

**Karnataka State Akkamahadevi Women's
University, Vijayapura**

**Department of Botany
HCT-3.1 Systematic Botany of Angiosperms**

**TOPIC-CASUARINACEAE AND
NYCTAGINACEAE**

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CASUARINACEAE AND
NYCTAGINACEAE

Classification :-

- **Kingdom:-** plantae
- **Division:-** Magnoliophyta
- **Class:-** Magnoliopsida
- **Order:-** Fagales
- **Family:-** Casuarinaceae
- **Genus:-** Casuarina

- Commonly occurring plants of Casuarinaceae :-

1. Australian pine or Beef wood tree(*Casuarina equisetifolia*) .

2. *Casurina glauca*.

3. *Casurina cunninghamiana*.

- **Distribution:-**

- The Casuarinaceae is a monotypic family, containing a single genus (Casuarina) with about 65 sps. It is mainly developed in northeast Australia but also distributed in Malaysia and Mascarenes Islands, in India.

- **Vegitative Characters :-**

- **Habit :-** Evergreen shrub or trees.
- **Root :-** Tap root.
- **Stem :-** Woody, grooved, jointed, having nodes and internodes.
- **Leaves :-** Whorled, sclae like, linear or lanceolate, united at base to form a toothed sheath.

- **Floral Characters :-**
- **Inflorescence :-** Male flowers in spike and females in spherical heads.
- **Flowers :-** unisexual, standing at axil of a bract and surrounded by 2 bracteoles. it is Monoceous Actinomorphic.
- **Perianth :-** Tepals 1 or 2.

- **Androecium** :- Stamens 1 to ∞ central, anther 4 celled, besifixed.
- **Gynoecium** :- Carpels 2 , Ovary superior, Originally bilocular but ultimately unilocular, style very short, linear.
- **Fruit** :- 1 Seeded winged nut, enclosed by woody bracteoles to form a dry cone - like structure.



- **Casuarina equisetifolia :-**

- **Vegitative Characters :-**

- **Habit :-** It is a Tree.

- **Root :-** Tap root.

- **Stem:-** Drooping branches, internodes short and furrowed.

- **Leaves :-** In whorls of 6-8, scales-like. united at base to form a toothed sheath.



Floral characters :-

Inflorescence :- male flowers in terminal spikes usually numerous at the ends of the same branches on which the females are borne lower down arranged in spherical heads.

Flower :- It is a monoceous plant. Flowers are actinomorphic.

Each male flower in the axil of a bract which with other bracts at the node form a sheath protecting the young flowers .

Female flowers are crowded at the ends of short lateral branches. Each stands singly in the axil of a bract with a pair of bracteoles.



- **Perianth** :- Tepals 2 .
- **Androecium** :-Stamen one, anther 2-celled, large.
- **Gynoecium** :- Ovary 1-celled composed of two carpels, ovules 2.
- **Fruit** :-Winged nut. The whole ripe female catkin resembles a small cone which is formed by the bracteoles becoming woody and form five valves enclosing the compressed nut like winged fruits.
- **Floral formula** :-

