CHAPTER-3
MORPHOLOGICAL STUDIES

Classification (Bentham & Hooker)

Kingdom: Plantae

Division: Angiospermae

Class: Dicotyledonae

Sub Class: Polypetalae

Series: Calyciflorae

Order: Rosales

Family: Leguminosae

Sub family: Caesalpiniae

Genus: Cassia

Species: occidentalis (L.) Link

auriculata L.

alata (L.) Roxb.

fistula L.

roxburghii DC.
Synonyms

*C. occidentalis* - *Senna occidentalis*, *Cassia caroliniana*, *C. ciliata*, *C. falcata*, *C. foetida*, *C.frutescens*, *C. geminiflora*, *C. linearis*, *C. longisiliqua*, *C.obliquifolia*, *C. planisiliqua*, *C.sophera*, *Ditremexa occidentalis*

*C. auriculata* - *Senna auriculata*

*C. alata* - *Senna multijuga* (L.C. Richard) Irwin & Barneby (misapplied)

*C. fistula* - *Cassia rhombifolia* (Roxb), *Cathartocarpus fistulus* L.(Pers)

*C. roxburghii* - *Cassia javanica* sensu, *Cassia marginata* Roxb,

*Cathartocarpus marginatus*, *Cathartocarpus roxburghii*.

Common Names:

*C. occidentalis* - Coffee Senna, Negro Coffee, Coffee Weed, Stinking Weed, Foetid Cassia

*C. auriculata* - Mature tea tree

*C. alata* - Candle bush, candlestick senna, Christmas candle, golden-candle senna, ringworm bush, Roman candle tree, seven golden candles, yellow top weed

*C. fistula* - Golden shower, Indian laburnum.

*C. roxburghii* - Red Indian Laburnum, Red Cassia, Ceylon senna
**C. occidentalis**

The plant is a variable, branching, erect shrub, upto 1.8 m (Plate.1.1) in height. Leaves pinnate pubescent, leaflets pale green to bluish green, 3 to 9 pairs (Plate.2.1), opposite, margin entire, lanceolate or elliptic, varying on the same plant, 1.5 to 5 cm. x 0.4 to 2 cm (Plate.3.1), flowers brilliant yellow (Plate.6.1), in erect, terminal racemes (Plate.5.1); Calyx lobes 5 green in color and ovate (Plate.7.1). Petals 5 yellow in color, oblong, obovate and imbricate aestivation. Stamens 10 of which upper 3 are staminodes and 7 antheriferous, lower 3 large, 2 medium, 2 short (Plate.8.1). The style is long and stigma terminal (Plate.9.1). Fruits are indehiscent pod and flattened. Pods light green when young to dark brown or black when mature (Plate.10.1), flat, thin, oblong pubescent, 3.5 to 7 cm. x 0.2 to 2.5 cm.; seeds dark brown (Plate.11.1), obovate-oblong, 5 to 7 number in each pod. A large sessile globose gland present on the upper surface of the petiole near the insertion portion on stem (Plate.12.1).

**C. auriculata**

It is a much branched shrub with smooth cinnamon brown bark and closely pubescent branchlets, evergreen shrub that grows up to a height of 4 m (Plate.1.2). The leaves are alternate, stipulate, paripinnate compound, numerous, closely placed, rachis 8.8-12.5 cm long narrowly furrowed (Plate.2.2), slender, pubescent, with an erect linear gland between the leaflets.
of each pair (Plate.12.2), leaflets 16-24, very shortly stalked 2-2.5 cm long 1-
1.3 cm broad, slightly overlapping, oval oblong, obtuse (Plate.3.2), at both
ends, mucronate, glabrous or minutely downy, dull green, paler
beneath, stipules very large (Plate.12.2), reniform-rotund, produced at base on
the side of next petiole into a filiform point and persistent (Plate.12.3).

Flowers are irregular, bisexual, bright yellow (Plate.6.2) and large
(nearly 5 cm across), the pedicels glabrous and 2.5 cm long. The racemes are
few-flowered (Plate.5.2), short, erect, crowded in axils of upper leaves so as to
form a large terminal inflorescence, zygomorphic, calyx and corolla 5,
ascendingly imbricate; stamens 10, free, upper 4 large, 3 medium and lower 3
short, reduced to staminodes (Plate.8.2); the ovary is superior, unilocular, with
marginal ovules (Plate.9.2). The fruit is a short legume, 7.5–11 cm long, 1.5 cm
broad, oblong, obtuse, tipped with long style base, flat, thin, papery
(Plate.10.2), undulately crimped, pilose, pale brown. 12-20 seeds per fruit in
separate cavity (Plate.11.2).

