

# NOTES ON SOME CULTIVATED *CALLIANDRA* (MIMOSACEAE)\*

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## ABSTRACT

This taxonomic study deals with the seven species of the genus *Calliandra* which includes some of the most showy ornamentals of the neotropics that are generally grown in various gardens of the Southeast Asian countries. Previous embryological and palynological studies by DNYANSAGAR (1958) and NEVLING AND ELIAS (1971) have been reviewed. Detailed morphological description, list of synonyms, types, herbarium citation of *Calliandra houstoniana*, *C. harrisii*, *C. tweedii*, *C. haematocephala*, *C. anomala*, *C. fasciculata* and *C. selloi* together with three detailed illustrations are provided.

## INTRODUCTION

Historical accounts of the genus *Calliandra* have very seldom dealt with its role in horticulture. No attention has been given to the fact that the genus comprises several beautiful garden forms partly because few species along with the hybrid variants have come into general cultivation. Besides *Calliandra haematocephala*, the common powder-puff which is commonly grown, a few other species have made their appearance in the gardens in recent years. *C. surinamensis* and *C. harrisii* achieved a very wide distribution in several of the Asiatic countries.

According to various estimates the number of *Calliandra* species varies from 100 to 125 (BRITTON & ROSE, 1928; HUTCHINSON, 1964; ISELY, 1972 and WOODSON & SCHERY, 1950). The genus occurs from Mexico to tropical America, extending to south-western and south central U. S. with some species in India and in south-east Asia. It consists of shrubs or small unarmed or armed trees with bipinnate leaves, without foliar glands; stipules persistent; flowers in axillary, clustered or racemose heads; polygamous, with long white, pink or red stamens which are far exserted from the corolla and at base connate into a tube; calyx campanulate; corolla sympetalous, cleft and half-way down and tube funnel-form, equalling or exceeding the lobes. Pods flat, linear, straight or curved individually after dehiscence, with thickened margins, 2-valved.

Evidence supporting the taxonomic study herein presented for the cultivated species of the genus *Calliandra* has been gathered mainly from the morphological studies supplemented by chromosome studies, pollen morphology and embryological studies by DNYANSAGAR (1958) and NEVLING AND ELIAS (1971).

## MORPHOLOGICAL ASPECTS

*Habit*—*Calliandra* comprises hardy shrubs and small trees which can grow in a variety of climate and environmental conditions. They seem to prefer well drained soil but at the same time they are not affected much by the poor soil. Full sun is wanted for the best results of growth for most of the species except *C. houstoniana* which to some extent prefer semi-shady places. If the stems of *C. surinamensis* are cut after one flush of bloom

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the plants become taller say approximately 10 ft. with a dense foliage. The habit therefore, is not a very reliable character taxonomically.

*Foliage*—The leaflets are always entire, but variable in size, and shape. The leaflets near the petioles and the upper most ones as a rule are smaller in *C. brevipes*, *C. houstoniana*, *C. tweedii* and *C. anomala*. The terminal leaflets of *C. haematocephala*, *C. harrisii* and *C. surinamensis* are generally longer than the basal ones. The pubescence on the leaves and stems is also variable in length of the hairs, density and location. Variations in the shape of the apex and base of leaflet even in the same species are noted. The length of the petiole is also not a constant character. In taking the length and breadth of the leaflets, only the terminal, middle and basal ones are taken into consideration. Most of these variations are due to environmental modifications.

*Floral morphology*—The floral characters, size and number of the corolla lobes, length of the corolla tube and peduncle length are also found to vary a great deal. 220 flowers of *C. surinamensis*, 300 flowers of *C. harrisii*, 113 flowers of *C. brevipes*, 95 flowers of *C. haematocephala* and 78 flowers of *C. houstoniana* were examined, of which 93 flowers (42.3%), 94 flowers (31.3%), 40 flowers (35.4%), 37 flowers (39.0%) and 25 flowers (31.2%), respectively showed variations in the number of corolla lobes, number and size of stamens and in length of the staminal tube. In *C. surinamensis* the length of the staminal tube is more pronounced. Mostly the middle flowers have longer staminal tube than the surrounding ones.

The number of flowers vary in individual inflorescence. It is mostly in between 22—45. The bisexual and staminate flowers in most cases are to be found clustered near the centre of the inflorescence in *C. haematocephala* while in other species like *C. brevipes*, *C. anomala* and *C. surinamensis* a few instances showed dimorphic flowers. The flowering generally starts from the base of the inflorescence and then proceeds upwards to the apex. These observations are in confirmity with NEVLING AND ELIAS (1971) studies on *C. haematocephala* Hassk. and *C. inequilatera* Rusby complex.