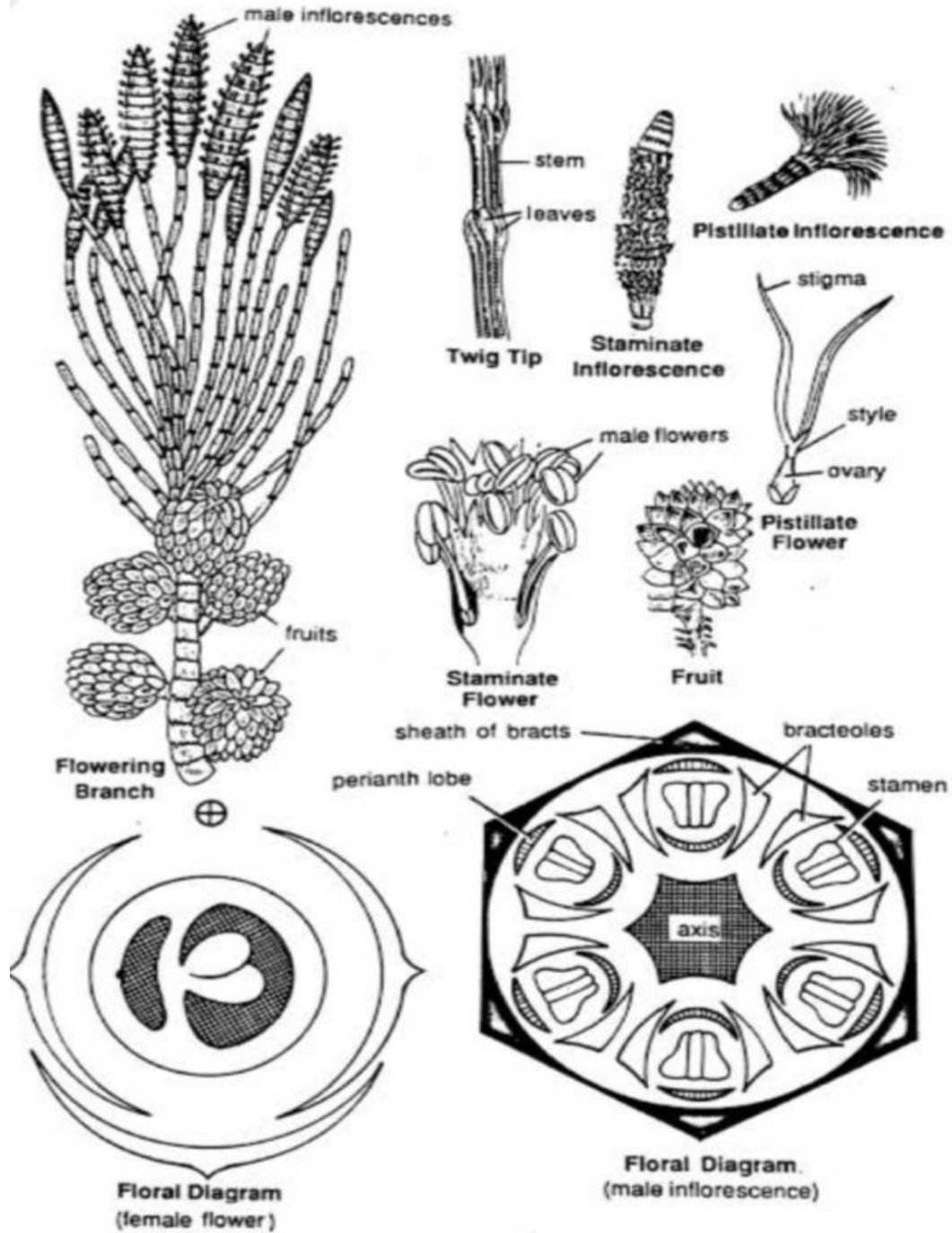


Fig. 18.101 *Casuarina equisetifolia* Forst.

Economic importance of casuarinaceae Family:-

Timber trees ('she-oak') where indigenous, and cultivated as ornamentals in warm regions elsewhere.

The wood of several species of Casuarina is valued for hardness. The wood of Casuarina equisetifolia is known as ironwood. Some species are grown for ornament.

Special characters :-

- Drooping branches, internodes short and furrowed.
- Leaves are United at the base to form a toothed sheath.
- Leaves are short scaly.
- Fruit is winged nut.

Nyctaginaceae

Classification :-

- **Kingdom** :- Plantae
- **Division** :- Angiosperms
- **Class** :- eudicots
- **Order** :- Caryophyllales
- **Family** :- Nyctaginaceae
- **Genus** :- Mirabilis
- **Species** :- Jalapa

• Commonly Occuring plants of Nyctaginaceae :-

- *Mirabilis jalapa* (four o'clock Clock plant)
- *Boerhavia diffusa*
- *Bougainvillea glabra*
- *Oxybaphus*
- *Pisonia aculeata*

- **Distribution :-**

- Nyctaginaceae or four o'clock family includes 30 genera and 300 sps . It is widely distributed in tropical and temperate America and warmer parts of the world.They are called four o' Clock because of the group of flowers in certain members of the group (mirabilis) open in greatest number in late afternoon.

- **Vegitative Characters :-**

- **Habitat :-** Mesophyte.
- **Habit :-** Herb, shrub or tree.
- **Root :-** Tap root.
- **Stem :-** Herbaceous or woody, erect.
- **Leaf :-** Alternate or opposite, simple, those of each pair being often very unequal, exstipulate.

