

## BOTANY OF SOME USEFUL PLANTS.—VI

BY

S. N. CHANDRASEKHARAN M. A.,

AVL

T. S. RAMAKRISHNAN, M. A.

### TERNSTROEMACEAE.

This is a small family confined to the tropics consisting of shrubs and trees with leathery ever-green exstipulate alternate leaves. The flowers are regular and usually hermaphrodite with sepals and petals in fives (or 4 to 7 rarely). The stamens are indefinite free or connate at the base. The ovary is superior, 3 to 5 or many celled with as many styles and one or more ovules in each cell. *Camelliaceae* and *Theaceae* are synonymous terms used for this family.

*Camellia thea* (Tam. Theilai) is the common tea plant. Originally this genus was split up into two the *Camellia* and *Thea* but now they have been merged into one since the differences are not marked.

Two types, the Assam (*Thea assamica*) and the Chinese (*Thea sinensis*) tea may be distinguished. The latter is probably a cultivated form of the former. The Assam tea is cultivated and also occurs wild in Assam. Tea is cultivated in extensive plantations in Southern India on the slopes of the Nilgiri, Malabar and Travancore hills at an altitude of about 4000 to 6,000 feet. Tea requires a sub-tropical climate where for the greater part of the year the atmosphere is moist and the rainfall ranges from 80 to 100 inches and is distributed evenly throughout the year, and the temperature does not rise far above 90° F. A well drained loose soil rich in nutriment is necessary. Usually the plantations are started in virgin soil after clearing forests.

It is a bushy plant capable of growing to the size of a small tree. In plantations they are carefully pruned so that they remain as dense spreading bushes about 3 feet in height and the leaves are easily accessible for plucking. The plants set apart for seeds are allowed to grow into small trees. The leaves are ever-green, alternate, simple, exstipulate ovate-elliptic tapering at

either ends, serrate coriaceous and glistening. The flowers are axillary, solitary or in small clusters, whitish, about an inch across and bracteate. The sepals are five to six, orbicular and persistent. The petals are as many as the sepals and obovate. The stamens are numerous adherent to the base of the petals and very slightly united. The ovary is 3 celled with one or 2 ovules in each cell. The style is terminal and branched into 3 arms. The capsule is trigonous, and splits loculicidally. The seeds are big and nearly round and dark brown in colour.

Tea is cultivated for its leaves. Generally 2 or 3 leaves with the terminal bud of each branch or twig are plucked. These are allowed to ferment for sometime and subsequently made to undergo various treatments and finally become the tea of commerce. The different brands of tea in the market are due to the grading after treatment. It is well known that tea forms a popular beverage.

#### MALVACEAE.

This is a fairly large family with about 700 species and is distributed throughout the world in the warm and temperate regions. It consists of herbs, shrubs and trees. The stem is covered with stellate hairs. Mucilage is often present in the stem and leaves. The leaves are alternate, stipulate with palmate reticulate venation. The flowers occur singly or in clusters and are regular and usually hermaphrodite. The bracteoles are 2 or more rarely absent often forming an involucre termed *epicalyx*. The calyx is gamosepalous with five valvate lobes. The corolla is usually showy and consists of 5 petals, twisted, and united at the base to the staminal tube. The stamens are indefinite and are usually united into a tube giving off a number of antheriferous branches above. The anthers are generally one celled and reniform. The pollen grains are large and spiny. The ovary is superior 2 to many celled and 2 to 5 or more carpelled with one or more ovules in each cell arranged on axile placentas; the styles are free or united and lie within the staminal tube; the stigmas are prominent and are usually equal to or twice as many as the carpels. The fruit is a capsule or schizocarp or rarely indehiscent. The flowers are generally pollinated by insects which come in search of nectar secreted at the base of the petals. Self-pollination is also known to occur.

*Hibiscus*.—This genus is chiefly distributed in the tropics and consists of herbs and shrubs. The leaves are usually palmately lobed. The flowers are solitary and axillary or rarely arranged in a terminal raceme. An epicalyx of 4 to 12 bracteoles, free or connate is present. The sepals and petals are each five in number. The stamens are indefinite monadelphous and the staminal tube is truncate or five toothed at the apex. The ovary is five celled, five carpelled with 3 or more ovules in each cell. Styles are connate with capitate or spatulate stigmas. The fruit is a loculicidal capsule. The seeds are glabrous or covered with hair.

