



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2016; 5(6): 245-248
Received: 04-09-2016
Accepted: 05-10-2016

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Gulmohar an ornamental plant with medicinal uses

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Abstract

Gulmohar is an ornament plant also known as flame tree. Gulmohar is well known for its beautiful flowers. But it also has some medicinal properties like Anti-diabetic activity, Anti-bacterial activity, Anti-diarrheal property, Hepatoprotective/Cytotoxic property, Anti-microbial activity, Anti-Inflammatory activity. It belongs from family Leguminosae. Phytochemically Gulmohar contain sterols, phenolic compounds, triterpenoids, and flavonoids.

Keywords: Delonix regia, Gulmohar, anti-diabetic, anti-bacterial, anti-microbial

Introduction

Gulmohar is a deciduous, large tree with fern-like leaves [1] Gulmohar is also known as flame tree or royal poinciana or the peacock flower tree (*Delonix regia*). This plant was previously placed in the genus *Poinciana*, named after Phillippe de Longvilliers de Poincy, who is credited with introducing the plant to the Americas [16] Gulmohar tree is a member of the family Fabaceae, subfamily Caesalpinioideae family. The gulmohar is a mostly street tree in India, and also admired for its beauty. In maturation time, trees develop broad umbrella-shaped crowns. It is mostly planted for their shade-giving properties and as an ornamental tree. The gulmohar tree grows to a height of between 30 and 40 feet [2] Leaves contain β -sitosterol, lupeol and tannins. Plant is used as spasmogenic and antirheumatic [12] The *Delonix regia* flower was used as acid-base indicator and as natural color [15].

Table 1: Botanical classification of gulmohar [3].

| | |
|------------------|-----------------------------------|
| Domain | Eukaryota |
| Kingdom | Plantae |
| Subkingdom | Viridiplantae |
| Phylum | Tracheophyta |
| Subphylum | Euphyllophytin |
| Class | Spermatopsida |
| Subclass | Rosidae |
| Super order | Rosanae |
| Order | Fabales |
| Family | Leguminosae |
| Subfamily | Caesalpinioideae |
| Tribe | Caesalpinieae |
| Genus | <i>Delonix</i> |
| Specific epithet | <i>regia</i> - (Hook.) Raf. |
| Botanical name | <i>Delonix regia</i> (Hook.) Raf. |

History

The tree is native to Madagascar. It is now widespread in most subtropical and tropical areas of the world and has been widely planted more as a garden and avenue tree in both moist and dry regions of tropical India. Although widely cultivated in the tropics since the 19th century, the native habitat of *delonix regia* was unknown to science until the 1930s. It is discovered by botanist Wensel Bojer in its native Madagascar in early 19th century. It was introduced into Singapore around 1840 [10, 11].

Geographical Distribution

Delonix regia originates from Madagascar. It is now widespread in most subtropical and tropical areas of the world. It is native in Madagascar and Zambia. It is exotic in Brazil, Burkina Faso, Cyprus, Ethiopia, India, Jamaica, Nigeria, Puerto Rico, Singapore, South Africa, Uganda, United States of America, Egypt, Eritrea, Kenya, Mexico, Niger, Sri Lanka, Sudan, Tanzania.

Table 2: Different species of gulmohar [3].

| |
|---|
| D. decaryi (Flamboyant Tree) |
| D. decaryi (Flamboyant Tree) |
| D. elata (White Gul Mohur) |
| D. floribunda (Poinciana) |
| D. leucantha (Poinciana) |
| D. pumila (Poinciana) |
| D. regia(Flamboyant) |
| D. regia 'Kampong Yellow' (Flamboyant Tree) |
| D. regia 'Smathers Gold' (Royal Poinciana) |

Table 3: Taxonomical Classification [13].

| Class | Dicotyledons |
|----------------|------------------|
| Subclass | Rosidae |
| Order | Fabales |
| Family | Leguminosae |
| Subfamily | Caesalpinioideae |
| Tribe | Caesalpinieae |
| Genus | Delonix |
| Botanical name | Delonix regia |

Table 4: Indian synonyms of Delonix regia [4, 5].

