FORTY COMMON INDIAN TREES

and how to know them

R. N. PARKER

(First published in 1933. Absolutely marvellous line drawings by Ganga Singh)

This book, when published originally over half a century back, met the demand for an explanatory book on Common Trees of India. It was written by a lover of nature, particularly of forest wealth, who knew his Botany as well as aesthetics. He avoided involving the reader in the complex nomenclature of trees and explained the individual characteristic of each family in a simple language that should be intelligible to both, the specialist and the genera list.

The interesting text is matched by brilliant illustrations by Ganga Singh that unravel many a mystery about the trees and their various uses, physical, emotional and even therapeutic.

When the former Forest Botanist at the Forest Research Institute, Dehra Dun, wrote this immensely readable book, little did he realise that it would remain an authentic source book on Indian trees even after much advanced research on different aspects of this natural gift to the environment.

Common Indian Trees and How to Know Them.

INTRODUCTION

This book has been prepared to meet a email demand for a simple book on the common trees of India. It is not intended for botanists who will find that the attempt to avoid the use of botanical terms has often made the phraseology awkward and clumsy. It is hoped that the illustrations will serve in place of more detailed descriptions and be much more useful to the persons for whom the book is intended. The trees selected are not common forest trees as a rule but they have been chosen as the commonest or most conspicuous trees seen generally in the plains of India excluding the moist parts of Assam and Bengal and a tract about 100 miles wide along the sea coast.

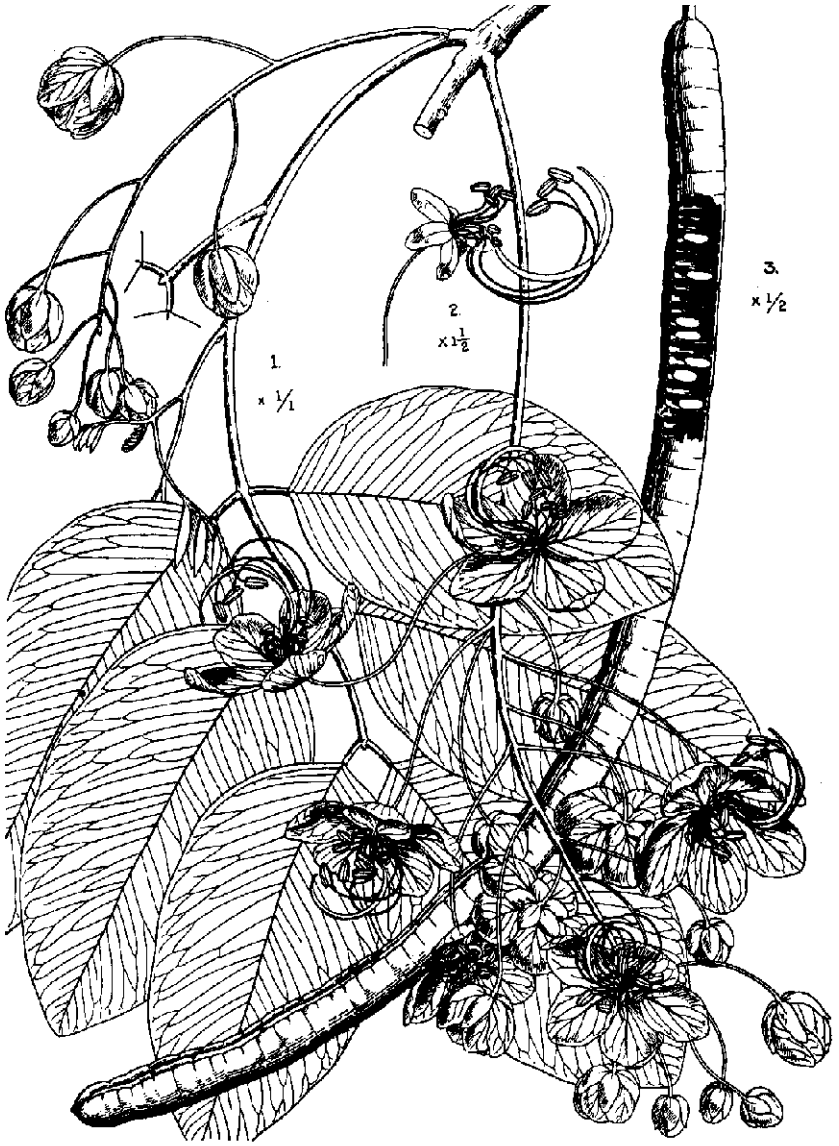
It has not been possible to avoid the use of botanical terms entirely; in fact there is no sharp line of separation between botanical and popular terms. If a typical flower is taken (not one of the daisy, marigold and sun-flower type which is a collection of very small flowers arranged so as to resemble a single flower, but a poppy, jasmine, tobacco or any ordinary garden flower) it will be found to consist of a number of parts arranged in series or *whorls.* The outer aeries is normally green and consists of 3, 4 or 5 free or united pieces. Each one of these is a *sepal* and the sepals collectively are called the *calyx.* The next series is the ordinary coloured part of the flower and consists of free or united pieces, each being called a *petal* and the whole collectively the corolla. The next series consists of the *stamens* of which there may be any number from one to very many. Normally a stamen consists of a slender stalk, the *filament,* carrying a head, the *anther;* in which a yellow powder, *pollen,* is produced. The central series is called the *pistil* and is composed of one or more, in the latter case usually united, *carpel's.* Normally the pistil consists of a lower swollen portion, the ovary, on which is usually a slender column, the *style* tipped by the *stigma.* The ovary contains ovules, which on ripening become seeds. The *pistil* on ripening becomes the *fruit* which is not necessarily edible and would often not be popularly considered a fruit. A flower which contains stamens but no pistil is said to be a male flower. One that contains a pistil but no stamens is said to be a female flower.

The botanist identifies a tree by its flowers and sometimes the fruit la necessary in addition to the flowers. Most people can recognize one or two trees even when they are not flowering. As the recognition of trees consists largely in knowing what to look for, a few hints may be given. The leaves on a tree may be arranged in pairs on either side of the stem (plate 12) and leaves so arranged are said to be *opposite.* In a few oases the leaves are very nearly but not quite opposite (plate 2). Leaves so arranged are said to be *sub-opposite.* The commonest arrangement is for the leaves to be *alternate* (plate 14). The leaf blade may consist of one continuous expanse or it may be cut up into separate pieces. In the former case the leaf is said to be *simple,* in the latter case *compound.* In compound leaves the leaflets may be arranged in two rows on the common axis (plate 8). Such leaves are said to be *pinnate* from a fancied resemblance to a feather. If in a leaf of the pinnate type we get in place of leaflets secondary axes which bear leaflets pinnately arranged, the leaf is said to be twice pinnate or *bipinnate* (plate 17). If in a compound leaf the leaflets are all borne on the common stalk at one point (plate 26), the leaf is said to be *palmate* from a fancied resemblance to the fingers of the hand. A very common type of compound leaf has 3 leaflets, and is said to be *trifoliate.* A trifoliate leaf may be pinnateiy trifoliate (plate 3) or palmately trifoliate (plate 26). A pinnate leaf may have an even number of leaflets (plate 24) when it is said to be even-pinnate or *paripinnate* or it may have an odd number of leaflets and be odd-pinnate or *imparipinnate.* In long pinnate leaves (such as *toon)* the tip of the leaf is apt to be undeveloped and an otherwise imparipinnate leaf becomes paripinnate so that this charactei cannot be relied upon in many cases. Leaves may show glands, a term used for several different kinds of structures. A common type is the translucent dot (found in the leaves of *bargad* or *jaman)* best seen by holding the leaf up to the light. Finally leaves and twigs may contain milky juice *(pipal* or *banyan).* This can be seen by cutting across the leaf stalk, except in the case of old leaves which have become dry and ready to fall.

Many other points might be mentioned but as this book is intended to be a simple introduction to one branch of nature study they have purposely been omitted.

Acknowledgments are due to Mr. H. G. Champion for kindly reading over the manuscript and making many useful suggestions.

CASSIA FISTULA



CASSIA FISTULA.

FIG. 1—A flowering branch. FIG. 2—A flower with the petals removed to show the stamens. This is the usual arrangement—3 large 4 medium sized and 3 small stamens. Sometimes there are 3 large 6 medium and 1 small stamen. FIG. 3—The fruit or pod.

The Indian Laburnam or Amaltas. Sometimes also called the Golden Shower or Pudding Pipe tree.

Cassia was a classical name for some tree with aromatic bark, probably a species of wild cinnamon. Its present botanical use is not very appropriate.

Fistula in Latin means a pipe and refers to the pods.

Description:—A small or medium-sized tree, occasionally reaching a height of 60 feet and a girth of 5 feet. The bark is smooth and grey or greenish-grey on young trees. The tree is very conspicuous in the hot weather when the flowers appear. These are large and bright yellow and occur in long pendulous bunches (racemes). At the time of flowering the tree is leafless or nearly so, the first flowers appearing as the last of the old leaves are falling and the flowering continues until the fresh foliage has been developed. The fresh leaves are often of a rich coppery colour. During the cold weather the tree is usually conspicuous from its pods which are 1—2 feet long and 0.75 to1 inch diameter and dark brown in colour.

*Uses:—*This tree is frequently planted for ornament. The timber is hard and durable but being available in small sizes only, it is used for posts, carts and similar purposes in villages rather than in the timber trade. To a small extent the bark is used for tanning. The pods are divided into 1-seeded cells by thin transverse partitions. The seeds are immersed in a dark-brown sweetish pulp which is much used medicinally being laxative in small doses and purgative in larger doses.

Propagation:— The pods when ripe should be broken up and the seed extracted. It is advisable to sow plenty of seed even if only a few plants are required as much of the seed lies dormant in the soil for a year or more without germinating though some usually come up in a few months after sowing. Germination may be hastened by pouring very hot water (nearly boiling) on the seed and leaving the seeds to soak for a day or two. Some of the seeds will probably be found swollen, these should be removed and sown at once (they must not be allowed to become dry). The hot water treatment can then be repeated on any unswollen seeds, if necessary two or three times.

The tree transplants readily but sometimes does not appear to grow well after transplanting. Such plants as a rule eventually recover and grow well. Under favourable conditions the trees should start flowering in about five years from seed.

Injuries:- The tree is very subject to defoliation by caterpillars. It is advisable to watch young plants and remove any caterpillars found eating the leaves. Older plants are often badly attacked but although the plants look unsightly for a time they usually soon recover and appear none the worse.

Habitat:- Throughout the greater part of India up to 4,000 feet in the Himalaya, Burma, Indo-China, Java and the Philippines. Planted for ornament in all tropical countries and naturalized in many places where it was not native.

LAGERSTROMIA FLOS-REGINAE

LAGERSTROEMIA FLOS-REGINAE.

FIG. 1—A flowering branch. FIG. 2—The fruit or capsules. FIG. 3—Stamens. FIG. 4—A seed.

Jarul (Beng.). Ajhar (Ass.).

Lagerstromia is so named after Magnus v. Lagerstrom, a Swede and friend of Linnaeus—1696-1759.

Flos-reginae in Latin means "flower of the queen".

Description:—A large deciduous tree usually with short bole and big branches, bark light grey, fairly smooth. Leaves 4—8 inches long, 1.5—3 inches wide, on stalks only about 0.25 inch long. Flowers very showy, 2—3 inches across, in large clusters at the ends of the branches. Petals crumpled in appearance, purple at first but gradually fading to nearly white before they fall. Fruit a somewhat woody capsule about an inch long and rather less in diameter, opening by 5 or 6 valves when ripe and seated on the persistent woody calyx. Seeds a little over 0.5 inch long, light brown with a stiff brittle wing, thin and light.

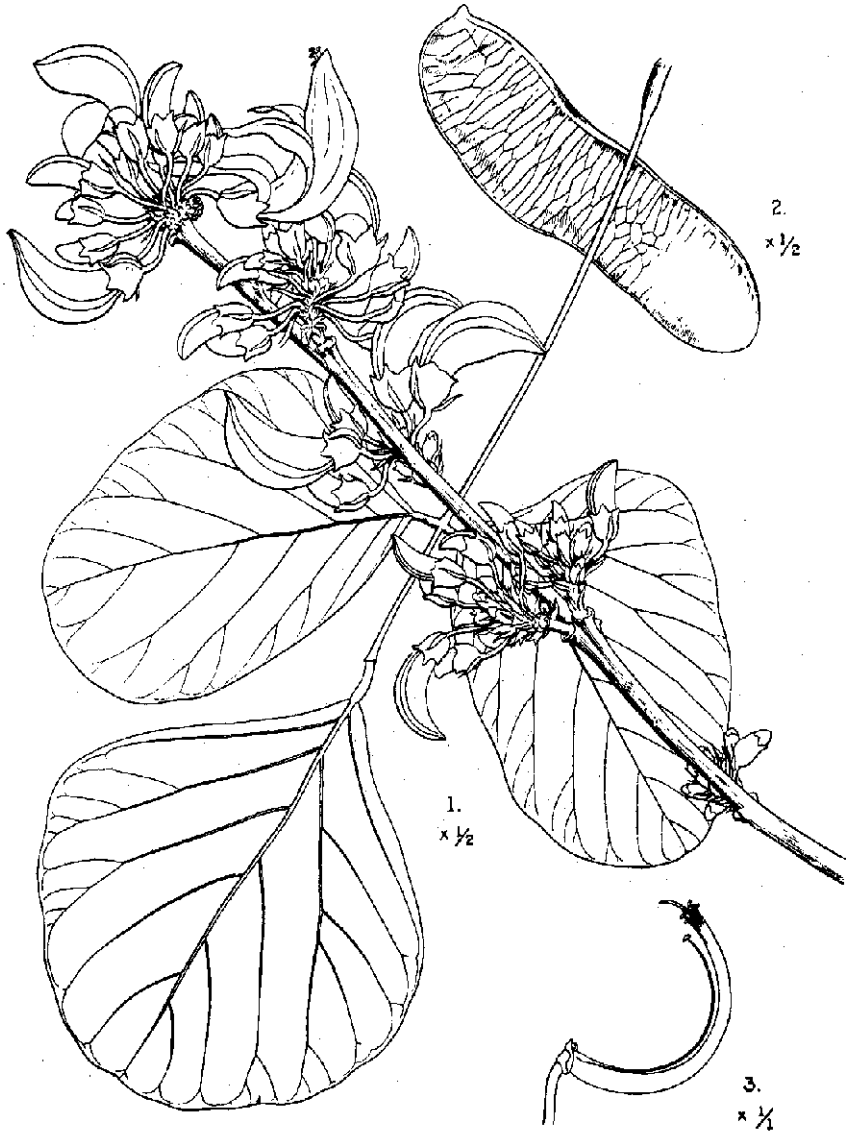
The leaves turn red before falling in February-March, the fresh leaves appearing in April-May. The flowers are somewhat irregular in their season, sometimes appearing more than once in the year between April and September. The fruits ripen in the cold weather but open and shed the seeds about the time the leaves fall.

Uses:—The timber is valued in Assam and Burma being used for boat building, particularly dugouts, carts and other purposes. Elsewhere this tree is mainly used for ornament on account of its handsome flowers. Planted trees, especially in dry localities, are usually too short and branchy for timber which is obtained mainly from trees growing on low-lying ground along rivers.

Propagation:—By seed. The growth is slow at first but improves after the first year. Plants can be readily transplanted at one year old and flower 3—5 years after planting. To obtain a well-shaped tree frequent and heavy pruning of side branches is usually necessary. If this is neglected the plant is apt to develop as a large shrub rather than a tree.

Habitat:—Bengal to Burma and in South India and Ceylon, Usually in swampy places or on banks of rivers.

BUTEA FRONDOSA



BUTEA FRONDOSA.

FIG. 1—A leaf and a flowering twig. FIG. 2—The fruit or pod. FIG. 3—The flower after removing the calyx and petals showing 9 stamens united and one free.

Dhak or palas:—Also but less often called chichra, chalcha, kakri or palah. "The Flame of the Forest." The battle of Plassey is said to have taken its name from this tree (palasi).

Butea:—Is so named in honour of John, Earl of Bute, a botanical author of the 18th century.

frondosa in Latin means leafy.

Description:—A small or medium-sized deciduous tree with crooked stem and large irregular branches. Bark fibrous, light brown or grey. Leaves consisting of 3 large leathery leaflets on a common stalk 4—9 inches long, conspicuously swollen at its base. Flowers 1.5—2 inches long, clustered along the branches, bright orange-red. Calyx 0.5 inch long, dark brown-velvety as are also the flower stalks, Pods 4—8 inches long, 1—2 inches broad, the top end where the solitary seed is situated and edges thickened, the rest thin, strongly nerved, grey-silky, pale yellowish-grey when ripe.

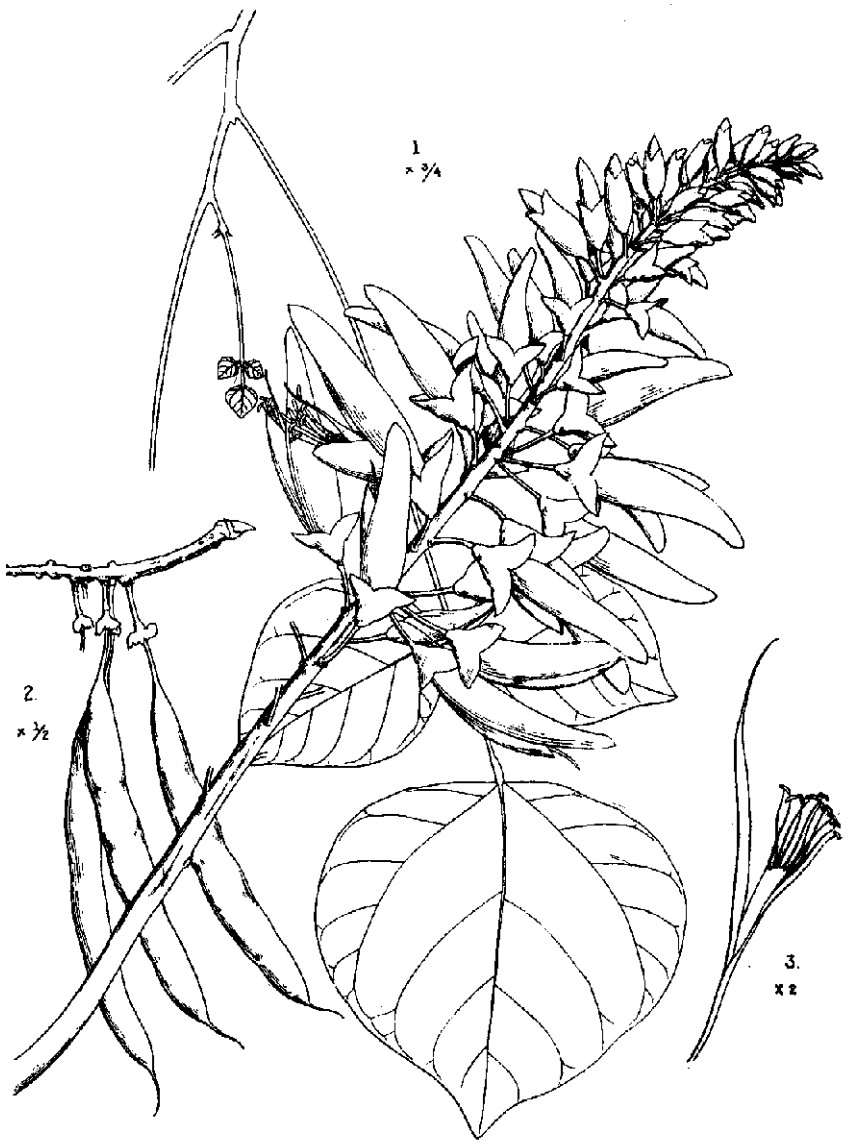
Leafless or nearly so when in flower from February to April. The flowers usually cover the upper portion of the tree and make it a most conspicuous and gorgeous object at the beginning of the hot weather. The pods develop very rapidly and being green when young look like foliage at a little distance. The ripe pods are very light and are scattered far and wide by the strong winds of the hot weather.

Uses:—From wounds in the bark a gum known as Bengal kino exudes as round tears as large as a pea and of an intense ruby colour. It is very astringent and is used medicinally. The flowers yield a bright yellow dye of little permanency. The seeds yield oil used as an anthelmintic. Lac is grown on the *dhak* which is one of the principal hosts of the lac insect. The bark yields a coarse fibre used for cordage. The leaves are used as fodder for buffaloes though curiously goats do not like them. The leaves are also used as plates and for covering umbrellas. The timber is of little value and is not durable except under water. It is a very poor fuel.

Propagation:—By seed which should be removed from the pods and sown as soon us ripe as it docs not keep well. Seedlings and also plants transplanted are apt to die back to the ground either in the winter or in the hot weather. This process may be continued for 2 or 3 years till a shoot strong enough to stand the unfavourable period of the year is produced. The growth of the *dhak* is rather slow and the tree is ornamental only when in flower or new leaf.

Habitat:—Throughout India and Burma except in the moistest and driest tracts. Frequently abundant in grass land, open scrub jungle and village grazing grounds.

ERYTHRINA SUBEROSA



ERYTHRINA SUBEROSA.

FIG. 1—Flowers and young leaves. FIG. 2—The pods. FIG. 3—The stamens and pistil.

Pangra, Dhaulduak. The Coral Tree.

Erythinia is from the Greek *eruthros,* red, referring to the colour of the flowers.

Suberosa in Latin means corky.

Description:—A. medium-sized deciduous tree with thick rough corky light grey bark. Branches armed with small conical prickles. Leaves composed of 3 leaflets each 4 - 6 inches long on a common stalk 4—8 inches long. Flowers on lateral axes 2—4 inches, long which appear near the ends of the leafless branches, bright red 1 – 1.5 inches long. Pod 5 - 6 inches long including the stalk and slender tip, containing 2—*5* pale brown, seeds.