• Floral Characters :-

- **Inflorescence** :- Cymose inflorescence.
- **Flower** :- Actinomorphic, hypogynous, bisexual, rarely zygomorphic, 3 to 5 separate or United brightly coloured bracts that are often mistaken for sepals.
- In *Mirabilis* each flower is surrounded at the base by an involucre of five sepal like bracts in *Bauhinia* there are three involucre bracts each subtending a flower in *Boerhaavia* and others the involucre leaves are reduced to teeth or scale.

- **Perianth** :-Tepals 4-5, gamophyllous, tubular with wide spreading lobes, often petaloid (infundibuliform) imbricate or twisted, connate in a funnel shaped or tubular , the base of which persists and enclosing the fruit forming the so called anthocarp.
- **Androecium** :- Stamens variable 2 to 20, free, usually 5 to 8 or equal to number of petals but there may be fewer or more; filaments of unequal lengths.

- **Gynoecium** :- One carpel, superior, unilocular with a single basal ovule; style long, simple.
- **Fruit** :- Dry, one-seeded anthocarp (achene surrounded by persistent perianth lobes) indehiscent.
- **Seed** :- Small non - endospermic.
- **Pollination** :- Entomophilous.
- **Floral Formula** :- $Br \oplus \text{♀} P_{(5)} A_{5 \text{ or } 2-20} \underline{G}_1$.

1. *Mirabilis jalapa* (Four O'clock plant)

Habitat :- Mesophyte.

Habit :- Large perennial herbs.

Root :- Tap and branched.

Stem :- Erect, aerial, herbaceous or somewhat woody, branched, cylindrical, pinkish green, swollen nodes.

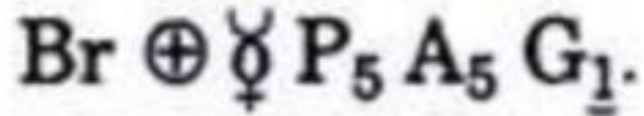
Leaves :- Cauline and ramal, opposite, petiolate, simple, entire, exstipulate, ovate, acute, glabrous, net veined, opposite leaves of pair unequal in size.



- **Inflorescence** :- Cymose.
- **Flower** :- Pedicellate, bracteate, an involucre of 5 sepaloid bracts, hermaphrodite, actinomorphic, complete, red, yellow or white, hypogynous. In *Mirabilis*, the flowers are arranged in cymes of three, of which only the middle flower develops; there remains an involucre of five parts at its base, which really belongs to cyme, but looks exactly like the calyx of the flower.

- **Perianth** :- 5 tepals, petaloid, imbricate or twisted, connate in a funnel shaped or tubular perigone, the base of which persists and enclosing the fruit forming the anthocarp.
- **Androecium** :- 5 stamens, alternate to tepals, filaments unequal, anther dithecous, basifixed, introse.
- **Gynoecium** :- Single carpel, ovary free, superior, unilocular, basal placentation, single basal erect ovule.

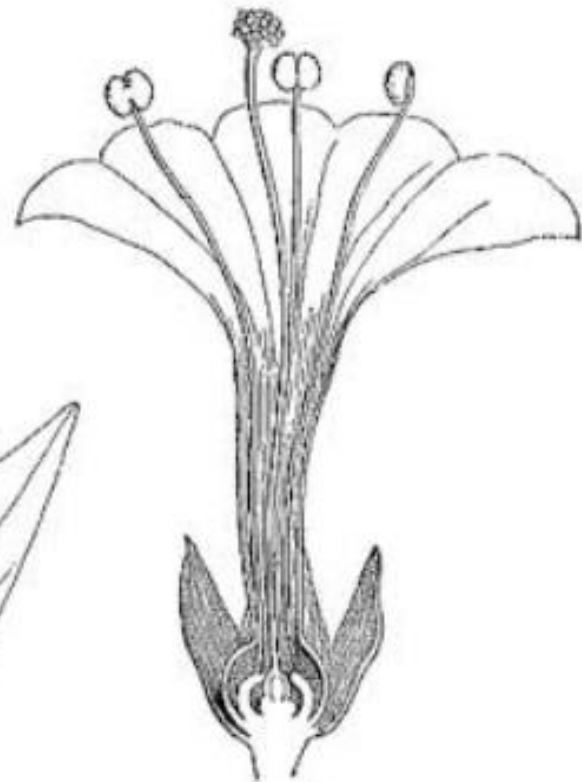
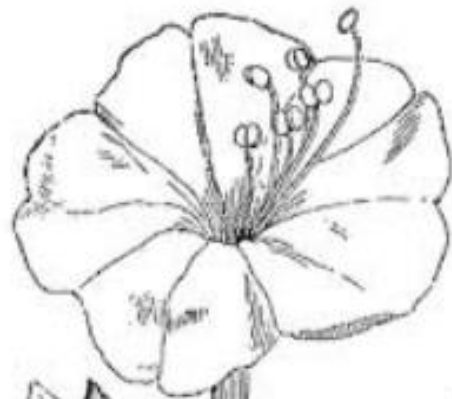
- **Fruit :-**An achene, enclosed within the persistent perianth, indehiscent.
- **Floral formula :-**







Mirabilis. Diagram.



