PRELIMINARY REVISIONS OF SOME GENERA OF MALAYSIAN PAPILIONACEAE III*) — A CENSUS OF THE GENUS CROTALARIA

by

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Of the 29 species recorded here, a fair proportion are introductions, some of recent time, mainly made for the purpose of green manure, and few species can be considered really native. Most introduced species are native in South-East Asia, a few come from Africa or America. Several are pantropical and it is difficult to ascertain their fatherland. One species, *C. valettonii* Backer, is endemic in Madura I. off the NE. coast of Java; it is very closely allied to an Indian species.

Part of the native species are indifferent to climate, but several are confined to the seasonally dry areas and their localities strictly follow the drought corridor as sketched in the first instalment of this series. They are: — drought class 1, indifferent to dry season: *C. chinensis* L., *C. ferruginea* Grah. ex Bth.; — drought class 2, feeble dry season: *C. alata* Buchh.-Ham. & Roxb. ex Don, *C. albida* Heyne ex Roth, *C. medicaginosa* Lamk., *C. sessiliflora* L.; — drought class 3, pronounced dry season: *C. linifolia* L.; — drought class 4, rather strong dry season: *C. acicularis* Buch.-Ham. ex Bth., *C. calycina* Schrank, *C. humifusa* Grah. ex Bth., *C. laburnifolia* L.; — drought class 5, severe dry season: *C. nuprrensis* Roth, *C. nama* Burm. f., *C. triqueta* Dalz.

This study has primarily been made on the collections preserved in the Rijksherbarium at Leyden and Utrecht. I express my sincere thanks to Prof. Dr. C.G.G.J. van Steenis under whose supervision this revision was executed and to Mr. M. Jacobs who tested and helped to improve the key to the species.

**Crotalaria** Linné


Erect, ascending or creeping herbs or shrubs with simple or digitately compound leaves which sometimes have more or less clearly pellucid dentate leaflets 3—5. Stipules absent or present, sometimes early caducous. Flowers in bracteate 1—to many-flowered, terminal or leaf-opposed racemes, the bracts sometimes glandular (darker coloured when dried). Bracteoles 2, inserted at the middle of the pedicel, or higher, sometimes on the base of the calyx, sometimes caducous. Calyx 5-lobed, halfway or more deeply incised. Corolla various in colour, often yellow, as long as the calyx or emergent. Vexillum at the base of the blade with 2 knobs or short-saccate appendages (?nectaria), sometimes hairy on the back. Stamens 10, monandrous, the tube slit towards the side of the vexillum; filaments and anthers alternatingly long and short. Style top barbate, stigma small. Ovary with 1—many ovules. Pod sessile or stipitate, sometimes included within the calyx, mostly inflated, without septa, 2-valved. Seeds 1—many, kidney-shaped, albuminous, without a caruncula.
KEY TO THE SPECIES

1. Leaves simple.
2. Ovary and pod glabrous.
3. Stem winged by the decurrent stipules.
4. Calyx 12—14 mm long. Hairs on the rachis of the racemes appressed or ascending. Stipular wings of equal width throughout their length. ... 2. C. alata
4. Calyx 18—24 mm long. Hairs on rachis patent, not straight. Stipular wings rather rapidly narrowing towards their base. ... ... 29. *C. rubiginosa
5. Stems not winged.
6. Calyx 4—10 mm long, split more than halfway; upper lobes for 1/3—4/5 connate. Bracteoles inserted on the base of the calyx-tube, 1—4 mm long. Pod 6—16 mm long. Leaves ½—7½ cm long, hairy on both sides.
7. Stipules widely patent, subulate to filiform. Pod 6—8 mm long.
8. Floral bract 3—5 mm, ovate-oblong. Hairs on the calyx 1¾—3 mm long. Stem patently long-hairy. Leaf-base oblique. Stipules of a pair unequal...
1. C. acicularis
9. Bracts 1—2 mm long, filiform. Calyx hairs at most 1 mm long. Stem densely ascending-hairy. Leaf-base equal. Stipules equal...
14. C. humifusa
10. Stipules absent.
11. Upper calyx lobes connate to near the top.
12. Racemes dense, short. Blade of the standard c. 5 mm long...
13. Racemes elongate, lax, many-flowered. Blade of standard 7—10 mm long...
18. C. linifolia
14. Upper calyx lobes halfway connate. Racemes elongate, lax, few-flowered...
26. C. prostrata
5. Other plants. Calyx mostly larger than 10 mm.
10. Calyx glabrous or short-hairy, split somewhat more than halfway, 9—16 mm. Corolla much larger than the calyx.
11. Floral bract leaf-like, with cordate base. Calyx glabrous. Leaves obovate...
31. *C. sericea
11. Floral bract subulate, 2—5 mm long. Calyx hairy.
12. Pod 2½—3½ cm. Leaves 3½—7½ cm long, obovate. Calyx 9—12 mm, laxly hairy. Pedicel shorter than the calyx...
13. Pod. 3½—5 cm. Leaves 5—10 cm long, widest about the middle. Calyx 12—15 mm, densely hairy. Pedicel as long as the calyx...
5. C. assamica
10. Calyx long-hairy, split to the base. Corolla hardly exceeding the calyx.
13. Floral bract 1—2½ mm. Bracteoles c. 2 mm. No stipules. Flowers and pods second...
13. C. albida
12. Floral bract at least 5 mm. Bracteoles 5—20 mm.
15. Stipules none. Leaves sometimes hairy above, all or mostly 2—4 times as long as wide. Calyx in fruit to 1½ cm. Racemes head-like...
14. C. chinensis
15. Stipules present. Leaves glabrous above, the higher ones 6 or more times as long as wide. Calyx in fruit up to 2—2½ cm. Racemes more elongate.
32. C. sessili flora

