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Himalayan Pepper (*Zanthxylum aratum*): Health Benefits

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Pahari Neem or *Zanthxylum aratum* is rich in medicinal properties. This is a plant found on the mountain, which is used to cure many diseases ranging from high BP. The people of olden days recognized these qualities. They were used to cure diseases. These medicinal plants helped them to stay healthy and attain long life. It has to be said with great regret that this traditional knowledge is now disappearing.

Plant Profile

Family	Rutaceae
Ayurvedic name	Tejovati, Tumbru (fruit)
Unani name	Kabab-e-Khanda
Hindi name	Tejbal, Nepali dhaniya
Trade name	Timru, Timur
Parts used	Stem bark, fruits and seeds

Morphological attributes

Zanthoxylum armatum is an evergreen, thorny shrub or small tree, attaining a height up to 6 m. Leaves are 4–20 cm long, imparipinnate, pungent, and aromatic with glabrous, narrowly winged petiole having two stipular prickles at the base. Leaflets are lanceolate, glabrous on the underside, and occur in two to six pairs. The plant can be recognized by its shrubby habit, dense foliage, with pungent aromatic taste, prickled trunk and branches, and small red, subglobose fruits.

Floral Characteristics

Flowers occur in dense terminal or sparse axillary panicles and are green to yellow in colour. Calyx consists of six to eight sub-acute lobes. Stamens are about six to eight in number. Ripe carpels or follicles are usually solitary, pale red, and tubercled. Seeds are globose, shining, and black. Flowering occurs from March to May, while fruiting occurs from July to August.

Diversity and Origin

Zanthoxylum armatum DC. is a deciduous xerophytic shrub or small tree that grows in well drained alluvial, black soil. It is distributed throughout China, Taiwan, Nepal, Philippines, Malaysia, Pakistan and Japan. In India, it has been reported from warmer valleys and foot hills of the Himalaya of Jammu and Kashmir at an altitudinal range of 1000-2100m, in the Eastern Ghats in Orissa and Andhra Pradesh at 1200m and the lesser Himalayan regions in the north eastern part of India including Khasi hills, Meghalaya, Mizoram and Manipur. Valleys and thickets in the mountains, wasteland and the under-storey of mixed forest are customary locations of the species. The name Zanthoxylum comes from the word Xanthoxylum which is derived from the Greek word 'xanthon xylon' which means 'yellow

wood'. It is known by many vernaculars such as 'Tejbal' in Hindi, 'Tumpunal' in Tamil, 'Toothache tree' or 'Indian Prickly Ash' in English, 'Gira' in Bengali, and 'Andkaka Dhiva' or Tumburi in Sanskrit. In Jammu region, it is commonly referred to as 'Timbru' (in Dogri) and 'Timber' (in Pahari).

Climate and soil

The plant is adapted to subtropical climate of lower warm valleys of the Himalayas with sufficient rainfall. It grows well in open pastures and secondary scrub forests. Loamy or clayey soil rich in organic content is preferred for its cultivation.

Propagation material

Freshly harvested seeds are best for the large-scale cultivation of Zanthoxylum species. Mature seeds can be collected in June–July. In the absence of sufficient seeds, terminal stem cuttings may be used as propagules.

Raising propagules

The crop can be raised by developing a nursery or by directly sowing in the main field. The seeds are sown in August– September in polybags (nursery) or main field. Stem cuttings may also be planted in the nursery during monsoon in July–August. The seeds germinate in 20–30 days after sowing. The seedlings attain a height of 20–30 cm by June–July, when they can be transplanted to the main field.

Propagule rate and pretreatment

About 2–3 kg seeds are required to raise a nursery for plantation on 1 hectare. Direct sowing may require about 30–50 kg seeds per hectare at a spacing of 50 cm × 50 cm. No seed treatment is necessary before sowing. However, stored seeds may require cold stratification for up to three months and may germinate in February– March.

Planting in the field

Land preparation and fertilizer application: Land may be ploughed two to three times using disc harrow and cultivator to make it friable and weed-free. About 10– 12 tonnes per hectare of FYM (farmyard manure) should be mixed with the soil as a basal dose before transplantation.

Transplanting and optimum spacing: After 10–12 months of growth in the nursery, transplanting in the field can be done during May–June if irrigation facilities are available. Otherwise, it is done in July–August (monsoon season) under rain-fed conditions. A spacing of 50 cm × 50 cm is recommended, which accommodates about 40 000 plants per hectare.

Interculture and maintenance practices: Weeding should be carried out during the initial establishment phase, 30–45 days after transplanting, and again at 60–80 days after transplanting. Later, weeding may be carried out only as and when required.

Intercropping system: The plant can be grown as a mono crop as well as a mixed crop with herbaceous species.

Irrigation practices: The plant requires frequent irrigation during the establishment stage. Once established, the plants are able to survive in rain-fed conditions and only life-support irrigation is required during the summer months.

Disease and pest control: The crop is generally free from any disease, insect or nematode attack, and physiological disorders.