This tree is found in two forms which differ mainly in the nature of the bark. The form described above has the leaves clothed beneath with matted hairs. This form is, the more widely distributed one as a wild plant. The common form in cultivation has a nearly smooth bark tinged with orange and is in favourable situations a fairly large tree. The leaves are nearly free of hairs beneath when mature.

*Uses:—*Much planted on account of its flowers which appear in March and April when the tree is leafless or as the young leaves arc appearing. It is planted in gardens as well as by villagers in hedges as it roots easily from cuttings. The wood is soft and perishable but is used to a small extent for such purposes as scabbards.

*Propagation:—*By seed which ripens about 2 months after the flowers. The seedlings stand transplanting well and are best left in nursery beds till big enough to plant out. It is also readily grown from cuttings which are used in places where seed cannot be obtained.

Habitat:- In dry but not arid forest throughout India and Burma.

FICUS GLOMERATA.

FICUS GLOMERATA.

FIG. 1—A leafy shoot showing the stipules still attached in pairs at the base of the leaf-stalk. FIG. 2—A twig showing young receptacles. FIG. 3—A young receptacle in section, the flowers on stalks are gall flowers. FIG. 4—A female flower showing 3 sepals. This number is not constant, there may be 4 or 5 sepals. FIG. 5—The female flower with sepals removed.

Gular (Hindi).

Ficus is the Latin name for the fig.

Glomerate in Latin means compactly clustered, and refers to the fruits.

Description:—A large deciduous tree with as a rule a short crooked or irregularly shaped stem and large branches. Bark smooth, grey with a yellowish or greenish tinge. Leaves 4—6 inches long, smooth, paler on the lower surface. Blowers very minute, crowded together with thin scales on the inner surface of hollow pear-shaped or top-shaped receptacles (figs). The figs are clustered on short leafless branches which issue from the main trunk or larger branches. Figs on short stalks 0.5—1 inch long, the mouth of the internal cavity being closed by small overlapping scales. When ripe they are 1—1.5 inches in diameter and purplish red in colour.

The flowers are of 3 kinds, male, female and gall flowers. In all three the petals and sepals are represented by free or united scales resembling a calyx. The male flowers are situated near the mouth of the receptacle and have 2 stamens with, united filaments. The female flowers contain a single ovoid ovary on top of which is a slender excentrically placed prolongation (style). The gall flowers resemble the female flowers but are stalked and have a shorter style. Ripe figs are found to be full of small insects.

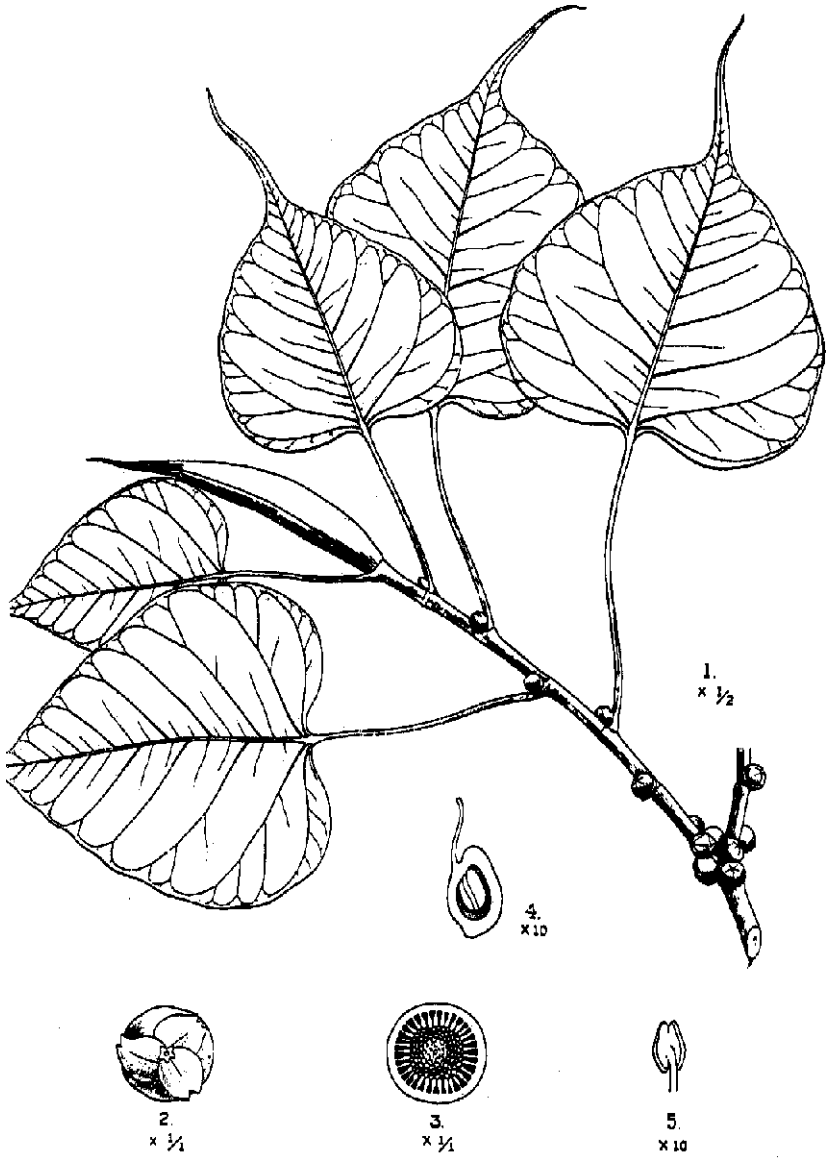
Function of the fig insects:—The fig insects or small "wasps" found within the ripe fig are essential for the production of seed. Each species of fig as far as is known has a species of wasp attached to it. The wasp cannot live without the fig, and fig trees cannot produce seed without the wasp. This is evident from the fact that foreign fig trees grown in India from imported seed do not produce seed. Also Indian species of figs when grown in a district where there are no wild figs of the same species do not produce seed except in a few cases such as the *piped* and *banyan* which have been grown so frequently and for so long a time that the insect has been able to extend its range to the whole area in which these trees are cultivated. When the fig is ripe, the male fig insects which are wingless cut a tunnel usually through the scales that close the mouth of the cavity in the fig. The female insects escape through this tunnel and in doing so presumably become dusted with pollen from the male flowers which ate situated as a rule near the mouth of the fig and shed their pollen when the fig is ripe. Having escaped they fly to young receptacles and force their way between the overlapping bracts closing the mouth of the cavity. On entering the cavity they lay their eggs in the gall flowers. The gall flowers thus produce a fig insect. In female flowers, owing to a longer style than in the gall flowers, the ovary cannot be reached by the insect and in them a seed is produced. It is by no means clear how pollen in any quantity can be conveyed by the wasps from the interior of one receptacle to the interior of another and the suggestion has been made that the production of seed follows from the, mechanical stimulation of the female flowers by the fig insect. A peculiarity of the fig is the fact that the male and female flowers are produced in a single receptacle at very different times. The female flowers are produced first, but the male not until the female flowers are over and have ripened seed. Fig insects are comparatively short lived and in order that they may persist, more than one crop of figs in the year appears to be necessary. In the case of the *gular* one crop of figs ripens in March-April and a second crop in July-August.

Uses:—The fruits are eaten in spite of the fact that when ripe they are usually swarming with insects. The leaves are frequently lopped for fodder.

Propagation:—By seed. The ripe figs should be crushed in water and the seed cleaned. The seed should be sown in a moist shady bed, care being taken with the watering. The beds must not be kept too wet, especially when the seedlings are small, and they must be well drained. Growing the *gular* from seed though not particularly difficult is not very easy and consequently seedlings appearing naturally near old trees are usually used. If found, natural seedlings can be readily transplanted. The tree is not ornamental and is not recommended for gardens as the fallen fruits litter the ground under the trees and smell unpleasantly when they ferment. In a garden the tree encourages flying foxes and monkeys.

Habitat:—A common tree throughout India excluding the arid regions. It is usually found near water.

FICUS RELIGIOSA.



FICUS RELIGIOSA.

FIG. 1—A shoot with young receptacles. FIG. 2—A receptacle seen from below, it is supported by 3 scales. FIG. 3—A receptacle or fig cut horizontally. FIG. 4—The pistil. FIG. 5—A stamen.

Pipal

Ficus is the, Latin name of the fig.

Religiosa in Latin means pertaining to religion and is given to the tree is considered sacred.

Description:—A large tree leafless or nearly bare for a short time during the hot weather, trunk usually fluted in old trees, bark smooth, pale grey. Leaves 4—7 inches long, 3—6 inches broad, very shiny on the upper surface, suddenly narrowed at the apex into a long tail-like tip, at least one-third the length of the rest of the leaf-blade, stalk 3—4 inches long, rather slender, slightly flattened, jointed on to the blade. Figs axillary, that is to say, situated in the angle between the leaf-stalk and the twig, sessile in pairs in the axils of the lower leaves of the twigs or sometimes above the leaf scars, the leaves having fallen, about 0.5 inch diameter, nearly spherical, purple when ripe.

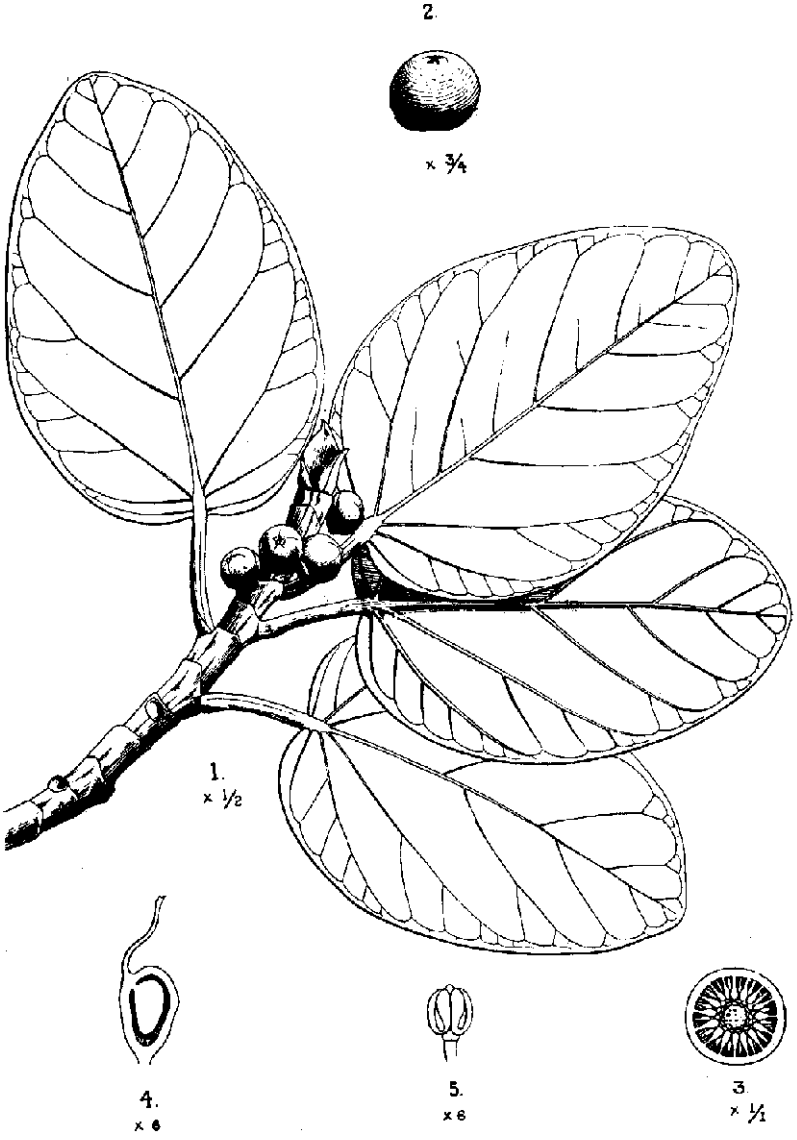
The flowers are essentially the same as described for *Ficus glomerate* but the male flowers have only one stamen. They are few in number and are absent in many of the receptacles. Just as the figs are much smaller than those of *Ficus glomerata* so is the fig insect attached to the *pipal* much smaller. The figs ripen abundantly on some trees in April, on others in October-November. Ripe figs in large numbers have also been found under a *pipal* tree in August. The *pipal* appears to be always accompanied by its insect, even isolated trees producing seed.

*Uses:—*The *pipal* is used almost entirely as a shade tree. Being sacred to Hindus it is much planted near temples. In the forest it is lopped for feeding goats, buffaloes, elephants and camels.

*Propagation:—*By seed or by cuttings. As it is not very easily grown from seed the most convenient method of propagation is to transplant natural seedlings which can usually be found without difficulty. When young it is often found growing as an epiphyte on other trees and very frequently on old walls and buildings to which it does much damage as the roots enlarge and split the masonry.

*Habitat:—*Almost throughout India either wild or cultivated. The *pipal* has been so much cultivated and for so long a time that its original home is not known with certainty. It is now found growing wild in many places where it is not indigenous,

FICUS BENGALENSIS.



FICUS BENGALENSIS.

FIG. 1—A leafy twig with young receptacles or figs. FIG. 2—The ripe receptacle or fig FIG. 3—The fig in cross-section. FIG. 4—The pistil with the ovary cut open to show the ovule. FIG. 5—A stamen

The Banyan. Bor, barh.

Ficus is the Latin name of the fig tree.

Bengalensis in Latin means from Bengal.

Description:—A very large evergreen tree with wide-spreading horizontal branches from which aerial roots descend and on reaching the ground rapidly thicken and serve as supports to the crown. Leaves 4—8 inches long, 2—6 inches broad, mostly elliptical in outline, thick and leathery, stalks 0.5—2 inches long, stout, not jointed to the blade. Fig 0.5 - 0.75 inch diameter, without stalks, in pairs in the leaf axils, that is to say, in the angle between the leaf stalk and the twig, globular, red when ripe.

The flowers are essentially the same as described for *Ficus glomerate* bnt the male flowers have only one stamen. Figs ripen abundantly on some trees in April, on others in October-November.

The banyan and almost all figs have a milky juice and two large scales (stipules) which cover the leaf-bud. These scales are attached to the twigs at the level of the leaf-stalk and as the leaf develops they fall off leaving an annular scar round the twig.

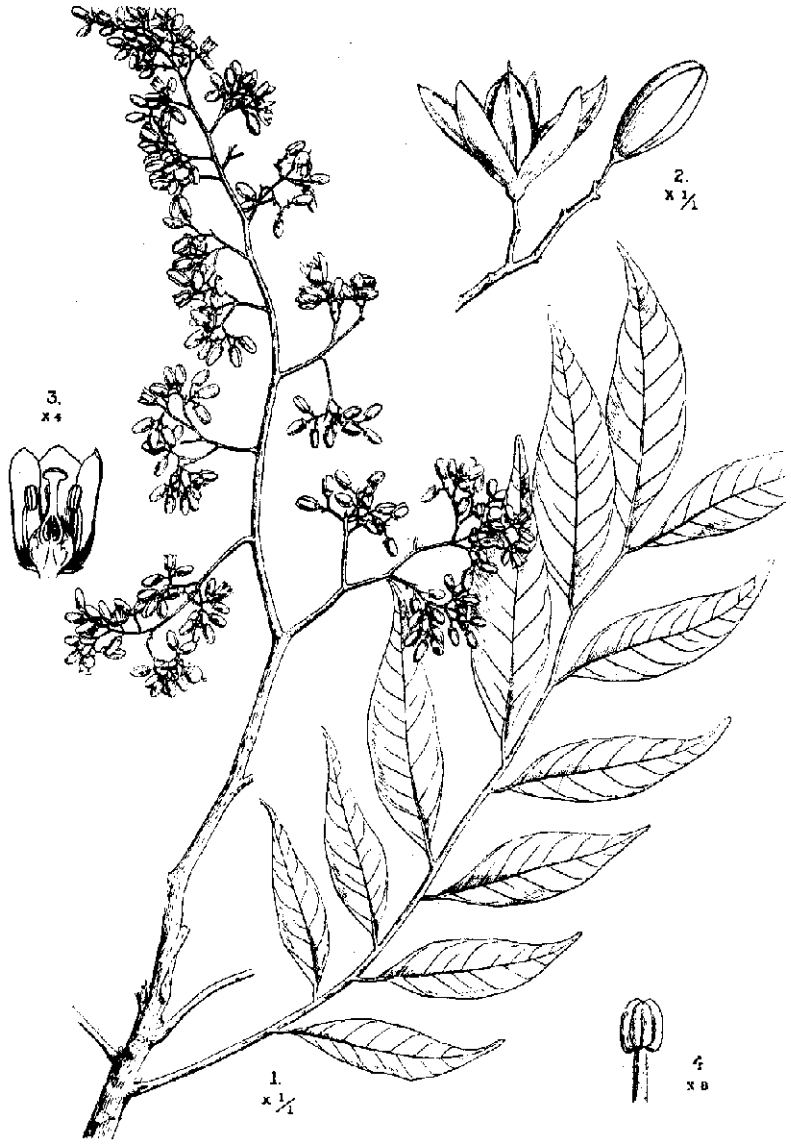
The banyan and many other figs begin life as an epiphyte on other trees starting from seeds dropped by birds in a fork or hollow. The seedling sends its roots down the hollow stem or down the bark of the tree on which it is growing until it reaches the ground. The roots spread round the tree on which the banyan is growing and where they cross one another they fuse, thus forming a network and ultimately a continuous sheath. By this means the tree is strangled, the banyan ultimately taking its place. Outside forest areas banyan seedlings are usually found on walls, buildings or the sides of wells. Owing to its thickening roots and the great weight of the tree, it destroys the buildings on which it grows if it is not kept in check.

Use:—For shade. The leaves are used as fodder for goats, buffaloes, camels and elephants. The wood of the banyan and other figs is coarse grained, soft, perishable and of no value as timber and very inferior as fuel.

Propagation:—By seed or more often by cuttings which root readily even when large branches are used.

Habitat:—Throughout India except the arid region. On steep rooky ground in the drier parts and as an epiphyte in moist forest areas.

CEDRELA TOONA



CEDRELA TOONA.

FIG. 1—A flowering twig. FIG. 2—The fruit or capsules. FIG. 3—A flower in section. FIG. 4—A stamen.

Tun or Toon.

Cedrela is from the Latin Cedrus, the cedar, and is given on account of the scented wood.

Toona a Latinized form of the vernacular name.

Description:—A large deciduous tree, bark smooth in young trees, afterwards cracking longitudinally and transversely and exfoliating in irregular scales. Leaves 1—2 feet long, consisting of 4—15 pairs of leaflets, with occasionally a terminal leaflet in addition. Flowers 0.5 inch long, honey-scented, yellowish-white, in drooping bunches. Fruit 0.75—1 inch long, dry, opening by 5 valves when ripe, thus liberating the seeds and exposing a 5-angled column of soft white pith which occupies the centre of the fruit. Seeds pale brown, flat, winged at both ends and very light.

Leafless as a rule from the end of December to the middle of March. The young leaves are a fine pinkish red but soon change to bright green. The flowers appear from March to May and ripe seeds arc produced in May to July. The empty fruits remain hanging on the trees long after the seeds are shed and may be seen when the trees are leafless.

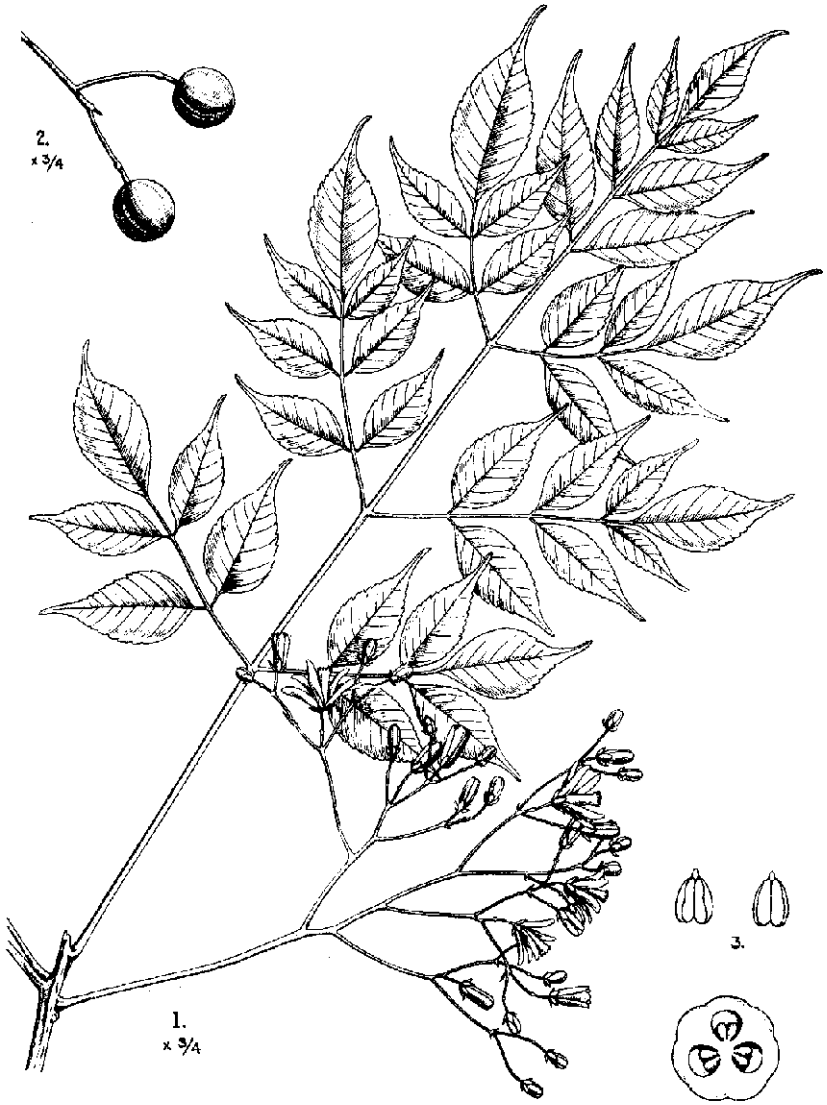
Uses:—The bark is used medicinally as a tonic. A yellow dye is obtained from the flowers. The main value of the *toon* is however foe shade and timber. As it is of rapid growth and easily cultivated it is much used u a roadside tree in moist localities. It reaches a height of 80 feet and a girth of 10 feet and under favourable conditions will reach a girth of 5 feet in 30 years. The timber is red, seasons and works well and takes a good polish. It is durable and not very heavy and consequently it is much used for furniture.

