

UNIVERSIDADE DE SÃO PAULO
INSTITUTO DE BIOCÊNCIAS

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Myristicaceae do Acre, Brasil
Myristicaceae in Acre, Brazil

São Paulo

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Campostrini Forzza

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RESUMO

A família Myristicaceae, com a espécie *Myristica fragrans* Houtt. conhecida mundialmente por ser uma especiaria comercializada, a noz-moscada, possui uma distribuição pantropical com centros de diversidade na África, Ásia e na Região Neotropical. Nas Américas ocorrem cinco gêneros e cerca de 110 espécies, 70 destas registradas na Amazônia e 59 na Amazônia brasileira, onde são conhecidas popularmente como ucuúba. Dentre os estados amazônicos brasileiros, o Acre está completamente inserido neste domínio e é o único com um catálogo da flora publicado (2008). Neste são listadas 28 espécies de Myristicaceae, entretanto, um levantamento atual de dados em plataformas *online* sugere que ocorram mais. Por causa da falta de estudos recentes desta família nas áreas do Brasil com uma maior riqueza de espécies, o objetivo deste trabalho foi analisar e revisar as ocorrências de espécies de Myristicaceae no Acre. Com base nos resultados foram elaborados chaves, descrições, comentários e ilustrações para 34 espécies e cinco gêneros: *Virola* (17 spp.), *Iryanthera* (12), *Compsoeura* (2), *Otoba* (2), and *Osteophloeum* (1).

Palavras-chave: Flora, Taxonomia, Distribuição de espécies, Amazônia

ABSTRACT

The family Myristicaceae, which includes *Myristica fragrans* Houtt., known worldwide as a spice, the nutmeg, has a pantropical distribution and centers diversity in Africa, Asia, and the Neotropics. In the Americas, there are five genera and 110 species, of which over 70 are in Amazonia and 59 are in Amazonia, Brazil, where is popularly known as *Ucuuba*. Among the Brazilian states in Amazonia, Acre is completely within this domain and the only state with a published flora catalogue (2008). This catalogue lists 28 Myristicaceae species; however, a data survey of online platforms suggested there are more species. Due to the lack of recent studies of this family in Brazil, the objective of this work was to analyze and revise the occurrences of the Myristicaceae species in Acre. Based on the results, keys, descriptions, comments, and illustrations are provided for 34 species and five genera: *Virola* (17 spp.), *Iryanthera* (12), *Compsoeura* (2), *Otoba* (2), and *Osteophloeum* (1).

Keywords: Flora, Taxonomy, Species Distribution, Amazon

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INTRODUCTION

The family Myristicaceae is part of the Magnoliids and the second largest family in the Magnoliales. It comprises approximately 21 genera and 500 species and is known worldwide for having the commercialized nutmeg (*Myristica fragrans* Houtt.) as a representative (APG IV, 2016; WFO, 2022). The species are trees, shrubs or rarely lianas, with a characteristic architecture of almost horizontal branches, which are mostly in the canopy, and red sap (fig. 1A, 1B, 1D). The leaves are simple, alternate, distichous, and lack stipules (fig. 1E). The plants are mostly dioecious with small, yellow, trimerous, unisexual flowers, pistillate flowers with a single unilocular carpel and a single basal ovule, and staminate flowers with 2–30 stamens that are often fused into a column (fig. 1E). The fruit is dehiscent and fleshy, described as a capsule or berry-like, and splits into two valves with a single seed that usually has an aril (fig. 1C; Hallé et al., 1978; Rodrigues, 1980; Smith, 1938; Vicentini & Rodrigues, 1999).

The family has a pantropical distribution with centers of diversity in Africa, Asia, and the Neotropics. In the Americas, it occurs from Mexico to Brazil, where there are five genera and around 110 species. In Amazonia, there are over 70 known species in five genera: *Compsonera* (A.DC.) Warb., *Iryanthera* (A.DC.) Warb., *Osteophloeum* Warb., *Otoba* (A.DC.) H.Karst., and *Virola* Aubl. (Ulloa Ulloa et al., 2017; WFO, 2022). In Brazil, there are currently 65 recorded species (12 endemic), popularly known as *Ucuuba*, of which most occur in Amazonia and some are in the Cerrado and Atlantic Forest (Flora e Funga do Brasil, 2023).

Queenborough et al. (2013) note the importance of expanding the knowledge of the family and revising the already known species. Doyle et al. (2004, 2008), Sauquet et al. (2003), Janovec et al. (2000), Jaramillo & Baslev (2004, 2020), Frost et al. (2021), and Santamaría-Aguilar & Lagomarsino (2022) focus on taxonomic, systematic, molecular and biogeographic aspects of Myristicaceae and neotropical species, but updated studies on the family in areas with high diversity in Brazil are still needed (Caruso & Cordeiro, 2000; Quintanilha & Lobão, 2017; Rodrigues 1980, 1997; Ribeiro et al., 1999; Silva & Silva, 2008).

The Amazon is the most diverse rainforest and the largest contributor to the biodiversity in the Neotropics. Numerous abiotic and biotic processes, such as the Andean uplift, global and local climate changes, species interactions and soil adaptations, have been fundamental to its formation over millions of years (Antonelli et al., 2009; Hoorn et al., 2010; Antonelli & Sanmartín, 2011; Antonelli et al., 2018). For centuries, this region has been sparking the interest of many naturalists and scientists, which has resulted in numerous expeditions to document its biodiversity (Ewan, 1992). Significant factors related to what remains unknown about Amazonian plant diversity include the difficulties of accessing and collecting in many areas, and Cardoso et al. (2017)

highlights that specialists and taxonomically verified material are important to reduce this knowledge gap and provide reliable data.

Brazil is a megadiverse country and has the most plant species in the world, which have been documented by specialists for centuries (Forzza *et al.*, 2012; BFG, 2018, 2021). Amazonia, Brazil, is a very diverse domain with over 14,500 plant species, which is second only to the Atlantic Forest (over 20,000 species) for biome diversity, although studies are still lacking in many areas (BFG, 2021; Flora e Funga do Brasil – 2022). This domain is over 4 mi km² in Brazil, which corresponds to 49% of the country and about 60% of all Amazonian rainforest, and houses not only high plant diversity but over 2,600 endemic plant species, reinforcing the importance of studying the Brazilian flora (Cardoso *et al.*, 2017; IBGE, 2020; Flora e Funga do Brasil, 2023).

Acre is the only Brazilian state in Amazonia with a flora catalogue for the entire state (Daly & Silveira, 2008), which was revised six years after being published (Medeiros *et al.*, 2014). The floristic inventory of the state accelerated considerably thanks to a collaboration between the Universidade Federal do Acre (UFAC) and The New York Botanical Garden (NYBG), which went from 2,500 species and around 8,000 collections to 4,004 species and 25,000 collections while preparing the catalogue (Silveira *et al.*, 1997; Daly & Silveira, 2008). For Myristicaceae in the state, 28 species were originally recorded by Daly & Silveira (2008), and six more species were added in the Brazilian Flora 2020 (BFG 2021). Further, Medeiros *et al.* (2014) note the importance of continuing studies in the area to look for possible new occurrences and better document the plant diversity. Thus, the objectives of this research were to revise and update the Myristicaceae species in Acre, including descriptions, comments and illustrations, point out possible taxonomic issues for future taxonomic studies, and provide reliable data for the family as a whole for the Brazilian and neotropical floras.

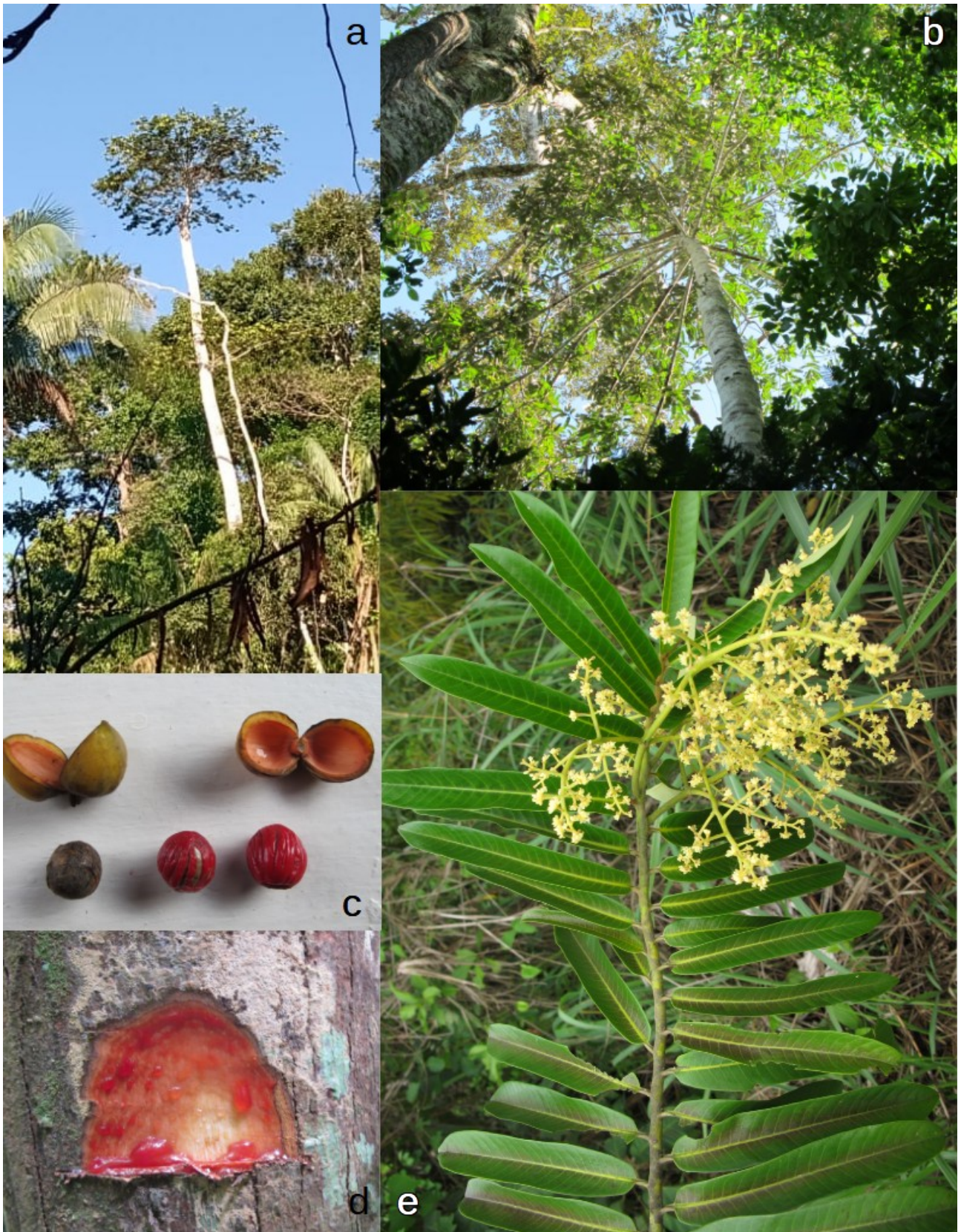


Fig. 1. Vegetative and reproductive aspects of Myristicaceae. **A-C.** *Virola surinamensis*. **A.** Far view. **B.** Under view of trunk and branches. **C.** Fruit, seed and aryl. **D.** *Compsonaura ulei*, longitudinal trunk cut showing red sap. **E.** Branch with leaves and flowers of *V. surinamensis*. Photos by I.T. Lopes.

MATERIALS AND METHODS

The state of Acre is in the North Region of Brazil in the extreme western part of the country. It is over 164,000 km², from 07°07' to 11°08'S latitude and 66°30' to 74°W longitude, and completely within Amazonia. Around 90% of Acre is native vegetation, and over 74,000 km² consist of conservation units. Acre mainly comprises the following phytoecological regions: open forest (*terra firme*), dense submontane forest, alluvial or floodplain forests (*várzea*), and *campinaranas* (fig. 2). The floristic composition is highly diverse in all these regions. The state also has two watersheds: the Juruá Basin in the western part and the Purus Basin in the eastern part. The climate is equatorial warm and humid, with an annual average temperature of 24.5°C and high levels of precipitation. The rainy season occurs most of the year, and the dry season lasts approximately four months during the winter and autumn (Daly & Silveira, 2008; ZEE, 2010; Medeiros *et al.*, 2014; IBGE, 2022).

A data survey of registered specimens was made to guide the study. The search was done using the keywords “Myristicaceae” and “Acre” (for locality) in the REFLORA (<https://reflora.jbrj.gov.br>), Specieslink (<http://specieslink.net>), GBIF (<https://www.gbif.org>), and Tropicos (<https://www.tropicos.org>) databases. Records with incorrect nomenclature or the wrong locality were updated when the exsiccatae were available, either by a visual analysis or when there was a label with the correct information. Records were discarded when this information was not available, the exsiccatae were from a different family or state, or they represented duplicate information. The survey served as the main source of data to direct and optimize the field and herbarium work. We prioritized the herbaria with significant material and samples with doubtful or incomplete determinations. The consulted herbaria were the following: INPA, NY, RB, SPF, UFACPZ, and UPCB (acronyms according to Thiers, 2016 onward). The herbaria were visited (RB, SPF, UFACPZ) or the material was loaned (INPA, NY, UFACPZ, UPCB). Digital herbaria enabled an online analysis of available exsiccatae from smaller or international collections, including specimens from neighboring areas and species types that were used as complimentary material. We used SpeciesLink and Re flora (cited above), as well as Jstor (<https://www.jstor.org>) and the virtual collections of B, CEN, F, HUEFS, IAN, K, M, MICH, MIRR, MO, P, U, US, and W (acronyms according to Thiers, 2016 onward).

Field work was done in the rainy season, one in October 2021 at different regions of the Purus Basin, and the other in November 2022, at *Parque Nacional da Serra do Divisor* in the Juruá Basin. Collected specimens were pressed and kept in 70% alcohol for transportation, dehydrated in a dryer at 70°C for at least 72 hours (Mori *et al.*, 1989), and deposited primarily in RB, UFACPZ, NY, and SPF.

Material was identified by consulting literature about the family (Smith, 1938; Rodrigues, 1980; Vicentini & Rodrigues, 1999; Jaramillo-Vivanco & Balslev, 2020) that has taxonomic keys, illustrations, photographs, descriptions and comments, as well as samples identified by specialists that were used to compare *in secco* aspects.

The dichotomous keys, taxonomic descriptions, and comments were written for the genera and species based on the exsiccatae of Myristicaceae collected in Acre and, for cases when flowers or fruits were lacking, adjacent states as complementary material. Vegetative and reproductive structures were examined and measured, especially the more expressive characters of each species. The morphological terminology follows Radford *et al.* (1974).

The occurrence maps were made using geographic coordinates and, when these were unavailable, the localities recorded on the exsiccata labels. The localities were confirmed using the platforms geoLoc (<http://splink.cria.org.br/geoloc>) and Google Earth. The coordinates were listed in an Excel sheet and plotted in the software Q-GIS v. 3.24.0 (www.qgis.org). The base maps used were of the Brazilian federal units made available by NEREUS (www.usp.br/nereus). The species distribution was based in the occurrences mentioned in the literature about the family, REFLORA, SpeciesLink and GBIF.

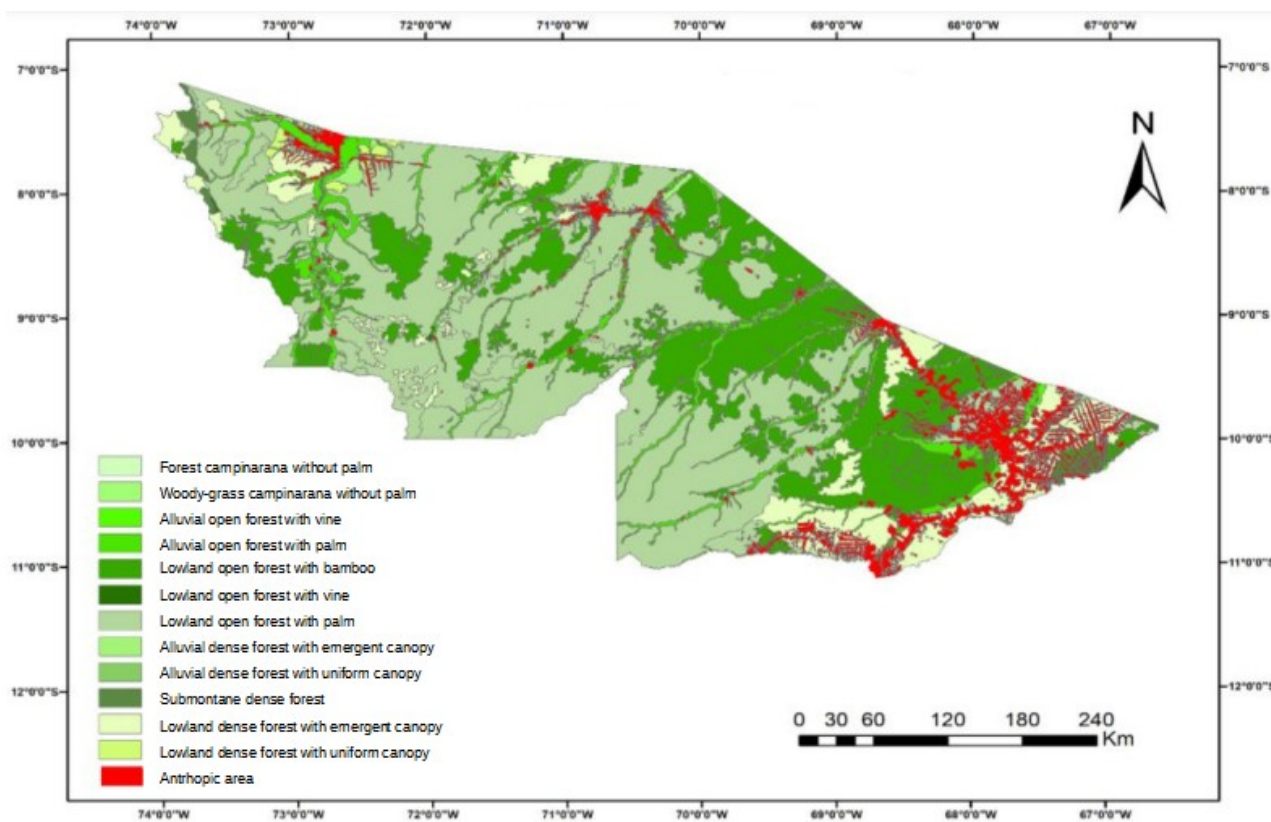


Fig. 2. Forest typologies in Acre, adapted from ZEE-Acre (2006) and Silva *et al.* (2019).

RESULTS AND DISCUSSION

This study identified and treated five genera and 34 species of American Myristicaceae. The flora catalogue mentions 28 species (Daly & Silveira, 2008), Flora e Funga do Brasil (2023) mentions 34 species, and the joined online data survey included 38 species. The majority of species listed were found in the three sources, but each one had exclusive records. Based on our analysis, the records of eight species were discarded due to misidentifications or a wrong assigned locality: *Compsonaura schultesiana* W.A. Rodrigues, *Iryanthera tessmannii* Markgr., *Virola divergens* Ducke, *V. malmei* A.C.Sm., *V. michelli* Heckel, *V. minutiflora* Ducke, *V. multcostata* Ducke, and *V. multinervia* Ducke. The study also confirmed online records of six species: *Iryanthera crassifolia* A.C.Sm., *I. olacoides* A.C.Sm., *I. paraensis* Huber, *I. sagotiana* (Benth.) Warb., *Otoba glycyarpa* (Ducke) W.A.Rodrigues & T.S.Jaram., and *Virola flexuosa* A.C.Sm. Five species are recorded for the first time for Acre: *Virola carinata* (Benth.) Warb., *V. excisa* D.Santam., *V. marleneae* W.A.Rodrigues, *V. rugulosa* Warb., and *V. yasuniana* D.Santam.

The genus *Virola* has the highest diversity for the state, with 17 species, followed by *Iryanthera* (12), *Compsonaura* and *Otoba* (two each), and *Osteophloeum* (one). This corresponds to 53% of the species recorded in Brazil; Acre is the second richest Brazilian state, and Amazonas is the richest (Flora e Funga do Brasil 2023). Aside from the flora catalogue (Daly & Silveira, 2008), previous studies of neotropical Myristicaceae, such as Ribeiro *et al.* (1999) and Penington *et al.* (2004), have shown the close or same richness ratio among genera, with 24 and 40 recorded species in total, respectfully.

The maps include 387 specimens, with the collections located close to accessible areas such as anthropic zones and river margins (fig. 3). The most well documented species are *Iryanthera juruensis*, *Otoba parvifolia*, *Virola calophylla*, *V. elongata* and *V. sebifera*, which are widely distributed in the state and occur in different habitats. Another 11 species also have wide distributions, but fewer collected specimens, and some species have restricted distributions with occurrences exclusive to each basin. Sixteen species are exclusive to the Juruá Basin, while two species are exclusive to the Purus Basin, resulting in 53% of Myristicaceae species being restricted to only one watershed. Differences in occurrences between the watersheds were previously observed by Guilherme (2013) with birds, and Medeiros *et al.* (2016) with vines and lianas (*Paullinia* L., Sapindaceae). Although mapping the species occurrences pointed to distribution patterns and provided hints about different floristic compositions in each basin, more specimens need to be collected to better understand this subject, considering that 11 species have not been collected for over 25 years and three new occurrences were recorded based on specimens collected in the last 15 years.

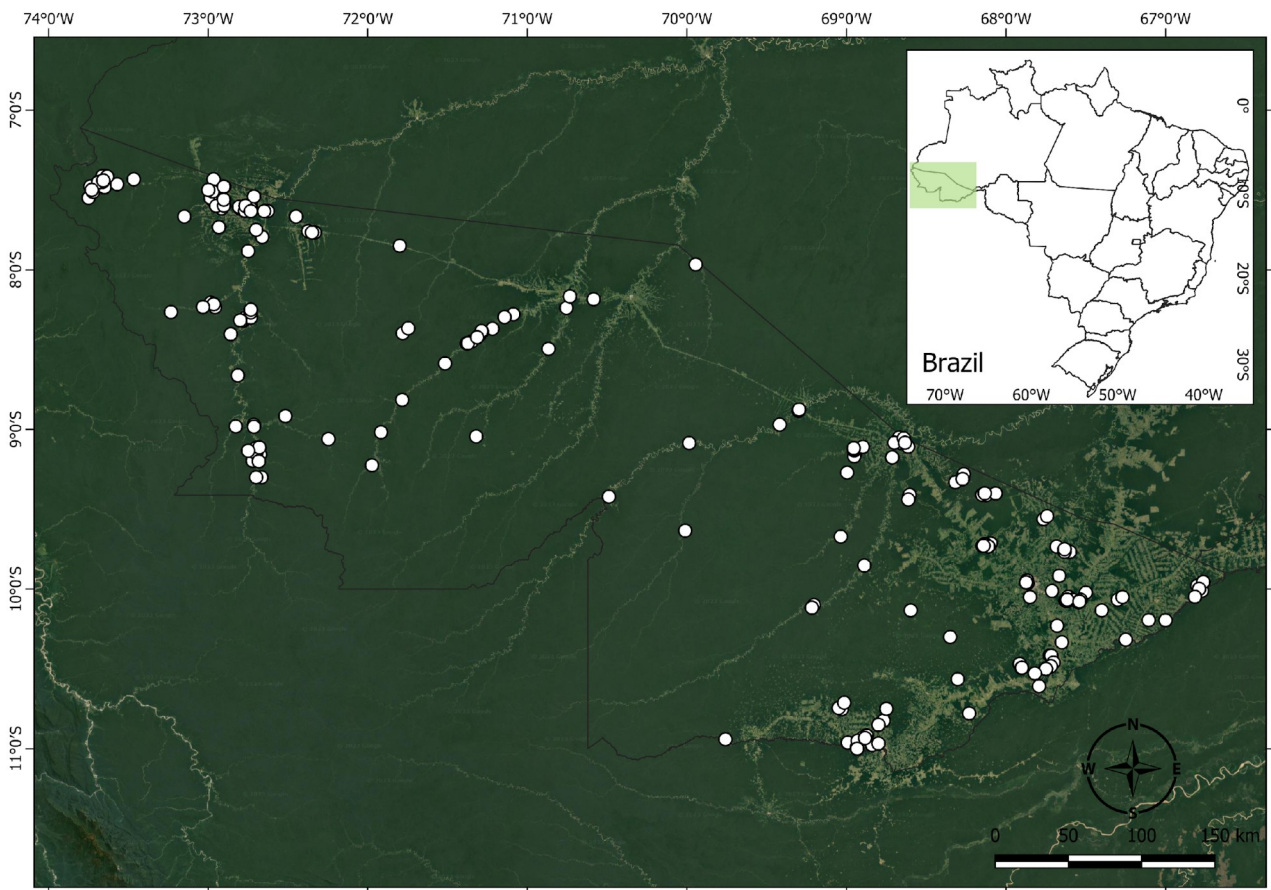


Fig. 3. Occurrence of Myristicaceae in Acre.

Some species share many similarities, and although the differences are discussed in the taxonomic comments, it is important to highlight these similarities because common misidentifications might be caused by the plasticity of the species and conservation state of specimens. These similarities might also be interesting topics for future studies that provide a better understanding of species characteristics and distributions. These species are *Iryanthera crassifolia* and *I. macrophylla*, *I. olacoides* and *I. tessmannii*, *Virola divergens* and *V. mollissima*, *V. duckei* and *V. rugulosa*, *V. carinata* and *V. pavonis*, *Virola elongata* and *V. sebifera*, as well as the *V. sebifera* synonym *V. theiodora* (Rodrigues, 1980; Flora e Funga do Brasil, 2023).

The descriptions and comments focus on the leaves and more external aspects of the inflorescences and fruits; the stamens, ovaries, and seeds are sometimes mentioned to differentiate similar species. The most important characters were the size, shape and trichome coverage in all structures (fig. 4, 5, 6), prominence and number of secondary nerves on the leaves (fig. 4), inflorescence type (fig. 5), and fruit apex (fig. 6). Due to the family being mostly dioecious and the previously observed sex ratio with a greater number of male specimens (Ackerly *et al.*, 1990), many species are restricted to only one type of inflorescence in the consulted collections. From the flowering specimens analyzed, 127 had staminate inflorescences, 17 had pistillate inflorescences, and 6 had both.

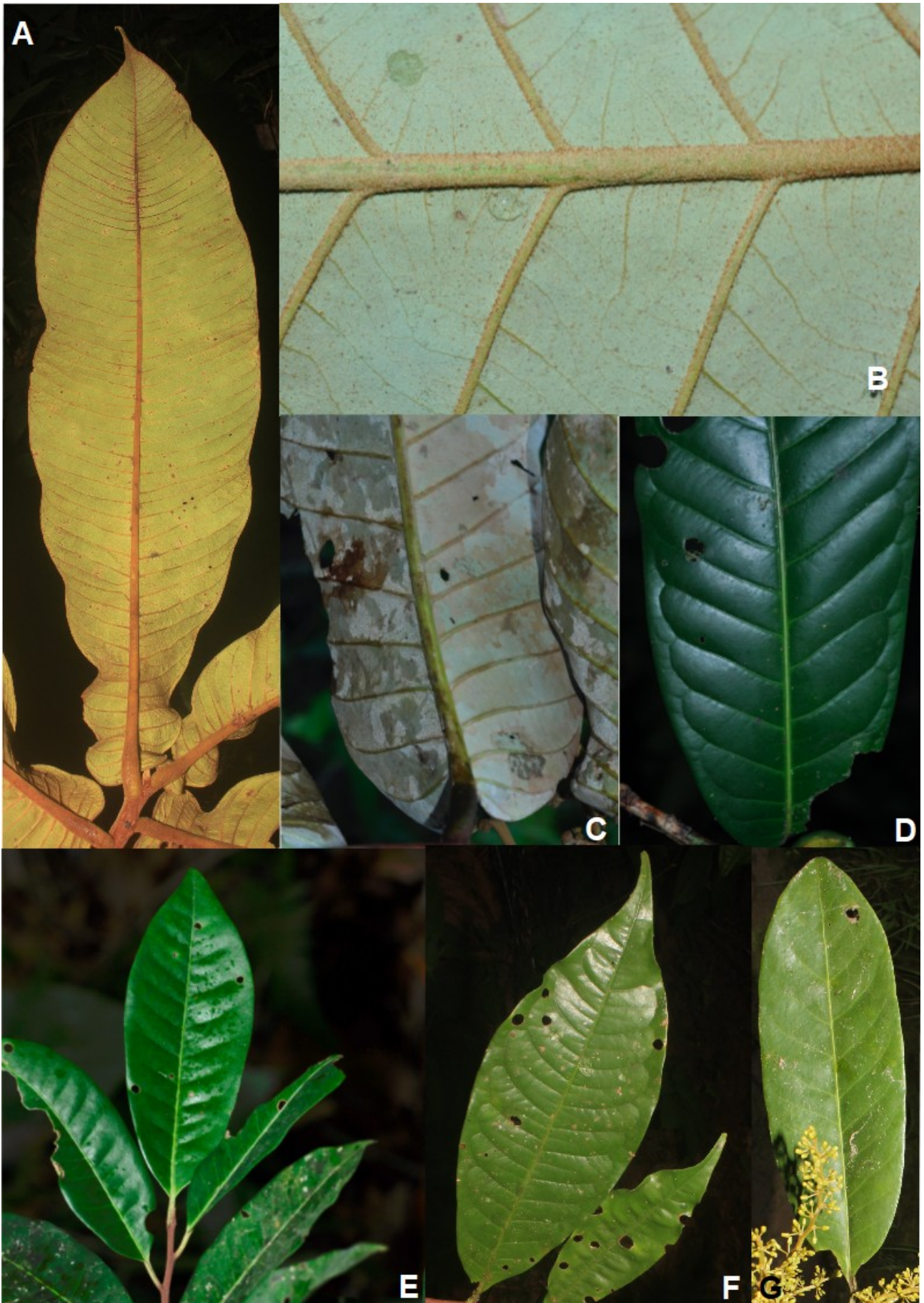


Fig. 4. Leaves. **A.** *Virola decorticans*, multiple secondary nerves (ca. 50) and puberulent leaf. **B.** *V. sebifera*, leaf underside puberulent and slightly ferruginous. **C.** *V. calophylla*, cordate leaf base and white underside **D.** *Iryanthera crassifolia*, impressed secondary nerves. **E.** *I. juruensis*, slightly impressed secondary nerves. **F.** *I. ulei*, impressed secondary nerves. **G.** *Otoba parvifolia*. Photos by H. Medeiros (A, F, G) and P.H. Labiak (B-E).

