



Review Article

A Morphological Review on *Gmelina Arborea* Linn- A Wonder Ayurvedic Herb

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Received: 17/11/2014

Revised: 08/12/2014

Accepted: 12/12/2014

ABSTRACT

Gmelina arborea an important medicinal plant is one of the most widely cultivated species of the family Verbenaceae. *Gmelina arborea* Roxb is a well-known medicinal plant. It is known to have been used in traditional Indian medicine having important source of chemicals of immense medicinal and pharmaceutical importance. It is highly valued from time immemorial because of its vast medicinal properties. The present article provides all necessary information regarding its literature. The roots, leaves, flowers, fruits and bark are used for treating different ailments in traditional medicine. The literature suggests use of the plant in treatment of scorpion sting, snake-bites and diabetes. The plant is anthelmintic and used for treating hallucinations, excess thirst, piles, abdominal pains, burning sensations, and fever. So considering the available literature on *Gmelina arborea* roxb, review study has been under taken.

Keywords: *Gmelina arborea*, Immemorial, Pharmaceutical, Verbenaceae

INTRODUCTION

Medicinal plants have been used to cure human illness since time immemorial. Certain of these drugs are believed to promote positive health and maintain organic resistance against infections by re-establishing body equilibrium and conditioning the body tissue. [1,2]

The root of *G. arborea* Linn. is one of the ingredients of “dashmuladikwath” and “bhrihatpanchamool” of ayurveda, which constitutes a number of ayurvedic preparations used as tonics. [3] According to the Ayurvedic literature, the roots of *G. arborea* Linn. have been reported to be used

in case of hallucination, fever, dyspepsia, hyperdipsia, hemorrhoids, gastralgia, anasarca, and in burning sensation. It is bitter, sweet, tonic, laxative, galactagogue, and anthelmintic. [4] It is a popular commercial timber grows naturally in the warm temperate regions of Mediterranean and South Asia. The plant is commonly found in abundance on the hills and in the Andaman Islands of India.

Classification

Botanical identification (engler and prantal,1931) [5]

Kingdom– Plantae

- Plants

Sub kingdom –Tracheophyta-Vascular plants
Division– Magnoliophyta -Flowering plants
Class – Magnoliopsida- Dicotyledons
Order – Lamiales
Family – Verbenaceae -Verbena family
Genus – *Gmelina*
Species – *arborea*

Latin name: *Gmelina arborea*

Gmelina means name of the research scientist. *arborea* means tree like. [6]

Family :Verbenaceae

General characters

VERBENACEAE [7]

Herbs, shrubs, or trees. Leaves usually opposite or whorled, simple or (in VITEX) digitate; stipules 0. Inflorescence cymose, racemose or spicate; cymes often compound or paniculate; bracts usually small; flowers often brightly coloured, hermaphrodite (rarely polygamous), usually irregular. Calyx inferior, gamosepalous, persistent, tubular or cup-shaped, 5-4 (rarely 6-8) lobed or toothed. Corolla gamopetalous; tube usually cylindrical or dilated above often curved limb 2-lipped or subequally lobed; lobes 5-4 (rarely more). Stamens 4, didynamous (rarely 2, very rarely 5-6), inserted on the corolla-tube; filaments free; anthers 2-celled, opening by longitudinal slits. Disk usually inconspicuous. Ovary superior, sessile 2-4 (rarely 8 or almost 1) celled, entire or 4-lobed; ovules variously attached, 2 (sometimes 1) in each cell; style terminal; stigma usually entire, less commonly 2 or more lobed. Fruit usually more or less drupaceous, 2-4 or 1 celled; mesocarp juicy, fleshy or dry; endocarp usually bony. Seed erect or pendulous, separate in distinct cells; albumen 0 in the Indian genera; embryo straight; radical inferior. Genera about 70. Species 750 – Almost all tropical and subtropical.

Genus [7]

GEMELINA LINN

Trees or shrubs unarmed or spinous; young shoots usually tomentose. Leaves opposite, entire or toothed, sometimes more or less lobed. Flowers large, yellow or brownish yellow, often tomentose, in small dense or lax sessile or pedunculate cymes along the branches of a terminal panicle; bracts usually narrow, rarely leafy. Calyx campanulate, 4-5 toothed or subentire, persistent and unaltered in fruit. Corolla 2-lipped, infundibuliform, ventricose in the upper part; tube slender below, much swollen above; limb oblique, spreading 4-5 lobed. Stamens 4, didynamous, inserted below the throat, shorter than the corolla; anthers with oblong more or less discrete cells. Ovary 4-celled; ovule solitary in each cell; style slender; stigma shortly 2-fid. Fruit a succulent drupe; endocarp undivided, bony, 2-4 celled. Seeds oblong; albumen 0; cotyledons thick. Species 8. Indo Malaya, Australia.

