

Taxonomy and systematics

## Tree and tree-like species of Mexico: Euphorbiaceae, Peraceae, Phyllanthaceae, Picrodendraceae, Putranjivaceae, and Urticaceae

### *Especies arbóreas y arborescentes de México: Euphorbiaceae, Peraceae, Phyllanthaceae, Picrodendraceae, Putranjivaceae y Urticaceae*

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#### Abstract

Trees or tree-like plants are defined here broadly as perennial, self-supporting plants at least 5 m tall, without considering ascending leaves or inflorescences, and with 1 or several erect stems with a diameter of at least 10 cm. In this fourth contribution of the taxonomic compilation of Mexico's native tree species, 178 species are presented: 134 in the family Euphorbiaceae (53% endemic), 1 in the Peraceae (not endemic), 12 in the Phyllanthaceae (none endemic), 1 in the Picrodendraceae (endemic), 3 in the Putranjivaceae (1 endemic), and 27 in the Urticaceae (7% endemic). The tallest tree species are *Tetrorchidium rotundatum* (Euphorbiaceae) reaching 45 m, and *Hieronyma alchorneoides* (Phyllanthaceae) being over 40 m, as reported on herbarium labels or in the literature. All species are listed in an appendix that includes the original publication, references of taxonomic revisions or floristic treatments, in some cases synonyms, existence of subspecies or varieties, maximum height in Mexico, and an indication if the species is endemic to Mexico. *Enriquebeltrania* (Euphorbiaceae) is the only endemic genus in these families.

**Keywords:** Biodiversity; Endemism; Flora

#### Resumen

Las plantas arbóreas o arborescentes se definen aquí en un sentido amplio como plantas perennes que se pueden sostener por sí solas, con una altura total de al menos 5 m (sin considerar hojas o inflorescencias ascendentes) y con uno o varios tallos erectos de un diámetro de al menos 10 cm. En esta cuarta contribución de la recopilación de las especies arbóreas nativas de México, se presentan 178 especies: 134 en la familia Euphorbiaceae (53% endémicas), 1 de Peraceae (no endémica), 12 de Phyllanthaceae (ninguna endémica), 1 de Picrodendraceae (endémica),

3 de Putranjivaceae (1 endémica) y 27 de Urticaceae (7% endémicas). Las especies arbóreas con mayor altura son *Terrorchidium rotundatum* (Euphorbiaceae) con 45 m y *Hieronyma alchorneoides* (Phyllanthaceae) con más de 40 m, reportadas en etiquetas de herbario o en la literatura. Todas las especies se enlistan en un apéndice que incluye el nombre científico, los datos de su publicación original, referencias de revisiones taxonómicas, en algunos casos sinónimos, la existencia de subespecies o variedades, la altura máxima en México y la indicación de si la especie es endémica de México. *Enriquebeltrania* (Euphorbiaceae) es el único género endémico en estas familias.

*Palabras clave:* Biodiversidad; Endemismo; Flora

## Introduction

In the majority of terrestrial ecosystems, trees are the most conspicuous components and dominate the landscape in terms of coverage and biomass. However, with regard to overall diversity, they are often surpassed by shrubby and/or herbaceous species. For Mexico, the total number of vascular plant species is estimated to be over 23,000 (Villaseñor, 2016), and approximately 2,500 (11%) of these are considered to be trees (Rzedowski, 1991). However, there is no single definition in the literature of what constitutes a tree. In Ricker and Hernández (2010), and slightly expanded in Ricker et al. (2013), trees or tree-like plants were defined broadly as perennial, self-supporting plants with a total height of at least 5 m, without ascending leaves or inflorescences, and with 1 or several erect stems with a diameter of at least 10 cm, measured at 1.3 m above the ground level, or measured above buttresses if these are present. A tree or tree-like species contains individuals with tree characteristics at least somewhere in its geographic range, but not necessarily everywhere. Our definition avoids the often arbitrary distinction of “trees” with a dominant trunk, from large “shrubs” with multiple stems. The term “self-supporting” excludes lianas, and the minimum diameter of 10 cm assures some type of a trunk that is typically associated with the term tree. Overall, however, the definition is anthropocentric, focused on plants that are individually impressive elements of a landscape from a human viewpoint. There are also plant species that could be considered trees, but do not comply with the above definition, and thus are not included in our compilation: tree-like (woody) species that are smaller than 5 m, or present a diameter of less than 10 cm, could be distinguished as “shrubs” or “dwarf trees.” The same is true for plants that are higher than 5 m, but do not present a diameter of 10 cm, such as some bamboo species (Poaceae).

After discussing the tree definition and emphasizing the need for an updated taxonomic list of Mexico’s tree species, Ricker and Hernández (2010) presented 170 species of gymnosperms, monocotyledons, and tree ferns. In Ricker et al. (2013), the work was continued with 619

species in the species-rich plant families Asteraceae, Leguminosae, and Rubiaceae. Subsequently, Ricker et al. (2016) presented 271 tree species in the families Apocynaceae, Cactaceae, Ebenaceae, Fagaceae, and Sapotaceae. In the current contribution, we report 178 tree species in 6 plant families: Euphorbiaceae, Peraceae, Phyllanthaceae, Picodendraceae, Putranjivaceae, and Urticaceae.

Throughout the 20<sup>th</sup> century and during the first years of the 21<sup>st</sup> century, Peraceae, Phyllanthaceae, Picodendraceae, and Putranjivaceae were included within Euphorbiaceae (e.g., Radcliffe-Smith, 2001; Webster, 1994). However, these taxa have subsequently been segregated as independent families (Angiosperm Phylogeny Group, 2016; Tokuoka, 2007; Wurdack & Davis, 2009; Wurdack et al., 2004, 2005). With regard to Urticaceae, it is here circumscribed to include Cecropiaceae, following Sytsma et al. (2002) and the Angiosperm Phylogeny Group (2016). Whereas Euphorbiaceae and its segregates are all closely related families within the Malpighiales, the distantly related Urticaceae belongs to the Rosales. Taxonomic descriptions of the families Euphorbiaceae, Phyllanthaceae, Picodendraceae, Putranjivaceae, and Urticaceae can be found in Heywood et al. (2007). Esser (2009) provides a description of Peraceae.

Generally speaking, our understanding of the arborescent Mexican species of Euphorbiaceae is incomplete. The only truly complete Floras for Mexico are those of the Sonoran Desert (Wiggins, 1964), Baja California (Wiggins, 1980), and the Valley of Mexico (Calderón-de Rzedowski & Rzedowski, 2001), and Euphorbiaceae trees are absent from all of those regions. The family has yet to be revised for any of the major on-going floristic projects, such as the “Flora del Bajío y de Regiones Adyacentes” (<http://inecolbajio.inecol.mx/floradelbajio/>), “Flora de Guerrero” (<http://biologia.fciencias.unam.mx/plantasvasculares/publicaciones.html>), “Flora Mesoamericana” (<http://legacy.tropicos.org/Project/FM>), “Flora de Veracruz” (<http://www1.inecol.edu.mx/floraver/>), and “Flora de Jalisco y Áreas Colindantes” (<https://www.yumpu.com/user/floradejalisco.cucba.udg.mx>). It is noteworthy that, although it was not completed

for the “Flora Novo-Galiciana” (discontinued), a few useful preliminary taxonomic treatments of portions of the family were published (McVaugh, 1961, 1993, 1995; Webster, 2001a), and these include some of the tree species of the appendix. The only major on-going floristic project that includes Euphorbiaceae is the “Flora del Valle de Tehuacán-Cuicatlán,” but only the description of 4 genera of the subfamily Crotonoideae has been published (Martínez-Gordillo et al., 2014), and of the 30 species included, only 6 are trees. There are taxonomic accounts of the family for Aguascalientes (de la Cerda-Lemus, 2011) and Sonora (Steinmann & Felger, 1997). For the latter state, there is also a revision of the trees (Felger et al., 2001). However, in both of these states, there are few Euphorbiaceae trees. Despite the lack of taxonomic treatments of the Euphorbiaceae in published floras, there are various important revisions or synopses that include many tree species, such as those covering *Bernardia* (Cervantes-Maldonado, 2002), *Cnidocolus* (Breckon, 1975), *Croton* (Martínez-Gordillo, 1995, 1996), portions of *Euphorbia* (Dressler, 1957; Ramírez-Roa, 1997), *Garcia* (Lundell, 1945), *Jatropha* (Dehgan, 2012), and *Mabea* (Martínez-Gordillo et al., 2000).

