DESCRIPTION AND TAXONOMIC POSITION OF MACLURA BRASILIENSIS (MORACEAE)

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1. INTRODUCTION

During study of American Chlorophoras (KAASTRA 1972) *Chlorophora brasiliensis* (Martius) Standley (= *Maclura brasiliensis* (Martius) Endlicher) and *Chlorophora scandens* Standley et Williams seemed not to be closely related to *Chlorophora tinctoria* (L.) Bentham et Hooker. The taxonomic position of *Maclura brasiliensis* was already called dubious by BENTHAM & HOOKER (1880) and more recently also by MACBRIDE (1937); the same holds true for *Chlorophora scandens* (STANDLEY & WILLIAMS 1950).

Chlorophora brasiliensis and *Chl. scandens* show much resemblance to some other genera treated by CORNER (1962) as sections of *Maclura*: *Maclura* Nuttall s.s. (= *Maclura pomifera* (Rafinesque) Schneider), *Cardiogyne* Bureau, and *Cudrania* Trécul. Corner, however, did not mention *Chlorophora brasiliensis* nor *Chl. scandens*. There is at least one other taxon that seems to be closely related to the group concerned here, the genus *Plecospermum* Trécul. BENTHAM & HOOKER (1880) combined *Plecospermum* with *Cardiogyne*; CORNER (l.c.) regarded it as a distinct but problematic genus. RICHTER (1895), on account of anatomical studies, pointed out that *Plecospermum*, *Cardiogyne*, and *Cudrania* could be regarded as a single genus.

The present study was made possible by recently collected material, because until 1945 no female plants were known; see list of specimens studied.

2. MATERIAL

Herbarium specimens were studied from the following herbaria: Chicago Natural History Museum (F); The New York Botanical Garden, New York (NY); Muséum National d'Histoire Naturelle, Laboratoire de Phanérogamie, Paris (P); Botanical Museum and Herbarium, Utrecht (U); U.S. National Museum, Washington, D.C. (US).

3. TAXONOMY

The section *Chlorophora* differs from all other sections of *Maclura* sensu Corner as shown in *table 1*. The most distinctive features are the longer stipules, the spicate staminate inflorescences, the presence of lithocysts in the leaves, and the

Table 1. Morphological features of plants from the sections of *Maclura* sensu Corner.

	Chlorophora tinctoria	Maclura pomifera	Maclura brasiliensis (incl. Chl. scandens)	Cardiogyne africana	Cudrania spp.
stipules	long	short	short	short	short
♂ inflor.	spicate	raceme-like	globose	globose	globose
♂ flowers	sessile	long-pedicellate	shortly pedicellate	sessile	sessile
embryo/ cotyledons	accumbent flat	obl. incumb. flat	obl. incumb. flat	incumbent folded	incumbent folded, and accumb. flat
stigma	long	long	long	long	short
filaments	inflexed	inflexed	inflexed	inflexed	not inflexed
lithocysts	present	absent	absent	absent	absent
bracts in ♂ inflor.	with glands	(no bracts)	without glands	with glands	with and without glands
tepals in ♂ flowers	without glands	without glands	without glands	with glands	with, without glands
bracts in ♀ inflor.	with glands	(no bracts)	without glands	without glands	with glands
tepals in ♀ flowers	mostly with glands	with, without glands	with glands	with, without glands	with glands
ovary	free	free	free	free	free; also embedded? see Corner (1962)
spines	without leaves	without leaves, sometimes with stipules	with leaves	with leaves	without leaves
habit	tree or shrub	tree	climber or tree	climber	climber or tree
habitat	tropical America	mainly temperate America	tropical America	tropical Africa	tropical Australasia
notes	a)	b)	c)	d)	e)

a) Data taken from the description in KAASTRA (1972);
Chlorophora spp. from Africa seem to have no glands in bracts and tepals but are otherwise, regarding the reported features, similar to *Chl. tinctoria.*
b) 10 specimens studied.
c) data taken from the description in the present paper;
the data about the embryo are based on a not yet fully mature one.
d) 3 specimens studied.
e) studied: 2 specimens of *Cudrania cochinchinensis* (Lour.) Kudo et Masumune;
1 specimen of *C. fruticosa* (Roxb.) Wight ex Kurz.

accumbent embryo. On the ground of these characters *Chlorophora* should not be treated as a section of *Maclura* but as a distinct genus.