Propagation:— By seed which should be collected from the trees when the fruits start opening. Fresh seed should be sown as it soon loses vitality if kept. The seed should be lightly covered with soil and carefully watered or the light seeds will be washed away. Growth during the first year is not fast but the seedlings can easily be transplanted during the second rains. If too big to transplant without damage to the roots, the stem may be cut back to 3 inches above the ground and the roots cut at 9 inches below the ground. Seedlings treated in this manner are easily moved and develop rapidly.

Injuries:—The *toon* is much damaged by the larva of a moth which bores along the pith of young twigs thus killing the twigs. Damage is not easy to prevent if there are infected trees in the neighbourhood. Twigs seen to be dying on young plants should be cut off and split open to find the caterpillar responsible. If the cut surface of the twig shows a dark hollow in the centre it should be cut again farther down as the larva if still in the twig *is* below the cut. If it has emerged a hole in the side of the twig shows the point of exit and the twig should toe cut off below this point. The borer reduces the rate of growth of young plants and tends to make them branchy but it is not very noticeable in big trees.

Habitat:—Throughout India and Burma but only in the moister tracts especially in ravines, near rivers or swampy places.

MELIA AZEDARACH



MELIA AZEDARACH.

FIG. 1—A flowering twig. FIG. 2—The fruit. FIG. 3—Stamens. FIG. 4—A fruit in cross-section showing 3 cells some having failed to develop, 5 or 6 is a more usual number.

Persian lilac or Bead Tree. Bakain, drek.

Melia is the Greek name of the Ash. It is not au appropriate uame for this tree which does not resemble an ash.

Azedarach (azad-darakht) is tho Persian name for this tree.

*Description:—*A moderate-sized deciduous tree, bark dark grey with long shallow vertical Assures. Leaves 9—18 inches long, much divided into separate leaflets which are 0.5—2 inches long. Flowers very numerous, 0.3- inch long, in loose clusters amongst the upper leaves, sweet-scented. Petals 5 or 6, lilac, rather narrow, spreading or somewhat recurved. Stamens with the filaments united into a purple tube about 0.25- nch long, the tube toothed at the slightly widened top, anthers 10 or 12, sessile between the teeth of the tube on its inner side. Fruit *0.5*-inch in diameter, globular, yellow and plump when ripe but becoming wrinkled, remaining long on the trees, containing a very hard usually 5—6 celled stone.

Leafless during the winter, the flowers appearing soon after the young foliage in March, April. Fruit ripens after the monsoon, gradually drying and shrinking, and much of the fruit often still on the trees when the fresh leaves appear. The common form of this tree has rather long branches which form a loose open crown. Another form, sometimes seen, has a dense umbrella-shaped crown. A third form flowers as a seedling, and continues flowering at irregular intervals for a few years by which time it has reached about 6 feet in height and begins to die off. These forms come true to seed.

*Uses:—*Mainly used for ornament. The tree is not long-lived and cannot be relied upon for more than about 20 years by which time it starts to die of and should be replaced. The timber is not usually appreciated but is of fair quality, works well and is not subject to insect attack. The fruits are said to be poisonous and are used to some extent medicinally as is also the inner bark. The stones of the fruits are used for necklaces and rosaries.

*Propagation:—*By seed. It is very easily grown and is a fast growing tree.

*Habitat:—*Indigenous in some of the Himalayan valleys and in Upper Burma. Cultivated and naturalized in all the less tropical parts of India and similar subtropical regions throughout the world.

TERMINALIA ARJUNA

TERMINALIA ARJUNA.

FIG. 1—A flowering twig. FIG. 2—The fruit. FIG. 3—A flower.

The Arjun.

Terminalia is from the Latin *terminalis,* terminal. The name is given because in many species of the genus (though not in this) the leaves are clustered at the tips of the branches.

Arjuna is the Latinized Hindi name for the tree, arjun.

Description:- A large evergreen tree with smooth bark, grey with a greenish or reddish tinge, the colour varying with the size of the tree and season of the year. The leaves on the lower surface have usually a pair of glands close to the top of the leaf-stalk. The leaves are opposite or very nearly so (sub-opposite). The flowers are pale yellowish white, small but crowded along axes 2—3 inches long at or near the tips of the branches. The fruit is a winged nut 1—1.5 in. long, the wings usually 5 in number are not over 0.5 in. wide and closely veined, the veins not spreading quite horizontally but tending to curve upwards.

Very similar to this is *Terminalia tomentosa,* a common forest tree seldom seen outside forest areas. It can be at once distinguished by its rough bark, larger fruits with broader wings the veins of which spread horizontally from the nut.

Uses:—An excellent shade tree and often planted on roadsides. The bark is used in native medicine as a tonic and astringent. It is also used for tanning for which purpose the outer bark is best. If carefully removed no injury is done to the tree.

Propagation:—By seed which should be sown so that half the fruit is below and half above ground. If buried too deeply the seed will not germinate. To do well the tree requires a deep and fairly moist soil. It can be easily transplanted from nurseries at one year old.

Injuries:—Young plants are apt to be injured by frost but the tree is not very sensitive and can be grown throughout the plains. Trees are sometimes injured by the collectors of bark cutting too deeply instead of taking only the outer bark.

Habitat:—Along streams and watercourses in Central and Southern India to Ceylon. Often on very rocky ground where the water is permanent. In Northern India it is occasionally found in similar places having become established from seed washed down from planted trees.

TERMINALIA BELERICA

TERMINALIA BELERICA.

FIG. 1.—A flowering twig. FIG. 2.—The fruit. FIG. 3.—A flower split down one side and opened out.

Bahera (Hindi), bahera. The Belleric myrabolan.

Terminalia has already been explained under *T.* arjuna.

Belerica is from the Arabic name for the fruit *balirij* corrupted by early writers and finally Latinized.

Description:—A large deciduous tree reaching 120 feet in height and 10 feet in girth. Bark grey with numerous fine longitudinal cracks. Leaves clustered near the ends of the branches, large and leathery, on stalks 1—4 inches long. Flowers greenish-yellow, on axes 3- 6 inches long amongst the leaves. Fruit 1 inch long, grey-velvety, pulp rather dry containing a hard thick-shelled stone.

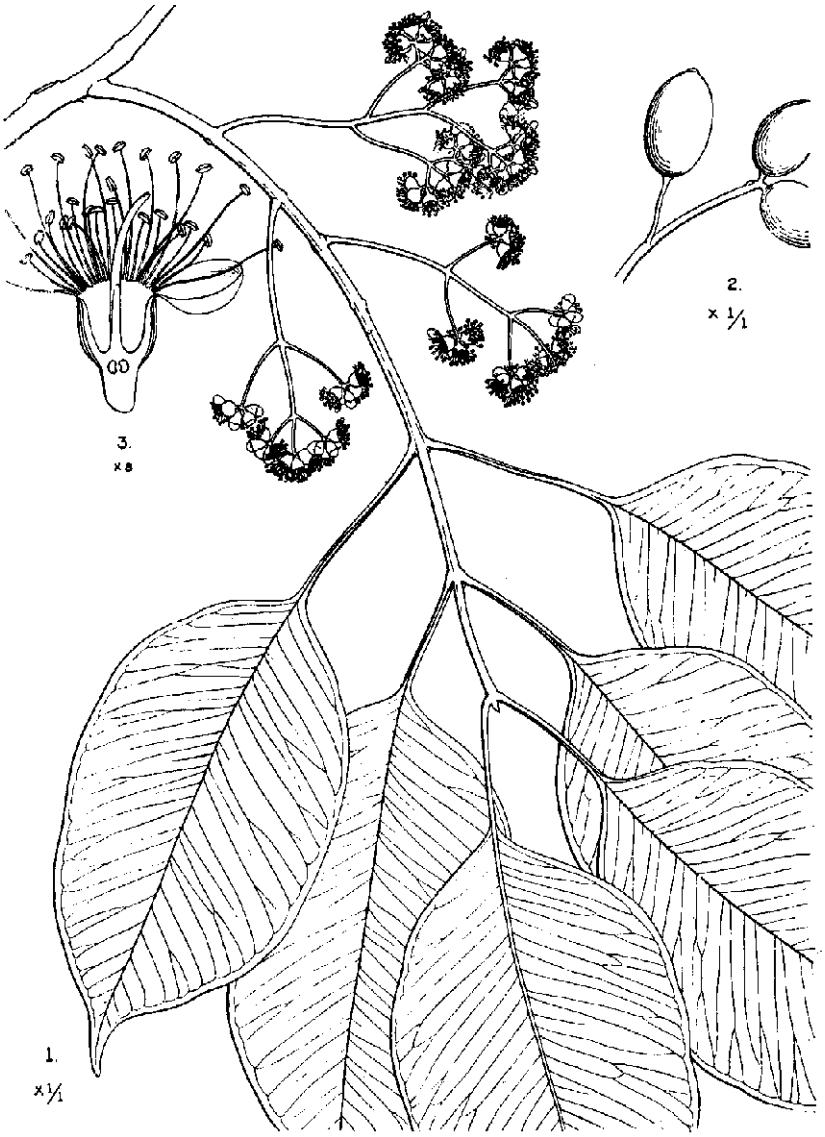
Leafless from November to April in dry places or only in February, March in moist situations. Flowers April to June, the flowers having a very strong honey-like scent which is pleasant when faint but overpowering to most people when near at hand. The fruit varies in shape from nearly globular to ovoid or pear-shaped.

*Uses:—*The fruit is used medicinally being the Belleric myrabolan of commerce. It is also used as an inferior dyeing and tanning material and in making ink. The kernel of the stones is edible and yields an oil used for the hair. The timber is yellowish-brown, coarse grained and not durable being very subject to insect attack and in consequence it is little used. The *bahera* grows well on poor soil and in places when most trees are stunted and the choice of suitable trees is small. For such conditions the *bahera* is valuable as a shade tree.

Propagation:—By seed. The whole fruits may be sown and if kept watered the seedlings should appear in one to two months. Seedlings may be transplanted in the second rainy season. The rate of growth IB fairly fast.

*Habitat:—*Throughout India and Burma excluding the arid region. Common except in the moistest tracts.

EUGENIA JAMBOLANA



EUGENIA JAMBOLANA.

FIG. 1—A flowering twig. FIG. 2—The fruit. FIG. 3—A flower in section.

The Jaman.

Eugenia is so named in honour of Prince Eugene of Savoy of the 17th century, a patron of botany.

Jambolana was the name used for this tree by Rumphius (1627-1702) who says it is a Latinized form of the Portuguese name for the tree.

Description:—A medium-sized to large evergreen tree with dense dark green foliage and smooth or nearly smooth bark. Leaves opposite, with translucent dots visible when held up to the light. The flowers are dirty-white in colour, fragrant and appear from the twigs usually below the leaves. The petals instead of separating from one another and spreading widely in flower, remain struck together and fall off in one piece like a cap. The fruit is up to 1 inch long, black when ripe with a pink juicy pulp. Seed one in each fruit.

The leaves have a characteristic vein-pattern. The lateral veins are very fine and numerous, they run straight from the midrib towards the margin but before reaching it they come to a vein which runs round the leaf a short way from the margin and with this vein they unite. There is a second less conspicuous vein very much closer to the leaf-margin.

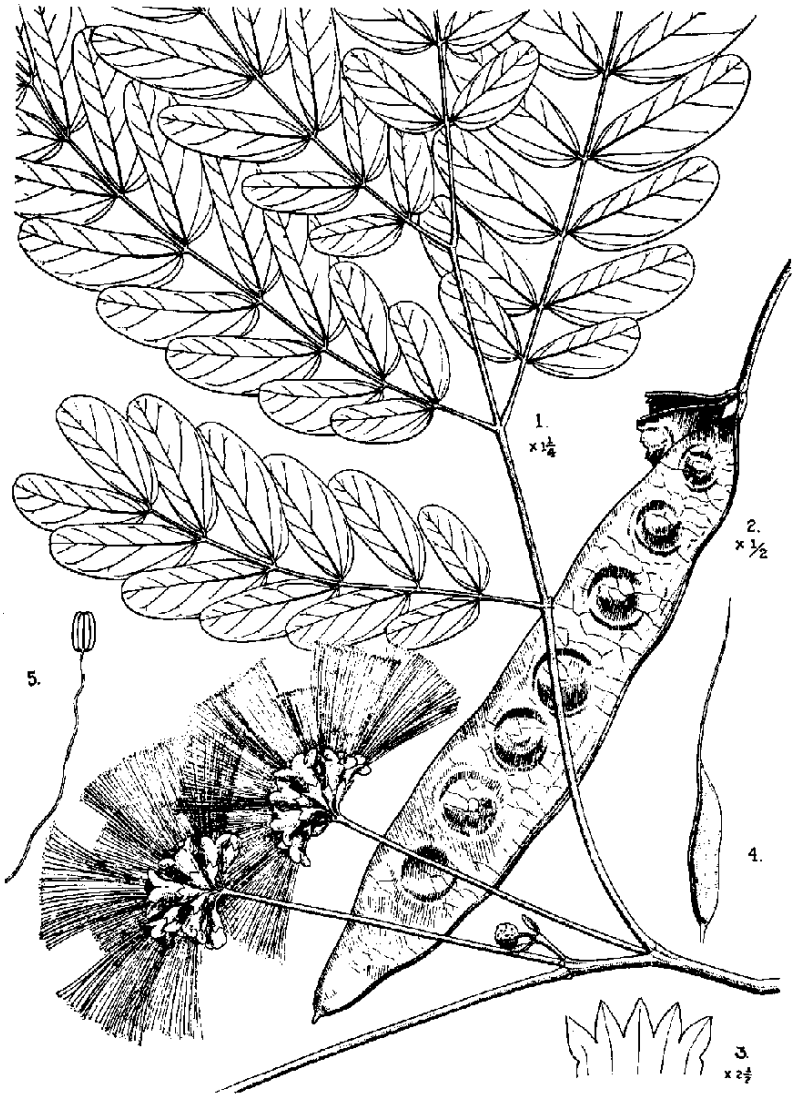
The tree is variable in the size and shape of its leaves and fruits. The form figured is the one commonly planted. It flowers from March to May and fruits in July.

Uses:—The main uses of the *jaman* are for shade and fruit. The fruit is rather astringent and varies in quality from tree to tree. The bark and seed are used medicinally. The timber is used for various purposes in villages being specially suitable for use under water.

Propagation:—By seed sown soon after ripening. No special precautions are required but as *the jaman* likes moisture young plants are apt to suffer from drought in the hot weather and the tree is only suitable for moist localities,

Habitat:—All India except the dry regions, to Indo-China and Australia.

ALBIZZIA LEBBEK



ALBIZZIA LEBBEK.

FIG. 1—A flowering twig. FIG. 2—The fruit or pod. FIG. 3—The corolla split and opened out. FIG. 4—The pistil. FIG. 5—A stamen.

The Siris.

Albizzia is so named in honour of Albizzi, an Italian naturalist of the 18th century.

Lebbek the name in Egypt where it is much used as a roadside tree.

Description:—A medium-sized to large deciduous tree with dark grey rough bark. Leaves compound, the main stalk (rachis) as a rule with a large gland about an inch from the base. The rachis does not bear leaflets direct but usually 2—3 pairs of lateral axes on which 3—9 pairs of asymmetrical leaflets are borne. Flowers very fragrant, pale greenish-yellow, in heads on stalks 2—4 inches long. The only conspicuous part of the flower is the long silky stamens. Pods 6—12 inches long, 1—2 inches broad, thin, straw-coloured when ripe.

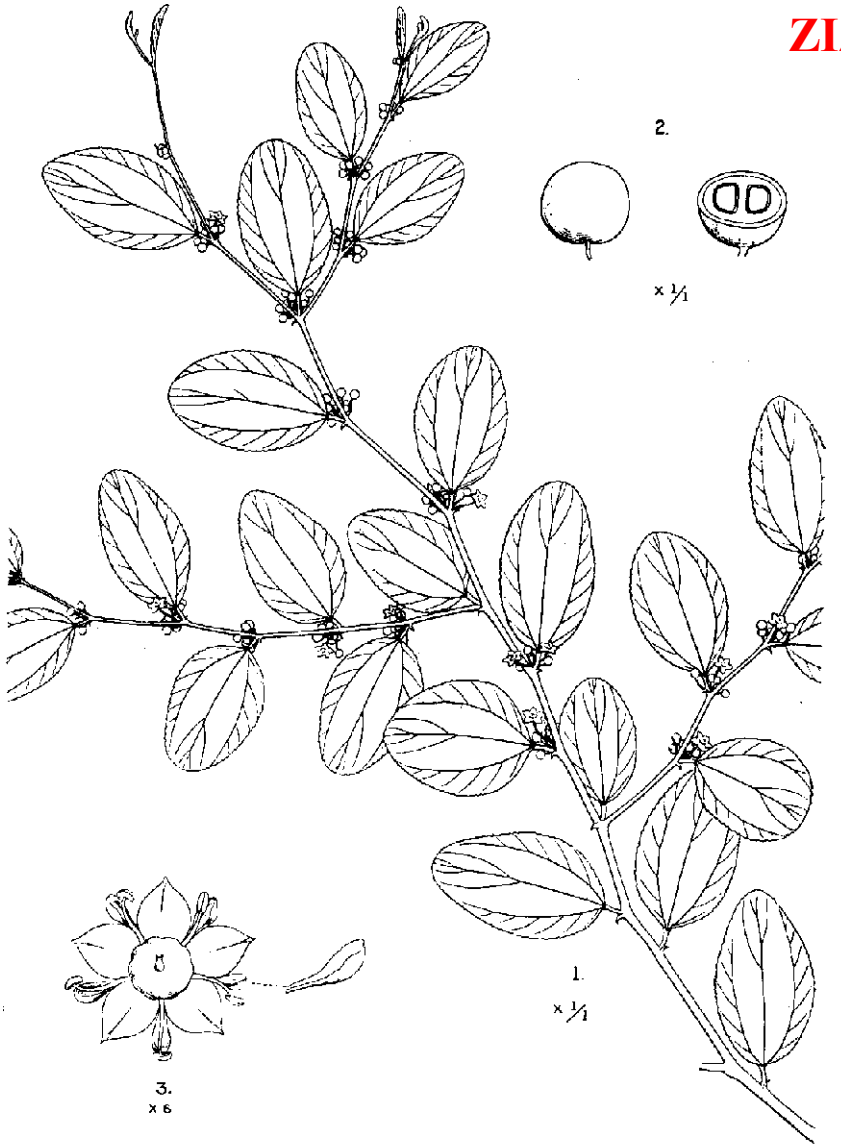
This tree is best recognized by its large pods which are freely produced and remain long on the tree, being specially conspicuous in the hot weather when the tree is more or less leafless.

Uses:—The *siris* is planted almost throughout India as a roadside tree as it is hardy, easily raised from seed and grows rapidly. It has an excellent habit for a roadside tree but is leafless during the hot weather. Moreover it is a relatively short lived tree. Old specimens are frequently much disfigured by dead stumps of large branches badly infested with wood-boring insects which eventually lead to the destruction of the tree..

The timber of the siris *is* exported to Europe from the Andaman's as *koko* or East Indian Walnut and is used for furniture but in most parts of India the wood of the sins is not appreciated. The sapwood is broad and very subject to attack by insects. The heartwood is dark brown with lighter and darker streaks, it polishes and works well. It is used for cane-crushers, oil-presses and parts of wheels.

Habitat:—The *siris* has been so much planted and spread by cultivation that its original habitat is not now known. It is found almost throughout India. To the west of India it is found through Arabia and Egypt to Senegal as a planted tree It is planted also in China and Indo-China. In tropical America it has long been cultivated and is locally known as Fry Wood owing to the incessant rattle of the pods in the wind making a sound like that of frying fish. Another American name is Woman's Tongue also referring to the sound of the pods in the wind.

ZIZYPHUS JUJUBA



ZIZYPHUS JUJUBA.

FIG. 1—A flowering shoot. FIG 2 The fruit. FIG. 3—A flower in the centre of which is a cushion like disk in which the ovary is immersed.

Ber, Indian Jujube.

Zizyphus is from *zizouf,* the Arabic name for one of the species.

Jujuba a Latinised form *of jujube,* the name of the fruit.

Description:—A. medium-sized tree or large shrub easily recognised by the spines at the base of the leaf-stalks. These spines are usually present especially on the lower branches and occur ill pairs, one being straight and the other curved. Leaves elliptical, rounded at each end, with 3 strong nerves, deep green above, white or buff coloured and velvety beneath. Flowers very small, green, the petals hooded over the stamens and more or less concealing them until the flower is fully expanded. In moat plants the stamens when the same in number as the petals are placed inside the petals opposite the gaps between the latter. In this plant they are opposite the base of the petals. Fruit ovoid, varying in size and colour 0.5 – 1.5 inches long, with a tough thin skin, rather dry pulp and a bony stone.

