

MONOGRAPH
ON
SHYONAKA
(*OROXYLUM INDICUM* VENT SYN. *BIGNONIA INDICA*, L.,
CALOSANTHES INDICA BLUME, *SPATHODEA INDICA* PRES)



FOREST BOTANY DIVISION
STATE FOREST RESEARCH INSTITUTE
JABALPUR (M.P.)

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FOREWORD

Oroxylum indicum (Linn) Vent. belonging to family Bignoniaceae is distributed throughout India in Eastern, Western Ghats and North East region up to an altitude of 1200m and found mainly in ravine and moist places in forests of different states of the country. In Madhya Pradesh, it occurs in Chhatarpur, Seoni, Jabalpur, Mandla, Dindori, Amarkantak. It is commonly known as Shivnak, Shyonak, Sonpatha or midnight horror.

Several parts of this tree contain alkaloids and flavonoids of medicinal value used in the cure of several ailments including bronchitis, jaundice, piles, smallpox, leucoderma, cardiac disorder, scabies, enlarged spleen, helminthiasis, gastropathy, hemorrhoids and cholera. Its root and stem contains three flavones named oroxylin A, baicalein and chrysin. Besides this it contains certain alkaloids, tannic acid, sitasterol and galactose. Seeds contain shiny oil that is 20%. Besides its medicinal value, the tree is also valuable from fuel wood, food and fodder points of view.

This monograph provides useful information on the distribution and habitats, morphology, flowering and fruiting, natural regeneration, artificial regeneration, utilization, chemical constituents, threat status and conservation measures etc., of this species for promoting their conservation and for the benefit of interested medicinal practitioners and overall development of forestry, environment and medicinal plant sectors.

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(C.P. Rai, IFS)
Director

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SHYONAKA

(*OROXYLUM INDICUM* VENT SYN. *BIGNONIA INDICA*, L.,
CALOSANTHES INDICA BLUME, *SPATHODEA INDICA* PRES)

I. KNOWING THE SPECIES

Syn. *Bignonia indica*, L., *Calosanthès indica* Blume, *Spathodea indica* Pres.

Regional names:

English:	Indian Trumpet
Telgu :	Dundilum, Pampini
Tamil :	Achi, Peiarlanthei
Kannada:	Tigdu, Bunepale, Sonepatta
Malayalam:	Palagapaiyani
Oriya:	Phapni, Phonphonia
Hindi:	Ullu, Arlu, Saona
Sanskrit:	Shayonak
Gujarat:	Tentu, Aralu
Bengoli :	Sona, Nasona, Sonpatti
Marathi:	Tetu
Panjabi :	Mulin, Tatmorang
Nepali & Lepcha:	Tatola
Assami :	Toguna, Bhatghila , Dingari

II. DISTRIBUTION AND HABITAT

Oroxylum indicum (Linn) Vent. (Family Bignoniaceae) is distributed throughout India in Eastern, Western Ghats and North East region up to an altitude of 1200m and found mainly in ravine and moist places in forests of different states of the country. In Madhya Pradesh, it occurs in Chhatarpur, Seoni, Jabalpur, Mandla, Dindori, Amarkantak. In Chhatisgarh, it is reported in Bastar District. It is commonly known as Shivnak, Shyonak, Sonpatha or midnight horror. It is a small deciduous,

soft wooded tree with few branches and a small open crown. It is found upto the height of 1200 m and is generally found in damp region. The tree is often grown as an ornamental for its strange appearance. It is annual small tree that has a height of 10 to 15m.

III. MORPHOLOGY

Genus

Trees, leaves large, 2-3 pinnate, opposite, leaflets entire or dentate- serrate. Flowers in terminal, large, long pedunculate racemes, bracteate. Calyx campanulate, persistent, not articulated, coriaceous, truncate or shallowly lobed. Corolla infundibuliform, thick, fleshy, 5-lobed, lobes crisped subequal. Stamens 5, sub equal, inserted above the middle of corolla, not or only slightly exerted from the throat, filaments in 2, unequal pears, 5th shorter, anthers glabrous, 2 celled. Disk large, not surrounding the base of ovary. Ovary linear-oblong, 2 locular, stigma 2 lipped. Fruit a capsule, large, broadly linear, sword-shaped, flatly compressed parallel to the septum, many seeded. Seeds discoid, with membranous wings. It is a monotypic genus of Indo-Malesia

Species

Tress, 10-15m height, irregularly branched. Bark is off brown in color. Leaves usually tufted towards twig end, long petiolate 5 to 10 cms long, leaflets are 13 cm long and 7 to 10 cms broad having sharp edges. The flowers stalk is one feet long. The flowers are purple in color. Flowers solitary on a tubercle, arranged in erect racemes, 40cm long, calyx dirty violet, campanulate, 3-5 cm long, turning woody in fruit, corolla deep maroon, 5-7 cm long, glandular inside, lobes obovate, sparsely toothed. Disk shallowly 5 – lobed. Capsule flat, pendent, 50-75 x 6-9cm, tapering at both ends. Seeds are flat and are 7.5cm broad and 5 cm broad. The long, podded fruits hang down from bear branches, looking like dangling sickles or swords in the night.