*Embryology and Pollen Morphology*—DNYANSAGAR (1958) presented a detailed account of micro- and megasporogenesis. He stated that the eight grained polyad of *C. haematocephala* is composed of two isobilateral tetrads. BREWBAKER (1967) has found the pollen to be trinucleate in *C. inequilatera*. NEVLING AND ELIAS reports that in *C. haematocephala* two types of massulae are found : a sixteen grained, disk-like and an eight grained, flattened, ellipsoidal polyad. My own studies showed that in *C. harrisii*, *C. brevipes* and *C. houstoniana* the massulae has been found to be ellipsoidal in shape and it is 8 to 16 celled. Individual grains are periporate and the exine surface is granulate.

*Chromosome number*—Only two chromosome reports from the meiotic division for *C. haematocephala* and *C. pitteri* are available :  $2n=16$  and  $2n=32$  (Jour. Elisha Mitchell Soc. 65 : 118-122. 1949, Am. J. Bot. 38 : 538-546. 1951 and Jour. Agric. Sci. Tokyo Nogyo Daigaku 8 : 49-62. 1962).

Key to species :

1. Stamens scarlet red or dark pink :
  2. Pinnae 8-14 or more pairs :
    3. Leaflets 18-60 pairs :
      4. Middle leaflets cultriform, 6-7 mm long ; corolla 6-8 mm long .. .. . 1. *C. houstoniana*
      4. Middle leaflets not cultriform, 2-2.5 mm long ; corolla 0.8-10 mm long .. .. . 5. *C. anomala*

- 3. Leaflets 1-18 pairs :
- 2. Pinnae 1-4 pairs :
  - 5. Leaflets not with a basal smaller leaflet :
    - 6. Leaflets 15-18 pairs, middle leaflets 5-8 mm long ; calyx and corolla silky with long white hairs .. .. 3. *C. tweedii*
    - 6. Leaflets 4-8 pairs, middle leaflets 15-30 mm long ; calyx and corolla not silky .. .. 4. *C. haematocephala*
  - 5. Leaflets with a basal smaller pair of leaflets 2. *C. harrisii*
- 1. Stamens with a light reddish or pinkish upper part and a whitish lower part :
  - 5. Stipules 4-5 mm long, furrowed with 10 longitudinal lines ; leaflets 7-12 pairs ; flowering pedicels 2-3 cm long, staminal tube far exerted .. .. 6. *C. fasciculata*
  - 5. Stipules 1-1.5 mm long, not furrowed ; leaflets 20-35 pairs, upto 4 mm long ; flowering pedicels much shorter than above ; staminal tube included .. .. 7. *C. selloi*

1. **Calliandra houstoniana** (Mill.) Standley, Contrib. U. S. Nat. Herb. 23 : 386. 1922 ; Standley and Steyermark in Fieldiana 24(5) : 24. 1946 ; Bunting in Taxon 16 : 471. 1967. (Plate 1 : 1-9).

*Gleditsia inermis* L. Sp. Pl. 2 : 1509. 1763, pro parte, non L. Syst. Nat. 1759.

*Mimosa houstoniana* Mill. Gard. Dict. ed. 8.

*Mimosa* No. 16. 1768.

*M. houstoni* L'Herit. Ser. Angl. 30. 1788.

*Acacia houstoni* (L'Herit.) Willd. Sp. Pl. 4 : 1062. 1806.

*A. metrosideriflora* Schlecht. in Linnaea 12 : 367. 1838.

*Calliandra houstoni* Benth. in Hook. Jour. Bot. 2 : 139. 1840, nom. illegit.

*Type* : From Veracruz, Guatemala and Honduras (not seen).

Large shrub upto 6.5 ft. tall. Stems and branches dark reddish brown all over, densely pubescent, branched from some distance from the base, round ; stipules 4-6.5 mm long, densely hairy, elliptic, somewhat aristate at the tip, persistent, brown ; petioles 1.2-2.5 cm long, pubescent. Pinnae 8-14 pairs, densely pubescent, axis 5-14 cm long including the petiole. Leaflets (18)—40 or 50 (or 60—) pairs, terminal and basal leaflets very small 1.5-2 mm long, 1 mm broad, middle leaflets 6-7 mm long, 1-2 mm broad, lustrous dark green above, cultriform, densely ciliolate on both surfaces, oblique at the base, curved mucronate at the tips, principal vein prominent. Flower dark pink at the ends of pedicels, pedicels up to 2-4 mm long, densely hairy. Calyx 5 lobed. Corolla 5, only slightly connate at the base, 6-8 mm long, obovate, rounded at the apex ; lobes ovate, 4-6 mm long, dark brown, densely ciliolate on the upper surface. Stamens many ; filaments 3-3.5 cm long, pinkish-red, not jointed at base into a staminal column or very shortly connate into a 4-5 mm long tube at the base ; anthers small, basifixed. Pods 7-9 cm long, 0.9-1.2 cm broad (at the middle), densely pubescent all through, cuspidate at the apex, narrowed towards base and broadest in the middle.

