



MARUMEGH

Kisaan E- Patrika

Available online at www.marumegh.com



ISSN : 2456-2904
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Received: 02-02-2022

Accepted: 05-02-2022

KARONDA: A FRUIT TO SOLUTION OF MALNUTRITION OF RURAL POPULATION

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Abstract: Horticultural genetic resource management activities include exploration, collection, characterization, evaluation, conservation and sustainable use of germplasm. Augmentation of germplasm is the first and the foremost activities of any crop improvement system and enrichment of diversity of particular crop. Karonda (*Carissa carandas*), is an indigenous fruit flourish, well in marginal and wasteland with limited water resources. Lack of attractive colour varieties with good fruit size of this fruit is necessitates urgent collection and conservation practices. Being a rich source of iron and minerals, karonda have potential to improve nutrition standard of rural population.

Accession no. IC-0632675 collected from Chirai gaon district Varanasi was found unique in term of attractive maroon coloured fruit with excellent blend of TSS (9.5 °B) acidity (1.10) and vitamin C (28mg/100gm) content.

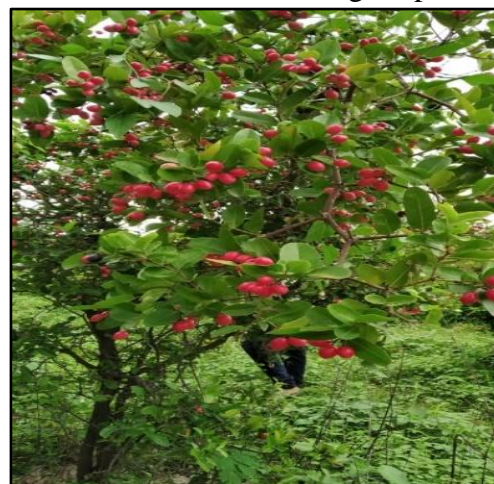


Fig.1: Unique maroon colored fruit of karonda (*C. Carandus*) collected from Chirai gaon, District Banaras, U.P.

Introduction:

Karonda (*Carissa carandas* L. 2n=22), belongs to the family Apocynaceae. In *Carissa* genus about 25 species are existing, out of five species are originate to India (*Carissa carandas* L, *Carissa spinarum*L, *Carissa congesta*, *Carissa edulis* and *Carissa grandiflora*). *Carissa carandas* performed well in Rajasthan, Madhya Pradesh, Uttar Pradesh, Bihar, West Bengal, Maharashtra and in the Western Ghats area of country. Being very hardy it can be

easily grown from arid to tropics climatic and sandy to clay loam soil. These plants easily adapt in arid climatic condition where water availability is cause of concern. A great beauty of this plant is that plants can survive during abiotic stress condition. In Ayurveda, the unripe fruits are used as astringent, appetizer, antipyretic, antidiabetic. Fruits are generally harvested at immature stage for vegetable purpose, fully ripen fruits are consumed fresh or processed. Improvement in productivity will definitely boost the crop expansion in non-traditional areas of India and other ancillary industries.

One of the simple approaches to improve production this crop is to boost up productivity through utilization of indigenous genetic resources. A large germplasm resource is always favoured in plant breeding program as many desirable traits may obviously remain in the population, which may exploit breeding program.

The diversity of karonda has not appropriately collected and used for breeding programmes hence this fruit remain poor yielder and underutilized. Hence the genetic resources of karonda were collected from different part of Uttar Pradesh (India). Accession no. IC-0632675 collected from Chirai gaon district Varanasi was found unique in term of attractive maroon coloured fruit with excellent blend of TSS (9.5 °B) acidity (1.10) and vitamin C (28mg/100gm) content.



