

Observation of Two Important Angiosperm Tree Species of Gujarat College, Ahmedabad, Gujarat, India

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ABSTRACT

Gujarat college has 30 Acres of land with historical important from botanical view point, because it endows valuable herbarium which is approximately 125 years old with total 2862 species belonging to 1220 genera and 155 families. The green treasure mine of the college is around 100 species stretched within the span of five Botanical Gardens in the campus. The ornamental trees conserved here in are *Saraca asoca* (Ashok), *Murraya paniculata* (Kamini), *Swietenia mahogany* (Mahogani), *Bauhinia purpurea* (Kanchnar), *Cassia fistula* (Garmalo), *Caryota urens* (Shiv Jata), *Delonix regia* (Gul Mahor), *Peltoforum roxburghii* (Peltoforum) etc. Some of the rare and valuable species like *Adansonia digitata* (Rukhdo), *Melaleuca leucadendron*, *Crescentia alata* (Top Golo), *Haplophragma adenophyllum* (Pali), *Guaiacum officinale* (Gum Goaecum), *Sterculia urens* (Kadayo), *Ehretia laevis* (Vadh Vareli), and *Jacaranda mimosifolia* in the campus. Valuable collection of herbaria at the Biology Department is a gold mine of plant specimen: a collection dating back to more than 100 years. A rich and diverse collection of 2862 species belonging to 1220 genera of 155 families attracts many biologists looking for specific variety. The collection reflects the dedicated efforts made by the renowned plant taxonomists like Shri Marten, Shri Garade, Shri Gammie, Shri Bhide, Shri Saxton, Shri Sedgwick, Shri B. N. Dastur, Shri R. N. Sutaria and Shri G. A. Kapadia. Botanical garden of this college have two main rare species that have *Melaleuca leucadendron* L which belongs to Myrtaceae family, is widely distributed in northern parts of Western Australia. The flowers are cream, white or greenish-white and are arranged in spikes. Each spike is up to 35 mm (1 in) in diameter, up to 80 mm (3 in) long and contains between 7 and 22 groups of flowers in threes. Fruits which are woody capsules, 3.9-4.9 mm long in loose clusters along the stems. Cajeput is a member of the melaleuca group of plants which includes eucalyptus, niaouli, and tea-tree. All have strong antiseptic properties. Cajeput is most commonly used in steam inhalation because of its strong support for the respiratory system, and decongestive effect. It has a strong, camphor-like, medicinal scent.

Keywords : Kamini, Mahogani, Gul Mahor, Rukhdo, Garmalo, Kadayo, Kanchnar, Gum Goaecum, Top Golo, Pali

I. INTRODUCTION

Gujarat Arts & Science College, popularly and earlier known as Gujarat College, is one of the oldest educational institution of India and second arts and science college of Gujarat, near Ellis Bridge, Ahmedabad. The institution was founded in 1845 as a government-run educational institute. It was established as regular college in 1850, and is now

under the direct management of the Education Department of Government of Gujarat.

The first college building was constructed in the year 1897, which followed more buildings appearing on the land using the generous flow of donations by Sir Chinubhai Madhavalal, Bert, ICE, who again donated another sum of ₹10 lakh (US\$15,000) as patron of College.

After Independence of India, the college continued to expand and the New Science Building was built in 1948, Tutorial Building in 1965, and Science Workshops in 1965. The Department of Dramatics was established in 1970-71.

The college is proud of our student Shahid Veer Vinod Kinariwala born on 20-SEP-1924. Veer Kinariwala braced the martyrdom on 10-AUG-1942 inside the college campus and became the first student martyr of India over 'Quit India Movement'. Proud memorial erected inside the campus, speaks about the brave son of the institute. Lok Nayak Shri Jayprakash Narayan inaugurated the memorial in 1947. The road facing the memorial site named as "Shahid Veer Kinariwala Marg" reminds every one of the story of great sacrifice by the young man.



Figure 1. Gujarat College, Ahmedabad

Guaiacum officinale Linn. Belongs to Zygophyllaceae family. Small tree reaching about 10 m (33 ft) in height with a trunk diameter of 60 cm, evergreen throughout most of its native range. The leaves are compound, 2.5-3 cm in length, and 2 cm wide. It is the national flower of Jamaica. There are approximately 3,00,000 plant species on the planet earth comprising flowering plants (87%), non-flowering plants (0.32%), ferns (4.4%), mosses (5%) and red and green algae (3.3%) (World Conservation Union, IUCN online).

II. METHODOLOGY



Figure 2. Collection Of Samples

The methodology and approaches for this two rare species at Gujarat College was followed as and suggested by Dr. R.S.Patel. An intensive field work undertaken with help by Shambhu bhai. Photos are taken and documented.

Results: The valuable species like *Melaleuca leucadendron* L. And *Guaiacum officinale* Linn. Both are presently existing in the campus. However, special measures should be taken to protect these species. We recorded three species of *Guaiacum officinale* Linn. In this campus. In campus, botanical garden and other two behind Sydenham Library.

