Minor fruit trees in agroforestry for addressing nutritional, medicinal, fodder and timber needs

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ABSTRACT : The paper highlights multiple uses of minor fruit trees and advocates their incorporation in agroforestry system for conservation of biodiversity, self-sufficiency in fruit, timber and top feed. Minor fruits are major source of nutrition to rural poor as they have poor access to major fruits. Timber wood import of country is looming large year after year and poor people have to bear burnt of increased prices. Minor fruits on their field bunds will meet their timber requirement without demanding additional land and care, and will constitute long term investment by poor farmers for their future generations. Animal husbandry is integral part of farming in India. Due to conversion of grazing lands to other land-uses, fodder shortage is hampering milk/meat production. Provision of top feed on farm-land will add to farmers' income by supplying green fodder as top feed in lean period. Many minor fruit trees have more than one utility; hence, they should be preferred under agroforestry. This will not only assist in conservation of these species but also in meeting the various requirements of the farmers *e.g.* nutrition, top feed, fuelwood and raw material for pharmaceutical.

Key words: Medicinal uses, National Agroforestry Policy, nutritional security, traditional uses and wood property

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1. INTRODUCTION

India is bestowed with a large number of fruit crops due to highly favorable and diverse agro-climatic conditions. The country ranks second in fruit production in the world with production of 88.9 million metric tonnes of fruits. However, only few major fruit crops *viz.* banana, mango, citrus, papaya, guava and apple contribute 80% of total fruit production (Indian Horticulture Database, 2014). There are other fruits, which are neglected or not cultivated on commercial scale, known as minor or underutilized fruits. Such fruit plants are grown on a very small scale and get lesser importance than the conventional fruits because of the lack of awareness of their potential uses, unorganized market and poor market value (Eleazar and Cesoiv, 2012; Bhati and Jain, 2016). Besides providing fruits, these plants are important source of timber, fodder (top feed), fuelwood, live fence material and host of economically important worms (silk, lac) and raw material for the ayurvedic medicines, etc., thus having economic significance in improving the livelihood of the tribal farmers (Slathia *et al*., 2017). These fruit crops are also playing important role in stability of the ecosystem by providing various ecosystem services (Roy, 2014). For hundreds of years, we have been selectively breeding the wild and minor fruits for increasing size, making prettier, sweet and easier to eat and transport. As of now, few minor fruit plants *viz*. aonla and ber have leaped forward to attain status of major fruits in due course of time on account of awareness, varietal development and marketing. In India, minor fruit plants are generally found growing in homesteads, village surroundings, wastelands and occasionally on field bunds. They may not be necessarily indigenous, but well acclimatized/naturalized in the country and normally perform well in biotic (insect, pest and diseases) and abiotic (salinity, sodicity, acid soil, low fertility, poor soil moisture, etc.) stresses as compared to the major fruits (Bhatt *et al*., 2008; Sharma *et al*., 2014). They are largely of seed origin and perpetuated by the farmers for meeting fruit, timber, fuel, fodder requirements, etc. Important minor fruits of India are listed in Table 1.

In India more than 80% of farmers are categorized as marginal and small land holders (Anonymous, 2014). Furthermore, decline in per capita availability of land from 0.5 ha (1950–51) to 0.15 ha (2009) and a drop to less than 0.1 ha by 2020 has been projected by Mahapatra and Behera (2011). With the growing population pressure, many trees on croplands and wastelands were harvested to facilitate agriculture. This has hampered the tree biodiversity to a large extent and as a result, many minor fruit plants have reached to the brink of extinction. Availability of good fertile land for orcharding in near future seems to be difficult as country needs more area for crop production to fill empty belly of millions. With decreasing forest cover, changing climate and scarcity of timber, there is a growing awareness to plant these minor fruit plants in homesteads and on field bunds of croplands *i.e.* agroforestry for strengthening biodiversity conservation. Agroforestry attracted worldwide attention after the Kyoto protocol specially in developing countries including India for its significant role in reducing vulnerability, enhancing the

resilience in crop production and climate related risks (Ram *et al*., 2016). Furthermore, recently announced National Agroforestry Policy-2014 will be helpful in boosting the area under agroforestry. Thus, minor fruit trees also can play important role in increasing the area under agroforestry.

