Various uses of Karonda (*Carissa carandas* L.) in the Indian subcontinent

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Abstract

In today's world, as the food we consume are traded across distant lands, there is a global awakening to learn about traditional foods popular in different cultures. Gaining knowledge about food diversity is important for food security in a world that is populating rapidly. Rediscovery and introduction of ingredients used in different cultures could lead to new commercially successful food commodities not yet known widely. The purpose of this paper is to introduce various uses of *Carissa carandas* L., a popular berry fruit known as 'karonda' in the Indian subcontinent. As the general public's interest in foreign ingredients grows, it can lead to economic benefit in importing countries. As a fruit tree with medicinal, nutritional and functional value, *Carissa carandas* L. has the potential to be an economically beneficial crop. Here, specific information has been collected about: 1) commercial species, 2) medicinal properties 3) propagation, 4) processed food items, and 5) other uses.

I. Introduction:

Karonda (*Carissa carandas* L.) belongs to dogbane or *Apocyanacea* family. It is a spinous, hardy, evergreen indigenous shrub that is drought-tolerant. It thrives in a wide range of soils, including unfertile sandy soil of arid regions and rain fed or wastelands inappropriate for most commercial fruits, under tropical and sub-tropical climate. Therefore, it is widely distributed in India, Nepal, Afghanistan, Malaysia, Bangladesh, Myanmar, Indonesia, Sri Lanka and Australia as well. In Africa, Kenya and Ethiopia have a rich history of utilizing it for medicinal purposes. Yet, it is considered an underutilized minor crop. From wild species, cultivars appropriate for commercial production have been identified using molecular markers. Germplasm of Carissa species have been widely collected from Kolhapur district of Maharashtra state, with a high degree of genotypic and phenotypic variability (Sawant et al., 2003). Variation in the number of flower buds per umbel, length of petals and pedicels, petal number and color of flowers were also recorded by Karale et al. (1990).

So far, *Carissa congesta* is considered commercially viable. The cultivated types are currently classified based on fruit color ranging from green to pink or white and are rich in iron, calcium, magnesium and phosphorus. The pink varieties are known to be richer in iron. Vitamin C and anthocyanin enhances the antioxidant properties of karonda fruit (Sawant and Godghate, 2013). Research and publication on karonda is few and mostly conducted in India, where it can grow in the states of Bihar, West Bengal, Uttar Pradesh, Uttarakhand, Maharashtra, Rajasthan etc. (Malik et al., 2010) and known by different local names (Table1).

Different parts of karonda tree (Fig.1) are used for various purposes. Its wood is used to make spoons and

combs. Its root extracts are used in lumbago, chest complains and venereal diseases and to treat helminthiasis. It is also used to assess the intensity of snake poisoning. According to Joshi and Boyce (1957), glucoside is present in the roots of *Carissa congesta*. Histamine liberating activity was observed in the ethanol extract obtained from its roots. The roots are useful in stomach disorder, intestinal worms, scabies, diabetes, ulcer and pruritus. The phyto-therapeutic significance of karonda has been described by Maheshwari et al. (2012).

Its fruits are useful to cure anemia and has antiscorbutic (counteracting scurvy) properties, a rich source of iron and contains a fair amount of Vitamin C. Its fruits and seed latex are used for treating rheumatoid arthritis, piles, cardiac diseases and nerve disorder.

Karonda fruits taste sweet and sour and has a peculiar aroma, so it is mostly used as the main ingredient in various recipes in the Indian sub-continent, where the tribal communities treat it as a cash crop. Dried fruits are similar to raisins and candied fruits are similar to cherries. The ripe fruit is used to prepare processed commercial items listed in Table 2. The mature berries contain a high amount of pectin and, therefore, besides being

Table 1. Local names of Karonda in different Indian languages

Languages	Common names
1. Hindi	Karaunda, Garinga, Gotho
2. English	Bengal current Natal plum Christ's thorn Black currant
3. Kannada	Kauli hannu, Karande kai
4. Assamese	Karja tenga
5. Bengali	Koromcha
6. Maithali	Karauna
7. Marathi	Kali maina, Boranda
8. Tamil	Kilakkai, Aintirikam, Cenkala, Karavinta, Kilamaram, Kilatti, Perumkla, Perungilamaram
9. Telegu	Vakkai
10. Bangla	Koramcha