*Specimens examined :*

*India* : Calcutta, W. Bengal : *S. P. Lancaster*, 22892, 3-3-1958 (LWG). Lucknow : cultivated in Dr. Mukherji's house, *Cumoo* 3551, 17-8-1952 (LWG) ; cultivated at National Botanic Gardens, *Hira Lal* 26040, 4-12-1956 (LWG) ; *S. R. Paul* 94529 (LWG). Dehradun : F.R.I. Garden, *Hira Lal*, s.n. (LWG). Kaulagarh : cultivated, *R. N. Parker*, 46519, 24-9-1928 (DD).

*Pakistan* : Lahore, Govt. Agric. Hort. Gardens, in flower, *R. N. Parker*, 38887, 13670, 28-9-1924 (DD).

*Mexico* : Veracruz : *Rosas* 821 (CAL).

Index Kewensis 2. 242. 1946 (?) cites *C. houstoni* Benth. as the correct name and mentioned *Mimosa houstoni* L'Herit in its synonymy.

**2. *Calliandra harrisii* (Lindl.) Benth.** in Hook. Journ. Bot. 3 : 95. 1844. (Plate (2 - 1-11)).

*Inga harrisii* Lindl. Bot. Reg. t. 41. 1839.

*Clelia ornata* Casar. Nov. Stirp. Bras. Dec. 84. 1842.

*C. cylindrocarpa* Benth. Lond. J. Bot. 96. 1844.

*Type* : Rio Tweedie 1218, 1837—cultivated Rio Janeiro Gardens, holotype (NY) and No. 1453, Rio Janeiro Gardens, 1837 Isotype (K).

Small shrub upto 6 ft. tall. Branches woody at the base, light grey coloured, round, branchlets flexuose, pubescent all over ; stipules 2 mm long, 0.5 mm broad, densely hairy, ovate-lanceolate or lanceolate, persistent ; petioles 5-12 mm long, puberulous. Pinnæ 1 pair. Leaflets 1 pair with a single smaller basal leaflet ; soft pubescent on the upper surface, mostly on the main vein and veinlets, 2.2-4.5 cm long, 0.6-1.5 cm broad, small basal pair of leaflets 13-22 mm long, 5-11 mm broad, oblanceolate-obovate, base obliquely round mucronate at the tip ; 2 principal veins prominent beneath densely ciliate on the nerves. Flowers blood red coloured in capitulate heads, 2.5-3 cm long, 3-3.5 cm in diameter, 22-24 per head, pedicillate ; pedicels 1.4-3.5 cm long. Calyx 3 mm long, 1.5 mm broad, green, tubular-campanulate, 5-6 lobed ; lobes very short, ovate, acute strigose at the margin. Corolla tube red, 6 mm long, 1 mm broad, 5 lobed ; lobes cleft to about 2 mm below, acute. Free parts of the stamen blood red coloured, connate below into a white tube ; staminal column 4 mm long, filaments 20-22 mm long ; anthers red, basifixed. Pods 5.5-6.7 cm long, 5-7 mm broad, 4 to 5-seeded, linear-oblanceolate, base tapering, apex cuspidate-mucronate ; seeds 4-6 mm long.

*Specimens examined :*

*India* : Lucknow cultivated at National Botanic Gardens, *Bhutani* s.n. 14-8-1964 (LWG) ; *A. P. Pandey* 93106, 93111 (LWG).

This species closely resembles *C. aculeata* but differs in the number of leaflets, size of the floral parts and in length of the pedicels which are longer in *C. aculeata* and shorter in *C. harrisii*.

**3. *Calliandra tweedii* Benth.** Hook. Jour. Bot. 140. 1840 ; Bailey, Man. Cult. Pl. 592.

1958 ; Isely in Madrono 21 : 281. 1972 et in Mem. N. Y. Bot. Gard. 25 : 82. 1973.

*Anneslia tweedii* (Benth.) Lindm., Bih. Svensk Vet. Acad. Handl. 24(7) : 51. 1898.

*Calliandra guildingii* Benth. in Hook. Lond. Journ. Bot. 3: 96. 1844.

*Inga pulcherrima* Cerv. ex Sweet, Hort. Brit. ed. 1. 483. 1825.

*Type* : Photo of the type at (Kew) ; (N.Y.) *Tweedie* 78, Rio Jacury, Brazil and *Sello* 1178 Brazil from Herb. Reg. Berolinense (NY).