*) Species marked with an asterisk have been recorded in literature to occur in Malaysia but no material was found to sustain these records.
16. Bracteoles inserted below the calyx. Upper surface of the leaves glabrous, but the midrib hairy. Pods not exceeding the calyx. 9. C. calyces
17. Stipules patent, 3—25 mm.
18. Bracteoles 5—8 mm. Pedicels 7—10 mm. Hairs on the calyx less than 1½ mm long. 18. C. ferruginea
18. Bracteoles 10—16 mm. Pedicels 7—10 mm. Hairs on the calyx 3—4 mm long. 22. C. myosocronia
17. Stipules, if present, appressed, shorter than 5 mm. Leaves c. 5—7½ cm long. 6. C. barbata

2. Ovary and pod hairy.
20. Stem largely terete, angular towards the top. Bracteoles at the top of the pedicel or somewhat lower down, c. 1½—3 mm long. Flowers yellow or striped purple. Upper surface of leaf often glabrous. 30. C. semperflorens
20. Stem sharply 4-angled upwards, towards the base angled-furred. Bracteoles inserted in the middle of the pedicel, ½—1½ mm long. Flowers blue-purple, often tinged with white, rarely white. Leaves short-hairy on both surfaces. 33. C. vormicinus

19. Stipules symmetrical, linear, or minute or wanting.
21. Stem prostrate or ascending, angled. Racemes peduncled, 1—3-flowered. Leaves shorter than 5 cm, glabrous or with a few lax long hairs. Calyx 5—10 mm.
22. Calyx 8—10 mm. Stipules patent or reflexed, oblong, 1—6 mm. Bract ovate, 2—3 mm. Pod 17—29 mm. 34. C. triquetra
22. Calyx 5—8 mm. Stipules absent or minute. Bract subulate, minute. Pod 9—13 mm. 7. C. biflora

24. Bracteoles inserted close to tip of pedicel or on calyx base. Pod 2½—3½ cm. Stipules erect, 1—2 mm. Leaves 3—10 cm by ½—3 cm. 16. C. juncea
24. Bracteoles inserted about halfway the pedicel. Pod 5 cm. Stipules erect to recurved, 4—8 mm. Leaves 4—20 cm by 1—6 cm. 57. C. tetragona
25. Leaves obovate, long 1—12 cm, wide ½—3½ cm, base narrowed.
26. Bracts appressed, elliptic, 5—9 mm by 5—12 mm, not glandelar. Sepals 4—8 mm wide, inside glandular and dark coloured when dried all over. Hairs on the stem appressed. 13. C. fulva
26. Bracts recurved, linear, 1 mm by 6—8 mm, glandular like the stipules. Sepals 1—3 mm wide, inside glandular towards the top. 25. C. paniculatus
25. Leaves elliptic, 3½—9 cm long, 2—4 cm wide, base rounded. Bracts cordate, sessile, recurved 3—8 mm by 3—4 mm, glandular and dark coloured when dried like the bracteoles and the sepals inside, the latter 2—4 mm wide. Hairs on the stem patent. 37. C. valetotii
1. Leaves compound.
27. Leaflets mostly 5, rarely 3 or 4.
28. Stem hollow. Calyx 12 mm, glabrous. Pod inflated, glabrous, brownish...

27. C. quinquefoliata

28. Stem pithy. Calyx 5—7 mm, hairy. Pod not inflated, cylindrical, hairy...

11. C. cleomifolia

27. Leaflets mostly 3.

29. Bract persistent till fruit is set.
30. Blade of vexillum 2—3 cm long. Ovary and pod distinctly stipitate. Bracteoles minute, inserted far below the calyx...

17. C. laburnifolia

30. Blade of vexillum ½—1½ cm long. Pod sessile or 1—4 mm stipitate. Bracteoles inserted near or at the top of the pedicel.
32. Leaflets obovate or parallel-sided, with truncate top, central leaflet 2—6½ mm wide. Pod oblique, somewhat angular in outline (fig. a).

