obtained from Urticineae database,
10 using FileMaker Pro 13.0v3, in which were analyzed approximately 23400 herbarium
11 specimens of Urticaceae from several herbaria of the world. In *Pourouma*, our analyses
12 were based in 6200 herbarium specimens from 43 herbaria and multiple field trips,
13 which resulted in Revision of *Pourouma* (Chapter 2).

14 The pattern of biogeographic regionalization was based in Morrone (2014), as well
15 as the coding of biogeographical regions character states, which reflect patterns of
16 endemism in *Pourouma*. The regions correspond to domains proposed by Morrone
17 (2014) and are: Mesoamerican; Pacific; Boreal Brazilian; South Brazilian; Chacoan;
18 Parana (Figure 1 B).

19 20 **Estimation of divergence times**

21 We implemented a Bayesian relaxed model to determine divergence times for the three
22 regions (*ptpsbA-trnH*, *nr26S*, and *nrFA16180b*) dataset using BEAST v.2.1.0
23 (Bouckaert *et al.*, 2013; Bouckaert *et al.*, 2014). A likelihood ratio test for rate
24 constancy was performed using PAUP* 4.0b10 (Swofford, 2002) and results indicated

1 that the gene region was not evolving in a clock-like manner. Based on the Akaike
2 information criterion - AIC (Akaike, 1974; Posada & Buckley, 2004), individual and
3 combined data sets were evaluated for the appropriate model of molecular evolution
4 using ModelTest v. 3.7 (Posada & Crandall, 1998). With BEAUti 2 (Bouckaert *et al.*,
5 2013) we created the input file with nucleotide substitution GTR + G (*ptpsbA-trnH* and
6 *nrFA16180b*) and GTR + G + I (*nr26S*) using a gamma distribution from with four rate
7 categories, under an uncorrelated lognormal relaxed clock model (Drummond *et al.*,
8 2006), and a Yule process of speciation (Gernhard *et al.*, 2008) was employed as prior.

9 Markov Chain Monte Carlo (MCMC) analysis was run for 10 million generations
10 and sampled every 1000th generation. Convergence of the chains was checked using
11 Tracer v.1.6.0 (Rambaut *et al.*, 2013). All trees obtained prior to convergence were
12 discarded and trees were summarized in a maximum clade credibility tree under 95%
13 highest posterior density (HPD) in TreeAnnotator v.2.0.3 (Rambaut & Drummond, 2013).
14 The final tree was viewed using FigTree v.1.4.2 (Rambaut, 2014).

15 *Boehmeria*, *Pilea*, *Parietaria*, and *Poikilospermum* were constrained as outgroup
16 taxa and node priors for the root.

17 The root node was set to a minimum age of 90 Mya based on fruits fossils of
18 *Urticoidea* (Knobloch & Mai, 1986; Collison, 1989) and a maximum age of 199 Mya
19 based on the oldest known angiosperm fossil (Bell *et al.*, 2010). For Cecropieae
20 (ingroup) upper age constraint was set to 70 Mya based on leaf fossil of *Coussapoites*
21 *camargoi* (Huertas) Pons. (Huertas, 1960) and the lower age constraint to 5 Mya based
22 on leaf fossil of *Coussapoites pliocenica* (Berry) Pons (Berry, 1922).

1 **Biogeographical Reconstructions and coding of biogeographical regions character**
2 **states**

3
4 We performed the biogeographic analyses with RASP v. 3.0 (Reconstruction Ancestral
5 State in Phylogenies; Yu *et al.*, 2012) using statistical dispersal–vicariance analysis (S-
6 DIVA; Yu *et al.*, 2010) and Bayesian binary Markov chain Monte Carlo (MCMC)
7 (BBM; Yu *et al.*, 2012) to reconstruct the biogeographical history of Cecropieae
8 (Urticaceae), with focus in *Pourouma*. For these analyses, we used the maximum clade
9 credibility tree under 95% HPD of TreeAnnotator v.2.0.3 from results of BEAST v.2.1.0.

10 S-DIVA and BBM analyses were performed in RASP v. 3.0 using default parameters.
11 Additionally, we set seven max areas at each node, and selected the three boxes (allow
12 extinction, allow reconstruction, and use ancestral range of condensed trees).

13 The regions correspond to biogeographical regionalization proposed by Morrone
14 (2014), except by (G) Afrotropical region from Linder *et al.* (2012), and are: (A)
15 Mesoamerican; (B) Pacific; (C) Borel Brazilian; (D) South Brazilian; (E) Chacoan; (F)
16 Parana.

17
18
19 **RESULTS**

20
21 **Patterns of biogeographic regionalization and diversity of *Pourouma* with**
22 **comments about other genus of Cecropieae**

23 *Pourouma* is distributed preferentially in areas of rainforests in South and Central
24 America (except Antilles), and southern Mexico (Veracruz) with only one species (*P.*

1 *scobina*). The center of diversity of genus is Amazon region, mainly in “terra firme”
2 forest at low altitudes to 450 meter, often in riparian forest. In northwest of South
3 America, between 79°–61°W and 7°N–5°S, occurs 38 species (ca. 88% of total) of
4 *Pourouma* (Figure 1 A).

5 *Pourouma guianensis*, *P. mollis*, and *P. velutina* occur also, in the Atlantic forest in
6 southeast of Brazil. *P. scobina* is the unique specie to presenting the Mesoamerican-
7 Pacific pattern of biogeographic regionalization.

8 Based on maps from revision of *Pourouma* (Chapter 2) and on biogeographic
9 regionalization proposed by Morrone (2014), we considered five patterns of
10 biogeographic regionalization for *Pourouma*: Neotropical, Mesoamerican, Pacific,
11 Boreal and South Brazilian (Figures 1-6).

12 **Neotropical pattern** (Figure 2 A). It is characterized by species with wide
13 distribution, comprising areas between north of South America (8°N and 79°W) to east
14 of Brazil (28°S and 34°W). This pattern includes three biogeographical regions from
15 Morrone (2014): Parana, Boreal and South Brazilian (Figure 2 B). Corresponds to the
16 distribution of three species (ca. 7% of total): *Pourouma guianensis*, *P. mollis*, and *P.*
17 *velutina*. These species occur often in secondary “terra firme” forest of the Amazonian
18 region and in dense ombrophilous forest of the Atlantic forest, often in lowland moist
19 areas, sometimes in riparian forest, usually at an elevation of about 50 to 400 m above
20 sea level. *Pourouma guianensis* and *P. mollis* are pioneer and commonly found in open
21 and disturbed areas of the forest. *P. velutina* is found only on forest interior.

22

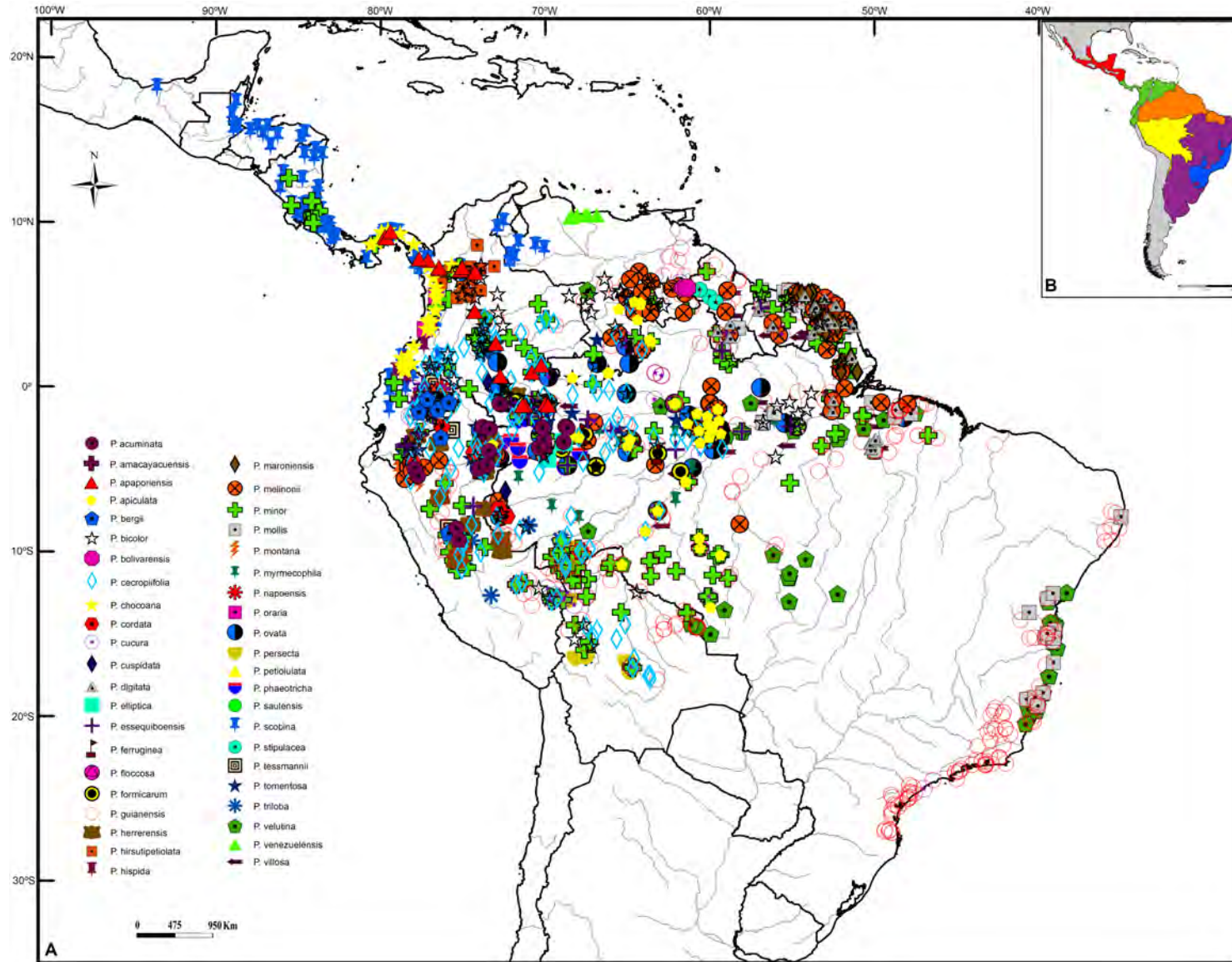


Figure 1. A. Diversity and geographic distribution of *Pourouma*. B. Biogeographic regionalization adapted from Morrone (2014): Mesoamerican (red); Pacific (green); Boreal Brazilian (orange); South Brazilian (yellow); Chacoan (purple); Parana (blue); Regions without register of *Pourouma* (gray).

1 **Mesoamerican-Pacific pattern** (Figure 3 A). It comprises south of Mexico (18°N)
2 up to northeast of Ecuador (1°50'S) and includes the Mesoamerican and Pacific
3 dominions (Figure 3 B). Only, *P. scobina* presents this pattern of biogeographic
4 regionalization, occurring in tropical moist evergreen forest, usually in lowland moist
5 areas, often in riparian forest, at an elevation of about 50 to 1600 m above sea level.

6 **Pacific pattern** (Figure 4 A). It includes Costa Rica, Panama, north of Colombia (up
7 to ca. 2°30'N), northwest of Venezuela (up to ca. 7°20'N), west of Ecuador, and
8 Colombia (76°20'W to 80°50'W). This pattern is related to the Pacific dominion (Figure
9 4B) from Morrone (2014), except by Galapagos Islands and Trinidad province, in which
10 *Pourouma* does not occur. It corresponds to the distribution of six species (ca. 14% of
11 total): *P. chocoana*, *P. hirsutipetiolata*, *P. hispida*, *P. oraria*, and *P. venezuelensis*.
12 These species are distributed in lowland moist evergreen forest, often in riparian forest,
13 at an elevation of about 50 to 500 m above sea level. *P. venezuelensis* occurs in
14 montane moist evergreen forest, at altitudes of about up to 1100 m above sea level. *P.*
15 *hirsutipetiolata*, *P. oraria*, and *P. venezuelensis* are endemic and rarely found in nature
16 (see conservation status in Chapter 2).

17

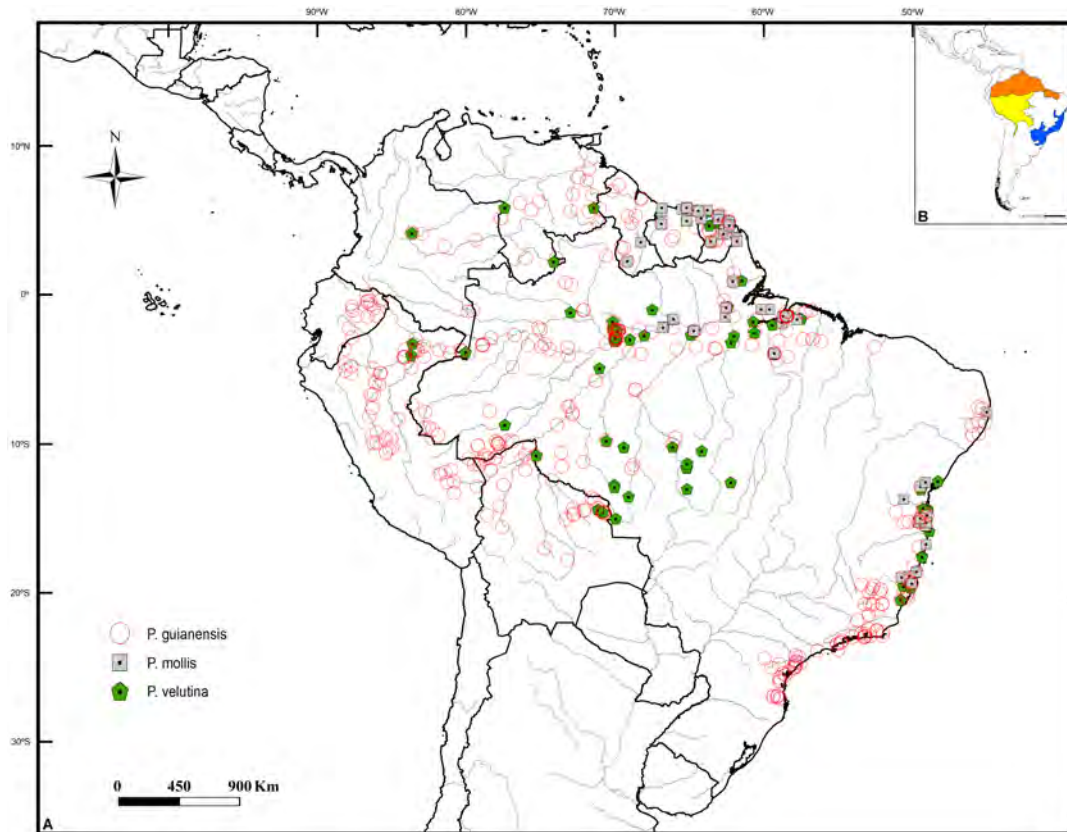


Figure 2. A. Neotropical pattern of biogeographic regionalization of *Pourouma*. B. Biogeographic regionalization adapted from Morrone (2014): Boreal Brazilian (orange); South Brazilian (yellow); Parana (blue).

