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Kaphal *(Myrica esculenta)* – a promising wild fruit tree of the Indian Himalayas

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INTRODUCTION

Myrica esculenta, commonly known as Box myrtle, Himalayan bayberry and locally as Soh–phi (Khasi) or Kaphal (Hindi), is a wild fruit tree native to the Indian Himalayas. It is a sub-temperate, small to medium-sized evergreen tree found throughout the mid-Himalayas starting from about 900 m and going up to about 2,100 m above sea level. It is globally distributed across Indo-Malesian region. In India, the tree has been recorded in Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Assam, Meghalaya, Nagaland, Manipur and Mizoram. The tree belongs to the family Myricaceae. The tree holds significant importance in various cultural, economic and ecological contexts, especially in the Himalayan regions where it is predominantly found and reported to have high nutritional and medicinal properties. The tree has also been used for tanning and producing yellow colored dye as well as for timber, fuelwood and fodder.

KEY CHARACTERISTICS

- **Leaves:** The leaves of *M. esculenta* are simple, alternate, and have a leathery texture. They are often lance-shaped with a distinct aromatic fragrance.
- **Flowers:** The tree produces small, unisexual flowers that are usually arranged in catkins. Its flowers are white in colour and born in clusters. The male and female flowers are found on separate trees (dioecious).The flowering starts from the first forenight of October and continues till the second fortnight of December.
- **Fruits:** The fruits are small, drupaceous, round and reddish-purple when ripe. They have a sweet-tart flavor and are consumed fresh or processed into juices, jams, and other products. The fruit is rich in vitamins and antioxidants. The fruiting season starts from the last week of March and continues till the last week of June (during the summer season).

- **Bark:** The bark of *M. esculenta*is rough, vertically wrinkled with greyish darkcolour from outside and dark brown from inner side with smooth surface (Lata *et al.,* 2021). It is often used in traditional medicine for its astringent and antiseptic properties.

KEY FEATURES AND BENEFITS

1. **Nutritional and Culinary Value**

   - ✓ **Edible Fruit:** The fruits of *M.esculenta* are small, dark red to purple berries and highly valued for its sweet and tart taste. It is consumed fresh, and its juice is enjoyed by locals. It is also used to make various traditional food products, including jams, jellies and beverages.
   - ✓ **Nutritional Content:** The parts of the tree are nutritionally important. It has been discovered that the bark and fruits are a good source of important nutrients including carbohydrates, proteins, fats and contains minerals like Na, K, Ca, P, Mg, Fe, Zn, Mn, Cu, etc. Kaphal fruits are rich in vitamins, particularly vitamin C, and known to have antioxidant properties, which make them beneficial for health.

2. **Traditional Uses**

   - ✓ In the local communities of the Indian Himalayas, the fruits are consumed fresh or dried. They are often sold in local markets and are considered a delicacy.
   - ✓ The fruit is used in traditional medicine to treat various ailments like asthma, fever and digestive disorders.
   - ✓ The bark and entire plant are traditionally used by many tribal people in Uttrakhand and are a powerful chemopreventive agent in the skin. It works well for asthma and chronic cough earaches as well.
   - ✓ Powdered bark is administered topically to treat ulcers and also useto cause intoxificationin fish.

3. Cultural Significance

   - ✓ Kaphal holds a special place in the folklore and traditions of the Himalayan communities. It is often associated with local festivals and customs, symbolizing the arrival of spring and the abundance of nature.
   - ✓ *M. esculenta* locally known as Kaphal is the state fruit of Uttarakhand, which is only available for a short time during peak summer and paints the hills of Uttarakhand into red colour.
   - ✓ Kaphal is associated with heart-touching folklores of Uttarakhand. In the month of Chaith (first month in traditional hindu calendar) a bird hymns "kaphal pako mai ni chakhyo" meaning the Kaphal has ripened but I have not tasted them, apparently she is the soul of a sad girl who died after being beaten up by her mother because the mother suspected she ate some of the berries that were left in her safe keeping. To which another bird

replies "Purray Putti Purray Purr" meaning 'they are complete daughter, they are complete'.

- ✓ In the melodious folk music of Kumaun, it has been described that Kaphal was the fruit of the gods and Kaphal express their grief as "khanaa layak Indra ka, hum chhiyan bhoolok aain padan" which means we were meant to be eaten by Lord Indra in heaven but now moved to Earth.

4. **Economic Importance**

- ✓ *M.esculenta* has significant potential for the development of value-added products such as jams, jellies, and beverages, which could boost local economies.
- ✓ For many rural communities, the collection and sale of Kaphal fruits provide a seasonal source of income. The fruit is gathered from the wild and sold in local markets, contributing to the local economy.
- ✓ Local tribes utilize the tree as source of timber, fuel and fodder (Dollo *et al.,* 2009) as well as for tanning and obtaining yellow colored dye (Kumar and Sinha 2004, Jeeva *et al.,* 2011).
- ✓ The tree also holds promise for agroforestry practices due to its adaptability to the hilly terrain and its contribution to soil conservation.