For Phyllanthaceae, the family has been completed for the “Flora del Bajío y de Regiones Adyacentes” (Steinmann, 2007) and “Flora del Valle Tehuacán-Cuicatlán” (Martínez-Gordillo & Cervantes-Maldonado, 2009), but in the latter area no tree species occur, and in the former there are only 2 tree species. There are revisions of the genera *Astrocasia* (Webster, 1992) and *Margaritaria* (Webster, 1979).

The family Urticaceae is better studied, and was revised in the “Flora Mesoamericana” series (pages 116-174 in Davidse et al., 2015), which includes Central America in addition to the Mexican states of Tabasco, Chiapas, Campeche, Quintana Roo, and Yucatán. It was also completed for the “Flora del Bajío y de Regiones Adyacentes” (Steinmann, 2005) and the “Flora del Valle de Tehuacán-Cuicatlán” (Steinmann, 2009). Additional information is found in revisions of the genera *Boehmeria* (Wilmot-Dear & Friis, 1996), *Cecropia* (Berg, 2015; Berg & Franco-Rosselli, 2005), *Coussapoa* (Berg et al., 1990), *Myriocarpa* (Monro, 2009), *Pourouma* (Berg et al., 1990), and *Urera* (Monro & Rodríguez-González, 2009).

The 3 smaller families Peraceae, Picrodendraceae, and Putranjivaceae similarly lack substantial taxonomic treatments, although Putranjivaceae was completed for the “Flora del Bajío y de Regiones Adyacentes” (Steinmann, 2001). Furthermore, there is a revision of a portion of its genus *Drypetes* (Levin, 2013) that includes one of the Mexican trees.

## Materials and methods

The list of species is presented in an appendix that provides the scientific names of the tree species (as defined above), with original publication, references of recent taxonomic revisions, in some cases synonyms, existence of subspecies or varieties, maximum height in Mexico, and the indication if the species is endemic to Mexico. Only species native to Mexico were included in the appendix, and naturalized species such as *Ricinus communis* L. are not included.

In addition to an exhaustive review of the pertinent literature, including all references mentioned in the introduction, extensive herbarium work was conducted. For all species, the specimens in the National Herbarium of Mexico (MEXU, Ciudad de México) were examined for growth form, height, and trunk diameter. The following herbaria were also consulted: ARIZ (Tucson, Arizona), QMEX (Querétaro, Querétaro), IBUG (Guadalajara, Jalisco), and RSA/POM (Claremont, California). In some cases, field observations were made.

Endemism refers to the species distribution being restricted to Mexico, as far as currently known, and the endemism status was also verified by herbarium records, if it was not clear from the literature. The heights reported in the appendix refer to the maximum heights reached by the species in some region of Mexico. Exceptional height values for Mexico are given in parenthesis, and when deemed relevant, heights in other countries are also reported in parenthesis. Where reasonable doubts remained about the trunk diameter reaching at least 10 cm or the height 5 m, the species was not included.

Recent literature with taxonomic descriptions for the recognized species names are cited in the appendix, whenever available. The authors of species names and original publications were verified in Tropicos (www.tropicos.org). Synonyms are mentioned only in cases when they reflect diverging opinions among different taxonomic specialists. For synonyms, species' author names are not provided here, but can be found in Tropicos.

## Results

In total, 178 species are reported for the 6 families treated in this contribution. The most relevant results are summarized in Table 1. Most species (75%) belong to the Euphorbiaceae, followed by the Urticaceae (15%). *Croton* and *Jatropha* (both Euphorbiaceae) are the genera with most species treated here (25 and 20, respectively).

Mexico has a high level of endemism, and Villaseñor (2016) reports that approximately 50% of the species

could be endemic to the country. This is comparable to the 52% estimate provided by Rzedowski (1991). For the families in our contribution, the Euphorbiaceae follows this trend closely, having 53% of its trees endemic to Mexico. However, for the Urticaceae, only 7% of the tree species are endemic. For the 4 smaller families, 12% (2 of 17) are endemic. Collectively, the level of endemism is 42%, or slightly less than the national average. A single genus is endemic: *Enriquebeltrania*.

The tallest Mexican trees previously reported in this project belong to Leguminosae, Pinaceae and Rubiaceae, which can reach heights of more than 70 m. Species of Apocynaceae, Cupressaceae, Fagaceae and Sapotaceae exceed 60 m (Ricker & Hernández, 2010; Ricker et al., 2013, 2016). None of the families treated in this contribution have trees reaching 50 m in Mexico (as far as known) and only 2 exceed 40 m: *Tetrorchidium rotundatum* and *Hieronyma alchorneoides*. By far, the diversity is found in small trees, and 103 species are 10 m tall or less.

## Discussion

The vast majority of the species covered in this contribution belong to Euphorbiaceae, the fifth most diverse family of vascular plants in Mexico (Villaseñor, 2016). It includes over 700 native Mexican species (Steinmann, 2002; Villaseñor, 2016), but according to our compilation only 134 species (about 19%) are trees. With regard to the small families Peraceae and Putranjivaceae, all 4 of the Mexican species are trees, whereas only 1 of the 4 Mexican species of Picrodendraceae shares this habit. Of the estimated 49 native Mexican Phyllanthaceae (Villaseñor, 2016), we here report 12 species of trees (24%). Finally, concerning Urticaceae, an estimated 91

native species occur in the country (Villaseñor, 2016), of which 27 are trees (30%).

Among the Mexican tree species of Euphorbiaceae are a number of economically important taxa. By far, the most significant of these is the Christmas Poinsettia, *Euphorbia pulcherrima*, one of the world's most lucrative ornamental plants. Although the cultivars are grown almost exclusively as herbaceous, the species occurs natively as a tree in western and central Mexico (Trejo et al., 2012). *Cnidoscolus aconitifolius*, the "chaya," is cultivated locally, and its leaves are consumed for their highly nutritious composition (Ross-Ibarra & Molina-Cruz, 2002). The latex of *C. tepiquensis* is collected and employed in Jalisco and Nayarit to make souvenir figurines (Cházaro-Basáñez & Guerrero-Nuño, 1995). Considerable quantities of *Croton lindquistii* and other species of *Croton* section *Eluteria*, such as *C. pseudoniveus* and *C. reflexifolius*, are harvested in northwestern Mexico for their straight, durable trunks, which are used in construction and as posts for the cultivation of crops (Steinmann, 2014). *Jatropha curcas* is currently being investigated as a source of biodiesel and also has medicinal uses (Abdelgadir & Van Staden, 2013). Various other species have regional importance in traditional medicine, e.g., *Croton arboreus*, *C. draco*, and *C. schiedeianus* (Barrera et al., 2016). The large leaves of *Omphalea oleifera* are used to wrap cheeses, and its seeds are consumed like a nut and also used for the preparation of soaps and cooking oils (Gillespie, 1988).