IV. SILVICS

Leaf fall occurs from December to February, the new leaves do not appear till May – June. The flowers are large and purplish in color, appearing in rainy season (June – August) and fruit appears in December March and dehisces usually during April – May. The fruits are two valved, flat, woody capsule containing a large number of seeds. The seeds are flat and are surrounded by a thin transparent white papery wing. The tree is also a night-bloomer and is pollinated naturally by bats. The seeds

are also carried by wind to some distance from the tree. The viability is reported to be 9-12 months under carefully storage conditions.

The tree is partially shade loving. Its root system is superficial and produces root suckers in great extent. The tree is prone to frost and drought in its initial stage of development. It is a fast growing species with mean annual girth increment of 4 to 6 cm.

V. NATURAL REGENERATION

The seedling appears in the rainy season under natural conditions. They are sensitive to drought. The seedlings require partial shade and moisture for its growth and establishment.

VI. ARTIFICIAL REGENERATION

Regeneration through seeds and root suckers

Conventionally, *O. indicum* reproduces via viable seeds and roots. The seed sowing in nursery beds is generally done in March-April. After sowing, seeds should be covered with thin layer of soil and need to be watered regularly. The seedlings require shade to protect from frost in winter. The nursery raised seedlings can be transplanted without difficulty during the first and second rainy seasons. The propagation of the species may also be done through root suckers.

Micro propagation through tissue culture

The low percentage of seed viability and destructive collection of roots from trees, limits its natural propagation. Hence, alternative methods like *in vitro* techniques could be used to propagate this plant and thereby multiply elite genotypes. *In vitro* regeneration of this tree has been reported (Dalal and Rai, 2004). Plant tissue culture offers unconventional techniques for plant improvement. It has become an important tool for conservation and mass propagation of important tree species. The large-scale propagation of *O. indicum* through apical and axillary buds through tissue culture technology is most appropriate method. A simple and reliable protocol was developed through apical and axillary bud explants of *Oroxylum indicum* for multiple shoot regeneration. Effect of 2 cytokinins; BAP and KN, was studied. BAP at 4.43 μM proved better than KN with highest frequency of shoot initiation and maximum number of shoots initiated. Axillary bud showed significantly ($p < 0.05$) high shoot multiplication on MS medium with 4.43 μM BAP in subsequent sub culture passages. Elongated shoots were rooted on half strength MS medium with 4.92 μM IBA. of the various methods used for hardening of *in*

in vitro regenerated plantlets, maximum plantlets survived after their subsequent transfer through sterilized-distilled-tap water and ultimately into soil: sand mixture.

VII. UTILIZATION

1. Use as fuel wood/ match boxes

The wood is (wt., 480kg/cu.m) yellowish white and soft and may be used as fuel. It has been reported to be used for match boxes in Philippines.

2. Use as food and fodder

The young shoots and unripe fruits are eaten as vegetables. Flowers and bark are also reported to be eaten. The tree is lopped for fodder.

3. Use as medicine

Several parts of this tree contain alkaloids and flavonoids of medicinal value used in the cure of several ailments including bronchitis, jaundice, piles, smallpox, leucoderma, cardiac disorder, scabies, enlarged spleen, helminthiasis, gastropathy, hemorrhoids and cholera. Its root and stem contains three flavones named oroxylin A, baicalein and chrysin. Besides this it contains certain alkaloids, tannic acid, sitasterol and galactose. Seeds contain shiny oil that is 20 %. The *in vitro* antioxidant potential of different parts of *Oroxylum indicum*. 2, 2-diphenyl 1-picrylhydrazyl (DPPH), nitric oxide, superoxide anion and hydroxyl radical scavenging potential and reductive ability assay of methanol extract of different parts i.e. root, root bark, stem, stem bark, leaves and fruits were reported. Leaves and bark extracts exhibits highest free radical scavenging activity than bark stem and fruit extract. Leaves extract showed maximum reductive ability and found to contain maximum amount of polyphenolic compounds. The highest free radical activity may be due to presence of polyphenolic compounds. Antioxidants with free radical scavenging activities may have great relevance in the prevention and therapeutics of these diseases. *Oroxylum indicum* is a rich source for flavanoid compounds having mucoprotective and antigastric ulcer properties, and containing *Oroxylum A*, *Chrysin* and *Baicalein*.