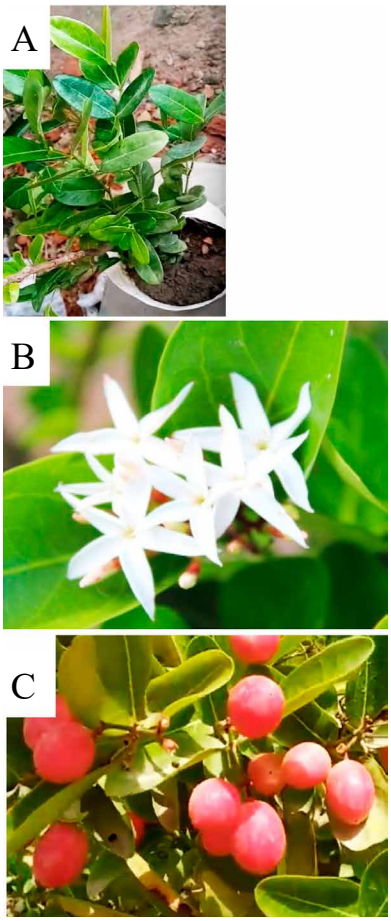

Fig. 1. Different parts of the karonda plant
A: young sapling B: white flowers C: pink berries of karonda

used for pickles, it is used to make jam, squash drink, syrup and chutney that are traded widely in the international market. Processing karonda has increased the potential for women's income generation. Women's India Trust, a Mumbai institution is a good example because it manufactures karonda jams and preserves that is sold as 'Carvandah Jelly'. Commercial ventures have processed its fruit as different commercial products shown in Fig.2.

The wine prepared from ripe fruits contains about 14-15% alcohol and is liked by wine connoisseurs. The un-

Table 2. Karonda used as ingredient in different types of food items listed below:

1. Karonda Jam
2. Karonda Jelly
3. Karonda Pickles
4. Karonda Chutney
5. Karonda Launji
6. Karonda Syrup
7. Karonda Dried fruit
8. Candied Karonda
9. Kaonda Murabba

Fig. 2. Processed commercial products of Indian origin that are made of karonda fruit
A: Karonda Pickle, B: Dried Karonda, C: Karonda Murabba, D: Glazed Karonda

ripe berries are also used in vegetables. The milky white latex from unripe berries can be used for making chewing gum. Such fruits can also be used in dyeing and tanning industries. Thus, under the changing world trade scenario, karonda tree can be utilized for multiple commercial products.

Leaves of karonda tree are easily biodegradable and enrich the soil with a lot of organic carbon and other mineral nutrients. Due to the presence of dense foliage, evaporation from soil underneath karonda plantation area is extremely low and can be useful for areas that suffer drought conditions.

Karonda trees are usually propagated from seeds; however, vegetative propagation by cutting, layering, grafting (inarching, softwood) and budding (shield) are possible. The trees are planted at 2.0 x 2.0 m and pruned regularly. Karonda flowers in March-April which continues even up to November in some parts of eastern India. Flowers (Fig.1, B) are borne both terminally and axillary. About 120-130 days are required from fruit set to maturity and each tree can produce 4-5 kg of fruits. Because of its soft flesh and high moisture content, the storage life of karonda is very short. It may be stored for a week at 13°C and 95% relative humidity. It is usually propagated by seeds which need immediate sowing after extraction as they are recalcitrant type. Vegetative propagation has been attempted using air layering but rarely used for propagation. Singh and Ravishankar (2010) attempted softwood grafting with a success rate of 40-50%. It is commercially propagated through seeds in August- September, though inarching and budding can also be practiced for vegetative propagation. Planting is done during early monsoon at a distance of 1.5 m. Collection, conservation, crop evaluation is successfully performed in different parts of India and standardized vegetative techniques of propagation have been applied.

Karonda can form an excellent impenetrable hedge or a bio-fence because of its auxiliary spines. It can also be planted on boundaries and bunds of fields or for keeping space in between other crops. Since its roots are heavily branched, it is suitable for stabilizing eroding slopes. It was rediscovered by Roy Moxham (2015) that in history, karonda was once used to make the ‘Great Hedge of India’ (or Indian Salt Hedge) which grew up to 12 feet high and ran 2500 miles from the Himalayas to Orissa and was planted and maintained by the British for almost 50 years in an attempt to prevent the smuggling of salt into British India.

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インド亜大陸でカロンダベリー(*Carissa carandas* L.)の様々な用途について

トゥラダール　アスタ

要　旨

昨今私たちが、消費する食品は長距離にわたって取引されている。さまざまな国や文化で、人気が高く、珍しい伝統食品について学ぶことに世界が目覚めている。多様な食料に関する知識を得ることは、人口急増と食料安全保障の観点から重要である。異文化の食材を再発見し紹介することで経済的な利益も可能である。本稿の目的はインド大陸で人気のベリーであるカロンダの様々な用途を紹介することである。新食材への関心が高まると輸入国に利益をもたらすであろう。そこで、医療、栄養、機能的価値を持つカロンダについて、本稿では以下の情報を収集した：1）品種、2）薬効、3）繁殖方法、4）加工食品、5）他の用途である。