

NOTES ON MALESIAN FABACEAE  
(LEGUMINOSAE–PAPILIONOIDEAE)

2. The genus *Canavalia* Adans.

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SUMMARY

The genus *Canavalia* (Leguminosae–Papilionoideae) is briefly introduced. Comments on several species are given. A key to the Malesian species is presented.

INTRODUCTION

*Canavalia* Adans. is a genus of c. 50 species distributed throughout the tropics and subtropics, but found mainly in North and South America.

Although *Canavalia* has been revised twice in this century (Piper & Dunn, 1922; Sauer, 1964) misidentifications are common. Several species [e.g., *C. ensiformis* (L.) DC., *C. lineata* DC.] have repeatedly been interpreted wrongly.

In the sections that follow comments will be given on the genus and on several, often confused species. A key to the nine Malesian species is presented.

CANAVALIA

*Canavalia* Adans. belongs to the subtribe *Diocleinae* Benth. of the tribe *Phaseoleae* DC. (Lackey, 1981). Within this subtribe it is easily recognised by its strongly bilabiate calyx with a large bifid upper lip and a much smaller trifid lower lip, and by its usually resupinate corolla.

Moreover, this genus can be recognised by the peculiar shape of its flower buds, and its pods and seeds.

The calyx in bud is strongly compressed laterally with the lobes of the upper lip pressed firmly together. At the base the upper lip is clasped by the lobes of the lower lip. The upper rim of the calyx is usually notched at the transition between the tube and the upper lip (Fig. 1).

The pods are linear to oblong, compressed laterally, with a rib or a wing along the upper suture and, usually, an additional rib or wing at some distance from the upper suture. The seeds are remarkable by their long linear hilum which is at least half as long as the seed.

Another peculiar feature is found in the development of the stipules. At first they are small, thin, and triangular, and often slightly spurred. Later on they become larger, thicker and more or less gland-like; mature stipules are  $\pm$  irregularly shaped.

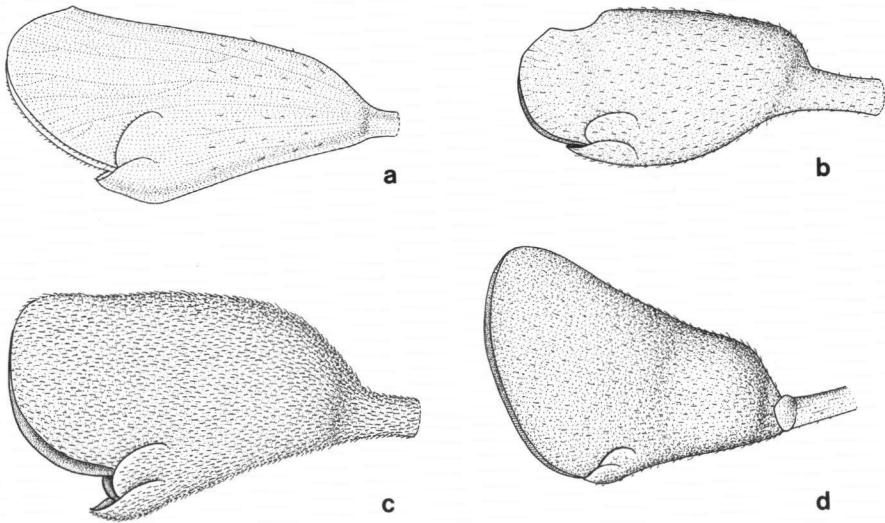


Fig. 1. Flower buds of *Canavalia*-species. a. *C. cathartica* Thouars; b. *C. maritima* (Aublet) Thouars; c. *C. mollis* Wight & Arn.; d. *C. nitida* (Cav.) Piper (a: Powell 400; b: Forman 1019; c: Holst-voogd 451; d: Verheijen 4733). Drawing J.H. van Os; all  $\times 3.25$ .

### *Canavalia cathartica*, *C. lineata*, and *C. maritima*

Several species of *Canavalia* are found almost exclusively in coastal habitats, namely *C. cathartica* Thouars, *C. lineata* DC., and *C. maritima* (Aublet) Thouars [*C. rosea* (Swartz) DC.]. Of these three, *C. cathartica* is sometimes found more inland.

*Canavalia cathartica* and *C. maritima* are widespread in the tropics and subtropics, and common on beaches in the Malesian area. They are easily distinguishable from the other species of *Canavalia*, not only by the habitat, but also by the form of the leaflets: In *C. cathartica* and *C. maritima* the leaflets are ovate to orbicular, or rarely obcordate or elliptic, with a rounded, emarginate, cuspidate, or short-acuminate apex; all other species of *Canavalia* have elliptic to ovate leaflets with an acute to acuminate, rarely an obtuse apex.

