

**DYSOXYLUM BINACTERIFERUM HOOK. F.: A PROMISING
HERBAL DRUG USED IN FOLK MEDICINE BY THARU
COMMUNITY OF UTTARAKHAND**

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ABSTRACT

Due to the extreme inhospitable conditions, tribal communities are dependent on collection and trade of medicinal plants, and they have gradually become familiar with the healing properties of the available plants. The Tharu tribe is a most popular tribe of India and Nepal. A smaller number of Tharu live in India, mostly in in Udham Singh Nagar District of Uttarakhand. The Tharu is largest and oldest ethnic group of the Terai region. *Dysoxylum binectariferum* Hook. f. Locally known as Achalkaat, is a small or medium sized tree up to 5 feet girth and 50 feet high from the family Meliaceae. *Dysoxylum* is used in treatment of Osteomyelitis and Abscess many skin ailments and also in cancer among Tharu community of Uttarakhand. The alkaloids present in this plant have also shown anti-inflammatory, analgesic,

antibacterial and anti-cancer properties. Hence *Dysoxylum* is a promising drug which can be incorporated in extensive preclinical and clinical research for its healing, analgesic anti-cancerous properties.

KEYWORDS: Ayurved, *Dysoxylum binactiferum* Hook.f., Tharu community, Uttarakhand.

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INTRODUCTION

Herbal medicines constitute a major part in all traditional system of medicine. Ayurveda is a vast science and was an integral part of life since ancient time in India. India is a rich country in terms of biodiversity in flora fauna with great variations in altitude, geographical entity. The pharmacological evaluation of substances from plants is an established method for the identification of lead compounds which can leads to the development of novel and safe medicinal agents. People in almost all part of country are using locally available plants as medicine for various ailments effectively among different communities. Most of the plants are listed in classical texts of Ayurveda but still many are not listed in codified drugs. But as Ayurveda itself have mentioned that not all plants can be covered in the books but the basic concepts remain same in using of medicines^[1] and we can get knowledge of various plants from the people living near forest.^[2]

Dysoxylum binectariferum Hook. f.

Dysoxylum binectariferum Hook.f. Syn. *D. macrocarpum* Bedd. locally known as Achalkaat, is a small or medium sized tree up to 5 feet girth and 50 feet high from the family Meliaceae. Bark pale brown or ashy, fairly smooth or roughish with an exterior corky layer. Twigs stout, smooth, clothed with a thick pale scurfy crustation. Leaves alternate, 12-24 inch long, imparipinnate. Petiole and rachis glabrous. Leaflets 6-11, alternate, elliptic- oblong or oblong, the lower leaflets border, entire or sinuate, acuminate, base rounded or cuneate and often very oblique, glabrous, dark glossy green, midrib prominent beneath; lateral nerves 7-12 pairs, arcuate, not reticulate between. Flowers 3-4 inch diameter, in terminal minutely pubescent, panicles 2-4 inches long. Calyx shortly 4-lobed or toothed, about half the length of the petals. Ovary 4-celled. Capsule 1.5-2 inches diameter orange suffused with reddish, smooth, globose or pyriform, 8- grooved, narrow at the base. Seeds 1-3 large, black enclosed in a scarlet aril.



Fig. 1: Habitat and Fruit of *Dysoxylum binectariferum* Hook. f.

Distribution of *Dysoxylum binectariferum* Hook. f.

There are about eighty recorded species in this genus, growing widely across the regions of Malesia, the western Pacific Ocean, Australia and south & south-eastern Asia; centered on the tropics between the Pacific and Indian Oceans. They grow naturally in New Guinea, eastern and northern Australia, New Caledonia, Fiji, South east Asia, Southern China, the Indian subcontinent, the Philippines, Taiwan, and in the western Pacific Ocean their most easterly occurrences, in the Caroline Islands, New Zealand and Niue.

In Indian subcontinent: Sri Lanka, India and nearby Bhutan and Nepal large trees of this *Dysoxylum* genus grow naturally in forests from lowlands to mid altitude mountains. About ten to twelve recognized species grow naturally in this region. Endemic Indian species of the genus are *D. beddomei*, *D. binectariferum*, *D. ficiforme* and *D. malabaricum*. *D. malabaricum* is popularly used in Ayurveda known as *agaru*.

According to Osmaston, 1926^[3] this species was found growing in association with *Syzygium cumini* (L.) Skeels at (Morcha- Bilori) Jaulasar range and Pilapani range, at east of the Haldwani forest Division at elevation of 600-700 feet in Uttarakhand area.

