"A SYSTEMATIC PHARMACOGNOSTIC AND PHARMACOLOGICAL REVIEW OF DELONIX REGIA BARK"

Dattaprasad N. Vikhe*[1], Sonal Upadhaye, Vaibhav V. Bhone
Department of Pharmacognosy & Pharmacy Practice
Pravara Rural College of Pharmacy, Pravaranagar, Maharashtra- 413736

CORRESPONDING AUTHOR:

Mr. Dattaprasad N. Vikhe*[1]

Assistant Professor, Department of Pharmacognosy,

Pravara Rural College of Pharmacy, Loni, Pravaranagar.

ABSTRACT:

The Fabaceae family includes the attractive tree Delonix regia. Delonix regia Rafin and Delonix elata are two species in the Delonix genus. A blooming plant is called Delonix regia. It has five petals, four of which are the same color but one of which is distinct and has white streaks. Delonix regia has been shown to have antibacterial, anti-inflammatory, antioxidant, and anti-diarrheal properties. It has been utilized in the traditional medical practices of several cultures, including those that cure rheumatism, arthritis, hemiplegia, leucorrhoea, and constipation. Delonix regia flowers have been utilized as tablet binders and as traditional herbal treatments for gynecological diseases. According to reports, Delonix elata contains anti-inflammatory, anti-arthritic, antioxidant, and ulcer-fighting properties.

Keywords: Delonix regia, petals, Pharmacological activity different parts of plant.

INTRODUCTION:

Botanist Wensel Bojer found the flamboyant Gulmohar tree in its native Madagascar at the beginning of the 19th century. Some claim it to be the world's most colorful tree. It is covered in flamboyant clusters of 4-5-inch-wide flame-red flowers for several weeks in the spring and summer. They feature four spoon-shaped spreading crimson or orange-red petals that are about 3 in long, and one erect somewhat bigger petal (the standard) that is marked with yellow and white. Even up close, the individual flowers are remarkable. The minuscule, individual leaflets that make up the fragile, fern-like leaves fold up as dusk approaches. The graceful, widely spreading canopy of Gulmohar, which can reach a height of 30 to 40 feet, can be wider than the tree itself.

The genus Delonix belongs to the Caesalpinioideae subfamily of the Fabaceae family, which includes peas. East Africa and Madagascar both have trees that are endemic to this genus. The Royal Poinciana (D. regia) is by far the most well-known species. Greek words "Delos" (meaning "evident") and "onyx" (meaning "claw," which relates to the petals) were combined to create the name of the genus. An unarmed tree is raised by Delonix. Stipules are tiny, leaflets are numerous but small, and leaves are abruptly bipinnate. Bracts are tiny, and the flowers are big and beautiful in terminal corymbs. The calyx tube has five subequal, valvate, and small lobes. There are five, subequal, imbricate, orbicular petals. The margins are brittle. There are ten free, declinate, long-extended stamens. Anthers are uniform, and filaments are villous below. the subsessile ovary

SUBSPECIES, VARIETIES, FORMS, AND CULTIVARS OF THE DELONIX GENUS:

D. baccal (Chiov.) Baker f. (Poinciana); D. boiviniana (Baill.) Capuron; D. brachycarpa (R.Vig.) Capuron; D. decaryi (R.Vig.) Capuron (Flamboyant Tree); D. elata (L.) Gamble (Creamy Peacock Flower); D. floribunda (Baill.) Capuron (Poinciana); D. pumila (Poinciana); D. regia (Bojer ex Hook.) Raf. – Royal Poinciana (Flame of the Forest); D. tomentosa (R.Vig.) Capuron; D. velutina (R.Vig.) Capuron 5. D. regia 'Kampong Yellow' (Flamboyant Tree); D. regia 'Smathers Gold' (Royal Poinciana); D. regia 'Supernova'; D. regia var. flavida; D. tomentosa (R.Vig.) Capuron; D. velutina (R.Vig.) Capuron; D. a; D. alata; D. leucantha (Poinciana); D. leucantha bemarahensis; D. leucantha gracilis; D. leucantha, leucantha; D. leucantha subsp. bemarahensis; D. leucantha subsp. Gracilis

Indian species of genus Delonix:

Two species of the genus Delonix, which belongs to the Eucaesalpiniea tribe, are found in India. Elonix and Delonix, respectively

Delonix elata:

Delonix elata (Syn. Poinciana elata) commonly known as white gold mohur and family Leguminosae [8]; subfamily Caesalpiniaceae. Commonly known as "Sandesaro" in Gujarati.

