

# The Comparison between the Modern Science of Plants and Kālidāsa's Plants

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## ABSTRACT

According to ancient Indian seers plants are living beings. Only the conscience is internal or dormant. However, the ancient scholars of India studied the plants mainly for the medicinal purposes. Starting from Rgveda to modern age of 21<sup>st</sup> century plants have been analysed from the point of view of the taxonomy, classification and usage. As the names of plants mentioned in the ancient scriptures, are recorded mostly in the sonnets or verses. In modern days plants are studied from the angle of the importance and nature of plants products. The living substance in the plants is called protoplasm, through which the various characteristics of plants are registered. The plants manufacture their colouring agent itself. These are called pigments. plants also have Latex which is the juice of the plants.

Plants are classified as Angiosperm and Gymnosperm. That group of plant is called angiosperm whose flowers hold the reproductive parts of the plants. The smallest flower in the family of angiosperm is Lemna. If the plant has one seed leaf it is called Monocots otherwise the two or more seed leaf plant is called Dicots The plants mentioned in Sanskrit works are also the subjects of modern science. The only difference being the botanical name of the plant along with the specie mentioned in the books of science.

The tree **Asoka** is called Asoka in English and **Saraca Aśoca** in Botany. It is a tall tree with flowers of red and orange colour and nice fragrance. Kālidāsa very aptly mentions the special treatment for blossoming of flowers on the tree. De candolle in 1883 divided in plants, into six groups where **Mango** is said to be cultivated for over 4000 years. Mango is called **Mangifera Indica**. In Botany. Kālidāsa also mentions the different varieties of Mango. (**Amra, Sahakara, Chuta**) **Candana** is **Santalum Album**, as it known in Botany. The sandal wood oil. The oil is used in the oriental countries as Perfume as well as medicine. It In Kālidāsa's works the paste of wood is used as a body ointment to get ritz of the sunheat

**Sugarcane** in English, is known as **SACCHARUM OFFICINARUM**. According to the poet also the sugarcane becomes readily for consumption in the winter. It is sweet and is used for making **jaggery**. Among the varieties '**Saliksu**' in the best one. It gives deep shade. **Jambu** is known as **Jambolan** or **Java plum** and **Indian black berry** in English whereas the botanical name is **SYZYGIUM CUMNII**. Kālidāsa says the medicinal potentialities of the leaves whose sap diluted in water can cure the after-effect of vomiting.

**KEYWORDS:** plants, science, taxonomy, Lemna, Monocots, Dicots

## INTRODUCTION:

The human existence is dependent upon environment. According to ancient Indian seers plants are living beings. Only the conscience is internal or dormant. However, the ancient scholars of India studied the plants mainly for medicinal purposes. The 'auśadhisūkta'<sup>1</sup> mentions some medicinal plants beneficial for the purification of environment. Starting from Rgveda to modern age of 21<sup>st</sup> century plants have been analysed from the point of view of the taxonomy, classification and usage. As the names of plants mentioned in the ancient scriptures, are recorded mostly in the sonnets or verses, it becomes difficult to identify them under a particular group or species. Considering the shape, colour, flowers, fruits, leaves, wood,

smell, taste the ancient scholars have categorized them under different names the plant remaining the same. As a result of which the study of plant in ancient India did not get that recognition. However **Vṛkṣāyurveda** came to be known as a scientific study of plants during the period of **Bṛhatsaṃhitā** and later on. Plants have been and still are responsible for the growth and prosperity of the world. In modern days, plants are studied from the angle of the importance and nature of plant products.

The living substance in the plants is called protoplasm, through which the various characteristics of plants are registered. It has the ability to grow, reproduce and respond to stimuli. A group of cells make a tissue who carry on

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different functions of the organs of the plant like root, stem and leaves. With the exception of few bacteria, green plants are the only living things that can actually make food.<sup>2</sup>

The grape sugar or glucose is produced through the process of photosynthesis by the help of chlorophyll, carbon-di-oxide and water. This sugar is utilized by every cell of the plant. It works as the source of energy and controls the plant metabolism. However, this sugar helps in building up more complex sugar like sugarcane or sucrose. It is highly nutritious and soluble in water. Man either consumes it directly or extracts it and uses after purification like aiggyery. Not only this, man even makes medicine out of the oils which are very aromatic and capable of attracting or repelling the insects etc. The insects attracted by the odour of the oil come closer to the plant and help in pollination. Similarly the colour also attracts the insect beneficial for pollination. The plants manufacture their coloring agent itself. These are called pigments.