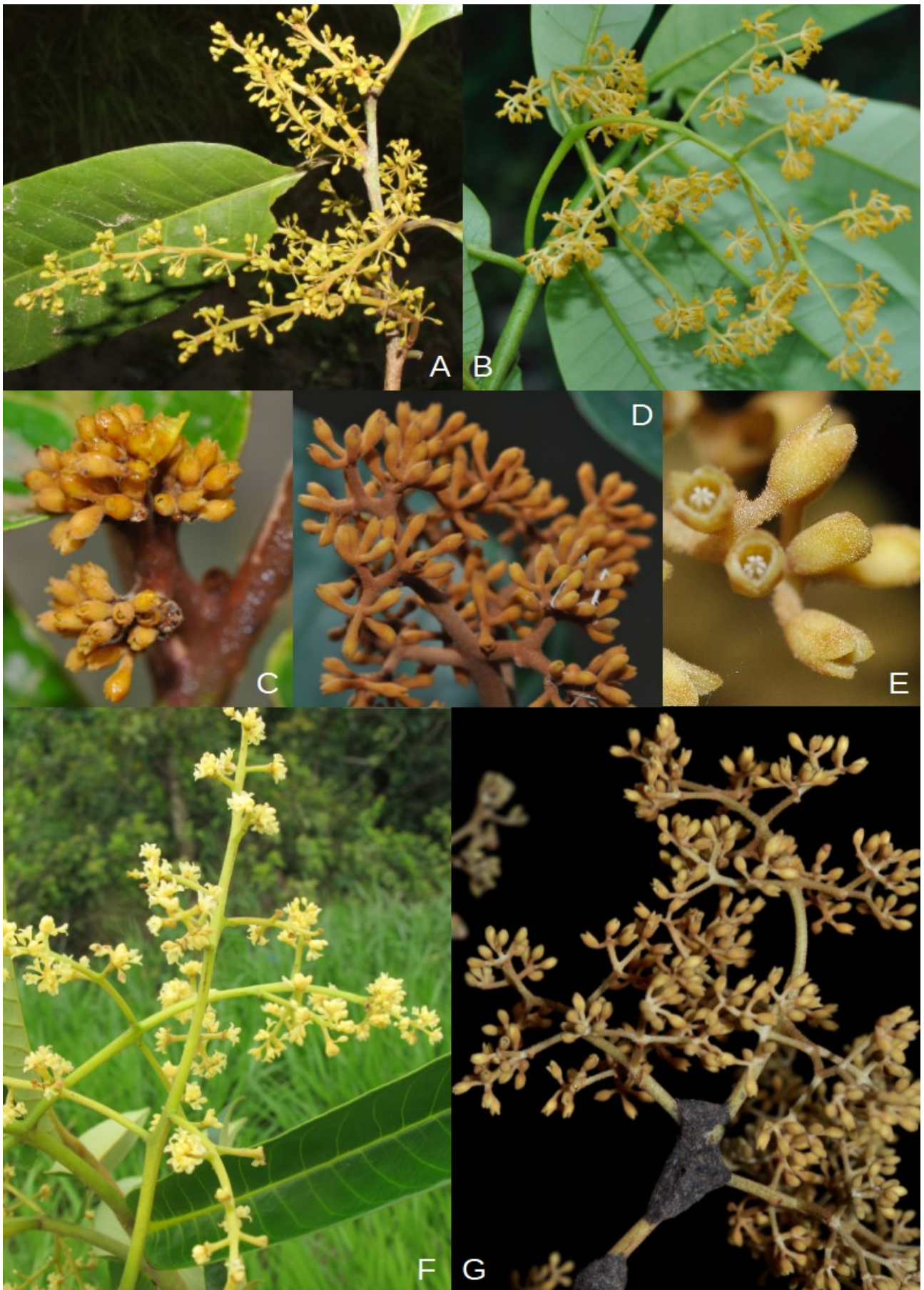


Fig. 5. Inflorescences. **A.** *Otoba parvifolia*, fasciculate-racemose inflorescence. **B.** *Virola carinata*, slender panicle. **C.** *V. peruviana*, pedicellate inflorescence. **D.** *V. mollissima*, ferruginous inflorescence. **E.** *V. sebifera*, staminate flower. **F.** *V. surinamensis*. **G.** *V. sebifera*, broad panicle. Photos by H. Medeiros (A), I.T. Lopes (F) and P.H. Labiak (B-E, G).

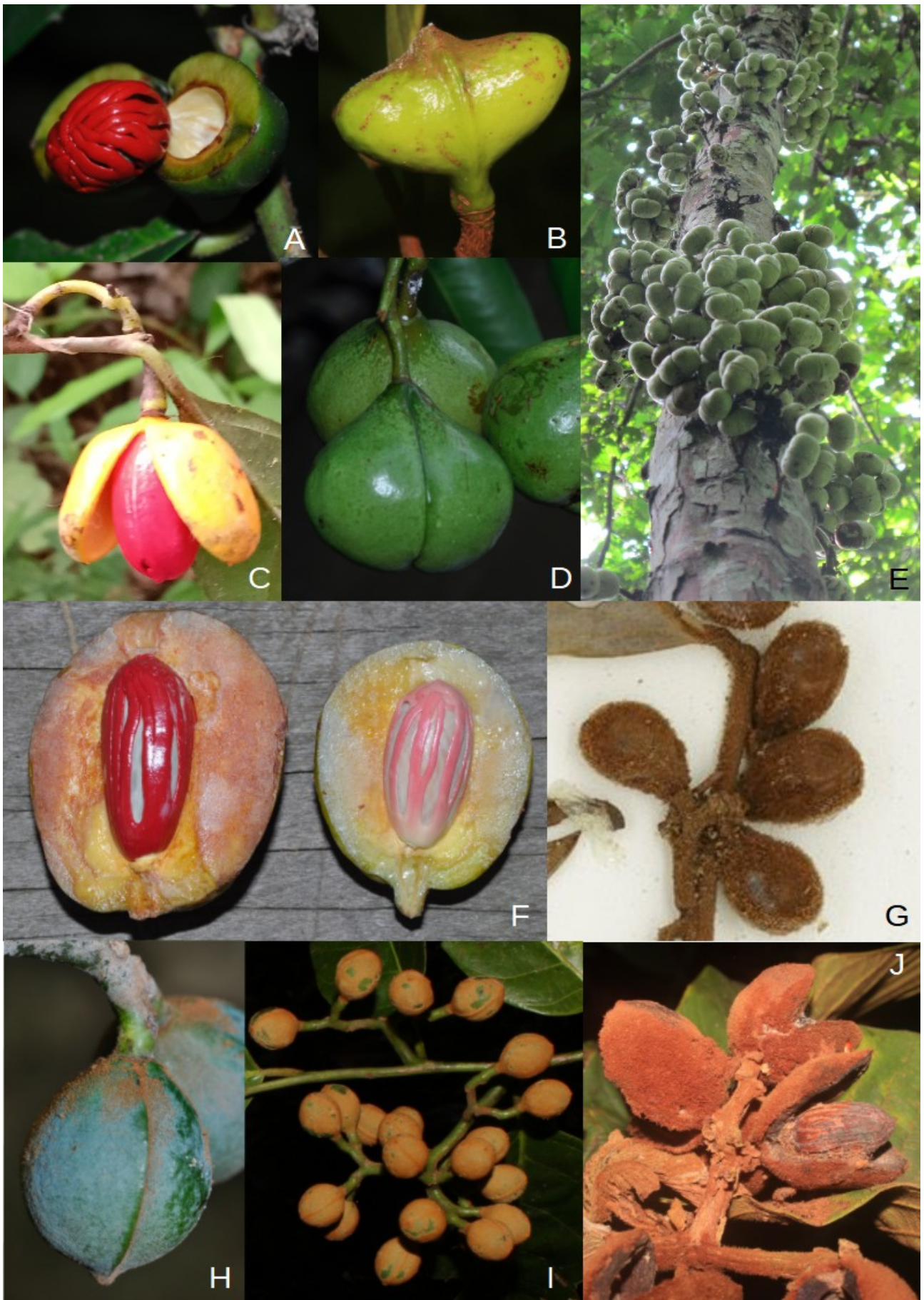


Fig. 6. Infructescences. **A.** *Iryanthera crassifolia*. **B.** *I. ulei*. **C.** *Componeura ulei*. **D.** *I. laevis*. **E.** *I. juruensis*, cauliflorous infructescences. **F.** *Virola pavonis*, fruits with different maturity stages. **G.** *V. marleneae*, obovoid fruit. **H.** *V. peruviana*, glabrescent fruit. **I.** *V. elongata*, pubescent fruit. **J.** *V. decorticans*, tomentose fruit. Photos by H. Medeiros (B), I.T. Lopes (C, E) and P.H. Labiak (A, D, F, H-J). G (Dodson et al. 2937).

GENERA KEY

1. Leaf with subparallel tertiary veins prominent on both surfaces, these almost perpendicular to the midrib; fruit longitudinally ellipsoid; seed with dark spots ***Compsonaura***
1. Leaf with discreet tertiary veins; fruit ellipsoid or other shape, seeds uniform in color 2
2. Inner sap whitish or yellowish; leaf often obovate-elliptic, with a round apex, petiole with a long, slender aspect ***Osteophloeum***
2. Inner sap red and translucent; leaf often elliptic or oblong, with an acute, acuminate or cuspidate apex, petiole with a short or thicker aspect 3
3. Trichomes stellate or with multiple branches; inflorescence a panicle ***Virola***
3. Trichomes, when present, simple or with one branch; inflorescence racemose rarely with few branches 4
4. Fruit transversely ellipsoid; flower with bracteoles ***Iryanthera***
4. Fruit longitudinally ellipsoid or globose; flower without bracteoles ***Otoba***

1. *Compsonaura* (A.DC.) Warb.

Compsonaura species are shrubs or treelets that are mostly distinguished by the characteristic tertiary veins of the leaves and have racemose inflorescences and ellipsoid fruits with spotted seeds. There are 18 species that occur from southern Amazonia, Brazil, to Mexico (Smith, 1938; Janovec, 2000).

KEY

1. Inflorescence 4.5–10 cm long; flowers aggregated in 3–10 fascicles on short, lateral branches; fruit with a more acute apex..... *C. sprucei*
1. Inflorescence 0.8–4 cm long; flowers solitary or sometimes paired; fruit with a more obtuse apex, often with a punctuation-like prominence..... *C. ulei*

1.1. *Compsonaura sprucei* (A.DC.) Warb., Nova Acta Acad. Leop.-Carol. 68: 143. 1897.

Shrub or small tree, up to 6 m tall. Petiole 9–22 × 1–2 mm, shallowly canaliculate, rugose, glabrous. Leaf blade (7.5)11–19.5 × 4–8 cm, chartaceous or thinly coriaceous, elliptic or oblong-elliptic, sometimes slightly obovate, glabrous, apex acuminate to cuspidate (up to 20 mm long), base acute to attenuate, secondary veins 6–11 per side, raised on both surfaces. Inflorescence 4.5–10 cm long, glabrous throughout, peduncle up to 15 mm long, fasciculate-racemose, with 10–20 fascicles per inflorescence and 3–10 flowers per fascicle; flowers 2–3 × 1–2 mm, cupuliform, pedicel 1–2 mm long, green, turning orange. Infructescence up to 2.5 cm long, glabrous throughout, with 1–3 fruits, peduncle 10–17 mm long; fruits 2.6–3 × 1.7–2 cm, ovoid, rarely ellipsoid, smooth, green to yellow. Figure 8A-E.

Representative specimens examined. BRAZIL. Acre: Cruzeiro do Sul, BR 364 km 42, ramal 4 do Projeto Santa Luzia (INCRA), 12 September 1985, *A. Rosas Junior et al.* 271 (INPA, NY, RB, UFACPZ, UPCB); estrada Alemanha, 8 May 1971, *P.J.M. Maas et al.* P12802 (INPA, MICH, NY, U); **Mâncio Lima**, basin of rio Juruá, rio Moa, Volta da Aurora, 4 May 1996, *D.C. Daly et al.* 8834 (NY, UFACPZ, UPCB); **Marechal Thaumaturgo**, Reserva extrativista do Alto Juruá, base da restauração, rio Tejo, 13 January 1996, *C. Figueiredo et al.* 1059 (MO, NY, US); *ibidem*, 23 January 1996, *C. Figueiredo et al.* 1090 (MO, NY); bacia do rio Juruá, rio Amônia, ca. 6 km da cidade de Marechal Thaumaturgo, colônia do Sr. Orlando, 16 June 2013, *H. Medeiros et al.* 1390 (NY).

Taxonomic notes: *Compsonaura sprucei* is easily identified by the tertiary veins. It is distinguished from the other *Compsonaura* species in Acre by the longer inflorescence with peduncled fascicles

(with up to 10 flowers) and often ovoid fruits (vs. short inflorescence with solitary or paired flowers and ellipsoid fruits).

Distribution, Habitat and Phenology: Belize, Bolivia, Colombia, Costa Rica, Ecuador, Guatemala, Guyana, Mexico, Nicaragua, Panama, Peru, Venezuela, and Brazil. In Brazil, it occurs in Acre and Amazonas. In Acre (fig. 7), it has been found in *terra firme* and floodplain forests. Flowering has been recorded in January and May, and fruiting has been recorded in September.

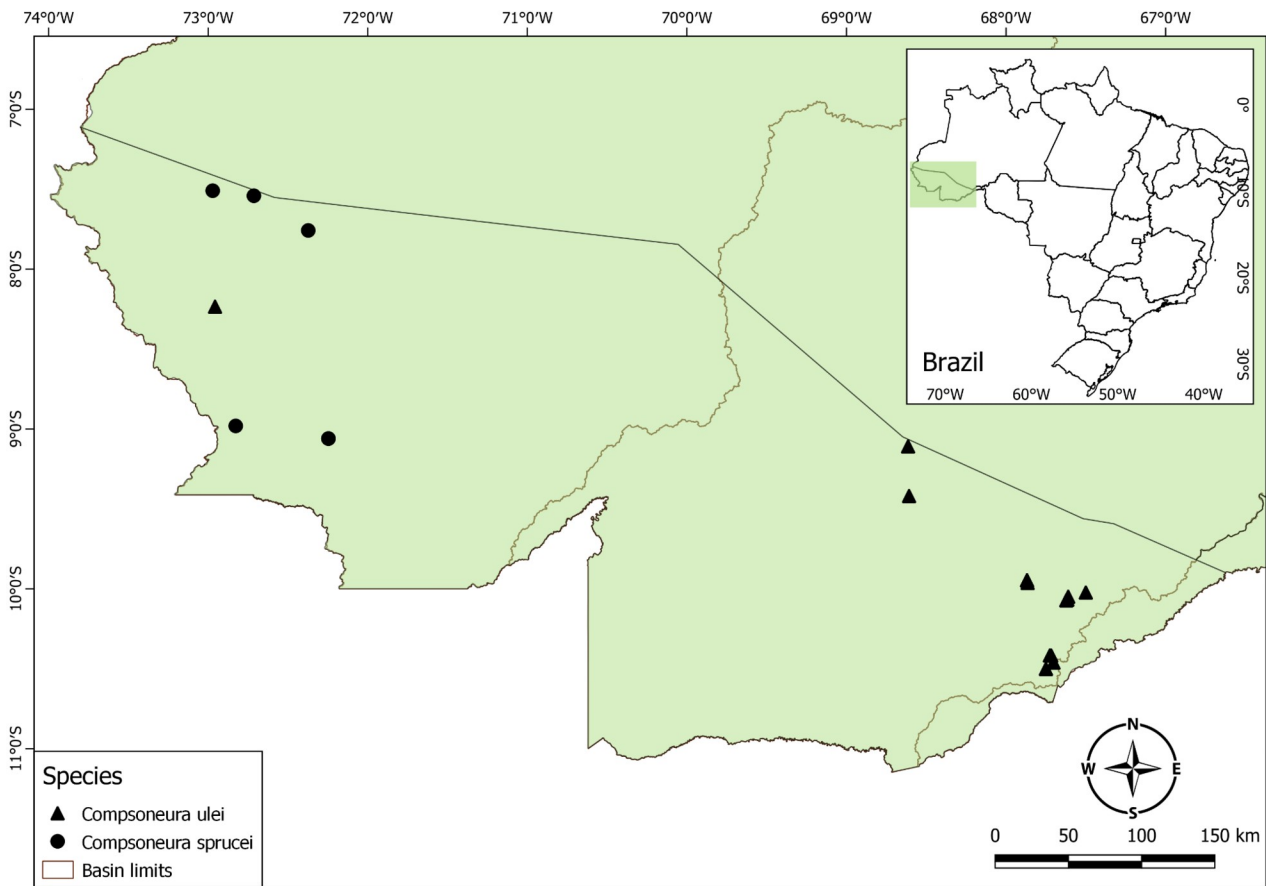


Fig. 7. Occurrence of *Compsonneura sprucei* and *C. ulei* in Acre.

1.2. *Compsonneura ulei* Warb., Yerb. Bot. Ver. Prov. Brand. 47: 136. 1905.

Shrub or small tree, up to 7 m tall. Petiole 5–18 × 1–2 mm, shallowly canaliculate, rugose, glabrous. Leaf blade 8.5–22.5 × 2.5–7.5 cm, chartaceous, elliptic to oblong-elliptic, glabrous, apex cuspidate to acuminate (up to 18 mm long), base attenuate, secondary veins 5–9 per side, raised on both sides. Inflorescence 0.8–4 cm long, glabrous, peduncle up to 10 mm long, racemose, with 3–10 flowers per inflorescence; flowers 2–4 × 1–3 mm, cupuliform, pedicel 2–5 mm long, yellow. Infructescence 2.9–4.5 cm long, glabrous, with 1–3 fruits, peduncle 5–9 mm long; fruits 1.1–2 × 0.9–1.3 cm, ellipsoid, smooth, shiny, orange. Figures 1D, 2D, 6C, 8F-I.

Representative specimens examined. BRAZIL. Acre: Capixaba, 60 km from Rio Branco on Rio Branco-Brasília road, 7 October 1980, *S.R. Lowrie et al.* 428 (INPA, MO, NY, UFACPZ, US); 65 km from Rio Branco on Rio Branco-Brasília road, 10 October 1980, *S.R. Lowrie et al.* 464 (INPA, MO, NY, RB, UFACPZ, US); **Porto Walter**, rio Juruá-Mirim, igarapé Comprido (right-bank tributary), near comunidade Santo Antônio, 12 May 2003, *D.C. Daly et al.* 11762 (NY); **Rio Branco**, Rio Branco-Porto Velho highway, km 22, Quinoá, 30 March 1979, *B.W. Albuquerque et al.* 1286 (MO, UPGB); BR 317 (Rio Branco-Brasília road) approx. 10 km W of km 68, 7 June 1991, *D.C. Daly et al.* 6894 (INPA, MO, NY, UFACPZ); *ibidem*, km 67 A.E.F./FUNTAC, 12 February 1992, *I.F. Rego & F.C.S. Waltir* 941 (NY, UFACPZ); *ibidem*, 15 February 1990, *R.S. Saraiva & I.F. Rego* 294 (NY, UFACPZ); **Sena Madureira**, basin of rio Iaco (tributary of rio Purus), fazenda São Jorge I, 11 July 2008, *D.C. Daly et al.* 13332 (RB); vicinity of km 7, road Sena Madureira to Rio Branco, 29 September 1968, *G.T. Prance et al.* 7661 (INPA, NY, US); **Senador Guimard**, BR 317, km 33 a 200 m da margem da estrada, 11 October 1980, *C.A. Cid Ferreira & B.W. Nelson* 2832 (INPA, UFACPZ, US); reserva experimental Catuaba, 14 January 1994, *C. Figueiredo* 337 (NY, UFACPZ); *ibidem*, 29 July 1997, *C. Figueiredo* 408 (MO, NY, UFACPZ, UPGB); *ibidem*, near km 22 of BR 364, 16 October 1997, *D.C. Daly et al.* 9590 (NY, UFACPZ, UPGB); *ibidem*, próximo à ponte, 27 October 2021, *I.T. Lopes et al.* 10 (NY, RB).

Taxonomic notes: *Compsoeura ulei* is the most common *Compsoeura* species in the state and distinguished by the shorter inflorescence with solitary, or sometimes paired, alternate flowers on the rachis. The fruit is smaller and ellipsoid, with a broader apex compared to *C. sprucei*, and often has a small prominence at the very top.

Habitat, Distribution and Phenology: Bolivia, Colombia, Ecuador, Guyana, French Guiana, Peru, Suriname, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Amapá, Maranhão, Mato Grosso, Pará, Rondônia, and Roraima. In Acre (fig. 7), it has been found in *terra firme* forest. Flowering has been recorded in January, February and March, and fruiting has been recorded from May to July and in September and October.

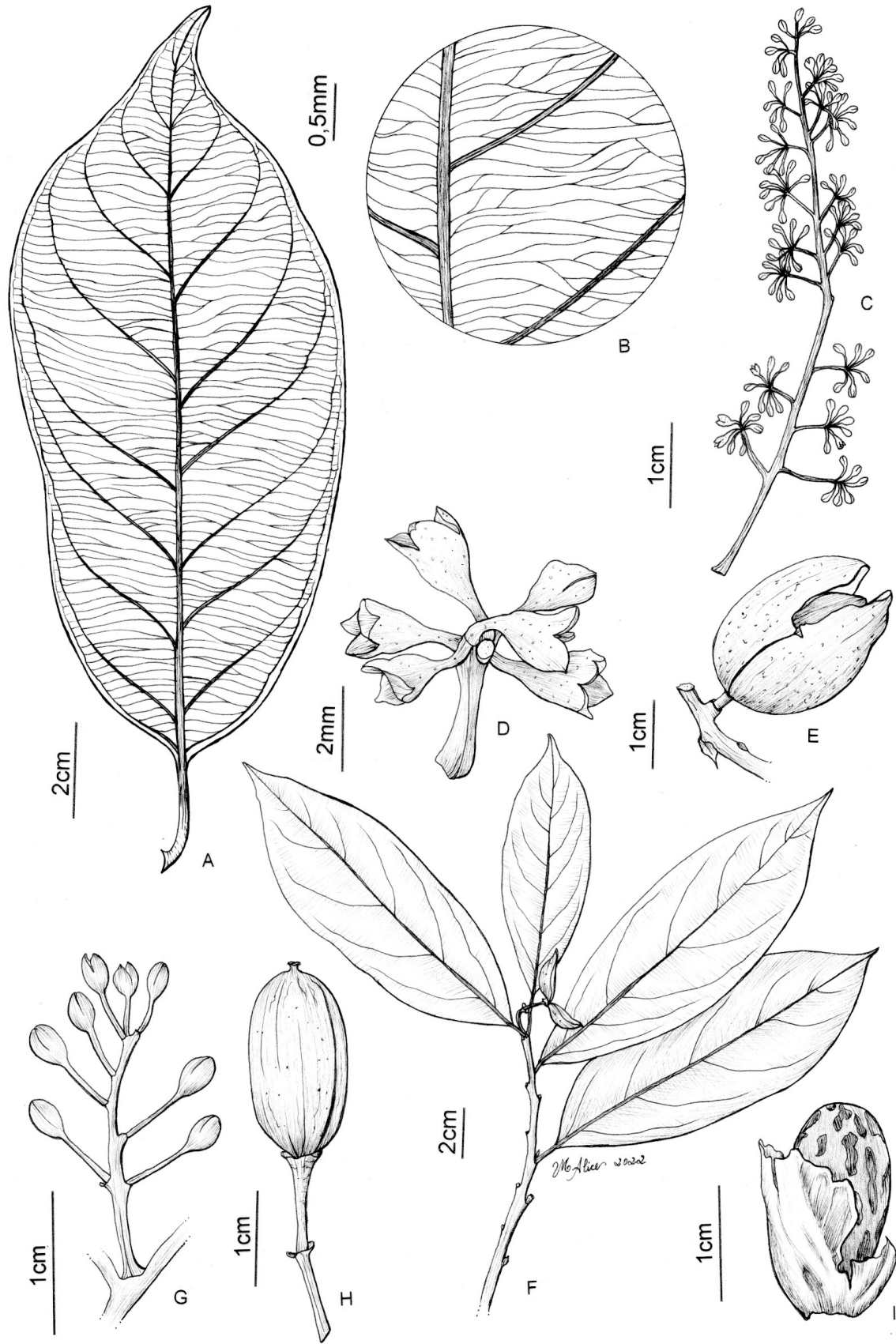


Fig. 8. *Compsonera sprucei* and *C. ulei*. **A-E.** *C. sprucei*. **A.** Leaf. **B.** Tertiary nerves. **C.** Inflorescence. **D.** Flower fascicule. **E.** Fruit. **F-I.** *C. ulei*. **F.** Branch with leaves and fruit. **G.** Inflorescence. **H.** Fruit. **I.** Pericarp with exposed seed. (A, B, E *A. Rosas Jr. et al.* 271, C, D *P.J.M. Maas et al.* P12802, F, H, I *I.T. Lopes et al.* 10, G *C.S. Figueiredo* 337)

2. *Iryanthera* (A.DC.) Warb.

Trees or sometimes treelets distinguished by their monoecy (with staminate and pistillate flowers on inflorescences of the same specimen), glabrous infructescences, and fruits usually transversally ellipsoid. The leaves are glabrous or glabrescent. There are 20–25 species in the genus, which occur from Bolivia to Costa Rica, although some need to be reviewed or revised (Smith, 1938; WFO, 2022; Zarate, 2022).

KEY

1. Leaf with secondary veins often obscure and nearly plane on both sides 2
1. Leaf with secondary veins noticeable, impressed or raised on one or both sides 5
2. Flower with campanulate perianth, pedicel 3–10 mm long, usually over 5 mm ***I. laevis***
2. Flower with cupuliform perianth, pedicel up to 5 mm long 3
3. Leaf base obtuse; inflorescence densely puberulent; fruit subglobose ***I. elliptica***
3. Leaf base acute or attenuate; inflorescence pubescent or puberulent; fruit ellipsoid 4
4. Fruit with round lateral extremities; inflorescence slender, with up to 20 fascicles, often glabrescent; flowers ca. 5 per fascicle ***I. sagotiana***
4. Fruit with acute lateral extremities, with a thin ridge along the dehiscence line; inflorescence with up to 15 fascicles, often pubescent; flowers up to 10 per fascicle ***I. tricornis***
5. Leaf with secondary veins slightly impressed to impressed on the upper surface, chartaceous or rarely thinly coriaceous 6
5. Leaf with secondary veins impressed to deeply impressed or raised on the upper surface, coriaceous or thickly coriaceous 7
6. Leaf with discreet intramarginal anastomoses; flower with cupuliform perianth; infructescence cauliflorous; fruits many per infructescence, smooth at apex ***I. juruensis***
6. Leaf with conspicuous intramarginal anastomoses; flower with campanulate perianth; infructescence on a branch; fruits up to 3 per infructescence, apiculate at apex ***I. olacoides***
7. Leaf with intramarginal anastomoses nearly plane, many times inconspicuous; inflorescence with up to 30 fascicles, with small spacing between them, especially closer to the apex; fruit subglobose with round apex ***I. lancifolia***
7. Leaf with intramarginal anastomoses impressed, conspicuous; inflorescence with up to 20 fascicles, with bigger spacing between them; fruit transversally ellipsoid with apiculate apex 8
8. Flower with campanulate perianth 9
8. Flower with cupuliform periant 11

9. Leaf blade up to 22 cm long, secondary nerves always impressed above; flower pedicel over 4 mm long; fruit often nigrescent *in secco* *I. paradoxa*
9. Leaf blade often over 22 cm long, secondary nerves impressed or raised above; flower pedicel up to 4 mm long; fruit often brown *in secco* 10
10. Leaf with acute base; inflorescence fascicle with short peduncle; fruit slightly apiculate
..... *I. crassifolia*
10. Leaf with round or obtuse base; inflorescence fascicle sessile; fruit strongly apiculate
..... *I. macrophylla*
11. Fruit apex smooth or slightly apiculate, round lateral extremities *I. paraensis*
11. Fruit apex conspicuously apiculate, subacute lateral extremities *I. ulei*

2.1. *Iryanthera crassifolia* A.C.Sm., Brittonia 2(5): 431. 1938.

Tree, 6–10 m tall. Petiole 14–20 × 3–5 mm, canaliculate, rugose, glabrous. Leaf blade 27–32 × 6–9 cm, thickly coriaceous, elliptic, glabrous, apex acuminate (up to 15 mm long), base acute, secondary veins 19–21 per side, raised on both sides. Inflorescence 3.5–8 cm long, puberulent, peduncle 1–2 × 0.2 cm, fasciculate-racemose, with 5–14 fascicles per inflorescence and 4–8 flowers per fascicle; flowers 3–4 × 2–3 mm, campanulate, pedicel 2–4 mm long, green. Infructescence up to 3 cm long, glabrous, with 1–4 fruits, pedicel 3–10 × 2 mm; immature fruits 1.5–2 × 1 cm, slightly transversely ellipsoid, carinate, rugose, green. Figures 4D, 6A, 10A-C.

Representative specimens examined. BRAZIL. Acre: Mâncio Lima, basin of rio Juruá, upper rio Moa, 5 km behind fazenda Arizona, near Serra do Divisor, 15 October 1989, *C.A. Cid Ferreira et al.* 10117 (INPA, NY); vicinity of Serra da Moa, 22 April 1971, *G.T. Prance et al.* 12275 (INPA, NY, RB, U, US); east slope of Serra da Moa, 28 April 1971, *G.T. Prance et al.* 12587 (INPA, NY, U, US); Parque Nacional da Serra do Divisor, trilha 3 do Programa Monitora, 1 December 2022, *I.T. Lopes et al.* 60 (INPA, NY, RB, SPF, UFACPZ, UCPB); estrada para Barão do Rio Branco, ca. 10 km de Mâncio Lima, 25 August 2008, *P. Fiaschi et al.* 3428 (RB); **Porto Walter**, rio Juruá, aproximadamente a 5 km atrás da vila Porto Walter, 31 October 1991, *C.A. Cid Ferreira et al.* 10490 (MO, NY, UFACPZ, UCPB); Porangaba, rio Juruá-Mirim, 20 May 1971, *P.J.M. Maas et al.* P13167 (INPA, NY, U, US).

Taxonomic notes: *Iryanthera crassifolia* is distinguished within the genus by its larger leaves. It is very similar to *I. macrophylla*. When the reproductive structures are immature it can be especially difficult to differentiate these species, but *I. crassifolia* often has leaves with an acute base (vs.

obtuse or round), inflorescence fascicles with short peduncles (ca. 3 mm; vs sessile), and many times its inflorescences and perianth are longer. Further, the fruit is carinate in both species, but the apex is less prominent in *I. crassifolia* than in *I. macrophylla*.

Distribution, Habitat and Phenology: Colombia, Ecuador, Peru, Venezuela, and Brazil. In Brazil, it is in Acre and Amazonas. In Acre (fig. 9), it has been found in *terra firme* forest and *campinarana*. Flowering has been recorded in April and May, and fruiting has been recorded in August and October.