Vernacular name:

Sanskrit- Siddeshwara [10]; Mumbai- Vayani; Telugu- Vatanaryana; Tamil- Vadanaryana

Botanical description:

An erect tree 6-9 m in height. Trunk: Smooth and ash colored. Leaves: compound, main rachis slender, 10-20 cm long, bipinnate.

Traditional uses:

As a folk treatment, leaves are utilized by traditional healers in situations of inflammatory joint problems. Folklore recommends Delonix elata for flatulence and joint discomfort. The bark is used as an antiperiodic and febrifuge in Indochina. Locals utilize the leaf and bark to make a paste that they use to numb pain and inflammation. It shows anti-inflammatory and anti-rheumatic properties as well as antioxidant and antibacterial activities

ANOTHER SPECIES IS DELONIX REGIA :

Delonix regia Rafin:

There is a type of blooming plant called Delonix regia. The evolutionary classification places it in the Fabaceae family (a subfamily of Leguminosae), however, the conventional classification of medicine has it in the Caesalpiniaceae family. Madagascar is the tree's natural habitat. It is a medium-sized decorative tree that is frequently planted in gardens and avenues throughout all of India's drier and warmer regions. It frequently ranks among the top five blooming trees in the world. The Royal Poinciana and Flamboyant are other names for the Delonix regia plant. Previously, this plant belonged to the genus Poinciana, which was

given that name in honor of Phillippe de Longvilliers de Poincy (1583–1660), who is credited with bringing the plant to America.

Geographical Distribution: Native to Madagascar, where it is virtually extinct, Delonix regia Rafin. Nowadays, this plant may be found in most tropical and subtropical regions. However, blooming becomes erratic at greater altitudes than is advised for the plant.

Native: Madagascar, Zambia

Taxonomical Classification Class: Dicotyledons; Subclass: Rosidae; Order: Fabales; Family: Leguminosae; Subfamily: Caesalpinioideae; Tribe: Caesalpinieae; Genus: Delonix; Specific epithet: regia - (Hook.) Raf.; Botanical name: - Delonix regia (Hook.) Raf.

Vernacular names English: flamboyant, flamboyant flame tree, the flame of the forest, flame tree, gold mohur, gul mohr, peacock flower, royal poinciana; Arabic: gold more; French: flamboyant, poinciana, royal; Burmese: seinban; Spanish: Acacia roja, Swahili: mjohoro, mkakaya; Hindi: gulmohr; Bengali: chura, Radha; Tamil: mayarum, mayirkonrai, Panjabi, Telugu.

MORPHOLOGY: Delonix regia Rafin. is 40 feet in height having an umbrella-like canopy can be wider than its height.

Flowers: Five petals on a large reddish-orange flower; one petal is slightly larger than the others and has white streaks in addition to the other four spreading scarlet or orange-red petals that are up to 8 cm long. The standard, the fifth upright petal, is slightly larger and has spots of yellow and white. When the blooms are open, the sepals, which are five in number and measure around 2.5 cm in length, reflex and are thick, green on the outside, and reddish with a yellow border within. The fifth stamen has ten crimson filaments. A 1.3 cm long, hairy, one-celled ovary is present in the pistil. approximately 3 cm long style

Leaves: The complex leaves are distinctively light, alternating, and bright green, and they have a fluffy look. They have two pinnate. 20 to 40 pairs of main leaflets, each of which is further split into 10 to 20 pairs of secondary leaflets, are present on each of the 30 to 50 cm long leaves.

Branches: Horizontal branches form a diameter that is wider than the tree's height, crown umbrella-shaped and spreading long branches [26].

Seed: Seed 30-45, hard, grayish, glossy, 2 cm long, oblong, and shaped very much like date seeds, transversely mottled with a bony testa. Weighing around 0.4 gm.

Bark: Smooth, grayish-brown, slightly cracked, and having many lenticels; inner bark is light brown.

Fruits (Pods): Green and flaccid when young, turning to dark brown, hard woody pods, 30-50 cm long, 3.8 cm thick, 5-7.6 cm broad, ending in a short break when mature, with many horizontally partitioned seed chambers inside, indehiscent, finally splitting into two parts.

Wood: Soft and white in color.

Flowering season: April to July.

Fruit season: August to October.

PHYTOCONSTITUENT:

Stem bark: flavonoids, alkaloids, saponins, sterols, stigmasterols, carotene, hydrocarbons phytotoxins β-sitosterol, lupeol32, p-methoxy benzaldehyde, isolupeol, carotene, hydrocarbons phytotoxins, and phenolic acids.