19. C. medicaginacea

32. Leaflets elliptic with rounded top, central leaflet ½—1¼ cm wide. Pod approximately symmetrical, rounded (fig. b).
31. Pod exceeding 1 cm. Seeds 5 or more, Calyx divided halfway.
33. Pods 3—4½ cm. Stipules absent...

36. C. usaramoensis

33. Pod 1½—2 cm. Stipules present, sometimes small.
34. Pod glabrous, 5 mm stalked. Racemes lax-flowered. Corolla hardly exceeding the calyx...

24. C. orizensis

34. Pod hairy, sessile or short-stalked. Racemes dense-flowered. Corolla exceeding the calyx.
35. Leaves c. 3 by ¾ cm, with scattered hairs. Pods densely puberulous. Wings as long as the keel...

20. C. mesopontica

35. Leaves c. 7 by 2—4 cm, fulvous-puberulent. Pods thick-pubescent. Wings shorter than the keel...

8. C. bracteata

29. Bract caducous before anthesis, leaving a distinct scar.
36. Blade of vexillum 16—26 mm. Stipules persistent. Bracteoles about halfway the pedicel, subulate, caducous. Calyx 13—15 mm...

4. C. anguypoides

36. Blade of vexillum 10—15 mm. Stipules early caducous. Bracteoles at top of pedicel or on the calyx at the base. Calyx 4—12 mm.
37. Bracteoles inserted on the calyx at the base, subulate. Calyx 4—8 mm long. Wings much shorter than the keel. Pod 4—5½ cm long, almost glabrous...

21. C. mucronata

37. Bracteoles inserted at the top of the pedicel. Calyx 10—12 mm. Wings approximately equalling the keel. Pod 2½—3½ cm, densely long-hairy...

15. C. incana

1. CROTALARIA ACICULARIS Buch.-Ham.

Crotalaria acicularis Buch.-Ham. [in Wall., Cat. 5390. 1832] ex Bth. in Hook.
Lond. J. Bot. 2: 476. 1843; Pl. Jungh. 1: 205. 1852; Mig., Fl. Ind. Bat. 1, 1: 326. 1855;
J. Sc. 5: Bot. 61. 1910; Backer, Schoolfl. Java 308. 1911; Gagnep., Fl. Gén. I.-C. 2:

*C. diasticha* Zoll. in Nat. & Geneesk. Arch. 3: 52, 75. 1846; in Flora 30: 694. 1847.

*C. prostrata* (non Roxb., nec Rottl.) Ceron, Cat. Pl. Herb. Manila 60. 1892.

**Distribution.**—Southeast Asia (Assam, Chittagong, Pegu, Tonkin, Cochinchina); in Malaysia: Philippines (Luzon, Mindoro), SW. Celebes, Central to East Java and the Lesser Sunda Islands (Bali).

2. **Crotalaria Alata** Buch.-Ham. & Roxb. ex Don


**Distribution.**—Southeast Asia (Assam, Khasia, Kumaon, S. Shan States; Siam; Sikkim; Tonkin); in Malaysia: Westcoast of Central Sumatra (Korthals), East Java, and East New Guinea (Milne Bay Distr.: Hoogland 4759).

According to Backer (1911 *l.c.*) long ago found in hedges near Klakah (Probolinggo); sometimes used as a green manure.

3. **Crotalaria Albida** Heyne ex Roth


*C. arenaria* Zoll. in Nat. & Geneesk. Arch 3: 52, 75. 1846, non Bth. 1843.


*C. henrici* Hochr. in Candollea 2: 390. 1925.

*C. pseudo-henrici* Hochr., *l.c.*

**Distribution.**—Southeast Asia (Nilgiris, Conceau, Kashmir, Assam, Siam, Kwangtung); in Malaysia: N. Sumatra (Atjeh), Philippines (W. Luzon), SW. Celebes, Central and East Java, rare in West Java (Dago, Lembang, Guntur), Lesser Sunda Islands (Lombok, Sumbawa, Sumba, Alor), and New Guinea (Moresby Distr.).

4. **Crotalaria Anagyroides** H. B. K.

DISTRIBUTION.—Introduced as a green manure from tropical America and commonly found throughout Malaysia in all major islands and island groups, also in the Philippines and New Guinea.

5. CROTALARIA ASSAMICA Btth.


DISTRIBUTION.—Southeast Asia (Khasya; Siam); in Malaysia: Philippines (Luzon: Abra, Ilocos Norte, Pangasinan, Bataan, and Zambales); introduced in the Hawaiian Islands (Oahu, _A. A. Heller_ 2911, Nov. 1895).

NOTES.—Differs from _C. retusa_ by a larger and inflated pod 3½—5 cm long and c. 7 mm stipitate, longer pedicels, and larger leaves which are oblong to obovate-oblong and up to 15 cm long. Pedicel as long as the calyx which is 12—15 mm. The two specimens examined from the Philippines have a pod only c. 3 cm. _C. kurzii_ Baker seems closely related.

*6. CROTALARIA BARBATA_ Grah. _ex_ W. & A.