2. MINOR FRUITS AS TIMBER

Forest wealth of country is dwindling fast due to illicit felling and diversion of forest land for development. As such, it is estimated that in 2020, the country's timber demand will be 153 million cubic m against the estimated supply of mere 60 million cubic m (Manoharan, 2011). This gap can safely be minimized through agroforestry. Timber demand is high in rural and urban areas as house construction is in full swing. Hence, local demands of timber met with small and minor fruit plants need to be restored. Timber quality of selected minor fruit plants is given in Table 2.

3. MINOR FRUIT TREES AS TOP FEED

Besides timber, minor fruit plants yield valuable top feed for animals (Table 3). These top feed trees serve the purpose during green fodder scarcity period. Some of the plants were regularly lopped for fodder. Leaves of *Aegle* spp.,*Carissa* spp. and *Cordia* spp., preferred by goats, sheep and camel (Slathia *et al*., 2017). Leaves of *B. lanzan* used as feed for animals during lean period in Bundelkhand as well as in Vindhyan zone (Dwivedi *et al*., 2012). Twigs and branches of lopped trees are used for brush wood fencing or as fuelwood. Seabuckthorn or Leh berry (*H. rhamnoides*), a multipurpose thorny shrub is used for food, fuel, fodder, medicine and live fencing of farm-land in cold arid region of Himalaya. Also having nitrogen fixation and soil stabilizing efficiency and planted along canal and sloppy land to control soil erosion in Ladakh region (Butola *et al*., 2012). Karonda and Leh berry are excellent species for making live fence around farm-land, orchards with added benefits.

Table 1. List of important minor fruit crops of India

Common name	Botanical name	Growth habit	Climate
Aonla	*Emblica officinalis*	Tree (medium size)	Sub-tropical
Bael	*Aegle marmelos*	Tree (medium size)	Sub-tropical
Ber	*Ziziphus mauritiana*	Tree (medium size)	Sub-tropical
Chironjee	*Buchanania lanzan*	Tree (small size)	Semi-arid sub-tropical
Custard apple	*Annona squamosa*	Shrub/small tree	Tropical to sub-tropical
Date palm	*Phoenix dactylifera*	Tree (monocot)	Arid sub-tropical
Fig	*Ficus carica*	Shrub	Tropical to sub-tropical
Jamun	*Syzygium cumini*	Tree (large size)	Sub-tropical
Karonda	*Carissa carandas*	Shrub	Sub-tropical
Ker	*Capparis decidua*	Shrub	Arid sub-tropical
Khejri	*Prosopis cineraria*	Tree (medium size)	Arid sub-tropical
Khirni	*Manilkara hexandra*	Tree	Sub-tropical
Lasoda	*Cordia myxa*	Tree	Sub-tropical
Mahua	*Madhuca indica*	Tree (large size)	Semi-arid sub-tropical
Mulberry	*Morus alba, M. rubra*	Tree	Sub-tropical, temperate
Palmirah palm	*Borassus flabellifer*	Tree (monocot)	Tropical
Phalsa	*Grewia subinaequalis*	Shrub	Sub-tropical
Pilu/Mitha Jal	*Salvadora oleiodes*	Large tree	Arid sub-tropical
Pomegranate	*Punica granatum*	Shrub	Tropical, sub-tropical and temperate
Rose apple	*Syzygium jambos*	Tree (small)	Coastal (Tropical)
Seabuckthorn	*Hippophae rhamnoides*	Shrub	Cold arid region
Tamarind	*Tamarindus indica*	Tree (large size)	Tropical to sub-tropical
Wood apple	*Feronia limonia*	Tree	Sub-tropical