Large unarmed shrub. Stems and branches very light brown coloured, glabrous or very sparingly pubescent; stipules scale like, 2-4 mm long, striped, densely pilose; petioles 3-5 mm long, densely hairy. Pinnæ 4 pairs, the axis 3-3.5 cm long, densely pubescent. Leaflets (15)-20 (or 20) pairs; basal and terminal leaflets 2 mm long, middle leaflets linear, 5-8 mm long, acute at the tip, base oblique, upper surface densely pubescent, brown with a prominent principal single vein, lower surface sparsely pilose with long hairs. Peduncles axillary from scaly buds which are upto 4-5 cm long, densely hairy. Flowers pedicellate; pedicels densely pilose; perianth pubescent. Calyx and Corolla 7-8 mm long, densely clothed with long, white hairs, silky, the latter 5, obovate with acute tip. Filaments free, purplish, clothed with soft hairs. Legumes 3.5-7 cm long, 3-5 mm wide.

*Specimens examined :*

Brazil : Rio Grande do Sul, Parecip. Montenegro, *B. Rambo* 42471, 21-1-1916 (LE); Sao Paulo : Rio Claro, *Dionisio Constantina* 7592, 21-1-1916 (LWG).

*C. guildingii* of horticulture which is somewhat similar to *C. haematocephala* in its few, large leaflets and in large red flower heads has been treated by DOTY AND JOHANSON (1954), MATHIAS AND McCLINTOCK (1963) as conspecific with *C. tweedii* and the same has been followed in the present study.

4. ***Calliandra haematocephala*** Hassk., *Retzia* 1 : 216. 1855; Cowen in *Baileya* 11 : 95. 1963; Maheshwari, *Illus. Fl. Delhi* 15. 1966; Nevling & Elias in *J. Arn. Arb.* 52: 81. 1971.

*C. inaequilatera* Rusby, *Memoirs of the Torrey Botanical Club* 6 : 28. 1896.

*Anneslia haematocephala* (Hassk.) Britton & Wilson, *Sci. Survey Porto Rico & Virgin Islands* 6 : 348. 1926.

*Type* : Bogor Garden. Java, Sheet No. 201280, Isotype (LE).

Bushy shrub up to 4 ft. tall. Branches many, spreading, grey, puberulous; stipules persistent, 6-7 mm long, 3 mm broad, hairy on the margins, long acuminate; petioles 0.9-1.5 cm long, knobbed or swollen at both the ends, puberulous. Pinnæ 1 pair, axis 3-7.5 cm long, puberulous on both surfaces, rachis ending in a sterile top. Leaflets 4-8 pairs, sessile, exstipulate, the terminal leaflets 15-32 mm long, 5-8 mm broad, middle ones 15-30 mm long, 8-9 mm broad, elliptic-lanceolate or narrowly elliptic, obliquely rounded at the base, acuminate or mucronate at the tip, dark green, shining above, principal middle vein prominent on both surfaces. Flowers blood red coloured, borne on axillary, capitate heads, 3-3.5 cm long, 4 cm in diameter, pedicellate; pedicels 0.8-2.5 cm long. Calyx funnel shaped, finely longitudinally ribbed, 2 mm long, 5 lobed; lobes broadly ovate, 1/2 mm long, light green, obtuse at tip. Corolla 3-6 mm long, 5 lobed, cleft to nearly 1/2 from above; lobes acute or obtuse, 2.5 mm long, glabrous. Staminal column 6-7 mm long; filaments 14-17 mm long, violet coloured; anthers minute, about 1/2 mm long, basifixed; pollen agglutinated into 8 celled pollinia. Pods strap shaped, 6.2 × 1.3 mm, glabrous, oblanceolate, reticulately veined with thick raised, striated sutures, 5 seeded.

*Specimens examined :*

India : Dehra Dun : cultivated, Forest School Garden, *Kirat Ram* 25097, 9-1-1921 (DD); *Balapure s. n.*, 6. 10. 1956 (LWG). Lucknow : cultivated at National Botanic Gardens, *Balapure* 72412, 16-11-1966 (LWG); *Hira Lal* 26034, 4-12-1956 (LWG), *A. P. Pandey* 93108 (LWG). Bihar Science College, Patna, *Saran* 25948, 13-3-1956 (LWG). Andhra Pradesh : Hyderabad, *Kaul s.n.*, Dec. & Jan. 1953 & 1954 (LWG). West Bengal : Calcutta, *Lancaster*, 48142, 9-2-1957 (LWG). Calicut : cultivated in University compound, *Ajay Singh* 72815 (LWG). Bangalore : cultivated at Lalbagh, *J. K.*

*Maheshwari* 88145, 5-7-1971 (LWG). Delhi : cultivated in Buddha Jyanti Park, *Bharati Chakravarty* 508 (DU). Bombay : Victoria Gardens, *H. Santapau* 12104 and 11495, 28-11-1950 ; *R. R. Fernandez* 2972, 3547 and 3549 (BLATT). Indore: cultivated in gardens, in flower, sheet No. 3513, 14-3-1912(DD). Calcutta : Indian Botanic Garden, *Raizada s.n.*, Jan. 1953 & Feb. 1954 (DD).