The *ber* is a variable plant, the cultivated forms are not quite the same in appearance as the wild ones and in addition there are other species of *Zizyphus* both wild and occasionally cultivated which resemble it in most respects.

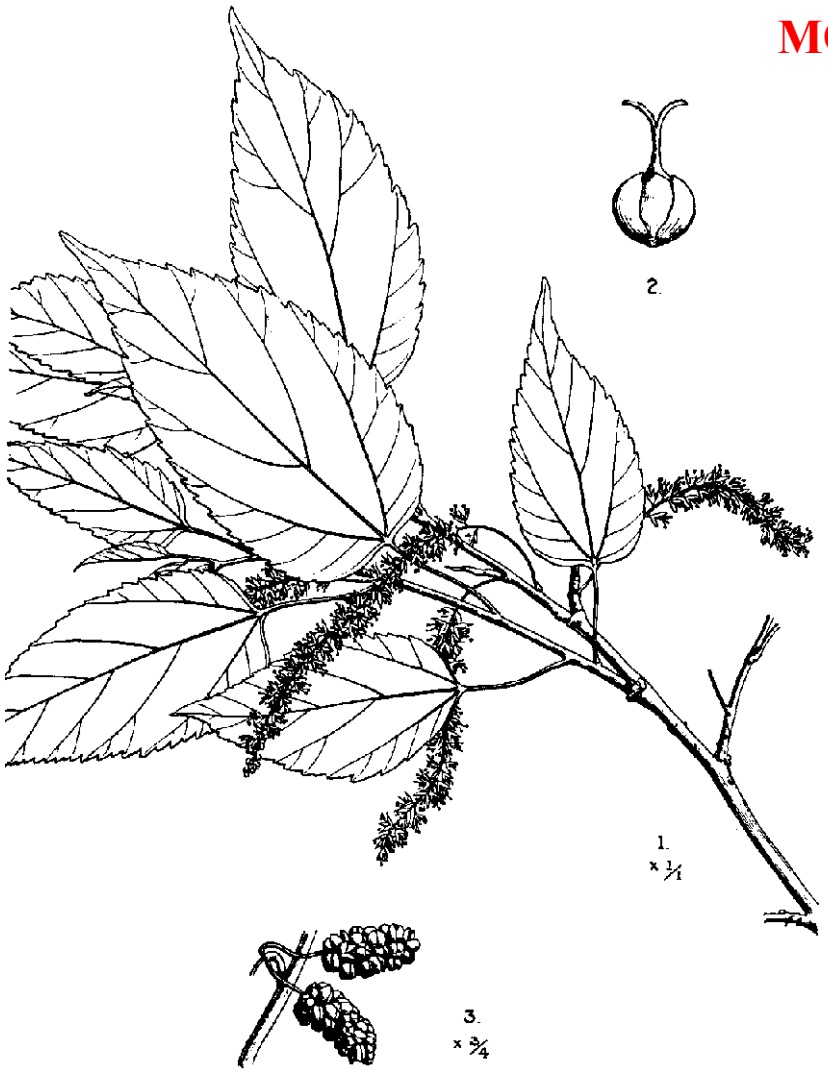
When grown for fruit it is often budded or grafted on to a wild stock and such trees are usually rather stunted with wide-spreading drooping branches.

*Uses:—*The principal use of the *ber* is for its fruit of which there are rainy varieties. The fruits of the wild *ber* are used mainly for sherbet. The bark and many other parts of the tree are used medicinally. The kernels of the stones are eaten. The branches are used for fencing fields. Lac is sometimes cultivated on the *ber* and it is a food for tasar and eri silk-worms. The timber is hard and tough and is used for agricultural implements.

*Propagation:—*The stone of the fruit should be cleaned from pulp and sown about 0.5 inch deep in March. If kept watered the seeds germinate in 2 to 4 months. Seedlings stand transplanting fairly well. Seed beds should be placed in open sunny situations as it has been found that seed sown in shady places does not germinate. Apparently with the *ber* as with some other hard bony seeds or fruits exposure to the sun, which involves great changes of temperature in the soil in which the seed lies, is beneficial or even necessary to- ensure germination.

*Habitat:—*Throughout India in the dry but not arid regions, Burma and Indo-China.

MORUS ALBA



MORUS ALBA.

FIG. 1—A shoot with male flowers. FIG. 2—A female flower much magnified. FIG 3—The fruit.

The Mulberry. Tut. *Morus* is the Latin name for the mulberry.

Alba in Latin means white and refers to the fruit.

Description:—A medium-sized deciduous tree, bark of large trees dark greyish brown, rough, the fissures mainly vertical. Leaves varying markedly in shape according to the age of the tree, in young plants and on vigorous shoots of old plants the leaves are usually deeply lobed, normally they are unlobed and 2-3 inches long. Flowers unisexual, very small, greenish, the sexes separated on different axes (spikes) either on the same branch or on different branches or occasionally a tree produces only male spikes or only female spikes. Male spikes 0.5—1.5 inches long, the flowers not densely crowded. Sepals 4, hairy, 1/10 inch long. Female spikes shorter than the male, the flowers crowded. Sepals 4, not hairy or only slightly so on the edges. Fruit 0.5—1 inch long, sometimes white, but more often red becoming black when ripe.

The fruit of the mulberry, using the term in its popular sense, is not a true fruit like a mango in that firstly it is produced by a cluster of flowers instead of one flower and secondly the edible portion consists of the sepals, which become enlarged and succulent. The fruit strictly speaking is the portion which would ordinarily be called a seed.

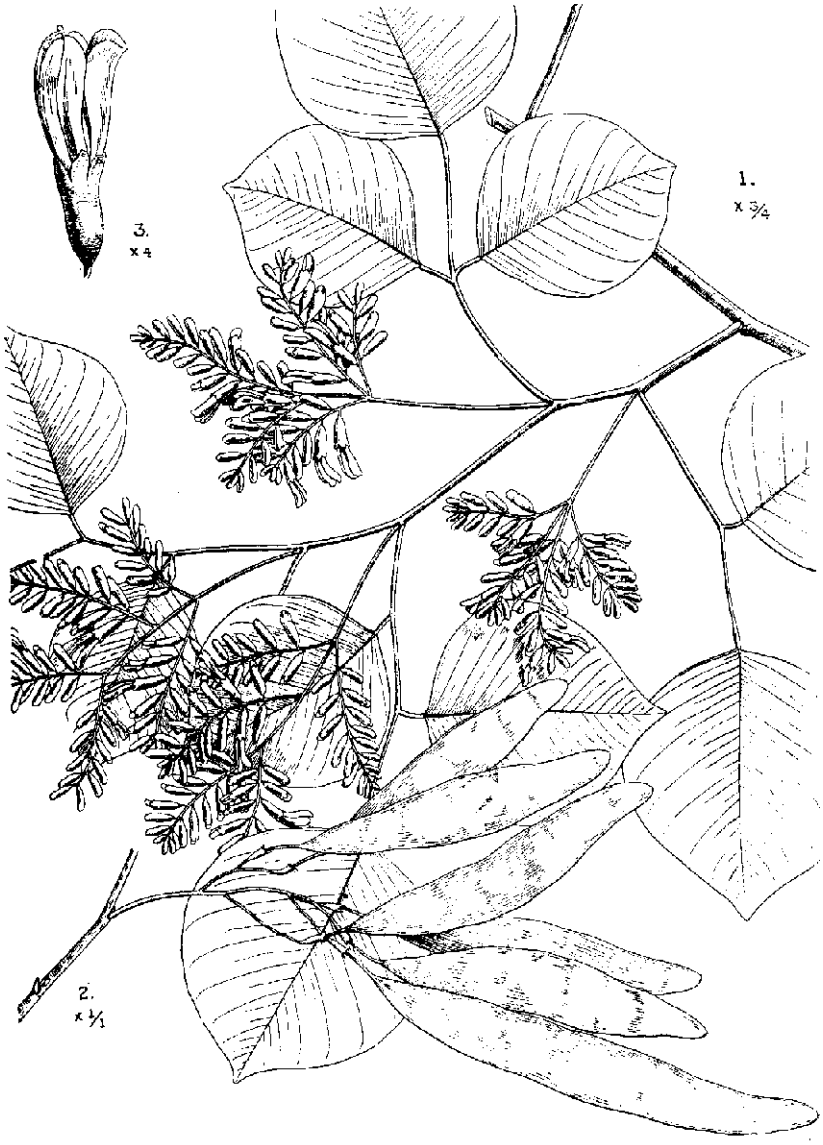
The mulberry is leafless during the cold weather. The flowers appear with the young leaves in March, April and the fruit ripens about a month after flowering. The .twigs and leaves contain a milky juice which is not very copious.

Uses:—The leaves of the mulberry are used as food for silk-worms. The bark of small twigs contains a fibre and strips of bark can be used for tying in place of string. The wood is a fairly good substitute for ash and is used for tool handles, bent wood frames of badminton and cheap tennis rackets, hockey sticks and cricket stumps. It is also used for shafts of tongas. The fruit is edible but is not of good quality.

Propagation:—By seed or by cuttings. The ripe fruits should be macerated in water to remove the pulp and the clean seed extracted. The seed should be sown in a moist shady place, care being taken not to over water as the young seedlings are subject to damping off. Young plants stand transplanting well if moved in winter when they are leafless. The tree requires a moist situation for satisfactory growth.

Habitat:—Native of China. Now found wild in the less tropical portions of India and has spread greatly with the extension of irrigation, tending to come up freely under the shade of other trees and sometimes replacing them in plantations. In Bengal and other more tropical parts of India this species is replaced by other mulberries some of which are indigenous.

DALBERGIA SISSOO



DALBERGIA SISSOO.

FIG. 1—Flowering twig. FIG. 2—The fruit or pods. FIG. 3—A flower enlarged.

Shisham, sissu or tali.

Dalbergia is so named in honour of Nicholas Dalberg, a Swedish botanist who died in 1820.

Sissoo is one of the vernacular names.

Description:—A fairly large deciduous tree with dark grey rough bark. Leaves composed of 3—5 leaflets arranged alternately on a somewhat zigzag axis which is swollen at the base. Flowers about 0.25- inch long, yellowish-white, rather numerous, inconspicuous but sweet-scented. Stamens 9, united in a tube slit along the upper side. Fruit a thin strap-shaped pod 1.5—4 inches long by 0.3—0.5 inch wide, containing 1—4 flattened seeds.

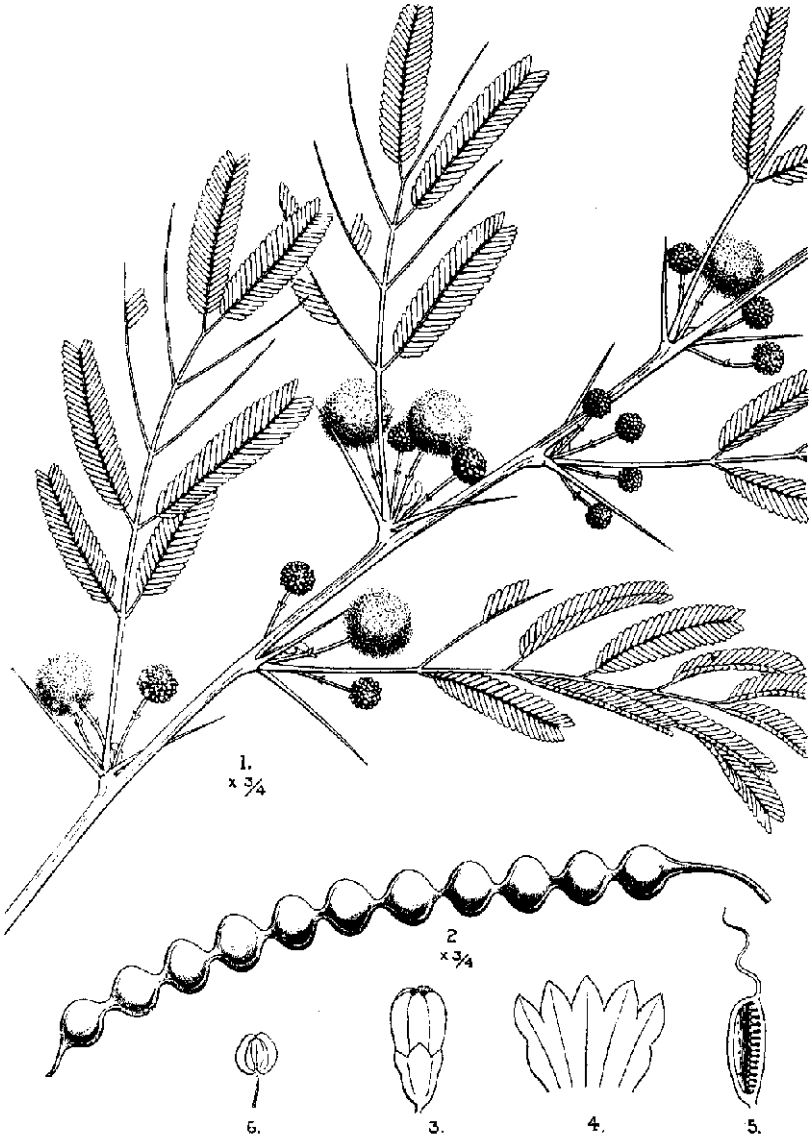
Leafless in January, February, the fresh foliage appearing in March and the flowers soon after. The fruit ripens in November but remains hanging on the trees for several months.

Uses:—The *shisham* is the favourite road-side tree in upper India. For this purpose it has many advantages. It is easily grown, fairly rapid in growth, in full foliage during the hot weather and almost immune from lopping, barking and other forms of wanton damage as the leaves are not used for fodder and the bark is not used for tanning or medicine. The timber is valuable. The sap-wood is perishable being very subject to attack by borers but the heart-wood is durable. It is hard, heavy, brown in colour with darker streaks. Though not easy to work it takes an excellent polish and is one of the main furniture woods. It is also used for spokes of wheels, carts, boats and many other purposes.

Propagation:—By seed. The pods do not burst open when ripe thus liberating the seed but under natural conditions they are scattered by the wind and by water. They float down streams and become stranded on mud or sand banks where they germinate. The most successful method of growing *shisham* is to imitate the natural process. If the pods are sown along the side of a trench in which water can be run and are covered with only sufficient soil to prevent them being blown away they can be moistened by water percolating from the trench. This method is the best if large numbers of plants are required. If only a few plants are wanted, the pods may be sown in beds or flower-pots and watered in the ordinary way. Under this method care is necessary to see that the soil does not become caked on the surface as this is likely to cause complete failure. Seedlings up to about 6 feet in height can be readily transplanted. It is advisable to prune down the stem to 2 inches above the ground and cut off the roots 9 inches below the ground. Such heavily pruned plants are more easily handled than entire plants and grow more vigorously after transplanting.

Habitat: — Indigenous along the foot of the Himalaya from the Indus to Assam extending along the banks of rivers for some distance into the plains. As the result of cultivation it is now found in many places where it is not indigenous especially in irrigated tracts.

ACACIA ARABICA



ACACIA ARABICA.

FIG. 1—A flowering twig. FIG. 2—The fruit or pod. FIGS. 3-6—the flower bud, corolla, pistil and a stamen, all enlarged.

The Babul or Kikar.

Acacia is a name used by Pliny for the tree producing gum-arabic or for the gum it produces; it is an African species of the genus. *Arabica,* Arabian as the tree occurs in Arabia.

Description:—A small or medium-sized tree with dark-coloured rough bark. Young trees armed with strong straight ivory-white spines which may be 2 inches long. These spines occur in pairs at the base of the leaf-stalk arid are absent on old trees. Branches subject to browsing by cattle are particularly well armed. Leaves compound, divided up into a great number of very small leaflets. Flowers in golden balls about 0.5 in. diam. the individual flowers being very small. Fruit a grey velvety pod more or less constricted between the seeds. Flowers during and after the rains, July to November.

*Uses:—*This tree is a very useful one. The bark is used for tanning and large quantities arc consumed in Cawnpore.The timber is hard, heavy and durable and is used for many purposes in villages especially for making cart wheels. It is an excellent firewood and makes good char coal. The branches are much used for fencing fields. From wounds in the bark a gum exudes which is used in place of gum arabic. The pods can be used for tanning and they are eaten by goats when they fall from the trees.

*Propagation:—*As for *Cassia fistula* but the seed must be sown where the tree is wanted and not in a nursery, as the seedlings do not transplant well.

*Injuries:—*The *kikar* stands lopping and ill-treatment better than most trees and it usually gets plenty of it near villages. It is very tender to frost and for this reason it is scarce to the west of the river Jhelum. Over most of the Punjab a severe winter is apt to kill every *kikar* below 6 or 8 ft. in height.

*Habitat:—*Believed to be indigenous to the Deccan and Sind also Arabia and northern Africa. It is now abundant throughout the Punjab plains wherever cultivation is found, excluding the north-west portion and in the drier parts of the United Provinces. The tree is eminently a tree of cultivated fields, though in Sind it is found on the banks of the Indus subject to inundation. It avoids the rocky hills of Kajputaua and Central India as well as the moist tract along the foot of the Himalaya.

TAMARINDUS INDICA

TAMARINDUS INDICA.

FIG. 1 -A flowering twig. FIG. 2—The fruit or pod. FIG. 3—The stamens.

The Tamarind. Imli, Amli (Hindi).

Tamarindus is from the Persian name for this tree *tamar-i-Hindi, i.e.,* the date of India.

Indica in Latin means Indian.

Description:—A very large handsome evergreen tree with dark grey rough bark. Leaves with 10-20 pairs of leaflets. Flowers about 0.5 inch long, variegated yellow and red, appearing in the hot weather. Pods 3-6 inches long, 0.5 inch thick, filled with dark brown fibrous, acid pulp, containing 3-10 seeds, ripening in the cold weather.

There is a variety the pod of which has sweet pulp and another variety with a reddish pulp. The last named is considered the best.

Uses:—In suitable places the tamarind is one of the finest trees in India, growing to an enormous size (a girth of 42 feet has been recorded) and reaching a great age. The pulp of the fruit is a favourite ingredient of curries and chutneys, it is used medicinally and also for making sherbet. The leaves and flowers are also eaten. The timber is durable but hard and difficult to work. Moreover the heartwood is rather small, otherwise the tree would be much more valuable foe timber. It is used for mallets, rice-pounders, oil presses, etc.

Propagation:—By seed sown in March or April. If watered regularly germination should commence in about a week. The seedlings should be transplanted to their permanent sites as soon as the monsoon starts, if left till the following year they do not stand moving well. The tamarind is very sensitive to frost and is scarcely worth growing north of Delhi as being rather slow-growing it requires protection in winter for several years and in any case does not thrive though it can be grown as fat north as Amritsar.

Habitat:—Believed to be indigenous to Tropical Africa. Now cultivated everywhere in the tropics and found growing spontaneously in Asia and America.

ARTOCARPUS INTEGRIFOLIA

ARTOCARPUS INTEGRIFOLIA.

FIG. 1—A twig showing a male receptacle. FIG. 2—The fruit much reduced. FIG. 3—A male flower. FIG. 4—A female flower. FIG. 5—The ovary and style dissected out of the female flower. FIGS. 3-5 greatly enlarged.

The Jack fruit. Kanthal, kathal, kathar. The name Jack fruit comes from tsjaka a name used by early Dutch and Portuguese writers and said to be the native name for the fruit in Malabar.

Artocarpus is from the Greek *artos* bread, *karpos* fruit. The Bread fruit tree is a species of this genus.

Integrifolia in Latin means entire (i.e., untoothed) leaves.

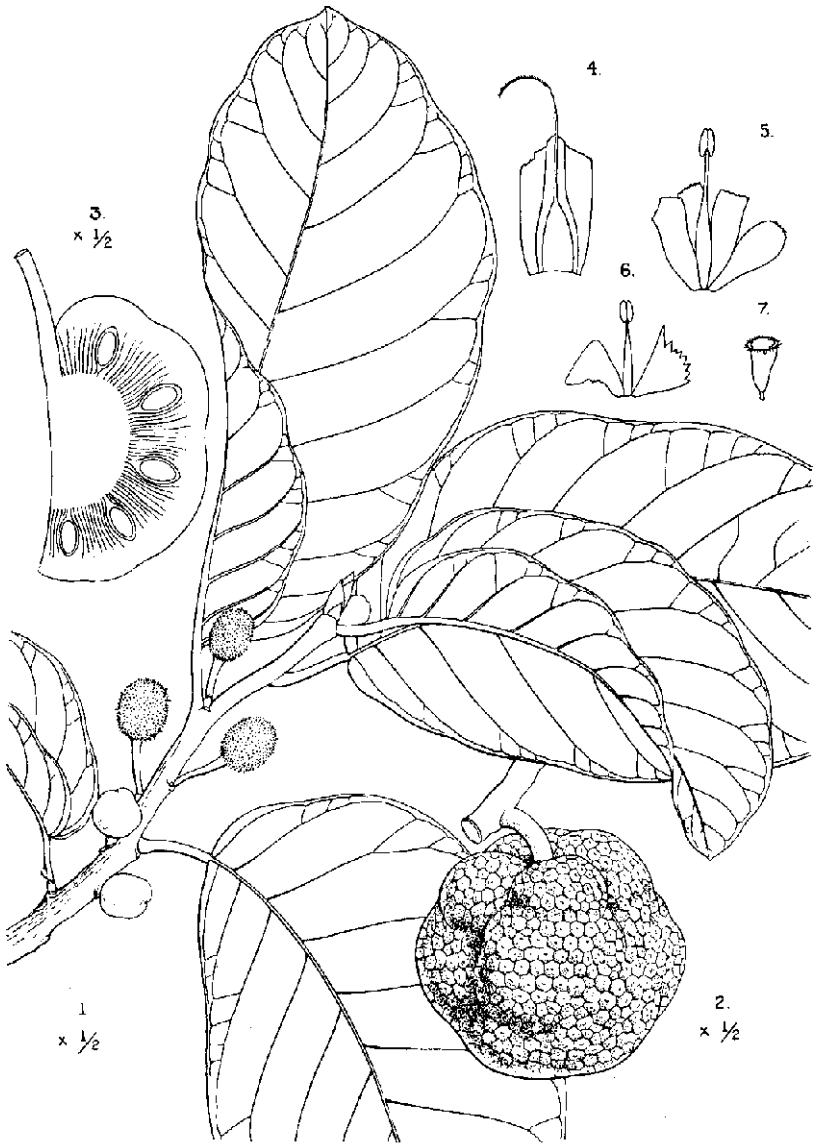
Description:—A large evergreen tree with dense crown. Bark dark brown, rough with warts. Leaves about 4 inches long, smooth, leathery, deep shining green above. When young at the base of the leafstalk two large scales (stipules) are found which embrace the next upper leaf and fall as it expands leaving an annular scar on the twig. Flowers minute, the sexes separated, innumerable flowers all of one sex closely covering the surface of a cylindrical structure (receptacle) 2-4 inches long, which in bud is enclosed in two sheaths similar to the stipules. Receptacles of both sexes on the same twigs which arc short and issue from 'the main trunk or larger branches. Male flowers consisting of 2 small wedge-shaped sepals and a single stamen. Female flowers consisting of a single carpel enclosed in a tubular calyx perforated at the apex to allow a thread-like structure (style) to protrude. Fruit very large 12-30 inches long, 6-12 inches diameter, weighing 10-60 lbs. or more, the surface rough with conical tubercles.