The other sections of *Maclura* sensu Corner are more closely interrelated. Section *Cudrania*, however, appears to be somewhat heterogeneous and differs by shorter stigmas and non-inflexed filaments. This section should not be included in *Maclura*. *Cardiogyne africana* Bureau and *Maclura pomifera* (Rafinesque) Schneider, the only representatives of sections *Cardiogyne* and *Maclura*, respectively, show many similarities to *Maclura brasiliensis* (including *Chlorophora scandens*) and but few differences. STANDLEY & WILLIAMS (1950) pointed out the resemblance of *Maclura brasiliensis* (*C. scandens*) to *Maclura pomifera*. The differences in the presence of glands (occurring as large yellow patches visible through the epidermis) in tepals and bracts are of little taxonomic value (cf. KAASTRA 1972). Regarding the staminate inflorescences, *Maclura brasiliensis* seems to be intermediate between *Maclura pomifera* with short, raceme-like inflorescences with long-pedicellate flowers, and *Cardiogyne africana* with globose inflorescences and sissile flowers.

Though there are thus some differences also, e.g. the different habit and the absence of bracts in *Maclura pomifera*, it is my opinion that *Maclura brasiliensis* is congeneric with *Maclura pomifera* and *Cardiogyne africana* (= *Maclura africana* (Bureau) Corner); the infrageneric classification of *Maclura*, however, remains a matter of future study.

MACLURA BRASILIENSIS

Maclura brasiliensis (Martius) Endlicher, Gen. Pl. Suppl. 4(2): 34. 1847. – *Broussonetia brasiliensis* Martius, Fl. Regensb. 24, Beibl.: 10–11. 1841; Herb. Bras.: 250. 1841; Miquel in Martius, Fl. Bras. 4(1): 158. 1853. – *Chlorophora brasiliensis* (Martius) Standley in Macbride, Fl. Peru 2(2), in Field Mus. Nat. Hist., Bot. Ser. 13: 310. 1937; Cuatrecasas in Steyermark et coll. Fieldiana Bot. 28(4): 888. 1957. – Type: *Anonymus s.n.*♂, Eastern Brazil, loco non ind. (U).

Ioxylon pomiferum Rafinesque var. *glaberrimum* O. Kuntze, Rev. Gen. Pl. 3(3): 294. 1898. – Type: *Kuntze s.n.* ♀, Bolivia, Yapacani (isotype NY).

Chlorophora scandens Standley et L. Williams, Ceiba 1: 77–78. 1950. – Type: *Standley 18431* ♀, Honduras, dep. Olancho, Catacamas (F; isotypes EAP, non vidi, US!).

Dioicious small tree, tall shrub or high-scandent vine, 2.5 m high or more. Trunk twisted at the base, with creamy-yellow milky latex; branches conspicuously lenticellate, often long and arching, armed with axillary, solitary, recurved spines; spines to 8 cm long, with scale-like stipules and small leaves, near the tip blackish shining, at the base with (sub)-persistent stipules.

Leaves alternate, ovate to elliptic-ovate, 3.1 — 4.6 × 5.0 — 8.5 cm, firmly membranaceous, shortly acuminate or acuminate with cuspidate tip, base acute, subequal; margin subentire; main lateral veins brochydodrome, 9–15 per side; subglabrous or uncinate-pilosellous but above somewhat less densely so; costa canaliculate; petiole slender, sulcate, 12–17 mm. Stipules (broadly) triangular,