Burma : Rangoon town 50 ft., P. O. Khant, D. R. 1105, 3-2-1949 (DD.)

COWEN (1963) writes, "*C. haematocephala* was described in 1855 by HASSKARL from plants growing in the Botanical Garden at Bogor, which were propagated by seeds received from Calcutta Botanical Garden. BENTHAM in Trans. Linn. Soc. 30 : 548, 1875 states that this species was unrelated to any old world species known to him at that time. R. N. PARKER in "A Forest flora for Punjab with Hazara & Delhi, Govt. Print. Office 1918 listed it with the following notation, "Occasionally grown in gardens, does not do well in Lahore. Only known in Indian gardens but probably of American Origin". The seeds of this plant might have reached some Indian port from Brazil by the Portuguese intentionally because of its great ornamental value (Merrill in the Botany of Cook Voyages Chron. Bot. Vol. 14. 1954).

Recently, NEVLING AND ELIAS in J. Arn. Arb. 52(1): 69-85, 1971 after studying *C. haematocephala* Hassk. and *C. inaequilatera* Rusby complex on the basis of morphology, palynology, cytology, geographical distribution concluded that these two are conspecific.

**5. *Calliandra anomala*** (Kunth) Macbride in Contrib. Gray Herb. 59 : 4. 1919 ; Bunting in Taxon 16 : 472. 1969 ; Ali in Fl. W. Pak. 36 : 34. 1973.

*Inga anomala* Kunth, Mimoses et autres Plantes Legumineuses du Nouveau Continent, 70. t. 22. 1819 (—24). *C. kunthii* Benth., Journ. Bot. 2 : 139. 1840.

*Calliandra grandiflora* (L'Herit.) Benth., Trans. Linn. Soc. 30 : 557. 1875, pro parte ; Parker, For. Fl. Punjab ed. 3. 202. 1956.

Large evergreen shrub upto 1-1/2 m tall. Stems dark brown, the branchlets slightly puberulous becoming glabrous later. Leaves petiolate ; petioles 5-10 mm long, clothed with white hairs. Pinnae (7)-10 or 15 (or 20—) pairs, axis 3.5-9 cm long; leaflets (25)-40 or 55 (or 60—) pairs, densely crowded, middle ones 2-2.5 mm long, 0.5 mm broad, ciliolate on the upper surface, dark green, undersurface with a principal single vein, glabrous or sparsely pilose beneath, base obliquely round, tip acute or obtuse, the basal leaflets upto 1 mm long. Racemes with a thick short or elongate rachis. Flowers pedicellate ; pedicels 4-7 mm long. Calyx 2.5 mm long, 4 lobed, densely pubescent. Corolla densely clothed with white hairs, 0.8-10 mm long, 4 lobed ; lobes 5-7 mm long, acute. Stamens pinkish red, 4-5.5 cm long, many ; anthers 4-5 lobed, yellow with a pinkish red centre to which the filament is attached. Pods 5-10 cm long, 11-14 mm broad, densely hispid, round or obtuse or rostrate at the apex 2- or 5 (or 6) seeded.

*Specimens examined* :

Java : Bogor : in fruit, Herb. of D. Brandis presented in 1880 to Dehra Dun herbarium without field number and date (DD.)

Mexico : State of Jalisco, Mountains above Etzatlan., *C. G. Pringle* 3601, 23-10-1903 (LE). Canyons near Guadalajara, *Pringle* 2371, 2426, 26-10-1889 (CAL).

**6. *Calliandra fasciculata*** (Willd.) S. R. Paul, comb. nov. (Plate 3 : 1-19).

*Inga fasciculata* Willd. Sp. Pl. 4 : 1022. 1806.

*Calliandra surinamensis* Benth. in Hook. Lond. Journ. Bot. 3 : 105. 1844.

*Type* : Hostmann 171 from Surinam, 1841. Negative no. N. S. 1962 (1953) (K).