Uses:—The fruit is eaten but is rather indigestible and in large quantities is apt to produce diarrhoea. The spoils arc roasted and eaten. The timber is good but as the tree is valued for its fruits the timber is not much used. An extract from the wood is used for dyeing the saffron robes of priests,

Propagation:—By seed which being perishable must be sown quite fresh. The seedlings do not stand transplanting well. The seeds should therefore be sown singly in pots or baskets and the plants planted out in their permanent sites when one year old. The growth is slow at first but more rapid after a year or two and shelter from the sun is necessary for young plants. This tree is sensitive to frost and consequently it is not found in the north-west of India. It likes a moist and equable climate.

Habitat:—Believed to be a native of the evergreen forests of the Western Ghats. Planted extensively as a road-side tree in the moister parts of India and in orchards and gardens elsewhere as far north as Lahore and Hoshiarpur, Also planted in other countries such as Burma, Ceylon, Java, etc.

ARTOCARPUS LAKOOCHA



ARTOCARPUS LAKOOCHA.

FIG. 1—A twig with male and female receptacles. FIG. 2—The ripe fruit. FIG. 3 The fruit in section. FIG. 4—The female flower. FIG. 5 & 6—Male flowers. FIG. 7—A scale from between the male flowers. FIG. 4-7 greatly enlarged.

The Monkey Jack fruit. Lakuch (Hindi). Dahu.

Artocarpus has already been explained under *A. integrifolia.*

Lakoocha from the Sanskrit name *lakuch.*

Description:—A large deciduous tree with reddish-brown bark, rough and scaly in old trees. Leaves 6-10 inches long, 3-5 inches broad, tough and leathery, smooth above, softy hairy beneath. Flowers minute the sexes separated as in *A. integrifolia.* Male flowers : on shoots of the previous year. The individual flower consists of a single small stamen with 2-4 sepals and these flowers mixed with small flat-topped scales are crowded on the surface of an orange-yellow globular spongy mass which has a very short stalk. Female flowers on shoots of the current year, the individual flower is similar in structure to that of *A. integrifolia* and these flowers mixed with small flat-topped scales are crowded on the surface of a fleshy mass which is either irregularly globdse or ovoid, 3/4-1 inch long on a stalk about f inch long. Fruit 3-4 inches diameter, irregularly lobed, the surface nearly smooth, yellow when ripe.

Uses:—Extensively planted for shade and as a fruit tree. The fruits are eaten as are also the male flower heads. The root gives a yellow dye. The timber of this tree is good but is not available in large quantities as the *lakuch* is commoner as a planted tree than as a wild tree in the forest.

Propagation:—By seed which does not keep well and should therefore be sown when fresh. The seedlings transplant very badly and consequently it is advisable to sow it in pots or baskets. Three or four seeds may be sown in each pot and if more than one plant comes up the surplus should be weeded out. When big enough the plants should be planted in their permanent situations. As sensitive to frost as *A. integrifolia* but is hardier as regards heat and exposure to the sun.

Habitat:—This tree has been so much planted that it is impossible to say where it is truly indigenous. It is found growing wild along the foot of the Himalaya from Kumaon to Assam, in Orissa and the Western. Ghats. Also in Ceylon, Burma and the Andamans.

MANGIFERA INDICA

MANGIFERA INDICA.

FIG. 1—A flowering shoot. FIG. 2—A flower. FIG. 3—Section of the flower with petals removed showing the ovaty seated on a fleshy disk and the solitary fertile stamen. FIG. 4—A stamen.

The Mango. Am (Hindi), Mankay (Tamil from which mango is derived).

Mangifera from mango and the Latin *fero,* I bear.

Indica in Latin means Indian.

Description:—A large evergreen tree with dense rounded crown of dark green foliage. Leaves leathery, shining, on stalks swollen at the base. Flowers yellowish-green, numerous, in stiff erect open bunches at the ends of the branches. Petals 4 or 5, each with 3 orange-coloured ridges on the inner face. Stamens 4 or 5, of which one only is perfect and longer than the rest. Fruit varying much in size and colour, in trees grown from seed 2—4 inches long, in grafted trees usually much larger, each containing a fibrous stone embedded in pulp.

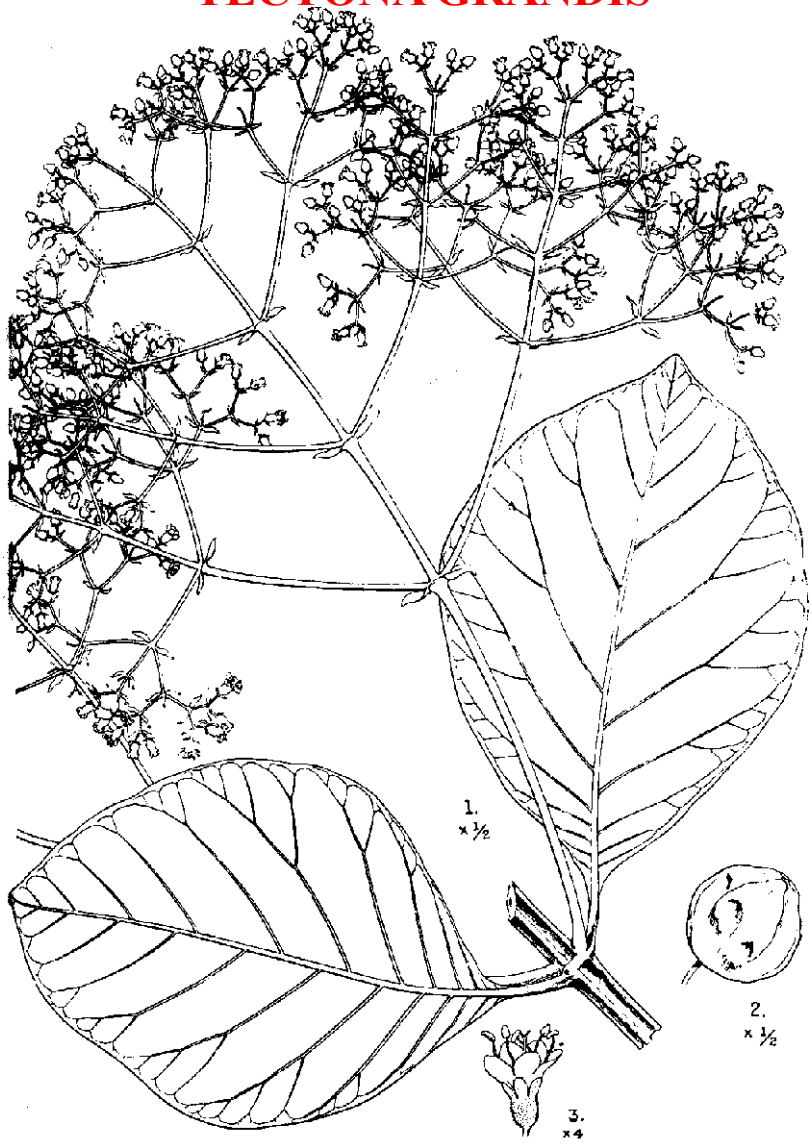
Flowers February to April, sweet-scented at first but afterwards developing a rather objectionable odour. Fruits June to August.

Uses:—The Mango is the best known fruit tree of India and in fact of the whole tropical zone. In most parts of India trees grown for fruit are inarched, that is to say a branch from a tree known to produce good fruit is cut half through and tied to a seedling similarly treated. When the two cut surfaces have united the branch is cut off and the top of the seedling also cut. For some time it is necessary to see that the seedling does not sprout but only nourishes the branch grafted on to it. Grafted trees do not reach the size of seedling trees so that for shade, trees grown from seed are preferred. The Mango being valued for its fruit is rarely used for other purposes. The timber is rather soft, rough-grained and not durable. It is used for packing cases and similar purposes.

Propagation:—By seed which being perishable should be sown as soon as ripe after the pulp has been removed. Seedlings require protection from the sun during the hot weather and from frost in winter. They do not transplant well and should therefore be moved during the rains when one year old.

Habitat:—Believed to be indigenous in some of the moist evergreen forests of Burma, Assam and the Western Ghats. Cultivated throughout India and often found growing spontaneously as is now also the case in Other tropical countries.

TECTONA GRANDIS



TECTONA GRANDIS.

Fig. 1—A flowering twig. Fig. 2—The fruit. Fig. 3—A flower.

The Teak. Sagun (Hindi).

Tectona and teak are both derived from the Malayalam name *tekku* through the Portuguese *teca.*

Grandis in Latin means large.

Description:—A large deciduous tree with light grey bark which peels off in thin vertical strips. Branchlets quadrangular. Leaves mostly 12—24 inches long, 6—12 inches wide, very rough on the upper surface, and with stellate hairs on the lower surface. Flowers 0.25 inch diameter, white, in huge open rather stiff bunches at the ends of the branches. Fruit about *0.5*-inch diameter, roughly globular but somewhat pointed at the apex, consisting of a large bony stone containing 1—4 seeds in a thick felt covering, the whole enclosed in the greatly enlarged bladder-like calyx.

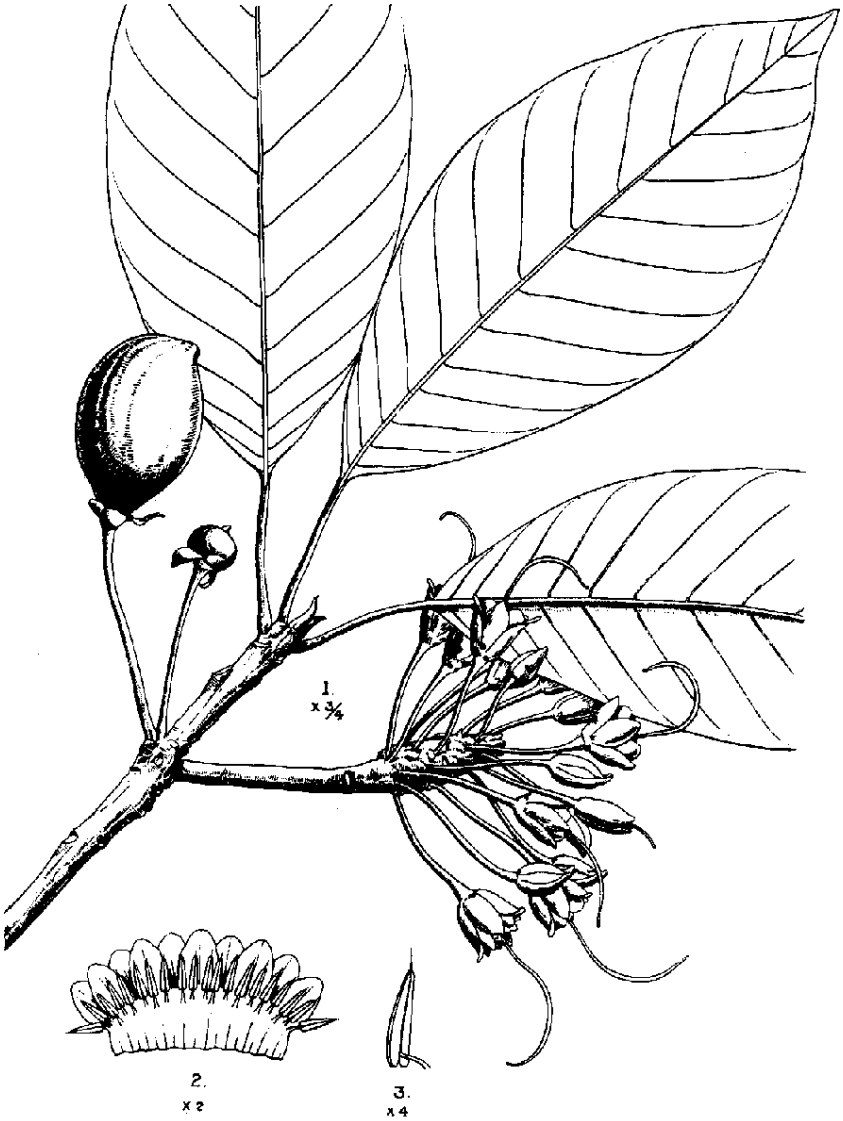
Leaves fall from November to March and the fresh leaves appear from April to June, in both cases the time depends on the dryness of the locality or season. Flowers June to September and the fruits ripen from November to January but do not fall readily. The young leaves when crushed in the hand stain the skin blood-red.

Uses:—For general uses teak is easily the finest timber in the world. This is due to its remarkable durability and working properties and to its being available in large quantities. It is not very hard nor very heavy and once seasoned not liable to warp or shrink. Finally it contains no substances liable to corrode, iron and consequently is the main timber used for ships, railway carriages and similar purposes where timber and iron are in contact. Compared with its value as a timber tree its other uses are unimportant, A tar can be extracted from the wood and is used medicinally. The leaves are used as one of the foods of the tasur silk worm, for umbrellas and for wrapping parcels.

Propagation:—By seed which being enclosed in a bony stone does not germinate freely, often not for a year after sowing. It is advisable therefore to sow plenty of seed covering it with half an inch of soil. Plants are readily transplanted when 1 or 2 years old, the stem being pruned back to 2 inches above the ground and the roots cut off 6 inches below the ground. The growth is very rapid in early youth. Young plants are very sensitive to frost and consequently teak is difficult to grow in places where frost occurs. Older plants do not suffer much from ordinary light frost.

Habitat:—Peninsular India, Burma, Siam and Java. Frequently planted in the frost-free parts of India and in parts where frost is light and does not occur every year.

BASSIA LATIFOLIA



BASSIA LATIFOLIA.

FIG. 1—A twig with flowers and fruit. FIG. 2—The corolla opened out. FIG. 3—A stamen.

Mohwa (Hindi).

Bassia:—Is so named after Ferdinando Bassi, a curator of the botanic gardens at Bologna.

Latifolia in Latin means broad leaves.

Description:—A large deciduous tree with grey, brown or blackish bark which has shallow wrinkles and cracks. Leaves leathery, clustered near the ends of the branches, on stalks 1—1.5 inches long. Flowers 0.5 inch across, cream-coloured, on woolly stalks 1—1.5 inches long, in dense clusters near the ends of the branches below the terminal leaf-bud. Calyx leathery deeply lobed, lobes usually 4. Corolla fleshy and juicy with usually 8 or 9 lobes but sometimes only 7 or up to 14. Fruit a green juicy berry 1—2 inches long, containing 1—4 brown polished seeds 0.5 inch long.

The *mohwa* has a milky juice easily seen if the leaf-stalk is cut or broken across. The flowers appear in February to April when the tree is leafless or nearly so. The fruits ripen in June or July.

Uses:—The timber of the *mohwa* is hard, tough and durable but as the tree is valued for its flowers and fruits it is seldom felled for timber. The flowers are eaten either raw or cooked or made into sweetmeats. In order to collect the flowers the ground beneath the tree is cleared of grass and leaves so that the fallen corollas may be swept up each morning. A single tree is said to give from 2—4 or even up to 8 maunds of flowers. The flowers are sometimes fermented and distilled for spirit.

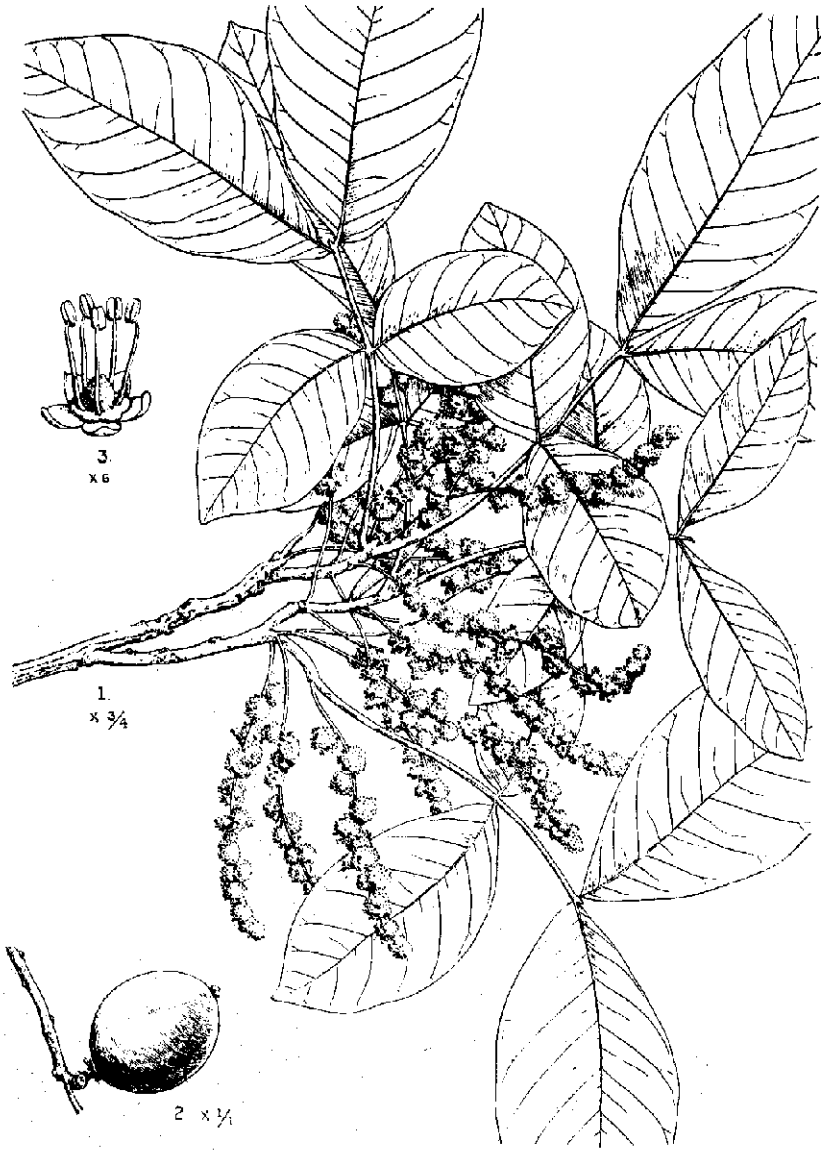
The seeds are crushed for oil. the oil being used as a substitute or adulterant for *ghee* and also for burning. The cake remaining from the oil-presses is used as a manure.

The dried milky juice and bark are used medicinally and the bark is also used as a dye.

Propagation:—By seed which being oily does not keep well. Fresh seed should therefore be sown and covered with half an inch of soil. As the seedlings do not stand transplanting well it is advisable to move them carefully when about one month old into flower pots in which they can be kept till big enough to plant. The growth in the first year is rather slow and the young seedlings require protection from frost.

Habitat:—Common in Central India and commonly cultivated in the plains of the United Provinces. Also found along the base of the Himalaya from the Ravi to Kumaon and in Upper Burma but perhaps not indigenous.

SCHLEICHERA TRIJUGA



SCHLEICHERA TRIJUGA.

FIG. 1—A flowering twig. FIG. 2—The fruit. FIG. 3—A male flower.

Kusum.

Schleichera is so named in honour of J. C. Schleicher, a Swiss botanist.

Trijuga in Latin means three yokes or pairs of leaflets.

Description:—A large deciduous tree, leafless for a short time only, trunk short, fluted, bark smooth grey, crown dense and shady. Leaves with 2—4 pairs of leaflets on a common axis 3—5 inches long. Leaflets of the lowest pair usually markedly smaller than those of the terminal pair. Flowers very small, yellowish-green. Fruits about f inch long, generally ovoid, beaked at the tip and sometimes with a few spiny excrescences, tough and leathery when fresh, containing 1 or 2 seeds. Seeds brown, enveloped in a succulent pulpy covering (aril) which has a pleasantly acid taste.

Young foliage various shades of red, turning light green and ultimately dark green. Flowers with the young leaves in March and April. Some trees bear male flowers, others bisexual flowers. The calyx is 1/10- inch across, 4—6 lobed. There are no petals. In male flowers the stamens are about 3 times as long as the calyx lobes, but in bisexual flowers scarcely longer than them, Fruit ripens in June and July.