*Canavalia cathartica* and *C. maritima* differ from each other as follows:

***C. cathartica*** — Leaflets rather thin, apex short-acuminate. Pods falcate, rarely oblong, additional rib at 5–10 mm from the upper suture (Fig. 2a). Hilum of seed 9–14 mm long.

***C. maritima*** — Leaflets usually thick,  $\pm$  fleshy, apex rounded, emarginate, rarely short-acuminate or cuspidate. Pods oblong, additional rib at 1–3 mm from the upper suture (Fig. 2c). Hilum of seed 6–8(–9) mm long.

*Canavalia lineata* has often been noted for the Malesian area. However, all Malesian specimens with this name seen in various herbaria belong to *C. maritima*.

The differences between *C. lineata* and *C. maritima* are as follows:

*C. lineata* — Pod (5–)6–9 × 2.5–3 cm, additional rib at 2–4 mm from the upper suture (Fig. 2b). Seeds 14–16 × 11 × 6–20 mm, hilum 12–13 mm long.

*C. maritima* — Pod (7–)9–13 × 2–2.5(–3.5) cm, additional rib at 1–3 mm from the upper suture (Fig. 2c). Seeds 12–15 × 8–11 × 4–7 mm, hilum 6–8(–9) mm long.

*Canavalia lineata* appears to be endemic in Japan. However, the species may occur in China as well.

### *Canavalia ensiformis* and *C. gladiata*

Two species of *Canavalia* are widely cultivated throughout the tropics: *C. ensiformis* (L.) DC., Jack bean, and *C. gladiata* (Jacq.) DC., Sword bean (Westphal, 1974; Anonymous, 1979; Duke, 1981).

They are easily distinguishable when ripe fruits and seeds are present:

*C. ensiformis* — Pods 15–35 cm long. Seeds white, 14–21 × 10–15 × 5–10 mm, hilum 5.5–9 mm long.

*C. gladiata* — Pods 20–60 cm long. Seeds brown, 25–35 × 14–20 × 4–14 mm, hilum 15–25 mm long.

The name *C. ensiformis* has been used mistakenly for several other species. So many errors have been published that it is impossible to correct them in this article. In coastal areas *C. cathartica* Thouars is meant, in Java also *C. mollis* Wight & Arn., in the Philippines *C. macrobotrys* Merr., and in New Guinea also *C. papuana* Merr. & Perry.

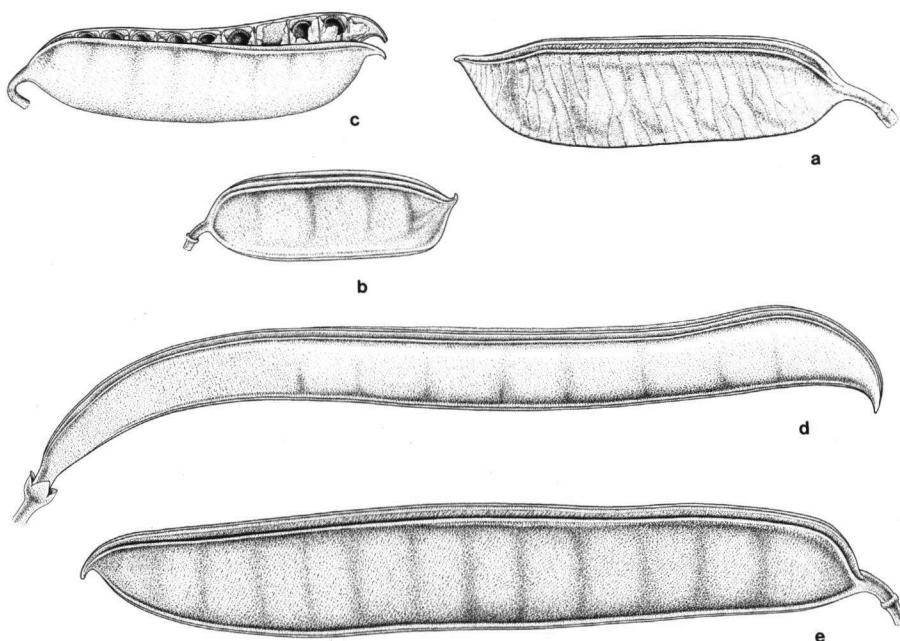


Fig. 2. Pods of *Canavalia*-species. a. *C. cathartica* Thouars; b. *C. lineata* DC.; c. *C. maritima* (Aublet) Thouars; d. *C. ensiformis* (L.) DC.; e. *C. gladiata* (Jacq.) DC. (a: Powell 400; b: Burger s.n.; c: PNH 36765; d: Verheijen 4717; e: Ochse s.n.). Drawing J.H. van Os, all × 0.4.