In the Urticaceae, the pioneer tropical forest tree *Cecropia obtusifolia* plays an important ecological role in early successional communities and has various medicinal uses (Pérez-Guerrero et al., 2001). *Myriocarpa longipes* is also used medicinally and its large leaves are used to wrap meat and tamales (Steinmann, 2005).

Table 1  
 Summary of the data in the Appendix <sup>1</sup>

Family	Tree species	Endemic tree species	Tallest species	Tree genera	Genera with most tree species
Euphorbiaceae	134	71 (53%)	<i>Tetrorchidium rotundatum</i> (45 m)	23	<i>Croton</i> (25 species), <i>Jatropha</i> (20)
Peraceae	1	0	<i>Pera barbellata</i> (20 m)	1	<i>Pera</i> (1)
Phyllanthaceae	12	0	<i>Hieronyma alchorneoides</i> (40 m, 60 m in Costa Rica)	5	<i>Phyllanthus</i> (6)
Picrodendraceae	1	1	<i>Piranhea mexicana</i> (25 m)	1	<i>Piranhea</i> (1)
Putranjivaceae	3	1	<i>Drypetes gentryi</i> (30 m)	1	<i>Drypetes</i> (3)
Urticaceae	27	2 (7%)	<i>Cecropia obtusifolia</i> (35 m)	9	<i>Myriocarpa</i> (7), <i>Urera</i> (7)
Total of all families	178	75 (42%)		40	

<sup>1</sup> *Enriquebeltrania* (Euphorbiaceae) is the only endemic genus.

All of the families treated here are either entirely tropical (Peraceae and Putranjivaceae) or primarily tropical (Euphorbiaceae, Picrodendraceae, Phyllanthaceae, and Urticaceae). With regard to floristic affinities, only 3 of the 178 species also occur in the continental United States. Two of them are restricted to tropical southern Florida: *Gymnanthes lucida* (Euphorbiaceae) and *Drypetes lateriflora* (Putranjivaceae); *Jatropha cinerea* barely enters in the county in southwestern Arizona. Whereas 14 species extend into the Antilles, the greatest affinities are with the tropical forests of Central and/or South America, where 101 species also occur. No species is distributed natively in the paleotropics.

There is no comprehensive evaluation of the conservation status of any of the families treated in this contribution. In fact, less than a third of the tree species have been evaluated, be it by the criteria of the International Union for Conservation of Nature (IUCN, 2012) or the alternative "Método de evaluación del riesgo de extinción de las especies silvestres en México" (Semarnat, 2002). Only 6 of the arborescent species of Euphorbiaceae have been assigned a risk category in the "Norma Oficial Mexicana NOM-059" (Semarnat, 2019). These include *Bernardia mollis* (threatened), *Cnidocolus autlanensis* (subject to special protection), *Croton guatemalensis* (subject to special protection), *Euphorbia coalcomanensis* (threatened), *Sapium macrocarpum* (threatened), and *Tetrorchidium rotundatum* (threatened). However, this

list certainly is not an accurate representation of the endangered taxa, and many more species are at risk than indicated by the "Norma Oficial Mexicana NOM-059." For example, a recent assessment of some species belonging to *Jatropha* subgenus *Curcas* determined that of the 12 Mexican tree species included, 7 are either threatened or near-threatened, with 2 of them being endangered: *Jatropha pereziae* and *J. stephani* (Christensen et al., 2019). Additionally, a study of 37 Mexican cloud forest trees by González-Espinosa et al. (2012) determined that in Euphorbiaceae, Phyllanthaceae, and Urticaceae, 15 (41%) of the evaluated species are worthy of some level of conservation concern (1 critically endangered, 4 endangered, 7 vulnerable, and 3 near threatened). The fact that most species lack even a preliminary evaluation, let alone any management strategies, support the urgency to evaluate the conservation status of more trees in these families.

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#### Appendix. List of tree species with original publication, references of taxonomic revisions, in some cases synonyms, existence of subspecies or varieties, maximum height in Mexico, and indication if endemic to Mexico.

##### Euphorbiaceae

- Acalypha diversifolia* N. J. von Jacquin, *Plantarum Rariorum Horti Caesarei Schoenbrunnensis* 2: 63. 1797. (González, 2010: 301; Parker, 2008: 259-260). 8(-15) m.
- Acalypha lancetillae* P. C. Standley, *Publications of the Field Museum of Natural History, Botanical Series* 4(8): 312. 1929. (Parker, 2008: 260). 6 m (often smaller and shrubby).
- Acalypha macrostachya* N. J. von Jacquin, *Plantarum rariorum horti caesarei schoenbrunnensis* 2: 63. 1797. (González, 2010: 302; Parker, 2008: 261). 8 m (but generally smaller and shrubby).
- Acalypha mortoniana* C. L. Lundell, *Bulletin of the Torrey Botanical Club* 64(8): 552. 1937. (Parker, 2008: 261; González, 2010: 302). 9 m (often smaller and shrubby).
- Acalypha skutchii* I. M. Johnston, *Journal of the Arnold Arboretum* 19(2): 120. 1938. (Parker, 2008: 261). 6(-12) m (often shrubby).
- Acalypha villosa* N. J. von Jacquin. *Enumeratio systematica plantarum, quas in insulis caribaeis* 32. 1760. (Múnoz-Rodríguez et al., 2014: 213-214; Parker, 2008: 262; González, 2010: 305). 7 m (often smaller and shrubby).
- Acidocroton madrigalensis* A. Hanan et V. W. Steinmann, *Acta Botanica Mexicana* 104: 94. 2013. 5 m. Endemic.
- Acidocroton spinosus* (P. C. Standley) G. L. Webster, *Annals of the Missouri Botanical Garden* 81(1): 107. 1994. 18 m (in some portions of its distribution smaller and shrubby).
- Adelia barbinervis* D. F. von Schlechtendal et L. K. von Chamisso, *Linnaea* 6: 362. 1831. (De-Nova et al., 2007: 587-588; Parker, 2008: 263; Rzedowski, 2015: 52). 9 m (often smaller and shrub-like).
- Adelia brandegeei* V.W. Steinmann, *Acta Botanica Mexicana* 61: 60. 2002. (De-Nova et al., 2007: 588-589; Felger et al., 2001: 146-147; Steinmann & Felger, 1997: 17). This name replaces *Adelia virgata* T.S. Brandege (1894) non *A. virgata* J.L. Poir (1810). 6 m (but mostly smaller and shrub-like). Endemic.