Large shrub upto 7-8 ft. high. Stems branched above the base, very light grey coloured, glabrescent, verruculose, round. Stipules 2 at each node, 4-5 mm long, 1 mm broad, furrowed by 10 longitudinal nerves, persistent, mucronate at the tip, ciliolate. Petioles 0.8-3.0 cm long, knobbed at the base, pubescent but becoming glabrous with age, green. Pinnae 1 pair, axis 2.4-8 cm long. Leaflets (7)- 8 or 9 (12-) jugate, terminal 5.5-20 mm long, 2.5 mm broad ; middle leaflets 8-22 mm long, 2-5.5 mm broad, gradually decreasing in size downwards, oblong, linear-oblong, oblanceolate-oblong with oblique rounded base, mucronate at the tip, principal vein prominent on both surfaces, upper surface of the leaflets near the base of the stems are dark green and gradually becoming lighter in colour upwards. Flowers in capitate heads, campanulate, glabrous, 22-25 per head, up to 4.5 cm long, pedicillate ; pedicels 2-3 cm long, tube 4-7 mm long in outer flowers, 11-25 mm long in middle ones. Calyx 4-5 lobed, green, 4 mm long ; lobes subequally cleft to about 1 mm from above, mucronate or obtuse at tip, ovate. Corolla glabrous, 8-10 mm long, subequally 4-5 lobed ; lobes ovate, mucronate. Stamens 12-13, connate into a white tube ; filaments glabrous, 28-30 mm long, free part very light pink, lower white ; anthers very small, 1/3 mm long, basifixed. Gynoecium white, glabrous. Pods 3.5-7 cm long, obovate-oblanceolate, 4 to 6-seeded, longitudinally dehiscent ; seeds 8 mm long, 4 mm broad, flat, ridged, oblong, brown.

*Specimens examined :*

India : Lucknow, National Botanic Gardens. *Balapore* 67180, 11-9-1966 (LWG) ; *A. P. Pandey*, 93107, 93110, 88638, 88619, 88618, 85679, 88617 (LWG). W. Bengal : Calcutta, *Lancaster* 18726, 11-2-1955 (LWG). Calcutta : Royal Botanic Gardens, cultivated *R. P. Subedar* 100, August 1974 (BLAT).

This species is tentatively associated with *C. schultzei* Harms but can be separated by its 7-12 pairs of leaflets, glabrous corolla and in having upper free part of filament light red and lower whitish. In Indian herbaria and nursery catalogues this species is wrongly labelled as *C. tweediana*. The shape and size of leaflets and of staminal tube show considerable variations. Gradations from one form to another is also not uncommon.

**7. *Calliandra selloi* (Spreng.) Macbride in Contrib. Gray. Herb. n.s. 59 : 5. 1919.**

*Acacia selloi* Spreng. Syst. 3 : 137. 1826.

*Calliandra brevipes* Benth. in Hook., Lond. Jour. Bot. 2 : 140. 1840.

*Type* : Photo of the type at (K). No. 1455 from Brizilia, Herb. Mus. Ind. 1837 and no. 1455 from Brazil (NY).

Small shrub upto 5 ft. tall. Stems much branched from about 1 ft. from the base upwards, light grey coloured, round, the branches lightly puberulent, afterwards becoming glabrous with age. Stipules very small, 1-1.5 mm long, densely ciliolate, persistent, subulate-linear ; petioles 1.5-3 mm long, slightly puberulous. Pinnae one pair, axis 1.5-2.5 cm long, slightly puberulous becoming glabrescent later. Leaflets 20-35 pairs, sessile, subequal, terminal pair curved, linear-oblong, linear-elliptic, base obliquely rounded, acute at the tip ; middle leaflets larger, about 4 mm long and 1 mm broad ; linear basal leaflets 1 mm long, elliptic. Flowers in capitate heads. Calyx 4 lobed, membranous, light green ; lobes 1 mm long. Corolla-tube 4-5 mm long, membranous, 4 lobed ; lobes acute at tip, ovate. Stamenal tube included ; filaments 2-2.5 cm long, free parts of filaments with a light red upper part and a whitish lower part. Pods 2-3 cm long, obovate, glabrous, 2 to 3-seeded.

*Specimens examined :*

India—Lucknow : Shrubbery, National Botanic Gardens, *Kapoor & Hira Lal* 17283, 11-4-1956 (LWG) ; *Hira Lal* 24089 (LWG) ; *A. P. Pandey* 88628, 93105 (LWG). W. Bengal : Calcutta ; *Lancaster*

49665, 5-5-1958 (LWG). Darjeeling : cultivated in Botanical Garden, *Raizada* 18897, 11-11-1944 (DD).  
 Madras : Ooty, *Raizada s.n.*, Aug., 1941 (DD). Tamil Nadu : *Sebastine, s.n.* (CAL).  
*Burma*—Maymyo : Govt. Bot. Garden, 3400 ft., *C. J. Bogg.* 1356, October 1924 (DD).  
*Java* : Cultivated, *S. J. Van Ooststroom* 13563, 3-4-1950 (LE).  
*Brazil*—Estado do Rio, Petropolis, Carangola, May 1943, *Dionisio Constantino* 96 (LWG). Minas  
 geraes : *Claussen ; s.n.* 1840 (CAL).