*C.alata*

A large shrub grows up to a height of 6-7 m (Plate.1.3). The thick stem
upright (erect or ascending) and occasionally branched. The once-compound
(pinnate) leaves are alternately arranged along the stem and very large (45-80
cm long and 12-25 cm wide). They are borne on stalks (petioles) 2-4 cm long
and have 8-14 pairs of large leaflets (Plate.2.3). The individual leaflets (5-17
cm long and 2-5.5 cm wide) are either oblong, oval (elliptic) or egg-shaped in outline (ovate) and have entire margin. They are finely hairy (pubescent) and have rounded or slightly notched tips (Plate.3.3).

The golden yellow or orange flowers are borne in elongated clusters (15-60 cm long) at the tip of the stem (Plate.5.3) or in the upper leaf forks (terminal or axillary racemes). These clusters are borne on hairy stalks (pubescent peduncles) 15-30 cm long and contain numerous (20-40) densely crowded flowers. The individual flowers (2-3 cm across) are borne on short pedicels 5-8 mm long. They are initially held within dark yellow (Plate.6.3) or orange colored bracts, but these fall off as the flowers open (caducous). Each flower has five sepals (9-15 mm long and 8 mm wide), five bright yellow petals (Plate.7.3) up to 20 mm long and 12 mm wide. Stamens 10, fertile stamens 7, opening with apical pores, lower 2 with stout filaments 4 mm and larger anthers, 4 with. 2 mm and smaller anthers, reduced stamens 3 or 4 (Plate.8.3) and two stamens with relatively large elongated anthers (11-12 mm long). There are also eight small filaments (2-4 mm long) that do not have any anthers, or only have rudimentary anthers (staminodes), and an elongated ovary topped with style and stigma (Plate.9.3). Flowers mainly during late autumn, winter and spring (May to November). The large and elongated pods (12-25 cm long and 8-20 mm wide) turn dark brown to black in colour as they mature and contain numerous (about 50) seeds. These pods are somewhat four-angled in cross-section and
have papery wings (about 6 mm wide) along the angles (Plate.10.3). The flattened compressed seeds are dark brown, dark grey or black in colour (4-5 mm in size) and dull in appearance (Plate.11.3).

**Cassia fistula**

It is a tree growing from 20 to 40 feet high, with many spreading branches towards the summit (Plate.1.4). The wood is hard and heavy. Leaves pinnate, alternate, from 30 – 45 cm long, deciduous; the leaflets opposite or nearly so, from 4 to 8 pairs, each leaflet measuring 7-21 cm long and 4-9 cm broad (Plate.2.4). The lower ones broad-ovate, smooth, obtuse, or emarginate, polished on both sides (Plate.4.4), on short, round petioles, 5 -15 cm long, and 3.8-7.6 cm broad. The flowers are large, fragrant, bright-yellow, and borne on long, slender, smooth pedicels (Plate.5.4). The racemes are axillary, pendulous, simple, and 30-60 cm long, each flower 4–7 cm in diameter with five yellow petals of equal size and shape (Plate.6.4). The calyx is composed of 5 nearly equal, oblong, obtuse, smooth sepals. The corolla consists of 5 petals, which are oval, unequal, concave, spreading, and waved (Plate.7.4). Stamens 10 of which upper 3 are staminodes and 7 antheriferous. The 3 lower filaments (Plate.8.4), much longer than the others, have a double curve, but no swelling, lower 3 large, 2 medium, 2 short. The style is long and stigma terminal (Plate.9.4). The fruit is a legume, 30–60 cm long and 1.5–2.5 cm broad, with a pungent odor and containing several seeds (Plate.10.4 and 11.4).
**Cassia roxburghii**

It is a fairly large "shower" tree with featherlike pinnately compound leaves and twigs covered with a dense carpet of fine, soft hairs stipulate (Plate.12.4). The leaves are about 1 ft (0.3 m) long and each has 15-20 pairs of oblong 5 cm leaflets (Plate.2.5). Red cassia produces clusters of pink, rose or orange flowers in axillary and terminal, often branched, racemes (Plate.5.5). The flower petals are about 1.3 cm long, calyx lobes 5, petals 5, flame color, ovate, oblong and concave (Plate.7.5) and the conspicuous yellow stamens are characteristically swollen in their middle portion. Stamens 10 and all are fertile, upper 3 large with curved filaments, lower 3 short with erect filaments, 2 medium with erect filaments and anthers with curved beak, next 2 short with filaments and anthers with curved beak (Plate.8.5). The style is long and stigma is terminal (Plate.9.5). The fruit is a typical legume: it is cylindrical and indehiscent; 20.3-30.5 cm long (Plate.10.5), less than 2.5 cm in diameter, and bears many seeds separated by papery partitions (Plate.11.5).