It is vata and Kapha suppressant. It helps in reducing pain and inflammation due to its hot potency. It also helps in improving the skin texture and promotes healing of wounds. It regularizes the digestion and prevents diarrhea. It is also very effective in worms and infection. It regulates the respiratory tract. And also tones up the urinary tract. It also helps in strengthening the whole body. Seeds are Laxative, astringent, root bark is diaphoretic, bark is diuretic and fruits are

anthelmintic, carminative and antiarthritic.

It was also reported to possess anticancer properties. The plant was reported to possess various pharmacological activities, which may be due to its antioxidant potential. Free radicals are known to have an important role in stimulation of phagocytosis, induction of drug detoxification pathways and stimulation of signal transduction pathways. However, the same radicals can be implicated in the pathogenesis of various diseases such as atherosclerosis, aging, ischemia, and reperfusion injury of many tissues, central nervous system injury, gastritis, including cancer.

Its paste is used in application on the pain of joint, wounds and inflammation and its powder is used in curbing the pain in the body and also helps in improving the digestion and is very effective in regularizing the peristaltic movements to normal. It helps in cleaning the respiratory tract as it expels out the extra amount of mucus in the tract.

5. Traditional uses:

The traditional knowledge of Maram Naga village of Senapati district, Manipur, reveals that the decoction of *O. indicum* bark can be used as a potent anticancer medicine, especially against nasopharyngeal cancer. The plant is also used in Asian folk medicine for the treatment of abdominal tumors.

VIII. CHEMICAL CONSTITUENTS

The leaves contain anthraquinone derivative aloë-emodin. Phytocompounds like flavonoids and phenolic acids, commonly found in plants have been reported to have multiple biological effects, including antioxidant activity (Conforti *et al.*, 2008; Kalaivani and Mathew, 2009). Therefore, medicinal plants can be a potential source of natural antioxidants (Cesquini *et al.*, 2003).

The stem and root barks contain three flavone colouring matters, viz., Oroxylin –A (stem bark 0.65%, root bark 0.86%), biacalein (stem bark 0.5%) and chrysin (stem bark 0.35%). Oroxylin –A is the 6-methyl ether of biacalein and has been synthesized. The bark contains also traces of an alkaloid, tannic acid, sitosterol and galactose. The seeds on extraction with petroleum ether yield c. 20% of a non-drying, bright yellow oil with the following constants: sp. Gr.25o, 0.9062; n_{25o}, 1.4646; acid val., 0.71; sap. val., 183.9; iod val. (Hanus), 71.5., Hehner val., 93.26; R.M. val., 0.92; Polenske val., 1.40; acet. Val., 6.30; and unsapon. matter 1.36%. The mixed fatty acids contain 80.4% oleic and 19.6% saturated acids (palmitic, stearic, and probably lignoceric and higher acids) The seeds contain a yellow

crystalline principle (m.p.2740) , and baicalein and its glucoside named tetuin (baicalein-6glucoside, C₂H₂₀O₁₀.2H₂O, m.p. 112-140).

IX. IMPORTANT FORMULATION

The plant is used as a constituent of ayurvedic preparation "Dashmularisht" and is a traditional herbal medicine in China and Japan. The plant extract in the form of Chrysin is also available in herbal product of China (supplier: Changsha Nutramax Inc.).

VIII. THREAT STATUS AND CONSERVATION MEASURES

Owing to the indiscriminate collection, over exploitation and uprooting of whole plants bearing roots, this valuable tree has become *vulnerable* in Karnataka and Andhra Pradesh and endangered in Kerala, Maharashtra, M. P. and Chhatisgarh and is feared to become endangered soon in other states too. It has been categorized as vulnerable medicinal plant by the government of India. Its conservation and mass multiplication for translocation in the natural habitat is highly essential. It is supplied from forests. Its average growth rate of demand in Ayurvedic preparations is reported to be 26.3% per annum.

IX.SOURCE INSTITUTIONS FOR DETAILED INFORMATION

1. State Forest Research Institute, Polipathar, Jabalpur 482008 (M.P.)
2. Botanical Survey of India, Central Circle 10 Chatham Lines, Allahabad 211002 (UP)
3. Forest Research Institute, PO – New Forest, Dehradun (Uttaranchal)
4. Bio-science Department of Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)
5. Institute of Forest Genetics and Tree Breeding , Coimbatore.
6. Tropical Forest Research Institute, PO RFRC , Jabalpur (M.P.)
7. Institute of Pharmacy and Technology, Salipur, Cuttack, Orissa-754 202, India
8. Council of Scientific and Industrial Research, New Delhi
9. <http://www.alibaba.com>.