| Language | Name |
|----------|---------------------------------------|
| Hindi | Waykaran, Samrsro, Sanesro, Sandeshra |
| Kannada | Kempukenjiga, Nirangi, Vatanarayana |
| Marathi | Sanchaila, Sankasura |
| Sanskrit | Siddesvara |
| Tamil | Perungondrai, Vadanarayanan, Varatti |
| Telugu | Chinna seribiseri, Chitti keshwaramu |
| Bengali | Krishnachura, Chura, Radha |

Table 5: International synonyms of Delonix regia [6].

| Language | Name |
|------------|--|
| Amharic | Dire dawa zaf |
| Arabic | Goldmore |
| Burmese | Seinban |
| Creole | Poinciana royal |
| English | Flamboyant, Flamboyant, Flame tree, Flame of the forest, Flame tree, Gold mohar, Gul mohar, Julu tree, Peacock flower, Royal Poinciana |
| French | Flamboyant, Poinciana, Royal |
| Hindi | Gulmohr |
| Spanish | Acacia roja, Clavellino, Flamboyán, Flor de pavo, Framboyán, Guacamaya, Josefina, Morazán, Poinciana |
| Swahili | Mjohoro, Mkakaya |
| Thai | Hang nok yung farang |
| Vietnamese | Phuong |
| Yoruba | Sekeseke |

Botanical Description

Gulmohar is an ornamental flowering tree. Height of gulmohar tree is generally 10-15 (max. 18) m. Stems are Woody throughout, erect or ascending, arching, spreading or decumbent. Stems or young twigs are glabrous or sparsely glabrate. Trunk is large, buttressed and angled towards the base [6, 7].

Fruit

The gulmohar fruit is legume, stipitate, unilocular, elongate and oblong. Fruit is green and flaccid when young and turning to hard, dark brown, woody pods, ending in short beak when mature. In maturation fruit split into 2 parts. Fruit is approximately 30-75 cm long, 3.8 cm thick and 5-7.6 cm broad.

**Fig 1:** Gulmohar fruits**Seeds**

Seeds are olive brown or black in color. Seed surface is

smooth. Seeds are hard, glossy, oblong and shaped very much like date seeds. Seed is approximately 2 cm long.



Fig 2: Gulmohar seeds

Flower

Gulmohar flower is actinomorphic or somewhat irregular, slightly fragrant and up to 5-13 cm across. Calyx is 5 lobed, glabrous. Sepals are thick, reddish with yellow border within and green outside. There are 5 petals. Petals are orbicular, broadly spoon shaped, rounded, broader, 5-6.5 cm long and 2-3 cm wide. 4 petals are orange-red, almost scarlet and 1 is whitish inside with red spots, longer and narrower than the others. Number of stamens range from 9 to 10. Stamens are completely free, separate and monadelphous. Filaments are hairy, villous and red or pink in color. The extract of *D. regia* consist of mixture of various components, such as flavonol, phenolic acid, carotenoid and anthocyanin from its flowers [14].



Fig 3: Gulmohar flower

Leaves

Leaves are biparipinnate, slightly hairy, alternate, light green and 20-60 cm long. Leaflets are oblong, margins entire, opposite, stalk less, in 18 to 30 pairs, about 1.5 cm long. There are 2 compressed stipules at the base of the leaf stalk that have long, comb like, narrow teeth.



Fig 4: Leaves of Gulmohar tree

Propagation

Delonix regia requires well-drained soils (clay to sandy, but it prefers sandy soils) in full sun, Altitude 0-2000 m, Mean annual temperature 14-26 deg C, Mean annual rainfall Over 700 mm and is well-suited in the tropics and subtropics. It is most commonly propagated by seeds. Seeds should be hard, woody testa and take a long time to germinate. Seeds may allow in the soil for 2-3 years without germinating and it usually takes 12-349 days to germinate. To break this dormancy seeds are collected, boiled in hot water for at least 24 hours then planted in unshaded nursery beds, they germinate within 5-10 days. Seedlings grow rapidly and can be transplanted when 20-25 cm high. Natural regeneration is common. Trees can also be propagated by cuttings method. ⁸

Phytoconstituents

Phytochemical screening yielded sterols, phenolic compounds, triterpenoids, and flavonoids. Flowers yielded saponins, flavonoids, carotenoids, tannins, steroids, alkaloids, and β -sitosterol. Bark yields β -sitosterol, carotene, hydrocarbons phytotoxins, saponins, alkaloids, and flavonoids. Stem bark yielded four triterpenes: β -sitosterol, stigmaterol, lupeol, epilupeol, and an aromatic compound p-methoxybenzaldehyde. Leaves yield β -sitosterol and lupeol [1].

