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Scoping Wood Apple Cultivation for Semi-Arid Bundelkhand

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SUMMARY

Wood apple is an underutilized and climate-resilient crop that can withstand extremely dry circumstances. It has good medicinal and nutraceutical properties. This article covers comprehensive information about wood apples' such as botanical description, origin, distribution, varieties, importance and uses, medicinal and traditional usage, and value-added products. Due to its versatility and wide climatic adaptability, this fruit crop could be encouraged for cultivation in drier, unutilized, or barren sites, such as in Bundelkhand.

INTRODUCTION

Wood apple (*Feronia limonia* Swingle) is an underutilized fruit belonging to the Rutaceae family. It is highly drought and salt-tolerant and prefers to grow well in a dry climate for optimum flowering and fruiting. It can also be grown in a fallow and barren wasteland. Besides these, it is a good source of several nutrients such as protein (1.8-7.0g), fat (4.0 g), CHO (15.6-18.1g), fibers (2.9-5.0 g), total sugar (3.40- 4.47 %), titrable acidity (0.83-3.98 %), TSS (9.40–16.0 ˚B), P (110 mg), K (600 mg), Ca (85 - 130 mg), (Mg), (3.18 - 5.92 %), Na (3.07-7.55 mg), Fe (0.60 mg), Zn (0.50 mg), Cu (0.25 mg), Mn (37.85 mg), Vitamin –A (60 mg), Vitamin-B_1 (40.0 µg), Vitamin-B_2 (170.0 µg), and Vitamin-C (1.68-3.40 mg), energy (134 Cal), and ash (1.55 g) (Hiwale 2006, Shukla and Singh 2008, Poongodi Bal., 2013, and Anitha et al., 2016). Besides these, it also contains several bioactive compounds which have good medicinal properties.

Botanical description

The wood apple tree is a deciduous, tall, erect, and slow-growing tree that grows up to 9–11 m in height. The bark on the tree trunk is ridged and fissured, and the scaly type and the twigs contain axillary and straight spines that are 2–5 cm long. The leaves are dark-green in color, leathery, alternate, and 3 to 5 inches long, and give off a lemon-flavored aroma on crushing. Flowers are small in size (1.25 cm), bisexual, dull red or green in color, and born on lateral or terminal panicles. Fruits are greyish to white in color, round to oval in shape, and have a scurfy hard rind. The pulp of the wood apple is aromatic, sticky, resinous, brown in color, astringent, acidic, or sweet in taste, with several seeds present in a scattered manner. The systematic description of wood apple is given below

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliospida
Order: Sapindales
Family: Rutaceae
Genus: *Limonia*
Species: *acidissima*

Origin and distribution

Wood apple is a drought-tolerant and indigenous crop that is grown in wild forms in different countries such as India, Bangladesh, Cambodia, Pakistan, Fiji, Java, Laos, Malaysia, Malesia, Myanmar, Thailand, and Vietnam. In India, it is grown in different parts of Andhra Pradesh, Arunachal Pradesh, Chhattisgarh, Delhi, Goa, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal (Figure 1). It is also found in the Bundelkhand region also (Table 1), as per data collected during the present study.

Figure 1. Distribution of wood apple in different parts of India

Table 1. Distribution of wood the apple in Bundelkhand Region

S. No.	States	District	Block
1.	Uttar Pradesh	Jhansi	Babina, Moth, Baragoan
		Lalitpur	Talbehat, , Birdha, Mehroni
		Hamirpur	Gohand, Maudaha, Muskara, Sarila, Sumerpur
		Jalaun	Rampura, Madhogarh, Nadigaon, Kadaura
		Mahoba	Charkhari, Kabrai, Panwari
		Banda	Badokhar Khurd, Mahuva, Baberu, Kamasin, Pailani
		Chitrakut	Mau, Pahari, Ramnagar
2.	Madhya Pradesh	Datia	Bhander, Seondha, Datia, Indergarh
		Niwari	Prithvipur, Orchha
		Panna	Ajaygarh, Panna, Gunnor, Pawai, Shahnagar
		Sagar	Banda, Bina, Deori, Kesli, Rehli, Sagar, Shahgarh
		Damoh	Batiyagarh, Damoh, Tendukheda, Patheriya
		Tikamgarh	Baldeogarh, Jatara, Palera, Tikamgarh
		Chhatarpur	Badamalhera, Bijawar, Nawgong, Rajnagar

Varieties

Thar Gaurav: It was developed by the Central Horticultural Experiment Station (ICAR-CIAH), Vejalpur, Gujarat, through selection process from germplasm collected from Indore, Madhya Pradesh, and was released in 2019 in the institute. It is a drought-tolerant, high-yielding, early-bearing variety (1st week of November) with larger fruit size and high quality that thrives in rain-fed and semi-arid environments. Fruits are rich in mineral content, pectin, and protein content. It can be planted at a high density of 5 x 5 m spacing with good canopy management practices.