DISTRIBUTION.—Native in Southeast Asia, obviously only in the Deccan, doubtfully recorded for Java.

NOTES.—Miquel, _l.c._ refers (with doubt) to this species a specimen collected by Horsfield near Surakarta which he said Bentham had identified as _C. glauca_. I have seen no material of it from Malaysia.

*7. CROTALARIA BIFLORA (L.) Linné


_Astragalus biflorus_ Linné, Mant. 273. 1771.


_C. rothiana_ DC., Prod. 2: 127. 1825, incl. _var_ _b ferruginosa._


DISTRIBUTION.—Southeast Asia (Deccan, Ceylon); in Malaysia recorded for Java by Baker _in_ Hook. f. and by Miquel.
NOTES.—Miquel does not quote specimens on which his records are based. Backer never saw specimens from Java, and at Leyden there is not a single sheet from Malaysia.

8. CROTALEARIA BRAC'TEATA Roxb.


**DISTRIBUTION.**—Southeast Asia (India: Bhotan; Chittagong; Burma: Tenasserim; Pegu; N. Siam: Chiang Dao); in Malaysia: Philippines (North Luzon).

NOTES.—Baker *in* Hook. f. mentioned its occurrence in the Malay Islands, Miquel mentioned Java, but neither Backer nor I have a certain record from that island.

9. CROTALEARIA CALYCINA Schrank


*C. roxburghiana* DC., Prod. 2: 129. 1825.


**DISTRIBUTION.**—Africa, Southeast Asia (Concan, Bengal, Tonkin) to Australia, through Malaysia: Philippines (Luzon: Zamboales, Rizal, Mindoro, East Mindanao), Celebes (Minahassa, SW. Peninsula, Buton I.), East Java (also Madura I.), Lesser Sunda Islands (Timor, Alor, Wetar), and New Guinea (Hollandia).

NOTES.—Miquel, *l.c.*, mentioned material collected by Junghuhn in Sumatra (Batak Lands) but I could not locate this material.

10. CROTALEARIA CHINENSIS Linné


**DISTRIBUTION.**—Southeast Asia (Concan, Malabar, Bengal, Upper Ganges, Pegu, Tenasserim); in Malaysia: Sumatra (Westcoast and Eastcoast Res.; Palembang: Pasemah Lands), SE. Borneo, Philippines (Luzon: Rizal; Negros; Mindanao: Misamis), and West New Guinea (Arfak; Kebar).

**Notes.**—Backer assumed that this species may occur in Java in sunny grassy places, but I am not aware of any records, neither in the literature nor in the Rijksherbarium collections.

**11. CROTALARIA CLEOMIFOLIA Welw. ex Baker**


**DISTRIBUTION.**—Tropical Africa, introduced in the Malay Peninsula (Pahang: Cameron Highlands, Tanah Rata).

**Notes.**—The only specimen (*Burkill 867*) is said to have been introduced by an agricultural experiment station. The specimen differs slightly from the description given by Baker through the presence of small stipules, but for the rest agrees better with *C. cleomifolia* than with the other 5-foliate species.

**12. CROTALARIA FERRUGINEA Grah. ex Bth.**


**Distribution.**—Southeast Asia (Ceylon, Ava, Martaban, Nepal, Assam); in Malaysia: Sumatra (Tarutung, Liwa), Borneo (Sarawak), Java, Lesser Sunda Islands (Bali, Lombok), SW. and Central Celebes (also Saleyer), Philippines (Mindanao: Bukidnon, Davao, Cotabatu, Lanao), Moluccas (Buru), and New Guinea (Ifar, Hollandia, Goroka, Central and Eastern Highlands).

**Notes.**—Wight & Arnott (Prod. 189. 1834) and Walpers (Rep. Bot. Syst. 1: 587. 1842) refer this species as a synonym to *C. prostrata*, but all other authors accept it as distinct.
It may well occur that the oldest specific epithet for this very common species is *C. lejoloba* Bartl. which Bentham (1843, 1852) referred with a question mark to its synonymy. In recent time Hochreutiner accepted *C. lejoloba* as the correct name. It is true that the brief original description of *C. lejoloba* is fairly good and covers the characters of *C. ferruginea*, but before definitely accepting this name for a widely distributed plant which has almost universally been called *C. ferruginea*, checking of the type material would be most desirable. This material must then consist of dried material of the plants raised in the Göttingen Botanic Gardens where it was introduced from seed said to have come from Java. Unfortunately Dr. Hans-Jürgen Beug, Kustos of the Göttingen Herbarium, informed us (24-5-1961) that authentic specimens are not preserved there. They may, of course, never have been made and the description may have been drawn merely from living plants.