- Adelia oaxacana* (J. Müller) W. B. Hemsley, *Biologia centrali-americana* [...] Botany 3(15): 129. 1883. (De-Nova et al., 2007: 591). 8 m (often smaller and shrub-like). Endemic.
- Alchornea chiapasana* F. Miranda, *Ceiba* 4(2): 131. 1954. (Secco, 2004: 129-131). 17(-30) m. Endemic.
- Alchornea latifolia* O. Swartz, *Nova Genera et Species Plantarum seu Prodrromus* 98. 1788. (González, 2010: 311; Parker, 2008: 264; Pennington & Sarukhán, 2005: 308-309; Rzedowski, 2015: 55; Secco, 2004: 103-108). 30 m.
- Bernardia albida* C. L. Lundell, *Wrightia* 5(7): 245. 1976. (Cervantes-Maldonado, 2002: 58-64). 5 m (often smaller and shrubby). Endemic.
- Bernardia chinantlensis* A. Cervantes et H. Flores, *Botanical Journal of the Linnean Society* 149: 244. 2005. 10 m (often smaller). Endemic.
- Bernardia dodecandra* (M. Sessé ex A. J. Cavanilles) R. McVaugh, *Botanical Results of the Sessé & Mociño Expedition (1787-1803)* 222. 2000. (Cervantes-Maldonado, 2002: 75-83; Parker, 2008: 266). *Bernardia interrupta* is considered a synonym. 10 m (often smaller).
- Bernardia fonsecae* A. Cervantes et J. Jiménez, *Novon* 12(1): 38. 2002. (Cervantes-Maldonado, 2002: 87-91). 18 m. Endemic.
- Bernardia gentryana* L. Croizat, *Journal of the Arnold Arboretum* 24: 165. 1943. (Cervantes-Maldonado, 2002: 91-95; Steinmann & Felger, 1997: 18). 6 m (often smaller and shrubby). Endemic.
- Bernardia heteropilosa* McVaugh, *Brittonia* 13: 155. 1961. (Cervantes-Maldonado, 2002: 95-97). 5 m. Endemic.
- Bernardia macrocarpa* A. Cervantes et H. Flores, *Botanical Journal of the Linnean Society* 149: 247. 2005. (Cervantes-Maldonado, 2002: 109-111). 15 m. Endemic.
- Bernardia mexicana* (W. J. Hooker et G. Arnott) J. Müller, *Linnaea* 34: 171. (Cervantes-Maldonado, 2002: 116-122). 1865. 5(-10) m.
- Bernardia mollis* C. L. Lundell, *Contributions from the University of Michigan Herbarium* 4: 12. 1940. (Cervantes-Maldonado, 2002: 125-129; Parker, 2008: 266). 15 m.
- Bernardia oblanceolata* C. L. Lundell, *Contributions from the University of Michigan Herbarium* 4: 13. 1940. (Cervantes-Maldonado, 2002: 136-139; Parker, 2008: 266). 10(-20) m.
- Bernardia santanae* McVaugh, *Contributions from the University of Michigan Herbarium* 20: 194. 1995. (Cervantes-Maldonado, 2002: 153-156). 7 m. Endemic.
- Bernardia wilburii* McVaugh, *Brittonia* 13: 157. 1961. (Cervantes-Maldonado, 2002: 172-173, 175). 5 m. Endemic.
- Bernardia yucatanensis* C. L. Lundell, *Contributions from the University of Michigan Herbarium* 4: 14. 1940. (Cervantes-Maldonado, 2002: 173-177; Parker, 2008: 266). 5(-12) m.
- Cleidion castaneifolium* J. Müller, *Linnaea* 34: 184. 1865. (González, 2010: 319; Parker, 2008: 267). 15 m.
- Cnidoscolus aconitifolius* (P. Miller) I. M. Johnston, *Contributions from the Gray Herbarium of Harvard University* 68: 86. 1923. (Breckon, 1975: 323-362; González, 2010: 320; Parker, 2008: 267-268; Fernández-Casas, 2014: 6-8, 12; Maya-Lastra & Steinmann, 2018: 3-4). *Cnidoscolus chayamansa* is considered a synonym. 8 m.
- Cnidoscolus autlanensis* G. Breckon, *Contributions from the University of Michigan Herbarium* 20: 201. 1995. (Breckon, 1975: 276-285; Maya-Lastra & Steinmann, 2018: 7). 6 m. Endemic.
- Cnidoscolus elasticus* C. L. Lundell, *Field & Laboratory* 12(2): 33. 1944. (Breckon, 1975: 263-272; Maya-Lastra & Steinmann, 2018: 10). 10 m. Endemic.
- Cnidoscolus megacanthus* G. Breckon ex F. J. Fernández, *Fontqueria* 55(63): 492. 2008. (Breckon, 1975: 375-387; González, 2010: 321; Maya-Lastra & Steinmann, 2018: 13). 6(-8) m.
- Cnidoscolus monicanus* L. A. Lomelí, E. Sahagun et V. W. Steinmann, *Novon* 19(1): 69. 2009. (Maya-Lastra & Steinmann, 2018: 14). 20 m. Endemic.
- Cnidoscolus multilobus* (F. Pax) I. M. Johnston, *Contributions from the Gray Herbarium of Harvard University* 68: 86. 1923. (Breckon, 1975: 230-262; Fernández-Casas, 2014: 18-21; Maya-Lastra & Steinmann, 2018: 14-15; Parker, 2008: 268; Pennington & Sarukhán, 2005: 310-311). Four subspecies, all in Mexico (Breckon, 1975: 230-262; Maya-Lastra & Steinmann, 2018: 14-15). 12 m.
- Cnidoscolus sinaloensis* G. Breckon ex F. J. Fernández, *Fontqueria* 55: 509. 2008. (Breckon, 1975: 312-322; Maya-Lastra & Steinmann, 2018: 18). 8 m. Endemic.
- Cnidoscolus souzae* R. McVaugh, *Bulletin of the Torrey Botanical Club* 71(5): 468. 1944. (Breckon, 1975: 363-374; Maya-Lastra & Steinmann, 2018: 18). 7 m.
- Cnidoscolus spinosus* C.L. Lundell, *Bulletin of the Torrey Botanical Club* 72(3): 329. 1945. (Breckon, 1975: 286-298; Maya-Lastra & Steinmann, 2018: 19; Sahagún-Godínez et al., 2014: 184-185). 10 m. Endemic.
- Cnidoscolus tepiquensis* (M. M. Constantin et Gallaud) R. McVaugh, *Bulletin of the Torrey Botanical Club* 71(5): 466. 1944. (Breckon, 1975: 299-311; Maya-Lastra & Steinmann, 2018: 20). 20 m. Endemic.
- Cnidoscolus tubulosus* (J. Müller) I. M. Johnston, *Contributions from the Gray Herbarium of Harvard University* 68: 86. 1923. (González, 2010: 321; Breckon, 1975: 387-402; Fernández-Casas 2014: 27-31; Maya-Lastra & Steinmann, 2018: 20-21; Parker, 2008: 268). *Cnidoscolus jurgenseii* is considered a synonym. 5(-8) m (mostly shrubby).