Root bark: glycosides, tannins, alkaloids, sterols, terpenoids, and carbohydrates.

Flowers: flavonoids, tannins, alkaloids, saponins, steroids, carotenoids (lycopene, phytoene, phytofluene, β-carotene, prolycopene, neo-lycopene, δ-lycopene, and γ-lycopene), phenolic acid (gallic acid, protocatechuic acid, salicylic acid, trans-cinnamic acid, and hlorogenic acid), anthocyanins (cyanidin-3-glucoside and cyanidin-3-gentiobioside and β sitosterol

Leaves: lupeol, phenolic acids (gallic acid, protocatechuic acid, and salicylic acid), and β sitosterol

Seeds: saponins and galactomannons

TRADITIONAL USES

It is well-recognized that Delonix regia extract has therapeutic qualities. Many nations create extracts with antibacterial and antifungal properties using this plant. With a remarkable spectrum of medicinal and biological qualities, Delonix regia Rafin has been employed in folk medicine systems of several cultures to treat conditions including rheumatism, arthritis,

hemiplegia, leucorrhoea, and constipation. Dysmenorrhea was treated using Delonix regia Rafin's Flower, which has antibacterial, anti-inflammatory, broad-spectrum antibacterial, analgesic, antimicrobial, and antifungal properties. The blossoms are also utilized as a tablet binder in addition to being used as traditional herbal treatments for gynecological diseases. Flavonoids found in the seeds of Delonix regia are used as a home remedy for wound healing.

BIOLOGICAL ACTIVITY:

Antidiabetic activity: Delonix regia leaf methanolic extract was utilized to measure animals with hyperglycemia brought on by glucose tolerance. A standard reference medication was glibenclamide (10 mg/kg). The statistical findings showed that the mice displayed considerable oral hypoglycemic action at each glucose dosage. The drug extract's highest antihyperglycemic activity was found to be 400 mg/kg.

Hepatoprotective activity: The objective of the study was to assess the protective effects of a methanol extract of aerial portions of Delonix regia in rats with liver damage brought on by CCl 4. The aerial portions of D. regia have a methanolic extract that has hepatoprotective properties against CCl4-induced liver damage in rats.

Anti-diarrhoeal activity: In vivo, anti-diarrheal action has been demonstrated for the flowers of the Delonix regia plant. Castor oil-induced diarrhea, prostaglandin-E2-induced enteropooling, and a charcoal-induced gastrointestinal motility test in Wistar albino rats served as the experimental models. For the activity, Delonix regia flowers' 70% ethanolic extract was employed. Delonix regia flowers exhibit dose-dependent antidiarrheal effects in all groups that have been treated.

Antiulcer activity and antinociceptive activity: The ethanolic extract at a dose of 100 and 200 mg/kg showed a significant reduction in writhing with 55.56% and 54.76% of inhibition respectively and after treating with extract the surface epithelium of gastric mucosa was intact

Anti-arthritic effect: The Hind Limb Bone Mass (HLBM) was significantly reduced on treatment with ethanolic extract (250 and 500 mg. kg-1 body weight) of Delonix elata. The standard drug Indomethacin (10 mg/kg) was used. As a result, we observed that the ethanolic extract of Delonix elata possesses potent anti-arthritic activity

Anti-inflammatory activity: The methanol extract and its, ethyl acetate soluble and insoluble daughter fractions of leaf extract of D. elata also showed significant anti-inflammatory action compared to control but it was lower than the effect of bark extract. For its anti-inflammatory properties, Delonix regia leaves were ground up. Cotton pellet granuloma and rat paw edema caused by carrageenan were used as models for anti-inflammatory action. When compared to the control group, the ethanolic extract of Delonix regia leaves exhibits considerable efficacy at 400 mg/kg in both animals.

Antimicrobial activity: Scopoletin was separated by silica gel chromatography from the dichloromethane extract of Delonix regia Rafin. leaves. Scopoletin has antifungal efficacy against Candida albicans as well as antibacterial activity against Bubtilis subtilis, Escherichia coli, Pseudomonas aeuroginosa, and Staphylococcus aureus. The plant extract did not affect the fungus Trichophyton mentagrophytes and Aspergillus niger. Using the disc diffusion technique, the antimicrobial activity of the various extracts (15 g mm-2) was assessed. The zones of inhibition shown by the fractions of petroleum ether, carbon tetrachloride, and dichloromethane were, respectively, 9–14 mm, 11–13 mm, and 9–20 mm. The usual medication employed was kanamycin, which has a 20–25 mm zone of inhibition.