1. A tree.....1. *Gmelina arborea*
 2. A shrub.....2. *Gmelina asiatica*
- Gmelina asiatica* Linn is used medicinally in Cambodia

Species [7]

Gmelina arborea :

It is a moderate sized unarmed deciduous tree with grayish yellow bark and frequent lenticels having vertical orientation. The tender parts are usually clothed with white pubescence.

Root - Is cylindrical and consists of a thick central cylinder covered over by thin layer of yellowish grey bark. The outer surface of the root is rough to touch due to presence of ridges and prominent broadly oblong lenticels having vertical orientation. The central of the wood is porous, hard and light.

Leaves: Simple petiolate unicastate exstipulate, reticulate and decussate about 20 cms long and 15 cms broad broadly ovate acuminate outer glabrous on ventral surface when mature and stellately tomentose on the dorsal surface, leaf – base cordate or

slightly cunate. The ventral surface is pole green petiole 5-12.5 cm long cylindrical pubenolous with a pair of glands at its top.

Flowers: Complete bi-sexual born in penicles with brownish yellow colour shortly pedicellate.

Calyx: Gamosepolous 0.5cm long campanulote with 5 teeth pale greenish yellow and tomanose.

Corolla : Gamopetalous bilobiate 5 lobet (3+2) lobes recurvol 3.7 cms long densely hairy outside yellowish brown with conspicuous yellow and brown spots.

Androceum : Poly androus didynamous epipetalous anothers introse pendulous supespatrate.

Gynoeceum: Superior 4 cellut with one ovule in each cell style slender stigma shortly bifid.

Fruit Drupe: 1.9-2.5 cms long ovoid glossy when ripe becomes orange yellow develops a sweet taste.

DISTRIBUTION [8]

Found throughout India, from foot of North West Himalaya to Chittagong and throughout Deccan peninusula.

PROPAGATION AND CULTIVATION [9]

It is planted in gardens and avenues. The tree prefers moist, fertile soil with good drainage. Natural reproduction takes place in rainy season soon after the drupes are fallen. Alternating heat and moisture are necessary to stimulate seed germination. Artificial reproduction may be carried out by direct sowing or by transplanting. Direct sowing in lines, 3-4m apart, with a distance of 30 cm between the plants has given good results. Dibbling of seeds (4-5 seeds at each peg) with a spacing of 2 x2 m and broadcast sowing also give satisfactory results for transplanting purposes. Seeds are sown in drills in nursery beds shortly before rains. Seedlings are transplanted in the first rainy season when 8-10 cm high. If the plants are to be kept for a year in the nursery, they are

pricked out to 22 cm apart in the first rains and planted out in the next rainy season with the stem pruned down to 5 cm and the root trimmed to 30 cm. a spacing of 2m x 2m is ordinarily suitable. The rate of growth is fast and the tree is well adapted as coppice. It has been found suitable for plantation on wastelands.

Micro propagation of *G. arborea* was tried through axillary bud culture. The epicormic and crown regions of a six-year-old plant were used to initiate shoot cultures. Explants from the epicormic region produced 2.7 (average) shootlets / explants when cultured on McCown's medium for woody plants supplemented with 2% sucrose. About 80% of in vitro regenerated shoots rooted on IBA (1.5 mg/l) supplemented McCown's medium within 7-9 days of culture.

Trade and Commerce : Retail market price – Root – Rs. 10/- per kg (2001).

MACROSCOPIC CHARACTERS [10]

Root – Root pieces are nearly cylindrical with uneven surface, grayish brown; fracture somewhat tough in bark, brittle and predominant in woody portion.

Root bark – Mature root bark, when fresh, is yellowish in colour; dry pieces curved and channeled, thinner ones forming single quills, external surface rugged due to presence of vertical cracks, ridges, fissures and numerous lenticels; fracture short and granular; paste mucilaginous, sweetish with slight bitterness.

Fruit : A drupe, ovoid, crinkled, black, 1.5-2.0 cm long, sometimes with portion of attached pedicel, 2- seeded, sometimes 1-seeded; taste sweetish, sour, seed is ovate, 0.5- 1 cm long, 0.4 – 0.6 cm wide, light yellow, smooth surface, seed coat thin, papery; taste oily.