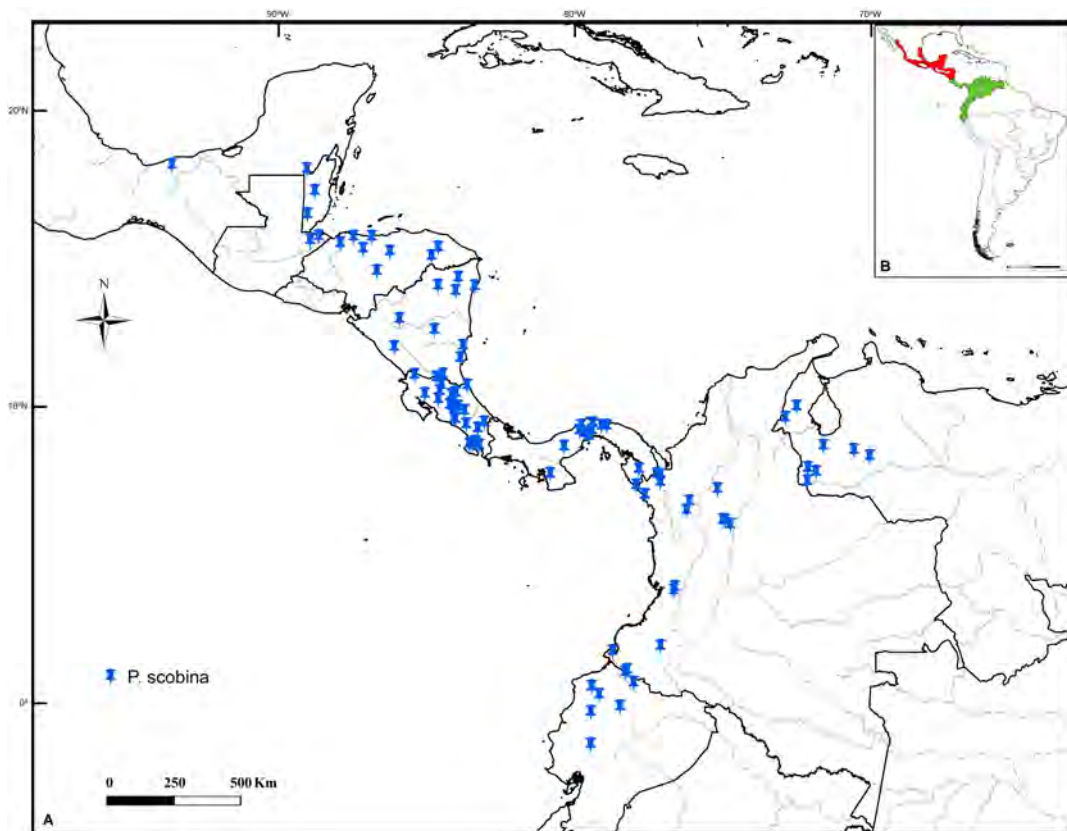


Figure 3. A. Mesoamerican-Pacific pattern of biogeographic regionalization of *Pourouma*. B. Biogeographic regionalization adapted from Morrone (2014): Mesoamerican (red); Pacific (green).

1 **Boreal Brazilian pattern** (Figure 5 A). This pattern corresponds to the Boreal
2 Brazilian dominion (Figure 5 B) from Morrone (2014). It included eight countries
3 (Brazil, French Guiana, Suriname, Guyana, Venezuela, Colombia, Ecuador, and Peru)
4 between the coordinates in about 9°40'N (Delta Amacuro, Venezuela) to 4°30'S
5 (Amazonas, Peru), and 42°W (Maranhão, Brazil) to 78°W (Amazonas, Peru). This
6 pattern comprises a great diversity of *Pourouma* with 13 species (ca. 30% of total): *P.*
7 *amacayacuensis*, *P. apaporiensis*, *P. bolivarensis*, *P. digitata*, *P. elliptica*, *P. floccosa*,
8 *P. maroniensis*, *P. montana*, *P. napoensis*, *P. petiolulata*, *P. saulensis*, *P. stipulacea*,
9 and *P. tomentosa*. These species occur mostly in lowland of “terra firme” Amazonian
10 rainforest, often in riparian forest, or sometimes in varzea forest, at an elevation of
11 about 10 to 600 m above sea level. *P. bolivarensis* and *P. montana* are distributed in
12 montane moist forest at an elevation of about 900 to 2010 m above sea level. Some
13 species are endemic and rarely found in nature, such as: *P. amacayacuensis*, *P.*
14 *bolivarensis*, *P. floccosa*, *P. montana*, *P. napoensis*, *P. saulensis*, *P. stipulacea*, and *P.*
15 *petiolulata* (see conservation status in Chapter 2).

16 **Boreal-South Brazilian pattern** (Figure 6 A). This pattern comprises two
17 biogeographical regions from Morrone (2014): Boreal and South Brazilian dominions
18 (Figure 6 B). It comprises the greatest diversity of *Pourouma* with 21 species (ca. 49%
19 of total): *Pourouma acuminata*, *P. apiculata*, *P. bergii*, *P. bicolor*, *P. cecropiifolia*, *P.*
20 *cordata*, *P. cucura*, *P. cuspidata*, *P. essequiboensis*, *P. ferruginea*, *P. formicarum*, *P.*
21 *herrerensis*, *P. melinonii*, *P. minor*, *P. myrmecophila*, *P. ovata*, *P. persecta*, *P.*
22 *phaeotricha*, *P. tessmannii*, *P. triloba*, and *P. villosa*. These species occur mostly in
23 lowland of “terra firme” Amazonian rainforest, often in riparian forest, or sometimes in
24 varzea forest, at an elevation of about 10 to 600 m above sea level.

25

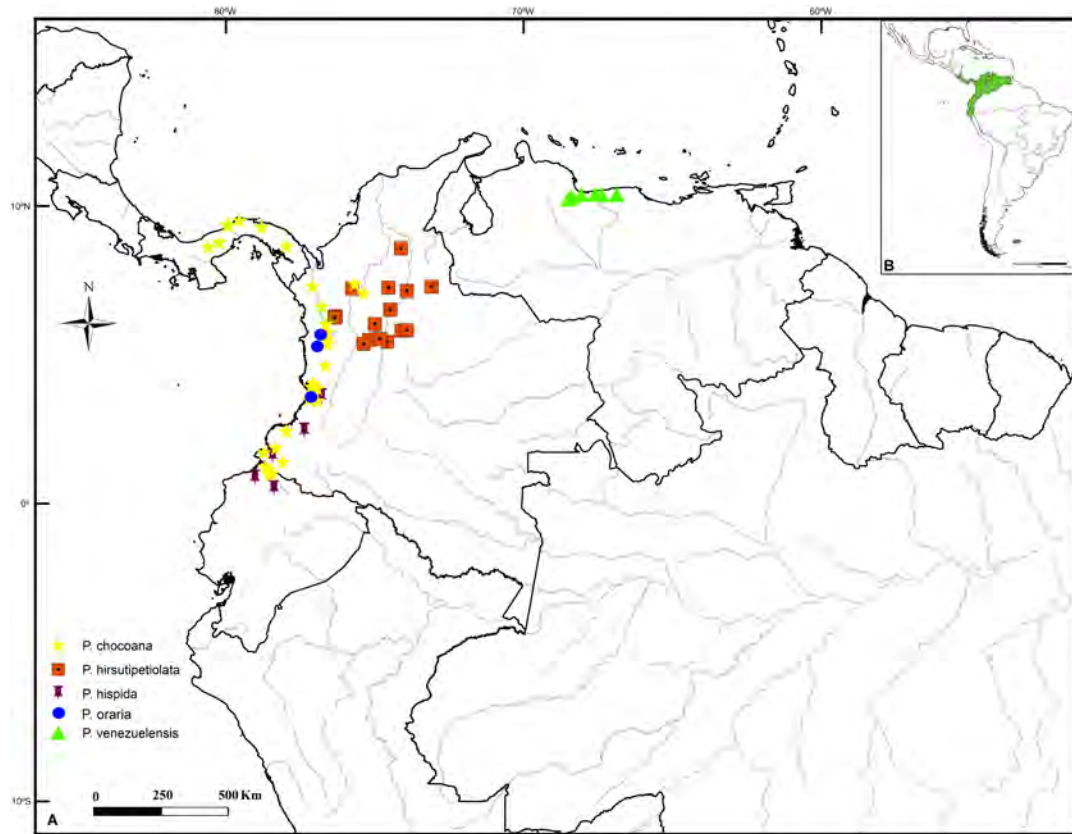


Figure 4. A. Pacific pattern of biogeographic regionalization of *Pourouma*. B. Biogeographic regionalization adapted from Morrone (2014): Pacific (green).

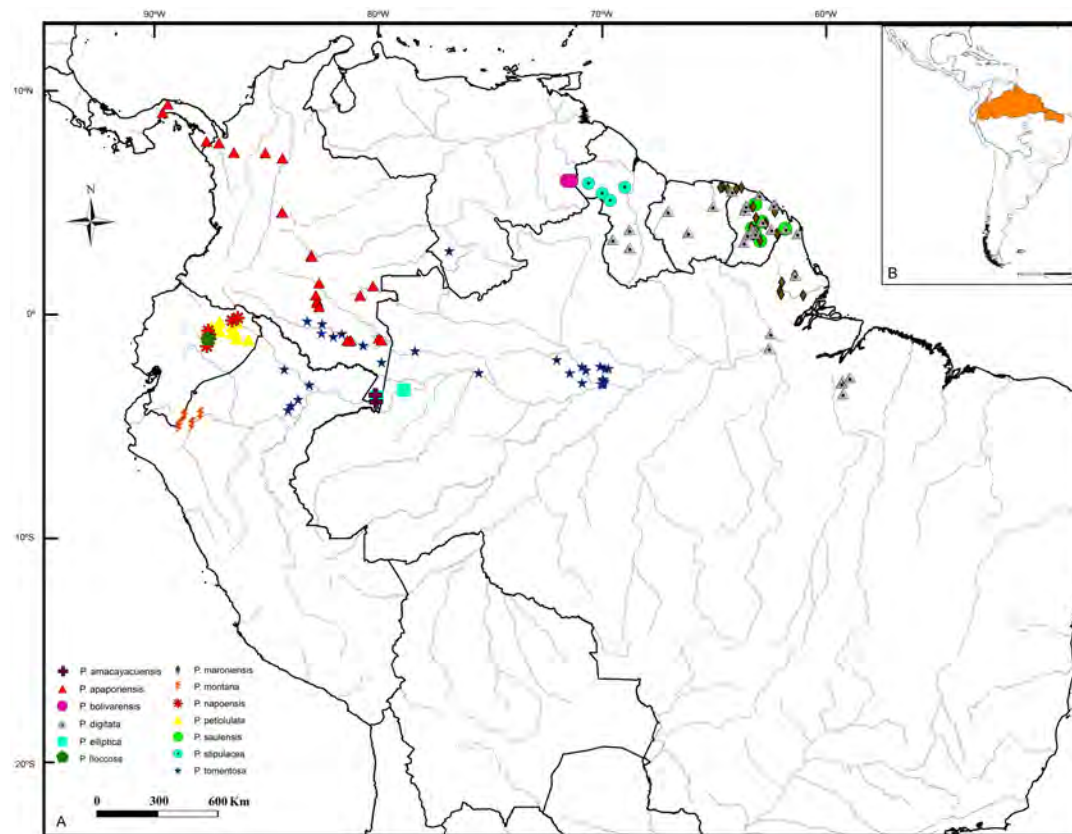
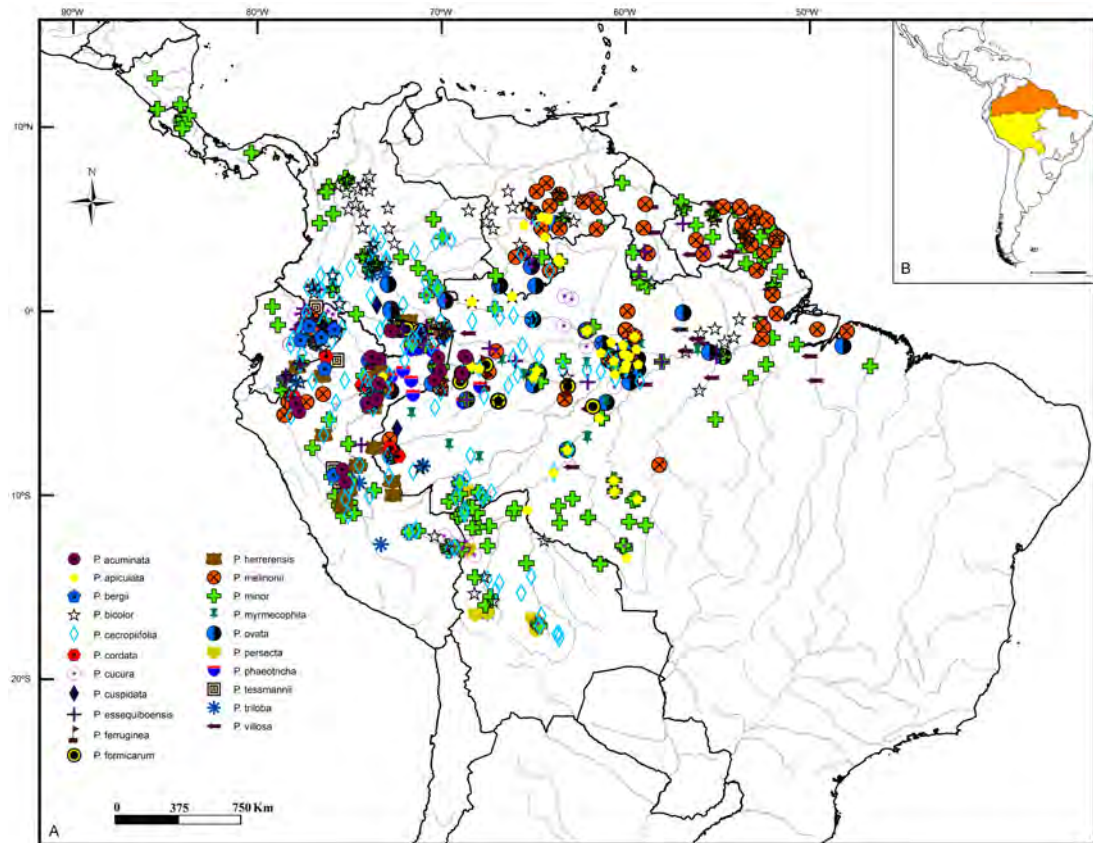