Melaleuca leucadendra (Weeping paperbark) Family: Myrtaceae

Paperbark; White Tea Tree; Weeping Tea tree; Weeping Tea Tree; Weeping Paper bark; Swamp Tea Tree; River Cadjeput; Paper bark Tree; Paper bark Tea Tree; Cajeput ; Cajaput Tree; Butterscotch Paperbark; Brown Tea Tree; Big White Paperbark; Broad-leaved Tea Tree Myrtaceae and is widespread in northern Australia, Southeast Asia, New Guinea and the Torres Strait Islands. It is a tree, sometimes growing to more than 20 m (70 ft) with a trunk covered with thick, white, papery bark and weeping thinner branches. It has a long flowering season, can flower at almost any time of the year and is often grown as a tree in parks

and on roadsides. It was the first melaleuca to be described and was described from a specimen growing in Indonesia.

III. DESCRIPTION



Figure 3. *Melaleuca leucadendra* Growing in Botanical Garden, Gujarat College

Melaleuca leucadendra is a large tree, usually less than, but sometimes more than 20 m (70 ft) tall. Its thick bark is papery, usually white but also pinkish or cream and it has weeping branches. Its leaves and young branches are covered with fine, short, white hairs when young but become glabrous as they mature. The leaves are arranged alternately, 75–270 mm (3–10 in) long, 6.5–40 mm (0.3–2 in) wide, flat, narrow egg-shaped or lance-shaped and tapering to a point. The leaves have 5 (sometimes as many as 9) longitudinal veins and are often curved or sickle-shaped.

The flowers are cream, white or greenish-white and are arranged in spikes on the ends of branches which continue to grow after flowering, sometimes on the sides of branches or in the upper leaf axils. Each spike is up to 35 mm (1 in) in diameter, up to 80 mm (3 in) long and contains between 7 and 22 groups of flowers in threes. The petals are 3–4 mm (0.1–0.2 in) wide and fall off soon after the flower opens. The stamens are

arranged in five bundles around the flower and each bundle contains 5 to 12 stamens. Flowering can occur at any time of the year and is followed by fruit which are woody capsules, 3.9–4.9 mm (0.15–0.19 in) long in loose clusters along the stems.

Taxonomy and naming: *Melaleuca leucadendra* was first formally described in 1762 by Carl Linnaeus in *Species Plantarum* as *Myrtus leucadendra*. Linnaeus used a description of the species written by Georg Eberhard Rumphius in 1741, before the modern system of classification was devised by Linnaeus. Rumphius had described a plant growing in what is now Indonesia. Later, Linnaeus realised that this species had little in common with other species in the genus *Myrtus* and described the genus *Melaleuca* to accommodate this species. Thus, *Melaleuca leucadendra* became the first melaleuca to be formally described. The description was published in 1767 in *Mantissa plantarum*. It follows that although nearly all melaleucas are found only in Australia, the first type specimen was from Indonesia.

Traditional uses: Aboriginal people used strips of bark from this tree and tied them to a frame of *Dodonaea* branches to build huts that were waterproof. The bark was used to wrap food before cooking in an underground oven called a *kap mari*. It was also used to wrap the bodies of their dead. The bark from trunks of very large trees was used to make bark canoes. The crushed leaves were used to respiratory infections and the flowers for making a sweet drinks.

Horticulture: This species of melaleuca is often grown in parks and as a street tree in tropical and sub-tropical areas like Brisbane and as far south as Sydney.^[16] It prefers a sunny location but will tolerate poor, waterlogged soils. It has also been used as a street tree in Hong Kong.^[18]

Essential oils: The essential oils of leaves, twigs and flowers of *Melaleuca leucadendra* L. grown in foothills of northern India were analyzed using GC–FID, GC–

MS, and ^1H and ^{13}C NMR. Thirty-seven constituents were identified constituting 94.28–98.84% of the total essential oil compositions. The essential oils were composed of mainly oxygenated sesquiterpenes (81.23–93.50%), followed by sesquiterpene hydrocarbons (1.84–11.41%). The main constituent of essential oils was (E)-nerolidol (76.58–90.85%) which is reputed as a high value aroma chemical in food-flavor, cosmetics and pharmaceutical products. Other major constituents of the essential oils were β -caryophyllene (1.52–4.49%), viridiflorol (0.19–2.79%), (E)- β -farnesene (≤ 0.10 –2.67%), and α -humulene (0.22–1.03%). Comparison of the results with earlier reports revealed notable qualitative and quantitative variations in essential oil composition of *M. leucadendra*. Moreover, the examined essential oil of *M. leucadendra* may be considered as a novel source of (E)-nerolidol for commercial utilization for natural derived flavor, perfumery and pharmaceutical preparations. A range of essential oils can be distilled from this species, depending on where the trees occur. Two of the most common chemotypes are based on methyl eugenol and E-methyl isoeugenol.^[1]

Timber: The timber from *M. leucadendra* can be used for general construction. In Vietnam, it is used for poles, piles and woodchips.