*13. CROTALARIA FULVA Roxb.*


**DISTRIBUTION.**—Native in Madagascar, the Seychelles, Mauritius, and Southeast Asia (Ceylon, Nilgiris, Concan, Mysore); in Malaysia said to have been collected at the Westcoast of Sumatra by Korthals and Junghuhn and in Java by Reinwardt. It seems, however, that all these materials were derived from Hortus Bogoriensis. On the sheets of Reinwardt ‘e Bengal’ is mentioned as origin. It may of course have locally and temporarily escaped, but if this introduction has taken place indeed it has presumably not been successful, as no other material has been collected since. It has been introduced in the Hawaiian Islands; I examined a sheet collected near Honolulu, in Oahu.

**NOTES.**—Baker (1876) reduced *C. pulchra* (non Andr.) DC. to *C. fulva*. Miqoul (Fl. Ind. Bat. 1, 1: 336. 1855) referred it correctly to *C. pulcherrima* Roxb. under which name Andrews had received seed from Lady Amelia Hume. Andrews published this plant, however, not with the epithet *pulcherrima*, but as *C. pulchra* Andr. Consequently *C. pulcherrima* Roxb. ex Sims in Bot. Mag. 46: t. 2027 1819; Fl. Ind. ed. Carey 3: 267. 1832; Miq., Fl. Ind. Bat. 1, 1: 336. 1855; Baker in Hook., Fl. Br. Ind. 2: 80. 1876 is a synonym of *C. pulchra* Andr., Bot. Rep. 9: t. 691. 1810.


**DISTRIBUTION.**—Southeast Asia (Kumaon to Sikkim, Khasya, Nepal, Anamalay Hills); in Malaysia: Philippines (Benguet), Central Java (Mt Lawu, etc. Backer, l.c.), the Lesser Sunda Islands (Lombok, Alor).

**NOTES.**—Merrill cited under C. acicularis Ham. *ex* Bth. at least one number (Merrill 4266) which belongs to *C. humifusa*, by the characters of the bract, indumentum of the rachis, etc. Also in the Kew Herbarium this specimen was referred to *C. humifusa*. In his new Flora of Java Backer said that there would be 6—8 seeds in each pod, but in Merrill 4266 there are 14, and presumably the number of seeds is variable from 6—20, as it is in *C. acicularis*.

15. **CROTALARIA INCANA** Linné


**DISTRIBUTION.**—Presumably native in the Caribbean Islands, widely introduced and now almost pantropical, in Central and Tropical America, Africa, Queensland, Hawaiian Islands; in Southeast Asia (Ceylon, Kumaon, Assam); in Malaysia very common: Sumatra (Westcoast: Korthals), Malay Peninsula (Singapore), throughout Java and also on the N. coast of Madura, Philippines (Luzon: Albay, Banao, Rizal, Batangas; Panay), Moluccas (Batjan; Obi), and New Guinea (Morobe Distr.).
16. CROTALEARIA JUNCEA Linné


**DISTRIBUTION.**—Madagascar, probably native in Southeast Asia (India: Madras, Concan, Mangalore, Gangetic Plains, Khasya; Burma: Pegu; Indo-China); in Malaysia introduced as a fibre plant, cultivated and naturalized: Malay Peninsula (Johore), Borneo, throughout Java (also in Madura I), Lesser Sunda Islands (E. Sumba; Kisor), S. Celebes (Bone), Philippines (Luzon: Rizal, Laguna), and New Guinea (Hollandia).

**Notes.**—There has been confusion about the interpretation of _C. sericea_ Retz. and according to Baker (1876) the description of Willdenow refers to _C. juncea._

17. CROTALEARIA LABURNIFOLIA Linné


_C. pendula_ Bert. _ex DC._, Prod. 2: 130. 1825.

DISTRIBUTION.—Africa (Zomba Distr.; Kongo, Katanga), Southeast Asia (Ceylon, Carnatic, Mysore); Malaysia: Malay Peninsula (Cumming 2282), Java (East Java only, E of Puger), Madura I. (Boerninh, Pamakasan, Ketapang, Bangkalan, and Tamberu), Lesser Sunda Islands (Bali, Alor, Wetar).

NOTES.—Baker localized Cumming 2282 in the Philippines, but according to Merrill (1923) this number was collected outside the Philippines, possibly in the Malay Peninsula. F.-Villar (1880) mentioned to have seen living specimens in Luzon and Panay but specimens to sustain these records are not represented in the herbaria. As the species distinctly prefers very dry places it would be astonishing if Cumming had found it in Malaya. Miquel mentioned it to be common in Java, but that generalization is certainly erroneous; in 1911 Backer had not seen a single specimen from Java except in the cultivated state in the Botanic Gardens.

18. CROTALARIA LINIFOLIA L. f.


C. montana Heyne in Roth, Nov. Pl. Sp. 335. 1821; DC., Prod. 2: 126. 1825, non Roxb. 1832.


1834.