Table 2. Timber/wood properties of important minor fruits in India

Species	Weight at 12% moist (lb/cft)	Grains/ texture	Durability	Colour	Uses	Remarks
Bael (*Aegle marmelos*)	57 (Heavy)	Straight grained fine texture	Very strong, hard and dough durable under cover	Light yellow or yellowish-grey naves of carts	Used for pots, shafts axils and tools, handles, furniture etc.	2nd class wood
Kaith (*Feronia limonia*)	53 (Heavy)	Straight or narrowly interlocked grains, medium texture	Very durable under cover	Yellowish grey to grayish white	Used for house building as rafters, scantlings, naves of wheels and oil crusher	3rd class timber, harder and closer grained than teak, gives smooth finish
Ber (*Ziziphus* spp.)	41 (Moderately heavy)	Narrowly interlocked grains, uneven texture	Moderately durable in open, durable under cover	Reddish-brown	Construction of houses, handles of axes, harrows, bed legs, toys, parts of wheel	3rd class timber, fairly smooth finish
Chironjee (*Buchanania lanzan*)	29 (Light)	Straighter grained, interlocked grains, coarse texture	Fairly durable if kept dry	Grayish-brown develops grayish-black stain	Used for boxes, doors, match splints cheaper class furniture	Suitable for match splints
Jamun (*Syzygium cumini*)	43 (Moderately heavy)	Interlocked grains, medium coarse textured	Moderately durable in open	Reddish grey to brownish-grey	Used for building rafters, door as posts, beams, frames and panel, solid wheels for cart, boat construction	About ¾th as strong as teak
Mahua (*Madhuca latifolia*)	62 (Heavy to very heavy)	Straight or shallowly interlocked grains, medium fine texture	Durable in open and very-very durable in water	Dark red or reddish-brown	All kind of building purpose such as beam, door, window frame and posts. All types of heavy work (bridge piles)	Resistant to white ant. Very strong, tough and hard timber, exceptionally well in water as bridge pile
Lasoda (*Cordia myxa*)	34 (Light to moderately heavy)	Shallowly inter-locked grains, very coarse and uneven textured	Not durable in exposed conditions, durable in water	Grayish brown and brown wood	Boat building, house construction as post, beams, cart wheels, furniture, boats	Moderately ornamental character, finishes well to smooth surface
Aonla (*Emblica officinalis*)	49 (Moderately heavy to heavy)	Shallowly and irregularly inter-locked grains, coarse and medium textured	Moderately durable under cover, durable in water	Dull red or reddish brown colour	Used for cheap building material and furniture, well construction excellent charcoal and fuelwood	Difficult to season, 3rd class timber, finishes to mica smooth shiny surface
Mulberry (*Morus* spp.)	40 (Light to moderate heavy)	Straight grains, medium coarse and somewhat uneven texture	Durable in open, moderately hard to hard elastic and very flexible when steamed	Bright and yellowish-brown to golden-brown	Use for house building, sport equipments, agricultural equipments, furniture, spokes, poles, shafts, bent parts of carriage and carts	Very good timber of 1st class
Barhal/ Monkey Jack (*Artocarpus lacucha*)	32 (Light)	Straight or inter-locked grains, very coarse and even textured	Durable in open and water as well	Light yellowish brown to golden brown	Used for well construction, buildings constructions as beam, posts, rafters, scantlings. Also used for piles, boat, dugouts, furniture, etc.	First class timber, similar to teak in strength and elasticity, seasons well, no white ant attack
Walnut (*Juglans regia*)	33 (Light)	Straight, closed grained, medium and even textured	Durable under cover	Grayish brown wood, often mottled with dark streaks	Used for rifle stock, furniture, buildings construction	First class most valuable timber, hardwood, excellent wood for carving, finishes to smooth, shiny surface, takes high polish

(Source: Pearson and Brown, 1932)

Table 3. Minor fruit plants as top feed

Common name	Botanical name	Animal	References
Ber	*Z. mauritiana*	Small ruminants	Pratap Narain (2006) and Gaikwad *et al.* (2017)
	Z. nummularia		
Lassoda	*Cordia myxa*	Small ruminants	Slathia *et al.* (2017)
Mahua	*Madhuca latifolia*	Cattle, small ruminants	Rangnekar (1991)
Jamun	*Syzygium cumini*	Cattle, small ruminants	Gaikwad *et al.* (2017)
Bael	*Aegle marmelos*	Cattle	Gaikwad*et al.* (2017)
Chironjee	*Buchanania lanzan*	Cattle	Dwivedi *et al.* (2012)
Sahjan	*Moringa oleifera*	Cattle, small ruminants	Gaikwad *et al.* (2017)
Khejari	*Prosopis cineraria*	Camel, small ruminants	Pratap Narain (2006) and Rangnekar (1991)
Mulberry	*Morus alba*	Camel, small ruminants	Bakshi and Wadhwa (2007)
Phalsa	*Grewia subinaequalis*	Small ruminants	
Pilu/Mitha Jal	*Salvadora oleoides*	Camel, small ruminants	Pratap Narain (2006) and Rangnekar (1991)
Sea buckthorn	*Hippophae rhamnoides*	Cattle, small ruminants	Butola *et al.* (2012)
Karonda	*Carissa carandas*	Small ruminants	Slathia *et al.* (2017)

