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## Wild edible and minor fruits of Odisha

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### Abstract

Located in the drier north eastern Ghat region of India, Odisha state boasts around 2,800 species of herbs, shrubs, climbers and trees. The edible fruits of forest lands play an important role by supplementing diet and nutrition to the tribal communities. Large numbers of indigenous fruit crops are used by local inhabitants for their curative properties. Beside their importance for nutritional value and a source of income, diversity of these fruits also has a cultural, social value and contributes to the stability of ecosystems. Cultivation of minor fruits is restricted to small specific areas and they have not undergone conscious phase of domestication or human selection. As minor fruit species are tolerant to many abiotic and biotic stresses they can successfully be grown in disaster and drought prone areas. Rapid modernization with GDP based development has led to erosion of traditional knowledge of wild crop. Majority of fruit crops are grown in the view of ongoing market demand and not on the basis of traditional culture preferences or agro-ecological condition. Increase in supply of minor fruits in the form of raw material for preparation of different ayurvedic medicine and for food processing would increase the popularity these fruit crops.

**Keywords:** Wild edible, minor fruits, indigenous, tribal, conservation

### Introduction

The State of Odisha with varied agro-climatic conditions is enriched with trees bearing wild edible fruits. In Odisha wild edible fruit are consumed either ripe or unripe while others are cooked and some are pickled<sup>[1, 2]</sup>. Indigenous communities have well recognized and utilized diversified wild edible fruits and their varieties for potential in nutritional, medicinal, therapeutic and industrial values<sup>[3, 4]</sup>. The total potential is yet to be divulge systematically. The existing knowledge of older generation about the usage of foods is limited and its transfer to the future generation hardly takes place. Brisk advertisements in media for western food, cold drinks and health drinks have made even the village people to ignore and forget these fruit crops which were easily and locally available. Spread of indigenous knowledge is moreover influenced by age, gender and their social role<sup>[5]</sup>. In conformity to the studies women in Odisha have more knowledge about the uses of wild fruit than men<sup>[1]</sup>. Tribals of the region without agricultural land or with marginal rain-fed land, which is unproductive and produces insufficient grain for family, needs to depend on wild plants to supplement their diet<sup>[6]</sup>.

The household income from natural products varies across landscapes and localities ranging from 12% to as high as 50%<sup>[7, 8]</sup>. Wild fruits support the livelihoods by way of income diversification on a small scale. On average 15% of gross family income is received by selling indigenous fruits by tribal households of Orissa and similar reports from South African village has also been provided<sup>[9]</sup>. Collection and diversified uses of indigenous fruits are reported higher in Kondhamal and Koraput districts of Odisha and the tribals of Sambalpur and Mayurbhanj are reported to sell more fruit<sup>[10]</sup>.

Decline in the use of some species also leads to gradual erosion in traditional knowledge associated with those species. In view of increasing population pressure and declining per capita land availability, wild fruit species offer tremendous scope for expanding Indian fruit industry by domesticating and commercializing them. The rapid deterioration of environmental factors and increasing extinction of biodiversity thus warrants sustainable conservation and documentation of indigenous knowledge base. The paper aims to identify, record vernacular names, document distribution, occurrence, estimate the nutritional value and intends to create awareness on potentiality and encouraging community knowledge on wild edible plant varieties for their genetic conservation.

## General description

### Aonla

*Emblica officinalis* known as Amla in Oriya and by various vernacular names in India belongs to the family Phyllanthaceae. It is originated from tropical South East Asia and also known as Indian gooseberry. The first domestication in India is reported in Kashi (Varanasi) of Uttar Pradesh [11]. Aonla tree are hardy deciduous, 5-6 m tall, prolific bearer and suitable for arid regions. Pale green to dark green coloured round fruits weighs 5-6 g with six-ribbed stone which splits into three segments. The pinnate leaves develop after the fruit set, giving the appearance of feathery branches. Flowers are unisexual, both male and female flowers are borne on the same branch, but the male flowers are borne towards the apices of small branches. The fruit contains 70.5% moisture, 23.8% total soluble solids constitute of the juice, 5.09% total sugars, 5.08% reducing sugars and 500-600 mg/100g ascorbic acid [11, 12]. The fruits are used in making pickles, preserves, triphala, chavanprash and bark being rich source of tannin is used in leather industry. Fruits are useful as a remedy of disorders related to digestive system and in the treatment of several other health problems like jaundice, coughs, haemorrhage, leucorrhoea etc [13]. Aonla reduces blood sugar level in diabetic patient by stimulating the isolated cells which secrete insulin [14]. It is also used in hair tonics, shampoo and hair dye as it prevents premature greying, falling of hair and hair pigmentation.