MICROSCOPIC CHARACTERS [9]

Root – Transverse section of root shows 6-8 layers of cork cells arranged in tangential direction and broken at places towards upper

layers. Cortex is composed of thin walled parenchymatous cells with starch grains; resin ducts present in abundance throughout cortex; scattered stone cells and fibres present, occurring mostly in singles; some cortical cells contain rosette crystals of calcium oxalate and oil globules. Primary phloem is characterized by the presence of sieve tubes with companion cells, phloem parenchyma, soft bast fibres and ray cells. Wood consists of simple, pitted wood parenchyma, medullary rays, vessels and tracheids; inner wood consists of a major portion of fibres together with a few vessels; are numerous and form almost a ring near the periphery of xylem cylinder whereas in central region they are scattered in groups or in singles. Wood fibres are abundant and with simple pits. Cambium is distinct. Medullary rays are generally uniseriate with abundant starch grains.

Root bark – Transverse section of mature root bark shows cork represented by 10-18 layers of tangentially elongated rectangular cells; secondary cortex composed of parenchyma and groups of stone cells; secondary phloem consists of parenchyma, groups of stone cells, sieve tube elements and medullary rays.

Fruit : Microscopically fruit shows pericarp differentiated into single layered epicarp, multilayered mesocarp and endocarp. Epicarp consists of single layer of thin walled cells; mesocarp composed of several layers of isodiametric, thin walled, parenchymatous cells; endocarp consisting of multilayered sclerenchyma. Seed shows outer integument consisting of 3-5 rows of crushed, parenchymatous cells followed by inner integument consisting of 2-3 rows of thin walled, tangentially elongated, parenchymatous cells; cotyledons consisting of single layered, radially elongated epidermal cells; mesophyll consisting of thin walled cells, filled with oil globules and aleurone grains.

Fruit powder is blackish brown and shows stone cells, oil globules and aleurone grains.

MAJOR CHEMICAL CONSTITUENTS [9]

Gmelofuran-a furanosesquiterpenoid, sesquiterpene, cerylalcohol, hentriacontanol-1, β - sitosterol, n-octacosanol, gmelinol, apiosylskimmin-a, apiofuranosyl-(1-6) - β - D- gulucopyranosyl (1.07) – umberliferone (root). Cluytyl ferulate, n-octacosanol, gmelinol, arboreal, 2-O methyl arboreal, 2-O ethylarboreol, isoarboreol, gmelanone, β – sitosterol, paulownin; 6-bromoisoarboreol, 4-hydroxysesami, 4,8- dihydroxysesamin, 1,4- dihydroxysesamin (gummadiol), 2-piperonyl-3- (hydroxymethyl)-4 (α -hydroxy-3-, 4-methylenedioxybenzyl)- 4 hydroxy tetrahydrofuran (I), 4-epigummadiol-4-O-glucoside, 1,4-dihydroxy-2, 6-dipiperonyl-3, 7- dioxabicyclo (3,3,0) – octane, gmelanone, palmitic, oleic and linoleic acids, stigmasterol, stigmastanol, campesterol, α -2-sitosterol, butulinol (heartwood); luteolin, apigenin, quercetin, hentriacontanol, β -sitosterol, quercetogenin and other flavons (leaf).

SUBSTITUTES AND ADULTERANTS [9]

Roots of *Gmelina asiatica* Linn. are used as substitute to *Gmelina arborea*.

IDENTITY, PURITY AND STRENGTH [10]

Root –

Foreign matter – Not more than 2%;

Total ash – Not more than 5%;

Acid insoluble ash – Not more than 0.3%;

Alcohol soluble extractive – Not less than 7%;

Water soluble extractive – Not less than 20%.

Fruit –

Foreign matter – Not more than 1%;

Total ash – Not more than 6%;

Acid insoluble ash – Not more than 0.4%;

Alcohol soluble extractive – Not less than 8%;

Water soluble extractive – Not less than 25%.

CONCLUSION

In a nut shell, the present morphological review helps in identification and ancient literature of traditional Indian medicine indicating the potential medicinal values of *Gmelina arborea* plant.

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How to cite this article: Ashalatha M, Sankh K. A morphological review on *gmelina arborea* linn- a wonder ayurvedic herb. Int J Health Sci Res. 2015; 5(1):304-308.