Figure 5. A. Boreal Brazilian pattern of biogeographic regionalization of *Pourouma*. B. Biogeographic regionalization adapted from Morrone (2014): Boreal Brazilian (orange).



1
2 **Figure 6.** A. Boreal and South Brazilian pattern of biogeographic regionalization of *Pourouma*. B. Biogeographic
3 regionalization adapted from Morrone (2014): Boreal Brazilian (orange); South Brazilian (yellow).
4

5 **Fossils calibration times**

6 This is the first study in Urticaceae to use fossil registers for time-calibrated molecular
7 phylogenetic tree. The reliable fossils of Urticaceae are scarce. The oldest clearly
8 recognizable fruits fossils of *Urticoidea* (Urticaceae) date from circa (ca.) 90 million
9 years ago (Mya) of Turonian age at Cretaceous (Knobloch & Mai, 1986; Collison,
10 1989).

11 Pons (1979) indicated multiple fossils of *Coussapoa* (Berry, 1921; Berry, 1922;
12 Hollick, 1924; Berry, 1925; Berry, 1929; Huertas, 1960) and proposed the combination
13 of these in *Coussapoides* with base in *Coussapoites portae*. Nevertheless, Collison
14 (1989) remarked that the identification of fossils studied by Pons (1979) were dubious.

1 During the literature review of studies cited by Pons (1979), we consider that the
2 *Coussapoides* fossils are probably *Coussapoa*. Moreover, the leaf fossil of *Coussapoites*
3 *camargoi* (Huertas) Pons is very similar to leaf of *Pourouma tomentosa* Mart. ex Miq.

4 The ages for *Coussapoites* fossils were estimated ranging Pliocene (5 Mya to 3.6
5 Mya, Zanclean age) in *Coussapoites pliocenica* (Berry) Pons up to Late Cretaceous (66
6 Mya to 72.1 Mya, Maastrichtian age) in *Coussapoites camargoi* (Huertas) Pons. These
7 fossils were collected in the southwest Bolivia (*Coussapoites pliocenica*), southeast
8 Ecuador (*Coussapoites cariioni* (Berry) Pons), northeast Colombia (*Coussapoites*
9 *portae* (Berry) Pons, *Coussapoites camargoi*, *Coussapoites gigantea* (Berry) Pons,
10 *Coussapoites ampla* (Berry) Pons), northeast Venezuela (*Coussapoites villosoides*
11 (Berry) Pons), Trinidad and Tobago (*Coussapoites vaningeni* (Hollick) Pons,
12 *Coussapoites vaningeni major* (Berry) Pons), and south of Mexico (*Coussapoites*
13 *veracruziana* (Berry) Pons).

15 **Divergence Time Estimation**

16 Our divergence time analyses (Figure 7; Table 1) suggest that the earliest diverging
17 contemporary lineages in Urticaceae arose to approximately 82.52 Mya during the Late
18 Cretaceous (node 1 with 95% HPD, 77.69–89.72 Mya). Although, the sampling in this
19 study is scarce for estimates age of family, the results are similar to Zerega *et al.* (2005)
20 and within of the estimates ages for Rosales (100.76–101.33 Mya) from (Magallón &
21 Castilho, 2009).

22 The analyses indicated also that the diverging contemporary lineages in Cecropieae
23 appeared to circa 60.12 Mya during the Paleocene (node 2 with 95% HPD, 76.74–55.65
24 Mya). This age is related to the estimates ages for fossil of *Coussapoites camargoi* from

1 Late Cretaceous (66–72.1 Mya, Maastrichtian age).

2 Within the tribe, the results showed *Coussapoa*, *Pourouma* and *Myrianthus* closely
3 related, and these lineages diverging to about 55.58 Mya during the Paleocene (node 3
4 with 95% HPD, 65.93–50.96 Mya). In this clade, *Pourouma* is more closely related to
5 *Myrianthus* with these lineages diverging in approximately 42.76 Mya during the
6 Eocene (node 4 with 95% HPD, 54.28–39.16 Mya).

7 The lineages in *Pourouma* diverged probably during Oligocene to 32.35 Mya (node 7
8 with 95% HPD, 76.74–55.65 Mya). The major *Pourouma* clades (nodes 8–13) diverged
9 during to Miocene mostly between 18–5.5 Mya (Table 1). Additionally, the chronogram
10 suggests that most part of terminals of *Pourouma* arose between the Pliocene and
11 Quaternary ca. 5–0.8 Mya.

12 *Cecropia* and *Musanga* appeared closely related, and these lineages diverging to
13 about 25.59 Mya during the Oligocene (node 14 with 95% HPD, 33.85–20.52 Mya).
14 However, the sampling of *Cecropia* in this study is insufficient for estimates age of
15 genus, and this clade needs more accessions to be reevaluated.

16

17 **Biogeographical Reconstructions**

18 Ancestral area reconstructions based on S-DIVA and Bayesian binary Markov chain
19 Monte Carlo (BMM) from RASP analyses indicated that the earliest divergences and
20 the most recent common ancestor (MRCA) in *Pourouma* arose in the Boreal Brazilian
21 region (Figure 6B) with 100% of frequency (Figure 7, node 7; Table 1). These results
22 are corroborated by occurrence of most fossil record in this region, and the greatest
23 diversity in Boreal and Boreal-South Brazilian pattern of biogeographic regionalization
24 (Figure 5A, 6A). The split between the major lineages in *Pourouma* (nodes 9–13) of S-

1 DIVA analyses suggest colonization of South Brazilian and Pacific regions in nodes 9–
2 13 (Figure 5B, 4B), and of Parana region in nodes 11 and 13 (Figure 2B). BMM
3 analyses reinforce the results obtained in S-DIVA with an increase of frequency in areas
4 of dispersion for each node (Table 1). Our reconstruction in *Pourouma guianensis* clade
5 (nodes 13) presented the most widespread MRCA, probably because of the recent
6 distribution. However, all MRCA of these major lineages (nodes 9–13) appear strongly
7 associated to Boreal Brazilian region, although our results of the reconstruction area do
8 not find a unique ancestral area. In fact, the colonization of these areas might be
9 correlated with lower diversity of species in these patterns of biogeographic
10 regionalization (Figure 2 A, 3 A, 4 A) compared to the Boreal and Boreal-South
11 Brazilian pattern (Figure 5 A, 6 A).

12 The reconstruction area in *Coussapoa*, *Myrianthus* and *Pourouma* clade (node 3 and
13 4) suggest that the MRCA might have arose in Boreal Brazilian region. Nevertheless,
14 more terminals of *Coussapoa* and *Myrianthus* need to be analyzed. The results suggest
15 also that the MRCA in Cecropieae shows connection between the Boreal Brazilian,
16 Pacific, and Afrotropical regions (Figure 7, node 2; Table 1). However, the tribe clade
17 needs more accessions to be reevaluated, as well as the clades of *Coussapoa* (node 5;
18 Table 1), *Cecropia* and *Musanga* (nodes 14 and 16). We do not consider the results of
19 reconstruction area in Urticaceae, because the insufficient sampling.

20

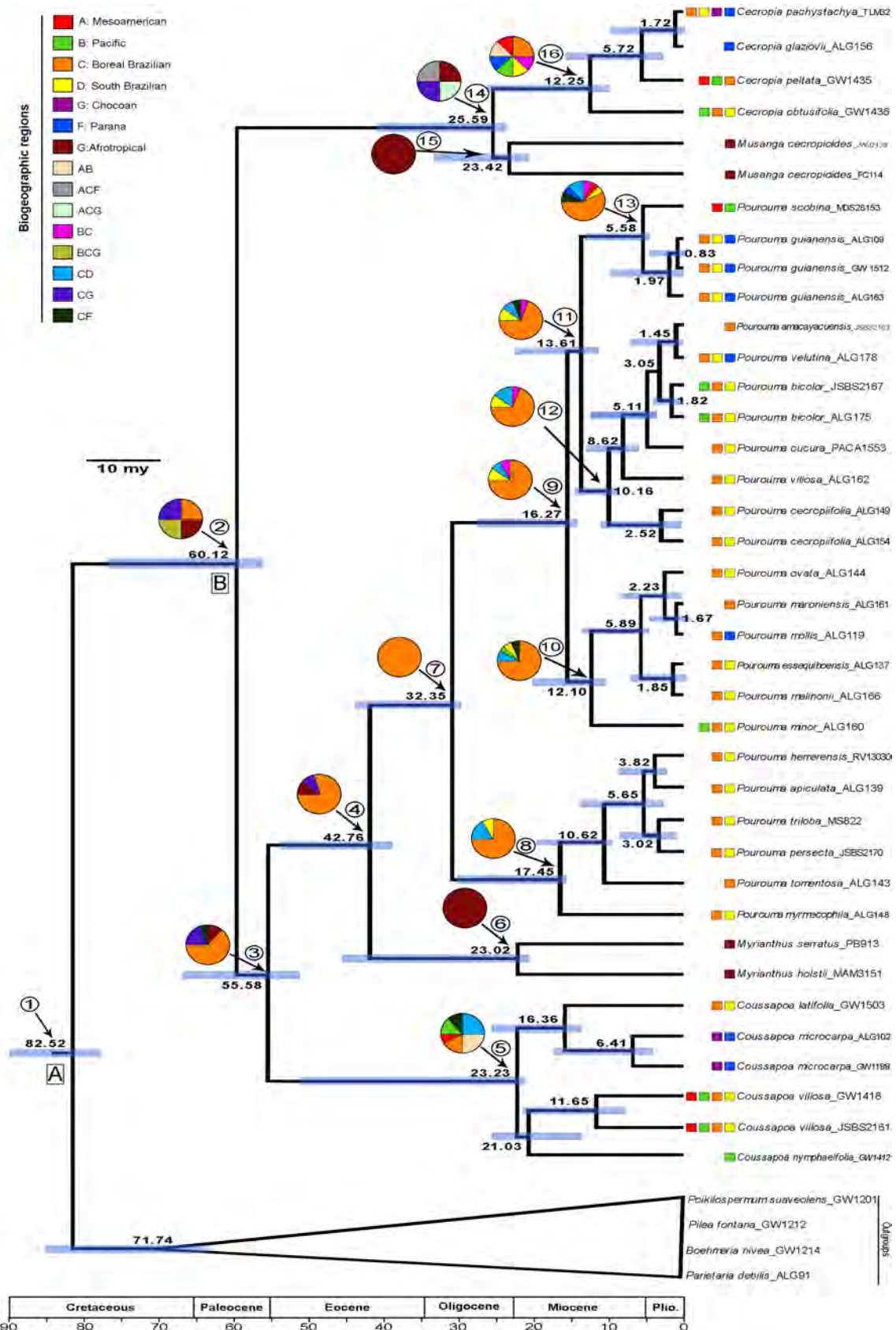


Figure 7. Chronogram resulting from the BEAST analysis of the combined sequence data (*psbA-trnH*, 26S, and *FA16180b*) of Cecropieae (Urticaceae), with focus in *Pourouma*. Bars represent the 95% high posterior density credibility interval for node ages, and numbers above or below branches are age of nodes. Pie graphs report relative probabilities from the statistical dispersal-variance analysis (S-DIVA) of the RASP analyses overlaid onto the maximum clade credibility chronogram from BEAST. Current distributions are indicated before the species names. Calibration points are indicated by A and B within square. Nodes 1–16 within circles are discussed in the text. Biogeographic regions from Morrone (2014) and Linder *et al.* (2012).