- Croton arboreus* C. F. Millspaugh, *Publications of the Field Columbian Museum*, Botanical Series 1(3): 303. 1896. 10(-15) m (sometimes shrubby). Endemic.
- Croton axillaris* J. Müller, *Linnaea* 34: 126. 1865. (González, 2010: 326; Parker, 2008: 270). 5 m.
- Croton billbergianus* J. Müller, *Linnaea* 34: 98. 1865. (Caruzo & Cordeiro, 2013: 21; González, 2010: 326-327; Parker, 2008: 273; Webster, 2001a: 355). Two subspecies, 1 in Mexico (Webster, 2001a: 355). 12 m (20 m in Costa Rica).
- Croton carpostellatus* B. L. León et M. Martínez, *Novon* 18(2): 189. 2008. 6 m. Endemic.
- Croton draco* D. F. von Schlechtendal et L. K. von Chamisso, *Linnaea* 6: 360. 1831. (González, 2010: 328; Parker, 2008: 271; Pennington & Sarukhán, 2005: 312-313; Rzedowski, 2015: 122; Webster, 2001a: 356). 18 m.
- Croton glabellus* C. Linnaeus, *Systema naturae* (editio decima) 2: 1275. 1759. (Parker, 2008: 271; van Ee et al., 2011). Two varieties, 1 in Mexico (van Ee et al., 2011). 20 m.
- Croton gomezii* G. L. Webster, *Lundellia* 8: 13. 2005. 7 m. Endemic.
- Croton guatemalensis* J. P. Lotsy, *Botanical Gazette* 20(8): 353. 1895. (Croizat, 1942: 447-448; Parker, 2008: 271-272; Webster, 2001a: 360-361). 15 m.
- Croton icche* C. L. Lundell, *Phytologia* 1(12): 404. 1940. 20 m.
- Croton lasiopetaloides* L. Croizat, *Publications of the Field Museum of Natural History*, Botanical Series 22(8): 450. 1942. 15 m.
- Croton lindquistii* V. W. Steinmann, *Phytotaxa* 166(3): 236. 2014. (As *Croton fantzianus* in Felger et al., 2001: 147-148; Webster, 2001a: 360; as *Croton* aff. *niveus* in Steinmann & Felger, 1997: 22). 7 m. Endemic.
- Croton mayanus* B. L. León et H. Vester, *Novon* 16(4): 505. 2006. 10 m. Endemic.
- Croton nitens* O. Swartz, *Nova Genera et Species Plantarum seu Prodromus* 100. 1788. (van Ee et al., 2011). 10 m (sometimes shrubby).
- Croton niveus* N. J. von Jacquin, *Enumeratio Systematica Plantarum, quas in insulis Caribaeis* 32. 1760. (González, 2010: 331-332; Parker, 2008: 272; Webster, 2001a: 359). 12 m.
- Croton nubigenus* G. L. Webster, *Madroño* 35: 117. 1988. (Álvarez-Jiménez et al., 2019: 849). 12 m.
- Croton oerstedianus* J. Müller, *Linnaea* 34: 105. 1865. (Parker, 2008: 272). 8 m.
- Croton pascualii* E. J. Lott et M. Martínez, *Lundellia* 15: 54. 2012. 6 m (often smaller and shrubby). Endemic.
- Croton pseudoglabellus* C. L. Lundell, *Phytologia* 1(12): 407. 1940. 8 m. Endemic.
- Croton pseudoniveus* C. L. Lundell, *Phytologia* 1(14): 449. 1940. (Webster, 2001a: 360). 6 m.
- Croton reflexifolius* K. S. Kunth, A. J. A. Bonpland et F. W. H. A. von Humboldt, *Nova genera et species plantarum (editio quarta)* 2: 68. 1817. (Martínez-Gordillo & Ginez-Vázquez, 2014: 59-61; Parker, 2008: 273; Webster, 2001a: 361). 10 m.
- Croton rosarianus* M. Martínez et R. Cruz, *Anales del Instituto de Biología de la Universidad Nacional Autónoma de México, Botánica* 73(2): 138. 2002. 8 m. Endemic.
- Croton schiedeanus* D. F. von Schlechtendal, *Linnaea* 19: 243. 1847[1846]. (González, 2010: 333-334; Parker, 2008: 273-274; Webster, 2001a: 359). 20(-25) m.
- Croton sousae* M. Martínez et R. Cruz, *Anales del Instituto de Biología de la Universidad Nacional Autónoma de México, Botánica* 73(2): 142. 2002. 20 m. Endemic.
- Croton tabacensis* C. L. Lundell, *Phytologia* 1(12): 408. 1940. 7 m. Endemic.
- Croton xalapensis* K. S. Kunth, A. J. A. Bonpland et F. W. H. A. von Humboldt, *Nova genera et species plantarum (editio quarta)* 2: 85. 1817. (González, 2010: 336-337; Parker, 2008: 274; Webster, 2001a: 356). 8 m.
- Enriquebeltrania crenatifolia* (F. Miranda) J. Rzedowski, *Boletín de la Sociedad Botánica de México* 38: 75. 1979[1980]. 5(-8) m (often shrubby). Endemic.
- Enriquebeltrania disjuncta* A. De-Nova et V. Sosa, *Systematic Botany* 31(3): 542. 2006. 6 m (usually shrubby). Endemic.
- Euphorbia calcarata* (D. F. von Schlechtendal) V. W. Steinmann, *Acta Botanica Mexicana* 65: 48. 2003. (Dressler, 1957: 104-109; Olson et al., 2005: 639-640). *Pedilanthus calcaratus* is considered a synonym. 7 m.
- Euphorbia calyculata* K. S. Kunth, A. J. A. Bonpland et F. W. H. A. von Humboldt, *Nova genera et species plantarum (editio quarta)* 2: 59. 1817. (Dorsey et al., 2013: 307). 12 m. Endemic.
- Euphorbia coalcomanensis* (L. Croizat) V. W. Steinmann, *Acta Botanica Mexicana* 65: 48. 2003. (Dressler, 1957: 112-115; Olson et al., 2005: 639-640). 7 m. Endemic.
- Euphorbia cotinifolia* C. Linnaeus, *Species Plantarum* 2: 453. 1753. (González, 2010: 350-351; Parker, 2008: 276). 10 m (often not as tall and shrubby).
- Euphorbia lundelliana* L. Croizat, *American Midland Naturalist* 29(2): 476. 1943. (Dorsey et al., 2013: 305). 25 m. Endemic.
- Euphorbia macvaughii* S. Carvajal et J. A. Lomelí, *Phytologia* 49: 189. 1981. 5 m (often smaller and shrubby). Endemic.
- Euphorbia pulcherrima* C. L. von Willdenow ex J. F. Klotzsch, *Allgemeine Gartenzeitung* 2(4): 27. 1834. (González, 2010: 357; Lack, 2011; Mayfield, 1997: 217-224; Parker, 2008: 277). 10 m (often not as tall and shrubby; cultivated generally less than 1 m).
- Euphorbia schlechtendalii* P. E. Boissier, *Centuria Euphorbiarum* 18. 1860. (González, 2010: 357-358; Parker, 2008: 277-278; Sahagún-Godínez et al., 2014: 185-186). 10 m (often not as tall and shrubby).