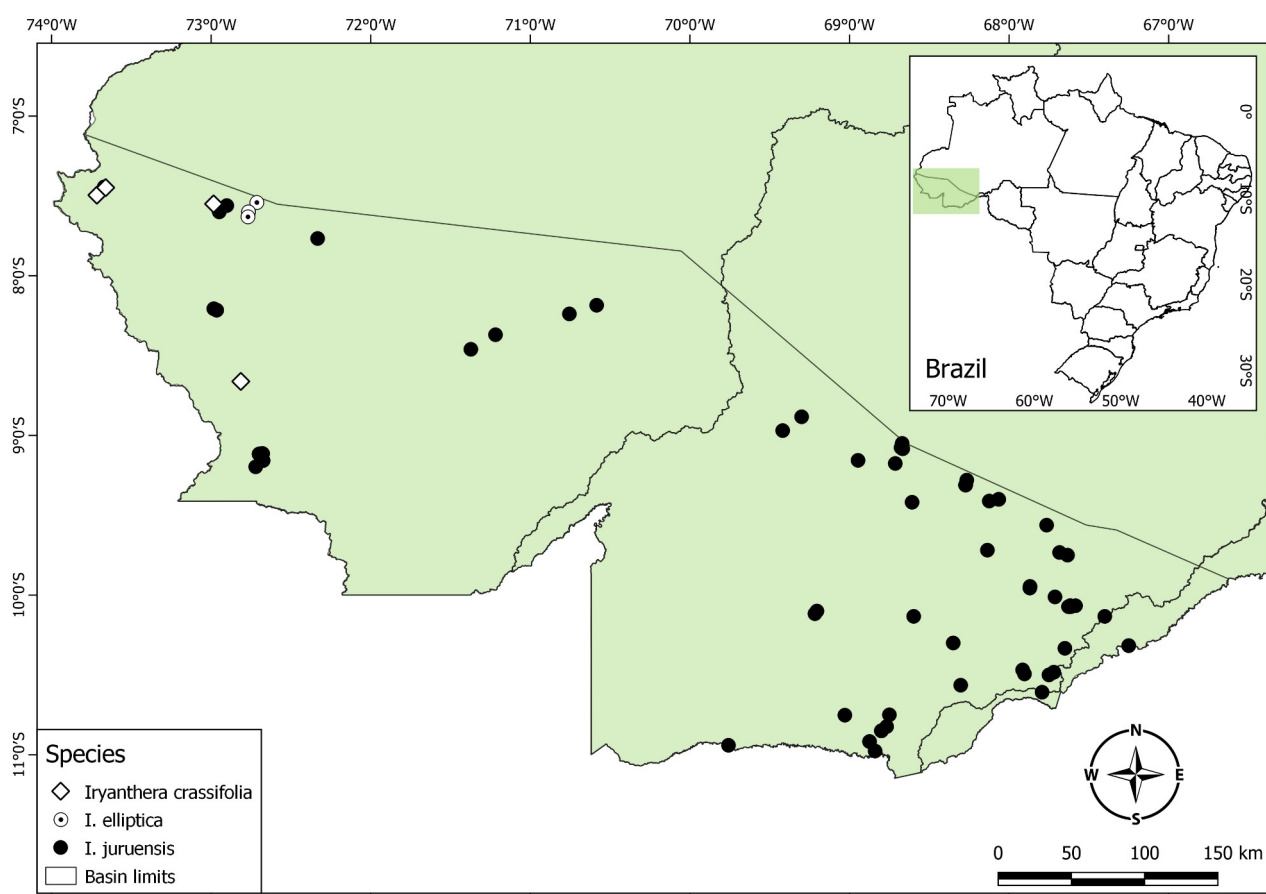


Fig. 9. Occurrence of *Iryanthera crassifolia*, *I. elliptica* and *I. juruensis* in Acre.

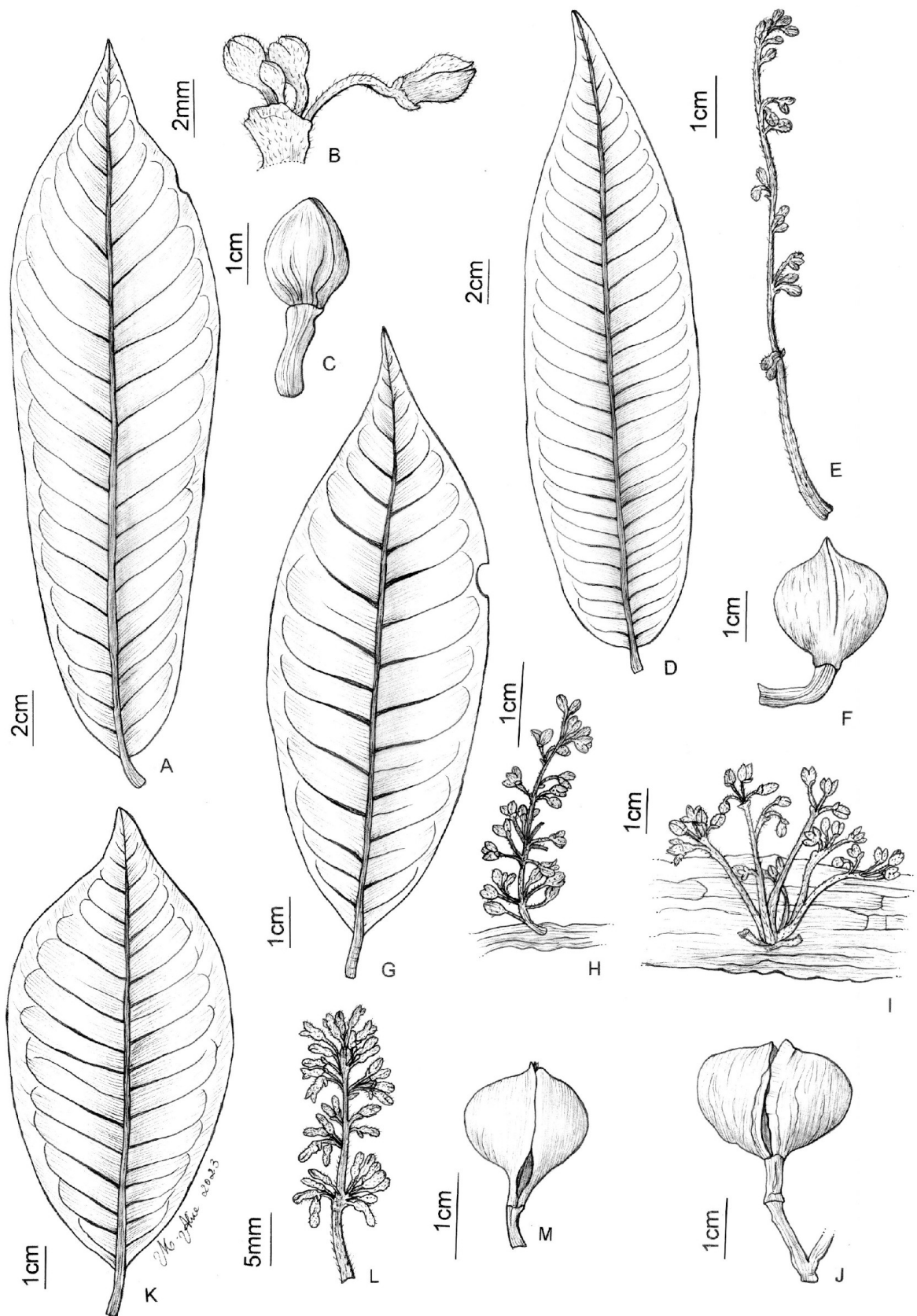


Fig.10. *Iryanthera crassifolia*, *I. macrophylla*, *I. juruensis* and *I. olacoides*. **A-C.** *I. crassifolia*. **A.** Leaf. **B.** Flower fascicle. **C.** Fruit. **D-F.** *I. macrophylla*. **D.** Leaf. **E.** Inflorescence. **F.** Fruit. **G-J.** *I. juruensis*. **G.** Leaf. **H.** Staminate inflorescence. **I.** Pistillate inflorescence. **J.** Fruit. **K-M.** *I. olacoides*. **K.** Leaf. **L.** Inflorescence. **M.** Fruit. (A C.A. Cid Ferreira et al. 10490, B G.T. Prance et al. 12275, C C.A. Cid Ferreira 10117, D,F C.A. Cid Ferreira et al. 10654, E P.J.M. Maas P12840, G J.M.A. de Souza 157, H A. Rosas Jr. et al. 207, I C.A. Cid Ferreira et al. 10191, J G.T. Prance et al. 7393, K, L D.C. Daly et al. 5541, M C.A. Cid Ferreira & A. Souza 3001)

2.2. *Iryanthera elliptica* Ducke, Jour. Wash. Acad. 26: 219. 1936.

Tree, 10–30 m tall. Petiole 8–20 × 2–3 mm, canaliculate, rugose, glabrescent. Leaf blade 12–24 × 4.5–6.5 cm, thinly coriaceous or coriaceous, elliptic-oblong, glabrous, apex acuminate (rarely cuspidate, up to 15 mm long), base slightly obtuse or round, rarely acute, secondary veins 14–20 per side, slightly impressed above, slightly raised below, nearly plane on both sides. Inflorescence 3–5 cm long, puberulent, peduncle 4–7 mm long, fasciculate-racemose, with 10–15 fascicles per inflorescence and 3–10 flowers per fascicle; flowers 2 × 2 mm, cupuliform, pedicel 2–3 mm long, ferruginous. Infructescence up to 4 cm long, glabrous, with 1–3 fruits, pedicel 5–11 × 1–3 mm; fruits 3–4 × 2–4 cm, subglobose and transversely ellipsoid, forming a ridge along the dehiscence line, rugose, green. Figure 11A,B.

Representative specimens examined. BRAZIL. Acre: Cruzeiro do Sul, estrada Alemanha, 14 April 1971, *G.T. Prance et al. 11849* (INPA, P, US); Projeto RADAM, sub-base de Cruzeiro do Sul, 12 February 1976, *L.R. Marinho 155* (IAN, INPA); *ibidem*, ponto 5, 19 February 1976, *L.R. Marinho 242* (IAN, INPA); *ibidem*, 19 February 1976, *O.P. Monteiro & C. Damião 76-514* (INPA).

Representative specimens additional examined. BRAZIL. Amazonas: Manaus, 16 May 1942, *A. Ducke 929* (IAN, MO, NY, RB, US).

Taxonomic notes: *Iryanthera elliptica* has leaves with a characteristic elliptic-oblong shape and usually obscure secondary veins, *in secco* often has a ferruginous coloring below. It differs from other *Iryanthera* species with discreet and often plane veins, such as *I. laevis*, *I. sagotiana* and *I. tricornis*, by the larger, thicker leaves with a often rounder or more obtuse base. The inflorescences are often more puberulent compared to the other three species, and the fruits are ellipsoid or subglobose. The fruits can resemble those of *I. lancifolia*, but *I. elliptica* can be differentiated by the nearly plane (vs. impressed in *I. lancifolia*) secondary veins of the leaves and the smaller inflorescence with fewer fascicles.

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, Peru, Venezuela and Brazil. In Brazil, it occurs in Acre, Amazonas, Mato Grosso, and Rondônia. In Acre (fig. 9), it has been found in *terra firme* forest. Flowering has been recorded in February and April, and fruiting has been recorded in February.

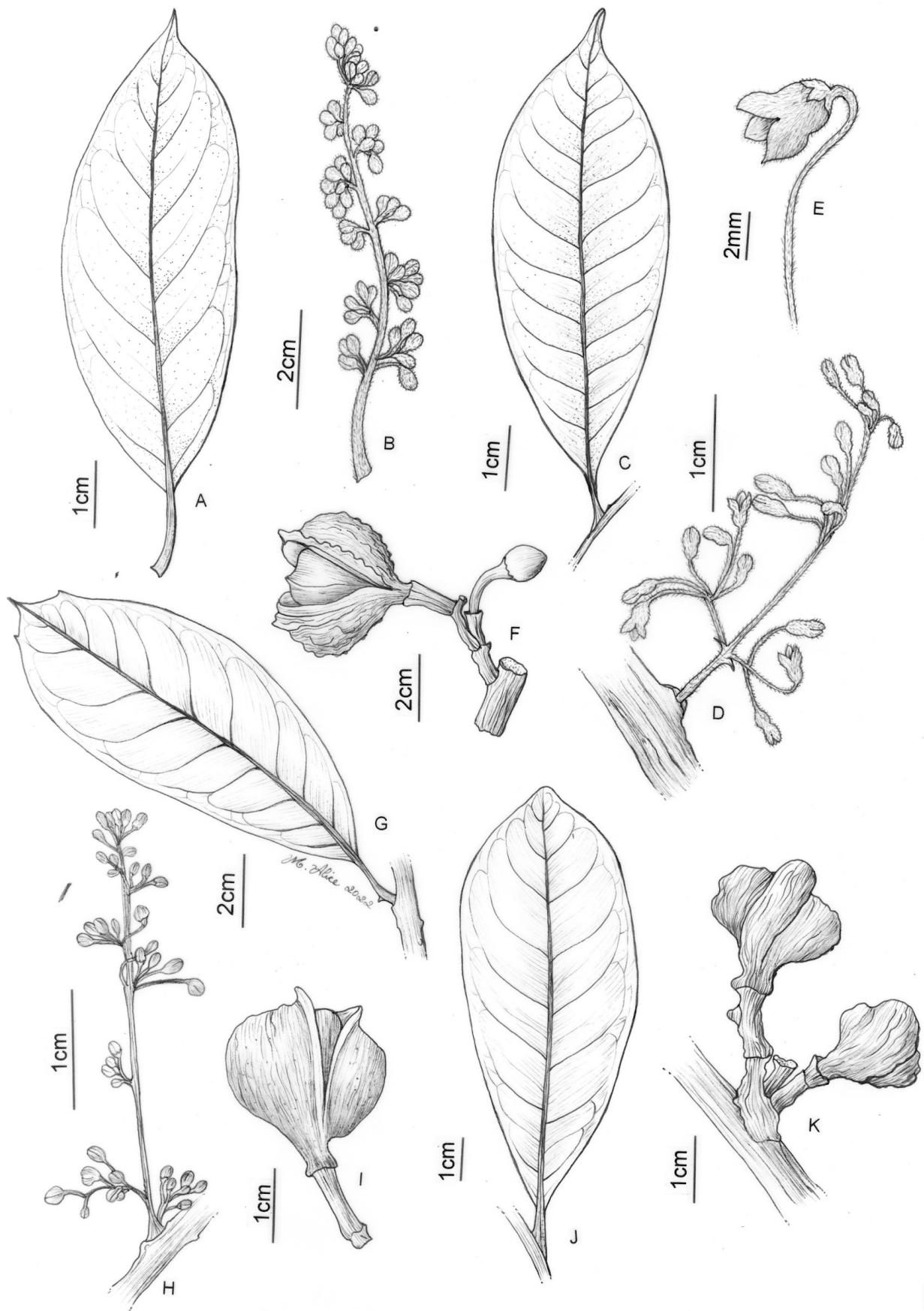


Fig. 11. *Iryanthera elliptica*, *I. laevis*, *I. sagotiana* and *I. tricornis*. **A-B.** *I. elliptica*. **A.** Leaf. **B.** Inflorescence. **C-F.** *I. laevis*. **C.** Leaf. **D.** Inflorescence. **E.** Flower. **F.** Fruit. **G-I.** *I. sagotiana*. **G.** Leaf. **H.** Inflorescence. **I.** Fruit. **J-K.** *I. tricornis*. **J.** Leaf. **K.** Fruit. (A, B G.T. Prance et al. 11849, C, D, E C.A. Cid Ferreira et al. 10205, F C.A.P. Toledo et al. 561, G, I C.A. Cid Ferreira et al. 10712, H B.M. Torke et al. 1513, J, K H. Medeiros et al. 1038)

2.3. *Iryanthera juruensis* Warb., Verh. Bot. Ver. Prov. Brand. 17: 137. 1905.

Tree, 5–20 m tall. Petiole 5–17 × 1–2 mm, canaliculate, rugose, glabrous. Leaf blade 7–20 × 2.5–6 cm, chartaceous or thinly coriaceous, elliptic or elliptic-obovate, glabrous, apex acuminate or cuspidate (up to 20 mm long), base acute to attenuate, secondary veins 10–18 per side, slightly impressed above, raised below. Staminate inflorescence up to 5 cm long, peduncle 5–10 mm long, panicle, 5–15 fascicles per inflorescence, flowers 3–6 per fascicle; pistillate inflorescence up to 7 cm long, peduncle up to 6 cm long, forming clusters with 20–30 flowers; both pubescent; flowers 2–3 × 1–3 mm, cupuliform, pedicel 1–4 mm long, yellow. Infructescence 4–9 cm long, glabrous, with 3–10 fruits, pedicel 4–8 mm; fruits 1.5–2.2 × 1.6–3.2 cm, transversely ellipsoid or subglobose, rugose, light green. Figure 4E, 6E, 10G-J.

Representative specimens examined. BRAZIL. Acre: Assis Brasil, Reserva Extrativista Chico Mendes, seringal Porongaba, estrada para a colocação Urubu, aproximadamente a 36 Km nortenordeste de Brasiléia, 10 July 1991, *C.A. Cid Ferreira et al. 10147A* (INPA, MO, NY, UFACPZ); seringal San Francisco, rio Acre, 1 May 1911, *E.H.G. Ule 9375* (L); **Brasiléia**, estrada para Assis Brasil km 13, a 4 Km da margem esquerda, 2 November 1980, *C.A. Cid Ferreira et al. 3085* (INPA, MO, NY); *ibidem*, ramal 19, colônia Nova Vida, a 21 km de Brasiléia, 27 July 1991, *C.A. Cid Ferreira et al. 10183* (INPA, NY, UFACPZ, UPCB); *ibidem*, 21 August 1991, *C.A. Cid Ferreira et al. 10191* (INPA, NY, UFACPZ, UPCB); *ibidem*, seringal Porongaba, colocação São José, 23 May 1991, *D.C. Daly et al. 6682* (INPA, MO, NY, UFACPZ); *ibidem*, 24 May 1991, *D.C. Daly et al. 6690* (INPA, NY, UFACPZ); *ibidem*, 27 May 1991, *D.C. Daly et al. 6737* (INPA, NY, UFACPZ); *ibidem*, 28 May 1991, *D.C. Daly et al. 6765* (INPA, NY, UFACPZ); *ibidem*, 30 October 1991, *D.C. Daly et al. 7031* (INPA, NY, UFACPZ); Reserva Extrativista Chico Mendes, seringal Porongaba, transecto 2, 22 February 1992, *L. Lima 327* (UFACPZ); basin of rio Acre, “Bom Futuro” 52 km W of Brasiléia on road to Assis Brasil, then 18 km on ramal Tocandeira, 27 September 2003, *P. Acevedo-Rodriguez et al. 13502* (RB, US); *ibidem*, transecto 2, 14 April 1992, *R. Saraiva & L. Lima 1490* (UFACPZ); *ibidem*, transecto 1, 15 April 1992, *R. Saraiva & L. Lima 1519* (UFACPZ); *ibidem*, 15 April 1992, *R. Saraiva & L. Lima 1520* (UFACPZ); **Bujari**, basin of rio Purus, rio Antimari, floresta estadual do Antimari, right bank, colocação Boa Vista, 10 May 1997, *D.C. Daly et al. 9437* (NY, UFACPZ); **Capixaba**, mata na propriedade São Luiz, 3 November 2021, *I.T. Lopes et al. 47* (NY, RB, SPF, UFACPZ); **Cruzeiro do Sul**, BR 364 km 42, ramal 4 do projeto Santa Luzia (INCRA), 10 September 1985, *A. Rosas Jr. et al. 207* (INPA, MIRR, NY, RB, UFACPZ, UPCB); alto rio Juruá, margem esquerda, localidade Tapauna, seringal São João, 14 March 1992, *C.A. Cid Ferreira et al. 10819* (INPA, NY, MO, UFACPZ); *ibidem*, margem direita, foz do igarapé São João do Breu, 18 March 1992, *C.A. Cid Ferreira et al. 10859*

(INPA, NY, MO, UFACPZ, UPCB); *ibidem*, 19 March 1992, *D.C. Daly et al. 7523* (NY, UFACPZ); rio Juruá-Mirim, igarapé Humaitá, across from “Aldeota” and ca. 1 km into reticulate narrow channels of the igarapé, 10 May 2003, *D.C. Daly et al. 11653* (NY); **Mâncio Lima**, ramal do Banho a 5 km da sede do município, 9 November 1991, *C.A. Cid Ferreira et al. 10656* (NY, UFACPZ, UPCB); bacia do rio Juruá, rio Moa, volta da Aurora, 12 July 2013, *D.S. Costa et al. 173* (RB); Parque Nacional da Serra do Divisor, trilha do mirante, 9 December 2022, *I.T. Lopes et al. 66* (INPA, NY, RB, SPF, UFACPZ); **Manoel Urbano**, estrada Sena Madureira km 6, 8 September 1978, *J. Lima et al. 153* (INPA, MBM); rio Purus, margem direita, seringal Samaúma Nova, colocação do Sr. Narciso da Silva, 17 November 1996, *M. Silveira et al. 1489* (MO, NY, UFACPZ, UPCB); **Marechal Thaumaturgo**, Reserva Extrativista do Alto Juruá, N de São João do Breu, margem esquerda, seringal Damião, colocação Belfort, 10 April 1993, *M. Silveira et al. 525* (MO, NY, UFACPZ, UPCB); **Plácido de Castro**, seringal Triunfo, a 17 km wnw of Plácido de Castro on road to Rio Branco (AC-040), 30 July 1989, *D.C. Daly et al. 6138* (INPA, UFACPZ); *ibidem*, 30 July 1989, *D.C. Daly et al. 6139* (INPA, UFACPZ); **Porto Acre**, bacia do rio Purus, percorrendo a fazenda do Senhor Pedro Dultrar, ao longo do riozinho do Andirá no percurso de subida do rio, 09 June 2014, *D.S. Costa et al. 593* (RB); **Porto Walter**, aldeota between Porangaba & Papagaio, 18 May 1971, *P.J.M. Maas et al. P13115* (MO, RB, US); **Rio Branco**, estrada de Boca do Acre km 27, fazenda Novo Horizonte, 12 November 1981, *A. Rosas Jr. & Jurandir 121* (UFACPZ); km 50 da estrada Rio Branco – Plácido de Castro a 400m da margem direita, 8 October 1980, *C.A. Cid Ferreira & B.W. Nelson 2794* (INPA, NY, RB); floresta estadual do Antimari, colocação Boa União, 24 September 1991, *C.A. Sothers & R.S. Saraiva 12* (NY, UFACPZ, UPCB); estrada de Xapuri km 135, ramal fazendinha, 1 September 1983, *C.D.A. Mota & Santos 85* (INPA); igarapé São Francisco do Espalha, colocação São Francisco, 19 September 2007, *C.S. Pessoa et al. 412* (RB); *ibidem*, BR 317 (estrada Rio Branco-Brasiléia) approximately 10 km w of km 68, 6 June 1991, *D.C. Daly et al. 6867* (INPA, NY, UFACPZ); *ibidem*, Universidade Federal do Acre, parque zoobotânico, trilha após o igarapé, 10 October 2012, *D.S. Costa & E.C. Oliveira 61* (RB); BR 364, km 14, EMBRAPA – CPAF/AC, área de manejo florestal de árvores, 7 August 1992, *F.C.S. Walthier & H.I.F. Roca 60* (UFACPZ); área de estudos florestais/FUNTAC, BR 317 km 68, 7 June 1989, *I.F. Rego & S.B. Barbosa 114* (UFACPZ); BR 364 km 23, margem direita, fazenda Catuaba, 20 June 1989, *I.F. Rego et al. 135* (UFACPZ); *ibidem*, BR 317 km 64, 3 October 1989, *J.M.A. de Souza 157* (UFACPZ); floresta estadual do Antimari, colocação Baixa Fria, picada 9, ponto 46, quadrante 3, 17 June 1990, *J.P. Santos et al. 536* (UFACPZ); *ibidem*, colocação Mal Acabado, picada 8, ponto 8, quadrante 2, 5 July 1990, *J.P. Santos et al. 692* (NY, UFACPZ); *ibidem*, ponto 15, quadrante 2, 6 July 1990, *J.P. Santos et al. 738* (NY, UFACPZ); *ibidem*, colocação Ladeira, 28 August 1990, *J.P. Santos et al. 1306* (UFACPZ); seringal Humaitá, próximo à estrada de Porto

Acre km 33, 28 October 1981, *L. Arangueren et al. 101* (UFACPZ); reserva extrativista São Luiz do Remanso, colocação Jarinal, 22 June 1990, *R.S. Saraiva & J.O. Souza 858* (UFACPZ); 14 km from Rio Branco, 27 September 1980, *S.R. Lowrie et al. 210* (INPA, MO, NY, RB, UFACPZ); **Sena Madureira**, riozinho do Andirá, colocação Curitiba, proprietário Francisco Firmino da Costa, 6 June 1995, *A.R.S. Oliveira et al. 487* (UFACPZ, UPCB); near mouth of rio Macauhan (tributary of rio Yaco), 5 August 1933, *B.A. Krukoff 5297* (MO, NY, US); vizinhança de Sena Madureira, 2 October 1980, *B.W. Nelson et al. 522* (INPA, NY, RB, UFMT); *ibidem*, 2 October 1980, *B.W. Nelson et al. 528* (INPA, NY, UFMT); *ibidem*, 27 September 1980, *C.A. Cid Ferreira & B.W. Nelson 2576* (INPA, NY, RB); bacia do rio Purus, rio Iaco, fazenda Nova Olinda, 26 August 1994, *C.S. Figueiredo et al. 473* (INPA, NY, UFACPZ, UPCB); basin of rio Iaco (tributary of rio Purus), fazenda São Jorge I, property of Acre Brasil Verde, timber concession of Laminados Triunfo Ltda., 107 km NW of Rio Branco on BR 364, then ca. 22 km E on Toco Preto access road, 11 July 2008, *D.C. Daly et al. 13328* (RB); floresta estadual do Antimary, ramal do Úirapuru, a margem do ramal, 20 August 2016, *D.S. Costa et al. 990* (NY, RB); vicinity of Sena Madureira, 26 September 1968, *G.T. Prance et al. 7563* (INPA, MO, NY, U, US); Reserva Extrativista Cazumbá-Iracema, arredores da colocação Junta América propriedade do Sr. Gabarito, borda de mata próxima ao igarapé Santo Antônio, 29 October 2021, *I.T. Lopes et al. 14* (INPA, NY, RB, SPF, UFACPZ); carreador dos Palmares. ca. 8 km da sede, 21 October 1993, *M. Silveira et al. 578* (INPA, MO, NY, UFACPZ, UPCB); **Senador Guimard**, BR 364 km 23, Rio Branco – Porto Velho, fazenda experimental Catuaba, 3 May 2002, *A.R. Soares et al. 1* (UFACPZ); BR 317, estrada Rio Branco - Brasiléia, km 68 a 4 km da BR, centro de estudos tropicais – FUNTAC, 27 August 1991, *C.A. Cid Ferreira et al. 10248* (FUEL, INPA, MO, NY, UFACPZ); *ibidem*, 27 August 1991, *C.A. Cid Ferreira et al. 10251* (FUEL, INPA, MO, NY, UFACPZ); fazenda experimental Catuaba, estrada de seringa, 11 January 1994, *C.S. Figueiredo 293* (NY, UFACPZ); *ibidem*, trilha do igarapé floresta, 28 March 2011, *E.S. Leal et al. 397* (NY, RB); *ibidem*, próximo à ponte, 27 October 2021, *I.T. Lopes et al. 9* (INPA, NY, RB, SPF, UFACPZ); *ibidem*, ao longo da estrada principal, à margem do ramal, 29 October 2016, *S. Bereta et al. 3* (NY); **Tarauacá**, rio Tarauacá, river at low water, 17 September 1994, *D.C. Daly et al. 8215* (NY, UFACPZ, UPCB); *ibidem*, basin of Rio Juruá, reserva indígena Praia do Carapanã, seringal & colocação Mucuripe, 20 November 1995, *D.C. Daly et al. 8650* (MO, NY, UFACPZ, UPCB); road Tarauacá to Feijó, 17 September 1968, *G.T. Prance et al. 7344* (INPA, U, US); rio Muru, 12 km above confluence with rio Tarauacá, 19 September 1968, *G.T. Prance et al. 7393* (INPA, NY, US); **Xapuri**, Reserva Extrativista Chico Mendes, seringal Dois Irmãos, colocação Já Começa, 3 June 1999, *C. Ehringhaus et al. 1020* (MO, NY, UFACPZ); *ibidem*, seringal Floresta, colocação Maloquinha, 14 December 1993, *L.C. Ming et al. 365* (UFACPZ).

Taxonomic notes: *Iryanthera juruensis* is the most well documented Myristicaceae species in Acre and occurs throughout the state. The leaves have slightly ascending secondary veins that are visible on the upper surface, while on the lower surface these veins are raised, darker, and more prominent near the midrib. When dry, their aspect is very characteristic, and it is often possible to identify the species without flowers or fruits. The staminate inflorescences are on branches closer to the leaves, while the pistillate inflorescences grow at different heights on the trunk and form clusters. Thus, the fruits are cauliflorous.

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, French Guiana, Guyana, Panama, Peru, Suriname, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Amapá, Maranhão, Mato Grosso, Pará, Rondônia, and Roraima. In Acre (fig. 9), it has been found in *terra firme* and floodplain forests, and *campinarana*. Flowering has been recorded from March to September, and fruiting has been recorded from March to May and August to November.

2.4. *Iryanthera laevis* Markgraf., Notizbl. Bot. Gart. Berlin 9: 965. 1926.

Tree, 8–20 m tall. Petiole 5–14 × 1–2 mm, shallowly canaliculate, rugose, glabrous. Leaf blade 8–15.5 × 3–5.2 cm, chartaceous or thinly coriaceous, usually shiny above, elliptic or obovate-oblong, glabrous, apex acuminate or cuspidate (up to 12 mm), base attenuate, secondary veins 9–14 per side, usually plane and discreet on both sides. Inflorescence 1.5–5.5 cm long, pubescent, peduncle 3–23 mm long, fasciculate-racemose or narrowly paniculate, with 3–8 fascicles per inflorescence and 3–8 flowers per fascicle; flowers 3–4 × 2–3 mm, pedicel 3–10 mm long, campanulate with lobed apex, greenish yellow. Infructescence up to 10 cm long, glabrous, with 2–10 fruits, peduncle 1–5(7) × 0.2–0.3 cm, many times ramified, pedicel 8–35 mm long; fruits 2–3 × 2.2–4 cm, transversely ellipsoid, carinate, apiculate or sometimes obtuse, rugose, green. Figure 6D, 11C-F.

Representative specimens examined. BRAZIL. Acre: Acrelândia, rio Abunã, Projeto de Assentamento Extrativista (PAE) Porto Dias, km 108 of BR 364 (Rio Branco-Porto Velho), then 30 km S on side road, colocação Palhau, 5 October 2003, *D.C. Daly et al. 12170* (RB); *ibidem*, 5 October 2003, *P. Acevedo-Rodriguez & E.C. Oliveira 13722* (RB, US); **Brasiléia,** BR 317, estrada para Assis Brasil km 8, 1 November 1980, *C.A. Cid Ferreira 3075* (INPA, MO, NY, UFACPZ); *ibidem*, km 20, a 3 km da margem da estrada, 3 November 1980, *C.A. Cid Ferreira et al. 3115* (INPA, MO); *ibidem*, colônia Nova Vida, ramal 19, a 21 km de Brasiléia, 21 August 1991, *C.A. Cid Ferreira et al. 10185* (INPA, MO, NY, UFACPZ); *ibidem*, km 26 Brasiléia-Assis Brasil road, projeto Quixadá, near bolivian frontier, 21 August 1991, *C.A. Cid Ferreira et al. 10205* (FUEL, INPA, MO, NY, UFACPZ); *ibidem*, Reserva Extrativista Chico Mendes, km 52 of Brasiléia-Assis

Brasil road, then 18 km on ramal (side road) “Tocandeira”, 28 September 2003, *D.C. Daly et al. 12002* (RB); *ibidem*, BR 317, 22 km from Brasília, 4 November 1980, *S.R. Lowrie et al. 714* (INPA, MO, NY); **Mâncio Lima**, serra do Moa, Apertar da Hora, 1 October 1984, *C.A. Cid Ferreira et al. 5108* (INPA, NY, RB, UFACPZ, UPCB); estrada do Barão, fragmento na beira da estrada, 27 October 2020, *C.A.P. Toledo et al. 561* (RB); slopes of Serra da Moa, 19 April 1971, *G.T. Prance et al. 12107* (INPA, NY, U, US); Parque Nacional da Serra do Divisor, margem do rio Moa, 30 November 2022, *I.T. Lopes et al. 58* (INPA, NY, RB, SPF, UFACPZ); **Marechal Thaumaturgo**, rio Juruá, reserva extrativista do Alto Juruá, fazenda Paraguay, 3 April 1993, *D.C. Daly et al. 7739* (INPA, MO, NY, UFACPZ, UPCB); rio Juruá, "Mato Grosso", 8 December 2000, *D.C. Daly et al. 10499* (UFACPZ); fazenda Bom Sossego, entre igarapé do Cujubim e igarapé Jacamin, 27 September 1985, *D.G. Campbell et al. 9089* (INPA); **Porto Walter**, igarapé Humaitá, afluyente da margem direita do rio Juruá, a 6 km da margem, atrás da colocação Dois Portos, 28 October 1991, *C.A. Cid Ferreira & L. Luz 10431* (INPA, MO, NY, UFACPZ, UPCB); **Senador Guimard**, Quinari, BR 317 a 38 km de Rio Branco, margem direita, 14 July 1988, *J.M.A. Souza 8* (INPA).