Plants also have latex which is the juice of the plant. In some plants it looks milky and coloured in some other plants. The **Alkaloids** are also helpful in the making of valuable drugs because they contain very strong poison and narcotics. This vegetable based Alkaloids contain nitrogen also.

The fruits and vegetables contain acids which attract the animals and the animals help in the dispersal of seeds. **Enzyme** of plants directly influences the digestion by breaking the insoluble substances to soluble ones. Fruits, green vegetables, seeds they all contain some or other vitamin. Even hormones are also important part of a plant who produce root, flowers, fruits etc.

Plants are classified as **Angiosperm** and **Gymnosperm**. That group of plant is called angiosperm whose flowers hold the reproductive parts of the plants. And the primitive character of angiosperm is the spiral arrangements of the petals. Actually the flowers are the modified shoots of the plants. The smallest flower in the family of angiosperm is **Lemna**. It is full of vitamins and its flowers are very beautiful and grow floating in the steady and slow flowing water.

Flower gets specific colours only for attracting the pollinators. This colour of petals depends mainly upon chlorophyll. The white coloured flower blossoms at night. And night blooming white flowers are more fragrant and release different types of odour.

The plants germinate from the seeds. If the plant has one seed leaf it is called **Monocots** otherwise the two or more seed leaf plant is called **Dicots**. When the study of modern science of plants enlightens with so much elaboration and exactness about the family of the plant one gets attracted to go deep into it and explore more of it. The plants mentioned in Sanskrit works are also the subjects of modern science. The only difference being the botanical name of the plant along with the species mentioned in the books of science.

The details of plants are recorded in those books with all minutes unlike Sanskrit works, especially the Kāvya.

Let us analyse some plants of Kālidāsa's discussed here in accordance with the modern botanical science.

#### ARJUNA:

It is called **Amaranth Terminalia**, Popularly known as white Mundah. Its family name is **Combretaceae**. This tree is found in forests near river banks but in dry hilly regions. Its flowers come in summer and the fruit in winter. It sheds its

upper bark once in a year. The flowers are said as of light green colour and devoid of fragrance. The fruits do not have seeds inside them. Except the mention of flower blooming in rainy season there is no other information given in Kālidāsa's works.

#### ARKA:

The **Calotropis Gignatea** or popularly known as madar or Akund is a shrub, mostly found in S. Asia and Africa. It has different species called **Calotropis Procera**. Though not of high quality it produces a type of silk cotton. In Indian Āyurveda it is considered as beneficial for several diseases. If taken in required doses it does not work as poison. Kālidāsa narrates the milky juice of the flowers in AS, which is very bitter.

#### AŚOKA:

It is called Asoka in English and **Saraca Aśoca** in Botany. It is a tall tree with flowers of red and orange colour and nice fragrance. Its pod comes in summer season. It gets seeds also. If pricked, the sap oozes out of the stem of the tree which becomes red, coming in contact with the air. It has many remedial potentialities. Kālidāsa very aptly mentions the special treatment for blossoming of flowers on the tree. For in Āyurveda the bark of Aśoka has been presented beneficial for the women to gain sexual vigour and get rid of some feminine diseases.

#### ĀMRA:

De Candolle in 1883<sup>3</sup> divided in plants, into six groups where mango is said to be cultivated for over 4000 years. It is a tropical plant and native of southern Asia. It is called **Mangifera Indica**. It is treated as a sacred tree in India. It grows upto a height of 90ft. The flowers come in panicles which are pink in colour. The fruit is very tasty with orange coloured pulp. The fleshy fruits are very aromatic also. It comes in more than 500 varieties. Kālidāsa also mentions the different varieties of mango. (**Amra, Sahakara, Chuta**) However he writes that the buds are of greenish white colour. It has a great historical background influencing the folklore and religion of India.

#### CAMPAKA:

Popularly known as Temple tree or pagoda tree is named as **Michelia champaca**. It is mainly used for making perfume. A sweet smelling flower of conspicuous yellow colour is a garden flower. It is an evergreen tree of large and middle size and a native of South Asia and South East Asia. Kālidāsa mentions the colour of the campaka as off-white yellow colour with mild fragrance which blooms in the spring season when there is less dew in the atmosphere.

#### CANDANA:

**Santalum Album**, as it is known in Botany. The sandal wood oil. The oil is used in the oriental countries as Perfume as well as medicine. It is also used as a cabinet wood form which chest and boxes are being made. Due to careless methods of lumbering the tree has been practically exterminated from many parts of East. It grows wild in India and S.E. Asia. It is cultivated also. It is a small or middle sized evergreen semi-parasitic tree. It grows in the semi-arid areas from India to the north coast of Australia. It is a tropical plant.