Crop maturity and harvesting: Flowering appears on five-year-old plants in March–May. Fruiting occurs in July–August. The crop, thus, takes five to seven years to mature. Fruits are collected in May–June. Stem pieces, if needed, may be cut during January–February before the flowers appear.

Post-harvest management: The herbage and fruits should be dried in shade. The fruits may be cut into pieces for drying and extracting seeds. Well-dried seeds are stored in damp-proof containers.

Yield: The yield of fresh and dry fruits is approximately 20 quintals per hectare and 6.50 quintals per hectare, respectively. Use of medicinal plants or their products have acquired a centre stage in traditional medicine either to prevent ailments or as a curative measure against distress and diseases. They provide a wide variety of bioactive natural products, such as phenolics, flavonoids, quinones, coumarins, lignans, amines, vitamins and other endogenous metabolites. These compounds have multiple biological activities including anti-oxidant properties and, as such are in great demand in nutraceutical (dietary therapy), pharmaceutical and cosmetic industry. About 80% of the world population, primarily in the developing countries, depends on herbal medicines for primary health care since they are cost effective, easily available and have negligible side effects.

Traditional/folk uses

Zanthoxylum aratum is known as an important magical plant as whole plant including stem, bark, fruits and seeds possess medicinal properties and has been used as a medicine in both traditional and Ayurvedic treatments for ages. Their fruits are used in the form of condiments, spices and medicine. Finely ground fruits and seeds are employed as an aromatic tonic in fever, dyspepsia and expelling roundworms. During winter, a soup/decoction prepared from the dried fruits is consumed as it is believed to give warmth to the body and provide relief from abdominal pain. Powdered fruit mixed with Mentha sp. and table salt and eaten with boiled egg is good for curing chest infection and digestive problems. Traditional appetizer, "Timbru chutney" widely relished in the household of Northern India is prepared from fresh, or dried fruits of timbru. Besides, pickles made from the fruits aids in relieving cold, cough, headache, tonsillitis, limbs numbness, and dizziness/vertigo. The intake of timbru is known to benefit people suffering from rheumatism. Teeth cleaning sticks (datun) as well as walking sticks are made out of its branches. Their bark is also utilized as traditional dye resource. Due to their disinfectant and antiseptic properties, the fruits are used to cure toothache, skin diseases and snake bites. In addition, timbru exhibits good antibacterial and antifungal properties. Bacterial infections of the mouth, digestive system and urinary tract are successfully treated with timbru fruits. Lupeol, a monoterpene found in timbru extracts, act as therapeutic and chemopreventive agent for the treatment of inflammation and cancer.
Pyorrhea: The bark of this hill Temruis used to remove pyorrhea. For this, its wood is chewed like a tooth. When there was no Manjan etc. in the mountains many years ago, the people there used it to clean the teeth.
Control blood pressure: Temru seeds are rich in potassium, so eating them leads to increased BP control. Please tell that the twigs of Timur are also prickly. The thorns of its twig are used for acupuncture, which reduces the increased blood pressure immediately.
To reduce or prevent bad breath: Putting Timur seeds in the mouth and chewing gives a taste like peppermint. This removes the foul smell of the mouth. If their seeds are chewed every night after eating food, then the gums also become strong.
Works as Antiseptic: A special element is found in the leaves of this tree, which acts as an antiseptic. If there is any injury or peeling on the body, then applying the paste of its leaves gets better soon. Not even a trace of that injury. There is a special element in the seeds of Timur, which is called linanool. It is an excellent antiseptic. Therefore, by applying grinding of leaves of Timur or grinding its seeds on injury or peeling, the injury dries quickly and there is no scar. Its use also removes the fear of septic. But keep in mind that while using the leaves or seeds, make sure to clean it thoroughly.
Treat stomach related diseases: The seeds of this tree are used as spices. It cures all diseases related to stomach and digestion. If you also have the problem of constipation or diarrhea, then Timur seeds will be beneficial.
Use as condiments: Pahari people use Timur seeds as a spice for cooking. Not only this, its chutney is also made which looks very tasty to eat.

Commercial value

As a high value medicinal plant, the various pharmaceutical, companies generally use timbru fruit for making polyherbal unani and ayurvedic formulations (Tejowatyadya Grita, Tumbawardi Churna) and in different types of toothpaste. Due to its appealing aroma and valuable perfume, timur is used in the manufacture of several health-care and cosmetic products. With its increasing commercial value, it has become a profitable non-timber forest product (NTFP).

Conclusion

Z. armatum is not a fast growing species and has low population size. A growing demand of *Z. armatum* has caused a serious reduction in native population due to over-exploitation of both fruits and wood for the economic benefits. In addition, unabated deforestation and rapid proliferation of invasive weeds such as Lantana in *Z. armatum* growing areas are also creating problems for the survival of this native species. It is a matter of concern that this target species (*Zanthoxylum armatum*) has been declared as an endangered species as per International Union for Conservation of Nature (IUCN) criteria. Therefore, there is an ardent need for exploring its regeneration potentiality and conservation strategies.