

Wood Apple – An Unexploited Medicinal Fruit Tree Species

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Abstract

Wood apple tree *Feronia limonia*, (syn. *Feronia elephantum*, *Limonia acidissima*) is small to moderately sized, deciduous and one of the very hardy trees found grown all over the plains of northern, central, eastern and southern regions. It is generally propagated by seed and also by vegetative propagation. It is a thorny tree commonly found in dry deciduous forests and cultivated in many parts of the India for its fruit. It possesses great tolerance to drought. Extensive root system and synchronization of its reproductive phase with high moisture availability make it suitable crop for arid zone. The ripe fruits contain sour-sweet aromatic pulp - 70 percent of total weight and pulp contain significant amount of proteins. The fruit is rich source of riboflavin, acidity about 2.3 percent and sugars 7.2 percent. The fruit is used as a liver and cardiac tonic, and when unripe, as an astringent means of halting diarrhea and dysentery, and effective treatment for sore throat and disease of gums. Leaves, bark, roots and fruit pulp are all used against snake bite. The rind of the fruit -hard and thick, can be carved and used as a utensil - bowl or ashtray. Yield varies considerably, mature tree can yield - 200 to 250 fruits per annum. Fruits can be graded on the basis of size and marketed. Wood apple toffee can be prepared by boiling the pulp with the sugar. It is also possible to prepare syrup and chutney from the wood apple.

Key words: Thorny tree, reproductive phase, snake bite, vegetative propagation, leaf decoction, curative properties

Introduction

The wood apple belongs to the family Rutaceae. The generally known common names are: Wood Apple, Monkey Fruit or Curd Fruit (English), Kaitha (Odia), Belada Hannu / Byalada Hannu (Kannada), Kaitha or Kath Bel (Hindi), Vellaga Pandu (Telagu), Vilam Palam (Tamil), Koth Bel (Bengali), Kothu (Gujarath)

Wood apple is a thorny tree commonly found in dry deciduous forests and cultivated in many parts of the India for its fruit. It is planted as roadside tree near village's boundary or barrier or support. It possesses great tolerance to drought. Extensive root system and synchronization of its reproductive phase

with high moisture availability make it suitable crop for arid zone.

Composition and Uses

Composition

The ripe fruits contain sour-sweet aromatic pulp - 70 percent of total weight and pulp contain significant number of proteins. The fruit is rich source of riboflavin, acidity about 2.3 percent and sugars 7.2 percent. The composition of wood apple fruit is presented in the following table.

Constituents	Values per 100 g edible portion	Constituents	Values per 100 g edible portion
Moisture	64.20 g	Magnesium	41
Protein	7.10 g	Copper	0.21
Carbohydrates	17.00 g	Manganese	0.18
Fat	0.30 g	Zinc	0.46
Total minerals	0.30 g	B-carotene (µg)	61.00
Energy value (kg ca/µg)	74	Thiamine (mg)	0.04
Calcium	4	Riboflavin (mg)	0.17
Phosphate	9	Niacin (mg)	0.80
Iron	0.50	Vitamin C (mg)	3.00

(Anon, 1956)

Uses

- The importance of wood apple fruit lies in its curative properties, one of the useful medicinal plants of India.
- Its medicinal properties dealt within *Charak samhita* and *Sushruta samhita*, and great demand from native system of medicinal such as Ayurvedic.
- The fruit is used as a liver and cardiac tonic, and when unripe, as an astringent means of halting diarrhea and dysentery, and effective treatment for sore throat and disease of gums.
- Pulp is applied externally as a remedy for bites of venomous insects and reptiles.

- The juice of young leaves is mixed with milk and sugar candy and given as a remedy for biliousness and intestinal troubles of children.
- The powdered gum mixed with honey is given to overcome dysentery and diarrhea in children.
- Oil derived from crushed leaves is applied on itch and the leaf decoction is given to children as an aid to digestion.
- Leaves, bark, roots and fruit pulp are all used against snake bite. .
- The rind of the fruit -hard and thick, can be carved and used as a utensil - bowl or ashtray.
- The scooped-out sticky pulp is eaten raw with or without sugar or is blended with coconut milk and palm sugar syrup and drunk as a beverage or frozen as ice cream.
- It is also used in chutneys and for making jelly and jam.
- The seeds contain bland, non-bitter, oil high in unsaturated fatty acids. The leaves - good source of fodder for cattle.
- Wood -fuel. Wood is yellow -grey or whitish, hard, heavy, durable and valued for construction, agricultural implements, and rollers for mills, carving and other products.
- The trunk or branches exude a white, transparent gum, as substitute for, or adulterant of gum arabic, and in making artist's watercolours, ink, dyes and varnishes.

Taxonomy and Morphology

Tree is small to moderately sized, deciduous, glabrous tree with thorny branches, height of 10 m and 0.60 to 1.60 m in girth. The trunk is short, cylindrical with symmetrical crown of foliage. The bark dark grey coloured, rough and thick. The leaves are alternate with 5-7 leaflets, dark brown, blunt or notched at the apex, dotted with oil and lemon scent.