**Canavalia mollis**

*Canavalia mollis* Wight & Arn. is one of the species of the genus that is more easily recognisable in the vegetative state. The species is pubescent with soft patent hairs. All other species of *Canavalia* in Malesia have a strigose indumentum with stiff, appressed hairs.

Up to now *C. mollis* has been found only in Java and the Lesser Sunda Islands. However, quite a number of specimens from Papua New Guinea show exactly the same type of indumentum. As there is no difference at all between these specimens and *C. mollis*, this material is included in this species.

The distribution of *C. mollis* shows a large gap between its western part (Java, Lesser Sunda Islands) and its eastern part (Papua New Guinea).

**Canavalia nitida**

*Canavalia nitida* (Cav.) Piper, a native of Mexico and the Antilles, was collected twice in Flores (*Kostermans 22096, Verheijen 4733*). As at least one of the localities is an abandoned garden, the species may have been introduced as an ornamental.

*Canavalia nitida* belongs to subg. *Catodonia* Sauer. It differs from the Malesian species of *Canavalia* in the inflorescence: each node bears 3–6 flowers instead of 1–3 and in the shape of the calyx which has no notch at the transition between the tube and the upper lip (Fig. 1d).

**Canavalia virosa**

*Canavalia virosa* (Roxb.) Wight & Arn. is another species that has been recorded erroneously (Miquel, 1855; Koorders, 1898; Backer & Bakh. f., 1963). A few specimens grown in the Bogor Botanical Garden excepted, no evidence for the occurrence of this species in Malesia has been found in the herbaria (A, BO, K, L, PNH, SING) studied so far.

## EXCLUDED SPECIES

*Canavalia bracteolata* Merr., J. Straits Br. Roy. Asiat. Soc. 86 (1922) 313. — Type: BS 1151 (*Ramos*), Sarawak, 1920. = *Dioclea virgata* (Rich.) Amshoff (Den Hengst, manuscr.).

## KEY TO THE SPECIES OF CANAVALIA IN MALESIA

The species of *Canavalia* are not always easy to identify. Complete material with mature leaflets, not too young flower buds, and ripe fruits and seeds is needed for a correct identification.

- 1a. Indumentum strigose, hairs mostly stiff ..... 2  
 b. Indumentum pubescent, hairs rather soft ..... *C. mollis*

- 2a. Leaflets ovate to orbicular, rarely obcordate or elliptic, apex rounded, emarginate, cuspidate, or short-acuminate. — Coastal plants, rarely (*C. cathartica*) more inland ..... 3
- b. Leaflets elliptic to ovate, rarely wider, apex acute to acuminate, rarely obtuse. — Inland or cultivated plants ..... 4
- 3a. Leaflets rather thin, apex short-acuminate. Pods usually falcate, rarely oblong, additional rib at 5–10 mm from the upper suture. Hilum of seed 9–14 mm long ..... *C. cathartica*
- b. Leaflets thin or thick, ± fleshy, apex rounded or emarginate, rarely short-acuminate or cuspidate. Pods oblong, additional rib at 1–3 mm from the upper suture. Hilum of seed 6–8(–9) mm long ..... *C. maritima*
- 4a. Lobes of the lower lip of the calyx all rounded ..... 5
- b. Median lobe or all lobes of the lower lip of the calyx apiculate, or slightly cuspidate, or acute, acuteness often accentuated by inrolled margins ..... 6
- 5a. Leaflets ovate, apex acute to short-acuminate. Seeds 20 × 18 × 4 mm, hilum c. 10 mm long. — Celebes, Lesser Sunda Islands ..... *C. aurita*
- b. Leaflets elliptic, apex acuminate. Seeds 24 × 21 × 6 mm, hilum c. 8 mm long. — Philippines ..... *C. ramosii*
- 6a. Median calyx lobe straight ..... 7
- b. Median calyx lobe usually reflexed ..... *C. macrobotrys*
- 7a. Standard (incl. claw) 30–45 mm long. Pods 15–60 cm long. Seeds 14–35 × 10–20 × 4–14 mm. — Cultivated, rarely escaped ..... 8
- b. Standard (incl. claw) 22–27 mm long. Pods 13–14 cm long. Seeds 13–14 × 7.4–8 × 5 mm. — Wild, New Guinea ..... *C. papuana*
- 8a. Upper lip of the calyx as long as or slightly longer than the tube. Pods 15–35 cm long. Seeds white, 14–21 × 10–15 × 5–10 mm, hilum 5.5–9 mm long ..... *C. ensiformis*
- b. Upper lip of the calyx shorter than the tube. Pods 20–60 cm long. Seeds brown, 25–35 × 14–20 × 4–14 mm, hilum 15–25 mm long ..... *C. gladiata*

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