### Bael

*Aegle marmelos* also known Bela in Oriya belongs to Rutaceae family and native to India, Pakistan and spread throughout South-East Asia. It is distributed in West Bengal, Odisha, Jharkhand, Assam and lateritic belts of India. Tree is deciduous in nature with a height up to 13 meters tall with slender drooping branches and shabby crown [15]. The leaf is trifoliate, ovate with tapering or pointed tip, rounded base and with mythological significance i.e. used to worship Lord Shiva. Fruit is globose or slightly pear-shaped with smooth, hard, yellow woody shell when fully ripe and available during March-April. Fruit contains numerous flattened-oblong seeds bearing woolly hairs which are encapsulated in slimy mucilage and orange aromatic pulp. Single fruit can weigh up to 1 kg and individual mature tree can yield around 500 numbers of fruit. Fruits consist of 61.5% moisture, 1.8% protein, 0.3% fat, 1.7% minerals, 2.9% fibre and 31.8% carbohydrates per 100g of edible portion. It contains good amount of vitamin C, calcium, phosphorus, iron, thiamine, riboflavin, niacin and carotene [13]. The fruits are consumed as fresh or in dried form and also processed into candy, toffee or nectar. Fruit, leaves, bark and roots are used in ayurvedic medicine as a remedy for diarrhoea, dryness of eye, cold and the tree is considered sacred for Hindus. It is also reported to prevent scurvy, strengthen and promote stomach actions [16]. It is regarded as distress or famine fruit which serve to be natural resource for forest dependent tribals with both nutritional and medicinal properties.

### Custard apple

*Annona reticulata* known as Custard apple, Bullock's heart and Ramopholo in Oriya belongs to family Annonaceae with five other edible species. Custard apple is native of Tropical America and distributed throughout the states of West Bengal, Odisha, Jharkhand, Madhya Pradesh etc. The trees are deciduous reaching a height of 8-10 meters producing 10-20

cm long slender and 2-7 cm wide leaves. Smooth fruit vary in shape, heart-shaped, spherical, oblong or irregular with hexagonal markings. The fruit matures in March-April and are brown or yellowish, with red highlights when ripen with grainy pulp. The average yield of individual mature tree is 80-100 pcs. The USDA nutrient database reports 100g of bullock's heart containing 101kcal energy, 25.2g Carbohydrates, 2.4g Fiber, 0.6g Fat, 1.7g Protein, 33IU Vitamin A, 19.2mg Vitamin C, 30mg Calcium, 0.7mg Iron, 18mg Magnesium, 21mg Phosphorous and 382mg Potassium. Potassium helps the body in regulating electrolytic balance, enhancing muscle growth and improves waste processing ability of the body. The fruits combat dysentery and the bark has an effective vermifuge and astringent properties. The leaves are used as emmenagogue and aphrodisiac by Southeast Asian medicine system of Unani [17].

*Annona squamosa* known as Sugar apple, Sweetsop and Aata in Oriya also belongs to family Annonaceae. It is a small semi-deciduous tree, 3-8 metres tall with small alternate leaves 5-17 cm long and 2-6 cm wide. Round or heart shaped, aggregate, soft fruits has a green bumpy surface with grainy pulp which matures in Sept-Oct month. The average yield of individual mature tree is 100 pieces. Apart from fresh consumption, the pulp can be processed to prepare products like pastries, chocolates, ice cream and mixed fruit jam. Fruits are used in Ayurveda as tonic which enriches blood, sedative to heart, relieves vomiting, and increases muscular strength and also as expectorant [18]. In traditional Indian and Thai medicine, the leaves are reported to be used in a decoction to treat dysentery, urinary tract infection and applied to wounds after crushing [19]. Seeds are locally used to control pests as it contains insecticidal properties.

### Fig

Fig known as Dimiri in Oriya and by various vernacular names i.e. Anjeer, Anjir belongs to the family Moraceae and is indigenous to western Asia. The genus fig consists of over 800 species within 40 genera [20].

*Ficus carica* tree is deciduous which grows up to 5-15 meters tall with wide spreading muscular branches. Leaves are large bright green, alternate, rough hairy on upper surface and soft hairy on under side. The flowers are tiny and clustered which sets fruits parthenocarpically. The peel of mature green fruit is tough, often cracks when ripen exposing the pulp containing a mass number of seed attached with jelly like flesh. Fruits are consumed fresh or in dried form and also used in making jam. Mature inflorescences of figs are reported to be eaten by people of Sambalpur district [10]. Fruit consists of 84% pulp and 16% skin which contain 2.2 g crude protein, 2.9 g crude fibre, 29 g carbohydrate, 85 mg calcium, 50 mg phosphorus, 0.6 mg iron, 92 IU vitamin A and 9.11 mg vitamin C [21]. Fig is considered valuable for its laxative properties and is often used against skin infection.