*Hibiscus cannabinus*.—The Bimilipatam jute, the deccan hemp or the gogu is largely cultivated in many parts of India and in Madras particularly in the Ceded Districts and Circars and to some extent in Coimbatore. It is grown both in dry and in garden lands often as a hedge or as a mixed crop. It is sown about the month of July and the plants are pulled out about January. It is a tall under-shrub with a sparsely prickly stem and a fairly deep taproot. It grows erect without much of branching and is fibrous. The leaves on the main stem and on the axillary shoots at the base are often undivided while those given off from the upper portion are palmately deeply lobed with 3-5 lobes. The lobes are narrow and serrate and the petiole is long, often prickly and a gland is present on the under-surface of the midrib. The flowers occur singly in the axils of leaves only in the upper half of the plant. There is an epicalyx of 7 to 10 free bracteoles with prickly margin. The calyx is persistent greenish with elongated hairy lobes armed with prickles each lobe having a prominent gland on the midrib. The corolla is yellow (sulphur yellow) with purplish centres. The staminal tube is elongated reddish in colour and is antheriferous throughout. The ovary is conical and covered with stiff hairs; the style is connate and is five branched at the tip each branch bearing a capitate stigma. The ovules are 2 to 3 in each cell and the seeds are covered with stellate scales.

The plant is mainly grown for the sake of its valuable fibre which is obtained from the stem. Ropes, coarse canvas and sack-cloth are made out of this fibre. The



tender leaves are made into chutneys and are also used as a pot herb.

*Hibiscus esculentus*. The Lady's fingers (Tam. Vendakai) is distributed throughout the tropics and is cultivated all over India. Several varieties are under cultivation. There are dwarf and tall forms with long and short capsules. In addition green stemmed, red stemmed, early and late forms also occur. The plant is generally grown in vegetable gardens or on the bunds of sugarcane fields. The crop is raised twice in the year; in the month of March in summer and again in the rainy season. It bears in 2 or 3 months.

It is a herbaceous annual with a rough hairy and fibrous stem. The leaves are large and broad palmately 3 to 5 lobed covered with rough hairs and mucilaginous. The flowers are axillary, large and showy. The involucre consists of 8 to 10 free linear bracts. The calyx is 5 lobed. The corolla is yellowish with purple centres. The staminal column is antheriferous throughout. The ovary is elongated, hairy with a style branched at its apex into five arms each bearing a capitate stigma. The fruit is hairy or rough and prickly, ribbed, tapering, many seeded and highly mucilaginous when young. The length of the capsule varies from a few inches to nearly a foot according to the variety.

The plant is mainly grown for the sake of its much relished unripe fruit which is used as a vegetable and also sliced and sundried and stored for use in cold weather. A fibre is extracted from the stem. The mucilage from the fresh leaves is used in place of soap to remove oil (as tali).

*Hibiscus sabdariffa*. The Roselle (the Red Sorrel) is commonly cultivated in many parts of India. The seeds are sown with the rains in June and the fleshy calyx is collected from November to January. It is an erect annual under-shrub growing to a height of 4 to 5 feet. The root system is shallow. The stem is red in colour and fibrous. Branching is very poor. The leaves on the main stem are palmately 3 lobed while those on the

axillary branches are often undivided. The petiole and the veins are all red in colour. The lamina is thick and fleshy with a serrate margin. There are extra floral nectaries present on the midrib on the undersurface. On the main stem the flowers are produced in the axils while the branches are extra axillary. The pedicel is short and stout. The involucre bracts are thick, pointed, ten in number and adnate to the base of the calyx. In the earlier stages they are greenish but turn red later on. The calyx is scarlet red coloured, five lobed thick and fleshy with a prominent gland on the lower half of each lobe. Both the epicalyx and the calyx are persistent and increase in size after fertilisation; the calyx is accrescent and encloses the ovary as it matures into a fruit becoming nearly an inch and a half in diameter. The plant appears very showy owing to the large number of persistent big scarlet red coloured calyces of the flowers borne almost from the base to the top of the plant. There are stiff sharp hairs on the surface of the lobes of the calyx. The corolla is whitish pink with a dark purple centre. The staminal column is short and the antheriferous portion is limited towards the upper end; fewer anthers are formed. The ovary is globose to conical and hairy with the short style bearing five radiating capitate stigmas red in colour. The capsule is about an inch in length and the seeds are covered with stellate hairs.

A strong silky fibre called the Roselle Hemp is obtained from the stem. The fleshy calyx is used as a vegetable in the preparation of jellies and chutneys. The leaves are also used as a pot herb. The seeds have various medicinal properties.

*Hibiscus rosasinensis*.—(Tam. Semparuthi) is an ornamental garden shrub. Several varieties of this are grown differing in the colour and size of the flowers. The flowers are large and showy and used for pujas. They have also medicinal properties. The plant is propagated by cuttings and seeds are rare.