1 Discussion

2
3 Our biogeographic reconstruction corroborates a Boreal Brazilian origin in *Pourouma*,
4 between the Andes and lowland Amazonia, during the Oligocene and/or Late Eocene
5 (Figure 7, node 7, ca. 32.35 Mya).

6 The Andean uplift has probably played a central role in the diversification of the
7 major lineages in *Pourouma* (nodes 8–11) by several likely ways, mostly during the
8 Late Oligocene and Miocene (ca. 25–10 Mya). The first split between the lineages in the
9 nodes 8 and 9 of *Pourouma* arose maybe in the colonization Guyana Shield through the
10 formation of “biotic corridors”. After that, the gradual uplift of the Eastern Cordillera
11 creates a huge watershed forming the Pebas system (Burnham & Graham, 1999;
12 Wesselingh *et al.*, 2002; Antonelli *et al.*, 2009; Hoorn *et al.*, 2010; Antonelli *et al.*,
13 2011) that might have been a geographical barrier between these lineages, during the
14 Middle Miocene (nodes 8 and 9).

15 Diversification of lineages (nodes 8–13) suggests multiple colonizations of the South
16 Brazilian and Pacific regions, during the middle and early Miocene. Some geological
17 events such as uplift of the Northern Andes, formation of Acre system and the
18 increasing nutrient deposition in western Amazonia (Hoorn *et al.*, 2010; Antonelli *et al.*,
19 2011) were perhaps important ways for colonization of these areas.

20 The colonization of lineages in the Mesoamerican region (*Pourouma scobina*, node
21 13) arose maybe during late Miocene to Pliocene (ca. 8–3 Mya). These stages match
22 with the formation of the landbridge and closing of the Panama Isthmus during the
23 Pliocene to ca. 3.5 Ma (Coates *et al.*, 1992; Burnham & Graham, 1999; Hoorn *et al.*,
24 2010).

1 Most part of the recent lineages of *Pourouma* arose during Pliocene and Pleistocene
2 (ca. 5.3–0.8 Mya) that was probably driven by the periods of intensified Andean uplift,
3 the draining of wetland in Amazonia and climate fluctuations including the glacial
4 climates (Burnham & Graham, 1999; Hoorn *et al.*, 2010). Parana region was likely
5 colonized during the Pliocene (ca. 2–0.8 Mya, *Pourouma guianensis* clade, node 13).

6 The contemporary pattern of biogeographic regionalization in *Pourouma* might be
7 also correlated with the refuge theory of Pleistocene (Haffer, 1969; Vuilleumier, 1971;
8 Granville, 1982; Andrade-Lima, 1982; Prance, 1982).

9 Ancestral area reconstructions analyses in Cecropieae do not identify where the tribe
10 arose. However, the results from S-DIVA and BMM analyses indicated that the South
11 America origin might be a hypothesis plausible.

12 Our analyses reinforce the importance of geological and climatic events in the
13 diversification of lineages in the Neotropical region, such as Andean Orogeny and
14 climatic fluctuations.

15 This study is the most comprehensive using time-calibrated phylogenetic trees and
16 ancestral reconstruction area of *Pourouma*. Nevertheless, it is only the beginning of a
17 major investigation about the biogeographical history of Urticaceae.

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- 1 Table 1. Age estimates from BEAST analyses and ancestral state reconstruction from RASP analyses.
 2 HPD: highest posterior density; S-DIVA: statistical dispersal–vicariance analysis; BMM: Bayesian binary
 3 Markov chain Monte Carlo.

Node number and major clades	Age estimate and 95% HPD	Probabilities for nodal reconstruction	
		S-DIVA	BMM
Node 1 - Urticaceae	82.52 Mya 77.69–89.72 Mya	Not shown	Not shown
Node 2 - Cecropieae	62.12 Mya 76.74–55.65 Mya	C: 0.25; G: 0.25; BCG: 0.25; CG: 0.25	C: 0.25; G: 0.25; CG: 0.25; BC: 0.12; BCG: 0.13
Node 3 - <i>Coussapoa</i> , <i>Myrianthus</i> , and <i>Pourouma</i> clade	55.58 Mya 65.93–50.96 Mya	C: 0.62; CG: 0.20; G:0.12; CF: 0.06	C: 0.54; G: 0.21; CG: 0.18; CF: 0.07
Node 4 - <i>Myrianthus</i> and <i>Pourouma</i> clade	42.72 Mya 54.28–39.16 Mya	C: 0.79; G:0.11; CG: 0.10	C: 0.66; G:0.17; CG: 0.12; CD: 0.05;
Node 5 - <i>Coussapoa</i>	42.72 Mya 51.22–21.12 Mya	AB: 0.25; CD: 0.25; C: 0.16; B: 0.13; CF: 0.12; BC:0.09	CD: 0.32; AB: 0.18; B: 0.17; CF: 0.12; C: 0.12; BC:0.09
Node 6 - <i>Myrianthus</i>	23.02 Mya 45.94–20.63 Mya	G: 1.00	G: 1.00
Node 7 - <i>Pourouma</i>	32.35 Mya 43.92–29.93 Mya	C: 1.00	C: 0.94; CD: 0.06
Node 8 - <i>Pourouma</i> <i>myrmecophila</i> clade	23.02 Mya 30.34–15.86 Mya	C: 0.75; CD: 0.17; D: 0.08	C: 0.69; CD: 0.20; D: 0.11
Node 9 - <i>Pourouma</i> core clade	16.27 Mya 28.56–14.11 Mya	C: 0.75; D: 0.12; CD: 0.07; BC: 0.06	C: 0.63; D: 0.19; CD: 0.10; BC: 0.08
Node 10 - <i>Pourouma</i> <i>minor</i> clade	12.10 Mya 20.73–10.48 Mya	C: 0.75; CD: 0.08; CF:0.07; D: 0.06; B: 0.04	C: 0.60; CD: 0.13; CF:0.12; D: 0.09; B: 0.06

Table 1. Continued

Node number and major clades	Age estimate and 95% HPD	Probabilities for nodal reconstruction	
		S-DIVA	BMM
Node 11 - <i>Pourouma</i> staminate tepals free clade	13.61 Mya 23.29–11.46 Mya	C: 0.69; D: 0.12; CD: 0.07; CF: 0.06	C: 0.56; D: 0.16; CD: 0.13; BC: 0.07
Node 12 - <i>Pourouma cecropiifolia</i> clade	10.16 Mya 14.71–8.84 Mya	C: 0.67; CD: 0.14; D: 0.12; BC: 0.07	C: 0.52; CD: 0.23; BC: 0.15; D: 0.10
Node 13 - <i>Pourouma guianensis</i> clade	5.58 Mya 13.84–4.71 Mya	C: 0.56; CD: 0.12; CF: 0.08; A: 0.07; D: 0.06; BC: 0.06 F: 0.05	C: 0.44; CF: 0.17; CD: 0.15; A: 0.08; D: 0.06; BC: 0.06 F: 0.04
Node 14 - <i>Musanga</i> and <i>Cecropia</i> clade	23.42 Mya 23.82–40.23 Mya	F: 0.25; G: 0.25; ACF: 0.25; ACG: 0.25	F: 0.31; G: 0.28; ACG: 0.25; ACF: 0.16
Node 15 - <i>Musanga</i>	23.42 Mya 33.85–20.52 Mya	G: 1.00	G: 1.00
Node 16 - <i>Cecropia</i>	12.25 Mya 23.82–10.22 Mya	C: 0.25; F: 0.13; AB: 0.13; D: 0.13; A: 0.12; B: 0.12; BC: 0.12	C: 0.28; B: 0.15; F: 0.15; D: 0.14; AB: 0.10; A: 0.10; BC: 0.08

1 **Appendix 1.** Species, voucher with collection locality, and GenBank accession number
2 for taxa included in this study.

3

4 **Tribe—Species**, collection locality, voucher specimen (Herbarium), GenBank
5 accession for nuclear *26S/FA16180b*/plastid *psbA-trnH*. (GenBank numbers will be
6 added after acceptance of manuscript)

7 **Cecropieae—*Cecropia glaziovii*** Snethl., Brazil, Rio de Janeiro, A.L. Gaglioti *et*
8 *al.* 156 (SP), XXX/XXX/XXX; ***Cecropia obtusifolia*** Bertol., Costa Rica, G. Weiblen
9 1436 (MIN), AY686781/XXX/XXX; ***Cecropia pachystachya*** Trécul, Brazil, Ceara,
10 T.L. Mioranza 32 (SP), XXX/XXX/XXX; ***Cecropia peltata*** L., Panama, G. Weiblen
11 1435 (MIN), AY686780/XXX/XXX; ***Coussapoa latifolia*** Aubl., Brazil, G. Weiblen
12 1503 (MIN), AY686769/XXX/XXX; ***Coussapoa microcarpa*** (Schott) Rizzini, Brazil,
13 Rio de Janeiro, A.L. Gaglioti *et al.* 102 (SP), XXX/XXX/XXX; ***Coussapoa microcarpa***
14 (Schott) Rizzini, Brazil, G. Weiblen 1188 (MIN), AY289260/XXX/XXX; ***Coussapoa***
15 ***nymphaeifolia*** Standl., Costa Rica, G. Weiblen 1412 (MIN), AY686771/XXX/XXX;
16 ***Coussapoa villosa*** Poepp. & Endl., Colombia, Leticia, J.S. Barreto-Silva *et al.* 2161
17 (COAH, SP), XXX/XXX/XXX; ***Coussapoa villosa*** Poepp. & Endl., Costa Rica, G.
18 Weiblen 1418, AY686768/XXX/XXX; ***Musanga cecropioides*** R. Br. ex Tedlie,
19 Liberia, J.W.A. Jansen 2138 (P), XXX/XXX/XXX; ***Musanga cecropioides*** R. Br. ex
20 Tedlie, Guinea Ecuatorial, F. Cabezas 114 (P), XXX/XXX/XXX; ***Myrianthus holstii***
21 Engl., Tanzania, M.A. Mwangoka 3151 (MO), XXX/XXX/XXX; ***Myrianthus serratus***
22 (Trécul) Benth., Mali, P. Birnbaum 913 (P), XXX/XXX/XXX; ***Pourouma***
23 ***amacayacuensis*** Gaglioti & Romaniuc, Colombia, Leticia, J.S. Barreto-Silva *et al.*
24 2162 (COAH, SP), XXX/XXX/XXX; ***Pourouma apiculata*** Spruce ex Benoist, Brazil,

- 1 Amazonas, A.L. Gaglioti *et al.* 139 (SP), XXX/XXX/XXX; ***Pourouma bicolor*** Mart.,
2 Colombia, Leticia, J.S. Barreto-Silva *et al.* 2167 (COAH, SP), XXX/XXX/XXX;
3 ***Pourouma bicolor*** Mart., Brazil, Amazonas, A.L. Gaglioti *et al.* 175 (EAFM, SP),
4 XXX/XXX/XXX; ***Pourouma cecropiifolia*** Mart., Brazil, Amazonas, A.L. Gaglioti *et*
5 *al.* 149 (SP), XXX/XXX/XXX; ***Pourouma cecropiifolia*** Mart., Brazil, Acre, A.L.
6 Gaglioti *et al.* 154 (SP), XXX/XXX/XXX; ***Pourouma cucura*** Standl. & Cuatrec.,
7 Brazil, Amazonas, P.A.C. Assunção *et al.* 1553 (INPA), XXX/XXX/XXX; ***Pourouma***
8 ***essequiboensis*** Standl., Brazil, Amazonas, A.L. Gaglioti *et al.* 137 (EAFM, SP),
9 XXX/XXX/XXX; ***Pourouma guianensis*** Aubl., Brazil, Rio de Janeiro, A.L. Gaglioti *et*
10 *al.* 109 (SP), XXX/XXX/XXX; ***Pourouma guianensis*** Aubl., Brazil, Amapa, A.L.
11 Gaglioti *et al.* 163 (SP), XXX/XXX/XXX; ***Pourouma guianensis*** Aubl., Brazil,
12 Amazonas, G. Weiblen 1512 (MIN), AY686835/XXX/XXX; ***Pourouma herrerenis***
13 C.C. Berg, Peru, Loreto, R. Vásquez *et al.* 13030 (MO), XXX/XXX/XXX; ***Pourouma***
14 ***maroniensis*** Benoist, Brazil, Amapa, A.L. Gaglioti *et al.* 161 (SP), XXX/XXX/XXX;
15 ***Pourouma melinonii*** Benoist, Brazil, Amapa, A.L. Gaglioti *et al.* 166 (SP),
16 XXX/XXX/XXX; ***Pourouma minor*** Benoist, Brazil, Amapa, A.L. Gaglioti *et al.* 160
17 (SP), XXX/XXX/XXX; ***Pourouma mollis*** Trécul, Brazil, Para, A.L. Gaglioti *et al.* 119
18 (IAN, SP) XXX/XXX/XXX; ***Pourouma myrmecophila*** Ducke, Brazil, Amazonas, A.L.
19 Gaglioti *et al.* 148 (EAFM, SP), XXX/XXX/XXX; ***Pourouma ovata*** Trécul, Brazil,
20 Amazonas, A.L. Gaglioti *et al.* 144 (EAFM, SP), XXX/XXX/XXX; ***Pourouma***
21 ***persecta*** (C.C. Berg & van Heusden), Colombia, Leticia, J.S. Barreto-Silva *et al.* 2170
22 (COAH, SP), XXX/XXX/XXX; ***Pourouma scobina*** Benoist, Nicaragua, W.D. Stevens
23 *et al.* 28153 (MO), XXX/XXX/XXX; ***Pourouma tomentosa*** Mart. ex Miq., Brazil,
24 Amazonas, A.L. Gaglioti *et al.* 143 (EAFM, SP), XXX/XXX/XXX; ***Pourouma triloba***

1 Trécul, Brazil, Acre, M. Silveira *et al.* 822 (INPA), XXX/XXX/XXX; *Pourouma*
2 *velutina* Mart. ex Miq., Brazil, Amazonas, A.L. Gaglioti *et al.* 178 (EAFM, SP),
3 XXX/XXX/XXX; *Pourouma villosa* Trécul, Brazil, Amapa, A.L. Gaglioti *et al.* 162
4 (SP), XXX/XXX/XXX.