In Kālidāsa's works the paste of wood is used as a body ointment to get rid of the sunheat. It grows in the south of India with the south breeze. It is a sacred tree and the paste and wood both are used in the religious ceremonies. King

cobra a poisonous variety of snake lives in the tree being attracted by the fragrance of the wood.

#### ELĀ:

It is called **ELETTARIA CARDAMOMUM**. It is mostly used as a spice for its aromatic seeds. It is a native of India. It is a perennial herb and grows to a height of 6 to 12 feet. The flowers are white in colour with blue and yellow lip and grows in a separate elongated stalk. The fruits grow in the whole year the seed beings stored inside the paper thin triangular capsules. It has less nutrient value than food. Being a spice, it stimulates the appetite and increases the flow of the gastric juices. The cardamom oil is used for flavouring beverages and in cooking also. The oil contains a good amount of cinoli.

The poet mentions it as growing in the south west coast of malavar being nourished by the south breeze.

#### IKṢU:

Sugar cane in English, is known as **SACCHARUM OFFICINARUM**. It is a vigorous, rapid growing perennial grass obtaining a height of 8 to 12 ft. it grows in clumps. The stem is solid with tough rinds and numerous fibrous strands. By 327 B.C. it had become an important crop in India. The word sugar comes from the Sanskrit word 'Sarkara' which means gravel. It grows in moist hot region. The cuttings from the upper joints of old canes used as the seed. The right time of harvesting is when the flowers begin to fade i.e. in winter. It contains sucrose and other sugars also. The raw or crude sugar looks brown and 96% pure. The molasses is a good food stuff. The flowers come on the plant in the rainy season. It's family name is **POACEAE**.

According to the poet also the sugarcane becomes readily for consumption in the winter. It is sweet and is used for making **jaggery**. Among the varieties 'Saliksu' is the best one. It gives deep shade.

#### JAMBU:

It is known as **Jambolan** or **Java plum** and **Indian black berry** in English whereas the botanical name is **SYZYGIIUM CUMNII**. It belongs to the flowering plant family **MYRTACEAE**. It is a large evergreen tree available throughout India. This specie is native to south east Asia. This specie is said as of lesser importance. The fruits look like grape, borne on the branches and trunk. It is used for fresh fruit, jelly, wine and cordials. It is both wild and cultivated. It is a huge tree growing upto 100ft. tall and 12ft. in width and lives for more than 100 years. The plant bears flower in summer and fruits in june-july in the rainy season.

These black plums the seasonal fruits taste sweet-n-sour. The bio-chemical content called '**Jamboline**' of the seed checks the pathological conversion of starch into sugar. It is a nutritious fruit. However, the bark, leaves, twigs roots are also useful. The leaves are used for curing teeth and gum problems, dysentery and skin complaints for they contain antibacterial properties. It's wood is resistant to any kind of insect penetration.

Kālidāsa says the medicinal potentialities of the leaves whose sap diluted in water can cure the after-effect of vomiting.<sup>4</sup>

#### KADALI:

The plantain tree in English is called **MUSAPARADISIACA** in science. It is a tropical fruit. India and Malaya the humid tropics are the original home of this plant.

It is considered as the world's oldest cultivated crop like mango. It is the tallest of the herbaceous plants. The sleathing spiral leaf bases grow upto the height of 12ft. The midrib is a good food delicacy in India. Each plant produces a single inflorescence. The clustered flower drops off as the fruits mature. A single clump may be productive for several years. The banana and plantain belong to same group.

Kālidāsa refers to the tree, fruit and flower in his works using them as examples for describing the beauty of ladies. However he speaks of the fruit as very tasty.

#### KALAMA:

The paddy is called **ORYZA SATIVA** in botany. The rice plant is a large annual grass. It produces as panicle as inflorescence of fine branches. Each branch transforms into a single grain surrounded by a husk. More than thousand of varieties of rice are found wild/ in the world. However, there are wild rice plants found in the tropics of both hemisphere. It grows in hot moist tropics on damp soil. The lowland rice grows in the flooded fields. But the upland or hill rice grows without irrigation.

The information matches to the ideas of the poet.

#### KARNIKĀRA:

It is also identified as **Karavira** whose botanical name is **NERIUM INDICUM**. It is an evergreen small tree and is found mainly in Southern Asia along with Mediterranean region, china Morocco and Portugal. It comes under the family of **APOCYNACEAE**. It comes in three colours, white, yellow and red, which is a special African variety, which is very toxic also. As usual, the plants are poisonous. Taking in high dose can affect the heart.