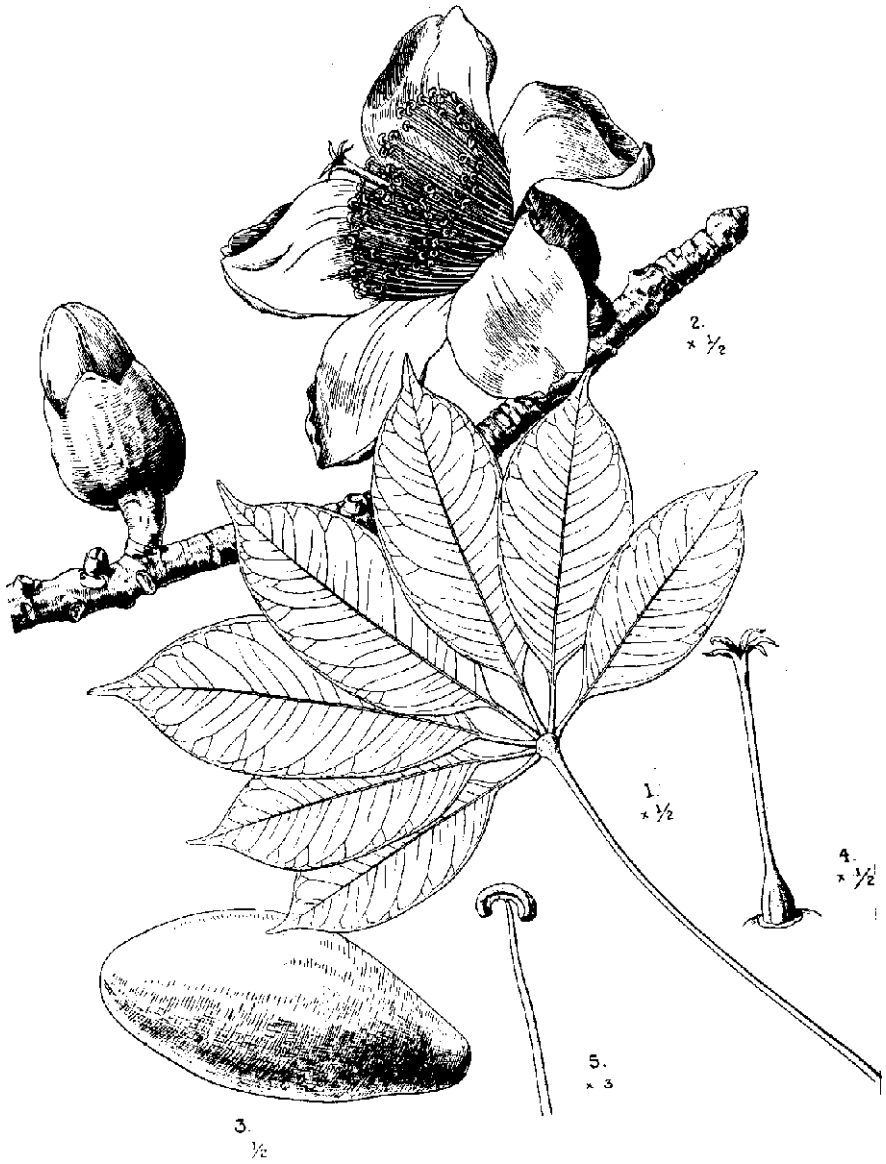
Uses:—The main value of this tree is as a host for the lac insect. The lac produced on *kusum* is considered to be the best quality. The seeds yields an oil used medicinally and for the hair. The young fruits are pickled and the aril of the seed is eaten. The timber is hard, durable, reddish-brown. It is used for wheels, axles, oil and sugar presses. The *Kusum* is an ornamental shade tree for gardens and can be recommended in places where it is not already common.

Propagation:—By seed which should be sown when fresh as it does not keep well. The growth is rather slow and the seedlings do not stand transplanting well. It is therefore advisable to grow the *kusum* in pots in which the plants can be kept till big enough to plant out. Young plants need protection from frost.

Injuries:—In some places the leaves of the *Kusum* are much disfigured by a leaf curl. If plants are carried from an area where this disease occurs to a fresh area the leaves should be stripped off and burnt so as to prevent the disease being carried with the plant.

Habitat:—From the Sutlej to Nepal, Central and Peninsular India and Burma.

BOMBAX MALABARICUM



BOMBAX MALABARICUM.

FIG. 1—A leaf. FIG. 2—A flowering twig. Fig. 3—A fruit. Fig. 4—The pistil. FIG. 5—A stamen.

Simal (Hindi). The Silk-cotton tree.

Bombax is from the Greek *bombux,* the silk-worm.

Malabaricum, in Latin means from Malabar.

Description:—A large deciduous tree, stem usually straight and undivided, branches in whorls, bark silvery grey, smooth. Young stems covered with sharp prickles on broad conical bases, old stems prominently buttressed at the base. Leaves composed of 5—7 leaflets, each on a stalklet about 1 inch long, inserted at the tip of the common stalk. Flowers very large, red or very rarely yellow. Petals 3—6 inches long, recurved over the calyx. Stamens very numerous, about 80, arranged in 5 bundles one opposite each petal and an inner bundle of 15 stamens. Fruit 4—6 inches long, woody, velvety outside, opening by 5 valves when ripe and liberating the seeds which are surrounded by white silky hairs.

Leafless from December to March or in moist situations only in February and March. Flowers from the end of January to early March.

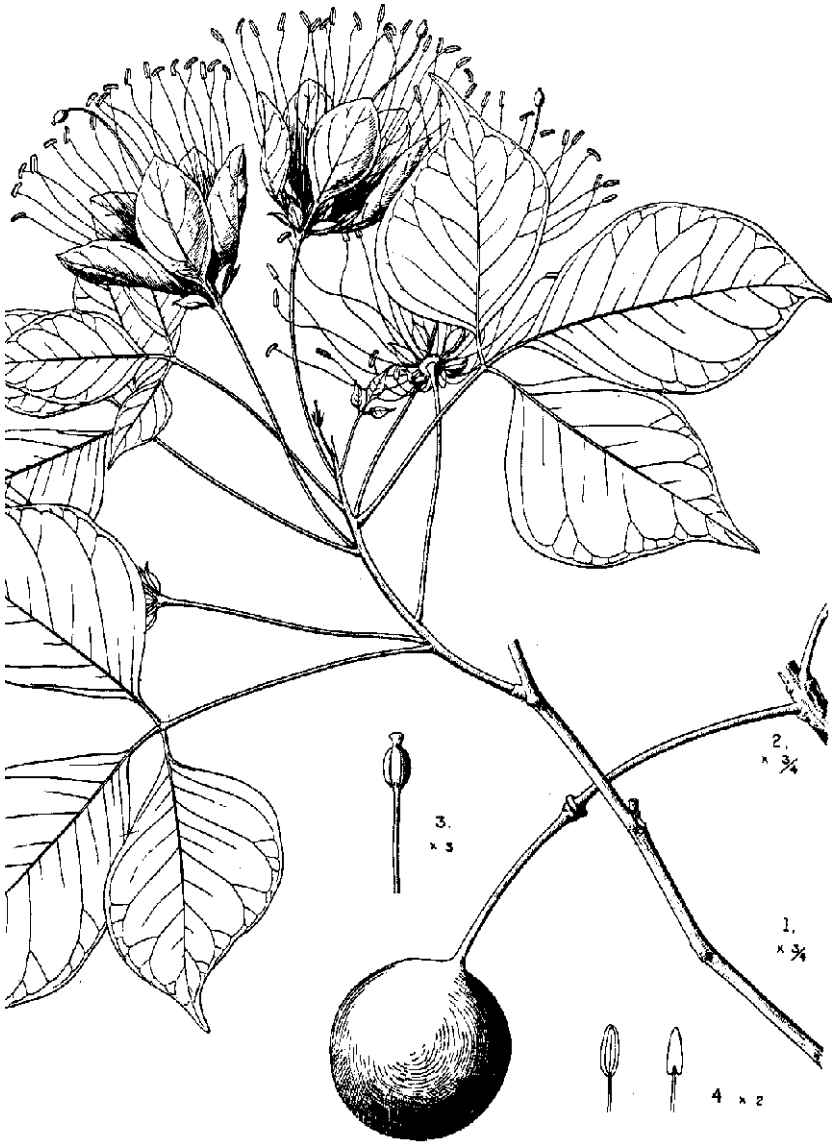
The *simal* sheds its branches in the same manner that trees shed their leaves. Branches 1 inch diameter or more may be picked up under the trees with smooth rounded ends showing that this has occurred and that they have not died and broken off as is usual with trees.

Uses:—The tree yields a gum which is used medicinally as an astringent in dysentery. The roots of young plants are also used medicinally. The flower buds are cooked and eaten as a vegetable. The timber is soft and not durable except under water. It is much in demand for planks, packing cases, dugouts and matches. Young poles are hollowed out and used as water pipes. Cattle eat the flowers and also the seeds. The hairs on the seed constitute the *simal* cotton used for stuffing pillows ; they are too smooth and silky to be spun for cloth. The inner bark yields a fibre used for ropes.

Propagation:—By seed or by cuttings. There is no special difficulty in growing the *simal* but to reach large dimensions it requires a deep soil with plenty of subsoil moisture.

Habitat:—Throughout India and Burma excluding the arid regions. It does best on the alluvial soil of river banks.

CRATEVA RELIGIOSA



CRATAEVA RELIGIOSA.

FIG. 1—A flowering twig. FIG. 2—A fruit. Fig. 3—The pistil on a portion of its long stalk. FIG. 4—Stamens.

Barna (Hindi).

Cratava is so named in honour of Crataevas, a Greek botanist who lived in the time of Hippocrates.

Religiosa in Latin means pertaining to religion. This name is not appropriate and is perhaps due to confusion with the *bael* tree—*Aegle marmelos,* a mistake frequently made by early writers both European and Asiatic.

Description:— A small or medium sized deciduous tree with nearly smooth pale grey bark. Leaves of 3 leaflets 2— 6 inches long on a common stalk 1.5—4 inches long. Flowers 2— 3 inches across, white, pale yellow or reddish yellow, in loose clusters each on a stalk 1—2 inches long. Sepals 4, deciduous. Petals 4, 1—1.5 inches long. Stamens numerous, longer than the petals. Ovary on a long stalk about l.5 inches long. Fruit a berry 1—2 inches long, globose or oblong, rind woody, seeds embedded in yellow pulp.

This tree is *very* variable, in fact there are several distinct species grouped together under this name. Some forms have the leaves green beneath, others whitish. The colour of the flowers and size and shape of the fruit varies in the different forms. The most marked differences are in the seeds which may be smooth or crested with hard points.

*Uses:—*The leaves and bark are used medicinally and the rind of the fruit is used as a mordant in dyeing. The wood is fairly hard, yellowish, smooth and even-grained. It is not durable but is used for making drums, combs and turnery articles. It is often planted for ornament as it is very handsome when in flower in April and May.

*Propagation:—*By seed which ripens about July. The seed being hard sometimes germinates a year after sowing. The tree produces root-suckers freely and these can probably be dug up and used for planting but definite information on the success of this method of propagation is lacking. The growth is rather slow and protection from cattle is necessary as the leaves are eaten readily.

*Habitat:—*Almost throughout India and Burma. The North Indian form is found in rather dry hilly places. Another form is found in South India and Burma along streams and in low-lying moist situations.

BAUHINIA PURPUREA

BAUHINIA PURPUREA.

FIG. 1—A flowering twig. FIG. 2—A fruit or pod. FIG. 3—Stamens. FIG. 4—The pistil with the ovary cut open to show the ovules.

The Geranium tree. The vernacular names are of local use and vary greatly from place to place.

Bauhinia is so named in honour of John and Caspar Bauhin, German botanists of the 16th century. The two leaflets united to-form a single loaf suggested the two brothers united in the study of botany.

Purpurea in Latin means purple and refers to the flowers.

Description:—A small or medium-sized tree with ashy grey or brown nearly smooth bark. Leaves cleft about half-way down with 9—11 strong nerves from the top of the stalk. Actually the leaf consists of two leaflets joined together thus making a characteristic leaf by which the *Bauhinias* can usually be at once recognized. Flowers usually rosy purple, large and showy, the flower buds 5-angled, appearing when the tree, is in leaf. Calyx consisting of a lower tubular portion less than J in. long and an upper portion (or limb) twice as long as the tube which usually splits into two reflexed segments, one notched at the tip, the other Smoothed. Petals 1.5—2 in. long. Stamens 3 or occasionally 4 fully developed. Pod 6—10 in. long 0.75-in. wide, bursting suddenly when dry, the valves spirally twisting owing to the unequal tension within which occurs during drying and ultimately causes the pod to burst and throws the seeds some distance away from the tree.

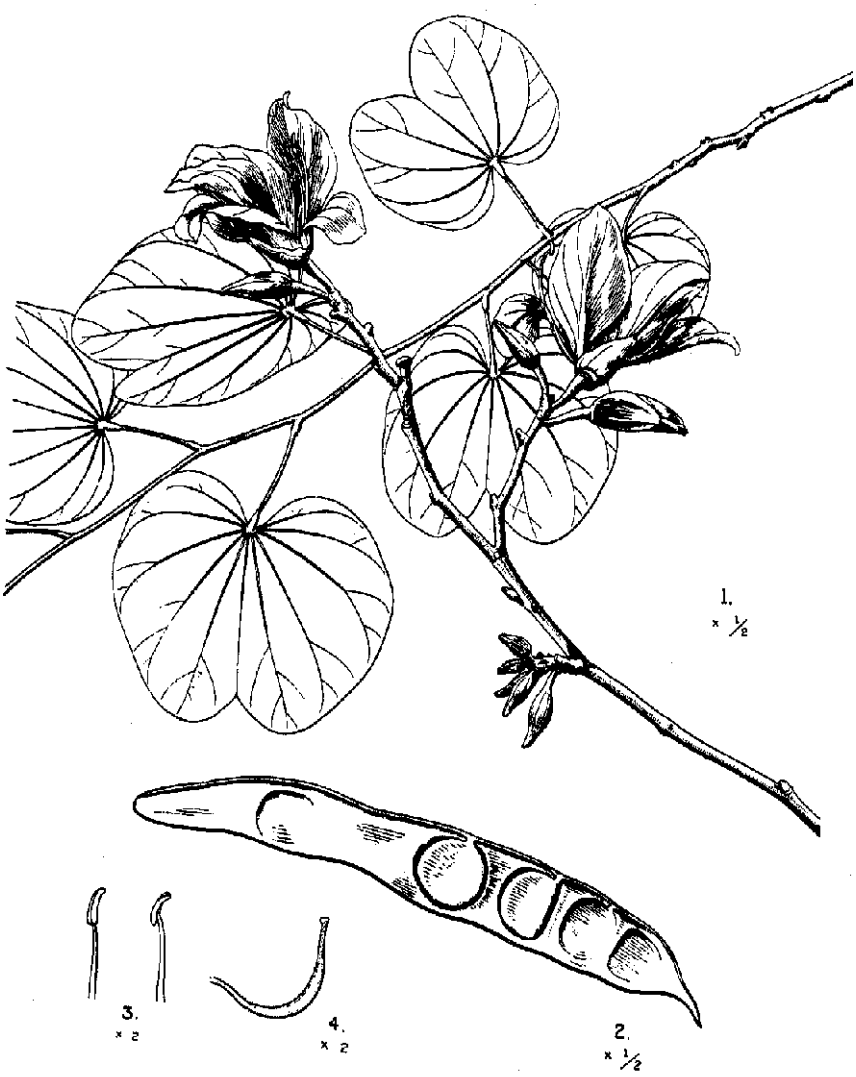
Flowers September to November. Pods ripen January to March.

Uses:—The chief use of this tree is for ornament. The bark can be used for dyeing and tanning. The flowers are used in curries or pickles and the bark is sometimes used for fibre.

Propagation:—Easily grown from seed and starts flowering at an early age.

Habitat:— Along the foot of the Himalaya from the Indus to Assam. Also on many of the hill ranges in Central and Southern India.

BAUHINIA VARIEGATA



BAUHINIA VARIEGATA.

FIG. 1—A flowering twig and a leafy twig. FIG. 2—One valve of the pod showing depressions from which the seeds have fallen. FIG. 3—Stamens. FIG. 4—The pistil.

Kachnar.

Bauhinia see under *B. purpurea.*

Variegata in Latin means variegated and refers to the flowers.

Description:—A small- or medium-sized tree with, brown slightly rough bark. Leaves cleft one-quarter to one-third the way down, with 11—15 strong nerves from the top of the stalk. Flowers appearing when the tree is leafless, large fragrant white or purplish, very often 4 petals are pale purple and the largest is darker purple with still darker veins. Calyx consisting of a lower tubular portion 0.5-1 in. long and an upper portion (or limb) which is not longer than the tube and 5-toothed at the tip. Petals 2-2.5-in. long. Stamens 5 fully developed. Pod 6-12 in. long by 0.5—1 in. wide, bursting elastically when ripe as in *B. purpurea.*

Flowers February to April that is to say when *B. purpurea* is in fruit which makes a convenient distinction between these two trees.

This tree is one that shows what are called "sleep-movements", that *is* to say at night the two leaflets of which the leaf is composed fold together so that-their upper surfaces are in contact. This is better seen in young rather than very old leaves. All Bauhinias show this movement more or less, some shut up more tightly than others and start at sunset, some start closing only when it becomes dark and do not shut completely. Many other plants such as the siris show these movements even better than *Bauhinia.* The object of leaves assuming a special position at night has never been satisfactorily explained. Changes of temperature appear to be the cause of the movement rather than changes of light.

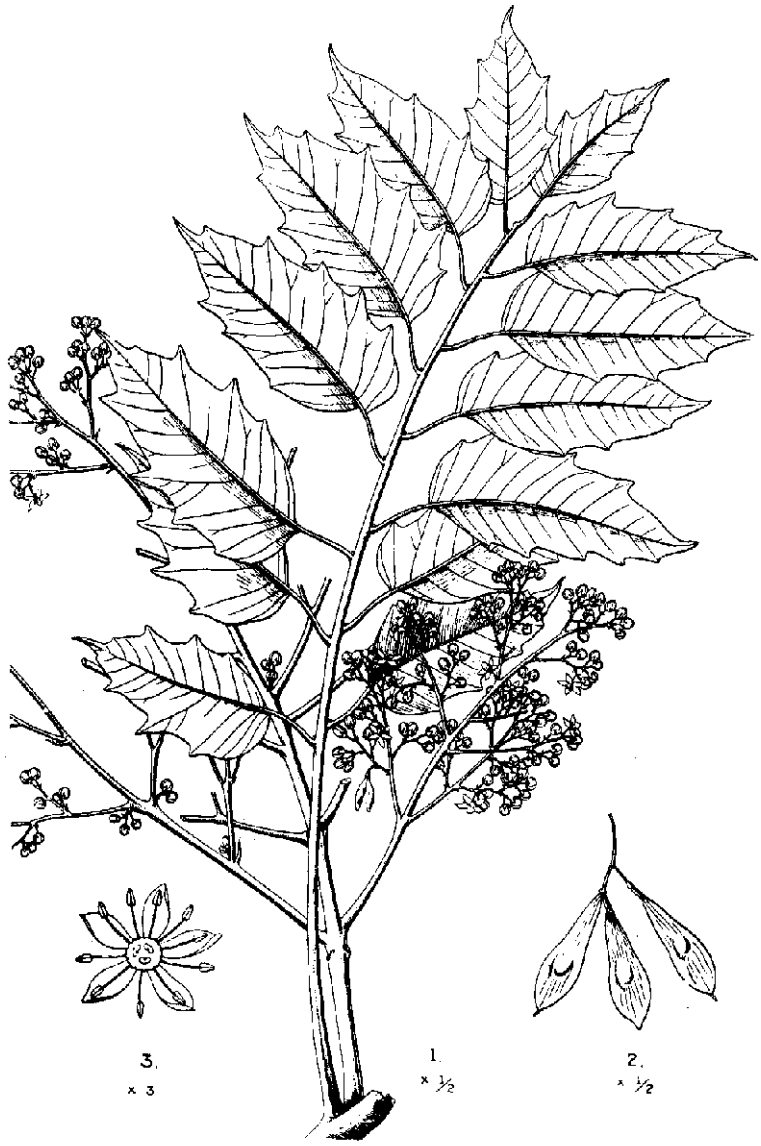
*Uses:—*This tree is often planted for ornament. The bark is used medicinally and trees arc often found damaged by its removal. The bark also yields a fibre.

Propagation:—It is very easily grown from seed and flowers at an early age when only 8 or 10 feet high.

*Injuries:—*Unauthorized removal of bark is the main cause of damage to which this tree is subject.

*Habitat:—*Throughout India in the hilly tracts, in somewhat dry rather than wet localities.

AILANTHUS EXCELSA



AILANTHUS EXCELSA.
FIG. 1—A flowering twig. FIG. 2—Fruits. FIG. 3—A flower.

Maharukh (Hindi) Arau (U. P.) Arua (Rajputana).

Ailanthtis is from *ailanto* which means Tree of Heaven and is the name for one of the species in the Moluccas.

Excelsa in Latin means tall.

Description:—A. large deciduous tree with stout stem and granular bark nearly smooth except on large trees. Branches rather large starting at right-angles from the stem and then curving upwards. Twigs thick, marked with large scars of the fallen leaves. Leaves large 2-3 ft. long with 8-14 pairs of leaflets. In young trees there is usually a terminal leaflet in addition to several pairs of leaflets. Leaflets very unequal-sided at the base, coarsely toothed, dull green, softly hairy especially beneath when young, on rather long stalks. Flowers yellowish-green, small but occurring in big bunches in April and May. Fruit l.75 - 2 in. long, 0.5 in. wide, thin, strongly nerved, twisted at the base bearing a solitary seed in the middle.

The fruit is very light and is designed so that it can be scattered far and wide by the wind.