5 **Boehmerieae**—*Boehmeria nivea* (L.) Gaudich., cultivated in the Beal Botanical
6 Garden, G. Weiblen 1214 (MIN), AY686767/XXX/XXX.

7 **Elatostemateae**—*Pilea fontana* (Lunell) Rydb., cultivated in the Beal Botanical
8 Garden, G. Weiblen 1212 (MIN), AY686776/XXX/XXX.

9 **Parietarieae**—*Parietaria debilis* G. Forst., Brazil, Sao Paulo, A.L. Gaglioti *et al.*
10 91 (SP), XXX/XXX/XXX.

11 **Urticeae**—*Poikilospermum suaveolens* (Blume) Merr., cultivated in the Beal
12 Botanical Garden, G. Weiblen 1212 (MIN), AY686772/XXX/XXX.

V. CONCLUSÃO DA TESE

A presente tese representa o estudo mais amplo filogenético e biogeográfico de *Pourouma*. Além disso, é o primeiro a incluir todos os gêneros da tribo Cecropieae em uma análise molecular. Por meio da convergência nos estudos moleculares, morfológicos, taxonômicos e biogeográficos, foi possível elaborar hipóteses sobre a evolução e diversificação espaço-temporal do grupo, bem como compreender as relações filogenéticas e a coerência morfológica das espécies.

Os resultados das análises moleculares corroboraram para inferir a monofilia da linhagem de *Pourouma*, inserida em Cecropieae, bem como fornecem um forte suporte para a inclusão de Cecropieae em Urticaceae.

A análise molecular combinada com caracteres morfológicos selecionados a partir de referências bibliográficas, estudos de materiais de herbário e viagens de coleta, permitiram um maior conhecimento sobre as inovações morfológicas-chaves na evolução da diversificação de linhagens em Cecropieae.

Nas relações filogenéticas em *Pourouma* foram inferidas as sinapomorfias das linhagens formadas a partir das análises moleculares, servindo de base para uma maior compreensão da importância dos caracteres morfológicos na delimitação de táxons.

Na revisão taxonômica de *Pourouma* foram reconhecidas, descritas e ilustradas 43 espécies, bem como sugeridas categorias de conservação para as espécies de acordo com IUCN (2014). Este resultado representa um incremento de aproximadamente 42% do número de espécies em relação a Flora Neotropical (Berg *et al.* 1990), principalmente devido ao restabelecimento de espécies e descrição de novas espécies.

Os resultados obtidos nas análises moleculares, combinados com a revisão taxonômica, juntamente com registros fósseis e os eventos geológicos conhecidos, forneceram, pela primeira vez, informações para elaboração de uma hipótese da evolução espaço-temporal da linhagem de *Pourouma* na região Neotropical (América do Sul e Central).

As análises biogeográficas sugerem que *Pourouma* surgiu durante o Oligoceno no noroeste da região Amazônica. Os resultados também corroboram para a importância da orogênese dos Andes na diversificação das primeiras linhagens em *Pourouma*. Mudanças geológicas e ambientais durante o Plioceno e Pleistoceno provavelmente conduziram a diversificação das linhagens recentes no gênero. Estes resultados reforçam a importância de

eventos geológicos e climáticos na diversificação das linhagens de plantas na região Neotropical.

Durante o desenvolvimento desse trabalho ficou evidente a necessidade da revisão e ampliação dos estudos moleculares e biogeográficos de outros gêneros de Urticaceae, tais como: *Cecropia*, *Coussapoa*, *Laportea*, *Myriocarpa*, *Phenax*, *Pilea* e *Urera*.

Consideramos que os objetivos propostos nesta tese foram atingidos, com um considerável incremento na compreensão da evolução espaço-temporal de *Pourouma* e *Cecropieae*. Acreditamos, ainda ter colaborado com as políticas de conservação do gênero, fornecendo dados sobre as espécies e sugerindo categorias de conservação.

Anexo I

Artigos publicados oriundos da tese

1. **Gaglioti, A. L. & Romaniu-Neto, S.** 2014. *Pourouma amacayacuensis* (Urticaceae), a new species from Colombia. *Systematic Botany* 39(3): 902-905.
2. **Gaglioti, A. L. & Romaniu-Neto, S.** 2014. *Pourouma bergii* (Urticaceae), a new species from South America. *Phytotaxa* 173(2): 168-172.
3. **Gaglioti, A. L., Carvalho, L.T., Margalho, L., Martins-da-Silva, R.C.V., Gomes, J.I. & Costa, C.C.** 2013. Conhecendo Espécies de Plantas da Amazônia: Mapati (*Pourouma guianensis* Aubl. – Urticaceae). Comunicado Técnico da Embrapa 240: 1-4.

***Pourouma amacayacuensis* (Urticaceae), a New Species from Colombia**

Author(s): André Luiz Gaglioti and Sergio Romaniuc Neto

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Pourouma amacayacuensis (Urticaceae), a New Species from Colombia

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Abstract—During a taxonomic revision of *Pourouma* (Urticaceae), a new species was discovered. *Pourouma amacayacuensis*, endemic to the municipality of Leticia, Amazonas, Colombia is here described and illustrated. This species is morphologically similar to *P. floccosa*, but is distinguished by foliar lamina with apex acute to acuminate, adaxial surface scabrous, abaxial surface of stipules with indument yellowish, hirsute, and fruiting perianth with indument brown-yellowish, velutinous.

Keywords—Amazon region, Cecropiaceae, conservation, endemic, Leticia.

Pourouma Aubl. is a Neotropical genus of approximately 29 species and 12 subspecies. It occurs in rainforests of Central and South America, but is absent from the West Indies. The greatest diversity of species occurs within the Amazon region, mainly in “terra firme” forest at low altitudes. It is characterized by dioecious trees, often with stilt-roots, leaves in spirals, entire or palmatilobed, stipules fused, fully amplexicaul, inflorescences in axillary, paired pleiochasia, pistillate perianth urceolate, and achenes enclosed by the enlarged, fleshy perianth at maturity, with a persistent stigma.

Pourouma has been classified in three different families: Cecropiaceae (Berg 1978; Cronquist 1988; Thorne 1992), Moraceae (Engler 1889; Romaniuc-Neto 1999), or Urticaceae (APG III 2009). However, phylogenetic studies (Sytsma et al. 2002; Datwyler and Weiblen 2004; Hadiah et al. 2008; Wu et al. 2013) suggest that the genera traditionally recognized in Cecropiaceae (*Cecropia* Loefl., *Coussapoa* Aubl., *Musanga* R. Br., *Myrianthus* P. Beauv., *Poikilospermum* Zipp. ex Miq., and *Pourouma*) are more appropriately included in the Urticaceae.

Within Colombia, 27 nominal taxa of *Pourouma* have been described. This diversity includes a mixture of species from different geographical regions such as Central America, western Colombia on the Pacific side of the Andes, and the Amazon region. As part of a taxonomic revision of the entire genus, a new species was discovered from the Amazon region of Colombia, which is described and illustrated herein. A key to morphologically similar species is included for comparative purposes.

MATERIALS AND METHODS

This new species was discovered after morphological analysis of 5,000 + specimens of *Pourouma* from 38 herbaria (AAU, B, BC, BM, BOTU, CAY, COAH, COL, EAFM, ESA, F, GUA, HAMAB, HEPH, HRCB, HUT, IAC, IBGE, INPA, K, M, MBM, MIN, MIRR, MO, P, PMSF, QCA, R, RB, SP, SPF, SPSF, U, UEC, UFACPZ, UPCB, and VEN), as well as voucher samples acquired from multiple field trips within Brazil, Colombia, and Peru. Scanning electron micrographs (SEM) of trichomes were obtained from the holotype specimen (*Silva* 2162 et al., SP). These samples were coated with gold in a Balzers SCD050 sputter-coater and examined using a Philips v.5.21 scanning electron microscope at the Electronic Microscopy Laboratory of the Instituto de Botânica de São Paulo, Brazil.

TAXONOMIC TREATMENT

Pourouma amacayacuensis Gaglioti & Romaniuc, sp. nov.—TYPE: COLOMBIA. Amazonas: Municipio Leticia,

Parque Nacional Natural Amacayacu, Parcela Permanente, 3°48'33.2"S, 70°16'4.29"W, 3 November 2011, J. S. B. Silva 2162 et al. (holotype: SP!; isotype: COAH!).

Pouroumae floccosae C. C. Berg similis, sed lamina supra scabra, apicibus acutis ad acuminatis, stipulis infra hirsutis et perianthio foemineo velutino differt.

Tree 15–25 m tall, with stilt-roots; bark smelling of menthol. Leafy twigs 3–8 mm thick, densely covered with floccose, brown, arachnoid hairs; internode 5–30 mm long. Lamina coriaceous, elliptic to obovate, 7–20.5 × 2.5–10 cm, entire, discolorous; base obtuse to cuneate, margin slightly repand, apex acute to acuminate; adaxial surface scabrous, green to dark-green, with indument whitish, strigose, indument of primary vein yellowish to whitish, sericeous to strigose; abaxial surface tomentose, with dense, whitish, arachnoid hairs, indument of primary vein whitish, sericeous to strigose and with dense, whitish, arachnoid hairs; midrib reaching apex of lamina, venation brochidodromous, in 10–12 pairs of secondary veins, basal pair unbranched, diverging from midrib at angle of 30°–45°, curved at apex, tertiary and quaternary veins reticulate; petiole 1.2–4.5 cm long, indument yellowish to whitish, sericeous to strigose and with floccose, brown, arachnoid hairs; stipules 3.5–7.2 cm long, caducous, abaxial surface with indument yellowish, hirsute and sparse, floccose, brown, arachnoid hairs, adaxial surface glabrous. Inflorescences in axillary, paired pleiochasia. Staminate inflorescences 7.5–9 × 4.5–6.5 cm, 4-branched, flowers organized in fascicles; peduncle 3–4.5 cm long, peduncle and branches with indument yellowish to whitish, sericeous to strigose and with dense, floccose, brown, arachnoid hairs. Staminate flowers 1.5–2 × 1.5–2 mm, sessile; tepals 4, 1.2–1.5 mm long, free or basally connate, with indument yellowish to whitish, sericeous to strigose. Pistillate inflorescences unknown. Infructescences 10–10.5 × 5–5.5 cm, dichotomous, fruits 5–11, organized in cymes; peduncle 5–6.5 cm long, peduncle and branches with indument yellowish to whitish, sericeous to strigose and with dense, floccose, brown, arachnoid hairs; fruiting pedicel 0.6–1.3 cm long; stigma peltate, 1.5–3 mm in diam, persistent. Fruit- ing perianth 1–1.2 × 0.5–0.2 cm, ovoid to ellipsoid, green to reddish, indument brown-yellowish, velutinous. Seeds 3–5 × 2–4 mm, ovoid to ellipsoid, brown. Figure 1.

Distribution, Habitat, and Ecology—It is known only from southwestern Colombia, within the Amacayacu Natural National Park, in Amazonian terra firme, lowland forests, at elevations up to 120 m.