C. caespitosa Roxb., Fl. Ind. ed. Carey 3: 266. 1832.

C. pallida (non Ait.) Blanco, Fl. Filip. 570. 1837.


DISTRIBUTION.—Southeast tropical Asia (India: Mysore, Carnatic; Siam; Indo-China) to Australia (Queensland and Northern Territory); in Malaysia: N. Borneo (Ranau, near Kinabalu), Java (some places round Bandung in West Java, further in East Java), Madura I. (Pamekasan), Lesser Sunda Islands (W. Bali, Sumba, Timor, Alor, Wetar), and Celebes (throughout the island; also on the adjacent Tanah Djampea and Buton Is.), Philippines (Luzon: Rizal, Manila, Bulacan; Mindoro), Moluccas (Halmahera; Ambon and Tanimbar Is.), and New Guinea (throughout the island).

19. CROTALARIA MEDICAGINEA Lamk.


_Indigofera foliosa_ Willd. in Ges. Naturf. Fr., Neue Schr. 4: 217. 1803.


_C. striata_ (non Retz.) Zoll. in Nat. & Geneesk. Arch. 3: 52. 1846.

_C. zollingeriana_ Miq., Fl. Ind. Bat. 1, 1: 344. 1855 (in U.)


DISTRIBUTION.—Southeast Asia (Afghanistan; India: West and East Himalaya, Mysore, Carnatic; Burma; Siam), to Australia (Northern Territory: Yirrkala, Pt. Bradshaw); in Malaysia: Java (Djakarta: Edam I.; S. Priang: Zandbaai; Surabaja) and Southeast New Guinea (Pt. Moresby).

NOTES.—Bentham (1864), followed by Bailey, and recently by Specht identified the Australian material as _C. trifoliastrem_ Willd., Sp. Pl. 3, 2: 983. 1802; in Ges. Naturf. Fr., Neue Schr. 4: 223, tab. 5. 1805, but this material belongs in my opinion to _C. medicaginea_ Lamk. I admit that these two species are very closely allied; in a concise way they can be contrasted as follows:
C. trifoliastrum: Calyx c. 4 mm long; wings of corolla c. 5½ mm; standard at base provided with 2 auricles, c. 7 mm long, as long as the keel; pod tending to be rectangular in outline, with the sides more or less parallel and the apex transverse.

C. medicaginea: Calyx c. 2½ mm; wings c. 3½ mm; standard c. 4 mm, without auricles at the base; keel c. 4½ mm; pod oblique tending to be triangular in outline through a median bulge, and with acute apex.

In the literature it has repeatedly been mentioned that there would also be a difference in the length proportion of the pedicel in relation to the leaflets, but this does not hold.

Baker distinguished three varieties, mainly according to the size and robustness of the plants; Backer mentioned that in Java only var. luxurians would occur. I cannot attach much significance to these forms.

C. tappenbeckiana Laut. & K. Sch. is tentatively reduced to this species; I have not seen the type (Lauterbach 2775).

*20. CROTALARIA MESOPONTICA Taub.


DISTRIBUTION.—Native in tropical Africa, according to Backer (1941) sometimes used as a green manure in Java, but presumably very rarely. I have seen specimens from Africa, but none from Java.

21. CROTALARIA MUCRONATA Desv.


C. pallida Klotzsch in Peters' Mossamb. Bot. 57. 1862, non Ait. 1789.
C. laburnoides Klotzsch, l.c.
C. saltiana (non Andr. 1811) Prain ex King in J. As. Soc. Beng. 66, ii: 41, 353.

DISTRIBUTION.—Native of Central and tropical America, widely introduced in other tropical countries, Africa, Asia, throughout Malaysia (extremely common) and Queensland, both in everwet and in seasonal countries, often referred to as C. striata, C. saltiana, and C. brownei.

NOTES.—Some authors take C. saltiana Andr. as a different species. I have not seen the type; in the drawing the stipules and bracteoles are not drawn and the wings are equal in length to the vexillum, which characters plead against conspecificity with C. mucronata Desv.

22. CROTALARIA MYSORENSIS Roth


DISTRIBUTION.—Native in Southeast Asia (Himalayan tracts, Concan, Upper Gangetic Plains); in Malaysia: Northeast Java (Surabaja, Pasuran, North Idjen, Asembagus), Madura I. (Sumenep; P. Puteran) and Lesser Sunda Islands (Lombok), obviously confined to the periodically driest area in Malaysia.

23. CROTALARIA NANA Burm. f.


DISTRIBUTION.—Southeast Asia (Nilgiris, Concan, Mysore, Carnatic); in Malaysia in Madura I. (Bangkalan, Arosbaja), also in Queensland. According to Miquel it would also have been collected on Mt Tengger (Bromo, Ider-Ider) but I have seen no material of that locality. This is possibly caused by the fact that Miquel erroneously reduced C. arenaria Zoll., non Bth., to this species. Though I have not seen Zollinger’s specimen I placed this under C. albida on the authority of Hochreutiner (in Candollea 2: 390. 1925).

24. CROTALARIA ORIXENSIS Willd.


DISTRIBUTION.—Tropical Africa, Aethiopia, India.

NOTES.—The only data I have is Merrill’s statement (1923): “Luzon, Manila. B.S. 19145 Guerrero. Apparently a casual introduction which will perhaps not persist”.