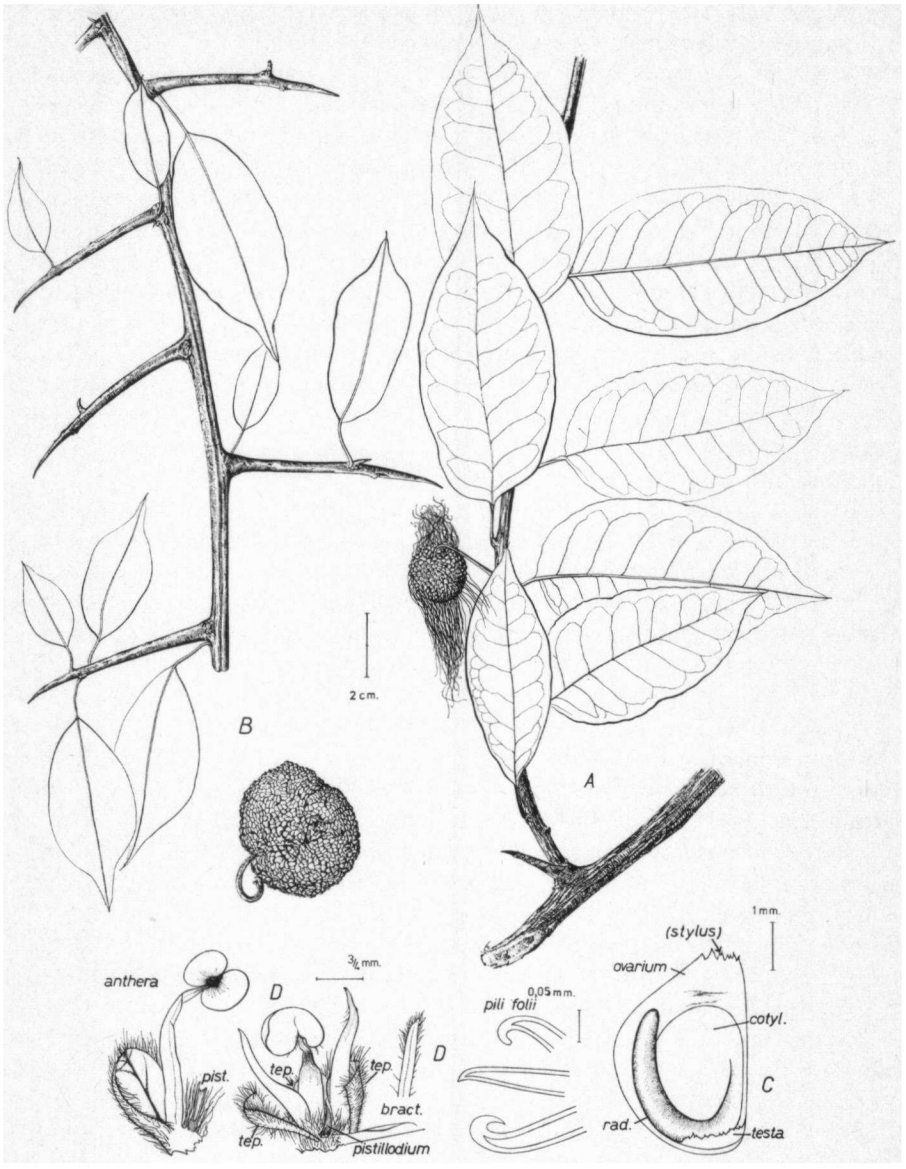

Plate I. *Maclura brasiliensis*: from *Steyermark 61949* (F) (*fig. A*), *Standley 18431* (F) (*fig. B*), *Kuntze s.n.* June 1892 (NY) (*fig. C*), and *Williams 6855* (F) (*fig.* D).

acuminate, to 2.5 mm, connate in the leaf-axil or more or less free, not amplexicaulous, (sub)-persistent, tomentellous.

Staminate inflorescences[1] globose, axillary, mostly solitary, 5–10 mm diam., densely set with flowers; peduncles slender, about 10 mm long; flowers with a pedicel up to half as long as the tepals; bracts narrowly oblong to sublinear, somewhat spathulate, 1.0–1.5 mm, sometimes somewhat cucullate, tip more or less fimbriate, otherwise velutinous; tepals obovate-spathulate, concave, about 1–2 mm long, membranaceous, near the base connate, tomentellous or somewhat strigulose-hispid, more densely towards the fimbriate tip; filaments with a median longitudinal dark line, at the base more or less connate with the tepals, in bud inflexed, at anthesis exserted and recurved and then about twice as long as the tepals; anthers broadly ovate, about 1 × 1 mm, more or less laterally dehiscent; pistillode about 0.5–0.7 mm long, base ovoid, near the tip plane and papyraceous, with two thick lateral margins and uncinate tip, surrounded by long woolly hairs.