*Uses:—*The tree is chiefly used as a shade tree. It is often seen as a roadside tree in hot dry parts of India as it is of rapid growth and easy to handle. The bark is used to some extent as a febrifuge and tonic and as a medicine for cattle. The wood is very light, soft but rather coarse in grain and not durable. It is used for special purposes such as floats, sheaths of swords, etc.

*Propagation:—*By seed which ripens in May or June and should be sown soon after ripening as it does not keep well. The seed or rather the whole fruit should be sown in porous soil and too much moisture should be guarded against as the young plants are apt to " damp off' If sown in nursery beds the beds should be well raised to allow for drainage. The fruits should be lightly covered with soil, scarcely more than sufficient to prevent them being blown away. The tree may also be grown from cuttings. Even large cuttings are said to root easily. Young plants are sensitive to frost and in places where the winters are damp as well as cold, seedlings are not easily grown.

*Habitat:—*The Indian Peninsula except in the coastal region and some of the driest parts.

SAPINDUS MUKOROSSI

SAPINDUS MUKOROSSI.

FIG. 1—A flowering twig FIG. 2—A flower. FIG. 3—Fruits.

Ritha, dodan, thali. The Soap-nut.

Sapindus is from the Latin *sapo,* soap and *indicus,* Indian,

Mukorossi, the Japanese name of this tree.

Description:—A fairly large deciduous tree, bark grey smooth or nearly so. Leaves mostly 12—18 inches long, composed of 5—10 pairs of leaflets. Flowers small, greenish-white, in large loose pyramidal bunches at the ends of the branches. Fruit 1 inch diameter, globular, usually solitary but sometimes two together, smooth, with yellow flesh, containing a solitary smooth black globular very hard seed.

This tree has much the appearance of the *toon (Cedrela toona)* but has nearly smooth bark. The leaves turn a pleasing yellowish colour before being shed in December. The young leaves are light green and appear in March or April. The fruits ripen in October or November but do not fall readily and are often conspicuous when the tree is leafless.

Uses:—The fleshy portion of the fruit contains saponin and lathers with water. It is much used as a substitute for soap. For washing woollen articles it is preferred to soap as also for washing the hair.

Propagation:—By seed which being very hard docs not germinate for 3 or 4 months and sometimes not till the following year. Seedlings do not stand transplanting well and should be moved carefully. The growth is not fast. The soap-nut does best in localities with a good rainfall and needs a moist cool situation in places where the rainfall is scanty.

Habitat:—A native of China, much cultivated in Northern India especially in the moister tracts along the foot of the Himalaya and up to 4,000 feet in the outer Himalaya.

AZADIRACHTA INDICA

AZADIRACHTA INDICA.

FIG. 1—A flowering twig. FIG. 2—Fruits. FIG. 3—A flower enlarged. FIG. 4—The pistil much enlarged.

The Nim or Margosa tree.

Azadirachta from the Persian *Azad-darakth,* the name of *Melia azadarach* to which the *nim* is allied.

Description:—A medium-sized to large evergreen tree. Bark some what rough, grey. Leaves bright green consisting of 9-15 leaflets. Each leaflet oblique or slightly curved, coarsely toothed, shining on the upper surface. Flowers rather small, whitish, scented, appearing from March to May. The arrangement of the stamens is peculiar, their stalks (filaments) are united into a tube, the heads (anthers) of the stamens are situated inside the tube and near its top which is 10-toothed. Fruit 0.5-0.75 in. long, longer than broad, greenish-yellow when ripe, 1-seeded.

*Uses:—*The *nim* is a tree of many uses. The best known part is the leaves which are used to keep insects out of clothes, books, etc. The dry powdered leaves when burnt are said to give a vapour fatal to insects. A gum which exudes from the bark is used medicinally as a stimulant. The seeds give oil used by the poorer classes for burning and as an antiseptic dressing for ulcers and in skin diseases. Internally the oil is an anthelmintio. The residue or cake left after the oil has been ex-pressed from the seeds is used as a manure and is said to be useful in keeping white ants away from plants in the ground. The bark is bitter and is used as a remedy for fever and as a tonic. The sap is used also as a tonic. Occasionally a *nim* tree exudes sap spontaneously sometimes in extraordinarily large quantities or the sap may be collected in a pot placed beneath a severed root. The timber is durable and is used, for carts and other purposes. The twigs are used as tooth-sticks. The tree is very often planted for shade along roads, etc.

Propagation:—By seed. As in the case of most oily seed, the seed of the *nim* does not keep. It ripens in the first half of the rains and should be sown as Boon after collection as possible.

*Injuries:—*The *nim* is very sensitive to frost and young plants damaged by frost do not recover easily. For this reason it is not a common tree in the Punjab except in the east of the Province. Young plants are very liable to be damaged by porcupines and are often seen coming up in thorny bushes which protect them. If planted on flat ground care should be taken to prevent water remaining round the tree during the rains as it dislikes too much, moisture.

*Habitat:—*The *nim* is believed to be indigenous to Upper Burma and possibly to the Deccan and other parts of South India. It has been so much cultivated and spreads so readily from planted trees that its original home is now impossible to determine.

MILLINGTONIA HORTENSIS

MILLINGTONIA HORTENSIS.

FIG. 1—A flowering shoot. As the branches are pendent, this figure is more natural if viewed upside-down. FIG. 2—The pistil. FIG. 3—Apex of the corolla split open to show the stamens.

The Indian Cork tree. Akas nim (Hindi).

Millingtonia is so named in honour of T. Millington, an English botanical writer of the l5th century.

Hortensis, in Latin means pertaining to a garden. For a long time this tree was only known in cultivation and its habitat was doubtful.

Description:—A. tall evergreen tree with narrow crown and yellowish-grey corky bark. Leaves large much divided into leaflets 1-2 inches long. Flowers white, sweet-scented, appearing in the cold weather at the ends of the pendent branches. Corolla 1 inch across, with a slender tube 2-3 inches long. Fruit pod-like, 12 inches long 0.75-inch broad, splitting into 2 valves when ripe, seeds flat with a broad delicate wing.

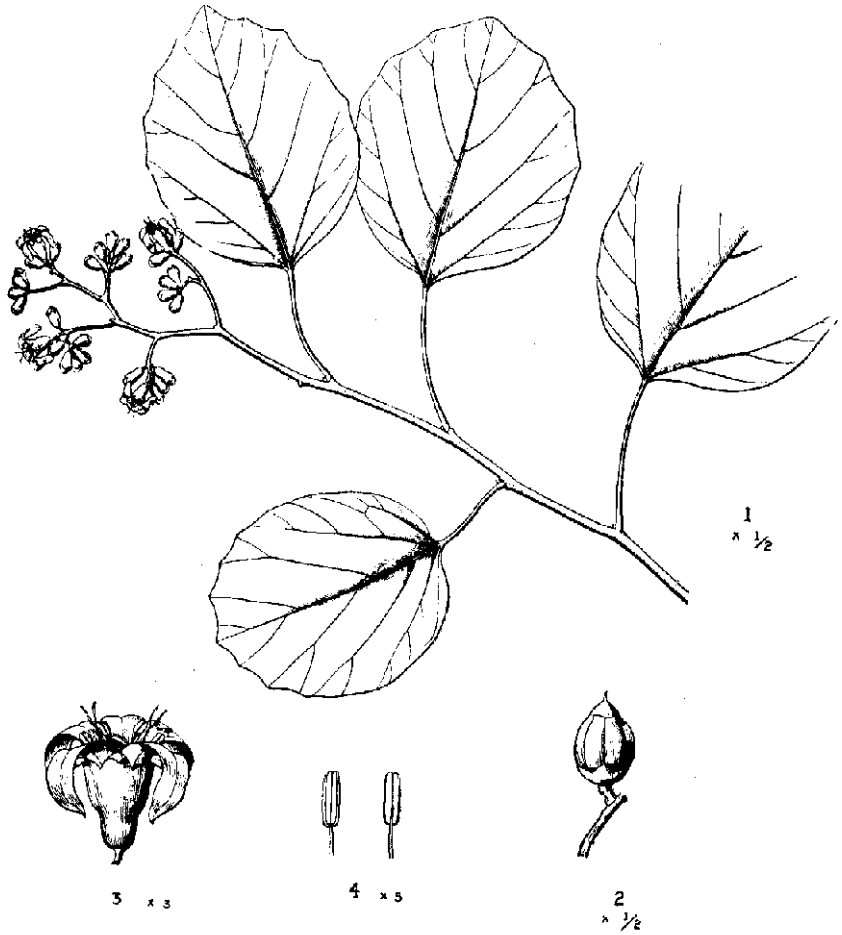
*Uses:—*This tree is only used for ornament. It is a handsome tree growing to a great height and makes an excellent avenue but owing to its height and to the tree being brittle it suffers much from storms. Although often, badly broken and disfigured by storms, its rapid growth and great powers of recovery soon repair the damage.

The flowers are sweet-scented at night and are evidently designed to attract moths which thanks to having a long proboscis are enabled to reach the nectar at the base of the long tubular corolla,

*Propagation:—*Seed is not produced in many parts of India and consequently the tree is reproduced by root suckers. The root-system is superficial and large specimens are generally surrounded by suckers which may be dug up and replanted. The tree is very hardy and often does well in dry places where few trees will grow. Its shallow roots make it unsuitable for general planting in gardens and its brittle nature make it inadvisable to plant it near buildings, electric-light wires, etc.

*Habitat:—*Indigenous to parts of Burma. Cultivated throughout India and naturalized in Orissa, Madras, etc.

CORDIA OBLIQUA



CORDIA OBLIQUA.

FIG. 1—A flowering twig. FIG. 2—A fruit. FIG. 3—A flower. FIG. 4—Stamens.

Lassura (Hindi).

Cordia is so named in honour of E. Cordus, a (German physician and writer on medicinal plants in the 16th Century.

Obliqua in Latin oblique or asymmetrical.

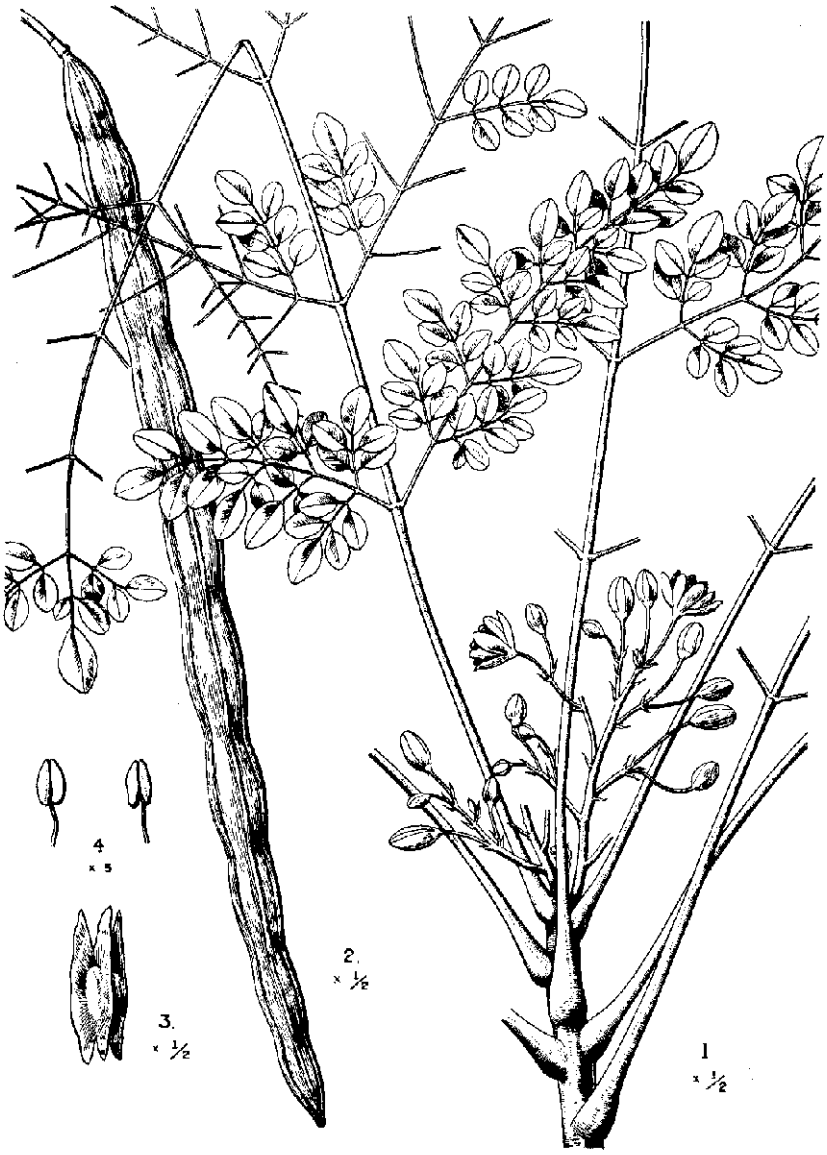
Description:- A small to medium-sized deciduous tree. Bark greyish-brown with shallow longitudinal fissures. Leaves 3-5 inches long, more or less broadly rounded in outline, leathery and rather harsh to the touch, with 3 or 5 strong nerves from the apex of the stalk which is about 1 inch long. Flowers about 0.3 inch across, white, in loose bunches at the ends of the short side branches. Fruit 0.5-1 inch loop, ovoid, yellowish or pinkish, finally black, seated on the enlarged saucer-shaped calyx. Each fruit contains a hard stone in a very viscid edible pulp.

*Uses:—*The fruit is eaten and the pulp of the fruit and bark are used medicinally. The bark is used for fibre and the leaves as plates. The timber is soft but fairly strong. It is used for boat building and for agricultural implements. The tree is variable and some forms in cultivation have fruits considerably above the average size.

*Propagation:—*By seed which ripens in June or July. The stones should be removed from the pulp before sowing. This is a safe rule to apply to all pulpy fruits. In some cases it is not necessary but in others unless the seed is cleaned from the pulp of the fruit it will not germinate. The stones should be covered with \ inch of soil and be watered regularly. Some will germinate in about a month, others take longer, up to 3 01 4 months. The seedlings do not make much growth in the first year and should be transplanted in the second rainy season. Growth after the first year is fairly rapid. The tree is not ornamental and has little to recommend it.

Habitat:- Almost throughout India, Burma and Ceylon, It is common near villages having sprung up in hedges from seeds scattered by birds.

MORINGA OLEIFERA



MORINGA OLEIFERA.

FIG. 1—A flowering twig. FIG. 2—A fruit. FIG. 3—A seed. FIG. 4—Stamens.

The Horseradish tree. Sohnjna (Hindi).

Moringa is the Tamil name for this tree.

Oleifera in Latin means oil-bearing.

Description:- A small to fairly large deciduous tree with thick corky bark. Leaves 1-2.5 feet long, much divided into leaflets which arc It-, inch long. Flowers appearing with the young leaves, 1 inch across, white, honey-scented, in large loose dusters 0-9 inches long. Fruit pod-like, 9-20 inches long, about 0.75 inch thick, 3-angular, pendulous, breaking tip into 3 valves when ripe, Seeds 3-angled, winged at the angles, 1 inch long including the wings.

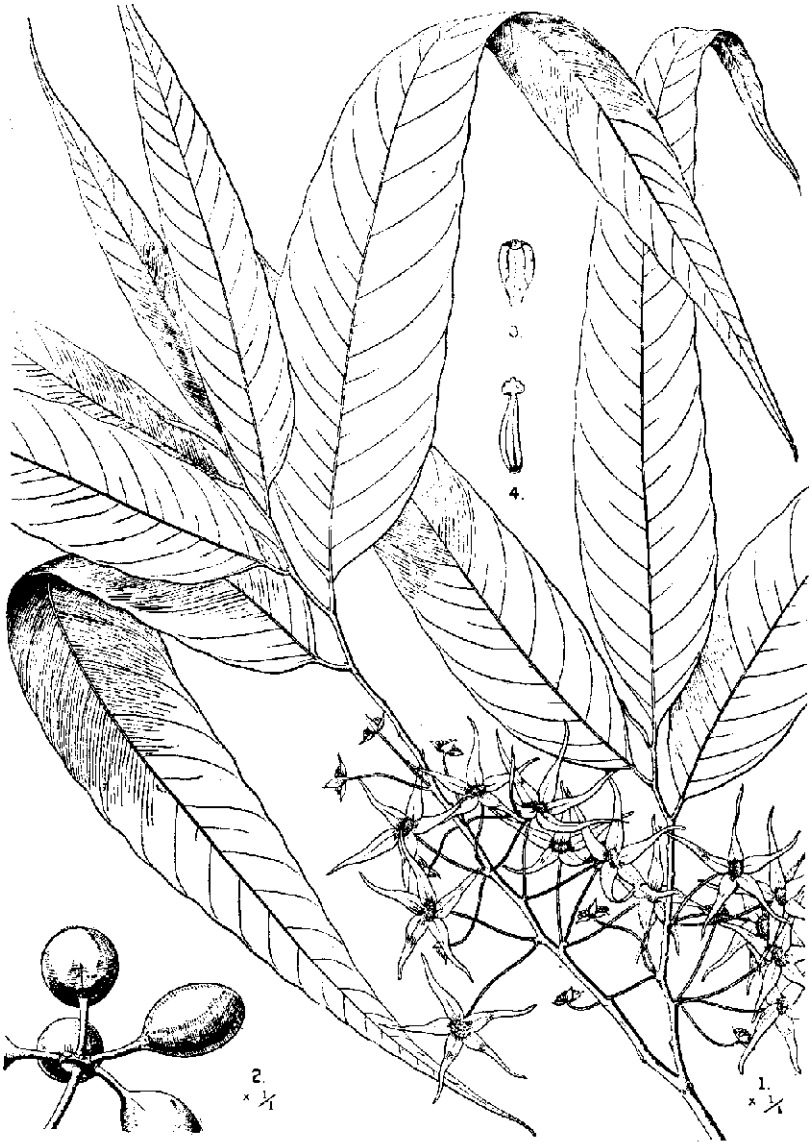
A very elegant true leafless for a short time before it flowers in February to April. Fruit ripens about 3 months alter flowering.

Uses:- The leaves, flowers and young fruits are eaten as a vegetable. The young roots furnish a substitute for horseradish and are used medicinally as is also the gum obtained by tapping the bark. The seeds yield an oil similar to *ben* oil, the product of an African species of *Moringa,* Like the true *ben* oil it is used by watch makers and also by perfumers as it 1ms the property of absorbing and retaining fugitive odours. The tree is often lopped for fodder especially for feeding camels. The wood is spongy, perishable and useless.

Propagation:- By seed which germinates soon after sowing but like all oily seeds does not keep well. The young plants are hardy and easy to handle. It may also be grown from cuttings, even large pieces rooting readily.

*Habitat:—*Indigenous along streams and rivers in the sub Himalayan tract from the Chenab to Bengal. Commonly cultivated almost throughout India especially in villages.

POLYALTHIA LONGIFOLIA



POLYALTHIA LONGIFOLIA.

FIG. 1—A flowering twig. FIG. 2—Fruits. FIG. 3—A stamen. FIG. 4—A carpel.

Debdar (Northern India) Asoke (Southern India).

Polyalthia, from the Greek *polys,* much and *altheo,* to cure, referring to supposed medicinal properties.

Longifolia, in Latin means long leaves.

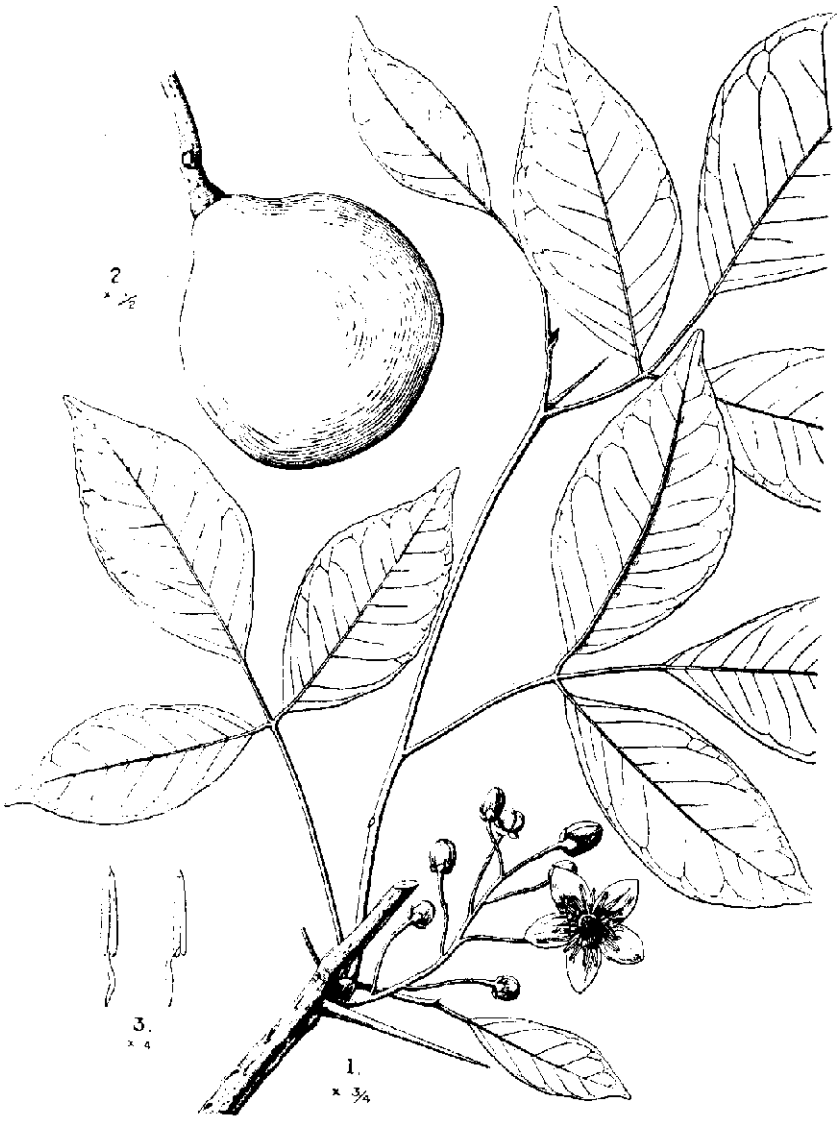
Description:—A. tall evergreen tree with straight stem and rather slender branches which spread more or less at right-angles from the stem. Leaves 5-8 in. long, shining, narrowed to a long point, undulate or wavy. Undulate leaves are not common and make this tree easy to recognize. Flowers yellowish green, on long slender stalks, appearing from February to April. Fruits egg-shaped, 0.75 in. long, several produced from one flower, each being on a stalk 0.5 in. long and containing one seed.