*Ficus semicordata* (syn. *Ficus cunea*) are the small to medium sized evergreen tree with long spreading branches down to the ground. Leaves are very variable in size, scab rid on each surfaces and waxy glands are present within the axils of the basal lateral veins. Fruit is an achene, broadly ovoid, slightly concave on one side with small tubercles and reddish brown when ripens. The fruits are eaten raw or as vegetable; leaves are used for dysentery, hematuria, carbuncle, piles and stems for rheumatism, sore throat, boils, tuberculosis of the testicles. Fruit consists of 89.01% moisture, 2.33% TSS, 10.11% total sugar, 1.24%

protein, 15.11% starch, 7.77 mg vitamin C, 600.9 µg beta carotene, 12.1 mg Ca, 11.71 mg Mg, 112 mg K and 2340 µg Fe [22]. Women and children eat this fruit to improve their appetite.

*Ficus auriculata* (syn. *F. Oxburghii*, *F. macrophylla*, *F. regia*) are dioecious tree with low spreading elongated and wide crown; bark is greyish brown in colour with rough texture. Leaves are broadly ovate; fruits are borne on scapose branchlets at base of the trunk and main branches. Fruits are pear shaped, reddish brown in colour and eaten raw or cooked as vegetable. Fruit consists of 87.91% moisture, 4.42% TSS, 4.15% total sugar, 3.50% protein, 13.13% starch, 5.48 mg vitamin C, 898 µg beta carotene, 15.6 mg Ca, 68 mg Mg, 329 mg K and 5432 µg Fe [22]. Leaves are crushed and applied on wounds in paste form. Juice extracted from bark is effective for diarrhoea and root latex for curing cholera, mumps and vomiting. Consumption of root and bark powder during jaundice is advisable [23].

### Hog plum

*Spondias dulcis* (syn. *Spondias cytherea*) belongs to the family Anacardiaceae and known as Ambada in Oriya, Amra Kai in Tamil. It is believed to be originated from Polynesia and in India its distribution occurs in the region of West Bengal, Odisha, Assam, Meghalaya, Tripura etc. Trees are deciduous in nature and grow to an average height of 12 meters with elliptic or obovate-oblong leaflets. The fruits are oval in shape, borne in bunches and turn golden yellow when ripe. Fruit remains available during the month of July-August, each mature tree with the productivity potential of 30 quintal. Immature fruits are eaten raw with salt or artificially sweetened with sugar and also used in different culinary art. Fruit is used in chutney preparation and pickled for future consumption as a processed product.

*Spondias pinnata* known as Pulicha Kaai in Tamil also belongs to the family Anacardiaceae. The centre of origin is Tropical Asia and reported to be distributed across the region of West Bengal, Odisha, Assam, Meghalaya, Tripura etc. Trees are deciduous in nature and grow to an average height of 10-15 meters with ovate-oblong to elliptic-oblong leaflets. The fruit is a drupe, ellipsoid to elliptic-ovoid in shape and yellowish orange at maturity with woody and grooved endocarp. The fruit size is bigger than that of *Spondias cytherea* and available during the month of July-August. Sweet and sour taste makes it appropriate for making chutney and also consumed in raw form. It posses ayurvedic properties and used in indigenous medicine.

### Jackfruit

*Artocarpus heterophyllus* known as Panasa in Oriya belongs to the family Moraceae and considered to be native to India. The fruit is available in humid tropical and near tropical climatic regions. Tree is evergreen with cauliflory bearing habit and bears the largest edible fruit in the world. Tender fruits are available in spring and continue till late summer as popular vegetable. Ripe Jackfruit flakes is starchy, fibrous and rich in vitamin C and used in preparation of products like jams, jelly, chips etc. The fruit contains carbohydrate, protein, fibre, fat, calcium, phosphorus, iron, carotene, thiamine, riboflavin, niacin and vitamin C in various concentrations [12]. A good amount of potassium in fruit helps to lower the high blood pressure and promote healthy cardiovascular system. Seeds provide starch and protein, relished when boiled or roasted and eaten or cooked in dishes. Jackfruit tree is used

for making furniture as it is rarely attacked by white ants [24]. The latex stimulates healing of abscesses, snakebite and glandular swellings. The root is used for curing asthma and skin diseases and root extract for treating diarrhoea and fever.