Pharmacological Profile [1].

Anti-diabetic activity

Study of methanol extract of leaf showed significant oral hypoglycemic activity, in glucose-induced hyperglycemic mice.

Anti-bacterial activity

Delonix regia has antibacterial activity. The most susceptible bacterial are *S. subtilis*, followed by *S. epidermis*. The methanol extracts show more effect than the aqueous extracts.

Anti-diarrheal property

Ethanol extract of *D. regia* showed dose-dependent anti-diarrheal properties in experimentally induced diarrhea, charcoal-induced motility test in rats and prostaglandin Ez-induced enter pooling, for evaluation of in vivo anti-diarrheal activity.

Hepatoprotective / Cytotoxic property

Study showed that ethanolic extract of *D. regia* isolated a triterpene (ursolic acid), three sterols (β -sitosterol, stigmaterol, and its 3-O-gucoside) and four flavonoids (quercitrin, quercetin, rutin and isoquercitrin), and an amino acid. Results of this study showed cytotoxic activity. *D. regia* also showed hepatoprotective activity by free radical scavenging activity of flavonoids.

Anti-microbial activity

A methanolic extract of *D. regia* showed strong inhibition of *S. paratyphi* growth and moderate inhibition of *S. aureus*, *S. typhi* and *S. dysenteriae*, in antimicrobial screening. *D. regia* also showed inhibition of *S. cerevisiae*, *C. albicans*.

Anti-Inflammatory activity

Study showed anti-inflammatory activity of leaves of *D. regia* by using a cotton pellet granuloma and carrageenan-induced rat paw edema models. Results of this study showed significant anti-inflammatory activity.

Medicinal uses of Gulmohar: It is used as:-

- Antimicrobial,
- Anti-diarrhea,
- Hepatoprotective,
- Anti-inflammatory,
- Antioxidant.
- Antidiabetic
- Antibacterial
- Carminative
- Antipyretic

Gulmohar as folk medicine

In Bangladesh folk medicine, used for the diabetes treatment. No reported folkloric medicinal use in the Philippines.¹

Economic Importance

Products

Fuel The large pods and the wood are used for fuel. The calorific value of wood is 4600 kcal/kg.

Apiculture Flowers are used to produce bee forage.

Gum or resin The tree yields thick mucilage of water-soluble gum in reddish-brown or yellowish warty tears. The seeds contain gum that is used in textile and food industries. The gum obtained from the dried seeds is used as a binder in the manufacture of tablets.

Timber The heartwood is yellowish to light brown, and the sapwood is light yellow. It is heavy (specific gravity 0.8), soft, weak, brittle, coarse grained, takes good polish and it is durable and resistant to water.

Other products the elongated and hard seeds are used as beads. The seeds yield 18 to 27.5 % fatty oil known as the “karanga” or “pangam” oil of commerce. Its main use is in tanning industry^[6].

Services

Ornamental It is widely planted in the subtropics and tropics area as an ornamental tree in parks and streets.

Shade or shelter Tree is planted as a shade tree in tea plantations, dairy farms and compounds.

Boundary or support or barrier It can be planted as live fence posts

Other Importance

It is host for lac- insect. It is a good tree to control soil erosion in the semi- arid and arid areas^[8].

Dish of Gulmohar

Signature bhajia^[9].

Conclusion

Gulmohar is an ornament plant in all over world. Its plant parts are used as a traditional medicine. Recent research on gulmohar have show many medicinal properties like Anti-diabetic activity, Anti-Inflammatory activity etc. Gulmohar also have economic importance.

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Table 6: Flowering season of gulmohar

| Place | Season |
|--|-------------------|
| Bangladesh | April-May |
| South Florida | May-June |
| Egypt | June |
| Vietnam | July |
| Indian subcontinent (India, Pakistan, Bangladesh) | April-June |
| Caribbean | May-September |
| Australia | December-February |
| Northern Mariana Islands | March-June |
| United Arab Emirates | May-July |
| Brazil | November-February |
| Thailand | April-May |
| Southern Sudan | March-May |
| Zambia and Zimbabwe | October-December |
| Mauritius | November-December |
| Hong Kong | May-June |