5. **Ecological Role**

- ✓ The tree plays an important ecological role in the Himalayan region. It helps in maintaining soil fertility and preventing erosion.
- ✓ The tree is capable of nitrogen fixation despite being a non-leguminous angiosperm.
- ✓ It also provides food and habitat for various wildlife species, contributing to the biodiversity of the region.

6. Medicinal Uses

- ✓ **Traditional Medicine:** In traditional Himalayan medicine, various parts of Kaphal, including the bark, leaves, and fruit are used to treat a range of ailments. The bark is believed to have anti-inflammatory, antidiarrheal, and antimicrobial properties. The fruits and roots of *Myrica* have enormous pharmacological significance in Ayurveda and are used as an active botanical ingredient in several Ayurvedic formulations (Table 1). The bark and fruits of *M. esculenta* are traditionally used to treat respiratory conditions like asthma and bronchitis.
- ✓ **Bioactive constituents:** The fruits of *M. esculenta* are rich in bioactive constituents such as phenolics, flavonoids, and anthocyanins, however, other parts of the plant also are rich in bioactive compounds.
- ✓ **Antioxidant Properties:** The fruits of *M. esculenta* are rich in antioxidants, which help in neutralizing free radicals in the body. This can reduce oxidative stress and lower the risk of chronic diseases such as heart disease and cancer.

- ✓ **Pharmacological and biological activities:** The fruits of *M. esculenta* have antifungal, anticancer activity. The oil from the plant possesses antimicrobial and anti-inflammatory properties. Stem bark has been found to have antidiabetic effect, antiallergic effect, anti-inflammatory effects, antipsychotic effects.

Table 1: Ayurvedic formulations of *Myrica esculenta* with their uses and manufacturers (Kabra, *et al.,* 2019).

S.No.	Formulation	Uses	Manufacturers
1	Chwayanprash	Improved digestion and strength and enhanced energy	Dabur, Patanjali, Nature & Nurture Healthcare
2	Katphaladi Churna	Treatment of fever, throat infection, respiratory disorders and abdominal pain	VHCA Ayurveda
3	Pushyanuga Churna	Treatment for bleeding disorders and candidiasis	AVN Ayurveda, Baidyanat-h
4	Katphala Taila	Treatment of joint pain	VHCA Ayurveda
5	Arimedadi Taila	Helps to relieve tooth decay and breathing problem	IMISPharmaceuticals
6	Mahavisagarbha Taila	Used for vata imbalance, neuromuscular conditions	VHCA Ayurveda
7	Bala Taila	Treatment of vata disorders, respiratory infections and weakness	Patanjali
8	Khadiradi Gutika	Treatment of dental, oral, throat and tonsillar infections	Zandu
9	Maha Vatagajankusa Rasa	Rheumatoid arthritis, Migraine, Paralysis, Cough, Cold, Asthma	Dabur Baidyanath, Shree Dhootapapeshwar
10	Brihat Phala Ghrta	Treatment of infertility	SN Pandit Ayurvedic

CONSERVATION AND SUSTAINABLE USE

Overharvesting and habitat destruction have led to a decline in the natural populations of *M. esculenta*. Due to increased human activity, the population of *M. esculenta* in their native habitat is declining, which contributes to the poor regeneration of the species in natural forest stands. There are few seedlings available because the native people who live close to the forest gather seeds for economic purposes. Comparably, the indigenous group removes the saplings to suit their fuelwood needs, which results in a low percentage of seedlings being converted to saplings (Jeeva *et al.,*

2011). Furthermore, *M. esculenta* mostly exhibit unreliable germination patterns because of physical dormancy of the seeds caused by impermeable seed coat. Due to its economic and ecological importance, there are efforts to conserve Kaphal trees in their native habitats. Sustainable harvesting practices and cultivation efforts are necessary to conserve this valuable species. There is growing interest in cultivating *M. esculenta* as a commercial crop, which could provide an alternative livelihood for local communities while also contributing to conservation efforts and promote ecological balance in the Himalayan region.

CONCLUSION

Overall, *M. esculenta* (Kaphal) is a promising wild fruit tree with considerable potential for medicinal, income generating and ecological benefits in the Indian Himalayas. Kaphal's high nutritional value makes it a possible source of income and food security for rural communities in the Indian Himalayan region, all while enhancing biodiversity. Because of its anti-inflammatory, antioxidant and neuroprotective qualities, *M. esculenta* has the potential to be used medicinally and in nutraceutical and pharmaceutical applications. Due to inadequate regeneration of the species in its natural habitat and overexploitation by the local people, the species is in the verse of extinction from wild. Deeply ingrained in the socioeconomic fabric of the region, the "Kaphal" tree serves a variety of services including traditional medicine, cultural rituals, in addition to offering timber, fuelwood, fodder and edible fruits. Its sustainable utilization and conservation could play a vital role in supporting the livelihoods of local communities and preserving the biodiversity of the region.

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