- Euphorbia tanquahuete* M. Sessé et J. M. Mociño, *Flora Mexicana*. 122. 1894. (Dorsey et al., 2013: 305; Sahagún-Godínez et al., 2014: 186-187). 25 m. Endemic.
- Euphorbia tresmariae* (C. F. Mills) Standley, *Contributions from the United States National Herbarium* 23(3): 601. 1923. 6 m (usually smaller and often shrubby). Endemic.
- Garcia nutans* M. Vahl, *Skrifter af Naturhistorie-Selskabet* 2(1): 217. 1792. (González, 2010: 360-361; Parker, 2008: 278; Rzedowski, 2015: 165). 15 m.
- Garcia parviflora* C. L. Lundell, *Wrightia* 1(1): 6. 1945. 15 m. Endemic.
- Gymnanthes actinostemoides* J. Müller, *Linnaea* 32: 103. 1863. 20 m. Endemic.
- Gymnanthes insolita* R. S. Ferris, *Contributions from the Dudley Herbarium* 1(2): 75. 1927. 5 m. Endemic.
- Gymnanthes longipes* J. Müller, *Linnaea* 34: 216. 1865. 18 m. Endemic.
- Gymnanthes lucida* O. Swartz, *Nova Genera et Species Plantarum seu Prodrum* 96. 1788. (Parker, 2008: 279; Rzedowski, 2015: 171; Wurdack, 2016: 228). 19 m.
- Gymnanthes riparia* (D. F. von Schlechtendal) J. F. Klotzsch, *Archiv für Naturgeschichte* 7: 182. 1841. (González, 2010: 361; Parker, 2008: 279). 20 m (25 m in Costa Rica).
- Hippomane mancinella* C. Linnaeus, *Species Plantarum* 2: 1191. 1753. (González, 2010: 364; Parker, 2008: 281). 10(-18) m.
- Hura polyandra* H. E. Baillon, *Étude générale du groupe des Euphorbiacées* 543. 1858. (Felger et al., 2001: 149; Parker, 2008: 282; Pennington & Sarukhán, 2005: 314-315). 20(-30) m.
- Jatropha alamanii* J. Müller, *Linnaea* 34: 207. 1865. (Dehgan, 2012: 174-175). 7 m. Endemic.
- Jatropha bartlettii* R. L. Wilbur, *Journal of the Elisha Mitchell Scientific Society* 70: 99. 1954. (Dehgan, 2012: 163-165). 7 m. Endemic.
- Jatropha cinerea* J. Müller, *Prodrum systematis naturalis regni vegetabilis* 15(2.2): 1079. 1866. (Dehgan, 2016: 202-203). *Jatropha canescens* is considered a synonym. 5 m (usually shrubby).
- Jatropha chamelensis* L. A. Pérez, *Boletín de la Sociedad Botánica de México* 42: 35. 1982. (Dehgan, 2012: 165-168). 10 m. Endemic.
- Jatropha cordata* (C. G. de Ortega) J. Müller in A. P. de Candolle, *Prodrum Systematis Naturalis Regni Vegetabilis* 15(2): 1078. 1866. (Dehgan, 2012: 203-206; Felger et al., 2001: 150-151; Sahagún-Godínez et al., 2014: 187-188; Steinmann & Felger, 1997: 58). 10(-13) m. Endemic.
- Jatropha curcas* C. Linnaeus, *Species Plantarum* 2: 1006. 1753. (Dehgan, 2012: 151-158; Dehgan, 2016: 202; González, 2010: 366-367; Guevara-Fefer et al., 2016: 91-100; Parker, 2008: 283). 15 m.
- Jatropha dehganii* J. Jiménez, *Acta Botanica Mexicana* 30: 5. 1995. (Dehgan, 2012: 210-212). 5 m (often smaller and shrubby). Endemic.
- Jatropha elbae* J. Jiménez, *Cactáceas y Suculentas Mexicanas* 31(1): 3. 1986. (Dehgan, 2012: 233-235). 8 m. Endemic.
- Jatropha galvanii* J. Jiménez et L. M. Contreras, *Cactáceas y Suculentas Mexicanas* 26(1): 3. 1981. (Dehgan, 2012: 198-201). 8 m. Endemic.
- Jatropha gaumeri* J. M. Greenman, *Publications of the Field Columbian Museum, Botanical Series* 2(6): 256. 1907. (Parker, 2008: 283; Dehgan, 2012: 194-196). 10 m.
- Jatropha malacophylla* P. C. Standley, *Proceedings of the Biological Society of Washington* 37: 45. 1924. (Dehgan, 2012: 158-159; Felger et al., 2001: 151-152; Steinmann & Felger, 1997: 59). 7 m. Endemic.
- Jatropha mcvaughii* B. Dehgan et G. L. Webster, *Madroño* 25(1): 36. 1978. (Dehgan, 2012: 160-161). 6 m (often smaller and shrubby). Endemic.
- Jatropha peltata* V. de Cervantes, *Gazeta de literatura de México* 3(Suppl.): 3. 1794. (Dehgan, 2012: 171-174). *Jatropha platyphylla* is considered a synonym. 10 m. Endemic.
- Jatropha pereziae* J. Jiménez, *Acta Botanica Mexicana* 30: 2. 1995. (Dehgan, 2012: 168-169). 10 m. Endemic.
- Jatropha pseudocurcas* J. Müller, *Linnaea* 34: 208. 1865. (Dehgan, 2012: 177-179, 181-182; Jiménez-Ramírez & Vega-Flores, 2014: 72-74). *Jatropha andrieuxii* is considered a synonym. 6 m. Endemic.
- Jatropha riojae* F. Miranda, *Anales del Instituto de Biología de la Universidad Nacional Autónoma de México, Botánica* 13: 456. 1942. (Dehgan, 2012: 209-210). 7 m. Endemic.
- Jatropha rufescens* T. S. Brandegee, *University of California Publications in Botany* 4: 88. 1910. (Dehgan, 2012: 179; Jiménez-Ramírez & Vega-Flores, 2014: 73-75). 10 m. Endemic.
- Jatropha sotoi-nunyezii* F. J. Fernández et E. Martínez, *Fontqueria* 55(62): 471. 2008. (Dehgan, 2012: 237-240; Guevara-Fefer et al., 2016: 91-100). 5 m. Endemic.
- Jatropha stephani* J. Jiménez et M. Martínez, *Anales del Instituto de Biología de la Universidad Nacional Autónoma de México, Botánica* 61(1): 1. 1991. (Dehgan, 2012: 168-171). 10 m. Endemic.
- Jatropha sympetala* S. F. Blake et P. C. Standley, *Proceedings of the Biological Society of Washington* 33: 118. 1920. (Dehgan, 2012: 206, 207-209, 212-213; as *Jatropha standleyi* in Pennington & Sarukhán, 2005: 316-317). *Jatropha ortegae* is considered a synonym. 10 m. Endemic.