Taxonomic notes: *Iryanthera laevis* has a characteristically slender inflorescence that many times is ramified close to the branch or trunk, one of the longest flower pedicels among all *Iryanthera* species (up to 10 mm long), and a campanulate perianth. The leaves are often shiny above and elliptic, with essentially plane and discreet secondary veins. This is also the only species that often has lenticels. The infructescence is many times ramified with ellipsoid fruits, mostly carinate with a slender pedicel.

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, Peru, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amapá, Amazonas, Mato Grosso, Pará, Rondônia, and Roraima. In Acre (fig. 12), it has been found in *terra firme* forest and *campinarana*. Flowering has been recorded in April and August, and fruiting has been recorded from July to November.

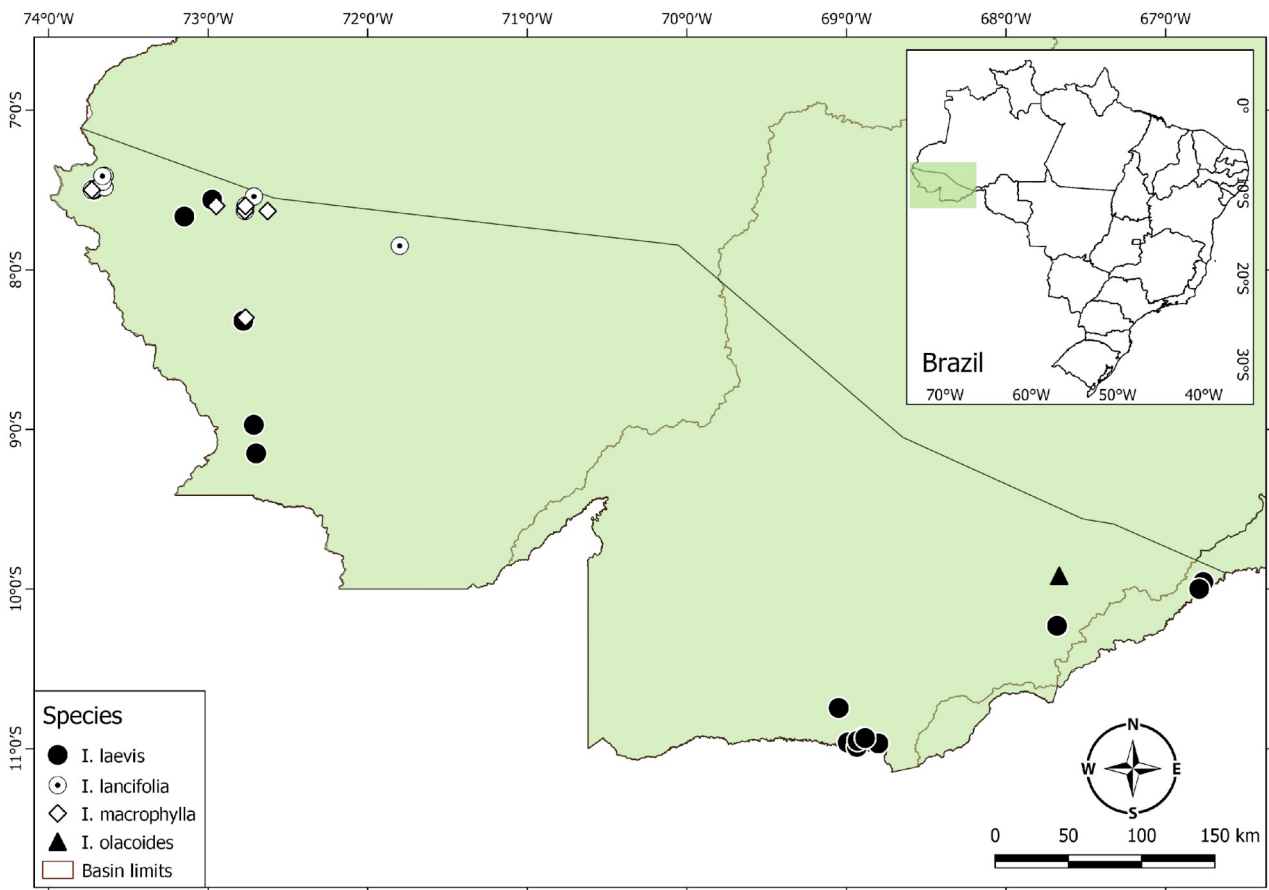


Fig. 12. Occurrence of *Iryanthera laevis*, *I. lancifolia*, *I. macrophylla* e *I. olacoides* in Acre.

2.5. *Iryanthera lancifolia* Ducke, Jour. Wash. Acad. 26: 217. 1936.

Tree, 8–25 m tall. Petiole 10–18 × 2–4 cm, canaliculate, slightly rugose, glabrous. Leaf blade 14–26 (30) × 3.5–7.5 (9) cm, coriaceous, often shiny and darker above, oblong or elliptic-oblong, sometimes slightly obovate, glabrous, apex acuminate (up to 20 mm long), base acute and slightly round, secondary veins 13–20 per side, impressed above. Inflorescence 6.5–10 cm long, puberulent, peduncle 5–10 × 1–2 mm, fasciculate-racemose, with 10–30 fascicles per inflorescence and 4–10 flowers per fascicle; flowers 1–2 × 1–2 mm, cupuliform, pedicel 2–4 mm long, ferruginous outside and green inside. Infructescence up to 8 cm long, pubescent, with 2–7 fruits, peduncle 2–2.5 × 0.4 cm, pedicel 4–10 mm long; fruits 1.3–3.5 × 1.5–4.5 cm, transversely subglobose, rounded apex often with a small dip into groove along the dehiscence line, rugose, glabrous, pale green. Figure 13A-C.

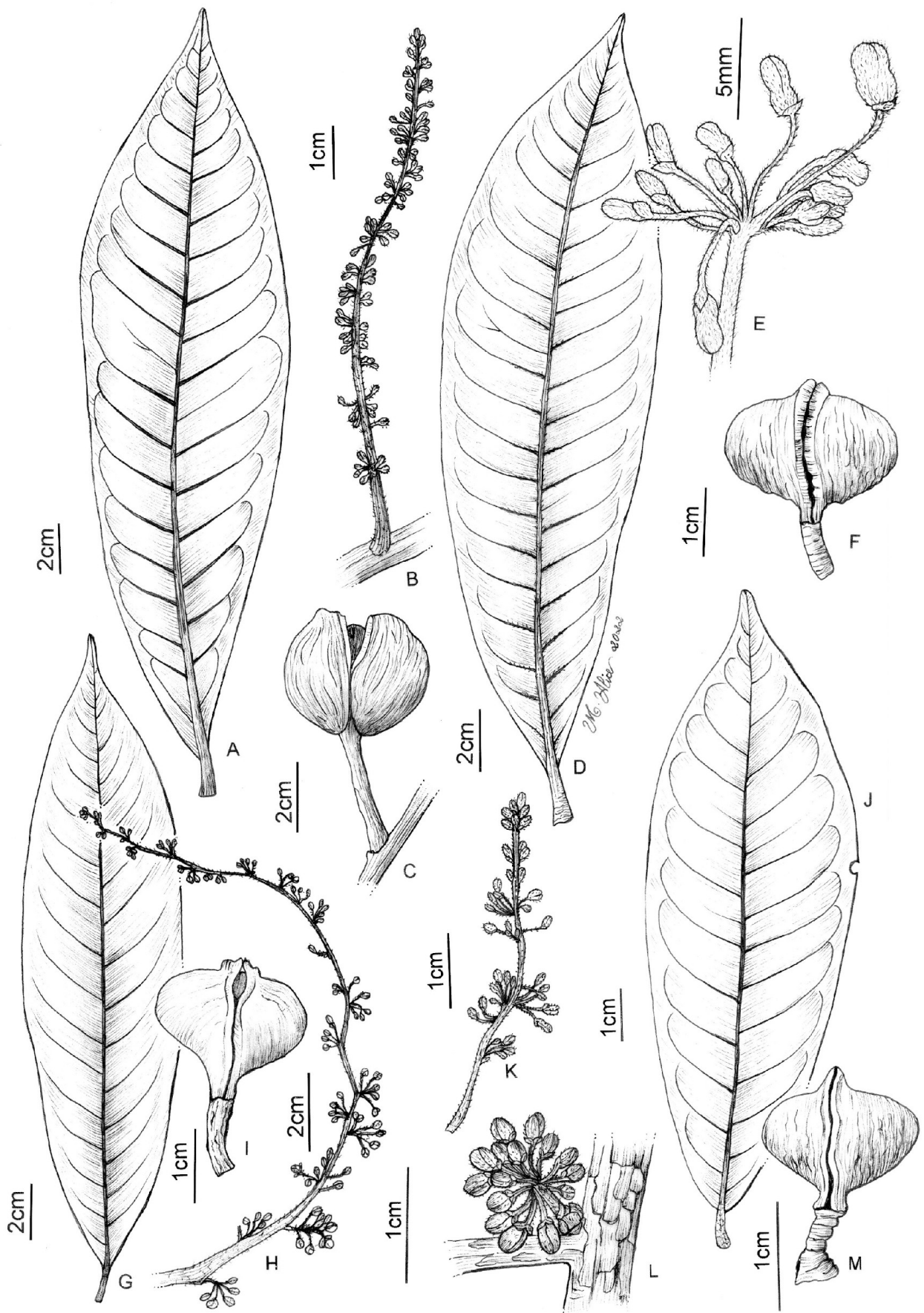


Fig. 13. *Iryanthera lancifolia*, *I. paradoxa*, *I. paraensis* and *I. ulei*. **A-C.** *I. lancifolia*. **A.** Leaf. **B.** Inflorescence. **C.** Fruit. **D-F.** *I. paradoxa*. **D.** Leaf. **E.** Flower fascicle. **F.** Fruit. **G-I.** *I. paraensis*. **G.** Leaf. **H.** Inflorescence. **I.** Fruit. **J-M.** *I. ulei*. **J.** Leaf. **K.** Staminate inflorescence. **L.** Pistillate inflorescence. **M.** Fruit. (A, B R.S. Saraiva 1412, C O.P. Monteiro & C. Damião 76-141, D, E N.C. Bigio 890, F C.A. Cid Ferreira et al. 10632, G, H G. Pereira-Silva et al. 13528, I C.A. Cid Ferreira et al. 10068, J, K, L W. Rodrigues et al. 10506, M M.Silva 622)

Representative specimens examined. BRAZIL. Acre: Cruzeiro do Sul, arredores do aeroporto internacional de Palmeira do Javari, sub-base do Projeto RADAM/BRASIL, 1 April 1976, *C.D.A. da Mota* 248 (INPA); estrada Alemanha, 14 April 1971, *G.T. Prance et al.* 11843 (INPA, NY, U, US); *ibidem*, 8 February 1976, *L.R. Marinho* 37 (IAN, INPA); *ibidem*, 6 February 1976, *O.P. Monteiro & C. Damião* 76-141 (INPA); *ibidem*, 7 May 1971, *P.J.M. Maas et al.* P12760 (INPA, NY, U, US); **Mâncio Lima**, Parque Nacional Serra do Divisor, serra do Moa, hunting trail leading from Boca da Serra to igarapé Anil, 9 May 1996, *D.C. Daly et al.* 8978 (NY, U, PCB); *ibidem*, 9 May 1996, *D.C. Daly et al.* 8981 (UFACPZ); vicinity of serra da Moa, 22 April 1971, *G.T. Prance et al.* 12258 (INPA, NY, U, US); *ibidem*, 29 April 1971, *G.T. Prance et al.* 12601 (INPA, MO, NY, U, US); *ibidem*, trilha atrás da pousada do Miro, 2 December 2022, *I.T. Lopes et al.* 62 (RB); *ibidem*, 2 December *I.T. Lopes et al.* 63 (INPA, NY, RB, SP, UFACPZ); *ibidem*, trilha da cachoeira da formosa, 10 December 2022, *I.T. Lopes et al.* 68 (RB, UFACPZ); **Tarauacá**, inventário florestal da BR 364, rio Liberdade, 25 km em direção Tarauacá, margem esquerda, amostra 13.6, parcela 2, 17 August 1991, *R.S. Saraiva & A.O.D. Veloso* 1412 (UFACPZ).

Taxonomic notes: *Iryanthera lancifolia* has leaves with impressed secondary veins on the upper surface and a coriaceous texture. It resembles *I. paradoxa*, *I. paraensis*, and *I. ulei* but is distinguished by the leaves with a darker upper surface and often more discreet or plane intramarginal anastomoses and secondary veins below. The fruits are also usually rounder and bigger than those of the other three species. The inflorescence can reach 10 cm long with small spacing between the fascicles, especially closer to the apex.

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, Guyana, Peru, Suriname, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Roraima, and Rondonia. In Acre (fig. 12), it has been found in *terra firme* forest. Flowering has been recorded in April, May and August, and fruiting has been recorded in February, April, and May.

2.6. *Iryanthera macrophylla* (Benth.) Warb., Ber. Deutsch. Bot. Ges. 13 (Gen. Heft.): 85. 1895.

Tree, up to 15 m tall. Petiole 8–15 × 3–4 mm, canaliculate, faintly rugose, glabrous. Leaf blade (14) 20–40.5 × (5.3)6.5–11.5 cm, thickly coriaceous, oblong, glabrous, apex acute to acuminate, base rounded or obtuse, secondary veins 13–25 per side, slightly impressed or raised above, raised beneath. Inflorescence 1–7 cm long, puberulent, peduncle 2–25 mm long, fasciculate-racemose, with 3–13 fascicles per inflorescence and 3–5 flowers per fascicle; flowers 2–3 × 2 mm, campanulate, pedicel 1–4 mm long, pale brown, sometimes yellow or green. Infructescence up to 4 cm long, glabrous, with 2–4 fruits, peduncle 5–10 mm long, pedicel 10–15 mm long; fruits 1.8–2.4

× 1.3–2.2 cm, transversally ellipsoid, carinate, with blunt, apiculate apex, rugose, green. Figure 10D-F.

Representative specimens examined. BRAZIL. Acre: Cruzeiro do Sul, sub-base do Projeto RADAM/BRASIL, 8 March 1976, *J.F. Ramos & G. Mota 359* (INPA); *ibidem*, 6 February 1976, *O.P. Monteiro & C.D. Mota 76-102* (INPA); igarapé São Francisco, lower rio Moa, 9 May 1971, *P.J.M. Maas et al. P12840* (INPA, NY, P, U); **Mâncio Lima**, ramal do Banho, 5 km from town seat, 9 November 1991, *C.A. Cid Ferreira et al. 10654* (MO, NY, UFACPZ, UPCB).

Taxonomic notes: Overall, *Iryanthera macrophylla* is very similar to *I. crassifolia*, especially because both species have large leaves. They can be difficult to tell apart, but *I. macrophylla* is distinguished by the often obtuse or rounder leaf base, smaller inflorescences (Smith, 1938), sessile fascicles, and fruits with a more prominent, blunt apicule.

Distribution, Habitat and Phenology: Colombia, Ecuador, Guyana, Panama, Peru, Suriname, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Mato Grosso, Pará, Rondônia, and Roraima. In Acre (fig. 12), it has been found in *terra firme* and floodplain forests, and *campinarana*. Flowering has been recorded from March to May, and fruiting has been recorded in February, October, and November.

2.7. *Iryanthera olacoides* (A.C.Sm.) A.C.Sm., Brittonia 2(5): 427. 1938.

Shrub, up to 5 m tall. Petiole 6–13 × 1–2 mm, shallowly canaliculate, rugose, soon becoming glabrous. Leaf blade 8.4–17 × 3.3–6.2 cm, chartaceous, elliptic, glabrous, apex acute or acuminate, base acute or attenuate, secondary veins 10–15 per side, slightly impressed or plane above, raised below. Inflorescence up to 3 cm long, pubescent, peduncle 3–6 mm long, fasciculate-racemose, with 4–6 fascicles per inflorescence and 4–8 flowers per fascicle; flowers 2–3 × 1–2 mm, campanulate, pedicel 1–3 mm long, pale green. Infructescence up to 2 cm long, glabrous, with 1–3 fruits, pedicel 2–6 mm long; fruits ca. 1.5 × 2 cm, transversely ellipsoid, slightly carinate, nigrescent, green, apex apiculate, ca. 1 mm long, stipe ca. 2 mm long. Figure 10K-M.

Representative specimens examined. BRAZIL. Acre: Rio Branco, estrada para Quixadá, km 23, próximo ao rio Acre, 22 October 1980, *C.A. Cid Ferreira & A. Souza 3001* (INPA, RB, UPCB).

Representative specimens additional examined. BRAZIL. Amazonas: São Gabriel da Cachoeira, rio Demití, 30-60 min by motorboat from mouth, 01 November 1987, *D.C. Daly et al. 5541* (INPA, MO, NY, RB, US).

Taxonomic notes: *Iryanthera olacoides* is characterized by the elliptic, thin leaves, short inflorescences (ca. 2 cm) with campanulate flowers, and nigrescent fruits. It is morphologically similar to *I. tessmannii*. Often, it is difficult to tell these species apart, especially based only on the apiculate fruits and inflorescences. However, *I. olacoides* has smaller infructescences and leaves with spreading secondary veins, while *I. tessmannii* has larger reproductive structures and ascending secondary veins.

Distribution, Habitat and Phenology: Bolivia, Colombia, Peru, and Brazil. In Brazil, it occurs in Acre, Amazonas, and Rondônia. In Acre (fig. 12), it has been found in *terra firme* forest. Fruiting has been recorded in October.

2.8. *Iryanthera paradoxa* (Schwacke) Warb., Nova Aeta Acad. Leop.-Carol. 68: 160. 1897.

Tree, up to 15 m tall. Petiole 8–13 × 2–4 cm, canaliculate, rugose, glabrescent. Leaf blade 20–21.5 × 6–7 cm, coriaceous, usually darker above, elliptic-oblong, glabrous, apex obtusely acuminate (up to 12 mm long), base acute or obtuse, secondary veins 17–22 per side, impressed above and raised below. Inflorescence up to 10 cm long, pubescent, peduncle 2–3 cm long, fasciculate-racemose or narrowly paniculate, with 4–9 fascicles per inflorescence and 5–10 flowers per fascicle; flowers 2–4 × 2–3 mm, campanulate, pedicel 4–9 mm long. Infructescence up to 3 cm long, glabrous, with 1–2 fruits, peduncle 5–10 mm long, pedicel ca. 4 mm long; fruits 1.2–1.6 × 1.4–1.8 cm, transversely ellipsoid or subglobose, slightly carinate, apiculate, rugose, green, nigrescent *in secco*. Figure 13D–F.

Representative specimens examined. BRAZIL. Acre: Cruzeiro do Sul, igarapé São Francisco, lower rio Moa, 10 May 1971, *P.J.M. Maas et al. PI2853* (INPA, U); **Mâncio Lima,** BR 364, amostra 8.20, parcela 1, FUNTAC, 13 September 1990, *A.O.D. Veloso & J.L. Santos 2* (UFACPZ); ramal do Banho, 5 km from Mâncio Lima, 8 November 1991, *C.A. Cid Ferreira et al. 10632* (MO, NY, UFACPZ, UFMT, UPCB); Parque Nacional da Serra do Divisor, serra do Moa, hunting trail leading from Boca da Serra to igarapé Anil (= igarapé República), 9 May 1996, *D.C. Daly et al. 8996* (UFACPZ); *ibidem*, 13 September 1990, *I.F. Rego & M.G. Lima 499* (UFACPZ); *ibidem*, 13 September 1990, *J.P. Santos & S.B. Barbosa 1331* (UFACPZ).

Representative specimens additional examined. BRAZIL. Rondônia: Porto Velho, ramal acesso garimpo, 8 May 2013, *N.C. Bigio et al. 890* (CEN, HUEFS, IAN, INPA, MG, NY, RB, RON).

Taxonomic notes: *Iryanthera paradoxa* shares leaf similarities with *I. lancifolia*, *I. paraensis* and *I. ulei*, but it can be distinguished by the longer flower pedicels (up to 9 mm long), campanulate perianth, and the slightly carinate fruits, instead of rounder or more sharply carinate. *In secco*, often has a nigrescent fruit and dark upper leaf side. The inflorescence can slightly resemble that of *I. laevis*, but the leaves are very different in size and the secondary veins differ in prominence.

Distribution, Habitat and Phenology: Colombia, Guyana, Peru, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Mato Grosso, Pará, and Rondônia. In Acre (fig. 14), it has been found in *terra firme* and floodplain forests, and *campinarana*. Fruiting has been recorded in September and November.

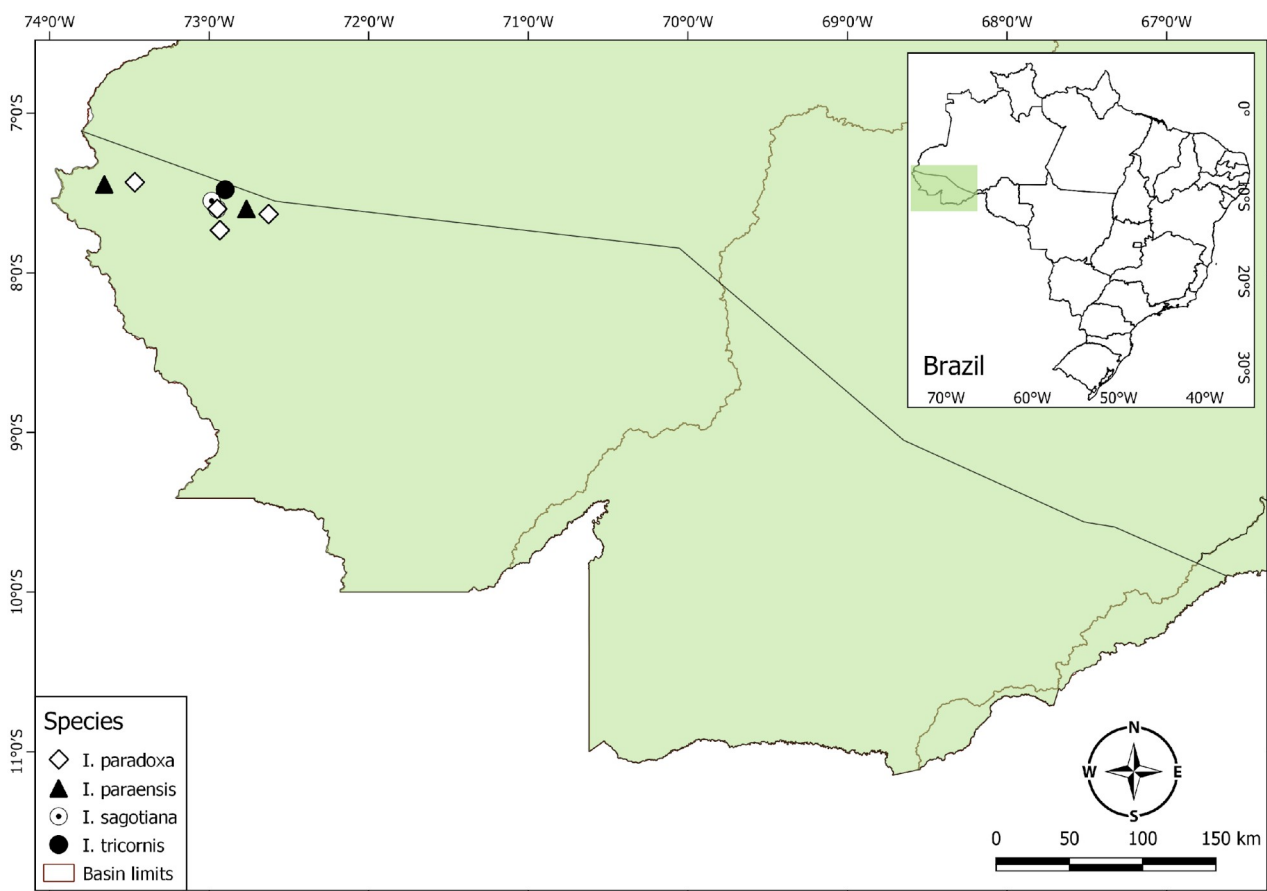


Fig. 14. Occurrence of *Iryanthera paradoxa*, *I. paraensis*, *I. sagotiana* and *I. tricornis* in Acre.

2.9. *Iryanthera paraensis* Huber, Bol. Mus. Goeldi 5: 358. 1909.

Tree, up to 6 m tall. Petiole 10–20 × 3–4 mm, canaliculate, rugose, glabrous. Leaf blade 20–26 × 5.5–8.5 cm, coriaceous, narrowly oblong, glabrous, apex acuminate, base obtuse to attenuate, secondary veins 18–21 per side, impressed above and raised below. Inflorescence up to 20 cm long, glabrescent, peduncle ca. 1 cm long, fasciculate-racemose, with 10–20 fascicles per inflorescence and 3–10 flowers per fascicle; flowers 1–2 × 1–2 mm, cupuliform, pedicel 1–3 mm long. Infructescence up to 3 cm long, glabrous, with 1–2 fruits, pedicel ca. 10 mm long, fruits ca. 1.4 × 2 cm, transversely ellipsoid, distinctly carinate, extremities rounded, stipe ca. 1 mm long, rugose, yellow. Figure 13G-I.

Representative specimens examined. BRAZIL. Acre: Cruzeiro do Sul, próximo do aeroporto novo, nas proximidades do acampamento do projeto RADAM/BRASIL, 10 February 1976, *O.P. Monteiro & C. Damião 76-243* (INPA); **Mâncio Lima**, Parque Nacional da Serra do Divisor, trilha para a cachoeira Formosa, 22 August 2008, *P. Fiaschi et al. 3329* (RB).

Representative specimens additional examined. Brasil. Roraima: Rorainópolis, conglomerado RR_375, subunidade 1, subparcela 1, 11 September 2017, *L.A.S. Santos 3542* (INPA, RB).

Taxonomic notes: *Iryanthera paraensis* has characteristic conspicuous secondary veins, especially closer to the midrib where it's more impressed above and darker below. Similar to *I. ulei* and *I. lancifolia* but can be distinguished by its rounder fruit extremities and slightly larger leaves and petioles compared to those of *I. ulei* and often more impressed intramarginal anastomoses compared to those of *I. lancifolia* (nearly plane). The inflorescence of *I. paraensis* is often glabrescent and long, with many fascicles, and the flowers have a cupuliform perianth.

Distribution, Habitat and Phenology: Colombia, Costa Rica, Ecuador, Guyana, French Guiana, Peru, Suriname, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Amapá, Mato Grosso, Pará, Rondônia, and Roraima. In Acre (fig. 14), it has been found in *terra firme* forest. Fruiting has been recorded in October and November.

2.10. *Iryanthera sagotiana* (Benth.) Warb., Nova Acta Acad. Leop.-Carol. 68: 158. 1897.

Tree, ca. 10 m tall. Petiole 7–15 × 1–2 mm, canaliculate, rugose, glabrous. Leaf blade 9–18 × 3–5.5 cm, chartaceous or thinly coriaceous, elliptic and slightly obovate, glabrous, apex acute or acuminate, base acute or attenuate, secondary veins 12–16 per side, nearly plane on both sides. Inflorescence up to 10 cm long, glabrescent, peduncle 5–10 mm long, fasciculate-racemose, with 10–20 fascicles per inflorescence and 1–8 flowers per fascicle; flowers 1–2 × 1–2 mm, cupuliform,

pedicel 2–4 mm long. Infructescence up to 7 cm long, glabrous, with 1–2 fruits, peduncle ca. 2.5 cm long, pedicel ca. 1 cm long; fruits 19–21 × 20–22 cm, transversely ellipsoid, slightly carinate, apiculate, ca. 2 mm long, stipe ca. 2 mm long, rugose, green. Figure 11G-I.

Representative specimens examined. BRAZIL. Acre: Mâncio Lima, ramal do Banho, a 5 km da sede do município, 12 November 1991, *C.A. Cid Ferreira et al. 10712* (UFACPZ); estrada para o Barão do Rio Branco, ca. 10 km de Mâncio Lima, 25 August 2008, *P. Fiaschi et al. 3418* (RB).

Representative specimens additional examined. BRAZIL. Pará: Belterra, Floresta Nacional do Tapajós, km 67 access from the BR 163 highway, immediate vicinity of the observation tower, 5 November 2015, *B.M. Torke et al. 1513* (HSTM, RB).

Taxonomic notes: *Iryanthera sagotiana* has nearly plane and discreet secondary veins. Its leaves share similarities with those of *I. laevis* and *I. tricornis*, but it is easily distinguished by the rounder fruit and slightly obovate leaf. The inflorescence and flower pedicel are slender, the perianth is cupuliform, and there are 1–8 flowers per fascicle. The thinner leaf texture, more acute leaf base, and glabrescent or pubescent inflorescence differentiate it from *I. elliptica*.

Distribution, Habitat and Phenology: Bolivia, Colombia, French Guiana, Guyana, Peru, Suriname, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Amapá, Pará, and Rondônia. In Acre (fig.14), it has been found in *terra firme* forest and *campinarana*. Fruiting has been recorded in November.

2.11. *Iryanthera tricornis* Ducke, Trop. Woods 31: 11. 1932.

Tree, up to 30 m tall. Petiole 9–13 × 1–2 cm, canaliculate, rugose, glabrous. Leaf blade 11.5–15.2 × 5–6.5 cm, chartaceous, elliptic or obovate-elliptic, glabrous, apex rounded to acute, base acute to attenuate, secondary veins 9–12 per side, raised or nearly plane on both surfaces. Inflorescence up to 7 cm long, pubescent, peduncle 8–20 mm long, fasciculate-racemose, with 4–10 fascicles per inflorescence and 4–9 flowers per fascicle; flowers 1–2 × 1–2 mm, cupuliform, pedicel 1–2 mm long, ferruginous. Infructescence up to 4 cm long, glabrous, with 1–2 fruits, pedicel 7–11 mm long; fruits ca. 2 × 2.1 cm, transversely ellipsoid, lateral extremities acute, apiculate (up to 3 mm long), with a thin ridge along the dehiscence line, rugose, green. Figure 11J-K.

Representative specimens examined. BRAZIL. Acre: Mâncio Lima, comunidade Santa Bárbara, BR 307, linha do PPBio, 30 November 2012, *H. Medeiros et al. 1038* (RB).

Representative specimens additional examined. BRAZIL. Amazonas, rio Solimões, Fonte Boa, 26 November 1927, *A. Ducke RB19568* (G, MO, P, U, US).

Taxonomic notes: The fruit of *Iryanthera tricornis* has a very characteristic shape because of the sharper angles (due to being apiculate), acute lateral extremities, and ridge. *Iryanthera tricornis*, *I. laevis*, and *I. sagotiana* have similar leaves and slender inflorescences. However, *I. tricornis* can be distinguished from *I. laevis* by the cupuliform perianth and smaller flower pedicel and from *I. sagotiana* by the usually smaller, pubescent inflorescence, less fascicles per inflorescence, and more flowers per fascicle.

Distribution, Habitat and Phenology: Colombia, Peru, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, and Rondônia. In Acre (fig. 14), it has been found in *terra firme* forest. Fruiting has been recorded in November.

2.12. *Iryanthera ulei* Warb., Verh. Bot. Ver. Prov. Brand. 47: 137. 1905.