Mirabilis.
Flower cut vertically.



Mirabilis. Androecium.



Mirabilis Jalapa.



Mirabilis.
Fruit, entire and
with vertical and
transverse sec-
tions (mag.).

Economic Importance of Nyctaginaceae:

- **Medicinal** :- Boerhaavia diffusa's root is laxative and also used in asthma, anemia, jaundice. It is an antidote to snake venom, B. repens is diuretic. The roots of Mirabilis jalapa are purgative. The leaves lessen inflammation and are applied to boils.
- **Ornamental** :- Mirabilis jalapa, Bougainvillea, Abronia. Pisonia aculeata is a hedge plant.

- *Mirabilis jalapa* - The powdered seeds are used in cosmetics and flowers are the source of crimson dye the leaves are edible.
- *Pisonia aculeata* - It is grown as a hedge plant.

Special characters :-

- Swollen nodes.
- Opposite leaves of pair unequal in size.
- Involucre of 5 sepaloid bracts.
- Perianth present i, e funnel shaped tubular.
- An achene fruit.

• **END**

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TOPIC- *CAPPARIDACEAE*

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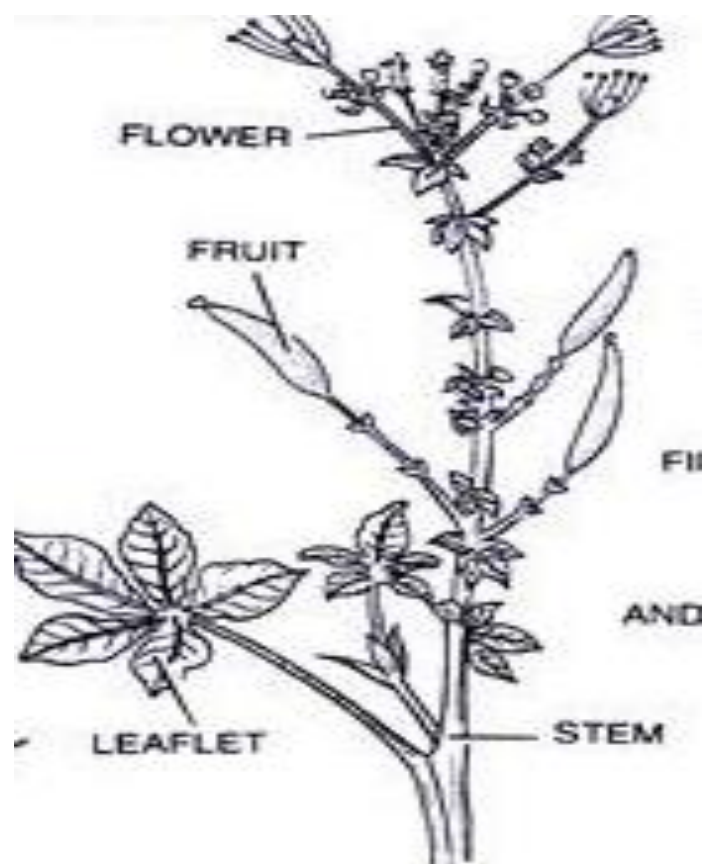
Capparidaceae



- Kingdom:Plantae
- *Clade*: Angiosperms
- Order:Brassicales
- Family:**Nymphaeaceae**

Characters of Capparidaceae:

- Stipules spiny, flowers actinomorphic rarely zygomorphic, hermaphrodite, hypogynous, gynophore present; calyx polysepalous, corolla polypetalous; stamens 4 to numerous; carpels two, ovary superior, parietal placentation.



A FLOWERING TWIG

Habit:

- There is a great variation in habit of the plants, may be herbs (Cleome), shrubs (Capparis) or trees (Crataeva).
- Several plants are extreme xerophytes with reduced leaves or leaves entirely absent in adult plant (Capparis aphylla). Unlike the Papaveraceae there is no latex in the stem.