Guaiacum officinale L. (Roughbark) Family: Zygophyllaceae

Roughbark lignum-vitae, guaiacwood or gaiacwood, is a species of tree in the **caltrop family, Zygophyllaceae**, that is native to the **Caribbean** and the northern coast of south America. Tree of life, Guaiacum is a small, slow growing and evergreen tree native to Caribbean and Northern coast of South America. It was introduced to Asian subcontinent from the West Indies. The tree belongs to the Zygophyllaceae family and measures about 3 to 12 m tall with trunk diameter of 60 cm. It has crooked bole and dense crown. The plant has broadly oval leaves with rounded tip. Flowers usually have five petals of blue color. Flower gives way to the heart shaped fruits of

yellow to orange color with red flesh containing black seeds. This flower is regarded as a national flower of Jamaica.



Figure 4. *Guaiacum officinale* L.

Discription: This tree is very slow growing, reaching about 10 m (33 ft) in height with a trunk diameter of 60cm (24 in.). The tree is essentially evergreen throughout most of its native range. The leaves are compound, 2.5-3 cm (0.98-1.18 in) in length, and 2 cm (0.79 in.) wide. The blue flowers have five petals that yield a bright-yellow-orange fruit with red flesh and black seeds. Lignum Vitae is the heaviest and densest wood in the world and will rapidly sink to the bottom when placed in water. It resists not caused by insects and moisture so effectively that remains of Lignum Vitae wood used as posts for dwellings by Taino Indians discovered in Tutu, St. Thomas were dated by carbon dating and found to be over 800 years old. The genus, Guaiacum, is taken from the tree's Caibbean name.

Taxonomy and naming: Authors disagree on spelling of genus name: some spell “Guaiacum” (Little, 1978, and Elis, 1980), Kartesz ,(1994) spells “Guajacum”, which follows rule in code of nomenclature: Linnaeus wrote “Guajacum” in his species Plantarum, and “Guaiacum” in his Genera Plantarum; according to the code of

nomenclature the name in the species *Plantarum* supersedes.

Habitat and Ecology: A slow-growing species of lowland dry forest, woodland and thicket, frequently growing in coastland areas, Systems: Terrestrial



Figure 5. *Guaiacum officinale* L. in Flowering Stage

Uses: The genus is famous as the supplier of *Lignum-Vitae*, which is the Heartwood of several species in the genus. It is the 4th hardest wood that is measured using the Janka Hardness Test, requiring a force of 4,500 lbf (20,000 N) to embed a steel ball 0.444 in (1.13 cm) in diameter a distance half of that into the wood. The Spanish encountered guaiacum wood when they conquered San Domingo; it was soon brought back to Europe, where it acquired an immense reputation in the sixteenth century as a cure for syphilis and certain other diseases. Paracelsus, a famous if controversial Swiss medical practitioner of the day, disputed its effectiveness and was censured for his criticism. Gum from the wood was used to treat syphilis; for example, Benvenuto Cellini records this use of it in his memoirs. The 1955 edition of the Textbook of Pharmacognosy also says that: "Guaiacum has a local stimulant action which is sometimes useful in sore throat. The resin is used in the compound concentrated solution of sarsaparilla, which was formerly much used as an alternative in syphilis. A widely used derivative drug is the expectorant known as guaifenesin. The soap fragrance oil of guaiac comes from *Bulnesia Sarmientoi*, a South

American tree from the same family. Members of the genus are grown in Florida and California as ornamental plants.

Horticulture: Light Requirement: tree grows in part shade/part sun; tree grows in full sun, Soil tolerances: clay; loam; sand; acidic; alkaline; extended flooding; well-drained, Drought tolerance: High, Aerosol salt tolerance: High

Essential Oils: Oil of guaiac is a fragrance ingredient used in soap and perfumery. It comes from the palosanto tree (*Bulnesia sarmientoi*). Oil of guaiac is produced through steam distillation of a mixture of wood and sawdust from palosanto. It is sometimes incorrectly called guaiac wood concrete. It is a yellow to greenish yellow semi-solid mass which melts around 40-50°C. Once melted, it can be cooled back to room temperature yet remain liquid for a long time. Oil of guaiac has a soft rose like odour, similar to the odour of hybrid tea roses or violets. Because of this similarity, it has sometimes been used as an adulterant for rose oil. Oil of guaiac is primarily composed of 42-72% guaicol, bulnesol, δ -bulnesene, β -bulnesene, α -guaiene, guaioxide and β -patchoulene. It is considered non-irritating, non-sensitizing, and non-phototoxic to human skin. Oil of guaiac was also pre-Renaissance remedy to syphilis.

IV. CONCLUSION

All the living and non-living things are interdependent in ecosystem. Existence of one species is directly linked with health of another. Humans are directly or indirectly dependent of vegetation. **Flora** helps in planning conservation strategies. Floral diversity might open new vistas in the field of pharmacological, bio clinical and biochemical investigations leading to new drug discovery. The present study has reported 2 species belonging to 2 families and 2 genus 2 species and from the Gujarat college, Ahmedabad, Gujarat.

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