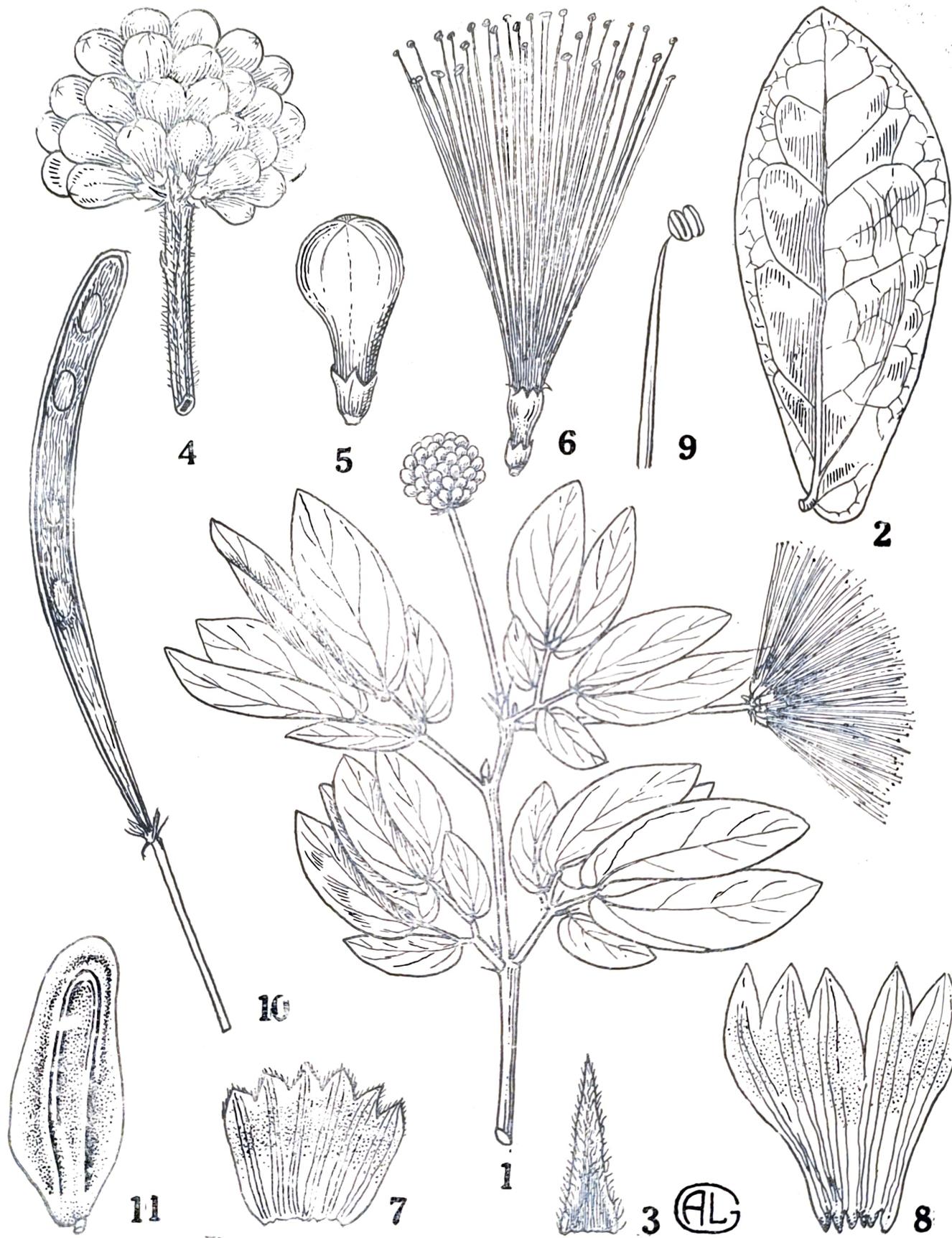
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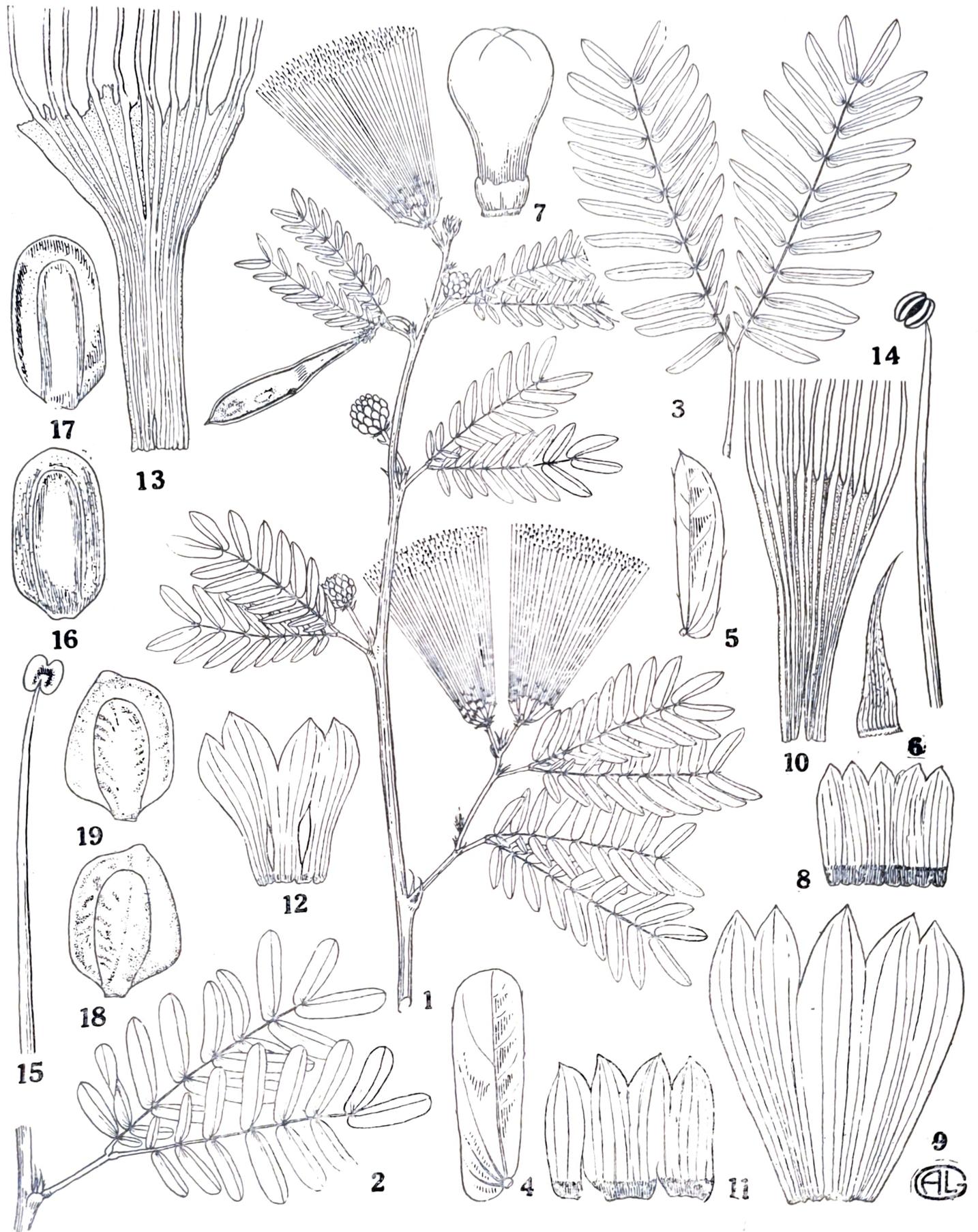
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## EXPLANATION OF THE PLATES