Tree, up to 20 m tall. Petiole 5–15 × 2–3 mm, canaliculate, rugose, glabrous. Leaf blade 12–21 × 4.5–6 cm, coriaceous, oblong-elliptic, glabrous above, glabrescent below, apex acuminate to cuspidate (up to 10 mm long), base acute, secondary veins 13–21 per side, deeply impressed above and raised below. Inflorescence up to 5 cm long, pubescent, peduncle 1–5 × 1–2 mm, fasciculate-racemose, with 6–8 fascicles per inflorescence and 4–9 flowers per fascicle; flowers 1–2 × 1–2 mm, cupuliform, pedicel 1–2 mm long. Infructescence up to 4 cm long, glabrous, with 1–4 fruits, pedicel 4–6 mm long; fruits 1.2–1.9 × 1.4–2.5 cm, transversely ellipsoid, stipe up to 3 mm long, carinate, apiculate (up to 2 mm long), rugose, green. Figure 4F, 6B, 13J-M.

Representative specimens examined. BRAZIL. Acre: rio Juruá, *P. Ule 5724* (RB); **Cruzeiro do Sul**, BR 364 km 42, ramal 4 do Projeto Santa Luzia (INCRA), 10 September 1985, *A. Rosas Jr. et al. 208* (INPA, NY, RB, UFACPZ, UPCB); *ibidem*, km 40, linha nº 1, 13 September 1985, *A. Rosas Jr. et al. 284* (INPA, NY, UFACPZ), *ibidem*, 13 September 1985, *A. Rosas Jr. et al. 307* (INPA, MIRR, NY, UFACPZ, UPCB); *ibidem*, sub-base do projeto RADAM/BRASIL, Serra do Divisor, 6 March 1976, *J.F. Ramos & G. Mota 325* (INPA); **Mâncio Lima**, Parque Nacional da Serra do Divisor, trilha da cachoeira da formosa, 10 December 2022, *I.T. Lopes et al. 67* (NY, RB, UFACPZ); *ibidem*, serra da Moa, near school, 1 May 1971, *P.J.M. Maas et al. P12694* (INPA, U).

Representative specimens additional examined. BRAZIL. Amazonas: rio Amazonas, entre o rio Castanho e o Araça, 13 June 1972, *M. Silva et al. 628* (RB).

Taxonomic notes: The deeply impressed secondary veins are very characteristic of *Iryanthera ulei*, together with the carinate fruit with subacute extremities. It is also distinguished from *I. lancifolia* by the conspicuous intramarginal anastomoses in the leaves, from *I. paraensis* by the usually smaller inflorescences, less flowers per fascicle, longer pedicels, and lateral extremities on the fruits, and from *I. paradoxa* by the cupuliform perianth.

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, Panama, Peru, Suriname, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Amapá, Maranhão, Mato Grosso, Pará, Rondônia, and Roraima. In Acre (fig. 15), it has been found in *terra firme* forest. Flowering has been recorded in May and September, and fruiting has been recorded in March, September, and November.

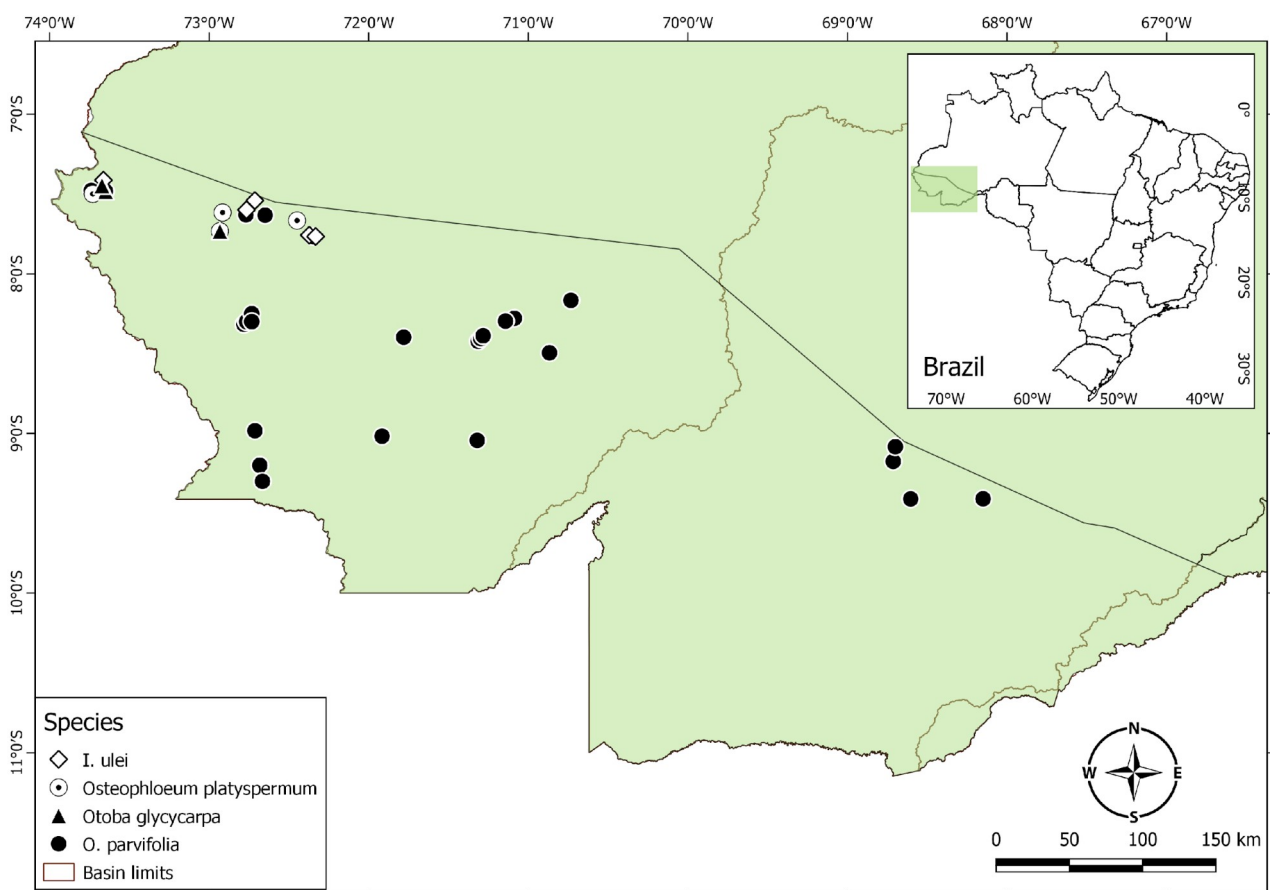


Fig. 15. Occurrence of *Iryanthera ulei*, *Osteophloeum platyspermum*, *Otoba glycyarpa* and *O. parvifolia* in Acre.

3. *Osteophloeum* Warb.

This is a monospecific genus. *Osteophloeum platyspermum* occurs from northern Bolivia to Panama, and the variety *O. platyspermum sulcatum* (Little) T.S. Jaram. & Balslev is restricted to the western coast of Colombia and Ecuador (Rodrigues, 1980; Jaramillo *et al.* 2000). The species is a tree that often has obovate leaves with a round apex, slender petiole, and cream-colored sap. It also has fasciculate-racemose inflorescences (up to 2.5 cm long) and glabrous, ellipsoid fruits.

3.1 *Osteophloeum platyspermum* (Spruce ex A.DC.) Warb., Nova Acta Acad. Caes. Leop.–Carol. German. Nat. Cur. 68: 162. 1897.

Tree, 20–35 m tall. Petiole 6–10 × 1–2 mm, canaliculate, slender, rugose, glabrous. Leaf blade 7.3–12 × 2.2–5.1 cm, chartaceous, elliptic to obovate-elliptic, glabrous above and pubescent below, apex round, base acute to attenuate, secondary veins 6–9 per side, nearly plane on both sides. Inflorescence 1.0–2.5 cm long, pubescent, peduncle 3–10 × 1–2 mm, fasciculate-racemose, with 2–4 fascicles per inflorescence and 1–5 flowers per fascicle; flowers 2–4 × 2–4 mm, cupuliform, pedicel 1–3 mm long, ferruginous. Infructescence ca. 2 cm long, glabrous, with 1–4 fruits, pedicel ca. 4 mm long; fruits 1.5–1.7 × 2.2–2.4 cm, ellipsoid, stipe 1–2 mm long, rugose, green. Figure 16A-B.

Representative specimens examined. BRAZIL. Acre: Cruzeiro do Sul, projeto Santa Luzia Az-250°, ramal 3, amostra 13.2, parcela 8, 28 September 1990, *A.O.D. Veloso & J.L. Santos 209* (INPA, UFACPZ); **Mâncio Lima**, 8,4 km após o Projeto São Pedro, Az 0, Amostra 14.7, Parcela 6, 18 September 1990, *A. O. D. Veloso 135* (UFACPZ); estrada do Isac, aproximadamente a 4 km da cidade, ramal do Goiaba, 25 March 1992, *C.A. Cid Ferreira et al. 10959* (INPA); vicinity of Serra da Moa, 22 April 1971, *G. T. Prance 12261* (INPA, MICH, MO, NY, P, US, V).

Taxonomic notes: *Osteophloeum platyspermum* has a round leaf apex (rarely obtusely acuminate) and slender petioles, which are very characteristic and easy to identify. The fertile branches usually have multiple short inflorescences alternating and paired with a petiole.

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, French Guiana, Guyana, Panama, Peru, Suriname, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Amapá, Pará, Rondônia, and Roraima. In Acre (fig. 15), it has been found in *terra firme* forest. Flowering has been recorded in September, and fruiting has been recorded in March and November.

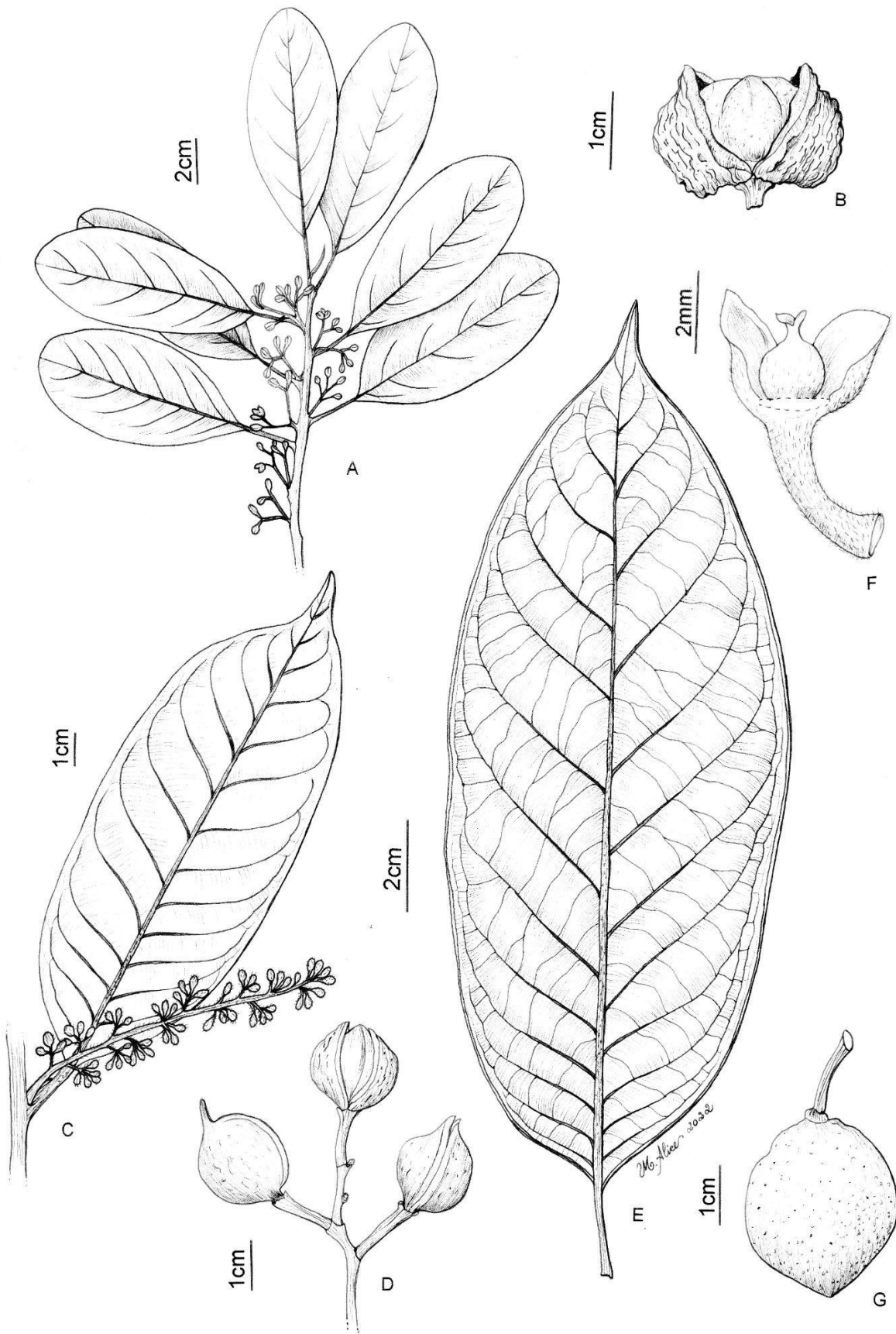


Fig. 16. *Osteophloeum platyspermum*, *Otoba glycyarpa* and *O. parvifolia*. **A-B.** *O. platyspermum*. **A.** Branch with leaves and inflorescences. **B.** Fruit. **C-E.** *O. parvifolia*. **C.** Leaf with inflorescence. **D.** Infructescence. **E.** Leaf. **F-G.** *O. glycyarpa*. **F.** Pistillate flower. **G.** Fruit. (A A.O.D. Veloso & J.L. Santos 209, B C.A. Cid Ferreira et al. 10959, C G.T. Prance et al. 7514, D D.C. Daly et al. 9469, C.A. Cid Ferreira et al. 10883, E D.C. Daly et al. 7790, F A.O.D. Veloso & J.L. Santos 152, G C.A. Cid Ferreira et al. 5303).

4. *Otoba* (A.DC.) H.Karst.

Previously placed as *Dialyanthera*, *Otoba* is recognized by its three stamens fused at different levels, lack of bracteoles (Jaramillo-Vivanco & Baslev, 2020), fasciculate-racemose inflorescence, globose or subglobose fruits and seeds, and simple or sessile trichomes. It occurs from Bolivia to Nicaragua and comprises 10 species divided into two groups, one in Amazonia and another in Central America and the western Andes (Jaramillo-Vivanco & Baslev, 2020; Frost *et al.*, 2021).

KEY

- 1. Leaf ferruginous pubescent below; ovary pubescent; fruit apex obtuse or acute *O. glycyarpa*
- 1. Leaf glabrescent and whitish below; ovary glabrous; fruit apex mucronate *O. parvifolia*

4.1. *Otoba glycyarpa* (Ducke) W.A. Rodrigues & T.S. Jaram., Nordic J. Bot. 20(4): 446. 2000.

Trees, up to 15 m tall. Petiole 15–30 × 1–2 mm, canaliculate, rugose, glabrescent to pubescent. Leaf blade 10–19.5 × 4.5–7.5 cm, chartaceous, elliptic or elliptic-oblong, glabrous above and pubescent below, apex acuminate or cuspidate, base attenuate, secondary veins 11–13 per side, slightly impressed above and raised below. Inflorescence 3–4 cm long, puberulent, subsessile but many times with fascicle scars at the base resembling a peduncle up to 4 × 2 mm, fasciculate-racemose, with 4–5 fascicles per inflorescence and 1–3 flowers per fascicle, bracts on each fascicle ca. 1 mm long, sometimes deciduous; flowers 2–3 × 2 mm, cupuliform, pedicel 2–4 mm long, light green or yellow. Infructescence up to 6 cm long, glabrous, with 1–2 fruits, pedicel 1–1.6 cm; fruits 1.8–3 × 1.6–2.7 cm, globose to subglobose, apiculate, rugose, green. Figure 16F,G.

Representative specimens examined. BRAZIL. Acre: **Mâncio Lima**, BR 364, FUNTAC amostra 14.5, parcela 7, 20 September 1990, *A.O.D. Veloso & J.L. Santos 152* (UFACPZ); margem direita do rio Moa, fazenda Arizona, 19 September 1984, *C.A. Cid Ferreira et al. 5303* (INPA, NY, UB, UPCB, US); Parque Nacional da Serra do Divisor (trilha do mirante), 10 November 2007, *F. Obermuller et al. 404* (RB, UFACPZ).

Taxonomic notes: *Otoba glycyarpa* is distinguished from *O. parvifolia* by the ferruginous underside of the leaves, smaller apiculate fruit apex, and pubescence on the ovary.

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, Peru, and Brazil. In Brazil, it occurs in Acre and Amazonas. In Acre (fig.15), it has been found in *terra firme* forest. Flowering has been recorded in September, and fruiting has been recorded in September and November.

4.2. *Otoba parvifolia* (Markgr.) A.H. Gentry, *Taxon* 28(4): 417. 1979.

Trees, up to 40 m tall. Petiole 10–27 × 1–2 mm, canaliculate, rugose, glabrescent. Leaf blade 7–19 × 2.5–7 cm, chartaceous, elliptic or oblong, usually whitish and glabrescent below, apex acuminate, base acute or attenuate, secondary veins 8–15 per side, slightly impressed above and raised below. Inflorescence 2.5–10 cm long, puberulent, sessile but many times with fascicle scars at the base resembling a peduncle up to 4–10 × 1 mm, fasciculate-racemose, with (10)14–20 fascicles per inflorescence and 1–10 flowers per fascicle, bracts on each fascicle ca. 1 mm long, sometimes deciduous; flowers 2–3 × 1–2 mm, cupuliform to cylindrical, pedicel 1–4 mm long, green or yellow. Infructescence up to 12 cm long, glabrous, with 1–6 fruits, peduncle up to 25 × 3 mm, pedicel 8–15 mm long; fruits 1.8–2.6 × 1.4–1.8 cm, globose to subglobose, apex mucronate (up to 6 mm long), rugose, green. Figure 4G, 5A, 16C-E.

Representative specimens examined. BRAZIL. Acre: Bujari, basin of rio Purus, rio Antimari, Floresta Estadual do Antimari, right bank, colocação Pé da Terra, 11 March 1997, *D.C. Daly et al.* 9469 (MO, NY, UFACPZ, UPCB); **Cruzeiro do Sul**, BR 364, 44 km E da cidade de Cruzeiro do Sul, P.A.D. Sta. Luzia, reserva florestal, 18 October 1984, *C.A. Cid Ferreira et al.* 5346 (INPA, NY); north bank of rio Juruá, opposite Cruzeiro do Sul, 27 October 1966, *G.T. Prance et al.* 2927 (GH, INPA, NY, U, US); sub-base de Cruzeiro do Sul, operação RADAM, ponto 7, 3 February 1976, *N.A. Rosa* 802 (IAN); **Feijó**, rio Muru, seringal Lancha, colocação Laranjeira, proprietário Sr. Valdo Julião, 1 December 1995, *A.R.S. Oliveira et al.* 708 (MO, NY, UFACPZ); **Jordão**, rio Tarauacá, downstream from Foz do Jordão, trails on east bank of the river, 9 February 2009, *F.A. Michelangeli et al.* 1369 (RB, UFACPZ); **Mâncio Lima**, upper rio Moa near fazenda Arizona, 10 October 1985, *D.G. Campbell et al.* 6163 (INPA); Parque Nacional da Serra do Divisor, margem do rio Ramon, 29 November 2022, *I.T. Lopes et al.* 54 (INPA, NY, SPF, RB, UFACPZ, UPCB); **Marechal Thaumaturgo**, seringal São João, Alto Juruá, rio Juruá, margem esquerda, localidade Tapauna, 14 March 1992, *C.A. Cid Ferreira et al.* 10807 (INPA, MO, NY, UFACPZ, UPCB); *ibidem*, foz do Tejo, 17 January 1996, *C.S. Figueiredo et al.* 1083 (UFACPZ); *ibidem*, seringal São João 19 March 1992, *D.C. Daly et al.* 7528 (NY, UFACPZ); *ibidem*, right bank, above mouth of igarapé Caipora, opposite fazenda Natal, 6 April 1993, *D.C. Daly et al.* 7790 (INPA, MO, NY, UFACPZ, UPCB); *ibidem*, rio Tejo, ca. 10 km antes da vila Restauração, 10 June 2013, *H. Medeiros et al.* 1310 (RB); **Porto Walter**, igarapé Humaitá, afluyente da margem direita do rio

Juruá, colocação Várzea Grande, 29 October 1991, *C.A. Cid Ferreira et al. 10459* (INPA, MO, UFACPZ, UPCB); rio Juruá, aproximadamente a 5 km atrás da vila Porto Watler, 31 October 1991, *C.A. Cid Ferreira et al. 10493* (MO, UFACPZ, UPCB); right margin of igarapé Viseu, ca. 6 km from left bank of rio Juruá, 5 November 1991, *C.A. Cid Ferreira et al. 10582* (INPA, MO, NY, UFACPZ, UPCB); *ibidem*, 21 March 1992, *C.A. Cid Ferreira et al. 10883* (INPA, NY, UFACPZ, UPCB); **Sena Madureira**, near mouth of rio Macauhan (tributary of rio Iaco), 8 August 1933, *B.A. Krukoff 5329* (NY, RB, U, US); *ibidem*, 15 August 1933, *B.A. Krukoff 5522* (NY, RB, U, US); basin of rio Iaco (tributary of Rio Purus), fazenda São Jorge I, property of Acre Brasil Verde, timber concession of Laminados Triunfo Ltda., 107 km NW of Rio Branco on BR 364, then ca. 22km E on Toco Preto access road, 7 July 2008, *D.C. Daly et al. 13230* (RB); BR 364, 4 km east of Sena Madureira, 27 September 1968, *G.T. Prance et al. 7600* (INPA, MO, NY, US); **Tarauacá**, rio Tarauacá, river at low water, seringal Universo, colocação Cumaru, 21 September 1994, *D.C. Daly et al. 8302* (INPA, NY, UFACPZ, UPCB); seringal Joaci, colocação Bela Vista, 23 September 1994, *D.C. Daly et al. 8330* (INPA, NY, UFACPZ, UPCB); *ibidem*, reserva indígena praia do Carapanã, seringal Universo, colocação Vai-quem-quer, 23 November 1995, *D.C. Daly et al. 8730* (MO, NY, UFACPZ); *ibidem*, seringal Pacujá, colocação Bom Jardim, 26 November 1995, *D.C. Daly et al. 8807* (MO, NY, UFACPZ, UPCB); vicinity of Taurauacá, 14 September 1968, *G.T. Prance et al. 7264* (INPA, MO, NY, U, US); *ibidem*, 14 September 1968, *G.T. Prance et al. 7265* (GH, INPA, NY, U, US); km 1-3 east of rio Tarauacá, 24 September 1968, *G.T. Prance et al. 7514* (F, GH, INPA, NY, U, US, V); *ibidem*, colocação Samaúma, rio Tarauacá, margem esquerda, 24 November 1995, *M. Silveira et al. 1139* (INPA, RB, UFACPZ, UPCB); *ibidem*, colocação Jardim, 26 November 1995, *M. Silveira et al. 1182* (INPA, MO, NY, UFACPZ, UPCB); rio Gregório, área indígena do rio Gregório, comunidade indígena dos Yawanawá, margem esquerda, entre a sede antiga Kaxinawá e a Nova Esperança, 16 November 1997, *M.T.V.A. Campos & L.A. Lima 848* (UFACPZ).

Taxonomic notes: *Otoba parvifolia* is identified by the glabrous and slightly white leaf underside, thin flower perianth, glabrous ovary, and globose fruit with a mucronate apex (up to 6 mm long).

Distribution, Habitat and Phenology: Bolivia, Colombia, Costa Rica, Ecuador, Panama, Peru, Venezuela, and Brazil. In Brazil, it occurs in Acre and Amazonas. In Acre (fig 15), it has been found in *terra firme* and floodplain forests. Flowering has been recorded in April and June, and from August to November, and fruiting has been recorded from September to March.

5. *Virola* Aubl.

Virola is the largest neotropical Myristicaceae genus and comprises ca. 70 species that occur from southeastern Brazil to Mexico (Santamaría-Aguilar & Lagomarsino, 2022). It is distinguished by the lack of bracteoles (Rodrigues, 1980), ramified or stellate trichomes, and usually pubescent or tomentose pedicels, leaf underside, and paniculate inflorescences. The fruits are covered with different amounts of trichomes, but we only found puberulent and tomentose indumenta in this genus.

KEY

1. Flower fascicles organized in visible receptacles up to 3 mm wide; fruits winged along the dehiscence line *V. yasuniana*
1. Flower fascicles organized freely or in inconspicuous receptacles; fruits not winged 2
2. Leaf with 35 or more pairs of secondary veins 3
2. Leaf with up to 35 pairs of secondary veins 4
3. Leaf blade largely elliptic or obovate-elliptic, tomentose on both sides, base round to cordate *V. decorticans*
3. Leaf blade elliptic, puberulent or tomentose on the underside, base cordate *V. flexuosa*
4. Leaf underside and sometimes the veins on the upper surface, petiole, inflorescence, and infructescence puberulent or tomentose, trichomes ferruginous 5
4. Leaf underside and sometimes veins on the upper surface, petiole, inflorescence, and infructescence with different trichome coverage, trichomes not or not only ferruginous 7
5. Inflorescence and infructescence up to 25 cm long; trichomes conspicuously long and slender *V. loretensis*
5. Inflorescence and infructescence up to 15 cm long; trichomes short 6
6. Leaf base acute or slightly round; fruit obovoid *V. marleneae*
6. Leaf base obtuse or cordate; fruit ellipsoid *V. mollissima*
7. Leaf underside and sometimes the upperside midrib tomentose to pubescent, yellowish; inflorescence pubescent or puberulent, yellow or rarely light brown, with deciduous bracts 8
7. Leaf underside pubescent or puberulent; inflorescence pubescent or puberulent, light or dark brown 11
8. Leaf up to 15 cm long, sparsely pubescent below, secondary veins slightly impressed above; fruit glabrous *V. surinamensis*
8. Leaf over 15 cm long, pubescent to tomentose below, secondary veins impressed or deeply impressed above; fruit glabrescent to puberulent 9

9. Leaf with deeply impressed secondary veins, veinlets visible; fruit globose or ovoid-ellipsoid *V. rugulosa*
9. Leaf with impressed secondary veins, veinlets inconspicuous; fruit ellipsoid 10
10. Leaf puberulent or tomentose below; flower pedicellate *V. duckei*
10. Leaf sparsely puberulent or pubescent below; flower sessile *V. albidiflora*
11. Secondary veins with a small amount of spacing between them (ca. 10 veins every 5 cm) 12
11. Secondary veins with more spacing between them (ca. 3 veins every 5 cm) 13
12. Fruit globose *V. carinata*
12. Fruit ellipsoid *V. pavonis*
13. Leaf blade essentially oblong, often with a whitish underside; fruit ellipsoid 14
13. Leaf blade elliptic or deltoid oblong, with concolorous or ferruginous underside; fruit globose to ellipsoid 16
14. Fruit glabrous or glabrescent; leaf underside glabrescent *V. peruviana*
14. Fruit puberulent; leaf underside pubescent or puberulent 15
15. Leaf densely puberulent below, tertiary veins inconspicuous *V. calophylla*
15. Leaf sparsely puberulent or pubescent below, tertiary veins usually visible *V. excisa*
16. Leaf membranaceous to chartaceous, underside puberulent or pubescent, with sessile, stellate trichomes; fruit subglobose, shortly puberulent or pubescent *V. elongata*
16. Leaf coriaceous, underside puberulent, with dendritic, ramified trichomes; fruit ellipsoid, puberulent or tomentose *V. sebifera*

5.1. *Virola albidiflora* Ducke, J. Washington Acad. Sci. 26(6): 259. 1936.

Tree, ca. 30 m tall. Petiole 8–14 × 2 mm, strongly canaliculate, rugose, puberulent. Leaf blade ca. 16.5–20 × 3.4–4 cm, thinly coriaceous, oblong, glabrous above, sparsely puberulent below, apex obtusely cuspidate, base obtuse and rounded, secondary veins 25–30 per side, impressed above and raised below. Inflorescence 13–15 × 8–12 cm, pubescent, peduncle 4–6 × 0.5 cm, panicle, with ca. 30 fascicles per inflorescence and 5–10 flowers per fascicle; flowers 1–2 × 1–2 mm, cupuliform, pedicel subsessile, yellow. Infructescence 10–13 cm long, with 8–20 immature fruits, peduncle 20–25 × 2–3 mm, pedicel 3–5 mm long, pubescent; immature fruits 8–10 × 5–7 mm, ellipsoid, apiculate, rugose, glabrescent. Figure 17E-G.

Representative specimens examined. BRAZIL. Acre: Sena Madureira, basin of rio Iaco (tributary of rio Purus), fazenda São Jorge I, property of Acre Brasil Verde, timber concession of Laminados Triunfo Ltda., 107 km NW of Rio Branco on BR 364, then ca. 22 km E on Toco Preto access road, 10 July 2008, *D.C. Daly et al. 13311* (RB); **Tarauacá**, basin of rio Juruá, rio Tarauacá, left bank, reserva indígena Praia do Carapaná, seringal Universo, colocação Vista Alegre, 21 November 1995, *D.C. Daly et al. 8664* (NY).

Representative specimens additional examined. Brasil, Amazonas: São Paulo de Olivença, 3 October 1931, *A. Ducke RB24563* (K, MO).

Taxonomic notes: *Virola albidiflora* shares similar features with *V. duckei* and *V. rugulosa* but is distinguished by the sparsely puberulent leaf underside (vs. densely puberulent), sessile or subsessile flowers (vs. pedicelate), and ellipsoid, glabrescent fruits (vs. pubescent and subglobose).

Distribution, Habitat and Phenology: Colombia, Ecuador, Peru, and Brazil. In Brazil, it occurs in Acre, Amazonas, Mato Grosso, and Rondônia. In Acre (fig. 18, it has been found in *terra firme* forest. Fruiting has been recorded in July.