Pistillate inflorescences subglobose, axillary, solitary, about 15 mm diam. at anthesis and 40 mm in fruit, densely covered with flowers on pedicels of up to 0.5 mm, flowers in fruit strongly coherent; peduncle straight or recurved, 25–30 mm, hirtellous-tomentose; bracts narrowly spathulate, 8–15 mm long, at the tip 0.5 mm broad, membranaceous, thinly villous, tip puberulous-fimbriate; tepals at the base connate, obovate-spathulate to narrowly spathulate, about 5–15 mm, the outer ones concave, the inner ones conduplicate and enclosing the gynoecium, with two large yellow glands, the tip somewhat cucullate, outside puberulous; style bifid with one sterile branch about as long as the tepals, the other branch bearing a filiform stigma to 4 cm long; ovary about 1.5–5.0 mm long, with a single pendulous U-shaped ovule; embryo (not fully mature) obliquely incumbent, with flat cotyledons.

Flowering time: from the end of December to April. Fruits in June not yet fully mature.

Distribution: rare in Brazil, Peru, Venezuela, and Honduras, in scattered localities, sometimes apparently abundant. New collections to be expected from other parts of tropical America. In woods at marshy places on the campos of Eastern Brazil, on forested slopes, and in thickets along rivers; altitude 400–1350 m.

Use: according to Martius, Fl. Regensb. 1841, as a yellow dye.

Vernacular names: tataiba (Brazil); mora, barba de tamagaz (Honduras). Because the local inhabitants hardly know this tree the data about use and vernacular names are doubtful; confusion with *Chlorophora tinctoria* is obvious (cf. STANDLEY & WILLIAMS 1950).

Specimens studied: Honduras: dep. Olancho, vicinity of Juticalpa, *Standley 17842a* st. anno 1949 (F); idem, at the edge of the village Catacamas, *Standley 18431* ♀ anno 1949 (F, type of *Chlorophora scandens* Standley et Williams; US).

[1] Illustrated in Martius, Fl. Bras. 4(1): t. 54. 1853.

Venezuela: Monagas, S.W. of Caripe, property of Juan Morocaima, along Quebrada Colorado Grande, *Steyermark 61949* ♀ anno 1945 (F, NY, US, VEN).

Peru: dep. San Martin, Juan Guerra, near Iarapold, *Llewellyn Williams 6855* ♂ anno 1929 (F).

Eastern Brazil: without exact loc., *collector unknown (Martius?) s.n.*♂ (U, 2 sheets, type of *Broussonetia brasiliensis* Martius).

Bolivia: Yapacani, *O. Kuntze s.n.* ♀ anno 1892 (NY).

Young branchlets, spines, and petioles are hirtellous or glabrous. Material from Honduras, described as *Chlorophora scandens*, has the spines about twice longer than the other material of *Maclura brasiliensis*, while the female inflorescences and the ovaries are larger and the plants are somewhat more hairy, but there is no reason not to combine *Chlorophora scandens* with *Maclura brasiliensis*.

EXCLUDED NAME

Maclura brasiliensis (Martius) Endlicher var. *reticulata* Chodat, Bull. Herb. Boissier II 3: 350. 1903 = *Sorocea saxicola* Hassler, Bull. Herb. Boissier II 7: 11–12. 1907.

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REFERENCES

BENTHAM, G. & J. D. HOOKER (1880): *Genera Plantarum* **3**: 363. Reeve & Co., London.

CORNER, E. J. H. (1962): The classification of Moraceae. *Gard. Bull. Singapore* **19**: 187–252.

KAASTRA, R. C. (1972): Revision of Chlorophora (Moraceae) in America. *Acta bot. Neerl.* **21**: 657–670.

MACBRIDE, J. F. (1937): Moraceae. Flora of Peru 2(2) in *Field Mus. Nat. Hist., Bot. Ser.* **13**: 310.

RICHTER, A. (1895): Die anatomischen und systematischen Verhältnisse dreier problematischer Genera der tropischen Flora: Cudrania, Plecospermum und Cardiogyne. *Természetrajzi Füz.* **18**: 294–307 et t. 5–6.

STANDLEY, P. C. & L. O. WILLIAMS (1950): Plantas nuevas hondureñas y nicaraguenses. *Ceiba* **1**: 77–78.