Flowers are small, numerous, pale greenish colour with red tinge. The fruit - berry, round to oval, 5 -12.50 cm wide, hard, woody, grayish white, scurry rind -6 mm thick. The pulp brown, mealy, odorous, acid or sweetish, with numerous small, white seeds scattered through it. *Feronia* is a monotypic genus in the family Rutaceae. There are two forms, one with large, sweet fruits and the other with small, acid fruits.

Origin and Distribution

Native of India and Sri Lanka and generally cultivated in both peninsulas. One of the very hardy trees found grown all over the plains of northern,

central, eastern and southern regions. More common in Deccan Maharashtra, Karnataka, Andhra Pradesh and Madhya Pradesh. Western Himalayas upto an elevation of 500 m. It is also grown in South East Asia and Malaysia.

Species and cultivars

The genus *Feronia* - family Rutaceae. It is a monotypic genus of the Indo -Malyan region represented by the only species *Feronia limonea* (syn. *F. elephantum*) Has $2n = 18$ chromosomes. There are no named or standard cultivars of the fruit. Some sour and sweet types have been observed.

Climatic Requirements

Native and common in dry plains, prefers a monsoon climate with distinct dry season. Can tolerate low temperature ((0-15°C) as well as a high temperature high as 47.5°C (Troup, 1921). The tree shed its leaves and the branches are bare for a short periodic (January) It possess great tolerance to drought

Soil

Wide variety of soils including degraded soils of arid regions and can tolerate salinity. Shows preference to B C soils for its optimum growth and fruiting. It can be grown successfully in marginal lands.

Propagation

Wood apple is generally propagated by seed and also by vegetative propagation.

Seed

It is usually propagated by the seed. Freshly extracted seeds used - raising seedlings. 66 percent germination observed when fresh seed is sown. Seed treatment is not required. Polyembryony to the extent of 63 percent is observed. Polyembryonic seedlings are vigorous in growth and breed true to type.

Vegetative propagation: Wood apple can be vegetatively propagated by cutting and budding.

Budding: Can be done in late summer or early monsoon. Budded plants are dwarf, precocious and prolific in flowering and fruiting.

Inarching: Bhore (1986) attempted propagation by inarch grafting and obtained more than 70 percent success.

Cultivation Practices

Planting

Regular planting does not exist. However, if done, planted - distance of 8 to 10 m. The pits --45 cm³ are dug and filled - top soil + 10 to 15 kg FYM. Pit

preparation should be completed before onset of monsoon. July and August - best time for planting. The transplants are taken out along with whole root system in a ball of soil and are planted in the center of the pit.

Training and Pruning

Allowed to grow freely on central leader with well-spaced branches in all directions.

Irrigation

Crop of dry region and once the plants are established, they hardly need any irrigation. However, conservation of runoff rain water in root zone - the productivity crop.

Manuring and fertilization

Manuring is not practiced but it will be benefited, if manured at the rate of 25 kg of FYM or compost / tree in the beginning of monsoon, helps in increasing fruit size and quality.

Flowering, pollination and fruiting

Numerous small flowers are borne on terminal or auxiliary panicles, mainly new shoots. February to May. The flowers are staminate and hermaphrodite. A highly cross-pollinated crop. Pollination - by insects and unpollinated flowers failed to set fruits. No evidence of bud pollination or parthenocarpy was noticed. Rife fruits from October to March. In fact, the period of flowering and fruiting is governed by climate and the period of moisture availability.

Harvesting and Yield

Harvesting

The stage of harvest is determined by the purpose of using the fruit. For *chutney*, immature but fully developed fruits are preferred; For squash and jelly, fully matured fruits are desirable. Proper care is required for harvesting of fruits. A minor crack on the rind can cause spoilage during storage. The stem end of the fruit is vulnerable to fungal infection.

Yield

A vegetatively propagated tree starts bearing at age of 3 years, optimum production - 10 years. Yield varies considerably, mature tree can yield - 200 to 250 fruits per annum. Fruits can be graded on the basis of size and marketed.

Storage and Post harvest technology

In general, fruits have a good post-harvest storage life because of its hard outer shell and it can withstand transport and marketing hazards. A good quality stiff jelly of attractive colour can be prepared from the pulp. Wood apple toffee can be prepared by boiling the pulp with the sugar. It is also possible to prepare syrup and chutney from the wood apple.

Area and Production

Information on area and production in India is not available because it is seldom planted in the form of regular orchards. Generally scattered trees are found on the borders of fields and as a road side tree in the villages.

Pests and Diseases

Since this tree is not under regular orcharding, there is no record of any serious problems. but the pests and diseases affecting citrus and bael may cause damage to this crop also. Larvae of insects are found in the pulp of the fruits. Insects also damages wood and defoliate.

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