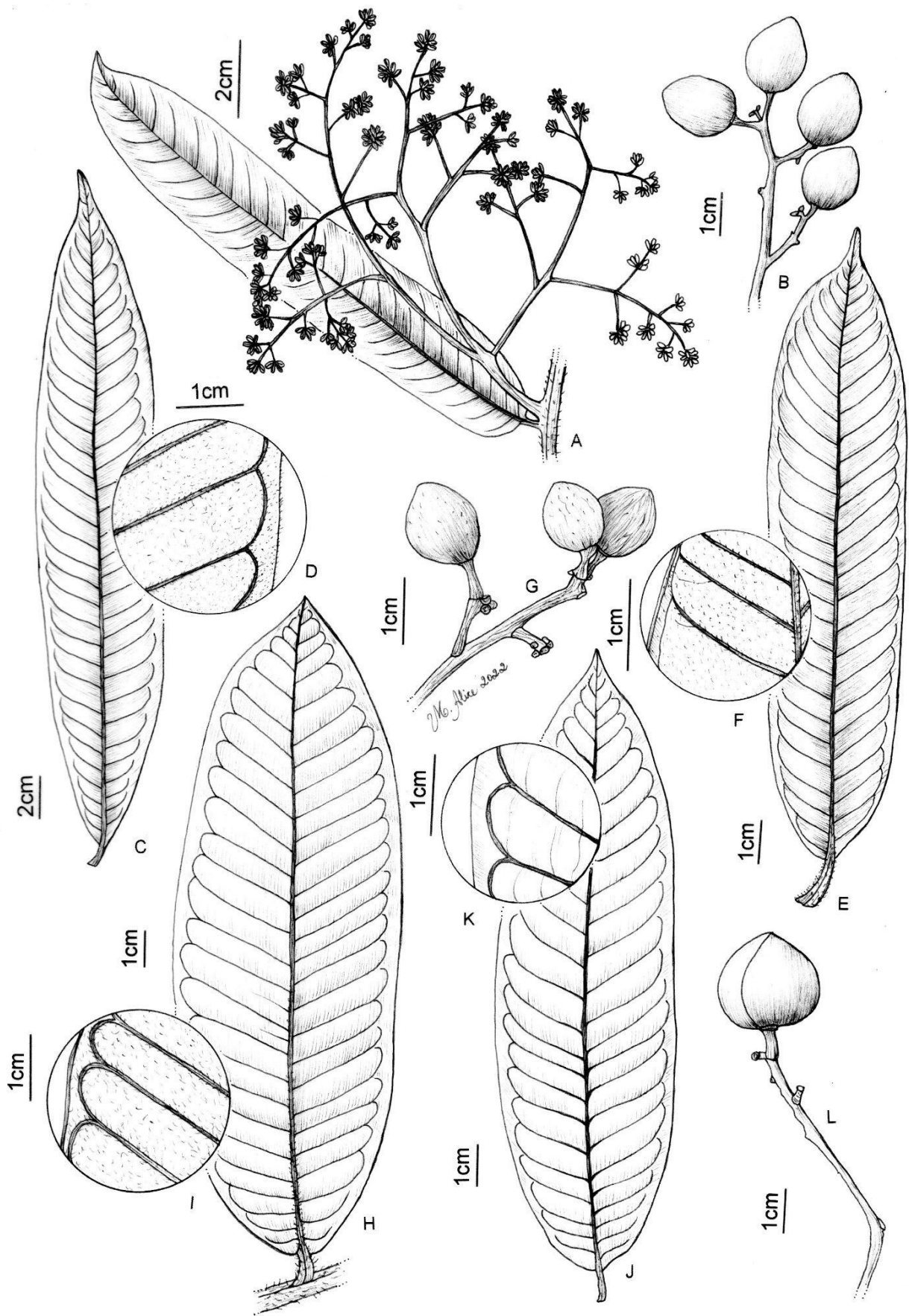


Fig. 17. *Viola albidiflora*, *V. carinata*, *V. duckei*, *V. rugulosa* and *V. surinamensis*. **A-B.** *V. surinamensis*. **A.** Branch with inflorescence. **B.** Inflorescence. **C-D.** *V. duckei*. **C.** Leaf. **D.** Nerve detail. **E-G.** *V. albidiflora*. **E.** Leaf. **F.** Nerve detail. **G.** Inflorescence. **H-I.** *V. rugulosa*. **H.** Leaf. **I.** Nerve detail. **J-L.** *V. carinata*. **J.** Leaf. **K.** Nerve detail. **L.** Fruit. (A I.T. Lopes et al. 49, B I.T. Lopes et al. 5, C, D C.A. Cid Ferreira et al. 5138, E-G D.C. Daly et al. 13311, H, I I.T. Lopes et al. 8, J, K H. Medeiros et al. 2606, L I.T. Lopes et al. 45)

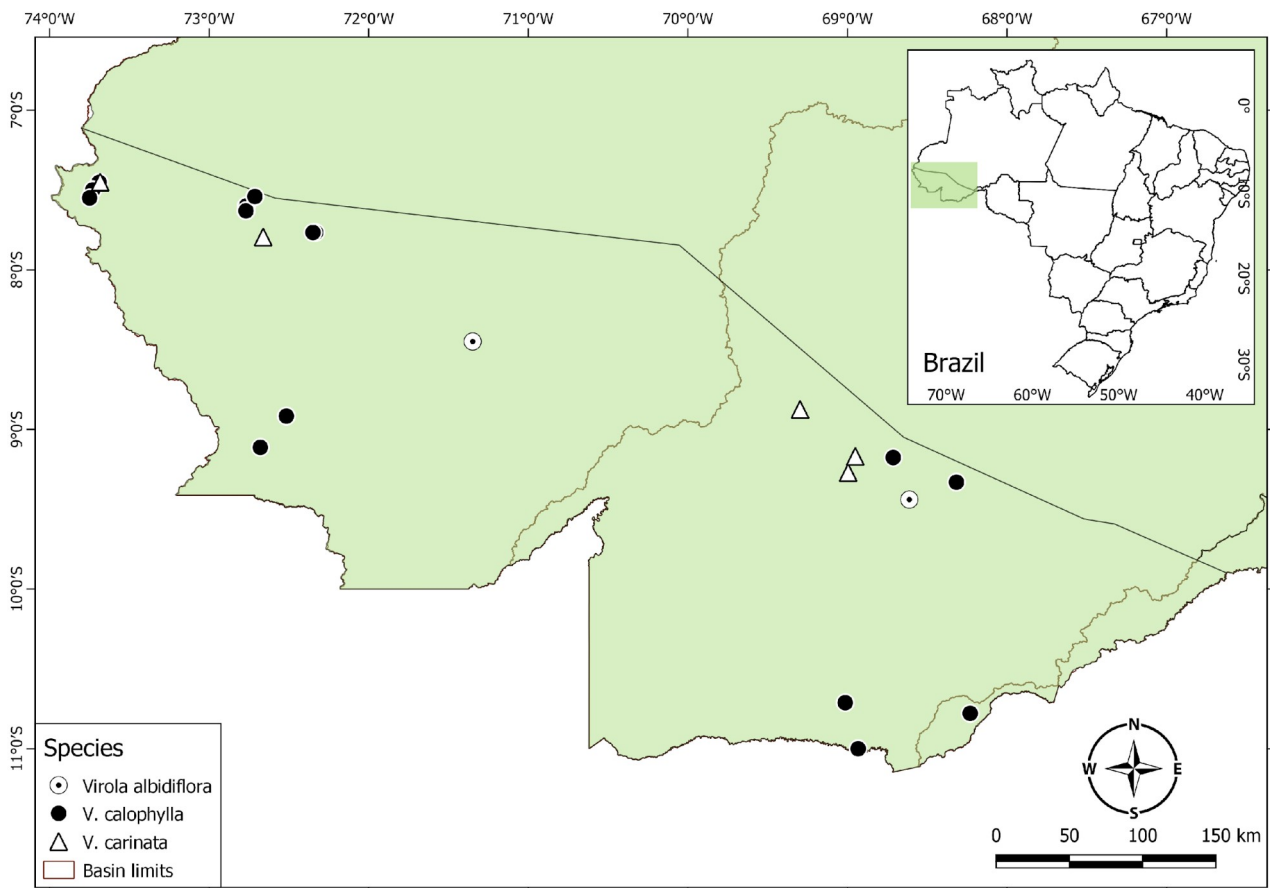


Fig. 18. Occurrence of *Virola albidiflora*, *V. calophylla* and *V. carinata* in Acre.

5.2. *Virola calophylla* (Spruce) Warb., Nova Acta Acad. Caes. Leop.–Carol. German. Nat. Cur. 68: 231. 1897.

Tree, up to 20 m tall. Petiole 8–25 × 1–4(9) mm, canaliculate, rugose, puberulent or pubescent. Leaf blade 7.0–33(42) × 2.0–15.5(20) cm, coriaceous, oblong or elliptic-oblong, shiny above, densely puberulent below, apex acuminate to cuspidate (up to 20 mm), base cordate or obtuse and rounded, secondary veins 7–21 per side, slightly impressed, forming a dip, and raised above and raised below. Staminate inflorescence 10–20 × 4.5–15 cm, peduncle 1.5–4.7 × 0.2–0.5 cm, panicle, with over 40 fascicles per inflorescence; pistillate inflorescence 0.7–2 × 1–1.5 cm, peduncle subsessile, fascicle-racemose, with ca. 9 fascicles per inflorescence; both tomentose with stellate trichomes, with 5–15 flowers per staminate fascicle and 3–7 flowers per pistillate fascicle; flowers 1–2 × 1 mm, cupuliform, pedicel 1–2 mm long, yellow. Infructescence 3–5 cm long, with 2–6 fruits, peduncle 8–15 × 4–5 mm, pedicel 2–8 mm long, pubescent; fruits 1.5–2 × 1–1.5 cm, ellipsoid or obovoid, apiculate, rugose, shortly tomentose, green and ferruginous. Figure 4C, 19A–C.

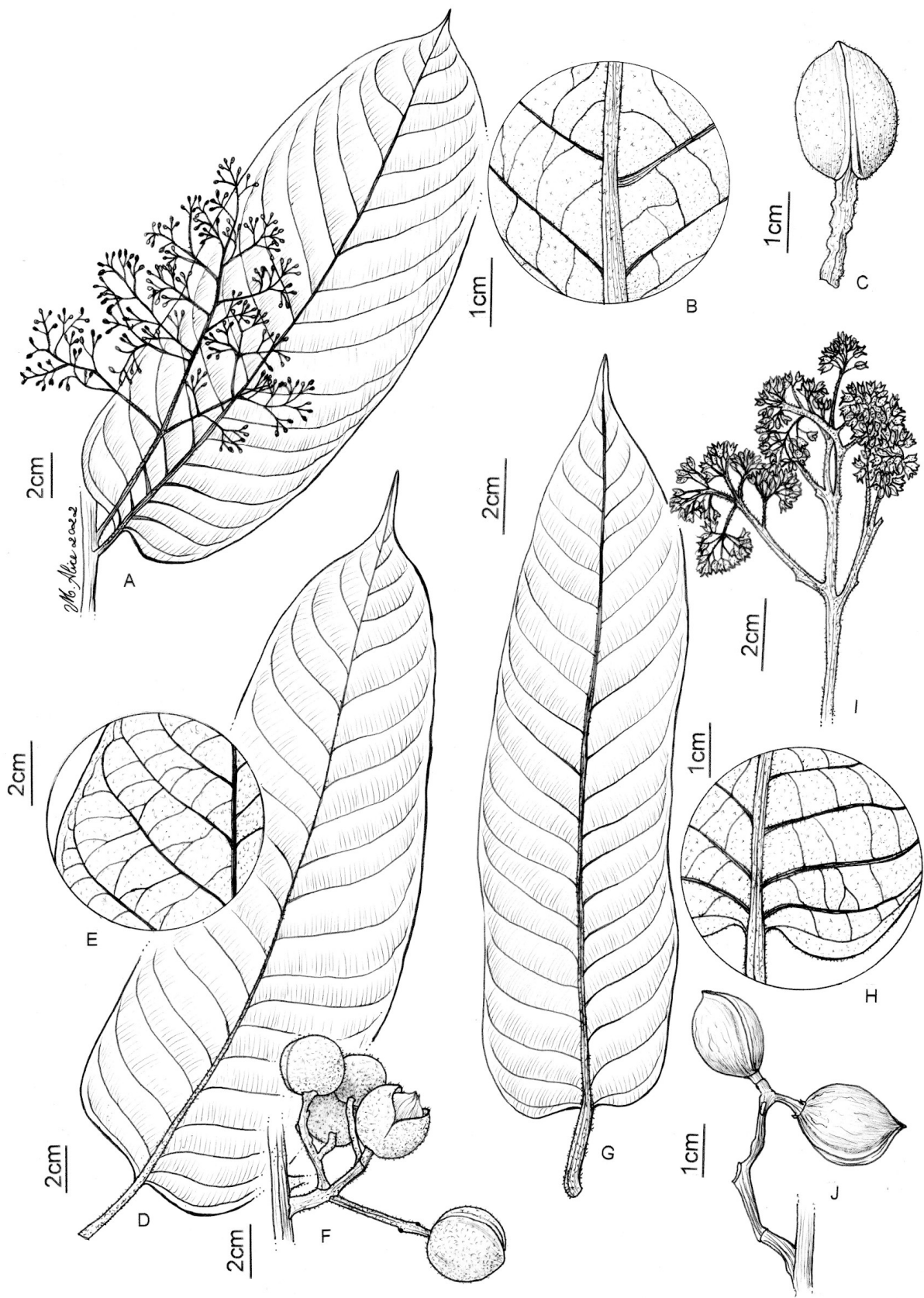


Fig. 19. *Virola calophylla*, *V. excisa* and *V. peruviana*. **A-C.** *V. calophylla*. **A.** Leaf with inflorescence. **B.** Leaf underside detail. **C.** Fruit. **D-F.** *V. excisa*. **D.** Leaf. **E.** Leaf underside detail. **F.** Infructescence. **G-J.** *V. peruviana*. **G.** Leaf. **H.** Leaf underside detail. **I.** Inflorescence. **J.** Infructescence. (A, B D.S. Costa et al. 71, D-F M. Silveira et al. 718, G, H, J D.C. Daly et al. 7825, I C.A. Cid Ferreira et al. 10867)

Representative specimens examined. BRAZIL. Acre: Brasiléia, estrada para Assis Brasil, km 26, projeto Quixadá, próximo a fronteira Brasil-Bolívia, 21 August 1991, *C.A. Cid Ferreira et al. 10212* (FUEL, INPA, MO, NY, UFACPZ); Reserva Extrativista Chico Mendes, seringal São Cristóvão, colocação Vá Quem Quer, 17 September 1999, *C. Ehrlinghaus 1085* (UFACPZ); **Cruzeiro do Sul**, BR 364, Cruzeiro do Sul a Tarauacá, km 40, linha nº 1, 13 September 1985, *A. Rosas Jr. et al. 281* (INPA, MIRR, NY, RB, UFACPZ, UPCB); *ibidem*, 44 km E de Cruzeiro do Sul, P.A.D. de Santa Luzia, reserva florestal, 18 October 1984, *C.A. Cid Ferreira et al. 5357* (INPA, NY, RB); estrada Alemanha, 13 April 1971, *G.T. Prance et al. 11800* (INPA, NY); Projeto RADAM, próximo do aeroporto de Cruzeiro do Sul, 9 February 1976, *L.R. Marinho 69* (IAN, INPA); *ibidem*, sub-base de Cruzeiro do Sul, ponto 7, 23 February 1976, *L.R. Marinho 301* (IAN, INPA); *ibidem*, 6 February 1975, *N.A. Rosa 665* (INPA); *ibidem*, 9 February 1976, *O.P. Monteiro & C. Damião 76-235* (INPA); *ibidem*, 12 February 1976, *O.P. Monteiro 76-337* (INPA); *ibidem*, 18, February 1976, *O.P. Monteiro 76-473* (INPA); *ibidem*, 20, February 1976, *O.P. Monteiro 76-533* (INPA); *ibidem*, 23 February 1976, *O.P. Monteiro 76-631* (INPA); estrada Alemanha, 06 May 1971, *P.J.M. Maas et al. P12718* (INPA, NY, US); *ibidem*, 8 May 1971, *P.J.M. Maas et al. P12788* (INPA, NY); **Mâncio Lima**, Parque Nacional da Serra do Divisor, margem do rio Moa, 29 November 2022, *I.T. Lopes et al. 52* (INPA, NY, RB, SPF, UFACPZ); *ibidem*, 30 November 2022, *I.T. Lopes et al. 56* (RB, SPF, UFACPZ); *ibidem*, between Cachoeira Grande and Serra da Moa village, 28 April 1971, *G.T. Prance et al. 12618* (INPA, NY, U, US); *ibidem*, near guard's house, 30 April 1971, *P.J.M. Maas et al. P12659* (INPA, MO, NY); **Marechal Thaumaturgo**, seringal Iracema, aproximadamente a 4 km da margem direita do rio Tejo, afluente do rio Juruá, 12 March 1992, *C.A. Cid Ferreira et al. 10779* (INPA, MO, NY, UFACPZ, UPCB); reserva extrativista do Alto Juruá, basin of rio Juruá, rio Bagé, near mouth of river, 12 March 1992, *D.C. Daly et al. 7373* (INPA, NY, UPCB, UFACPZ); *ibidem*, seringal São João, colocação Tapaúna, 19 March 1992, *D.C. Daly et al. 7500* (INPA, MO, NY, UFACPZ, UPCB); **Sena Madureira**, near mouth of rio Macauhan (tributary of Rio Yaco), 14 August 1933, *B.A. Krukoff 5492* (NY, RB); a beira do ramal do Ouro a 37 km do acampamento da SEF, 9 March 2013, *D.S. Costa et al. 71* (RB); **Xapuri**, fazenda Bomfim, 18 March 1995, *D.C. Daly et al. 8369* (INPA, MO, NY, UFACPZ, UPCB).

Taxonomic notes: *Virola calophylla* has leaves that greatly vary in size but are distinctly discolored (even *in secco*) and have a shiny and darker upper surface and whitish, slightly silver or golden lower surface. It shares similar features with *V. excisa* and *V. peruviana* but can be distinguished especially by the puberulent leaf underside, cordate leaf base, and tomentose fruit with persistent trichomes.

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, Guyana, Panama, Peru, Suriname, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Amapá, Mato Grosso, Pará, Rondônia, and Roraima. In Acre (fig. 18), it has been found in *terra firme* forest. Flowering has been recorded in February, April and May, and fruiting has been recorded in February, March, September, and October.

5.3. *Virola carinata* (Benth.) Warb., Nova Acta Acad. Caes. Leop.–Carol. German. Nat. Cur. 68: 222. 1897.

Tree, up to 15 m tall. Petiole 3–10 × 1–2 mm, canaliculate, slightly rugose, glabrescent. Leaf blade (5.5) 7.5–25 × (1.5) 2–6 cm, thinly coriaceous, oblong or elliptic-oblong, glabrous above, pubescent below, apex acute to cuspidate, base acute or round obtuse, secondary veins 17–26 per side, slightly impressed above and raised below. Inflorescence 8–15 × 5–12 cm, peduncle 2–4.5 × 0.1, panicle, 30 or more fascicles per inflorescence and 5–15 flowers per fascicle; flowers 1 × 1 mm, cupuliform, pedicel 1–3 mm long, pale yellow. Infructescence 5–7 cm long, with 1–3 fruits, peduncle 10–30 × 2–3 mm, pedicel 5–10 mm long, glabrescent, soon becoming glabrous; fruits 1.5–1.7 × 1.3–1.5 cm, globose, shortly apiculate, rugose, greenish brown. Figure 5B, 17J–L.

Representative specimens examined. BRAZIL. Acre: Cruzeiro do Sul, BR 364 km 42, ramal 4 do projeto Santa Luzia (INCRA), 12 September 1985, *A. Rosas Jr. et al.* 276 (INPA, MIRR, MO, NY, RB, UFACPZ, UPCB); **Mâncio Lima,** Parque Nacional da Serra do Divisor, margem do rio Moa, 20 November 2022, *I.T. Lopes et al.* 50 (INPA, NY, SPF, RB, UFACPZ); **Manoel Urbano,** às margens da BR 364, próximo à ponte sobre o rio Purus, 1 November 2021, *I.T. Lopes et al.* 45 (INPA, NY, RB, SPF, UFACPZ); **Sena Madureira,** Reserva Extrativista Cazumbá-Iracema, Programa de Monitoramento da Biodiversidade, unidade amostral 01 (Cazumbá), pá L, 16 October 2017, *H. Medeiros et al.* 2606 (RB); *ibidem*, rio Caeté, igarapé Maloca, unidade amostral 02 (Gamas), pá N, 5 December 2019, *H. Medeiros et al.* 4308 (RB, UFACPZ).

Taxonomic notes: *Virola carinata* is very similar to *V. pavonis*, especially in the leaf size, shape, trichomes, and number of secondary veins. It can usually be distinguished by the slightly more oblong leaf, with a rounder base and spreading and more numerous secondary veins, and rounder fruit. Also, its inflorescences are slenderer and paler than those of *V. pavonis*.

Distribution, Habitat and Phenology: Bolivia, Colombia, Peru, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Amapá, Mato Grosso, Pará, Rondônia, and Roraima. In Acre (fig. 18), it has been found in *terra firme* forest. Fruiting has been recorded in November.

5.4. *Virola decorticans* Ducke, J. Wash. Acad. Sci. 26: 262. 1936.

Tree, up to 16 m tall. Petiole 7–10 × 5–7 cm, densely tomentose. Leaf blade 45-60 × 17-21 cm, chartaceous to coriaceous, largely elliptic or obovate and slightly obovate, densely covered in ramified trichomes on both sides, apex acuminate, base round to cordate, secondary veins 50-60 per side, slightly impressed above and raised below. Inflorescence tomentose, panicle, with dense fascicles forming clusters, bracts persistent, ca. 5 mm long, ovate; flowers ca. 1 × 1 mm, cylindrical, slender, pedicel ca. 1 mm long. Infructescence up to 15 cm long, with 2–6 fruits, peduncle ca. 3.5 × 0.6 cm, pedicel up to 3 mm long, rugose; fruits 2.5-3.5 × 2.7 cm, ellipsoid or ovoid-ellipsoid, slightly carinate, rugose, tomentose, ferruginous. Figure 4A, 6J, 20D-F.

Representative specimens examined. BRAZIL. Acre: Cruzeiro do Sul, projeto RADAM, ponto 13, 4 February 1976, *N.A. Rosa 637* (IAN); rio Moa, estrada Alemanha, 8 May 1971, *P.J.M. Maas et al. P12796* (F, INPA, NY, P, U); **Mâncio Lima**, 17 September 1990, *A.O.D. Veloso & Zé Lima 123* (UFACPZ); Parque Nacional da Serra do Divisor, trilha atrás da pousada do Miro, 2 December 2022, *I.T. Lopes et al. 64* (NY, RB, UFACPZ).

Taxonomic notes: *Virola decorticans* is easily distinguished by the large leaves, often located on the branches apex, and number of secondary veins (ca. 50). It is very similar to *V. multinervia* but is easily distinguished by the trichomes on both leaf sides, while *V. multinervia* is glabrous above. The inflorescence is a panicle up to ca. 22 cm long and wide, densely tomentose, and has many flowers per fascicle. The infructescence is also densely tomentose and has ovoid-ellipsoid fruits.

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, Peru, and Brazil. In Brazil, it occurs in Acre, Amazonas, Pará, and Rondônia. In Acre (fig.21), it has been found in *terra firme* forest. Flowering has been recorded in May.

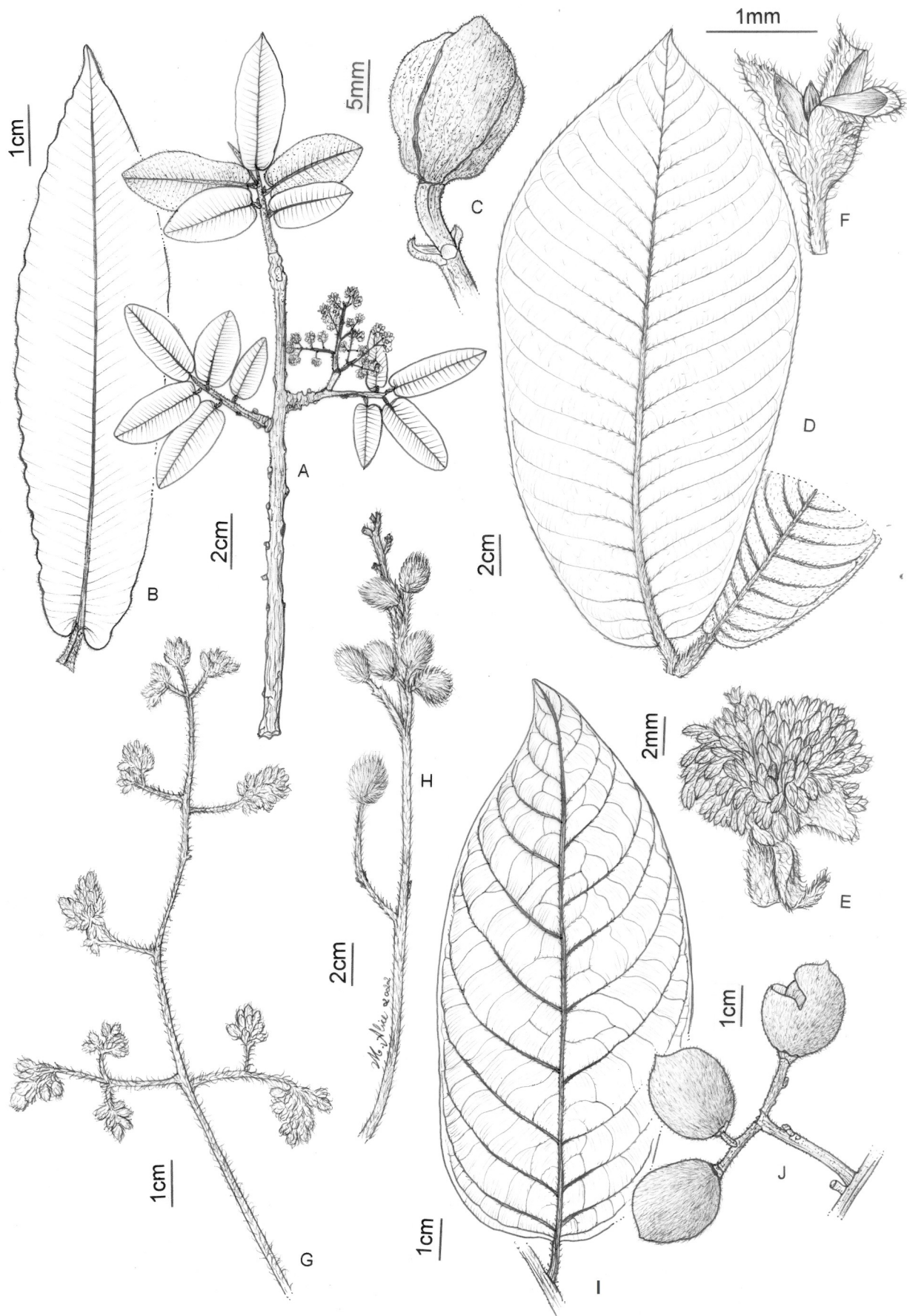


Fig. 20. *Virola decorticans*, *V. flexuosa*, *V. lorentensis* e *V. mollissima*. **A-C.** *V. flexuosa*. **A.** Branch with leaves and inflorescence. **B.** Leaf. **C.** Fruit. **D-F.** *V. decorticans*. **D.** Leaf upper and underside. **E.** Flower fasciculate. **F.** Staminate flower. **G-H.** *V. lorentensis*. **G.** Inflorescence. **H.** Infructescence. **I-J.** *V. mollissima*. **I.** Leaf. **J.** Infructescence. (A D.C. Daly et al. 12155, B D. Coelho s/n (RB 171251), D-F P.J.M. Maas et al. P12796, G P.J.M. Maas et al. P13324, H G.T. Prance et al. 2805, I, J J. Ramos & G. Mota 310).

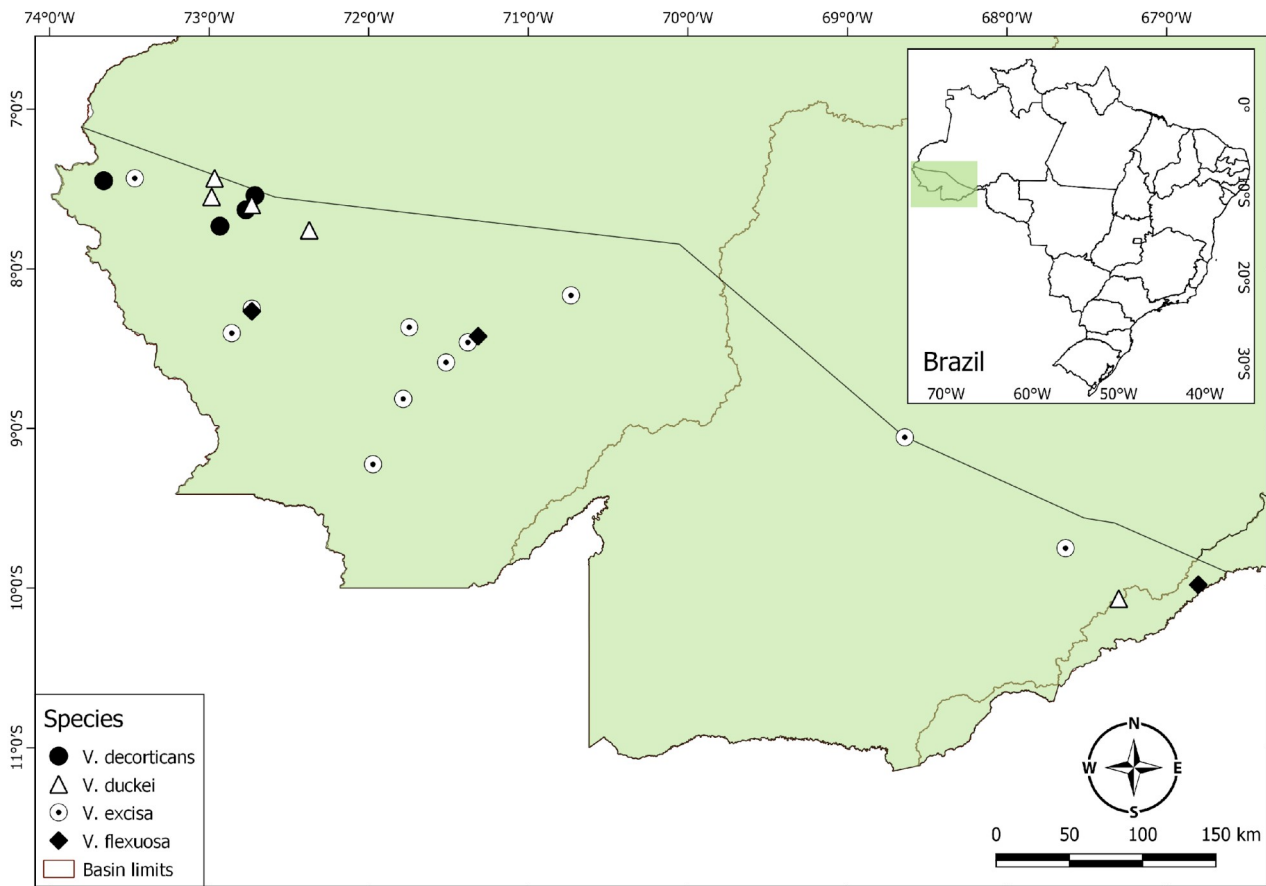


Fig. 21. Occurrence of *Virola decorticans*, *V. duckei*, *V. excisa* and *V. flexuosa* in Acre.

5.5. *Virola duckei* A.C.Sm., Brittonia 2(5): 487. 1938.

Treelet, up to 7 m tall. Petiole 5–10 × 2–4 mm, canaliculate, puberulent. Leaf blade 18–33 × 3.5–6 cm, chartaceous to coriaceous, narrowly oblong, short tomentose below and on the midrib above, apex acute to acuminate (up to 12 mm long), base round, secondary veins 30–33 per side, impressed above and raised below. Inflorescence 10–12.5 cm long, tomentose, peduncle 1–4 × 0.3 cm, panicle, with over 50 fascicles per inflorescence and 5–20 flowers per fascicle; flowers 1 × 1 mm, cupuliform, pedicel ca. 1 mm long, yellow. Infructescence up to 12 cm long, with 1–3 fruits, peduncle 6–7 × 0.5–0.9 cm, pedicel 3–10 mm long, pubescent; fruits 1.5–2 × 1–1.5 cm, subglobose or elliptic, apiculate. Figure 17C-D.

Representative specimens examined. BRAZIL. Acre: **Cruzeiro do Sul**, projeto Santa Luzia, amostra 3.68, parcela 20, 27 September 1990, *A.O.D. Veloso & J.L. dos Santos 203* (UFACPZ); estrada do aeroporto da cidade, 19 October 1984, *C.A. Cid Ferreira et al. 5138* (INPA, NY); **Mâncio Lima**, ramal Pentencostes, amostra 8.20, parcela 1, 13 May 1989, *A.O.D. Veloso & J.L. dos Santos 1* (UFACPZ); estrada para o lugar Barão entre os kms 30 e 52, 24 October 1984, *C.A. Cid Ferreira et al. 5227* (INPA, MO, NY, UFACPZ, UPCB); **Plácido de Castro**, road Abuña to rio

Branco, km 242-246, vicinity of Campinas, 18 July 1968, *E. Forero et al.* 6370 (INPA, NY, U, US).