Anthelmintic activity: The Caesalpiniaceae flower, Delonix regia Rafin, was found to have anthelmintic action against Pheritima posthuma (Indian Earthworm). Delonix regia Rafin. flower extracts were administered in three different concentrations (25, 50, and 100 mg/ml). It was stated that the timing of worm paralysis and death had been determined. As a standard medicine, piperazine citrate (10 mg/ml) was administered, while distilled water served as the control. Methanolic extract exhibits the most anthelmintic activity, however, both aqueous and methanolic extract exhibit some anthelmintic activity.

Wound healing activity: The purpose of this study was to determine whether Delonix regia can heal wounds in experimental animal models. To research the impact on wound healing, ethanolic and aqueous extracts of Delonix regia flowers were synthesized. Rats with albinism were the creatures employed. Incision and excision wound models were used. The rate of wound contraction, length of epithelization, tensile strength (skin breaking strength), and assessment of the hydroxyproline content of skin were used to measure wound healing. The healing process was greatly accelerated by the ethanolic and aqueous extracts.

Gastroprotective activity: Delonix regia flower ethanolic extract was obtained and tested for gastroprotective efficacy in an animal model of caused ulcers. In the pylorus ligation-

produced gastric ulceration model, the different parameters including ulcer index, pH of gastric juice, % protection in all models, and stomach volume, free acidity, and total acidity were tracked. The ethanolic floral extract of Delonix regia Rafin had dose-dependent gastroprotective properties.

REFERENCES

1. Rani P. Maria Jancy, Kannan P. S. M. and Kumaravel S. Screening of antioxidant activity, total phenolics and gas chromatograph and mass spectrometer (GC-MS) study of Delonix regia. African Journal of Biochemistry Research. 2011;5(12): 341-347
2. Asima Chatterjee and Satyesh Chandra Prakash. The treatise on Indian medicinal plants New Delhi. Publications and Information Directorate. 1992; 2:125- 126.
3. Ahmed Jameel, Nirmal Sunil, Dhasade Vipul, Patil Anuja, Kadam Sagar, Pal Subodh, Mandal Subhash, and Pattan Shashikant. Hepatoprotective activity of methanol extract of aerial parts of Delonix regia; Phytopharmacology. 2011;1(5): 118-122
4. Raghunathan K, Miss Roma Mitra. Pharmacognosy of indigenous drugs. Central Council for Research in Ayurveda and Sidda, New Delhi. 1982; 2: 654-666.
5. Shiramane Rajabhau S, Biradar Karnakumar V, Chivde Basavaraj V, Shambhulingayya HM, and Goud Veerana . In-vivo anti-diarrhoeal activity of ethanolic extract of Delonix regia flowers in experimentally induced diarrhea in Wistar albino rats. International Journal of Research in Pharmacy and Chemistry. 2011; 1(3): 442-447.
6. Shewale Vaishali D., Deshmukh Tushar A., Patil, Liladhar S. and Patil Vijay R. Anti-Inflammatory Activity of Delonix regia (Boj. Ex. Hook). Advances in Pharmacological Sciences. 2011; 2012: 1-4
7. Jamal Ahmad, Adbel- Barry, Mohammed HH, Al-Hakiem. Acute intraperitoneal and oral toxicity of the glycosidic extract of Trigonella foenumgraecum in mice. J Ethanopharmacol. 2000; 70: 65-68.
8. Rahman M, Hasan N, Das AK, Hossain T, Jahan R, Khatun A, Rahmatullah M. Effect of Delonix regia leaf extract on glucose tolerance in glucose-induced hyperglycemic mice. Afr J Tradit Complement Altern Med. 2011;8(1):34-6.
9. Kale RH, Joshi UM, Ambhore DP, Sitaphale GR. Evaluation of Delonix regia Raf. Endospermic mucilage as tablet binder. Int J ChemTech Res. 2009; 1(1): 11