Kālidāsa mentions the yellow flower which is used for decoration of the body and hair of the maiden.

#### KEŚARA:

It is known as **CROCUS SATIVUS** in botany and belongs to the family **IRIDACEAE**. It is a flower plant cultivated for over 4000 years by Greeks and Hebrews and Orient, originating in the late Bronze Age. The flowers are of light pastel colour similar to lilac. The stamens are yellow. The stigma is red. The flower blooms in the autumn and bears a very mild scent. It is cultivated by replanting the 'corms' the bulb like structure. This flower does not close at night. It is very precious for each flower provides only three stigma, which are being used after they dry. They are used as spice and as dye stuff.

The poet Kālidāsa also depicts the couples drinking the smell of the flower in RV.

#### KETAKĪŅ:

It is otherwise called as Kewda, whose botanical name is registered as **PANDANUS TECTORIUS**. It is named as serew pine. It is also named as **Pandanus Odoratissimus**. The leaves of these shrubby plants are used for making mats. This is found in South eastern Asia and oceania, Australia, New South wales and Hawaii. It is mostly found in the seacoast of Indian Peninsula.

However, Kālidāsa names them to be found in **Dasarna** area of Central India. The pollens scatters around to make the surrounding fragrant.

#### KICAKA:

It is commonly known as Bamboo and is named as **BAMBUSA TULADA** in Science Bamboos thrive in wet soil



and are easily propagated by seed or cuttings. Bamboo fibre is an important source of paper in India and China. This plant grows in tropical countries but, especially, common in the monsoon region of Eastern Asia. They are the largest of the grasses with woody stems.

Kālidāsa has the knowledge about this plant as he mentions the hollowed stems. This graceful spinous perennial erect herby grows wild throughout India especially in hill forests.

#### KIŅSUKA / PALĀSA:

It in English it is known as **jungle flame** or **flame** of the forest, the botanical name is **BUTEA MONOSPERMA** i.e. the Bengal Kino. It is a medium sized deciduous tree with slightly crooked trunk. It is a native of tropical Southern Asia. The SAARC countries. But it is a common plant found throughout India. The plant is useful for the **gum kinos**. Different varieties of the save Malabar kino, which is called **PTEROCARPUS MARSUPIUM** consisting dried juice is a large Indian tree. The Kino is secreted in cavities between the wood and bark which oozes out after incisions. Coming in contact with the air this hardens into a solid reddish mass. This resin or kinos are used mainly for acidity and throat medicines and also for tanning. Kālidāsa mentions the flower as of red colour and leaves of dark green colour. It inspires the lovers by the beautifully shaped and coloured flowers.

#### KOVIDARA:

Scientifically it is called as **BAUHINIA VARIEGATA**. In English it is known as purple orchid. A small to medium sized tree grows in the dry forests in India near 'Pampalake'.<sup>5</sup> In this plant flowers of white purple and yellow colours blossom which are big in size. The colour determines the varieties. This variety is used for medicinal purpose. But *Bauhinia Purpurea* or *Bauhinia tomentosa* are also used for extracting medicine. The while coloured *Bauhinia Acuminatae* is on ornamental garden plant. Its bark contains liquid sticky gun. The flower comes in February to March on the leafless branches. The fruit comes in April – May. It grows wild in forests in the Himalayan valley and lower hilly regions.

Kālidāsa mentions the tender leaves and flower in autumn which differs from the scientific information of Botany.

#### KUNDA:

The Kunda, Mallika and Yuthika all are the varieties of Jasmine. The jasmine in English is otherwise known as '**Jaati**' **Kusumam** in Sanskrit. **JASMINUM MULTIFLORUM**, **JASMINUM SAMBAC** and **JASMINUM AURICULATUM / MOLLE** are the scientific names of above flowers. The other variety of it is called as **JASMINUM GRANDIFLORUM (Skt.jati, Hindi-Chameli)**. It grows all over India; the flowers are mainly used for making perfumes and oil. It is a creeper. The flowers are white in colour and clove shaped. It blossoms in the rainy season. The chemical called '**jasminine**' is found in its leaves.

According to Kālidāsa **Mallikā** (giri) and **Yuthika** both blossom in rainy season. But Kunda is mentioned in the MD. So it is obvious that the blossoming time of this flower in rainy season. But in RS the same is recorded in the description of autumn season. However the colour is the same i.e. white.