Representative specimens additional examined. BRAZIL. Amazonas: Manaus, estrada da raiz, 10 December 1942, *A. Ducke* 1203 (IAN, MO, NY, RB, US).

Taxonomic notes: *Virola duckei* is distinguished by the short yellowish trichomes on the leaves, which are densely puberulent below and on the upper midrib. It is very similar to *V. albidiflora*, but the flowers of *V. duckei* are pedicellate while those of *V. albidiflora* are sessile. The inflorescence can also resemble that of *V. surinamensis*; when more immature, the fascicles are aggregated and yellow. However, the leaves of *V. duckei* are larger and more puberulent. *Virola duckei* usually has infructescences with less fruits than those of *V. albidiflora* and *V. surinamensis*, and its fruits are pubescent and elliptic or subglobose (vs. glabrescent or glabrous).

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, Peru, Venezuela, and Brazil. In Brazil, it occurs in Acre and Amazonas. In Acre (fig. 21), it has been found in *terra firma* forest. Flowering has been recorded in October.

5.6. *Virola elongata* (Benth.) Warb., Ber. Deutsch. Bot. Ges. 13: 89. 1896.

Treelet, up to 10 m tall. Petiole 5–13 × 1–2 mm, canaliculate, rugose, glabrescent or pubescent. Leaf blade (7)10.5–23 × 2.5–6.5 cm, membranaceous or chartaceous, sparsely covered with trichomes below, apex elliptic, acute, acuminate or cuspidate (up to 25 mm long), base acute to obtuse, secondary veins 12–17 per side, slightly impressed above, raised below. Inflorescence 5.5–9 × 3.5–6 cm, tomentose, peduncle 13–30 × 1–2 mm, panicle, with 4–50 fascicles per inflorescence and 3–10 flowers per fascicle; flowers 1–2 × 1 mm, cupuliform, pedicel 1–2 mm long, yellow. Infructescence up to 4.5 cm long, with 3–7 fruits, peduncle 5–25 mm long, pedicel ca. 6 mm long, rugose; fruits 10–12 × 8–9 mm, subglobose, apiculate, rugose, pubescent, ferruginous. Figure 6I, 22A–D.

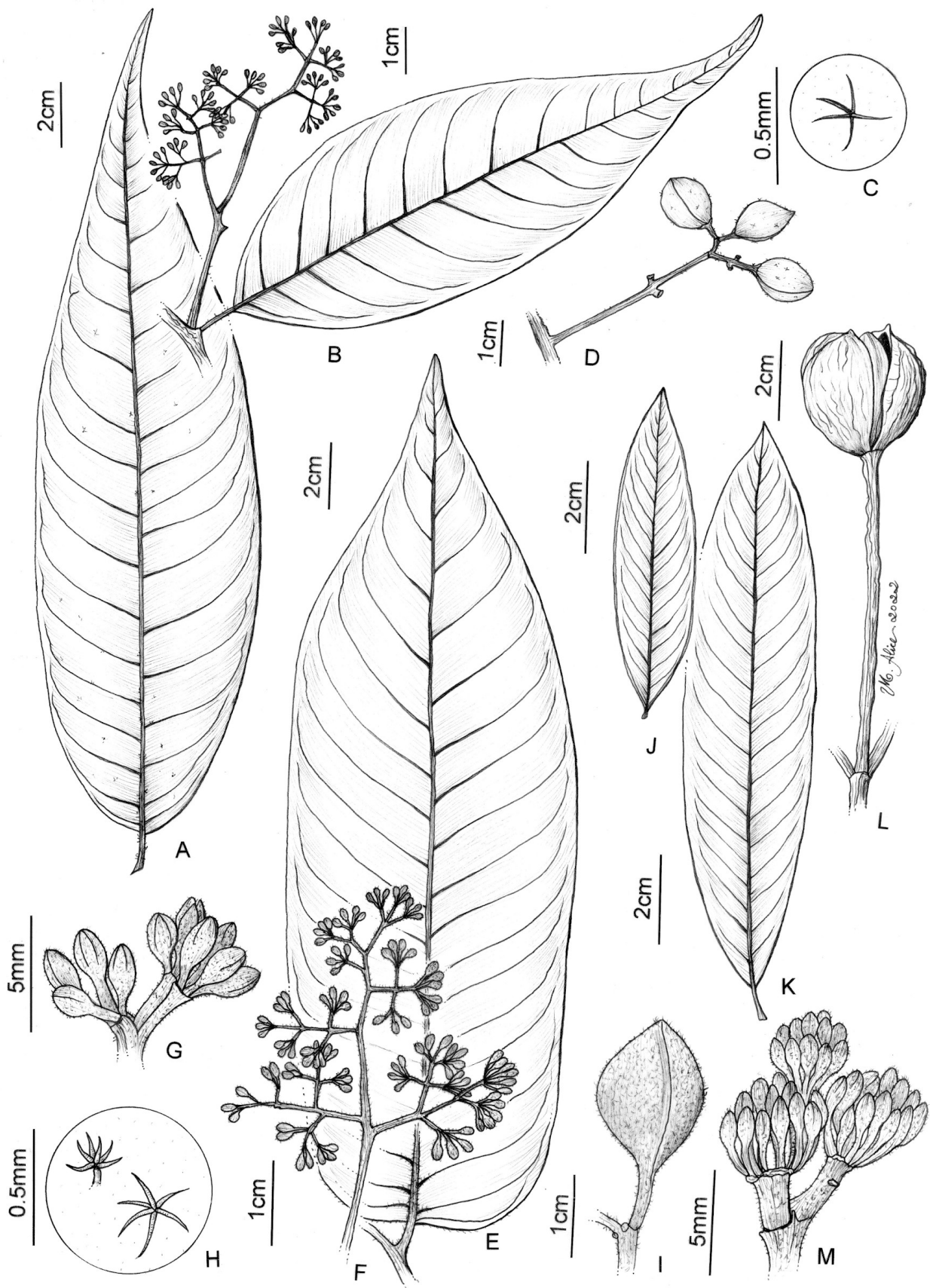


Fig. 22. *Virola elongata*, *V. pavonis*, *V. sebifera* and *V. yasuniana*. **A-D.** *V. elongata*. **A.** Leaf. **B.** Branch with leaf and inflorescence. **C.** Trichome stellate in the leaf underside. **D.** Infructescence. **E-I.** *V. sebifera*. **E.** Leaf. **F-G.** Inflorescence. **H.** Trichome stellate in the leaf underside. **I.** Fruit. **J-L.** *V. pavonis*. **J-K.** Leaf. **L.** Infructescence. **M.** *V. yasuniana* flower fascicle. (A P.J.M. Maas et al. P12875, B-D I.T. Lopes et al. 2, E, G, H C.A. Cid Ferreira et al. 5355, F M. Silveira et al. 1641, I D.C. Daly et al. 6843, J-L O.P. Monteiro & C. Damião 76-352, M D.C. Daly et al. 8594)

Representative specimens examined. BRAZIL. Acre: Bujari, riozinho do Andirá, próximo a ponte, 3 September 2013, *D. S. Costa* 196 (RB); às encostas do Riozinho do Andirá, 27 November 2013, *D.S. Costa et al.* 327 (RB); *ibidem*, próximo a fazenda Nova Olinda, a borda do pasto, 27 December 2015, *D.S. Costa et al.* 715 (NY, RB); *ibidem*, 27 January 2007, *F. Obermuller et al.* 206 (RB, UFACPZ); *ibidem*, 28 May 2009, *F. Obermuller et al.* 453 (RB); *ibidem*, margem ao longo do rio, 19 December 2008, *H. Medeiros et al.* 85 (RB, UFACPZ); *ibidem*, margem ao longo do rio, 28 December 2009, *H. Medeiros et al.* 298 (RB, UFACPZ); *ibidem*, BR 364, km 52, 24 April 2010, *H. Medeiros et al.* 531 (RB); *ibidem*, km 65, 26 October 2021, *I.T. Lopes et al.* 2 (INPA, NY, RB, SPF, UFACPZ); **Cruzeiro do Sul**, alto rio Juruá, margem esquerda, localidade Tapauna, seringal São João, 14 March 1992, *C.A. Cid Ferreira et al.* 10812 (INPA, MO, NY, UFACPZ, UPCB); government agricultural station, rio Moa, 15 km NW of Cruzeiro do Sul, 25 October 1966, *G.T. Prance et al.* 2779 (INPA, NY, U, US); road from Cruzeiro do Sul to Japiim, km 18, 26 October 1966, *G.T. Prance et al.* 2840 (INPA, MO, NY, U, US); rio Moa, between Igarape Ipiranga and Aquidaba, 18 April 1971, *G.T. Prance et al.* 12057 (INPA, NY, U, US); rio Juruá between Mundurucus & Tatajuba, 13 May 1971, *P.J.M. Maas et al.* P12875 (INPA, NY, U, US); Porangaba, rio Juruá-Mirim, 15 May 1971, *P.J.M. Maas et al.* P12996 (INPA, NY, U, US); aldeota between Porangaba & Papagaio, rio Juruá-Mirim, 18 May 1971, *P.J.M. Maas et al.* P13114 (INPA, NY, U, US); along rio Moa, a few miles upstream from the mouth at rio Jurupa, north of Cruzeiro do Sul, vicinity of Boiador, 20 August 1986, *T.B. Croat & A. Rosas Jr.* 62396 (INPA); rio Moa, up river (south) from mouth at rio Juruá, near international airport, 21 August 1986, *T.B. Croat & A. Rosas Jr.* 62462 (INPA, MO, UFACPZ); **Feijó**, rio Juruparí, 22 October 2009, *H. Medeiros et al.* 179 (RB, UFACPZ); **Mâncio Lima**, 16 September 1990, *A.O.D. Veloso & Zé Lima* 86 (UFACPZ); bacia do Alto Juruá, rio Moa, Volta da Aurora, 3 May 1996, *M. Silveira et al.* 1193 (INPA, MO, NY, UFACPZ, UPCB); **Manoel Urbano**, bacia do Purus, rio Chandless, ao longo do seringal Reintregue, próximo a entrada do Chandless Chá, 20 January 2014, *D.S. Costa et al.* 492 (RB); **Plácido de Castro**, Abunã, seringal Itamarati, 10 January 1995, *C.S. Figueiredo et al.* 528 (NY, UFACPZ); *ibidem*, 14 July 2000, *I. Rivero et al.* 441 (UFACPZ); **Porto Acre**, reserva florestal do Humaitá, beira do rio Acre, 21 March 1995, *C.S. Figueiredo et al.* 740 (NY, UFACPZ, UPCB); *ibidem*, fragmento de mata na beira do rio Riozinho do Andirá, 5 December 2021, *D. Nunes et al.* 628 (MG, RB, SPF, UFACPZ); *ibidem*, 2 November 1993, *D.C. Daly et al.* 7994 (INPA, NY, MO, UFACPZ, UPCB); **Porto Walter**, near Porangaba, rio Juruá-Mirim, 17 May 1971, *G.T. Prance et al.* 13050 (NY, U, US); bacia do rio Juruá, rio das Minas, ca. 20 km da cidade de Porto Walter, 18 June 2013, *H. Medeiros et al.* 1410 (NY, RB); *ibidem*, 17 May 1971, *P.J.M. Maas et al.* P13050 (INPA, NY, U, US); *ibidem*, 25 May 1971, *P.J.M. Maas et al.* P13205 (INPA, NY, U); **Rio**

Branco, parque zoobotânico, 13 April 1994, *C.S. Figueiredo 385* (UFACPZ); fazenda experimental Catuaba, 29 July 1994, *C.S. Figueiredo 407* (UFACPZ); rio Antimary, margem direita, 24 June 1993, *F.C.S. Walthier 172* (UFACPZ); margeando o lago Amapá, 4 December 1982, *L. Coelho & A. Rosas Jr. 1930* (INPA, NY, UFACPZ); Floresta Estadual do Antimari, colocação Mapinguari, margem direita, 21 September 1989, *S.B. Barbosa et al. 74* (INPA, NY, UFACPZ, UPCB); **Sena Madureira**, riozinho do Andirá, colocação Curitiba, proprietário Francisco Firmino da Costa, 6 June 1995, *A.R.S. Oliveira et al. 502* (MO, NY, UFACPZ); **Senador Guimard**, basin of rio Purus, rio Iquiri, downstream from intersection with BR 364 highway, 5 March 1997, *D.C. Daly et al. 9222* (MO, NY, UPCB); *ibidem*, upstream from km 37 (departing from Rio Branco) of BR 364, 20 May 2009, *D.C. Daly et al. 13765* (RB, UFACPZ); mata às margens do rio Iquiri, 27 October 2021, *I.T. Lopes et al. 6* (RB, UFACPZ); BR 364, km 34, 19 March 2011, *M.H. Terra-Araujo et al. 659A* (RB); **Tarauacá**, basin of rio Juruá, rio Tarauacá, left bank, reserva indígena Praia do Carapanã, seringal Universo, colocação Samaúma, 24 November 1995, *D.C. Daly et al. 8754* (NY, UFACPZ, UPCB); **Xapuri**, fazenda Bomfim, 18 March 1995, *D.C. Daly et al. 8368* (INPA, MO, NY, UPCB).

Taxonomic notes: *Virola elonagata* shares similar features with *V. sebifera* due the characteristics and plasticity of both species. It can be differentiated by the thinner texture of the leaves (vs. coriaceous), usually narrower leaf base (vs. obtuse to cordate), rounder, pubescent fruits (vs. ellipsoid and tomentose or puberulent), and sessile trichomes on the leaves (vs. ramified).

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, Guyana, Panama, Peru, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Amapá, Mato Grosso, Pará, Rondônia, and Roraima. In Acre (fig. 23), it has been found in *terra firme* and floodplain forests. Flowering has been recorded in February, May and August, and fruiting has been recorded from August to November.

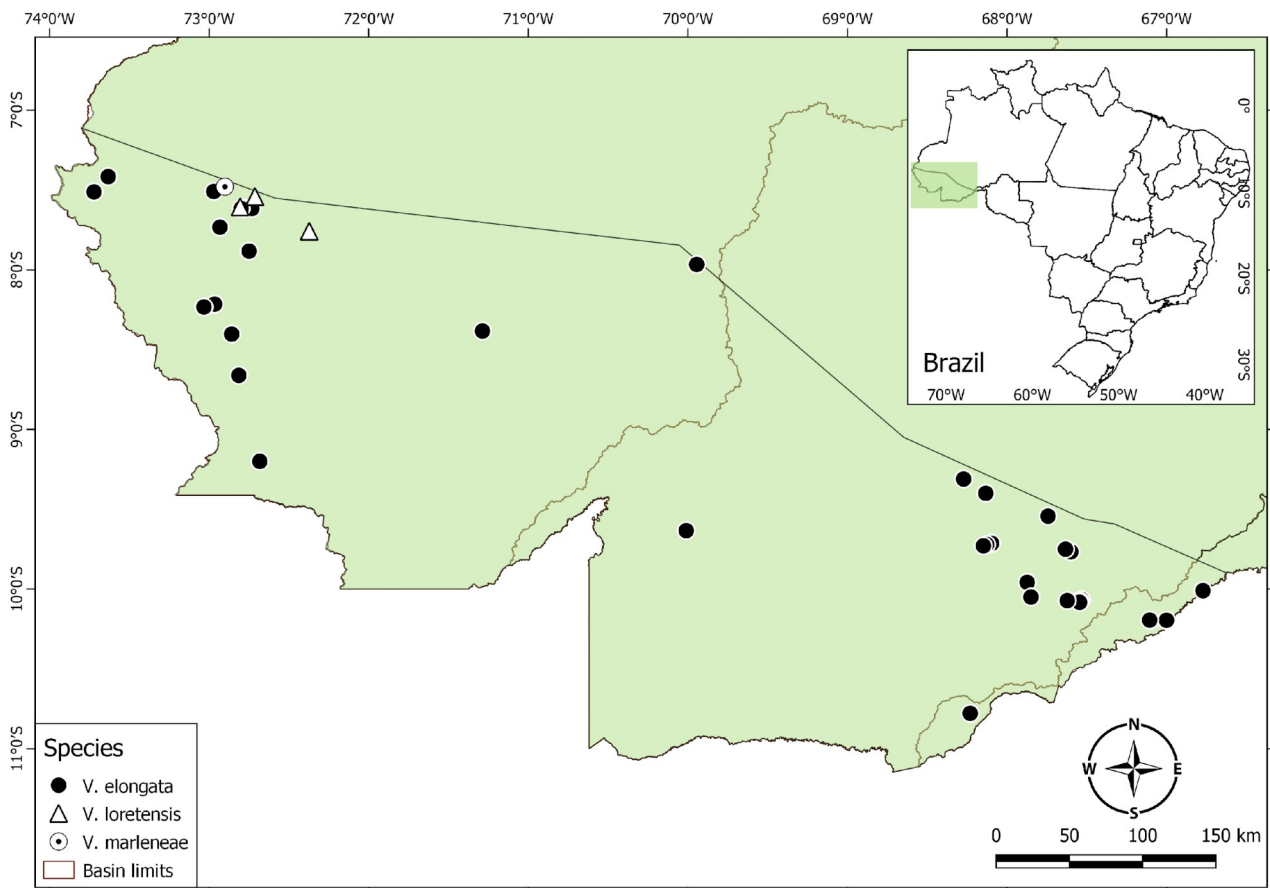


Fig. 23. Occurrence of *Virola elongata*, *V. lorentensis* and *V. marleneae* in Acre.

5.7. *Virola excisa* D. Santam., PhytoKeys 197: 81. 2022.

Tree, up to 13–20 m tall. Petiole 13–19 × 3–6 cm, slightly canaliculate, rugose, pubescent. Leaf blade 30–45 × 8.5–14.5 cm, coriaceous, oblong, sparsely pubescent or pubescent below, apex acute or acuminate, base obtuse or slightly cordate, secondary veins 18–25 per side, slightly raised above, raised below. Inflorescence not seen. Infructescence up to 8.5 cm long, with 1–15 fruits, peduncle 10–20 × 3–6 mm, pedicel 2–8 mm long; fruits 1.5–2.5 × 1–2 cm, ellipsoid, slightly apiculate, tomentose, ferruginous. Figure 19D-F.

Representative specimens examined. BRAZIL. Acre: Cruzeiro do Sul, rio Juruá, margem direita do igarapé Viseu, a aproximadamente 6 km da margem esquerda do rio Juruá, 5 November 1991, *C.A. Cid Ferreira et al. 10586* (INPA, NY, UFACPZ, UPCB); **Jordão**, ao longo do rio Jordão, 6 February 2009, *R. Goldenberg et al. 1316* (NY, RB); downstream Jordão, colocação do Sebastião, 10 February 2009, *R. Goldenberg et al. 1374* (RB); **Mâncio Lima**, Parque Nacional da Serra do Divisor, serra do Moa, hunting trail leading from Boca da Serra do igarapé Anil (= igarapé República), 9 May 1996, *D.C. Daly et al. 8992* (UFACPZ); **Porto Acre**, bacia do rio Purus, reserva florestal de Humaitá, margem esquerda do rio Acre, ca. 4 horas de barco abaixo de rio Branco, 3 November 1993, *M. Silveira et al. 718* (INPA, MO, NY, UFAPZ, UPCB); **Porto Walter**, bacia do

rio Juruá, rio das Minas, ca. 20 Km da cidade de Porto Walter, 18 June 2013, *H. Medeiros et al. 1415* (NY, RB); **Sena Madureira**, trail from W. bank of rio Iaco to rio Purus, 3 km above confluence, 5 October 1968, *G.T. Prance et al. 7862* (INPA, NY, US, V); **Tarauacá**, rio Tarauacá, seringal Mucuripe (Sr. Jorge Kaxinawá), 10 June 1995, *C.S. Figueiredo et al. 798* (NY, UP CB); 1-3 km east of rio Tarauacá, 21 September 1968, *G.T. Prance et al. 7510* (INPA, NY, US); *ibidem*, colocação Remanso, 19 September 1994, *M. Silveira et al. 840* (INPA, MO, NY, UFACPZ, UP CB); bacia do Alto Juruá, rio Tarauacá, margem direita, seringal Tamandaré, colocação Santa Maria, 18 November 1995, *M. Silveira et al. 1012* (UFACPZ, UP CB); *ibidem*, área indígena do rio Gregório, comunidade indígena dos Yawanawá, área do Mutum, 20 November 1997, *M.T.V.A. Campos & L.A. Lima 874* (UFACPZ).

Taxonomic notes: *Virola excisa* is characterized by the long, usually discolored leaves with tertiary veins slightly visible on both sides. It shares similar features with *V. calophylla* and *V. peruviana* but can be distinguished by the pubescent leaf underside, opposed to puberulent and glabrescent, respectively. The fruits are very similar to those of *V. calophylla*, due being ferruginous and tomentose, but they are slightly smaller and the trichomes fall off *in secco*. The inflorescence is up to 15 cm long, ferruginous and tomentose (Santamaría-Aguilar & Lagomarsino, 2022).

Distribution, Habitat and Phenology: Colombia, Ecuador, Peru, and Brazil. In Brazil, it occurs in Acre and Amazonas. In Acre (fig. 21), it has been found in *terra firme* and floodplain forests. Fruiting has been recorded in February, March, June, and from September to November.

5.8. *Virola flexuosa* A.C. Sm., Brittonia 2(2): 151. 1936.

Tree, up to 35 m tall. Petiole 2–4 × 1 mm, canaliculate, puberulent. Leaf blade 3.5–6 × 2–2.5 cm, coriaceous, elliptic, tomentose below, apex acute, base cordate, secondary veins 33–40 per side, impressed above, raised below. Inflorescence ca. 8 cm long, tomentose, peduncle 5–10 × 2–3 mm, panicle, many fascicles forming round clusters, with over 10 flowers per fascicle; flowers 1 × 1 mm, cupuliform, greenish and ferruginous. Infructescence ca. 5 cm long, with 3–9 fruits, peduncle up to 6 × 0.5 cm, pedicel ca. 5 mm long; fruits ca. 1.5 × 1 cm, ellipsoid-obovoid, pubescent, ferruginous. Figure 20A-C.

Representative specimens examined. BRAZIL. Acre: Acrelândia, rio Abunã, Projeto de Assentamento Extrativista (PAE) Porto Dias, km 108 of BR 364 (Rio Branco-Porto Velho), then 30 km S on side road, colocação Palhau, 4 October 2003, *D.C. Daly et al. 12155* (RB); **Cruzeiro do Sul**, igarapé Humaitá, afluente da margem direita do rio Juruá, colocação Santo Antônio, 30

October 1991, *C.A. Cid Ferreira et al. 10483* (UFACPZ); **Tarauacá**, rio Tarauacá, bacia do rio Juruá, rio médio Tarauacá, seringal Universo, colocação Praia do Carapanã, 21 September 1994, *M. Silveira et al. 865* (INPA, NY, UFACPZ, UPCB).

Representative specimens additional examined. BRAZIL. Amazonas: Manaus, lago do castanho, 3 December 1974, *D. Coelho s/n* (RB 171251).

Taxonomic notes: *Virola flexuosa* is recognized by the number of secondary veins, cordate leaf base, and leaf size. The flowers are organized in small round clusters. A specimen analyzed was previously identified as *V. multinervia*, which has similar leaf and flower characteristics, but *V. flexuosa* has smaller, thinner leaves, a more distinctly cordate leaf base, and smaller inflorescences. The infructescence is up to 5 cm long, pubescent, and has ellipsoid-obovoid fruits.

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, Peru, and Brazil. In Brazil, it occurs in Acre, Amazonas, Pará, and Rondônia. In Acre (fig. 21), it has been found in *terra firme* and floodplain forests. Flowering has been recorded in September and October.

5.9. *Virola lorentensis* A.C.Sm., Bull. Torrey Bot. Club 58: 95. 1931.

Shrub, 3–5 m tall. Petiole 6–12 × 3–4 cm, canaliculate, tomentose. Leaf blade 15.5–25.5 × 6.5–11 cm, membranaceous or chartaceous, elliptic or oblong-elliptic, puberulent below and on the veins above, apex acuminate or cuspidate (up to 15 mm long), base obtuse or sometimes cordate, secondary veins 10–18 per side, impressed and raised above, raised below. Inflorescence 8–16 × 6–8 cm, tomentose, peduncle 4–4.5 × 0.1–0.2 cm, panicle, with over 50 fascicles per inflorescence and 3–12 flowers per fascicle; flowers 1 × 1 mm, cupuliform, pedicel subsessile, ferruginous. Infructescence up to 25 cm long, tomentose, with 3–10 fruits, peduncle 4.5–9.5 × 0.2 cm, pedicel ca. 3 mm long; fruits 1.4–1.8 × 1–1.3 cm, ellipsoid, densely covered with long, ferruginous trichomes. Figure 20G-H.

Representative specimens examined. BRAZIL. Acre: Cruzeiro do Sul, BR 364 km 42, ramal 4 do projeto Santa Luzia (INCRA), 10 September 1985, *A. Rosas Jr. et al. 232* (INPA, MO, NY, UFACPZ, UPCB); *ibidem*, government agricultural station, rio Moa, 15 km NW of Cruzeiro do Sul, 25 October 1966, *G.T. Prance et al. 2805* (INPA, NY, U, US); *ibidem*, estrada Alemanha, 27 May 1971, *P.J.M. Maas et al. P13324* (INPA, NY, U, US).

Taxonomic notes: *Virola lorentensis* is characterized by the numerous ferruginous trichomes on its vegetative and reproductive structures, and it is distinguished from similar species, such as *V.*

mollissima and *V. divergens*, by the longer trichomes and infructescence, and often slenderer inflorescence.

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, Peru, and Brazil. In Brazil, it occurs in Acre and Amazonas. In Acre (fig.23), it has been found in *terra firme* and floodplain forests. Flowering has been recorded in May, and fruiting has been recorded in September and October.

5.10. *Viola marleneae* W.A. Rodrigues, Acta Amazon. 7(467): 469, f. 4A–D. 1977.

Treelet, ca. 5 m tall. Petiole 7–9 × 2–3 cm, slightly canaliculate, tomentose. Leaf blade 11–19.5 × 3.5–6 cm, thin coriaceous, elliptic-oblong, tomentose below and on the midrib above, apex acute to acuminate, base acute or slightly round, secondary veins 12–16 per side, slightly impressed above, raised below. Inflorescence ca. 4 cm long, tomentose, peduncle ca. 1.5 × 0.2 cm, panicle, with ca. 30 fascicles per inflorescence and 5–15 flowers per fascicle; flowers 1 × 1 mm, cupuliform, pedicel ca. 1 mm, ferruginous. Infructescence ca. 3.5 cm long, tomentose, with ca. 4 fruits, peduncle ca. 5 × 3 mm, pedicel ca. 2 mm long; fruits 2–2.1 × 1.5–1.7 cm, obovoid, densely covered with brown ferruginous trichomes. Figure 6G.

Representative specimens examined. BRAZIL. Acre: Mâncio Lima, bacia do rio Juruá, BR 307, 40 km de Cruzeiro do Sul, localidade Santa Bárbara, 14 August 2007, *M. Silveira et al.* 3764 (RB).

Representative specimens additional examined. BRAZIL. Amazonas: Borba, 15 km east of Borba, 23 June 1983, *C.A. Todzia et al.* 2232 (INPA, MO, NY, RB, UPCB).

Taxonomic notes: *Viola marleneae* is characterized by the elliptic leaves and numerous ferruginous trichomes on its vegetative and reproductive structures. It is differentiated from *V. lorentensis*, *V. mollissima* and *V. divergens* by the shorter inflorescence and infructescence (vs. over 5 cm long), smaller leaf with acute base (vs. obtuse or subcordate base), and obovoid fruits (vs. ellipsoid).

Distribution, Habitat and Phenology: Colombia, Peru, and Brazil. In Brazil, it occurs in Acre and Amazonas. In Acre (fig. 23), has been found in *campinarana*. Fruiting has been recorded in August.

5.11. *Virola mollissima* (Poepp. ex A.DC.) Warb., Nova Acta Acad. Caes. Leop.–Carol. German. Nat. Cur. 68: 183. 1897.

Tree, up to 13 m tall. Petiole 9–16 × 2–4 cm, slightly canaliculate, rugose, puberulent. Leaf blade 15–35 × 6.5–13.5 cm, chartaceous or subcoriaceous, elliptic-oblong, puberulent or pubescent below and on the veins above, apex acuminate or cuspidate (up to 20 mm long), base obtuse to cordate, secondary veins 7–20 per side, impressed and raised above, raised below. Inflorescence 10–18 × 8–21 cm, peduncle 2–4.8 × 0.3–0.5 cm, rugose, puberulent to tomentose, panicle, over 50 fascicles per inflorescence, flowers 4–6 per fascicle; flowers 1–2 × 1 mm, cupuliform, pedicel ca. 1 mm long, ferruginous. Infructescence up to 12 cm long, tomentose, with 3–25 fruits, peduncle 2–3.5 × 0.2–0.6 cm, pedicel 2–7 mm; fruits 1.8–3.2 × 1.4–2.5 cm, ellipsoid, densely covered with short ferruginous trichomes. Figure 5D, 20I–J.

Representative specimens examined. BRAZIL. Acre: Acrelândia, basin of rio Abunã, Projeto de Assentamento Extrativista Porto Dias, colocação Palhau, 108 km east of Rio Branco on BR 364, then 30 km South on side road, 5 October 2003, *P. Acevedo-Rodriguez & E.C. Oliveira 13719* (RB); **Cruzeiro do Sul**, estrada Treze de Maio, 20 October 1984, *C.A. Cid Ferreira et al. 5170* (INPA, RB, UPCB, US); rio Juruá, margem esquerda ao lado do igarapé Viseu, a 5 km da margem, 4 November 1991, *C.A. Cid Ferreira et al. 10557* (INPA, NY, UFACPZ, UPCB); sub-base do projeto RADAM/Brasil, 5 March 1976, *J. Ramos & G. Mota 310* (INPA); **Mâncio Lima**, serra do Moa, local Apertar da Hora, 1 October 1984, *C.A. Cid Ferreira et al. 5107* (INPA, NY, RB, UFACPZ, UPCB); upper rio Moa near fazenda Arizona, 24 September 1984, *D.G. Campbell et al. 8299* (INPA); *ibidem*, 23 April 1971, *G.T. Prance et al. 12301* (INPA, NY, U, US); Parque Nacional da Serra do Divisor, margem do rio Moa, 29 November 2022, *I.T. Lopes et al. 51* (INPA, NY, RB, SPF, UFACPZ, UPCB); *ibidem*, 30 November 2022, *I.T. Lopes et al. 55* (INPA, NY, RB, SPF, UFACPZ); *ibidem*, 30 November 2022, *I.T. Lopes et al. 59* (NY, RB, SPF, UFACPZ); **Manoel Urbano**, rio Purus, colocação Lago Novo, próximo ao roçado, 15 November 1996, *M. Silvera et al. 1418* (NY, UFACPZ, UPCB); **Sena Madureira**, vicinity of km 7, road Sena Madureira to Rio Branco, 29 September 1968, *G.T. Prance et al. 7665* (INPA, NY, U, US).

Taxonomic notes: *Virola mollissima* is mainly identified by the ferruginous tomentose leaf underside and midrib on the upper side, inflorescence and fruits. Most characters are similar to those of *V. divergens*, Rodrigues (2002) suggested that *V. divergens* could be a variation of *V. mollissima*, but still points the lack of collected specimens to confirm it. *V. mollissima* can be distinguished from *V. divergens* mainly by the fused anther apex (vs. divergent), other characters such as lack of smell (vs. characteristic smell), spreading secondary nerves (vs. ascending) and

short fruit trichomes (vs. long fruit trichomes) can assist but are not as consistent. *V. mollissima* also shares similarities but can be differentiated from *V. lorentensis* by the shorter trichomes and infructescence (vs. longer trichomes), and from *V. sebifera* by the trichomes in the midrib in the upper face (vs glabrous or deciduous), more conspicuous veinlets, and bigger and more densely tomentose fruits.