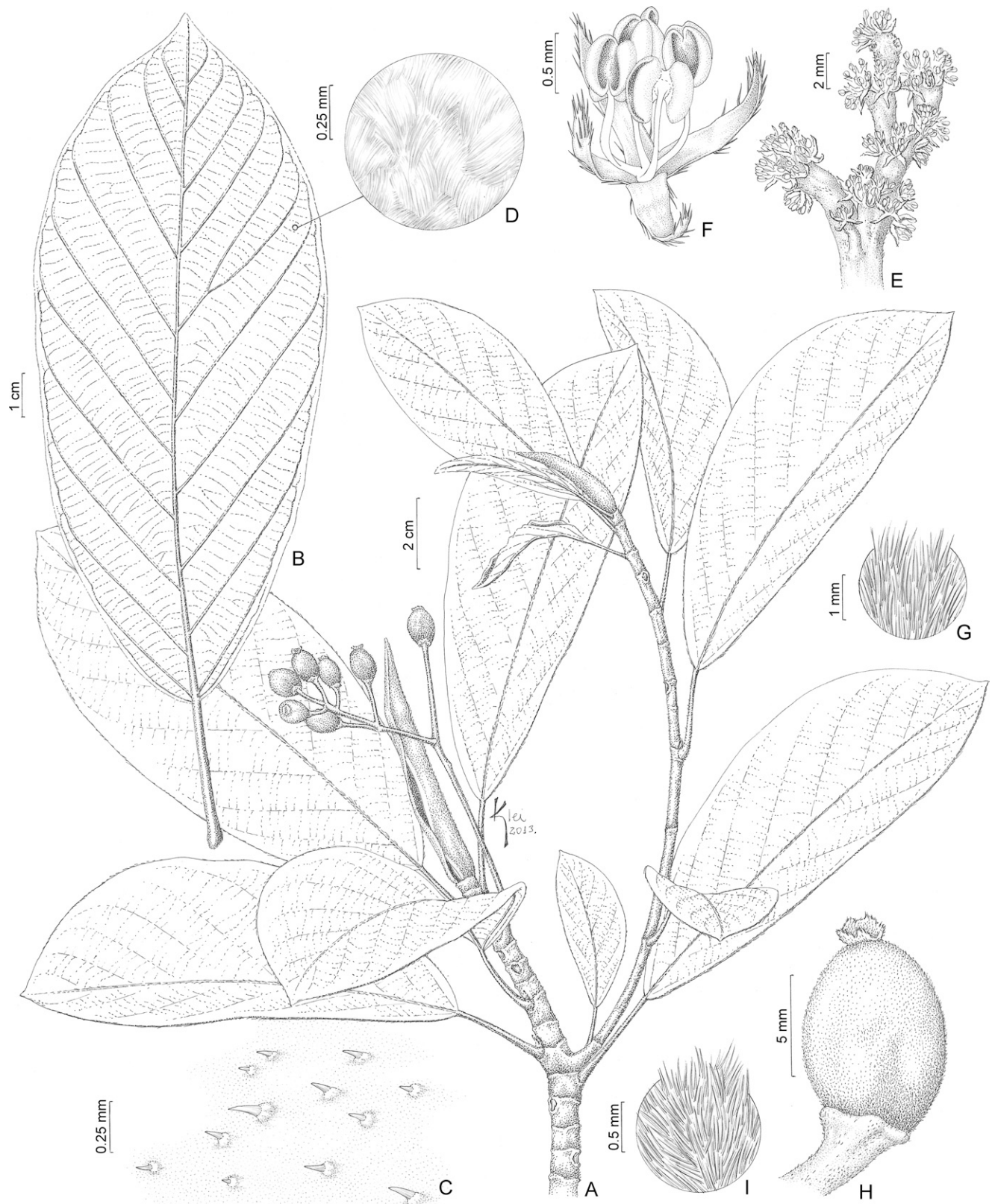


FIG. 1. *Pourouma amacayacuensis*. A. Leafy twig with infructescence. B. Leaf, abaxial surface. C. Strigose indument of adaxial lamina surface. D. Arachnoid hairs on primary vein of abaxial lamina surface. E. Staminate inflorescence. F. Staminate flower. G. Hirsute indument of abaxial stipule surface. H. Fruit, fruiting perianth, and pedicel. I. Velutinous indument of fruiting perianth. [A–D, G–I: from J. S. B. Silva 2162 et al. (SP); E–F: from A. Rudas 3150 et al. (MO)]

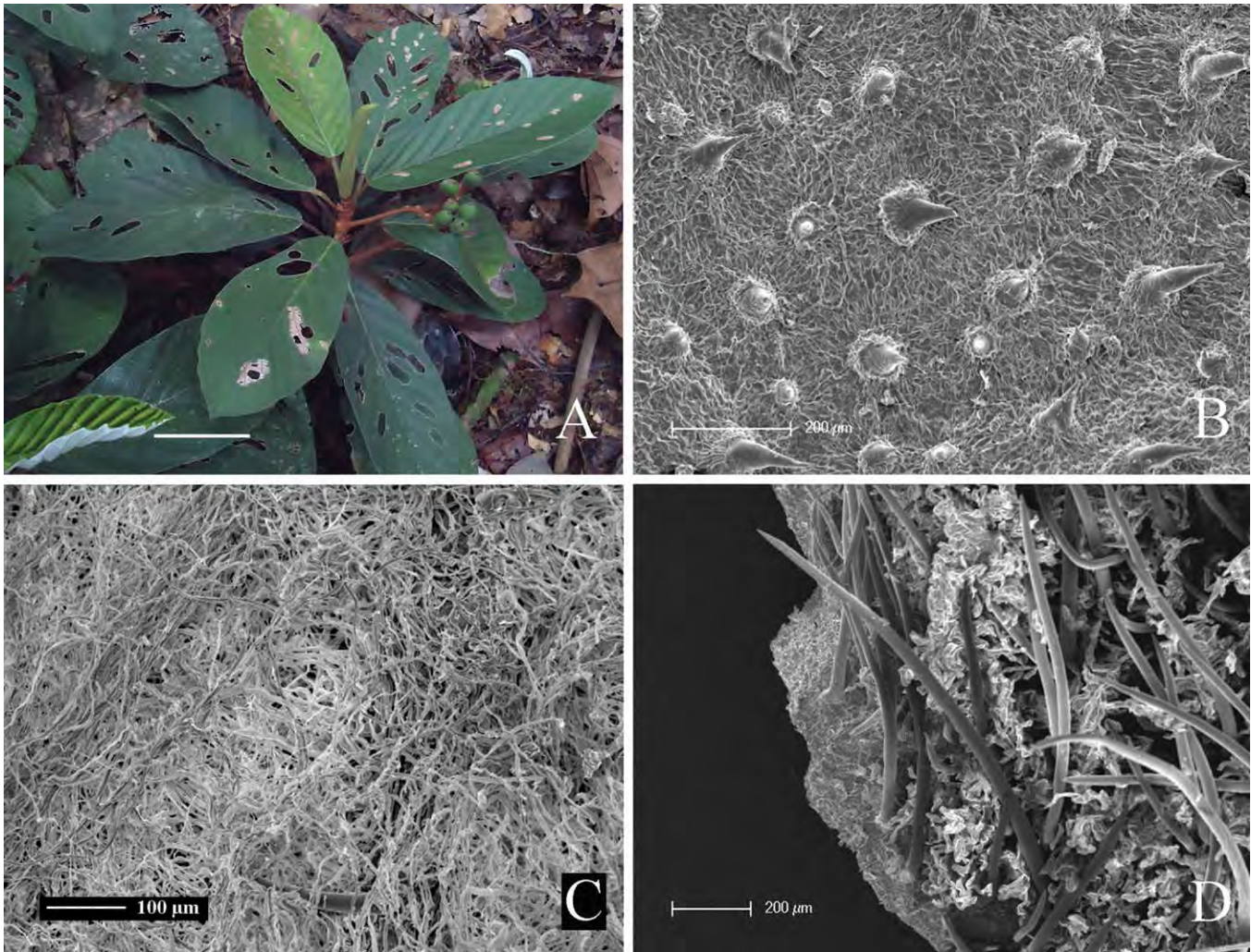


FIG. 2. *Pourouma amacayacuensis*. A. Leafy twig with infructescence. Scale bar = 5 cm. B. Strigose indument of adaxial lamina surface. Scale bar = 200 μm . C. Arachnoid hairs of abaxial lamina surface. Scale bar = 100 μm . D. Hirsute and arachnoid hairs of abaxial stipule surface. Scale bar = 200 μm . [All photos from J.S.B. Silva 2162 et al. (SP)]

Vernacular Name—It is known as uvilla by Tikunas from the municipality of Leticia, Amazonas, Colombia.

Etymology—The epithet is a tribute to the type locality, Amacayacu Natural National Park.

TABLE 1. Main characters distinguishing *Pourouma amacayacuensis* from *P. floccosa* and *P. phaeotricha*

Character/Species	<i>P. amacayacuensis</i>	<i>P. floccosa</i>	<i>P. phaeotricha</i>
Indument of leafy twigs	Floccose	Floccose	Sericeous to hirtellous
Lamina apex	Acute to acuminate	Rounded to emarginate	Acuminate
Adaxial lamina surface	Scabrous	Smooth	Smooth to scabrous
Whitish arachnoid hairs on primary vein of abaxial lamina surface	Present	Absent	Absent
Indument of abaxial stipule surface	Hirsute	Floccose	Sericeous to velutinous
Staminate inflorescence arrangement	Fascicles	Unknown	Glomerules
Indument of fruiting perianth	Velutinous	Puberulous to hispidulous	Puberulous

Paratype—COLOMBIA. Amazonas: Municipio Leticia, Parque Nacional Natural Amacayacu. Centro Administrativo Mata-matá; troche que conduce a Amacayacu, en el km 4, 3°47'S, 70°15'W, 120 m, 25 September 1991, A. Rudas 3150 et al. (MO).

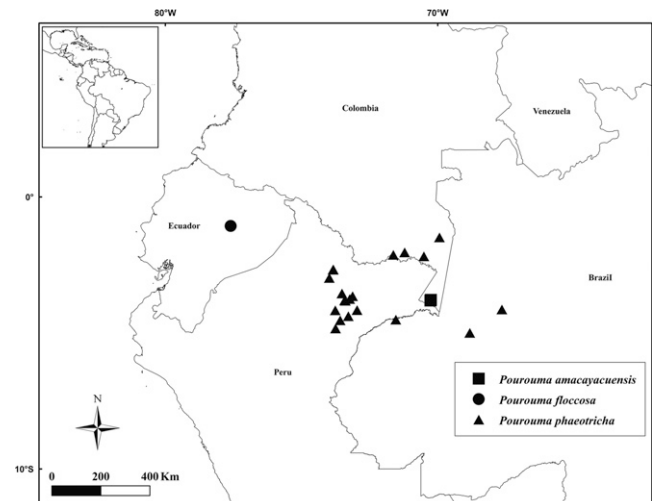


FIG. 3. Distribution map of *Pourouma amacayacuensis*, *P. floccosa*, and *P. phaeotricha* (data from available herbarium material).

DISCUSSION

Pourouma amacayacuensis belongs to a group of species with basal secondary veins unbranched, which have leaves usually entire (Figs. 1A, 2A; see the key below). It is morphologically most similar to *Pourouma floccosa* due to the dense, brown, floccose, arachnoid hairs on the leafy twigs. It is distinguished by the foliar lamina with apex acute to acuminate (Fig. 1B), adaxial lamina surface scabrous (Figs. 1C, 2B), abaxial surface of stipules with indument yellowish hirsute (Figs. 1G, 2D), and fruiting perianth with indument brown-yellowish, velutinous (Fig. 1I). *Pourouma amacayacuensis* is also similar to *Pourouma phaeotricha* Mildbr. because the foliar lamina is entire, obovate, and the adaxial lamina surface is scabrous. It is distinguished by the dense,

brown, floccose, arachnoid hairs (Fig. 2A), lamina with whitish, arachnoid hairs on the primary vein of the abaxial surface (Fig. 2C), and staminate flowers organized in fascicles (Fig. 1E). These distinguishing features are summarized in Table 1.

The morphologically similar *Pourouma floccosa* is endemic to Napo (Ecuador) and *P. phaeotricha* occurs in the Amazon region in northwestern Brazil, northeastern Peru (Loreto), and southwestern Colombia. *Pourouma amacayacuensis* is endemic to Amacayacu Natural National Park, Leticia, Amazonas, Colombia (Fig. 3). According to the IUCN red list categories (IUCN 2013), *P. amacayacuensis* is considered endangered, EN B1a,b(iii), because of the limited occurrence in Amacayacu Natural National Park (ca. 2,935 km²).

KEY TO THE SPECIES OF *POUROUMA* WITH BASAL UNBRANCHED SECONDARY VEINS

1. Leafy twigs with dense, floccose, brown, arachnoid hairs 2
2. Lamina scabrous to scabridulous adaxially; apex acute to acuminate; indument of whitish, arachnoid hairs on primary vein of abaxial lamina surface; fruiting perianth velutinous *P. amacayacuensis*
2. Lamina smooth adaxially; apex rounded to emarginate; indument of whitish, arachnoid hairs only on areoles, tertiary and quaternary veins of abaxial lamina surface; fruiting perianth puberulous to hispidulous *P. floccosa*
1. Leafy twigs puberulous, sericeous, hirtellous to hirsute-tomentose 3
3. Lamina scabrous to scabridulous adaxially 4
4. Stipules 1–3 (–4.5) cm long; pluricellular hairs on leafy twigs dense; staminate flowers in glomerules; pistillate inflorescences with 11–15 flowers *P. phaeotricha*
4. Stipules 2–12 cm long; pluricellular hairs on leafy twigs absent or sparse; staminate flowers in fascicles; pistillate inflorescences with 2–8 flowers *P. velutina*
3. Lamina smooth adaxially 5
5. Stipules sericeous to velutinous on adaxial surface 6
6. Secondary veins 8–10 pairs; pluricellular hairs on leafy twigs dense; staminate flowers in glomerules, 1.5–2 mm in diam *P. phaeotricha*
6. Secondary veins 9–21 pairs; pluricellular hairs on leafy twigs absent or sparse; staminate flowers in glomerules, 3–7 mm in diam 7
7. Stipules 1.5–3 cm long; perianth of staminate flower sericeous; peduncle of pistillate inflorescence up to 32 cm long *P. ovata*
7. Stipules 3.5–8 cm long; perianth of staminate flower hirsute-tomentose; peduncle of pistillate inflorescence up to 10 cm long *P. herrereiensis*
5. Stipules glabrous on adaxial surface 8
8. Leafy twigs puberulous to glabrous 9
9. Stipules 1–5 cm long; stigma bilobed, 1.5–2.5 mm in diam *P. saulensis*
9. Stipules 1–15 cm long; stigma knob-shaped, 2.5–6 mm in diam *P. minor*
8. Leafy twigs puberulous, sericeous, hirsute to hirsute-tomentose 10
10. Indument of whitish, arachnoid hairs on leafy twigs, petioles, and peduncle *P. elliptica*
10. Indument of whitish, arachnoid hairs only on areoles and smaller veins of abaxial lamina surface 11
11. Lamina with puberulous indument on primary vein; stigma peltate, 1.5–2 mm in diam *P. acuminata*
11. Lamina with sericeous to velutinous indument on primary vein; stigma knob-shaped, 2.5–6 mm in diam *P. minor*

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Pourouma bergii (Urticaceae), a new species from South America

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Abstract

During the course of the taxonomic revision and molecular phylogeny of *Pourouma*, we encountered a new species from Peru and Ecuador. *P. bergii* Gaglioti & Romaniuc is here described, illustrated and its morphological similarities to *P. tomentosa* subsp. *persecta* and *P. petiolulata* are discussed. A Conservation Assessment determines *P. bergii* to be Data Deficient (DD).