4. MINOR FRUIT TREES FOR NUTRITIONAL SECURITY

Currently food habits in rural and urban households is changing and this has led to the over-dependence upon the food, which are energy rich, but poor in nutrients (Nyadanu and Lowor, 2015). Continuous consumption of nutrient poor diet resulted in occurrence of malnutrition (FAO, 2011). Minor fruits are an important constituent of traditional diet of the local inhabitants and are a valuable source of carbohydrate, protein, fat, minerals, vitamins, fiber and many antioxidants (Deshmukh and Waghmode, 2011; Cheema *et al*., 2017). These fruit plants meet nutritional requirement of many poor people. Tribal communities in various parts of India, mostly depend upon the underutilized food crops. *Mahadeo Koli* tribe in western Maharashtra uses 144 types of non-traditional fruits and crops in their dietary pattern (Kulkarni, 2006). Kumar *et al.* (2015) also reported the use of underutilized fruits by *Adi* tribes of Arunachal Pradesh. Nutritional properties of some minor fruit plants are given in Table 4.

5. MINOR FRUIT TREES FOR HEALTH CARE

Tribal and rural households transfer their tradition of eating underutilized or minor fruits from generation to generation. It is believed that such fruits keep them healthy with longer life span as compared to people in urban areas (Singh *et al*., 2014). Minor fruit plants were used as raw material for preparation of several ayurvedic medicines. Minor fruits offer wisdom of eating fruits as fresh, dry, powder form, juice, pickle, arak, chutney, jam, jelly, wine and in other medicinal forms. Other parts like root, twigs, leaves and flowers are also used for curing diseases. In Rajasthan, some minor fruits like khejri, lasoda, ker, etc. used for vegetable purposes. *Panchkuta* is popular preparation in Rajasthan used for balanced diet which is prepared from pods of khejri, dry fruits of ker, dry destined fruits of lasoda, seeds of kumat (*Acacia senegal*) and dried mango pieces or mango powder. Plentiful literature on medicinal use of minor fruit plants is available as ITK and many of them have been indicated in literature as well (Table 4).

6. MINOR FRUIT TREES AS A HOST FOR ECONOMIC INSECTS

Some of the minor fruit plants are used as integral component of agro-based industries *viz*. silk and lac production. *Morus* sp. are used for rearing of silk worm and *Jujuba* sp. are used for lac cultivation. Mahua tree is a host of *Antheraea paphia* (tassar silkworm) which produces silk, traditionally used for sari making (Vantomme, 2002).

7. CONCLUSION

There is a paucity of research attention on minor fruits and its potential uses are under estimated and under-exploited. There is a need to domesticate minor fruit trees for nutrition, timber, fodder and industrial uses in different landscapes. Their cultivation should be encouraged in agroforestry systems for biodiversity conservation; nutritional security and timber availability, besides other purposes such as lac cultivation, silk worm rearing and honey production.

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Table 4. Nutritional, medicinal properties and traditional uses of some minor fruits