Distribution, Habitat and Phenology: Colombia, Ecuador, Peru, and Brazil. In Brazil, it occurs in Acre, Amazonas, Mato Grosso, Pará, Rondônia, and Roraima. In Acre (fig. 24), it has been found in *terra firme* forest and *campinarana*. Fruiting has been recorded in March, April, and from September to November.

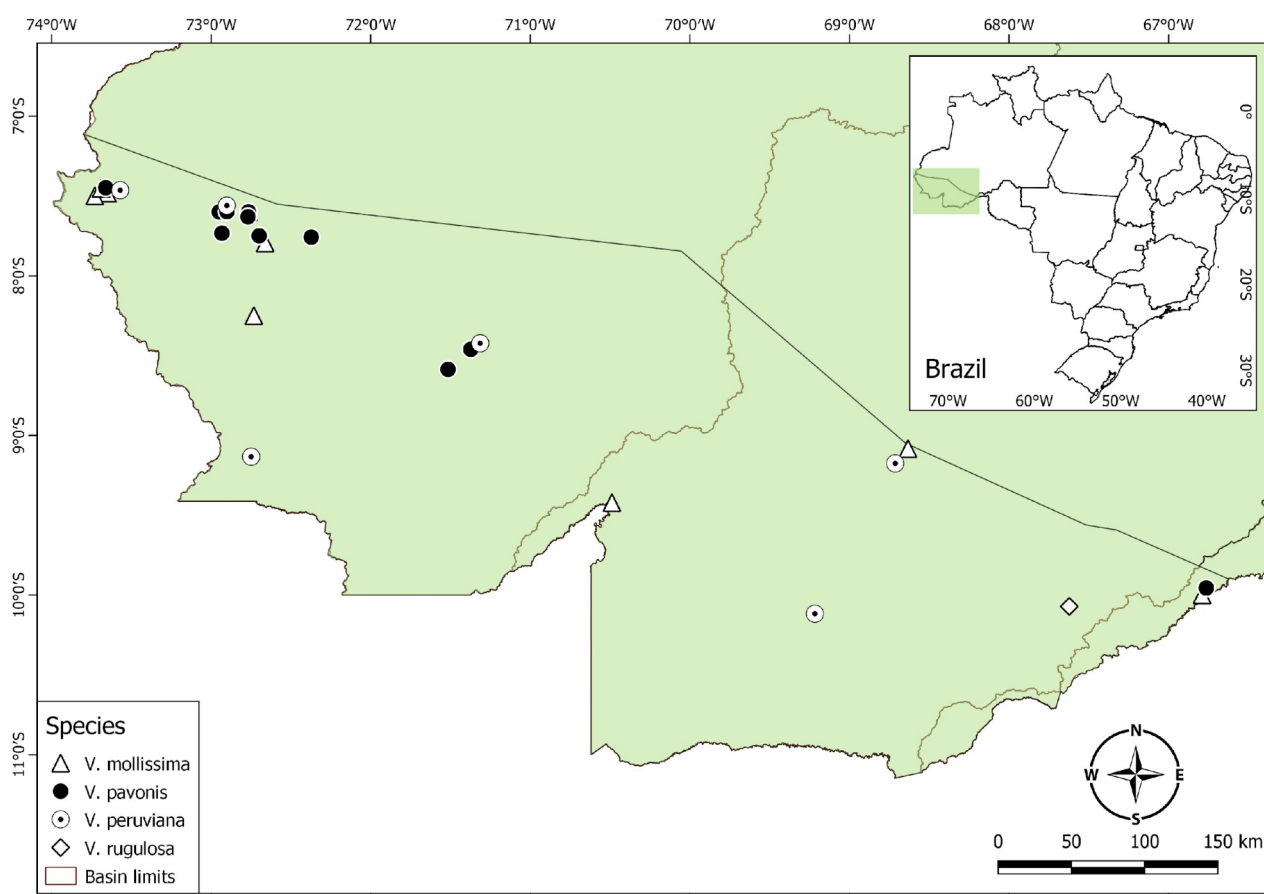


Fig. 24. Occurrence of *Virola mollissima*, *V. pavonis*, *V. peruviana* and *V. rugulosa* in Acre.

5.12. *Virola pavonis* (A.DC.) A.C.Sm., Brittonia 2(5): 504. 1938.

Tree, 10–20 m tall. Petiole 3–12 × 1–2 mm, canaliculate, rugose, pubescent, soon becoming glabrous. Leaf blade 7–18 × 2–5.8 cm, thinly coriaceous, elliptic or elliptic-oblong, glabrous above, glabrescent to pubescent below, apex acute or acuminate, base acute or attenuate, secondary veins 14–21 per side, slightly impressed above, raised below. Inflorescence ca. 6 cm long, pubescent, peduncle 2–2.5 cm long, panicle, with ca. 50 fascicles per inflorescence and 3–8 flowers per fascicle; flowers 1–2 × 1 mm, cupuliform, pedicel 1–2 mm long, yellow or light brown. Infructescence up to 15 cm long, pubescent, with 1–5 fruits, peduncle 2–3.5 × 0.2–0.4 mm, pedicel 3–7 mm long; fruits 2–3.2 × 1.6–2.6 cm, ellipsoid, apiculate, rugose, green. Figure 6F, 22J-L.

Representative specimens examined. BRAZIL. Acre: Acrelândia, rio Abunã, Projeto de Assentamento Extrativista (PAE) Porto Dias, km 108 of BR 364 (Rio Branco-Porto Velho), then 30 km S on side road, colocação Palhau, 5 October 2003, *D.C. Daly et al. 12187* (RB); **Cruzeiro do sul,** estrada Treze de Maio, 20 October 1984, *C.A. Cid Ferreira et al. 5172* (INPA, RB, UPCB); ramal do Açude a 5 km da vila Rodrigues Alves, 12 November 1991, *C.A. Cid Ferreira et al. 10717* (UFACPZ); projeto RADAM, próximo do aeroporto de Cruzeiro do Sul, 9 February 1976, *L.R. Marinho 49* (IAN); *ibidem*, 9 February 1976, *O.P. Monteiro & C. Damião 76-197* (INPA); *ibidem*, 13 February 1976, *O.P. Monteiro & C. Damião 76-352* (INPA); **Mâncio Lima,** 5.4 km após o projeto São Pedro, az 280, amostra 14.6, parcela 9, 21 September 1990, *A.O.D. Veloso & J.L. Santos 170* (UFACPZ); ramal do Banho a 5 km da sede do município, 9 November 1991, *C.A. Cid Ferreira et al. 10653* (NY, UFACPZ, UPCB); rio Moa (Japiim), 1 June 2007, *F. Obermuller & E.C. Oliveira 292* (NY, RB); Parque Nacional da Serra do Divisor, trilha atrás da pousada do Miro, 2 December 2022, *I.T. Lopes et al. 61* (INPA, NY, RB, SPF, UFACPZ); **Tarauacá,** basin of rio Juruá, rio Tarauacá, right bank, seringal Tamandaré, colocação Santa Maria, praia de Santa Maria, 18 November 1995, *D.C. Daly et al. 8590* (NY, UFACPZ, UPCB); *ibidem*, reserva indígena Praia do Carapanã, seringal & colocação Mucuripe, 20 November 1995, *D.C. Daly et al. 8659* (NY, UFACPZ, UPCB).

Taxonomic notes: *Virola pavonis* is essentially similar to *V. carinata*, and it is difficult to differentiate these species with only the elliptic-oblong leaves and inflorescences. However, *V. pavonis* is usually more puberulent and has ellipsoid fruits, while *V. carinata* fruits are usually subglobose or ovoid. The inflorescence is more robust and usually strongly yellow (vs. pale yellow or brown).

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, Peru, Suriname, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Mato Grosso, and Rondônia. In Acre (fig. 24), it has been found in *terra firme* and floodplain forests, and *campinarana*. Flowering has been recorded in February and September, and fruiting has been recorded in February, October, and November.

5.13. *Virola peruviana* (A.DC.) Warb., Nova Acta Acad. Caes. Leop.–Carol. German. Nat. Cur. 68: 188. 1897.

Tree, up to 15 m tall. Petiole 11–18 × 2–4 mm, canaliculate, rugose, pubescent. Leaf blade (15)17.5–37.5 × 5.5–11 cm, coriaceous, oblong, glabrescent, apex acuminate or cuspidate (up to 10 mm), base truncate to cordate, secondary veins 16–24 per side, impressed and raised above, raised below. Staminate inflorescence 10–17 × 8–16 cm, peduncle 2.8–4 × 0.2 cm, over 40 fascicles per inflorescence; pistillate inflorescence ca. 0.7–2 × 1–1.5 cm, peduncle ca. 1 × 0.3 cm, up to 20 fascicles per inflorescence, both tomentose ferruginous panicles; with 3–8 flowers per staminate fascicle and 3–5 flowers per pistillate fascicle; flowers 2–3 × 1–2 mm, cupuliform, pedicel up to 1 mm long. Infructescence up to 8 cm long, glabrescent to pubescent, with 3–5 fruits, peduncle 2.3–2.8 × 0.2–0.3 cm, pedicel 3–5 cm long; fruits 1.7–2.5 × 1.0–2.0 cm, ellipsoid, with a prominence along the dehiscence line, shiny, green or ferruginous. Figure 5C, 6H, 19G–J.

Representative specimens examined. BRAZIL. Acre: Cruzeiro do Sul, alto rio Juruá, margem esquerda, localidade Volta Grande, 19 March 1992, *C.A. Cid Ferreira et al.* 10867 (INPA, NY, UFACPZ, UPCB); **Mâncio Lima**, bacia do rio Juruá, rio Moa, volta da Aurora e rio Japiim, 8 July 2013, *D.S. Costa et al.* 128 (RB); Parque Nacional da Serra do Divisor, margem do rio Moa, 8 December 2022, *I.T. Lopes et al.* 65 (INPA, NY, RB, SPF, UFACPZ, UPCB); **Sena Madureira**, basin of rio Purus, near mouth of rio Macauhan, (tributary of the rio Iaco), 7 August 1933, *B.A. Krukoff* 5314 (MO, NY, US); rio Iaco, right bank, Nova Olinda, between igarapé Santo Antônio and igarapé Boa Esperança, 21 October 1993, *D.C. Daly et al.* 7825 (INPA, NY, UFACPZ, UPCB); **Tarauacá**, seringal Universo, colocação praia do Carapanã, 12 June 1995, *C.S. Figueiredo* 833 (MO, NY, UFACPZ, UPCB).

Taxonomic notes: *Virola peruviana* is very similar to *V. calophylla* and *V. exsica*, but it can be differentiated mostly by the slightly larger perianth and androecium, as well as glabrescent leaves and fruits. The pericarp is conspicuously carinate.

Distribution, Habitat and Phenology: Bolivia, Colombia, Ecuador, Peru, Venezuela, and Brazil. In Brazil, it occurs in Acre and Amazonas. In Acre (fig. 24), it has been found in *terra firme* and

floodplain forests. Flowering has been recorded in March, July, August and December, and fruiting has been recorded in June, September, October and December.

5.14. *Virola rugulosa* (Spruce) Warb., Nova Acta Acad. Caes. Leop.–Carol. German. Nat. Cur. 68: 227. 1897.

Tree, ca. 12 m tall. Petiole 5–9 × 3–4 mm, strongly canaliculate, puberulent. Leaf blade (9.5) 16–26 × 3.5–7.2 cm, coriaceous, elliptic or elliptic-oblong, glabrous above, tomentose below, apex acute to cuspidate, base obtuse to slightly cordate, secondary veins 26–30 (34) per side, impressed above, raised below. Inflorescences not seen. Infructescence up to 11 cm long, puberulent throughout, with 6–21 fruits, peduncle 2.5–5 cm long, pedicel 3–5 × 1–2 mm; fruits 7–10 × 7–9 mm, globose, shortly apiculate, yellow. Figure 17H-I.

Representative specimens examined. BRAZIL. Acre: Senador Guimard, fazenda experimental Catuaba – UFAC, próximo à ponte, 27 October 2021, *I.T. Lopes* 8 (INPA, NY, RB, SPF, UFACPZ).

Taxonomic notes: *Virola rugulosa* shares similar features with *V. duckei* and *V. albidiflora*, such as the quantity of secondary veins and yellow puberulent leaf underside, but it is distinguished by the more deeply impressed secondary veins and conspicuous veinlets, as well as the globose fruits. Its inflorescence is up to 25 cm long, densely tomentose, and has compact fascicles with many flowers (over 20) and deciduous bracts (Rodrigues, 1980).

Distribution, Habitat and Phenology: Brazil, in Acre and Amazonas. In Acre (fig. 24), it has been found in *terra firme* forest. Fruiting has been recorded in October.

5.15. *Virola sebifera* Aubl., Hist. Pl. Guiane 2: 904. 1775.

Tree, up to 25 m tall. Petiole 7–20 × 1–4 mm, canaliculate, rugose, glabrescent to tomentose. Leaf blade (7.5)9–30(37) × (2)4–11.5(15) cm, coriaceous, elliptic- or deltoid-oblong, puberulent below, apex acuminate, acute or cuspidate (up to 20 mm long), base obtuse to cordate, secondary veins 9–21 per side, impressed above, raised below. Staminate inflorescence 16–26 × 20–30 cm, peduncle 4–7 × 0.3–0.5 cm, over 50 fascicles per inflorescence; pistillate inflorescence 6.5–8.5 × 5.5–8 cm, peduncle 2–2.8 × 0.3–0.4 cm, over 40 fascicles per inflorescence, both rugose, tomentose panicles, sometimes with deciduous trichomes, with 3–10 flowers per staminate fascicle and 3–6 flowers per pistillate fascicle; flowers 2–4 × 1–3 mm, cupuliform, pedicel 1–2 mm long, lightly ferruginous. Infructescence up to 11 cm long, with 1–20 fruits, peduncle 1.5–3 × 0.2–0.5 cm, pedicel 1–4 mm

long; fruits 1.3–1.7 × 1–1.2 cm, subglobose or ellipsoid, apiculate, short tomentose and pubescent, ferruginous. Figure 4B, 5E, 22E-I.

Representative specimens examined. BRAZIL. Acre: Rio Acre, seringal Iracema, 27 March 1933, *A. Ducke RB24551*; **Acrelândia**, rio Abunã, Projeto de Assentamento Extrativista (PAE) Porto Dias, km 108 of BR 364 (Rio Branco-Porto Velho), then 30 km South on side road, colocação Palhau, 5 October 2003, *D.C. Daly et al. 12196* (RB); *ibidem*, 20 October 1995, *F.C.S. Walthier 351* (UFACPZ); rio Abunã, margem do rio, 23 March 2011, *M.H. Terra-Araujo et al. 691* (RB); **Brasiléia**, Reserva Extrativista Chico Mendes, seringal Porongaba, estrada para a colocação Urubu, aproximadamente 36 km norte-nordeste de Brasiléia, 10 July 1991, *C.A. Cid Ferreira et al. 10141a* (UFACPZ); *ibidem*, colocação São José, 2 June 1991, *D.C. Daly et al. 6843* (INPA, NY, UFACPZ); **Capixaba**, Projeto de Assentamento Extrativista (PAE) São Luis do Remanso, colocação Estrangeiro, 30 km west of Capixaba, then 15-21 km north on new unpaved access road, 30 September 2003, *D.C. Daly et al. 12038* (RB); **Cruzeiro do Sul**, projeto Santa Luzia, ramal 3, 28 September 1990, *A.O.D. Veloso & Z. Lima 207* (UFACPZ); *ibidem*, ramal 4, BR 364, 10 September 1985, *A. Rosas Jr. et al. 202* (INPA, MO, NY, UFACPZ, UPCB); *ibidem*, BR 364, 44 km east da cidade de Cruzeiro do Sul, reserva florestal do INCRA (área do inventário florestal do D.G. Campbell), 18 October 1984, *C.A. Cid Ferreira 5126* (INPA, NY, RB, US); *ibidem*, 18 October 1984, *C.A. Cid Ferreira 5333* (INPA, NY); *ibidem*, 18 October 1984, *C.A. Cid Ferreira 5354* (INPA, NY); *ibidem*, 18 October 1984, *C.A. Cid Ferreira 5355* (INPA, NY, RB); igarapé Humaitá, afluyente da margem direita do rio Juruá, a 6 km da margem, atrás colocação Dois Portos, 28 October 1991, *C.A. Cid Ferreira & L. Luz 10433* (INPA, MO, NY, UFACPZ, UPCB); projeto RADAM, sub-base de Cruzeiro do Sul, Ponto 5, 19 February 1976, *L.R. Marinho 255* (INPA); **Mâncio Lima**, BR 364, FUNTAC, amostra 14.7, parcela 17, 8.4 km pelo ramal com acesso ao projeto São Pedro, 18 September 1990, *A.O.D. Veloso & J.L. Santos 146* (UFACPZ); margem direita do alto rio Moa, Serra do Divisor entre o lugar Pedernal, fazenda Boa Vista, 12 October 1989, *C.A. Cid Ferreira et al. 10017* (IAN, INPA, NY); vicinity of serra da Moa, 23 April 1971, *G.T. Prance et al. 1208* (INPA, NY, US); *ibidem*, 6 km above school, 25 April 1971, *G.T. Prance et al. 12448* (INPA, NY, U, US); Parque Nacional da Serra do Divisor, margem do rio Moa, 29 November 2022, *I.T. Lopes et al. 53* (INPA, NY, RB, SPF, UFACPZ); *ibidem*, 30 November 2022, *I.T. Lopes et al. 57* (NY, RB, SPF, UFACPZ); **Porto Acre**, reserva florestal do Humaitá, 21 June 1994, *A.R.S. Oliveira 261* (MO, NY, UFACPZ); **Porto Walter**, Parque Nacional da Serra do Divisor, bacia do alto Juruá, margem esquerda do rio Branco, afluyente do Juruá-Mirim, 15 April 1999, *M. Silveira et al. 1641* (MO, NY, UPCB); **Rio Branco**, parque zobotânico, bloco 02, parcela nº 4, placa nº 44, 18 March 1994, *C.S. Figueiredo 351* (INPA, UFACPZ); BR 317 (estrada Rio

Branco – Brasília) approximately 10 km west of km 68, 7 June 1991, *D.C. Daly et al. 6886* (INPA, MO, NY, UFACPZ); *ibidem*, 7 June 1991, *D.C. Daly et al. 6896* (INPA, UFACPZ); *ibidem*, bloco 02, próximo a placa 6, 28 April 1992, *G. Claros et al. 70* (INPA, UFACPZ); *ibidem*, 1 July 1992, *G. Claros et al. 122* (INPA, UFACPZ); ramal da BR 364, projeto Padre Peixoto, 4 August 1983, *N. Paula & Webber 265* (UFACPZ); **Santa Rosa**, rio Purus, left bank, seringal Refúgio, South of Igarapé Extrema de Baixo, 26 March 1999, *D.C. Daly et al. 10081* (NY, UFACPZ, UPGB); **Sena Madureira**, margem direita do rio Iaco a 4 m da margem, 5 October 1980, *C.A. Cid Ferreira & B.W. Nelson 2774* (INPA, NY, UFACPZ); basin of rio Purus, rio Macauã, colocação Cachorro Macho, 2 April 1994, *D.C. Daly et al. 8150* (INPA, NY, UFACPZ, UPGB); Reserva Extrativista Cazumbá-Iracema, 30 April 2017, *H. Medeiros et al. 2093* (RB); **Senador Guimard**, fazenda experimental Catuaba, BR 364, km 35.3 December 2008, *H. Medeiros et al. 115* (RB).

Taxonomic notes: Most *Virola sebifera* characters are highly variable. The species is usually recognized by the leaves that are large and puberulent below, with a wider base, many times cordate, as well as puberulent or tomentose round fruits. Some inflorescences have a thick and conspicuously rugose peduncle. It shares similar features with *V. elongata* but can be differentiated by the more ellipsoid fruit, thicker leaves, and ramified trichomes. Differentiated from *V. mollissima* by the glabrous upper leaf face (vs. trichomes on the midrib), bigger flower perianth (over 2 mm long vs. up to 2 mm long) and often smaller fruits with less tomentose coverage.

Distribution, Habitat and Phenology: Bolivia, Colombia, Costa Rica, Ecuador, French Guiana, Guyana, Nicaragua, Panama, Peru, Suriname, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Amapá, Bahia, the Distrito Federal, Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Rio de Janeiro, Rondônia, Roraima, São Paulo, and Tocantins. In Acre (fig. 25), it has been found in *terra firme* and floodplains forests. Flowering has been recorded in March, April and October, and fruiting has been recorded in June.

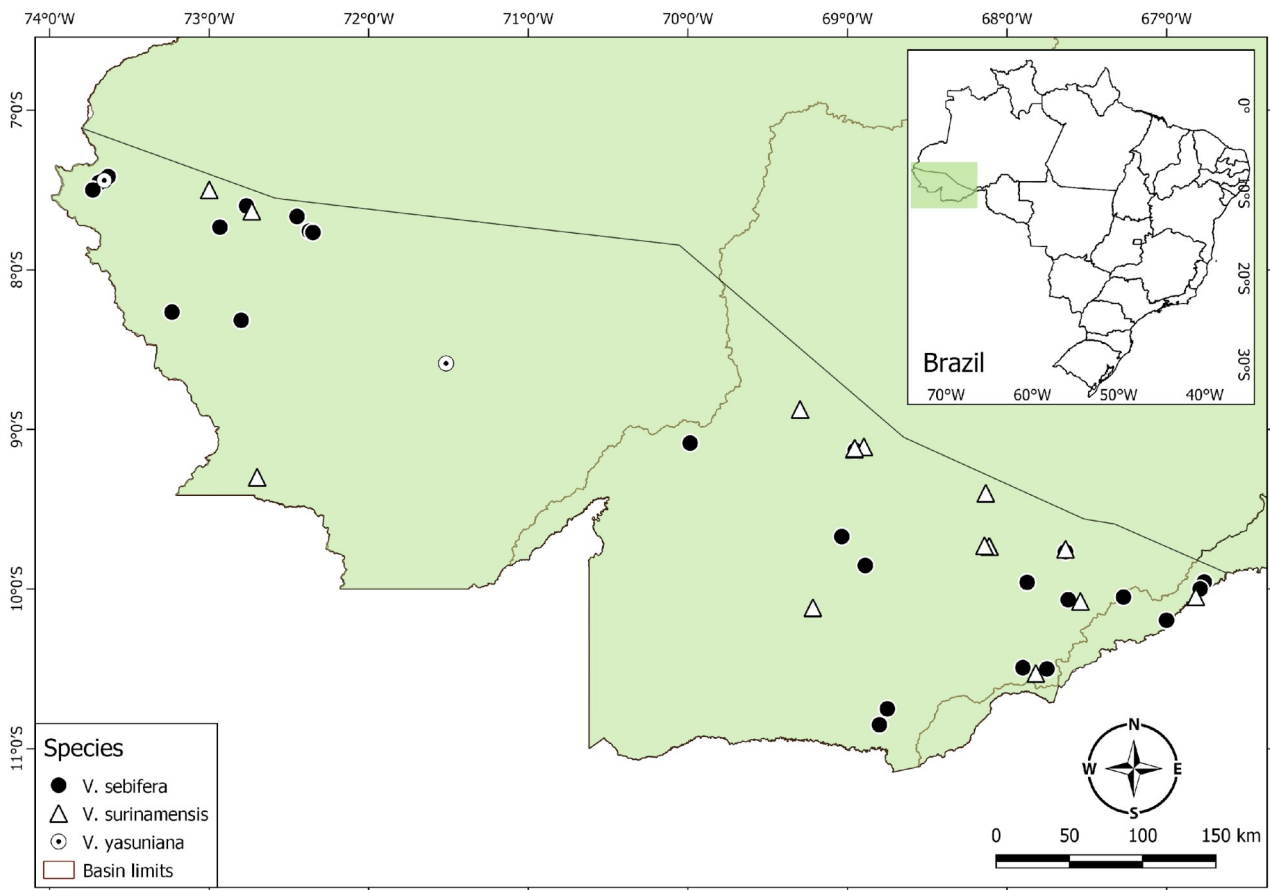


Fig. 25. Occurrence of *Virola sebifera*, *V. surinamensis* and *V. yasuniana* in Acre.

5.16. *Virola surinamensis* (Rol. ex Rottb.) Warb., Nova Acta Acad. Caes. Leop.–Carol. German. Nat. Cur. 68: 208. 1897.

Tree, 20–30 m tall. Petiole 3–7 × 1–2 mm, canaliculate, rugose, puberulent. Leaf blade 8.5–15 × 2–3.5 cm, coriaceous, narrowly oblong, pubescent below, apex acute or acuminate (up to 5 mm long), base acute or obtuse, secondary veins 19–24 per side, slightly impressed above, raised below. Inflorescence 6–18 × 4–24 cm, pubescent, peduncle 5–35 × 2 mm, panicle, with over 30 fascicles per inflorescence and 4–15 flowers per fascicle, bracts 4–7 mm long, oblong or obovate, deciduous; flowers 1–3 × 1–2 cm, cupuliform, pedicel 2–3 mm long, yellow. Infructescence up to 8 cm long, glabrescent, with 3–8 fruits, peduncle 10–35 × 2 mm, pedicel 3–6 mm long; fruits 1.6–2 × 1.4–1.5 cm, subglobose to ellipsoid, apiculate, rugose, greenish brown. Figures 1, 5F, 17A-B.

Representative specimens examined. BRAZIL. Acre: Acrelândia, rio Abunã, ONG – SOS Quelônios, 25 March 2011, *R.C. Forzza et al.* 6238 (RB); **Bujari**, BR 364, nas margens do igarapé, 26 October 2021, *I.T. Lopes et al.* 1 (INPA, NY, RB, SPF, UFACPZ); *ibidem*, às margens da BR, 26 October 2021, *I.T. Lopes et al.* 3 (INPA, NY, RB, SPF, UFACPZ, UPCB); **Capixaba**, mata na propriedade São Luiz, 3 November 2021, *I.T. Lopes et al.* 49 (INPA, NY, RB, SPF, UFACPZ); **Mâncio Lima**, Parque Nacional da Serra do Divisor, rio Moa, 12 May 1996, *D.C. Daly et al.* 9041

(MO, NY, UFACPZ, UCPB); bacia do Alto Juruá, rio Moa, margem direita, cerca de duas horas acima da voz, 31 May 1994, *M. Silveira et al.* 779 (INPA, MO, NY, UFACPZ, UCPB); **Manoel Urbano**, às margens da BR 364, próximo à ponte sobre o rio Purus, 1 November 2021, *I.T. Lopes et al.* 46 (INPA, NY, RB, SPF, UFACPZ); **Marechal Thaumaturgo**, bacia do rio Juruá, margem direita, Reserva Extrativista do Alto Juruá, foz do igarapé Caipora, April 1993, *M. Silveira et al.* 489 (INPA, MO, NY, UFACPZ, UCPB); **Rio Branco**, projeto Humaitá, ramal Murum, 17 August 1988, *I.F. Rego & J.M.A. Souza* 40 (INPA, UFACPZ); floresta estadual do Antimari, colocação Mappinguari, 19 September 1989, *S.B. Barbosa et al.* 27 (INPA, UFACPZ); **Sena Madureira**, basin of rio Purus, rio Iaco, right bank, Nova Olinda, between igarapé Santo Antônio and igarapé Boa Esperança, 25 October 1993, *D.C. Daly et al.* 7910 (INPA, MO, NY, UCPB); Reserva Extrativista Cazumbá-Iracema, ramal do núcleo da Cazumbá-Iracema para o rio Caeté, colocação do Sr. Branco, 4 May 2017, *H. Medeiros et al.* 2186 (NY, RB); *ibidem*, mata de várzea às margens do igarapé Santo Antônio, próximo à propriedade do Sr. Manoel Maia, 30 October 2021, *I.T. Lopes et al.* 29 (NY, RB, SPF, UFACPZ); *ibidem*, caminho para o porto do rio Caeté ao lado do desague do igarapé Santo Antônio, 31 October 2021, *I.T. Lopes et al.* 38 (INPA, NY, RB, SPF, UFACPZ); riozinho do Andirá, margem esquerda, BR 364, km 47, sentido Sena Madureira, colocação do Sr. Severo, 16 September 1995, *M. Pardo et al.* 145 (MO, NY, UFACPZ, UCPB); **Senador Guiomard**, mata às margens do rio Iquiri, 27 October 2021, *I.T. Lopes et al.* 5 (INPA, NY, RB, SPF, UFACPZ).

Taxonomic notes: *Virola surinamensis* is distinguished by the narrowly oblong leaves, yellow inflorescences with aggregated fascicles when immature, and the essentially glabrous infructescence with subglobose fruits.

Distribution, Habitat and Phenology: Bolivia, Colombia, Costa Rica, Ecuador, French Guiana, Guyana, Panama, Peru, Suriname, Venezuela, and Brazil. In Brazil, it occurs in Acre, Amazonas, Amapá, Ceará, Maranhão, Mato Grosso, Pará, Piauí, Rondônia, Roraima, and Tocantins. In Acre (fig. 25), it has been found in *terra firme* and floodplain forests. Flowering has been recorded in April, May, July, October and November, and fruiting has been recorded in March, August, and October.

5.17. *Virola yasuniana* D.Santam., PhytoKeys 197: 81. 2022.

Tree, up to ca. 30 m tall. Petiole 10–14 × 1–2 mm, canaliculate, pubescent. Leaf blade ca. 10.5–14 × 3.5–4.2 cm, chartaceous, lanceolate or elliptic-oblong, glabrescent, apex acuminate or acute, base acute, secondary veins 14–16 per side, slightly impressed above, slightly raised below.

Inflorescence 1–4.5 cm long, peduncle 3–8 mm long, rugose, panicle, with 7–16 fascicles per inflorescence in small receptacles and 8–20 flowers per fascicle; flowers 1–2 × 1 mm, cupuliform to ovate, pedicel ca. 1 mm long, light brown. Infructescence ca. 5 cm long, fruits 1-2 per infructescence, peduncle ca. 10 × 5 mm, pedicel ca. 10 mm long, fruits ca. 3 × 2.7 cm, ellipsoid, winged ca. 5 mm, glabrescent. Figure 22M.

Representative specimens examined. BRAZIL. Acre: Mâncio Lima, bacia do Alto Juruá, rio Moa, Parque Nacional da Serra do Divisor, caminho para o rio Anil, 17 June 1996, *M. Silveira et al.* 1374 (MO, NY, UFACPZ, UPCB); **Tarauacá**, basin of rio Juruá, rio Tarauacá, right bank, seringal Tamandaré, colocação Santa Maria, praia de Santa Maria, 18 November 1995, *D.C. Daly et al.* 8594 (NY, UFACPZ, UPCB).

Taxonomic notes: *Virola yasuniana* is distinguished by the ramified inflorescence with short branches and flower fascicles organized in receptacles up to 3 mm wide. The infructescence is up to 4 cm long, and the fruits are winged on the line of dehiscence, which is considerably different from other *Virola* fruits.

Distribution, Habitat and Phenology: Ecuador and Brazil; in the latter, it only occurs in Acre. In Acre (fig. 25), it has been found in *terra firme* forest. Flowering has been recorded in November.

CONCLUSION

This study treated 34 Myristicaceae species in the state of Acre, which corresponds to 53% of the family species in Brazil. Older collections were revised and newer were added and identified, confirming six species online records and five new occurrences. Species distributions were mapped, and although it's important to collect more specimens to confirm, the patterns have shown that 16 species have a wide distribution in the state and 18 are restricted to a watershed.

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