Tharu community: The Tharu tribe is a most popular tribe of India and Nepal. A smaller number of Tharus live in India, mostly in Champaran District of Bihar and in Udham Singh Nagar District of Uttarakhand. The Tharu is largest and oldest ethnic group of the Terai region, living in villages near dense malaria-infested jungles in regions that were isolated over the millennia, allowing them to develop a unique culture. They work usually as farmers

or peddlers. Although physically the Tharu are similar to other peoples in the area, they speak their own language that originated in Sanskrit and is now recognised officially. Recent medical evidence supports the common belief that the Tharu people, having lived in the swampy Terai region for centuries have developed an innate resistance to malaria.^[4]

We have interacted with many folk healers, one of them named Shri. Cheda Singh, 75 years old male, residing at Selapani forest area of Sitarganj. They are folk healers from many generations and are using many Ayurveda medicines for treating ailments. Upon discussion with them one plant identified as *Dysoxylum*, which is locally called by them as Achalkaat is being used very effectively along with other herbs. Also they are effectively treating many diseases like Diabetes, Jaundice, Leucorrhea, Piles etc with use of well-known Ayurveda herbs like Bael (*Aegle marmelos*) (L) Correa., Apamarg (*Achyranthes aspera* L.), Punarnava (*Boerhavia diffusa* L.), Krishna mushali (*Curculigo orchoides* Gaertn.) etc.

Ethno-Medicinal use: *Dysoxylum* wood is popularly used as fuel and furniture purpose among Tharu people. As per discussion with folk healers of Tharu it is used in combination as: Bud of *Syzygium aromaticum* [L.] Merr. (*Myrtaceae*) known as Lavanga or Laung, Resin of *Pinus roxburghii* Sargent (*Pinaceae*) known as Cheer or Dhoop Patra and Fruit of *Dysoxylum binectariferum* Hook. f. (*Meliaceae*) known as Achalkaat is used as 12 gm *Syzygium aromaticum* [L.] Merr. & L.M.Perry, 12 gm white pepper and 12 gm resin of *Pinus roxburghii* Sargent and 4-5 fruits powder of *Dysoxylum binectariferum* are mixed and paste is formed, which is fried in mustered oil. Q.S. paste is applied locally to cure osteo-myelitis, fruit is also applied on pustules, abscess and many skin ailments and cancer.

Recent works on medicinal properties of *Dysoxylum*: *D. binectariferum* Fruits contains Dysobinin; Dysobinol and have Central depressant and inflammation inhibitor action.^[5] *D. binectariferum* Stem and bark contains Pi- peridinylbenzopyranone and have anti-inflammatory and immunomodulatory.^[6] It is also reported to have very good analgesic properties.

Rohitukine (C₁₆H₁₉O₅N), a chromane alkaloid, found in *Dysoxylum binectariferum* Hook. f., exhibits both anti-inflammatory as well as immuno-modulatory properties besides acting as an anticancer compound.^[7] Rohitukine is a precursor for the semi-synthetic derivative, flavopiridol.^[8] Flavopiridol inhibits several cyclin-dependent kinases (CDKs), a family of kinases which govern progression of cells through the cell cycle, and displays anticancer

properties.^[9] Favopiridol also known to selectively induce apoptotic cell death as well as exhibiting some anti-angiogenic properties.^[10] In preclinical studies, flavopiridol was shown to inhibit the proliferation of a broad range of human tumor cells in vitro and in vivo. Flavopiridol has also been shown to block human immunodeficiency virus Tat trans-activation and viral replication through inhibition of positive transcription elongation factor b (P-TEFb).^[11] Study results also demonstrate the anticancer activity of rohitukine on both ovarian and breast cancer lines.^[12]

CONCLUSION

The plant is being used from ages in Tharu community, which can be further incorporated in clinical trials so as to establish it in use for Osteomyelitis, Abscess treatment for its anti-bacterial and healing properties which need to be studied and validated. Furthermore as it contains anti cancerous properties hence further studies using the drug as a whole plant or in combination with other Ayurveda drugs can also be undertaken to validate its efficacy in combating cancer. There is a growing threat on the use of medicinal plants, their products and the Indigenous medicinal practice as the deforestation and encroachment by people are rapidly leading to agriculture land and urbanization in the former jungle. As the result of the popularity of medicinal plants and their associated indigenous knowledge, the number of people and national and international institutions seeking information on these plants is increasing very rapidly. As the viability of the plant is very low and it is restricted only to limited region in India hence conservation of this promising plant is also needed and must be taken up by concerned authorities.

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