- Mabea excelsa* P. C. Standley et J. A. Steyermark, *Publications of the Field Museum of Natural History, Botanical Series* 23(3): 123. 1944. (González, 2010: 368; Martínez-Gordillo et al., 2000: 89-93; Parker, 2008: 284). 15(-30) m.
- Mabea occidentalis* G. Bentham, *Hooker's Journal of Botany and Kew Garden Miscellany* 6: 364. 1854. (González, 2010: 369; Martínez-Gordillo et al., 2000: 89-93; Parker, 2008: 284-285). 15 m.
- Mabea tenorioi* M. Martínez, J. Jiménez et R. Cruz, *Anales del Instituto de Biología de la Universidad Nacional Autónoma de México, Serie Botánica* 71(2): 93. 2000. 6 m. Endemic.
- Manihot aesculifolia* (K. S. Kunth, A. J. A. Bonpland et F. W. H. A. von Humboldt) J. B. E. Pohl, *Plantarum Brasiliae Icones et Descriptiones* 1: 55. 1827. (Felger et al., 2001: 15; González, 2010: 370-371; Parker, 2008: 285; Rogers & Appan, 1973: 39-45; Steinmann & Felger, 1997: 59). 8 m (usually smaller and shrubby).
- Manihot auriculata* R. McVaugh, *Brittonia* 13: 190. 1961. (Rogers & Appan, 1973: 39-40). 6 m. Endemic.
- Manihot caudata* J. M. Greenman, *Proceedings of the American Academy of Arts and Sciences* 32: 82. 1903. (Rogers & Appan, 1973: 68-70; Sahagún-Godínez et al., 2014: 188-189; as *Manihot* sp. in Steinmann & Felger, 1997: 60-61). 10 m. Endemic.
- Manihot crassisejala* F. Pax et K. Hoffmann in H. G. A. Engler, *Das Pflanzenreich IV* 147 II(44): 28. 1910. (Rogers & Appan, 1973: 74, 76-77). 15 m (mostly smaller). Endemic.
- Manihot foetida* (K. S. Kunth, A. J. A. Bonpland et F. W. H. A. von Humboldt) J. B. E. Pohl, *Plantarum brasiliae icones et descriptiones* 1: 55. 1827. (Rogers & Appan, 1973: 74-75). 10 m. Endemic.
- Manihot michaelis* R. McVaugh, *Brittonia* 13: 190. 1961. (Rogers & Appan, 1973: 70-71). 10 m. Endemic.
- Manihot oaxacana* D. J. Rogers et S. G. Appan, *Flora Neotropica Monograph* 13: 46. 1973. 5 m (usually smaller and often shrubby). Endemic.
- Manihot rubricaulis* I. M. Johnston, *Contributions from the Gray Herbarium of Harvard University* 68: 90. 1923. (Rogers & Appan, 1973: 44-47; Steinmann & Felger, 1997: 60). *Manihot rubricaulis* subsp. *isoloba* is considered a synonym. 5 m (sometimes smaller and shrubby). Endemic.
- Manihot tomatophylla* P. C. Standley, *American Midland Naturalist* 36(1): 178. 1946. (Rogers & Appan, 1973: 70-73). 10 m. Endemic.
- Manihot websteri* D. J. Rogers et S. G. Appan, *Flora Neotropica Monograph* 13: 72. 1973. 9 m. Endemic.
- Omphalea oleifera* H. B. Hemsley, *Pharmaceutical Journal and Transactions* 13: 301. 1882. (Gillespie, 1988: 227-233; González, 2010: 373; Parker, 2008: 287; Pennington & Sarukhán, 2005: 318-319). 30(-35) m.
- Pleradenophora lottiae* (R. McVaugh) A. L. Melo et H. J. Esser, *Phytotaxa* 81(1): 33. 2013. *Sebastiania lottiae* is considered a synonym. 12 m. Endemic.
- Pleradenophora tikalana* (C. L. Lundell) A. L. Melo et H. J. Esser, *Phytotaxa* 81(1): 35. 2013. (As *Sebastiania cornuta* in Felger et al. 2001: 153-154; Steinmann & Felger, 1997: 63-64). *Sebastiania tikalana* is also considered a synonym. 9 m.
- Pleradenophora tuerckheimiana* (F. Pax et K. Hoffmann) A. L. Melo et H. J. Esser, *Phytotaxa* 81(1): 35. 2013. (Parker, 2008: 292). *Sebastiania tuerckheimiana*, *S. confusa*, and *S. longicuspis* are considered synonyms. 18 m.
- Sapium glandulosum* (L.) T. Morong, *Annals of the New York Academy of Sciences* 7: 227. 1893. (González, 2010: 388; Kruijt, 1996: 44-50; Parker, 2008: 291). 25 m (30 m in Costa Rica).
- Sapium lateriflorum* W. B. Hemsley, *Icones plantarum* 27. 1901. (Kruijt, 1996: 57-59; Parker, 2008: 291). *Sapium nitidum* is considered a synonym. 20(-30) m.
- Sapium macrocarpum* J. Müller, *Linnaea* 32: 119. 1863. (González, 2010: 389; Kruijt, 1996: 65-67; Parker, 2008: 291). 30 m (35 m in Costa Rica).
- Sebastiania appendiculata* (J. Müller) E. Jablonszky, *Phytologia* 16: 423. 1968. *Sapium appendiculatum* is a synonym. 10(-16) m. Endemic.
- Sebastiania chiapensis* C. L. Lundell, *Wrightia* 4(1): 35. 1968. 9 m. Endemic.
- Sebastiania cruenta* (P. C. Standley et J. A. Steyermark) F. Miranda, *Anales del Instituto de Biología de la Universidad Nacional de México* 24: 64. 1953. 10(-15) m.
- Sebastiania glandulosa* (O. Swartz) J. Müller in A. P. de Candolle, *Prodromus systematis naturalis regni vegetabilis* 15(2): 1186. 1866. (Parker, 2008: 292). *Sebastiania adenophora* is considered a synonym. 15 m.
- Sebastiania hintonii* C. L. Lundell, *Wrightia* 2(2): 105. 1960. *Sebastiania jaliscensis* is considered a synonym. 10 m. Endemic.
- Sebastiania pavoniana* (J. Müller) J. Müller in A. P. de Candolle, *Prodromus systematis naturalis regni vegetabilis* 15(2): 1189. 1866. (Felger et al. 2001: 154-155; González, 2010: 390; Sahagún-Godínez et al., 2014: 190-191; Steinmann & Felger, 1997: 64). *Sebastiania palmeri* and *S. pringlei* are considered synonyms. 15 m.
- Stillingia acutifolia* (G. Bentham) G. Bentham ex W. B. Hemsley, *Biologia centrali-americana [...] Botany* 3(15): 135. 1883. (Parker, 2008: 293; Rogers, 1951: 243-244). 9 m.
- Stillingia sanguinolenta* J. Müller, *Linnaea* 32: 88. 1863. (Rogers, 1951: 224-226). 7 m.
- Tetrorchidium brevifolium* P. C. Standley et J. A. Steyermark, *Publications of the Field Museum of Natural History, Botanical Series* 23(3): 126. 1944. (Parker, 2008: 293-294). 21 m.
- Tetrorchidium rotundatum* P. C. Standley, *Tropical Woods* 16: 44. 1928. (González, 2010: 392; Parker, 2008: 294). 45 m.

### Peraceae

*Pera barbellata* P.C. Standley, *Publications of the Field Museum of Natural History, Botanical Series* 8(1): 19. 1930. (Parker, 2008: 287-288). 20 m.

### Phyllanthaceae

*Astrocasia peltata* P. C. Standley, *Contributions from the Dudley Herbarium* 1: 74. 1927. (Calderón-Sanoa, 2014: 165-168; Webster, 1992: 318-319). 5 m.

*Astrocasia tremula* (A. H. Grisebach) G. L. Webster, *Journal of the Arnold Arboretum* 39: 208. 1958. (González, 2010: 315; Parker 2008: 265; Webster 1992: 319-321). 10 m (frequently smaller).

*Hieronyma alchorneoides* Allemão, *Hieronima alchorneoides (Typographis do Archivo medico brasileiro)* 1-2. 1848. (Franco-Rosselli, 1990: 317-323; González, 2010: 363; Parker 2008: 280; Webster, 2001b: 886). Two varieties (González, 2010), 1 in Mexico. 40 m (over 60 m in Costa Rica).

*Hieronyma oblonga* (L. F. Tulasne) J. Müller, *Linnaea* 34: 66. 1865. (Franco-Rosselli 1990: 323-327; González, 2010: 363-364; Parker, 2008: 280-281; Webster, 2001b: 886-887). 25 m. (40 m in Costa Rica).

*Margaritaria nobilis* C. Linnaeus filius, *Supplementum plantarum* 428. 1781[1782]. (González, 2010: 371-372; Parker 2008: 286; Webster, 1979: 412-415; Webster, 2001c: 891-892). 20 m.

*Phyllanthus acuminatus* M. Vahl, *Symbolae botanicae* 2: 95. 1791. (González, 2010: 377-378; Parker, 2008: 289; Webster, 2001a: 382; Webster, 2001d: 896). 8 m (frequently smaller, but 15 m in Costa Rica).

*Phyllanthus botryanthus* J. Müller in A. L. P. de Candolle, *Prodromus systematis naturalis regni vegetabilis* 15(2): 323. 1866. (Webster, 2001a: 383). 8 m (frequently smaller).

*Phyllanthus elsiae* I. Urban, *Repertorium specierum novarum regni vegetabilis* 15: 405-406. 1919. (Webster, 2001a: 381; Webster, 2001d: 897-898). 15 m.

*Phyllanthus grandifolius* C. Linnaeus, *Species plantarum* 2: 981. 1753. (Parker, 2008: 289; Steinmann, 2007: 16-18). 9 m.

*Phyllanthus mocinianus* H. E. Baillon, *Adansonia* 1: 35. 1860. (Webster, 2001a: 383; Steinmann, 2007: 21-24). 5 m.

*Phyllanthus tuerckheimii* G. L. Webster, *Annals of the Missouri Botanical Garden* 54(2): 195-196. 1967. 8 m (frequently smaller).