- **Stem:**
- Herbaceous or woody, solid, branched, spinous and cylindrical.
- **Leaves:**
- Alternate, simple or palmately compound, with stipules, the latter may be modified into spines or glands. In some cases e.g., Capparis aphylla, the leaves are suppressed and adult plant may be without leaves.

- **Inflorescence:**
- Raceme (Cleome), corymb (Maerua, Capparis aphylla), solitary (Niebuhria).
- **B. Floral characters:**
- **Flower:**
- Bracteate, actinomorphic sometimes zygomorphic (Capparis aphylla), hermaphrodite, bracteoles absent; hypogynous, pedicellate, tetramerous. The internode between the petals and stamens is elongated to form androphore or that between the stamens and carpels elongated of form gynophore.

- **Calyx:**
- Sepals 4, usually arranged in two whorls (2 + 2); polysepalous imbricate aestivation and inferior. In *Capparis aphylla* the sepals are unequal and the hinder sepals forms a hood-like structure.
- **Corolla:**
- Petals 4, polypetalous with long claws; imbricate (*Cleome*) or valvate (*Crataeva*) aestivation, inferior. In the Australian genus *Emblingia* the petals are fused.

Androecium:

- Stamens numerous to four. In Capparis and Crataeva there are numerous stamens. In Cleome gynandra only six stamens are present; in Cleome tetrandra there are only four stamens. Cleome spinosa has six stamens and its floral structure is remarkably similar to that of the Brassicaceae excepting that they are not tetradynamous.
- In Cleome gynandra (Gynandropsis) both androphore and gynophore are present. In Capparis there is only gynophore. In Cleome the gynophore is very small or reduced.

- **Gynoecium:**
- Carpels 2 or sometimes four, syncarpous, seated on a long gynophore or sessile; ovary superior, unilocular with parietal placentation; ovules many on each placentum; style short or absent, stigma capitate or depressed.
- **Fruit:**
- A siliqua (Cleome) or berry (Capparis) or drupe (Roydsia).
- **Seed:**
- Usually kidney shaped, ex-albuminous and embryo curved.

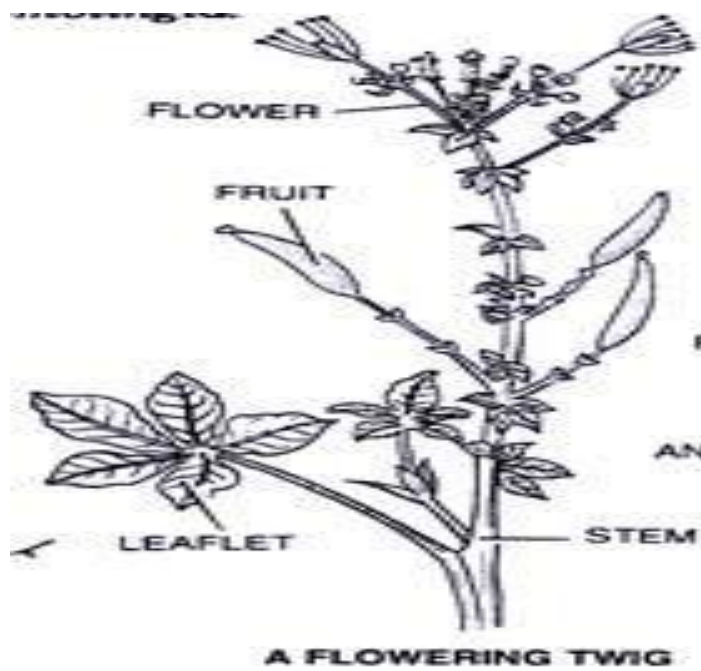
- Floral formula:

$\oplus \underset{\downarrow}{\text{Y}}$ K_{2+2} C_4 A_{4-6} or α $\underline{G(2)}$