### Jamun

*Syzygium cumini* belongs to the family Myrtaceae and known as Jamu koli in Oriya. *Syzygium* has several other species whose fruits are edible, nutritious and have potential for commercial use. So far, 10 species and 15 varieties of *Syzygium* genus have been planted and are being studied. It is a perennial tree native to India and distributed across West Bengal, Assam, Odisha etc. The tree has dense foliage ideally suited for wind break and road side plantations with soft black fruit with inseparable skin and pulp. Mature tree yields 50 kg fruit on an average which are highly perishable. Fruits contain 83.7-85.8 g water, 14-16 g carbohydrate, 0.7 g protein, 1.2-1.62 mg iron, 8-15 mg calcium, 15-16.2 mg phosphorus, 0.15-0.3 g fat, 0.3-0.9 g fibre, 80 IU vitamin A, 5.7-18 mg ascorbic acid and 62 kcal calories. It has been used in ayurvedic medicine for treatment of diabetes and has proven to have good anti-oxidant, anti-bacterial, antigenotoxic, anti-inflammatory and anti-HIV properties [25]. Fully ripe fruits are eaten fresh, taken as a dessert fruit and can also be processed into jam, jelly, squash, wine, etc. Leaves are used as fodder and seed powder reduces the sugar content in urine. It is also regarded as famine or distress fruit.

### Tamarind

*Tamarindus indica* belongs to the family Fabaceae and known as Tentuli in Oriya. It is native to Tropical Africa and distributed across the region of West Bengal, Odisha, Assam is one of the important fruit of India. It is long-lived evergreen tall tree upto an average height of 20-25 meters with spreading crown. Ripe elongated fruits mature during the month of March-April with the average yield potential of 5-10 quintal. The sweet acidic pulp has low water content, high levels of K, Ca, P and Vit C. The fruit is used in the Indian medicine and the leaf sap possesses diuretic, antibacterial properties and nematode toxicity. Seeds contain a good amount of starch, protein and oil. The fruit crop is highly drought tolerant with capacity to with stand adverse agro-climatic conditions and suitable for all types of marginal lands.

### Wood apple

The wood apple (*Feronia limonia* synonyms *Limonia acidissima*, *Feronia elephantum correa*, and *Schinus limonia*) known as Kaitha in Oriya is native to India and commonly found in dry plains of the country. It belongs to the family Rutaceae. It is a hardy upright tree producing a hard shelled many seeded berry with nutritive acidic fruit and the pulp is eaten raw with or without sugar. The pulp contains 70% sweet aromatic pulp, 18.1%-22.1% carbohydrate, 2.2%-7.1% protein, 3.3%-3.7% fat, 5.0% fibre, 1.9% mineral matter and 1.3% ash [12, 26]. The pulp is a rich source of calcium, phosphorus, iron and vitamins like carotene, riboflavin, niacin, thiamine and vitamin C. It is also used for making chutneys, jam, jelly and squash. The fruit is used as a liver and cardiac tonic, and when unripe, for easing diarrhoea and dysentery. Every part of the fruit posse's medicinal property. Fruits, leaves and stem bark of wood apple have been studied for anti-tumor and antimicrobial activity [27]. Fruit pulp has anti-inflammatory, antipyretic and analgesic activity [28].

Wood apple has anti-diabetic and antioxidant potential by reducing the level of blood glucose and malondialdehyde [29]. In addition to this, wood apples also have hypoglycemic activity, antitumor, larvicidal and antimicrobial activity and hepatoprotective activity [30]. Beside the importance for nutritional value and a source of income, diversity of this fruit also has a cultural and social value and contributes to the stability of ecosystems.

### Conclusion

In spite of existing germplasm in India, developments of standard varieties for these species are limited. Having a wide degree of adaptability with high tolerance, the fruits can thrive well under adverse climatic and edaphic conditions. Domesticated wild fruit species could be grown on village wasteland and degraded forest areas or community land. With increased areas under indigenous fruit plantations, collection in a given locality could attain the commercial tradable volumes essential for marketing the products. These unexplored fruits are to be explored in such manner so that tribal people can get its due share as they conserved it over the centuries. In the UN sponsored Decade of Biodiversity 2011-2020, officials of local government, political parties, bureaucrats, agriculture and forest officials need to be sensitized towards the importance of conservation of wild and underutilized crops for future food security. Hence, research and development work, farmers awareness and feasibility for cultivation of these less known fruits are to be given due consideration.

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