*Savia sessiliflora* (O. P. Swartz) C. L. von Willdenow, *Species plantarum (editio quarta)* 4(2): 771. 1805[1806]. (Rzedowski, 2015: 315; Steinmann, 2007: 30-33). 10 m.

### Picrodendraceae

*Piranhea mexicana* (P. C. Standley) A. Radcliffe-Smith, *Kew Bulletin* 51: 546. 1996. (Pennington & Sarukhán, 2005: 320-321). 25 m. Endemic.

### Putranjivaceae

*Drypetes brownii* P. C. Standley, *Tropical Woods* 20: 20. 1929. (González, 2010: 344; Levin, 2001: 878; Parker, 2008: 275). 25 m. (30 m in Costa Rica).

*Drypetes gentryi* [as *gentryi* by] J. A. Monachino, *Phytologia* 3: 32. 1948. (Felger et al., 2001: 148-149; Levin, 2013: 83-84; Steinmann & Felger, 1997: 28). 30 m. Endemic.

*Drypetes lateriflora* (O. P. Swartz) C.W.L. Krug & I. Urban, *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 15(1): 357. 1892. (González, 2010: 344; Levin, 2001: 878; Levin, 2016: 269-270; Parker, 2008: 275; Rzedowski, 2015:134; Steinmann, 2001: 2-5). 20 m.

### Urticaceae

*Boehmeria caudata* O. Swartz, *Nova genera et species plantarum seu prodromus* 34. 1788. (Parker, 2008: 933; Pool, 2001: 2481; Wilmot-Dear & Friis, 1996: 21-26; Wilmot-Dear et al., 2015: 120). 9 m.

*Boehmeria pavonii* H. A. Weddell, *Annales des Sciences Naturelles, Botanique, série* 4-1: 202. 1854. (Parker, 2008: 933; Wilmot-Dear & Friis, 1996: 43-44; Wilmot-Dear et al., 2015: 121). 8 m.

*Boehmeria radiata* W. C. Burger, *Phytologia* 31(3): 267. 1975. (Wilmot-Dear & Friis, 1996: 51-53; Wilmot-Dear et al., 2015: 122). 3(-15) m.

*Boehmeria ulmifolia* H. A. Weddell, *Annales des Sciences Naturelles; Botanique, série* 4-1: 202. 1854. (Parker, 2008: 933; Pool, 2001: 2482; Steinmann, 2005: 7-8; Wilmot-Dear & Friis, 1996: 48-51; Wilmot-Dear et al., 2015: 122-123). 5(-13) m.

*Cecropia angustifolia* A. A. Trécul, *Annales des Sciences Naturelles, Botanique, série* 3-8: 83. 1847. (Berg & Franco-Rosselli, 2005: 51, 54-63; Berg, 2015: 123-124). 25 m.

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- Myriocarpa bifurca* F. M. Liebmann, *Det Kongelige Danske videnskabernes selskabs skrifter; Naturvidenskabelig og matematisk afdeling* 2: 307. 1851. (Monro, 2009: 87; Monro, 2015c: 133; Pool, 2001: 2483; Steinmann, 2009: 11-13). *Myriocarpa brachystachys* is considered a synonym. 8 m.
- Myriocarpa cordifolia* F. M. Liebmann, *Det Kongelige Danske videnskabernes selskabs skrifter; Naturvidenskabelig og matematisk afdeling* 2: 306. 1851. (Monro, 2009: 87-88; Monro, 2015c: 133-134). 12 m.
- Myriocarpa cubilguezensis* A. K. Monro, *Novon* 19(1): 88. 2009. (Monro, 2009: 88-90; Monro, 2015c: 134). 9 m.
- Myriocarpa heterospicata* J. Donnell, *Botanical Gazette* 12(6): 133. 1887. (Monro, 2009: 90; Monro, 2015c: 134; Parker, 2008: 935; Pool, 2001: 2483). 9 m.
- Myriocarpa longipes* F. M. Liebmann, *Det Kongelige Danske videnskabernes selskabs skrifter; Naturvidenskabelig og matematisk afdeling* 2: 306. 1851. (Monro, 2009: 90-92; Monro, 2015c: 134-135; Parker, 2008: 150; Pool, 2001: 2483; Steinmann, 2005: 19-20). 12 m.
- Myriocarpa obovata* J. Donnell, *Botanical Gazette* 46(2): 117. 1908. (Monro, 2009: 92-93; Monro, 2015c: 135; Parker, 2008: 935; Pool, 2001: 2484). 17 m.
- Myriocarpa trifurca* A. K. Monro, *Novon* 19(1): 93. 2009. (Monro, 2015c: 135). 6 m. Endemic.
- Phenax mexicanus* H. A. Weddell, *Annales des Sciences Naturelles, Botanique, série 4-1*: 193. 1854. (Monro, 2015d: 137; Parker, 2008: 935-936; Steinmann, 2009: 16-19). 10 m.
- Pourouma bicolor* C. F. von Martius, *Systema materiae medicae vegetabilis brasiliensis* 34. 1843. (Berg et al., 1990: 132-144; Berg, 2015: 161; Parker, 2008: 152; Pennington & Sarukhán, 2005: 158-159; Stevens, 2001: 596). Five subspecies, 1 in Mexico (Berg, 2015). *Pourouma aspera* is considered a synonym of subspecies *bicolor*, which does not exist in Mexico. 30 m.
- Urera baccifera* (C. Linnaeus) C. Gaudichaud ex H. A. Weddell, *Annales des Sciences Naturelles; Botanique, sér. 3* 18: 199. 1852. (Monro & Rodríguez-González, 2009: 270-271; Monro, 2015e: 166-167; Parker, 2008: 936-937; Pool, 2001: 2493). 10 m.
- Urera corallina* (F. M. Liebmann) H. A. Weddell, *Prodromus systematis naturalis regni vegetabilis* 16(1): 90. 1869. (Felger et al., 2001: 330-331; Monro & Rodríguez-González, 2009: 271-273; Monro, 2015e: 167; Parker, 2008: 936; Pool, 2001: 2493-2494; Steinmann, 2005: 50-52). *Urera corallina* has often been treated as a synonym of *U. caracasana*, but they are considered here distinct species (see justification in Pool, 2001; Steinmann, 2005). *Urera caracasana* does not exist in Mexico. *Urera corallina* has also been confused with *U. alceifolia* and *U. elata*, species that also do not occur in Mexico. 10 m (15 m in Nicaragua).
- Urera glabriuscula* V. W. Steinmann, *Acta Botanica Mexicana* 71: 22. 2005. (Monro & Rodríguez-González, 2009: 276; Monro, 2015e: 137). 10 m.
- Urera pacifica* V. W. Steinmann, *Acta Botanica Mexicana* 71: 28. 2005. 8 m. Endemic.
- Urera rzedowskii* V. W. Steinmann, *Acta Botanica Mexicana* 71: 33. 2005. Although treated as a synonym of *Urera simplex* by Monro & Rodríguez-González (2009: 281), it is here maintained as a distinct species. 13 m.
- Urera simplex* H. A. Weddell, *Prodromus systematis naturalis regni vegetabilis* 16(1): 90. 1869. (Monro & Rodríguez-González, 2009: 281-282; Monro, 2015e: 170-171; Parker, 2008: 938; Pool, 2001: 2494; Rzedowski, 2015: 348). *Urera tuerckheimii* is considered a synonym. 10 m.
- Urera verrucosa* (F. M. Liebmann) V. W. Steinmann, *Acta Botanica Mexicana* 71: 39. 2005. (Monro & Rodríguez-González, 2009: 282; Monro, 2015e: 171; Steinmann, 2005: 56-58). 10(-30) m.

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