ABSTRACT

Delonix regia, also known as flame of forest, Delonix regia is well known for its beautiful flowers is a semi-deciduous tree, distributed throughout Madagascar, India, Africa and Northern Australia. Various parts of the plant are traditional and Medicinal used for the treatment of different ailments such as inflammation, rheumatism, bronchitis, diabetes, anemia, fever, gynecological disorders, and pneumonia. The plant possess antioxidant, hepatoprotective, gastroprotective, wound healing, antiarthritic, larvicidal, antimalarial, antiemetic, antibacterial, antifungal, anti-inflammatory, analgesic, antidiarrheal, antihemolytic, diuretic, and anthelmintic activities. This review is an up-to-date compilation on its traditional uses in context to phytochemical and pharmacological perspectives.

KEYWORDS: Delonix regia, Traditional medicinal plant, Pharmacological activity.

INTRODUCTION

Delonix regia is a stirring ornamental medium sized tree planted in garden in all the warmer and damper part of India, native to Madagascar. It is commonly known as Gulmohar (Hindi) and flamboyant or Royal Poinciana (English). Leaves are abruptly bipinnate, subulate and quickly caduceus. Leaflets are small and are many in number. This aptly named tree produces striking flame-like scarlet and yellow flowers. Petals are five, orbicular, imbricate clawed, sub equal or the uppermost dissimilar and margin is fimbriate. Stamens are ten, ovary is sub-sessile and many-ovulated. Pod is elongated, flat, woody and dehiscent. Seeds are transverse oblong. Bark contain leucocyanidin, lupeol, tannin, β-sitosterol and free OH-proline as major
amino acid and is used as antiperiodic and febrifuge. Flower anthers are a rich source of zeaxanthin. Its aqueous and alcoholic extracts were active against roundworm. Leaves contain tannins, lupeol and β-sitosterol. Plant is used as antirheumatic and spasmogenic.

Ayurveda is one of the most ancient traditional systems of medicine in India with sound philosophical, experiential, and experimental basis and plays an important role in development of new therapies and in drug discovery.\[^1\] Due to increased side effects of allopathic drugs, high cost of new drugs, lack of curative treatment, and development of new disease, people not only in developing countries but also in developed countries often use herbal medicines.\[^2\] Though scientific studies on many Indian botanicals have been carried out by scientists, but numerous drugs are still in queue to enter international market through the exploration of ethnopharmacology and traditional medicine\[^3\]

Synonyms: Delonix regia var. flavida Stehle, genuina Stehle, genuina Stehle, Poinciana regia Hook, Poinciana regia Boje.\[^4\]

**Indian synonyms of Delonix regia.\[^5,6\]**

**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

**Taxonomic classification\[^7\]**

**Domain:** - Eukaryota  
**Kingdom:** - Plantae  
**Subkingdom:** - Viridaeplantae  
**Phylum:** - Tracheophyta  
**Subphylum:** - Euphyllophytina  
**Class:** - Spermatopsida  
**Subclass:** - Rosidae  
**Super order:** - Rosanae  
**Order:** - Fabales  
**Family:** - Leguminosae  
**Subfamily:** - Caesalpinioideae  
**Tribe:** - Caesalpinieae
Genus: - Delonix  
Specific: - epithet regia - (Hook.) Raf.  
Botanical name: - Delonix regia (Hook.) Raf.

**Botanical Description**

Delonix regia is an ornamental flowering tree. Height of Delonix regia 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.\[^{8,9}\]

**Fruit:** - The Delonix regia 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: Delonix regia Fruits.](image)

**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: Delonix regia seeds.](image)

**Flower:** - Delonix regia 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 Delonix regia consist of mixture of various components, such as flavanol, phenolic acid, carotenoid and anthocyanin from its flowers.\cite{10}

Fig 3: Delonix regia 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: - Delonix regia Leaves.

Pharmacological Profile.\cite{11}

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 Delonix regia showed dose-dependent antidiarrheal properties in experimentally induced diarrhea, charcoal- induced motility test in rats and prostaglandin Ezinduced enter pooling, for evaluation of in vivo anti-diarrheal activity.
Cytotoxic property
Study showed that ethanolic extract of Delonix regia isolated a triterpene (ursolic acid), three sterols (ÄY-sitosterol, stigmasterol, and its 3-O-gucoside) and four flavonoids (quercitrin, quercetin, rutin and isoquercitrin), and an amino acid. Results of this study showed cytotoxic activity. Delonix regia also showed hepatoprotective activity by free radical scavenging activity of favonoids.

Anti-microbial activity
A methanolic extract of Delonix regia showed strong inhibition of S. paratyphi growth and moderate inhibition of S. aureus, S. typhi and S. dysenteriae, in antimicrobial screening. Delonix regia also showed inhibition of S. cerevisiae, C. albicans.