*Gossypium*.—This genus is of great economic importance and a number of species belonging to this supply cotton. It is distributed throughout the warmer parts of

the world. It includes 40 species and several varieties. The genus consists of shrubs and arboreal forms. The plants are perennial by habit but several of them are removed, under cultivation, after each season. But in some localities the plants are allowed to remain in the soil for 4 to 5 years. The arboreal forms are of course perennial and are less common. India occupies a high place as a cotton growing country. In Madras the cultivation of cotton extends over the Central and Southern Districts and the black clayey soil seems to be admirably suited for the cultivation of cotton. Hence the soil itself has come to be called the black cotton soil. Cotton is grown both in the black and also in the red soils. The plants are small or big shrubs with a very fibrous stem. There is a fairly long tap root going deep into the soil and a number of lateral roots are given off very near the surface and these spread almost horizontally. The plants are adapted to withstand a certain amount of drought. The stem is usually erect and hairy and much branched. Generally the buds at the lowest 2 or 3 nodes do not develop. There are two sorts of buds the axillary and the extra axillary at each node. In the lower portions the axillary buds develop first and produce vegetative branches which may later on bear flowers, the extra axillary buds at this region do not develop much at first. If they develop they begin to bear flowers. In the upper portions of the plant the extra axillary buds develop into flowering branches while the axillary buds remain short or may develop later and bear flowers. The flowering branches are shorter and exhibit a sympodial growth since the flower is leaf opposed. Flowering commences at the basal nodes and proceeds in ever widening circles. The leaves are simple, palmately 3-7 lobed with a prominent extra floral nectary at the back of the prominent veins.

The flower arises on the extra axillary branches and is solitary and leaf opposed. It is subtended by an involucre of three large bracts united at the base and with divided margins. Sometimes an inner whorl of three smaller bracts is seen. At the base of each bract a gland may sometimes be present and also between the bracts on the calyx glands are noticed. The calyx is gamosepalous cup shaped with five rounded or pointed lobes and abounds

with numerous black dots. Sometimes the lobing is indistinct. The corolla is yellow, red or white, in colour with five petals. Often scarlet eyespots are present at the base of the petals. The stamens are indefinite in number and monadelphous and the staminal column bears anthers almost throughout its length. The ovary is 3 to 5 celled with a fairly long style bearing as many stigmas as there are cells; the stigmas are twisted. The fruit is a loculicidal capsule. It is known in the popular language as the 'boll' and the individual cells are termed as "locks." The size and shape of the bolls vary according to the species.

The seeds may be rounded or elongated and are covered with hairs—the cotton fibre. There are two kinds of hairs—long hairs called the lint or the staple, and short hairs called fuzz. The colour of the fibre is white or reddish or brownish. Some varieties have very little or no fuzz. The length and the quality of the lint vary with the species. The cotton fibre is only an outward extension of the outermost layer of cells of the integument of the seed (the seed coat). The lint and fuzz are often found mixed together and produced from the entire surface of the seed coat. In some cases the fuzz may be limited to certain portions. The hair is unicellular with thickened walls and is more or less ribbon-shaped or flattened; usually it is twisted. It is made up of cellulose.

In the Madras Presidency the following species are largely cultivated.

- Gossypium herbaceum.*
- „ *indicum.*
- „ *hirsutum.*
- „ *obtusifolium.*

The seeds are generally sown in the months of September—October and the first picking is done about March—April. The plants flower once more and a second picking is often made in June—July and in August the plants are pulled out.

*Gossypium herbaceum.* This is synonymous with the Uppam or Ukkan of Coimbatore and Tinnevely and the westerns and northern. But the Westerns and

northerns are mostly mixtures, the former composed mainly of *herbaceum* and the latter often made up mostly of *indicum*. It is usually grown as a dry crop in black soil. It is a small hairy plant 2 to 4 feet in height with more or less a conical form and having a deep root system. The leaves are small in size with 3 to 5 rounded lobes. The leaves are lighter in colour when compared with the cambodia or karunganni. The glands at the base of the involucre are absent and only those on the calyx are present. The calyx lobes are very short and rounded. The corolla is yellow with red eyespots. The bolls are small more or less ovoid with a blunt beak and usually 3 celled but variations occur—4 to 5 celled bolls are noticed. The seeds are small and rounded and are fuzzy. The lint is short and coarse.