*Uses:—*For ornament. This tree is often planted near temples and in the warmer and moister parts of India it is frequently used as an avenue tree. Elsewhere it is found planted in gardens and requires a position sheltered as far as possible from hot dry winds.

*Propagation:—*By seed which ripens in July or August and should be sown as soon as ripe as it dons not keep well. The tree grows slowly and does not transplant well so that it is advisable to keep it in a flower pot till big enough to plant out.

*Habitat:—*Indigenous to Ceylon, It is now found growing wild in the extreme south of India having spread from planted trees.

AEGLE MARMELOS



AEGLE MARMELOS.

FIG. 1—A flowering twig. FIG. 2—A fruit. FIG. 3—Stamens.

The Bael tree or Bel

Aegle was the Latin name for one of the Hesperides, throe sisters who aided by a dragon guarded the golden apples belonging to Hera.

Marmelos is from a Portuguese name for this tree "marmelos de Bengala" *i.e.,* Bengal quince.

*Description:—*A small or medium-sized deciduous tree armed with straight thorns about 1 inch long. Leaves consisting of 3 leaflets of which two have hardly any stalk and the central one has a fairly long one. Flowers greenish-white, sweet-scented, about 1 inch across. Petals 4, rather thick, dotted with glands, fruit spherical, varying in size from 2 - 7 inches diameter, grey or yellowish, with a hard woody rind, Seeds numerous embedded in an orange-coloured pulp.

The leaves when held up to the light show translucent dots due to small cavities filled with oil and when crushed they are aromatic.

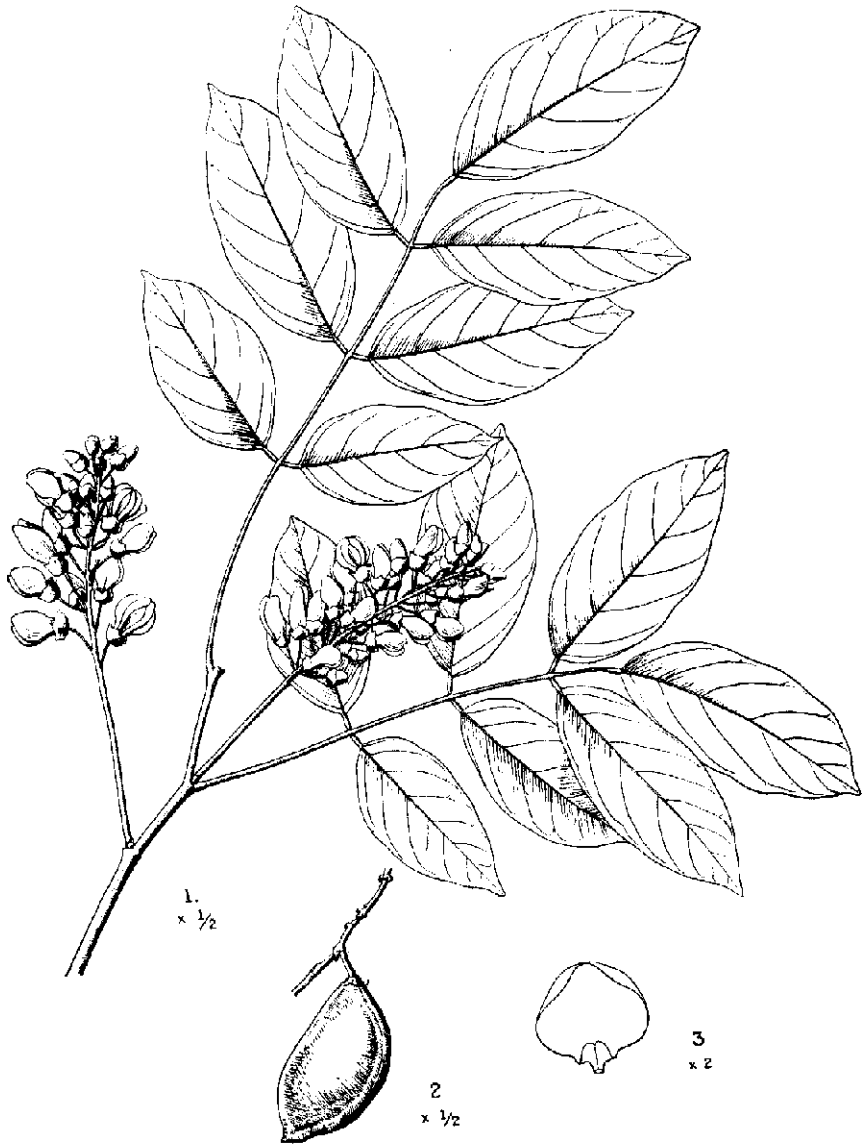
Uses:- The *bael* tree is sacred to Hindus the leaves being used in the worship of *Siva.* It is therefore sometimes planted near temples. The fruit is used as an astringent in diarrhoea and dysentery for which purpose either the unripe fruit or the small fruited wild forms are preferred. The pulp of the ripe fruit makes a refreshing sherbet. A gummy substance found round the seeds is used in lime plaster if a polished surface is required or for use under water. The rind of the fruit is used for snuff bo VPS.

As a fruit tree some of the cultivated forms should be selected as the fruits may be 7 inches diameter whereas the wild forms are only 2—4 inches diameter. The *bael* flowers in May and June and the fruits ripen about a year later.

*Propagation:—*By seed which should be taken from ripe fruit on the tree. The seed does not keep well and those in fallen fruits are apt to be useless for sowing. The growth is slow and trees do not start to fruit till they are 5- 8 years old and arc not in full bearing till 25—30 years old. The tree produces root-suckers rather freely and these can be used instead of seedlings. Root-suckers taken from a good tree are much to be preferred to seed from an unknown source if large-fruited plants are required.

Habitat:— Throughout India except in the very moist and very dry parts.

PONGAMIA GLABRA



PONGAMIA GLABRA.

FIG. 1—A flowering twig. FIG. 2—A fruit or pod. FIG. 3—The largest of the petals.

Papar, Karanji (Hindi).

Pongamia is from the Tamil name ponga or pongam.

Glabra in Latin means smooth, without hairs.

Description:—A medium-sized, nearly evergreen tree with short bole and spreading shady crown, bark smooth, grey. Leaves composed of 5, 7 or 9 leaflets on a common axis swollen at the base, bright green and rather glossy. Flowers 0.5 inch long, white tinged with pink or violet, on stalks about 1/3- inch long inserted several together on the swollen nodes of a common axis. Pod 1.5—2 inches long, 0.75—1 inch broad, woody, yellowish-grey when ripe ultimately becoming dark grey, not opening when ripe, containing one or sometimes two, reddish-brown seeds.

Flowers April-June. Pods ripen March-May of the following year.

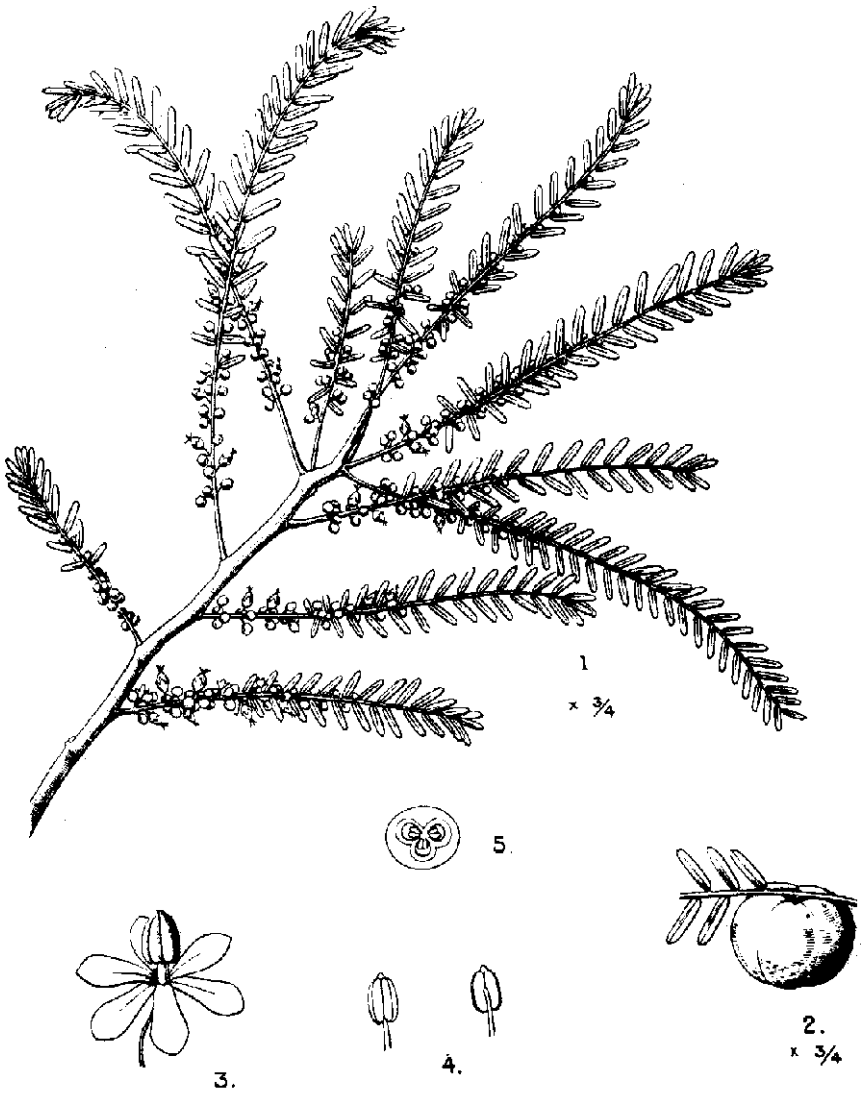
Uses:—Mainly used as a shade tree. The seeds give a thick reddish-brown oil used for burning and also medicinally for skin diseases.

Injuries:—In some places the leaves are much disfigured by round grey spots caused by an insect which mines in the leaf eating the green tissue. If plants are taken to a locality where this form of injury does not occur, the leaves should be stripped off and burnt.

Propagation:—Easily grown from seed which should be removed from the pods to hasten germination. It can also be grown from cuttings. As the tree is naturally branchy, pruning should be done when the tree is young until a sufficient length of straight stem has been obtained.

Habitat:—Sandy beds of streams and on the sea coast. It is now found wild in most parts of India but has undoubtedly spread in many places from planted trees.

PHYLLANTHUS EMBLICA



PHYLLANTHUS EMBLICA.

FIG. 1—A flowering twig. FIG. 2—A fruit. FIG. 3—A male flower enlarged. FIG. 4—Stamens. FIG. 5—The ovary in cross-section.

Aonla (Hindi). The Emblic myrobalan.

Phyllanthus from the Greek *phullon a* leaf and *anthos* a flower. Some species have flattened leaf-like branches on the edges of which the flowers are borne.

Emblica:—Myrobalanus Emblica was the name used for this tree or its fruit by early pharmacists, *i.e.* the Emblic myrobalan. It has been derived from the Persian amlah and Arabic ambalji.

Description:—A small or moderate-sized deciduous tree with smooth grey bark, often mottled owing to scales of bark falling and exposing a fresh surface of a different colour from the older bark. Leaves very small about 0.5 inch long and 1/10 inch wide, arranged in two rows on either side of the slender twigs and having the appearance of a compound leaf with numerous leaflets. Flowers unisexual, male and female, both very small, greenish, in small clusters, often on the naked portion of the twigs below the leaves. Fruit about f inch diameter, orange-shaped, yellowish green, fleshy, containing a 6 ribbed stone which ultimately splits into 3 portions each containing usually 2 seeds.

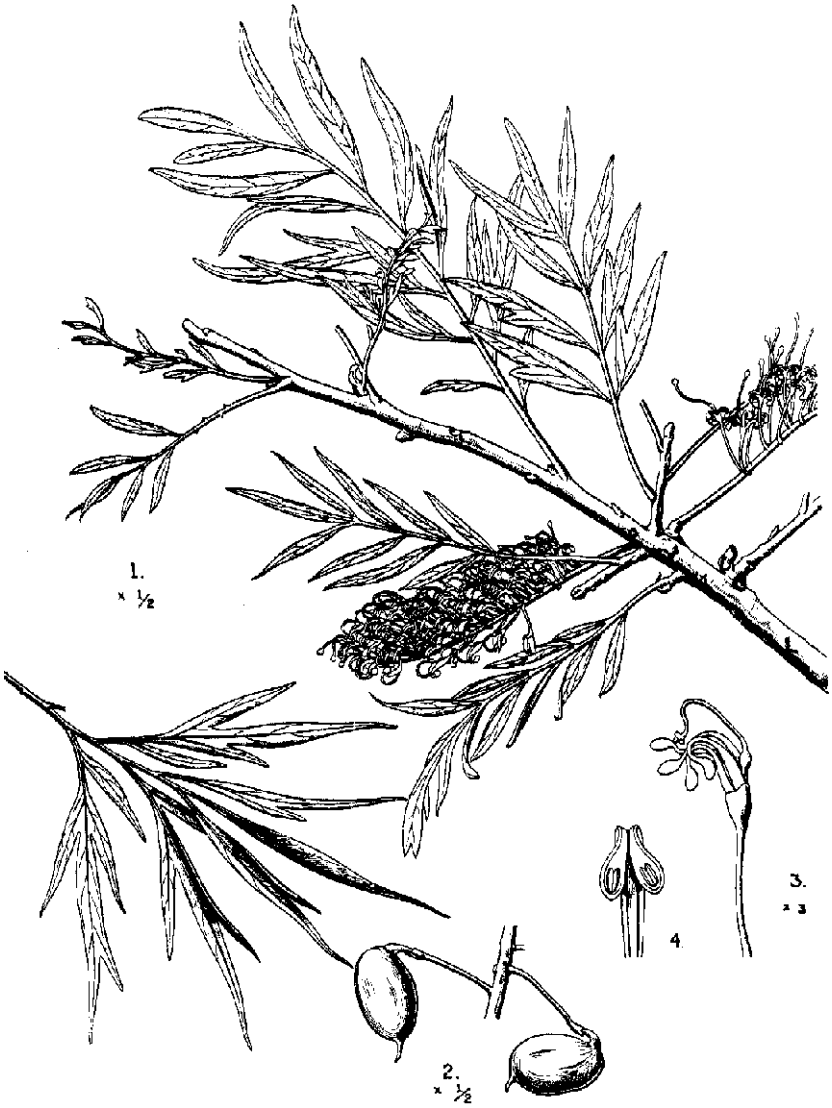
This tree has the peculiarity of shedding its twigs with the leaves attached which is very unusual in broad-leaved trees though often met with in conifers. Flowers in March-May. Fruit ripens November-February.

Uses:—The fruit, bark and leaves are used in tanning and dyeing. The fruits are eaten, usually pickled as they are very astringent. They are also used medicinally. The timber is hard and red but as it splits badly it is little used.

Propagation:—By seed but much of the seed is infertile. The ripe fruits should be kept in the sun till they dry and the stones split thus allowing the seed to escape. The seed should be sown in March and be kept regularly watered. The seedlings should be big enough to plant out as soon as the rains commence. The growth during the first few yean is fairly rapid but later on it becomes somewhat slow.

Habitat:—Throughout India and Burma excluding the arid region.

GRAVILLEA ROBUSTA



GREVILLEA ROBUSTA.

FIG. 1—A flowering twig. FIG. 2—Fruits. FIG. 3—A flower. FIG. 4—Two petals with two stamens.

The Silky Oak.

This name refers to the timber which is like that of the oak, otherwise the tree in no way resembles the oak.

Grevillea is so named in honour of C. F. Greville, at one time Vice-President of the Royal Society.

Robusta in Latin means robust or vigorous.

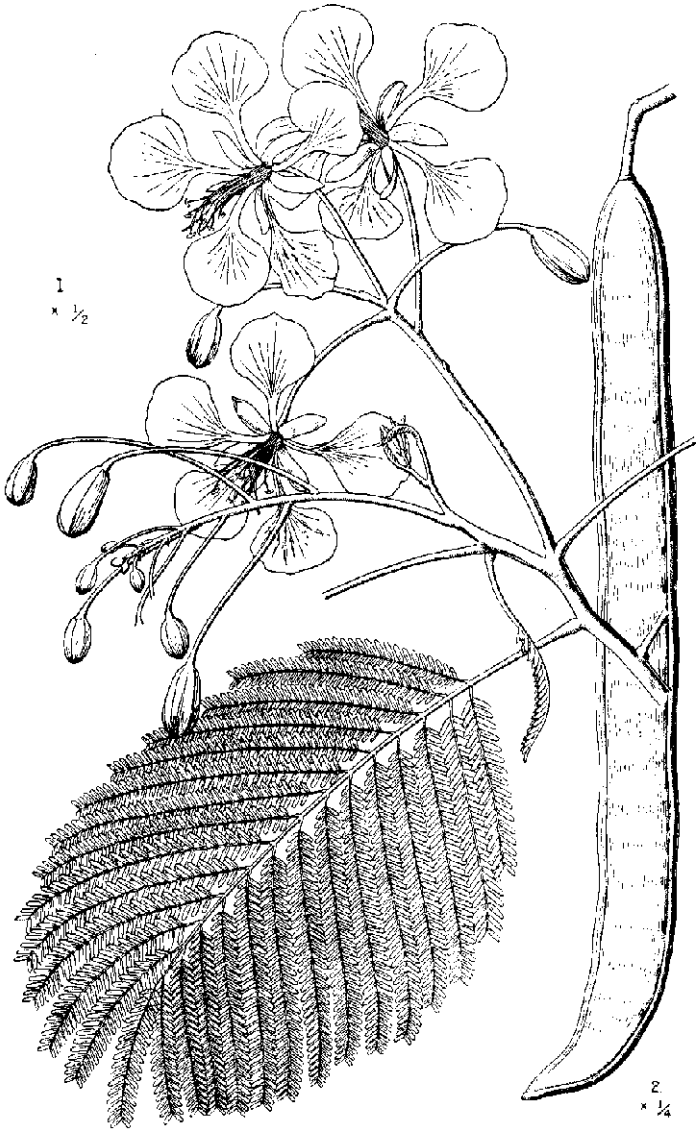
Description:—A moderate sized evergreen tree with a long conical crown when young. Bark dark grey, rough. Leaves 6—12 inches long, much divided and fern-like, the ultimate segments narrowly oblong, acute with recurved margins, firm and tough, dark green above, grey silky beneath. Flowers orange-yellow or "old-gold" in colour, about half an inch long, densely arranged on axes 3—4 inches long which appear on dwarf leafless branches below the leaves. Corolla tubular splitting down one side, the 4 segments of the apex cohering long after the tube has split open. Fruit dry, nearly 0.75 inch long and 0.5 inch broad, oblique, splitting down one side and liberating 1 or 2 seeds. Seeds light, winged all round.

Uses:— For shade and ornament When young the fern-like foliage is attractive and the tree is very ornamental but when old it is apt to become ragged and loses most of its ornamental value. The flowers are produced freely in March to May. In its native country the timber is considered durable and has a bold handsome appearance if the logs are cut in a radial plane.

Propagation:—By seed. It is very easily raised from seed and grows rapidly for 15 to 20 years after which it should be cut down and replaced.

Habitat:—Native of Australia in Queensland and New South Wales. Much planted in India, in gardens, at railway stations, on tea estates, etc., etc.

POINCIANA REGIA



POINCIANA REGIA.
FIG. 1—A flowering twig. FIG. 2—A pod.

The Gold Mohur. Gul Mohr.

Poinciana is so named in honour of M. de Poinci, a governor of the West Indies and a patron of botany.

Regia in Latin means royal.

Description:—A large nearly evergreen tree with a broadly spreading crown of light feathery foliage. Leaves up to 2 ft. long, divided up into numerous leaflets about 1/3 inch long and 1/8 inch wide. At the base o£ the leaf-stalk two peculiar scales (stipules) are found which have long narrow comb-like teeth. Flowers 4 inches across, bright scarlet, very freely produced in the hot weather. Pod 1-2 feet long, 2 inches broad, thick and firm. Seeds arranged at right angles to the length of the pod, oblong, mottled.

Uses:—Much planted for ornament throughout the warmer parts of India and in all tropical countries. It is one of the most gorgeous of flowering trees.

Propagation:— By seed which being very hard and bony often takes a long time to germinate. Seeds often lie for 2 or 3 years in the soil without germinating and appear just as hard as they were when sown. Soaking the seed in hot water or filing the seed so as to reduce the thickness of the outer coat may be tried but these expedients do not seem to be very successful. The best plan-is perhaps to sow plenty of seed as some germinate much sooner than others. The tree is very sensitive to frost and is difficult to grow in places where even light ground frosts occur. In favourable places it is a rapid growing tree but not long lived.

Habitat:—Said to be a native of Madagascar but is apparently not found growing naturally there. It is believed that the forests in which it was native have been destroyed to make room for cultivation and that in consequence it is not now found growing under natural conditions.