25. CROTALARIA PANICULATA Willd.


NOTES.—Lamarck, Willdenow, Miquel, Bentham, and Baker record this species to occur in Java. It is not impossible to be due to a confusion with the specimen collected by Sonnerat which was erroneously identified as *C. chinensis* by Lamarck. Neither Backer nor I have seen any Malaysian material of *C. paniculata*.

26. CROTALARIA PROSTRATA Rottl. ex Willd.


*C. obliqua* Span. in Linnaea 15, 1: 189. 1841, nomen.
DISTRIBUTION.—Southeast Asia (Concan, Himalayan tracts, Bengal) in Malaysia; Philippines (West Mindoro), S. Celebes (P. Muna), Lesser Sundas Islands (Bali), and Central and East Java (Jogjakarta; Lumajang).

NOTE.—This is a new record for the Philippines (Sulit PNH 13759).

27. CROTALARIA QUINQUEFOLIA Linné


DISTRIBUTION.—Native country not exactly known to me, now almost pantropical in distribution and throughout Malaysia indifferent to presence or absence of a dry season.

28. CROTALARIA RETUSA Linné


Lupinus cochinchinensis Lour., Fl. Coch. 2: 521. 1793; DC., Prod. 2: 410. 1825;


C. paulina Schrank ex DC., Prod. 2: 127. 1825.

DISTIBUTION.—Probably a native of Southeast Asia, now pantropical in distribution, cultivated and introduced throughout Malaysia.

NOTES.—At Leyden there are two specimens, one from Hawaii (Heller 811) and one from Siam (Kerr 830) which have been distributed as C. assamică but which, by their leaves, are very similar to C. retusa, and cannot be referred to C. assamică. The ripe pods of the Siamese plant are 6—6½ cm long, the immature ones of Hawaii measure 4½ cm; they are too long for C. retusa and may account for a variety.

*29. CROTALARIA RUBIGINOSA Willd.


C. wightiana Grah. [in Wall., Cat. 5388B. 1832] ex W. & A., Prod. 181. 1834;

DISTIBUTION.—Ceylon and the Deccan Peninsula. This species has often been confused with C. alata Don. It has been assumed to occur in Malaysia, but neither Miquel nor Backer saw any material from Malaysia and it is not represented from that area in the Bogor and Leyden herbaria.

30. CROTALARIA SEMPERFLORENS Vent.

Prod. 187. 1834; Bth. in Hook. Lond. J. Bot. 2: 560. 1843; Zoll. in Nat. & Geneeskr.
Arch. 3: 51, 75. 1846; Miq., Fl. Ind. Bat. 1, 1: 333. 1855; Baker in Hook., Fl. Br. Ind.
1: 78. 1876, incl. var. walkerii (Arn.) Baker; Backer, Schoolfl. Java 311. 1911; Bekn.
Fl. Java (em. ed.) 5: fam. 120, p. 34. 1941.

C. walkerii Arn. in Nov. Aet. Acad. Nat. Cur. 18, 1: tab. 18, 328. 1840; Walp.,

Wight, ic. 3, 3: 8, tab. 982. 1845.


DISTIBUTION.—Native in Southeast Asia (Ceylon, Nilgiris, Canara, Madras), not certainly native in Malaysia where it occurs widely distributed throughout Sumatra, Java, Borneo (one collection) and the Lesser Sunda Islands (Lombok, Sumbawa, Timor).

NOTES.—It occurs mostly above 600—700 m altitude. Formerly probably used as a green manure.
31. Crotalaria sericea Retz.


**DISTRIBUTION.**—Widely distributed throughout the Old World and Polynesia, native country not exactly known to me, not known from Malaysia.

**NOTES.**—The Malaysian specimens which have been referred to this species belong mostly to *C. juncea* L., e.g. Zollinger 2679 mentioned by him *in Nat.* & Geneesk. Arch. 3: 51. 1846. Merrill (1923) excluded the species from the Philippine flora. Baker mentioned it from Pegu and Malacca, but I could not verify this. The confusion arose by the misinterpretation by Willdenow of *C. juncea* L. for which he took *C. sericea*. Hence, all subsequent authors accepted the pod of *C. sericea* as being hairy which is true for *C. juncea*, but not for *C. sericea*.

32. Crotalaria sessiliflora Linné


C. brevipes Champ. ex Bth. in Hook., J. Bot. Kew. 4: 44. 1852.
C. calycina (non Schrank) Pule in Nova Guinea 8, 2: 375. 1910.

**DISTRIBUTION.**—Southeast and East Asia (India: Himalayan tracts, Sikkim, Assam, Khasya; Siam; Indo-China; Japan: Nagasaki); in Malaysia: Sumatra (Kota Tjansen, Brastagi, Padang Sidempoon, Angkola, Palembang; Bt. Serillo, Pasemah), Malay Peninsula (Trengganu: G. Tebu F.R.), Java (throughout), Lesser Sunda Islands (Timor), Central and S. Celebes, Philippines (Palawan, Luzon), Moluccas (Buru; Aru Is.: Trangan), and New Guinea (throughout). It occurs in areas subject to at least a feeble dry monsoon and is most abundant in pyrogenous grasslands and woodland savannahs.