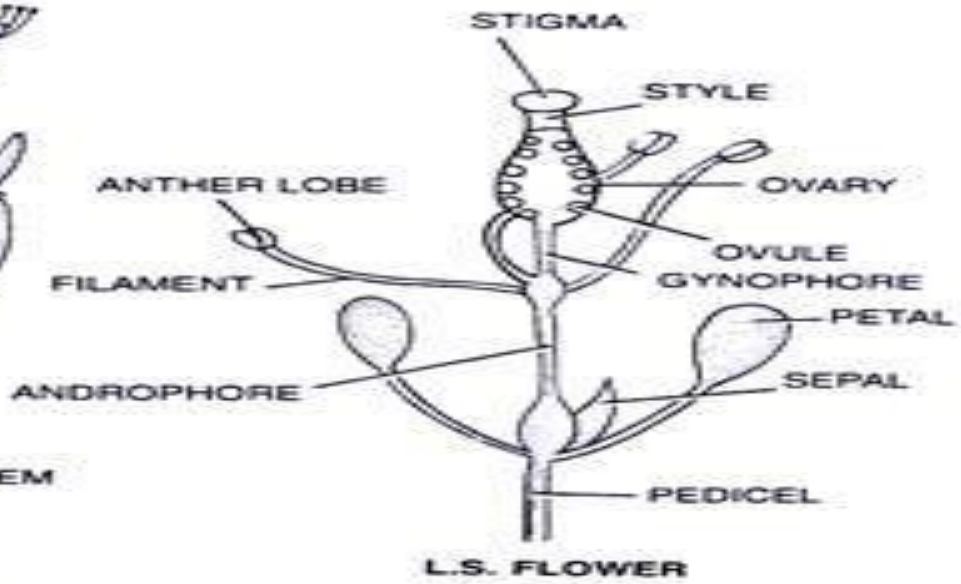


Fig. 32.1. Floral diagram of *Cleome spinosa* with six stamens and a nectary on the posterior side (after Eichler).

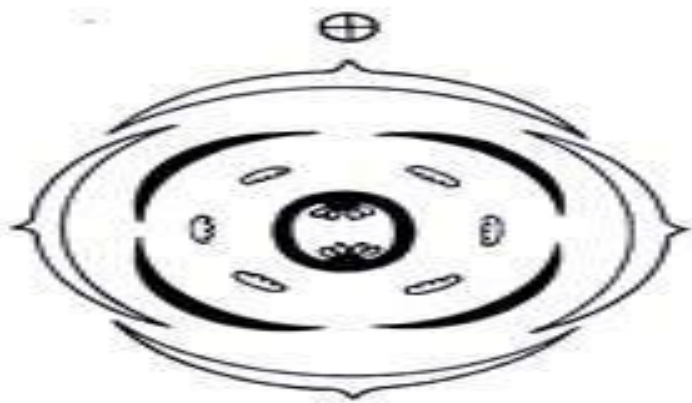
- ***Important Types of Capparidaceae:***
- 1. Cleome gynandra, Linn. (Syn. Gynandropsis pentaphylla or G. gynandra).



A FLOWERING TWIG



L.S. FLOWER



FLORAL DIAGRAM
Fig. 32.3, *Cleome gynandra*

Cleome gynandra, Linn.

- **Habit:**
 - An annual herb.
- **Root:**
 - Tap, branched.
- **Stem:**
 - Erect, herbaceous, cylindrical, branched, green, solid below and hollow above, glandular hairs present.
- **Leaves:**
 - Alternate, stipulate, petiolate, palmately compound, pentafoolate.
- **Leaflet:**
 - Elliptical, obtuse apex, serrate margin, unicostate reticulate venation.

- **Inflorescence:**
- Corymbose raceme.
- **Flower:**
- Bracteate, pedicellate, complete, hermaphrodite, actinomorphic, hypogynous, androphore and gynophore present.
- **Calyx:**
- Sepals 4, polysepalous, green, in two whorls, outer anteroposterior and inner lateral, imbricate aestivation, inferior.
- **Corolla:**
- Petals 4, polypetalous, long clawed, white, valvate aestivation, inferior.

- **Androecium:**
- Stamens 6, polyandrous, androphore present, filament long, anthers dorsifixed, dithecous, introrse, purple.
- **Gynoecium:**
- Bicarpellary, syncarpous; ovary superior, unilocular, parietal placentation, many ovules on each placenta, gynophore present; stigma sessile and capitate.
- **Fruit:**
- A silique (Cleome)

Floral formula:

$\oplus \text{ } \overline{\text{K}}_2+2 \text{ } \overline{\text{C}}_4 \text{ } \overline{\text{A}}_6 \text{ } \underline{\text{G}}(2)$



Fig. 32.1. Floral diagram of *Cleome spinosa* with six stamens and a nectary on the posterior side (after Eichler).

• END