10. Vidyasagar GM, Prashantkumar P. Traditional herbal remedies for gynecological disorders in women of Bidar district, Karnataka, India. Fitoterapia.
11. Khan Mohd Asif, Amit Saxena, Farheen Tabassum Fatima, Gaurav Sharma, Veerana Goud, and Asif Husain. Study of wound healing activity of Delonix regia flowers in experimental animal models. American Journal of Pharmtech Research. 2012; 2(2): 380-390
12. Ahhirao R.A., Patel M.R., Hamid Sayyed and Patil J.K. In vitro anthelmintic property of gulmohar flowers against Pheritima posthuma; Pharmacolgyonline. 2011;1:728-732.
13. Jyothi M.V., Mandayan S.N., Kotamballi N.C., Bhagyalakshmi N. Antioxidative efficacies of floral petal extracts of Delonix regia Rafin.; Int. J. Biomed. Pharmaceut. Sci. 2007; 1: 73-82.
14. Lakshmi Vijai. Constituents of wood of Delonix regia. National Academy Science Letters. 1987; 10(6): 197-198.
15. Lawal, O., Uzokwe, N.E., Igboanugo, A.B.I., Adio, A.F., Awosan, E.A., Nwogwugwu, J.O., Faloye, B., Olatunji, B.P., Adesoga, A.A. Ethno medicinal information on
16. Arora Arun, Sen Rajendra and Singh Jitendra. Fatty acid composition of Delonix regia (Gulmohar) seed oil from an arid zone of Rajasthan. J. Ind. Council Chem. 2010; 27(2): 150- 152
17. Sammour R. H., El-Shanshoury A. E. R. Botanical Bulletin of Academia Sinica (Taipei). 1992; 33: 185.
18. Jahan Israt, Rahman Mohamaad S., Rahman Mohammad Z., Kaisar Mohammad A., Islam Mohamaad S., Wahab Abdul and Rashid Mohammad A. Chemical and biological investigation of Delonix regia (Bojer ex. Hook) Raf. Acta Pharmaceutica. 2010; 60(2): 207-215
19. Shabir Ghulam, Anwa Farooq, Sultana Bushra, Khalid Zafar M., Afzal Muhammad, Khan Qaiser M., and M. Ashrafuzzaman. Antioxidant and antimicrobial attributes and phenolics of different solvent extracts from leaves, flowers, and bark of Gold mohar [Delonix regia (Bojer ex Hook.) Raf.]. Molecules. 2011;16: 7302-7319
20. Jungalwala F.B. and Cama H.R. Carotenoids in Delonix regia (Gul Mohr) Flower. Biochem. Journal. 1962;85(1): 1-8.
21. Sammour R. H., El-Shanshoury A. E. R. Antimicrobial activity of legume seed proteins. Bot. Bull. Acad. Sin. 1992; 33: 185-190.
22. Parekh J, Chanda SV. In vitro activity and phytochemical analysis of some Indian medicinal plants. Turk J Biol. 2007; 31: 53-58

23. Joy P.P., Mathew J.S., Skaria B.P. Medicinal plants. Trop. Horticult. 2001; 2, 449-632.
24. Sama Kavitha and Xavier Vergeese Raja A. Preliminary phytochemical screening of root bark of Delonix regia. International research journal of pharmacy. 2011; 2(10): 42-43.
25. Adje Felix, Lozano Yves F., Meudec Emmanuelle, Lozano Paul, Adima Augustin, Agbo N'zi Georges and Gaydou Emile M. Anthocyanin Characterization of Pilot Plant Water Extracts of Delonix regia Flowers. Molecules. 2008; 13: 1238-1245.
26. Meenakshisundaram M., Santhaguru K. and Rajendran K. Effects of bioinoculants on quality seedlings production of Delonix regia in tropical nursery conditions. Asian Journal of Biochemical and Pharmaceutical Research Issue. 2011; 1(1): 98-107
27. Doss A., Doss A. Pichai Anthony, and Dhanbalan. In vitro antioxidant properties of certain indigenous medicinal plants from Western ghats of India. The internet journal of Nutrition and wellness. 2009; 7(1)
28. Pankaj B. Satpute, Dattaprasad N. Vikhe. Pharmacognosy and Phytochemistry of Tinospora cordifolia. Research Journal of Pharmacognosy and Phytochemistry. 2022; 14(3):195-3.
29. Mohini B. Shelke, Dattaprasad N. Vikhe, Ravindra S. Jadhav. A Review on Caralluma adscendens: A Potential Medicinal Herb. Research Journal of Pharmacognosy and Phytochemistry. 2022; 14(3):219-4.
30. Archana R. Pawar, Dattaprasad N. Vikhe, R. S. Jadhav. Recent Advances in Extraction Techniques of Herbals – A Review. Asian J. Res. Pharm. Sci. 2020; 10(4):287-292.
31. Habeeba S Shaikh, Ravindra S Jadhav, Dattaprasad N Vikhe. A Review on “Phytochemical and Pharmacological activity of Bauhinia racemosa”. Research Journal of Science and Technology. 2021; 13(4):256-0.