### PLATE 1. *Calliandra houstoniana* (Mill.) Standley

1. Habit  $\times 1$ ; 2. The upper surface of Leaflets  $\times 10$ ; 3. Lower surface of the Leaflets  $\times 10$ ; 4 & 5. Stipules  $\times 8$ ; 6 & 7. Corolla  $\times 5$  and  $10$ ; 8. Stamen  $\times 10$ ; 9. Fruit  $\times 1$ .

### PLATE 2. *Calliandra harrisii* Benth.

1. Habit  $\times 1$ ; 2. Lower surface of the leaflet  $\times 2$ ; 3. Stipule  $\times 30$ ; 4. Flowering buds  $\times 3$ ; 5. A single bud  $\times 6$ ; 6. Flower  $\times 3$ ; 7. Opened Calyx  $\times 9$ ; 8. Opened Corolla  $\times 6$ ; 9. Stamen  $\times 30$ ; 10. Pod  $\times 1$ ; 11. Seed  $\times 10$ .

### PLATE 3. *Calliandra fasciculata* (Willd.) Paul

1. Habit  $\times 10$ ; 2. Leaflets from base of the plant  $\times 1$ ; 3. Leaflets from upper portion of the plant  $\times 1$ ; 4 & 5. Leaflet  $\times 3$ ; 6. Stipule  $\times 5$ ; 7. Bud  $\times 10$ ; 8. Opened Calyx  $\times 10$ ; 9. Opened Corolla  $\times 10$ ; 10. Opened staminal tube of the outer flowers  $\times 5$ ; 11. Opened calyx of the middle flowers  $\times 10$ ; 12. Opened Corolla of the middle flowers  $\times 5$ ; 13. Opened staminal tube of the middle flowers  $\times 3$ ; 14 & 15. Stamen  $\times 40$ ; 16, 17, 18 & 19. Seed  $\times 5$ .