Key words: *Cecropieae*, *conservation*, *Neotropical flora*, *taxonomy*

Introduction

Pourouma Aubl. (1775: 891) is a neotropical genus comprising about 40 species. The most recent reviews of the genus were undertaken by Berg *et al.* (1990, 1993, 2004) and Berg (2004). The genus is restricted to the Neotropics where it is most frequently encountered in tropical moist forest in South and Central America. It is absent from the Lesser and Greater Antilles. *Pourouma* comprises dioecious trees, often with stilt-roots, leafy twigs not fistulous, releasing a watery exudate when cut, the exudates turning black on exposure to the air, entire to palmatilobed leaves born in spirals, stipules fully encircling the stem, axillary inflorescences usually comprising a compound cyme, urceolate pistillate perianths, and fruits at maturation consisting of an achene enclosed by enlarged fleshy perianth parts with persistent stigma.

Most of the *Pourouma* species are associated with non-inundated secondary forest at elevations up to 1000 m. Some species, e.g. *Pourouma guianensis* Aubl. (1775: 892), are pioneer and commonly found in areas disturbed of the forest. Others species, e.g. *Pourouma elliptica* Standl. (1937: 181), are only found in undisturbed forest.

Peru and Ecuador represent a centre of diversity for *Pourouma* and species-richness is highest in the moist Amazonian at low elevation. The exception is *Pourouma montana* C.C. Berg (2004: 258) that is confined to an elevation of 1800 to 2100 m above sea level. Berg *et al.* (1990) and Berg (2004) recognized 17 species and five subspecies for Peru, of which *Pourouma herrerenensis* C.C. Berg (1989: 513) and *P. montana* are endemic. Berg *et al.* (1993) recognized 14 species and six subspecies from Ecuador, of which *Pourouma napoensis* C.C. Berg (1990: 59), *Pourouma floccosa* C.C. Berg (1993: 89) and *Pourouma petiolulata* C.C. Berg (1993: 100) are endemic.

Reproductive characters are fundamental to the delimitation of species within the genus, in particular the types, sizes and numbers of flower in the inflorescences; the shape, size and number of stamens of the staminate flower; size, stigma and indument of the pistillate flower; and the shape, size and indument of fruiting perianth. Nevertheless, the vegetative characters (lamina leaf, stipule, venation and indument) are important for recognizing species groups.

Material & Methods

Approximately 5,500 specimens of *Pourouma* were studied, including type materials, from AAU, B, BG, BM, BOTU, CAY, COAH, COL, CUVC, EAFM, ESA, F, GUA, HAMAB, HEPH, HRCB, HUT, IAC, IBGE, INPA, K, M, MBM, MEDEL, MIN, MIRR, MO, P, PMSP, QCA, R, RB, SP, SPF, SPSF, U, UEC, UFACPZ, UPCB, and VEN, together with voucher samples acquired from multiple field trips within Brazil, Colombia, and Peru. Scanning electron micrographs

(SEM) of trichomes were obtained from the holotype (Vásquez & Jaramillo 809, MO) and paratype (Aulestia *et al.* 745, MO) specimens. These samples were coated with gold in a Balzers SCD050 sputter-coater and examined using a Philips v.5.21 scanning electron microscope at the Electronic Microscopy Laboratory of the Instituto de Botanica de São Paulo, Brazil. The software Google Earth pro 7.1.2.2041 was used to estimate the extent of occurrence of the new taxon.

Taxonomic Treatment

Pourouma bergii Gaglioti & Romaniuc, *spec. nov.*

Affinis Pourouma tomentosa subsp. *persecta* et *P. petiolulata* sed ramulis glabris, perianthio masculino infundibuliformi (nec urceolato neque e tepalis liberis constanti), staminibus 2 (nec 4), perianthio foemineo tomentoso (nec velutino neque hispidulo) differt.

Type:—PERU. Loreto: Prov. Alto Amazonas, Andoas, campamento petrolero, Río Pastaza, no. de Iquitos, 2°55'S, 76°25'W, 210 m, 21 November 1980 (♀), Vásquez & Jaramillo 809 (holotype: MO!, isotypes: BG!, FI!, NY!)

Tree, 8–25 m tall, 10–28 cm dbh, with stilt roots. Leafy twigs 5–12 mm diam., glabrous, not fistulous, releasing a watery exudate when cut, the exudate turning black on exposure to air; internode 5–22 mm long. Lamina palmatisect 10.5–40.5 × 10–38.5 cm, venation palmate; 5–7 segments, with incisions down to the petiole and segments, pseudo-petioliules 5–12 mm long; segments lanceolate to elliptic, 5–19.5 × 3.5–8.5 cm, coriaceous, apex acuminate, margin with indument sparsely yellowish, sericeous, hairs 0.1–0.4 mm long, base acute; adaxial lamina surface smooth, indument of primary vein yellowish, sericeous, hairs 0.1–0.4 mm long; abaxial lamina surface smooth, with indument yellowish, sericeous, hairs 0.1–0.4 mm long, and sometimes with indument sparsely white, arachnoid, on the veins, hairs 0.2–20 mm long; secondary veins in the mid-segment 14–26 pairs, basal pair unbranched, diverging from the midrib, born at an angle of 50°–60°; tertiary and quaternary veins reticulate, slightly prominent, with indument white, arachnoid in the areoles, hairs 0.2–20 mm long; petiole 3.5–18.5 (–26) cm long, glabrous to subglabrous, sometimes with indument sparsely white, arachnoid in the juvenile leaves, hairs 0.2–20 mm long; stipules 3–11.5 cm long, abaxial surface with indument yellowish, sericeous, hairs 0.1–0.4 mm long, and with indument sparsely white, arachnoid, hairs 0.2–20 mm long, adaxial surface with indument sparsely yellowish, sericeous, hairs 0.1–0.4 mm long, to glabrous, caducous. Staminate inflorescences 5.5–10.5 × 2.5–6.5 cm, 2–3-branched; peduncle 1.5–2.5 cm long, peduncle and branches with indument yellowish, velutinous to hirtellous, hairs 0.2–0.5 mm long; flowers ca. 250–650, flowers organized in 15–50 glomerules; glomerule 4–6 mm diam. Staminate flowers 2.2–3.2 × 0.8–1.5 mm, sessile; perianth 1.2–1.8 × 0.8–1 mm, infundibuliform, tepals connate, with indument whitish, sericeous, hairs 0.1–0.4 mm long; 2-stamens, filaments 1.5–2 mm long, free, filaments exceeding the perianth. Pistillate inflorescence unknown. Infructescence 6.5–9 × 4.5–6.5 cm; peduncle 3–4.5 cm long, peduncle and branches glabrous or with indument sparse white arachnoid, hairs 0.2–20 mm long; fruits 6–8, organized in 2–3 cymes; pedicels 8–15 mm long; stigma peltate, 8–1 mm diam., sometimes with indument yellowish, sericeous. Fruiting perianth 10–18 × 5–10 mm, ovoid to ellipsoid, brown to vinaceous, with indument yellowish to whitish, sericeous, hairs 0.1–0.4 mm long, and with indument white, arachnoid, hairs 0.2–20 mm long. Achene 8–15 × 3–8 mm, glabrous. Seed 5–10 × 2–5 mm, ovoid, brown to vinaceous.

Distribution, habitat & ecology:—Northeast of Peru (Loreto and Pasco) and Ecuador (Napo and Pastaza), in primary terra firme forest of the Amazonian region, in lowland moist area, at an elevation of about 200 to 365 m above sea level.

Etymology:—The epithet honors Dr. Cornelis Christiaan Berg (1934–2012†), a great specialist botanist in Moraceae, Cannabaceae, Ulmaceae and Urticaceae.

Local name:—It is known as 'yohue' by Huaorani from Pastaza, Ecuador.

IUCN conservation status:—*Pourouma bergii* is known from only seven collections in the provinces of Loreto, Pasco (Peru), Napo and Pastaza (Ecuador), made between 1980 and 1994. However, the extent of occurrence of *P. bergii* is ca. 96,000 km² and the population size are unknown. For these reasons *P. bergii* is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN 2013).

Additional specimens examined:—ECUADOR. Napo: Orellana, Parque Nacional Yasuni, carretera y oleoducto de Maxus en construcción, km 54–58, 0°48'S, 76°30'W, 250 m, 26–30 September 1993 (♂), Aulestia *et al.* 745 (MO!); carretera y oleoducto de Maxus en construcción, km 40, 0°39'S, 76°26'W, 250 m, 7 September 1994 (♀), Aulestia *et al.* 2698 (MO!); Añangu, NW corner of the Parque Nacional Yasuni, 0°33'S, 76°22'W, 355–365 m, 1–15 February 1986 (♀), Korning *et al.* 47618 (AAU!, BG!, MO!, NY!); Canton Francisco de Orellana, Via de los Zorros, pozo petrolero

Jaguar I, 40 km al SW de Coca, 0°44'S, 77°05'W, 250 m, 23 October 1988 (♀), *Palacios 3238* (BG!, MO!). Pastaza: Pastaza Canton, Pozo petrolero Moretecocha de Arco, 01°34'00"S, 77°25'00"W, 580 m, 4–12 October 1990 (♀), *Gudiño et al. 958* (MO!, NY!). PERU. Pasco: Prov. Oxapampa. Distrito Iscozacín, 22 september 1986 (♂), *Pariona et al. 954* (BG!, F!, MO!).

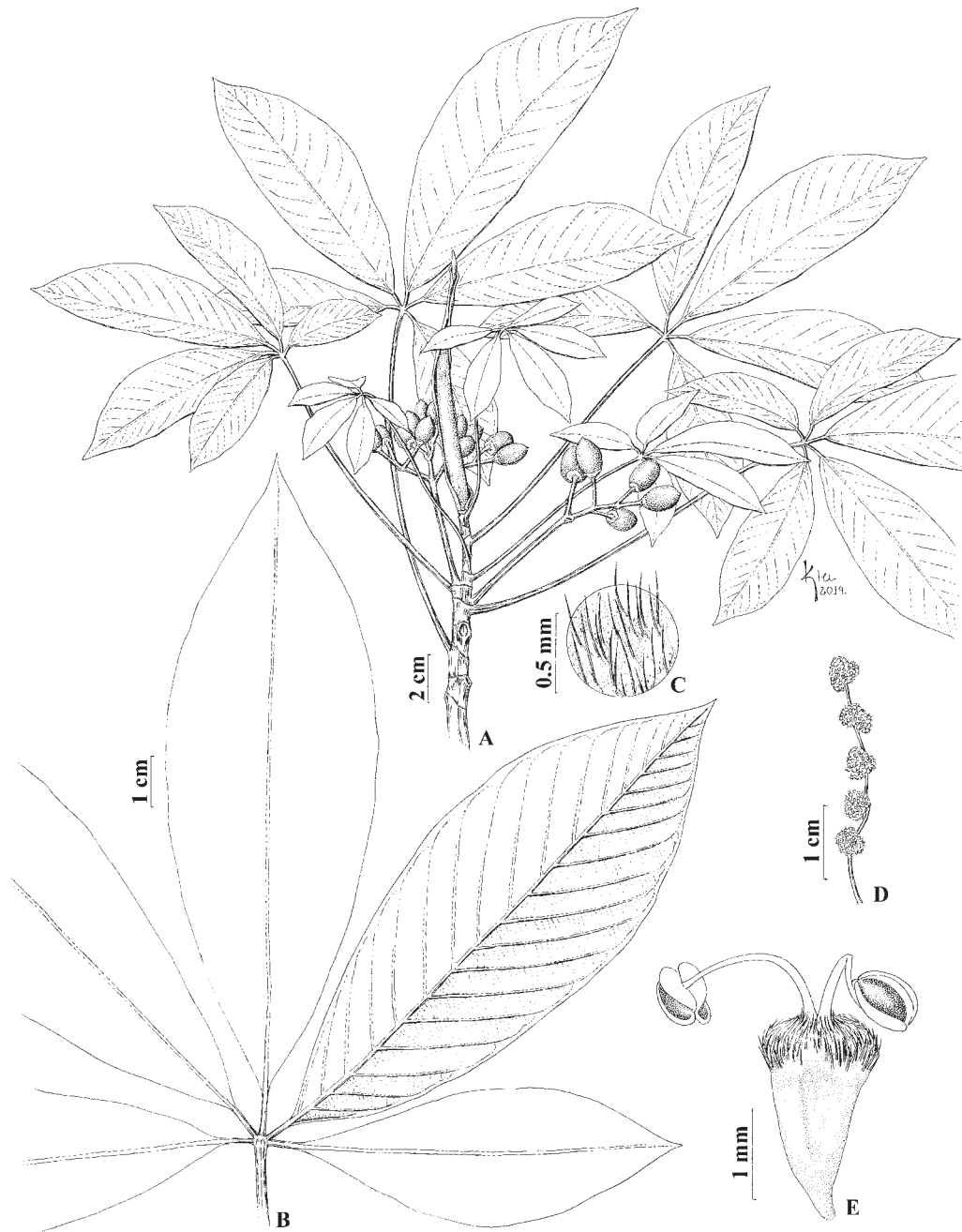


FIGURE 1. *Pourouma bergii*. A. Leafy twig with infructescence. B. Leaf, abaxial surface. C. Indument of the pistillate perianth. D. Staminate inflorescence. E. Staminate flower. A–C from *Vásquez et al. 2809* (MO) and D–E from *Aulestia et al. 745* (MO). Scale bar: A = 2 cm; B = 1 cm; C = 0.5 mm; D = 1 cm; E = 1 mm. Drawn by Klei Sousa.