Fruit crop	Nutritional properties		Medicinal properties	Other traditional uses	References
Bael (*Aegle marmelos*)	Moisture (%) Protein (%) Fat (%) Fiber (%) Carbohydrate (%) Minerals (mg/100 g) Vitamins (mg/100 g) Other nutritional value	61.5 1.8 0.3 2.9 31.8 Ca-85, P-50, Fe-0.6 Thiamin-0.13, Riboflavin-1.2, Niacin-1.1 Oxalic acid-18.7mg, Carotene-55mg	Partially ripe fruit regarded as astringent, digestive and stoma chine, fruit pulp also used in chronic diarrhea and dysentery. Acts as tonic to heart and brain, roots, bark, leaves and seed valued in indigenous medicine (ingredient of dasmularisht)	Yellow dye extracted from rind of ripe fruit	Data modified from USDA nutrition data base (2016)
Chironjee (*Buchanania lanzan*)	Protein (%) Fat (%) Fiber (%) Carbohydrate (%) Minerals (mg/100g) Vitamins (mg/100g) Other nutritional value	19-21.6 59.1 3.8 12.1 Ca-279, P-528, Fe-8.5, Mg-373, Na-10.2, K-436, Cu-0.86, S-186, Cl-25 Thiamin-0.69, Riboflavin-0.53, Niacin-1.5, Vit. C-5.0 Oxalic acid-2.0mg, Energy-656 Kcal/100g	Ointment from kernel for curing skin stitches	Kernel oil (35.4-47.2%) is substitute of almond and olive oil. Kernel is substitute for flavoring sweet meats and confectionary. Gum exuded from tree is partially soluble and suitable for dressing textile, used in diarrhea and intestinal pains, gum dissolved in cow milk used in internally rheumatic pains. Leaves have cardiotonic properties and used for curing wounds. Leaves also used as green fodder	Data modified from USDA nutrition data base (2016)
Lasoda (*Cordia myxa*)	Protein (%) Fat (%) Fiber (%) Carbohydrate (%) Minerals (mg/100g) Vitamins (mg/100g)	1.8 1 - 12.2 Ca-40, P-60 Riboflavin-0.17, Vit. C-3.0, Carotene-6.1, Thiamine-0.04, Niacin-0.8	Anti-helminthic, diuretic, demulcent, expectorant properties. Leaves used to cure ulcer, headache. Kernel used for external application for rind worm, bark used in dyspepsia and fever. Fruit used for diseases of chest and urinary tract and constipation	Bark contains 2% tannin	Data modified from USDA nutrition data base (2016)
Kaith/wood apple (*Feronia limonia*)	Protein (%) Fat (%) Fiber (%) Carbohydrate (%) Minerals (mg/100g) Vitamins (mg/100g)	7.1 3.7 - 15.5-18.1 Ca-13, P-110, Fe-0.6 Riboflavin-170, Ascorbic acid-2m	Fruits used for preparing medicines for diarrhea, dysentery and throat problem. Leaves and bark have antiscorbutic property. It is antidote for poison and also help in curing sore throat	Tannin 1.03%	Data modified from USDA nutrition data base (2016)
Ber (*Ziziphus* spp.)	Protein (%) Fat (%) Fiber (%) Carbohydrate (%) Minerals Vitamins (mg/100g) Other nutritional value	0.34 - - 13.6 Ash-0.03%, ß-carotene-81.2 Reducing sugar-3.5-5.8%, Non-reducing sugar-2.4-8.4%	Roots chewed to relive jaw ache and root extract used in diarrhea. Stem bark used to cure sore throat and impaired voice	Leaves are valuable source of fodder, known for rearing of lac insect	Nath *et al.* (2011)
Aonla (*Emblica officinalis*)	Protein (%) Fat (%) Fibre (%) Carbohydrate (%) Minerals Vitamins (mg/100g)	0.5 0.1 - 14.21.8 P-2, Ca-50 Vit. C-500-1500, Nicotinic acid 0.2, Fe-1.2	Fruits are used in Triphala and Chavanprash (ayurvedic medicine). It is also valued as an antiscorbutic diuretic, laxative and antibiotic. Traditionally, it is used for balancing vata and pitta, enhancing digestion, purifying blood, strengthening heart and benefitting eyes, etc.	Fruits contain > 25% tannin while twigs have > 15% tannin	Data modified from USDA nutrition data base (2016)