**33. CROTALARIA TETRAGONA Andr.**


**DISTRIBUTION.**—Southeast Asia (Sikkim, Assam, Khasya; S. China: Yunnan). It is said to have been collected in Java but neither Backer nor I have seen wild specimens.

**NOTES.**—Andrews based his description on plants from a garden at Arley, raised from seeds received from Dr. Roxburgh who had forwarded them from India under the name *C. tetragona*.

Miquel described *C. grandiflora* Reinw. based on a specimen of Reinwardt's which was by some held to have come from Mt Malabar in West Java; the plant, or the seeds from which it was raised, came possibly from Malabar in India. It may have been cultivated in Java. Miquel also cited a specimen of Horsfield which I have not seen. Zollinger mentioned under the name *C. tetragona* two numbers of his collection, viz 2205 from Modjokerto and 1173; these could not be located at Leyden.

**34. CROTALARIA TRIQUETERA Dalz.**


*C. tetragona* (non Andr.) Miq., Fl. Ind. Bat. 1, 1: 335. 1855.
DISTRIBUTION.—Southeast Asia (Deccan, Concan, Bombay) and in Malaysia: East Java (Asembagus, Sempol) and the Lesser Sunda Islands (Bali, possibly also Sumbawa (Mt Tambora, leg. Zollinger, sec. Miquel), and Timor (sec. Backer, 1911, sed legum. glabr.).

NOTES.—Backer, l.c. 1941, recorded for Java a var. tetragona (Miq.) Backer which is anyhow an illegitimate name, as in merging C. tetragona Andr. with C. triquetra Dalz. the former is the correct name. Backer’s variety should be suppressed as the Javanese material belongs distinctly to C. triquetra; C. tetragona is an entirely different species.

35. CROTALARIA UNCINELLA Lamk.


DISTRIBUTION.—Africa, Madagascar, Bourbon, in Southeast Asia, not in India (Baker, l.c.), but in Siam, Indo-China (Hanoi, Tourane) and South China, recently introduced in the Malay Peninsula (Kuala Trengganu, J. Sinclair SF 40505).

NOTES.—The type of Lamarck is from Bourbon collected by Commerson. De Candolle distinguished already a var. glabra, observing that leaves and pods may be glabrous in the species.

Craib maintained *C. elliptica* alongside *C. uncinella*, because he found some differences between the Mascarene material and that of Siam, though he did not specify these differences. The material from Madagascar I examined does not, as far as I can judge, show differences from that of Siam.

36. CROTALARIA USARAMOENSIS Baker f.


DISTRIBUTION.—Native in Africa (?), because of its usefulness distributed as a green manure throughout Malaysia and found in all island groups under both everwet and seasonal climate.
37. CROTALARIA VALETONII Backer


DISTRIBUTION.—Only known from the island of Madura, NE. of Java (Ambunten, Tambaru), under seasonal climatic conditions.

NOTES.—It would be very much surprising if there would be a local endemic Malaysian species, as all other species are either introduced from or shared with tropical southeast Asia. In comparing the material from Madura I. with Asiatic species it appears to come extremely close to that of the Indian C. madurensis Wight. They have a very similar calyx (c. 11—15 mm long, with black, recurved margins of the acute lobes). As far as I can see in the specimens present at Leyden, there are the following slight differences: C. madurensis: corolla 15 mm. Pods (sec. Baker) 2¼ cm. Seeds 10—12. C. valetonii: corolla 17—20 mm. Pods 1½ cm; ovules 2, of which I abortive.

38. CROTALARIA VERRUCOSA Linné


C. caerulea Jacq., Ic. Rar. 4: tab. 144. 1784; Coll. 1: 67. 1787.
C. flexuosa Moench., Meth. Suppl. 55. 1802.
C. acuminata G. Don, Gard. Dict. 2: 134. 1832.
Phaseolus bulbiflora Blanco, Fl. Filip. 572. 1837.
DISTRIBUTION.—A pantropical weed of uncertain native country; in Malaysia commonly represented in all the larger islands or island groups, largely below 800 m altitude. Several authors have distinguished minor varieties which have no merit for distinction.

Hochreutiner (1925) believed that C. verrucosa and C. semperflorens are connected by transitional specimens (Wight 200, Hochreutiner 249, 2611); I have examined the last mentioned specimen; this is in my opinion C. verrucosa, and not transitional.

DOUBTFUL SPECIES


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The first number of each pair is the collector's number, the second refers to the number of the species in the text. No numbers are given under series numbers, except two under HB of which the proper collector is not known. All numbers examined have been cited also of collections from outside Indonesia. All cited numbers have been examined by the author; numbers recorded in literature but not seen by the author have not been cited.


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