Discussion:— *Pourouma bergii* belongs to the group of species with palmatisect laminae. It shows similarities to *P. tomentosa* subsp. *persecta* C.C. Berg & van Heusden (1988: 108) and *P. petiolulata* C.C. Berg (1993: 100): palmatisect lamina with segments usually pseudo-petiolules (Figs 1A–B). It may be distinguished from *P. petiolulata* by glabrous leafy twigs (versus hirsute), infundibuliform staminate perianth (Figs 1E, 2A) (versus perianth urceolate or with free tepals) and tomentose pistillate perianth with white arachnoid indument (Figs 2 C–D) (versus yellow velutinous or hispidulous, see Table 1.)

The related species *P. petiolulata* is endemic of Napo (Ecuador) and *P. tomentosa* subsp. *persecta* occurs in the Bolivia (Cochabamba and La Paz), northwest of Brasil (Amazonas, Acre and Mato Grosso).

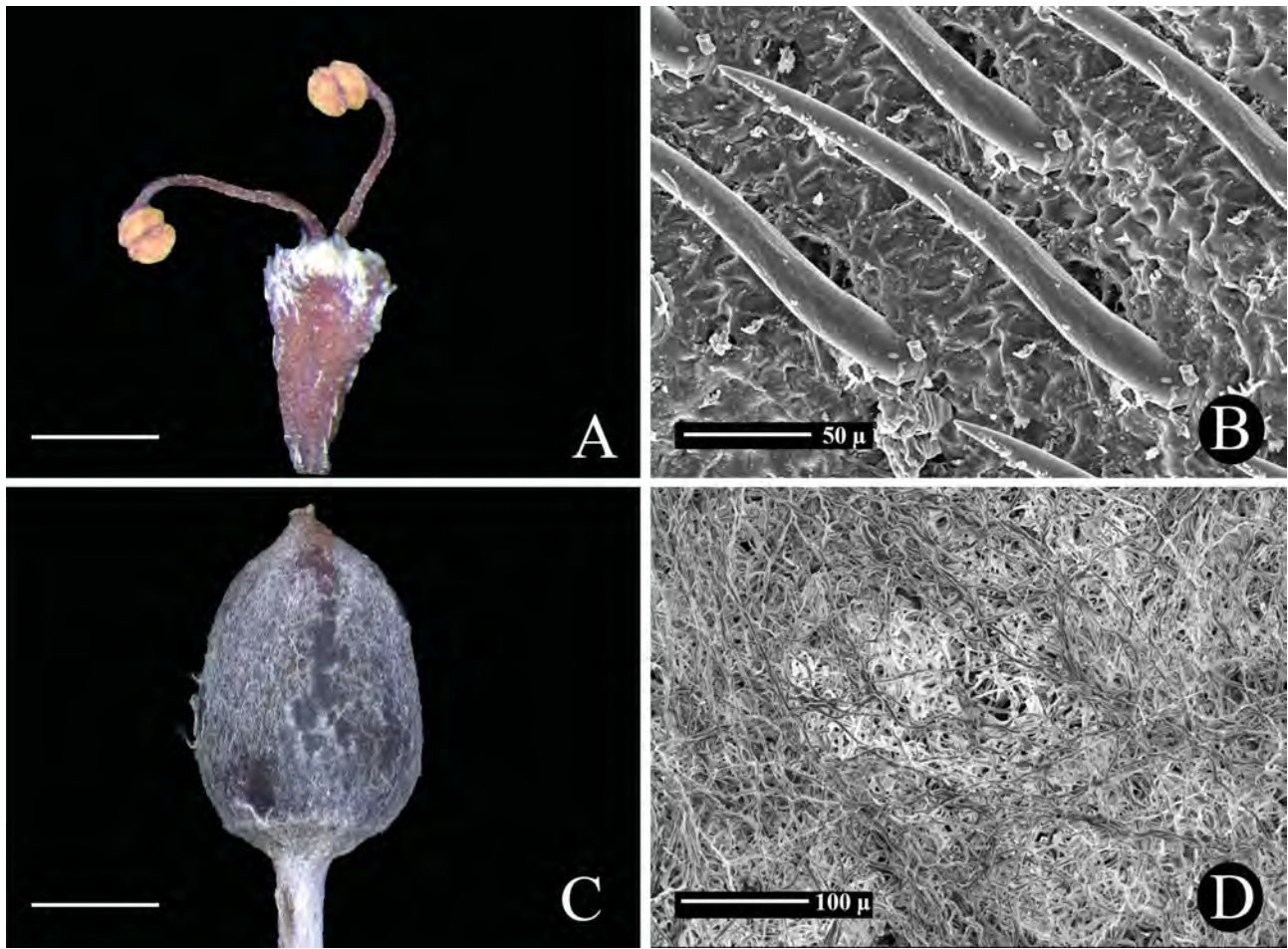


FIGURE 2. *Pourouma bergii*. A. Staminate flower. B. Indument sericeous of the staminate perianth. C. Fruiting perianth, fruit and pedicel. D. Indument sericeous of the fruiting perianth. A–B from *Aulestia et al.* 745 (MO) and C–D from *Vásquez et al.* 2809 (MO). Scale bar: A = 1 mm; B = 50 µm, C = 5 mm, D = 100 µm

TABLE 1. Main characters distinguishing *Pourouma bergii* from *P. tomentosa* subsp. *persecta* and *P. petiolulata*

	<i>P. bergii</i>	<i>P. tomentosa</i> subsp. <i>persecta</i>	<i>P. petiolulata</i>
Indument of the leafy twigs	Glabrous	Hirsute	Hirsute to hirtellous
Adaxial lamina surface	Smooth	Smooth	Scabrous
Staminate perianth	Infundibuliform, tepals connate	Urceolate, tepals connate	Tepals free
Number of stamens	2	4	4
Indument of the pistillate perianth	Tomentose, with indument white arachnoid	Velutinous, without indument white arachnoid	Hispidulous, without indument white arachnoid

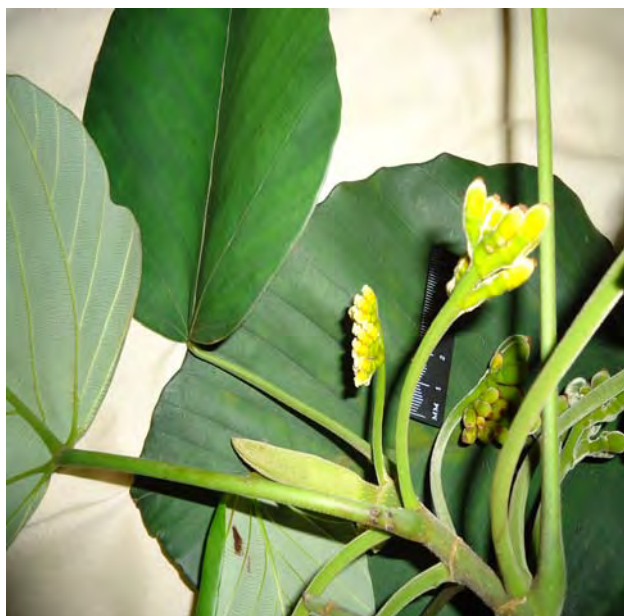
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Foto: André Luiz Gaglioti.



Conhecendo Espécies de Plantas da Amazônia: Mapati (*Pourouma guianensis* Aubl.-Urticaceae)

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Taxonomia

Pourouma guianensis Aubl., Histoire des Plantes de la Guiane Française 2: 892, t. 341. 1775.

Pertence à família Urticaceae, de acordo com The Angiosperm Phylogeny Group (2009) e Romaniuc Neto e Gaglioti (2012).

Pourouma Aubl. é um gênero de Urticaceae, reconhecido como um grupo arbóreo e dioico, com inflorescências em fascículos ou cimeiras e estípulas terminais amplexicaules. Possui cerca de 29 espécies e mais de 100 binômios sinonimizados. Ocorre preferencialmente em áreas de florestas úmidas da América do Sul e Central.

Nomes populares

Amapati (PA), embaúba-benguê (PR), imbaubarana (MT, PR), imbaúba-da-mata (PE), inharé, itararanga (BA), imbaúba-torém (MT), imbaubarana (MT, PR), mapati (PA), pau-de-jacu (PR), puruma-

da-guiana, purumã-da-guiana, taranga-branca (BA), uva-de-macaco (região Norte, região Nordeste) (INTERNATIONAL TROPICAL TIMBER ORGANIZATION, 1999; CAMARGOS et al., 2001; LORENZI, 2002).

Como reconhecer a espécie

Árvore de 10 m a 30 m de altura; tronco reto e cilíndrico (roliço – Figura 1), com casca quase lisa e lenticelada (estruturas na casca que parecem “boquinhos”). Estípulas com pelos (tricomas) amarelados a esbranquiçados. Folhas de forma variável, inteiras, com 3 a 5 lobos, com a base leve ou profundamente cordada ou algumas vezes arredondada (Figura 2). Inflorescências masculinas (estaminadas) globosas e femininas (pistiladas) ramificadas (Figura 3). Fruto aquênio ovoide a elipsoide, com perigônio acrescente carnosos, pubescente, de 2 cm a 2,5 cm de diâmetro, vináceo, contendo uma única semente (GAGLIOTI, 2011) (Figura 4).

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Foto: Luciano Ferreira Margalho.



Figura 1. Detalhe do tronco e da copa.



Foto: André Luiz Gaglioti.

Figura 3. Inflorescências femininas.



Foto: André Luiz Gaglioti.

Figura 4. Frutos ovoides.

Fotos: Luciano Ferreira Margalho.

Figura 2. Diversidade foliar de *P. guianensis* Aubl.: (a) folha inteira evidenciando a face abaxial; (b) face adaxial, (c) folha com três lobos (trilobada) evidenciando a face abaxial; (d) face adaxial.

No campo, essa espécie pode ser reconhecida facilmente pelas raízes entrelaçadas acima do solo, chamadas de raízes adventícias ou escoras (Figura 5). Em um corte no tronco, pode-se sentir o odor de cânfora que exala do ritidoma. As folhas no chão, próximas à árvore, também indicam a presença da espécie.



Foto: André Luiz Gaglioti.

Figura 5. Raízes adventícias escoras de *Pourouma guianensis* Aubl.

Ocorrências na Amazônia Brasileira

Amapá (IAN, RB), Pará (IAN, INPA, MG, MO), Roraima (IAN, INPA), Amazonas (IAN, INPA, MG, MO, NY, P, R, RB, SP), Rondônia (IAN, INPA, NY) e Acre (INPA, MG, MO, NY, R, RB). Além dos registros nos herbários citados nos parênteses, a espécie também ocorre nesses estados, de acordo com Romaniuc Neto e Gaglioti (2012).

Usos

A madeira é empregada para produção de polpa celulósica, confecção de brinquedos, palitos, caixas e pequenas embalagens e carvão (MELO, 1979; SOUZA, 2009). Suas folhas servem de alimento ao bicho-preguiça. Seus frutos são comestíveis e muito apreciados pela fauna. A árvore possui qualidades ornamentais que a recomendam para o uso paisagístico. Também, é indicada para a composição de reflorestamentos mistos com fins preservacionistas (LORENZI, 2002).

Os índios Waimiri Atroari usam a casca dessa espécie contra os sintomas de gripe (INTERNATIONAL TROPICAL TIMBER ORGANIZATION, 1999).

Madeira

Características gerais

Madeira leve ($0,33-0,38 \text{ g/cm}^3$), esbranquiçada, macia, textura média, grã direita, de baixa resistência mecânica e não durável.

Descrições anatômicas

Poros visíveis a olho nu, médios a grandes ($100 \mu\text{m}$ a $300 \mu\text{m}$), muito poucos a poucos ($3-7/\text{mm}^2$) (Figura 6).

Parênquima axial aliforme losangular e, ocasionalmente marginal, associado aos anéis de crescimento.

Raios no topo visíveis a olho nu e não estratificados.

Fibras apresentando comprimento de $788 \mu\text{m}$ a $1.462 \mu\text{m}$; diâmetro de $24 \mu\text{m}$ a $48 \mu\text{m}$ e espessura da parede $4 \mu\text{m}$ (valor médio) (MELO, 1979).

Informações fenológicas

Floresce durante os meses de agosto e setembro. Os frutos amadurecem a partir de dezembro (LORENZI, 2002).

Agradecimentos

Ao Projeto Rede Biomassa (Embrapa/Fapespa) pela concessão de bolsa para os coautores dois, três e seis. À Marta Freire (assistente de pesquisa), Edilson Silva e Jéfyne Carréra (estagiários), pelo preparo de corpos de prova e fotomicrografia da madeira.

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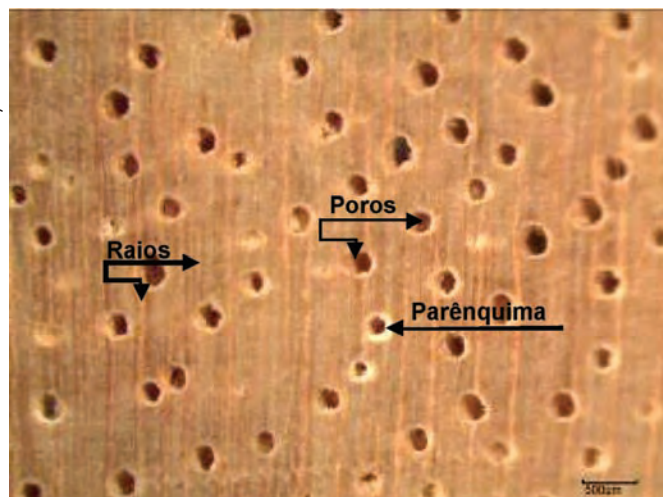


Figura 6. Fotomicrografia da madeira de *Pourouma guianensis* Aubl.

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