Jamun (*Syzygium cumini*)	Moisture (%) Protein (%) Fat (%) Fibre (%) Carbohydrate (%) Minerals (mg/100g) Vitamins	83.7-85.8 0.7-1.3 0.15-0.3 0.3-0.9 14 Ca-8.3 to 15, Mg-35, P-15 to16.2, Fe-1.2 to 1.62, Na-26.2, K-55, Cu-0.23, S-13, Cl-8 Vit. A 80IU, Thiamin-0.008-0.3mg/100g, Riboflavin-0.0009-0.01 mg/100g, Vit. C- 5.7-18mg/100g, Folic acid 3µg/100g	Fresh fruit contains 708 mg/100g AEAC units of antioxidants		Data modified from USDA nutrition data base (2016)
Mulberry (Fruit) (*Morus* sp.)	Moisture (%) Protein (%) Fat (%) Fibre (%) Carbohydrate (%) Minerals (%) Vitamins Other nutritional value	85-88 0.4-1.5 0.4-0.5; Free fatty acids-1.1-1.9 1.7 7.8-9.2 0.7-0.9 Vit. A 25IU, Thiamin-0.029mg/100g, Riboflavin-0.101mg/100g, Niacin-0.62029mg/100g, Vit. C- 36.4mg/100g, Vit. E-0.87mg/100g, Folic acid-6µg/100g Energy- 43 to 45Kcal/100g	Fruit juice for curing throat infection, controllingfever and also blood purification, bark used for nerve tonic	Known for rearing silk worm, twigs for basket, bark for paper, left over after silk worm feeding is used for cattle feeding and in pond for herbivorous fishes	Data modified from USDA nutrition data base (2016)
Barhal (*Artocarpus lacucha*)	Moisture (%) Protein (%) Fat (%) Fibre (%) Minerals (%) Other nutritional value	90 2 1 3 Minerals-1%, Ca-67 mg, P-67 mg Energy-73 cal/100g	Used for treating dysentery, arthritic swelling, prevent skin diseases and cleaning of wounds. Due to flavonoids and phenolic compounds, bark extract has antioxidant properties		Data modified from USDA nutrition data base (2016)
Mahua (*Madhuca latifolia*) (Dried flower)	Moisture (%) Protein (%) Fat (%) Fiber (%) Carbohydrate Minerals (%) Vitamins Other nutritional value	19.8 6.38 0.5 - Total sugar-54.06%, Reducing sugar-54.62% Total invert sugar-54.24%, Ash-4.36%, Ca- 8%, P-2% Vit. A- 525-696 IU, Vit. C.- 42.9-60.0 mg/100g 25Acidity-0.09-0.12	The sweet, fleshy flowers are eaten fresh or dried, powdered and cooked with flour, used as sweetener or fermented to make alcohol. Flowers used to relieve coughs, biliousness and heart-trouble and believed as good for the eyes, TB, asthma, blood diseases, thirst and burning sensations. Fruit is given in cases of consumption and blood diseases, bark used to cure leprosy and in wound healing	Dried flowers used in local dishes like kheer, halwa, puri, burfi as a sweetner in mahua growing area. Alcoholic drink prepared by fermentation of flower called as Mahua, country liquor. Vinegar also prepared from flower	Peter (2007); Fern (2014); Patel and Naik (2010)
Mahua (*Madhuca latifolia*) (Fruit)	Carbohydrate (%) Minerals (%) Vitamins	TSS-13.8 1.4-2.3 Vit. A-586-860 IU, Vit. C- 47.5-72.5 mg/100g		The fleshy epicarp of the fruit is used as a vegetable	Peter (2007)
Mahua (*Madhuca latifolia*) (Seed)	Protein (%) Fat (%) Minerals (%)	21.25 42-49 (oil); Free fatty acids-0.53-1.2% 3.9-6.4	Seed oil is used as substitute of ghee or adulterant	Mahua seed oil is used to make soaps and candles and is used against pest infestations in stored grains. Seed cake is being used as fertilizer and to control a root-knot nematode	Peter (2007); Orwa *et al.* (2009); Fern (2014)
Fig (*Ficus carica*)	Moisture (%) Protein (%) Fat (%) Fiber (%) Carbohydrate (%) Minerals (%) (mg/100g) Vitamins Other nutritional value	30.05 3.3 0.93 9.8 63.87 Ca-162, Mg-68, P-67, Fe-2.03, Na-10, K-680, Zn-0.55 Vit. A 10IU, Thiamin-0.085 mg/100g, Riboflavin-0.082 mg/100g, Vit. C-1.2 mg/100g, Niacin-0.62 mg/100g, Vit. B6-0.11, Vit. E 0.35 mg/100g, Folate-9 µg/100g Energy-249 Kcal/100g	Its bark, fruit, leaves, roots and latex are medicinally used in different forms. Fresh and dry fruit used as dietary food. Fig fruit is used as laxative to relieve constipation, expectorant, diuretic and used to cure disorders of diabetes, liver diseases, asthma, cough, ulcer, vomiting, menstruation pain, skin disease, scabies and gonorrhoea. Juice extracted from fruit is taken orally to relive constipation	The plant latex is used as a curdling agent in the production of extremely well-known milk product like cheese by several indigenous communities	Budgujar *et al.* (2014) Data modified from USDA nutrition data base (2016)

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