Anti-Inflammatory activity
Study showed anti-inflammatory activity of leaves of Delonix 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 Delonix regia: - It is used as: - ● Antimicrobial, ● Anti-diarrhea, ● Hepatoprotective, ● Anti-inflammatory, ● Antioxidant. ● Antidiabetic ● Antibacterial ● Carminative ● Antipyretic

Phytoconstituents present in various parts of the plant
Flowers
Flavonols: Quercetin trihexoside, Quercetin 3-O-robinobioside, Quercetin 3-O-rutinoside, Quercetin 3-O-galactoside, Quercetin 3-O-glucoside, cynidine 3-β-D-glucoside, cynidine 3-β-D-rutinoside, cynidine-3-gentiobioside, Kaempferol rhamnosyl hexoside, Isorhamnetol rhamnosyl hexoside, Quercetin.\[12,13\]
Phenolic acids: Gallic acid, protocatechuic acid, 2-Hydroxy 5- [(3, 4, 5 trihydroxy phenyl) carbonyl oxy] benzoic acid.\[14\]
Glucoside: Stigmaster-diol-3-O-glucoside, 12, 15-Dihydroxy-chol-8-en-24-oic-acid-3-oxy-6′-acetyl-glucoside and sodium, potassium adducts of 12, 15-Dihydroxy-5-chol-9-en-24-oic-acid-3-oxy-rhamnosyl-rhamnoside\[15\]
Carotene hydrocarbons: Phytoene, phytofluene, β-Carotene, Pigment X, C-Carotene, γ-Carotene, Prolycopene, Neolycopene, Lycopene.\[16\]
Ketocarotenoid: Astaxanthin
Anthocyanins: Peonidin-3-O-glucoside, Petunidin-3-O-acetyl-glucoside\textsuperscript{17} and other various acids such as α-ketoglutaric acid, oxaloacetic acid, pyruvic acid, glyoxylic acid\textsuperscript{18}, Zeaxanthin.\textsuperscript{19,20}

**Leaves**

**Flavonoids:** Kaempferol-3-rhamnoside, Quercetin-3-rhamnoside, Kaempferol-3-glucoide, Kaempferol-3-rutinoside, Kaempferol-3-neohesperidoside, Quercetin 3-rutinoside, Quercetin 3-glucoside\textsuperscript{21}

**Tannin:** Prodelphinidin

**Triterpenoidal Saponin:** Lupeol

**Sterols:** β-sitosterol, and proline with free OH group\textsuperscript{23,24,25}; Phytol, Oleananoic acid\textsuperscript{26}

**Coumarin:** 7, 8-dihydro-7-hydroxy-6-methoxy-8-oxo, Scopoletin, Squalene, and Vitamine E.\textsuperscript{24,27}

**Others:** L-Azetidine-2-carboxylic acid\textsuperscript{22}

**Bark**

**Tannin** (Propelargonidin and procyanidin), alkaloids

**Sterols:** β-sitosterol, Stigmasterol

**Triterpenoidal saponins:** Lupeol, Epilupeol

**Flavonoid:** Leucocyanidin

**Pigments:** Carotene, Auroxanthin

**Other:** p-methoxy benzaldehyde; hydrocarbons, phytotoxins and prolin with free OH group\textsuperscript{23,28,16}

**Seeds Fruits**

**Fatty acids:** Linoleic acid, 7-[2-octaecyclopropen-1-yl] heptanoic acid (malvalic acid), 8-[2-octacyclopropen-1-yl] octanoic acid (sterolic acid), myristic acid, palmitic acid, stearic acid, oleic acid\textsuperscript{29}

**Amino acids:** trans-3-hydroxy-L-proline, 7-methylene glutamic acid, 7-methylene glutamine\textsuperscript{30}, hydrocarbons

**Sterols:** Stigmasterol, Sitosterol, Phytol, Ergost-4-en-3- one and Ergost-5-en-3-ol

**Carbohydrate:** galactomannan, Crude protein\textsuperscript{31}

**Tannin** (Propelargonidin and procyanidin)\textsuperscript{25}
Traditional use

Delonix regia is a well-known ethnomedicinal plant; various parts of the plant have traditionally been used to treat different disorders Table 1.

Table 1: Traditional uses of Delonix regia.

<table>
<thead>
<tr>
<th>Useable part of Delonix regia</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flowers</td>
<td>Anthelmintic\textsuperscript{[32]}, insecticidal\textsuperscript{[33]}, gynecological disorders or dysmenorrhea, febrifuge, inflammation, diarrhoea\textsuperscript{[34]}</td>
</tr>
<tr>
<td>Plant</td>
<td>Rheumatism, spasm genic\textsuperscript{[32]}, cathartic, flatulence\textsuperscript{[33]}, emetic, CNS depressant and in the treatment of anemia and fever\textsuperscript{[36]}</td>
</tr>
<tr>
<td>Leaves</td>
<td>Bronchitis and pneumonia in infants\textsuperscript{[37]}, anti-diabetic\textsuperscript{[38]}, gastric problems, body pain, and rheumatic joints pain\textsuperscript{[39]}</td>
</tr>
<tr>
<td>Bark</td>
<td>Antiperiodic, febrifuge\textsuperscript{[32]}</td>
</tr>
<tr>
<td>Root</td>
<td>Abdominal pain\textsuperscript{[40]}</td>
</tr>
</tbody>
</table>

Plant parts used: Flowers, Plant, Leaves, Bark, Root

CONCLUSION

Delonix regia is an ornament plant in all over world. Its plant parts are used as a traditional as well as medicinal. Recent research on Delonix regia have shown many medicinal properties like Antidiabetic activity, Anti-Inflammatory activity antioxidant, hepatoprotective, gastroprotective, wound healing, antiarthritic, larvicidal, antimalarial, antiemetic, antibacterial, antifungal, anti-inflammatory, analgesic, antidiarrheal, antihemolytic, diuretic, and anthelmintic activities. This review is an up-to-date compilation on its traditional uses in context to morphological and pharmacological perspectives.

REFERENCE

4. "Delonix regia (Hook.) Raf. — The Plant List". theplantlist.org