*Gossypium indicum*. It is locally known as karunganni or yerrapathi. This is said to be the best indigenous cotton of this tract. It is taller than uppami and less hairy with the branches ascending up at an acute angle. The stem and branches are reddish coloured. The leaves are darker in colour and have 3 to 5 narrow pointed lobes. The flowers are yellow, rarely white and the eyespots are present. The glands at the base of the involucre bracts are absent while those on the calyx are noticed. The calyx is studded with numerous black dots. The lobes are rounded. The bolls are small and longish with a pointed beak. They are usually 4 celled (3 to 5 also occurring). The seeds are elongated with a sharp point and are fuzzy. The lint is of a superior quality.

*Gossypium hirsutum*. This is what is locally known as Cambodia. It is generally grown as an irrigated crop though in some localities it may be cultivated as a dry crop. The plant is more bushy. The stem and branches are hairy reddish coloured. The leaves are broad and large with 3 to 5 broad lobes. The flowers are big creamy or yellowish. The coloured spot on the petals is absent. The involucre bracts are much bigger with long teeth and glands are present at the base of the bracts. The calyx also bears the glands and is provided with five pointed distinct lobes. Sometimes the calyx lobes show variation in size. The black spots on the calyx



are less prominent than in karunganni. The bolls are comparatively very big and globose with a very short beak. The bolls are generally four celled (3 to 5 also occurring). The seeds are bigger and densely fuzzy. The lint is much longer and finer than in uppam. The Bourbon and Dharwar-american are varieties of *G. hirsutum*. Bourbon has seeds devoid of fuzz.

*Gossypium obtusifolium*. This represents the Nadam of Coimbatore and the Cocandas of Circars and Ceded districts. The plant is grown as a perennial in Coimbatore while in other localities it is grown as an annual.

The main shoot is erect and strong while the lateral branches project outwards and upwards. The stem and branches are usually reddish coloured and slightly hairy. The leaves are small and resemble those of *herbaceum* but for the lobes being more pointed and less hairy. The flowers are yellow in colour with eyespots. The bolls are sharp pointed and the seeds are covered with long dense woolly fuzz. The lint is fine, short and soft. In the Cocandas the lint is often reddish tinged.

The other species of cotton which may be seen in some parts of the Madras Presidency are:—

1. *Gossypium arboreum* which grows to the size of a small tree. The lint from this is made use of for making the sacred thread of the brahmin. 2. *Gossypium barbadense* or the Sea Island cotton. This is very rarely grown, the seeds are devoid of fuzz and the lint is long and fine. 3. *Gossypium neglectum*—the Pulichai and 4. *G. roseum* are two other species rarely met with.

The harvested cotton forms the kappas of the market which consists of the seeds with the lint and fuzz. Cotton is mainly grown for the sake of the lint. The lint is spun into thread and woven into clothing. These processes are carried out either by hand or with the help of machinery. Cotton is also used for stuffing pillows and beds. The cotton seed is valuable as cattle food. The seed contains an oil which is said to be used for cooking purposes and the cake forms a fertiliser. The seeds are sometimes roasted and used as a substitute for coffee. The cotton stalks form good fuel. The seed-coat and the bark on the stem sometimes serve as raw materials for paper making.

*Bombax malabaricum* and *Eriodendron pentandrum*.— are two other plants belonging to this family and supply the “Elavam panju” or ‘silk cotton’. They are big trees often found growing wild on the west coast and other parts of the Presidency. They are also planted and cultivated.

*Bombax malabaricum*. is the ‘silk cotton tree, with a tall and stout stem devoid of branches for some height and covered with hard conical prickles. The leaves are digitate and the flowers are produced when the leaves are off the tree (during February-March). The flowers are red in colour, large and devoid of bracteoles. The calyx is cup shaped and leathery. The stamens are numerous and polyadelphous. The capsule opens by five valves. The seeds are smooth embedded in long white cottony fibres, the latter being produced from the walls of cells.

This fibre is used for stuffing pillows, cushions and beds. The tree yields a gum and a fibre is obtained from the bark and made into ropes. The timber is light but not durable. It is used for making boats since it keeps longer when under water.

*Eriodendron pentandrum*.—is the “Kapok”. This is tall and the stem when young is covered with prickles. The branches occur in whorls. The leaves are digitate and the flowers are whitish in colour. The epicalyx is absent. Stamens occur in 5 bundles opposite the petals united slightly at the base, each bearing 2 or 3 anthers. The capsule opens by five deciduous valves and is woolly within; embedded in this are the seeds. The seeds are smooth. The cotton from this is used for the same purpose as that from *Bombax* and is considered superior.

Till now these plants were included under Malvaceae but Rendle has brought them under “Bombaceae.”