#### NĀRIKELA:

Popularly known as coconut is named a **COCOS NUC IFERA** in Botany. It is a native of the Malay archipelago. It grows near the seashore. The embryo is embedded in the hard

endosperm. It is a tropical plant. But grows in any kind of soil and at altitudes up to 5000 ft. It's fruit is available throughout the year and is picked after every two months. The fruits germinate in a few months and one year old seedlings are transplanted elsewhere, oil, sugar, pulp, water all the products of coconut are beneficial.

Kālidāsa writes about the water and pulp mass of the coconut, as edible. Kālidāsa depicts a typical Himalayan forest of long and straight trees.

#### SĀLA:

It is known as **SHOREA ROBUSTA**. Another specie is called **VATERIA INDICA 'Damar'** a Malayan word denotes a torch of decayed wood. It is obtained by tapping in trees. The trees that yield damars, typical to south eastern Asia, especially India, are sal damar from shorea Robusta and white dammar from '**VATERICA INDICA**' and black damar from **CANARIUM STRICTUM**. The East India regions and damar and products of the same tree the only difference is that the resins are older and harder and gathered from ground or watercourses. Damars are used mainly in spirit varnish. Sal is also an important wood of tropical Asia.

The poet gives the idea about the height of the tree and intoxicating sap of the tree.

#### SĀLMALĪ:

It is named as **BOMBAY CEIBA** in Botany. It is also known as Indian '**Semal**' or **Red silk cotton tree**. It is also known as **SALMALIA MALABARICA**. Cotton has been in use in India since 1800 B.C. It was the centre for cotton Industry from 1500 B.C. to 1500 A.D. Hindus were the first people to weave cloth. The word cotton in derived from the Arabic Wood 'qutn' for they are the people who introduced cotton in Europe. The surface fibers are the cottons.

Kālidāsa does not mention the cotton. Only the thorns grown on the bark are mentioned.

#### ŚIRIᅒA:

It is known as **ALBIZZIA LEBBECK**. It comes from the **MIMOSACEAE** family. In English it is called as 'Siris' tree. It grows at a height of 8000 ft. above the sea level. It has black, yellow, and white varieties of flowers and pods. The flowers are without stem but fragrant. It gets flower in the rainy season and fruits come in winter. It has some medicinal potentialities.

Anyhow, kālidāsa differs in stating that the flower comes in summer.

#### TINTIDIKĀ:

Tamarind tree is named as **TAMARINDUS INDICA**. It originated in tropical Africa and Southern Asia. It grows in semi-arid regions growing up to a height of 80 ft. A large tree with deep shade gets fruit in the pods, brown in colour. It's pulp contains 12 percent **Tartaric Acid**. The ripe tamarind promotes digestive functions.

Kālidāsa also mentions about the digestive power of the fruit.

#### VIMBA:

Popularly known as Tindora and it's botanical name is **COCCINIA GRANDIS**. The poet uses the morphology of the fruit for showing the beauty of the lips of a lady.

#### CONCLUSION:

As planned the comparison between the modern science of plants and Kālidāsa's knowledge of plants is done with much elaboration. However some plants mentioned only by name

are not taken into consideration here, in this chapter. For example 'Aparajitā' a vine with flowers resembling the butterfly is not discussed here. Though, it is known that the flower is called '**SUPUSPI**' in Sanskrit and **CLITORIA TEMATEA** in Botany. This stem of this plant is used in the '**Kavaca**' of **Sarvadanana** in AS.

The knowledge of plant life is not indigenous to the modern researchers, it was prevalent in India since 6000 years back or even seven more than that Susruta deals with the therapeutic drugs of hundred types even though some of them do not originate in India.

They had the knowledge of an expert but they used a language which is not popular in the present days. So it appears as a missing link which exists there between the two expertise knowledge of now and then. The Puranic seers divided the earth into seven islands and named them after the plants available in abundance in that particular island. The seven Islands are **Jambu** (SYZYGIVM CUMNINI), **Plaksa** (FICUS RELIGIOSA) **Salmali**, (BOMBAX CEIBA) **Kusa**, (DESMOSTACHYA BIPINNATA) (a type of grass) **Kraunca**, (EGRETTA THULA) **SAKA** (TECTONA GRANDIS) and **Puskara** (NELUMBO NUCIFERA) All these Sanskrit names of the Islands denote a botanical name referring to a particular plants.

#### End Notes:

1. R̥gv-x-mandala
2. Economic Botany – Albert – F. Hill p.6.
3. I bid – p – 287
4. Science Reporter- vol. 46-no=2, CSIR pp-32-34
5. Ramayana – Kiskindhya Kanda – 1- 4.1-80

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