Ellora: A regular-bearing variety with a semi-spreading nature and suitable for dryland conditions. It was released in 1986 by Vasantrao Naik Marathwada Krishi Vidyapeeth (VNMKV), Parbhani, Maharashtra.

Dharwad Selection-1: Developed by UAS Dharwad. It is a superior type of germplasm and is suitable for fruit production under dryland conditions.

Dharwad Selection-2: Developed by UAS Dharwad. It is a superior type of germplasm and is suitable for fruit production under dryland conditions.

Other varieties: In CISH Lucknow, some promising selections i.e., CISH WA-1, 2, 4, 10, and 16, have been identified.

Importance and uses

The wood apple is an underutilized fruit with a wide range of traditional, medicinal, and nutritional properties**.** The different plant parts of the wood apple have the ability to cure several problems, such as antioxidant activity, anticancer and antitumor activity, hepato-protective activity, anti-inflammatory activity, anti-diabetes activity, antiviral activity, antibacterial and antifungal activity, snake bites, biliousness, intestinal troubles, inflammation, peptic ulcers, cold and other respiratory disorders. Used to treat certain cardiac problems, relieve sore throats, chronic coughs, blood purifying, stone problems, diabetes, liver tonic, skin cancer, jaundice and gastropathy, dysentery, diarrhea, or piles, cataract patients, and cure several ear problems (Xiao et al., 2016 and Yadav et al., 2022). The different plant parts of wood apple such as wood (used in agricultural implements, construction, carving, fuel, patternmaking, rollers for mills, and rulers), gum (used as glue and waterproof wells and walls), fruit (shell of the fruit is used into snuffboxes and other small containers and dye from the rind is used to color silks and calico) have traditional uses as well (Yadav et al., 2022). The fruit is generally used to make different processed products like beverages, candy, cream, jam, jelly, leather, pickle, powder, preserve, RTS, squash, sherbet, toffee and wine (Figure 2).

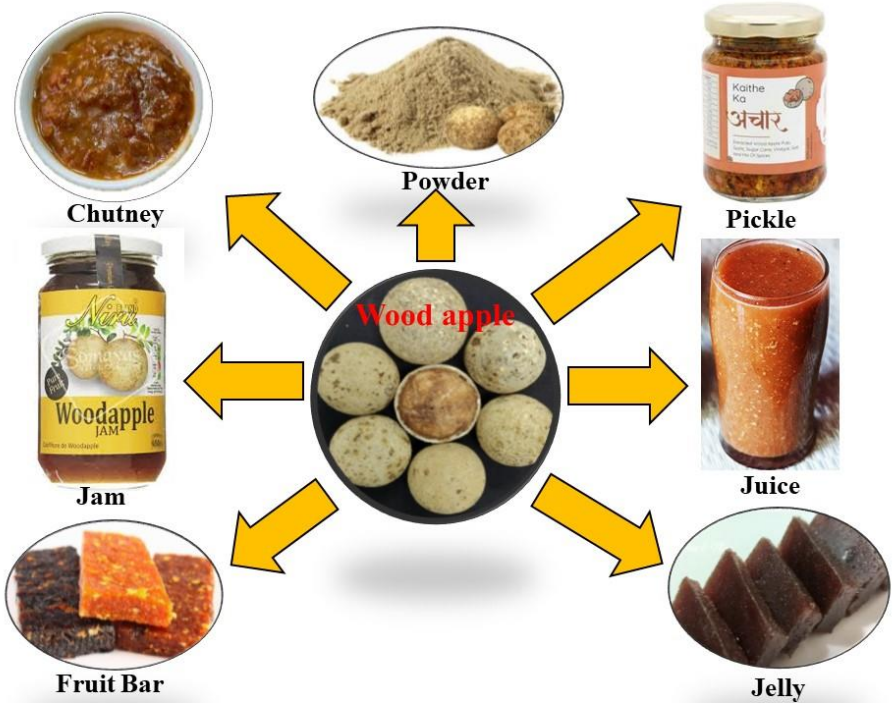

Figure 2. Processed products of wood apple

CONCLUSION

The wood apple has the potential to significantly contribute to the livelihood security of communities through increased household income, the creation of jobs, and environmental protection because it is rich in nutritional, medicinal, and processing features in semi-arid tropics of Bundelkhand. Development of production technology and better varieties for increased fruit production is however essential. The protocol for standardization of value-added produce and products needs to be prioritized by involving institutions and agencies for the popularization of wood apple and value addition to harness the nutritional and therapeutic benefits.

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