Fig. 2: Collection of diversity in Karonda germplasm

Proximate composition of karonda (All value in 100 gm of edible portion)

| | |
|-----------------|----------|
| Energy Kcal | 59.4 |
| Water | 87 |
| Protein(g) | 0.3 -1.1 |
| Carbohydrate(g) | 0.5-2.9 |
| Crude fibre (g) | 0.6-1.8 |
| Ca (mg) | 21 |
| P(mg) | 28 |
| Vitamin A (IU) | 1619 |
| Vitamin C (mg) | 9-30 |

Need of germplasm collection to solve malnutrition problem:

Since, it is well known fact that genetic resources are basic raw material in any crop improvement, improving productivity and nutritional. The world's population growing rapidly and reached 7.7 billion in mid-2019 and is expected to reach 8.5 billion during 2030, 9.7 billion in 2050 and 10.9 billion in 2100 (United Nations, 2019). India accounts 137 crore population accounting 17 per cent of world population with meagre 2.4 per cent of the world surface area. In contrast, the USA accounts for 7.2 percent of the surface area with only 4.5 percent (33 crore) of the world population. Feeding this rapid increasing population, the safe and nutritious food is the greatest challenge to the humanity. India has failed to combat malnutrition that adversely affects the country's socio-economic progress. Million children under the age of five in developing country like India are stunted, anaemic, overweight or underweight. To conquer this serious malnutrition problem 195 nations decided to adopt SDG (Sustainable development goal) for the betterment of the lives of the people in their respective country by the year 2030 by bringing together their respective governments, businesses, media, institutions of higher education, and local NGOs by holistic approach.

Biodiversity of Indian flora

India is a mega-diverse country with only 2.5% of the land area, accounts for 7.8% of the recorded species of the world spread over 45,968 (11.18% of world) species of plants and 91,212 species of animals (7.43 % of the world) that have been documented in its ten bio-geographic regions (Gautam et al. 2010). India shares four of the 34 biodiversity hotspots with the neighbouring countries: i) Western Ghats and Sri Lanka, ii) Himalayas, iii) Indo-Burma (Northeast India south of Brahmaputra, Myanmar, Thailand, Laos, Vietnam and Southern part of China) and iv) Sundaland (Andaman and Nicobar Islands, Malaysia and Indonesia). About one third of our species of higher plants are endemic. Thus, a diverse array of plant species needs to be conserved and managed for the present and future use of mankind. As on today ICAR-NBPGR conserved about 4.43 lakh accessions of about 1900

species in its gene bank and about 3520 accessions of recalcitrant species have been conserved in cryobank.

Ethno botanical use of Karonda (*Carissa carandas* L.)

Fruits are used as antiscorbutic and as a remedy for biliousness. Fruits are rich in minerals especially iron, calcium, magnesium and phosphorus hence good alternatives to solve malnutrition problem. Mature fruit contains high amount of pectin and, therefore, besides being suitable for making pickle, it can be exploited for making jelly, jam, squash, syrup and chutney, which are of great demand in the international market. Its main flowering season is March–April with fruits maturing during August–September which enables the plants to make best use of monsoon rain. However, some varieties/plant types also flower during October–November.

Harvesting and Value addition in karonda:

Harvesting stage plays an important role and determines the overall quality of fruits. As per the need and distance of market, a farmer should harvest the produce. Mature fruit can be used for preparation of chutney and vegetable while ripe fruit should use for beverages preparations. Since, fresh karonda fruits cannot consumed fresh due to acidic and astringent nature. Therefore, it needs to be processed for all group of age particularly for younger ones. Storage life of karonda is very short because of its soft flesh and high moisture content. Processing is one of the most grabbing opportunities for rural communities to earn sustainable livelihood.

| Value addition in karonda | |
|---------------------------|---|
| Maturity stage | Idle product for processing |
| Unripe but mature fruit | Pickle, Candy, chutney and vegetable |
| Ripe fruit | RTS, Jam, nectar, syrup, canned products etc. |





Fig. 3: Farmer doing on processing at chiraigaon,Varanasi,India

Grading:

This is a very important operation which ensures the final price and marketability. Grading helps to secure extra return as graded produce fetches higher price than the ungraded. Uniform size, colour, shape attracts the consumers and consumers also ready to pay as desired value by seeing the conditions of fruits. In the international market, fruits are graded according to destination country. Weight and colour of fruit are two important factors for grading of karonda. Fruits vary in the size from round to oblong. The skin has colour from white, green and maroon colour. Maroon colour fruit fetch good price in market.

Karonda candy:

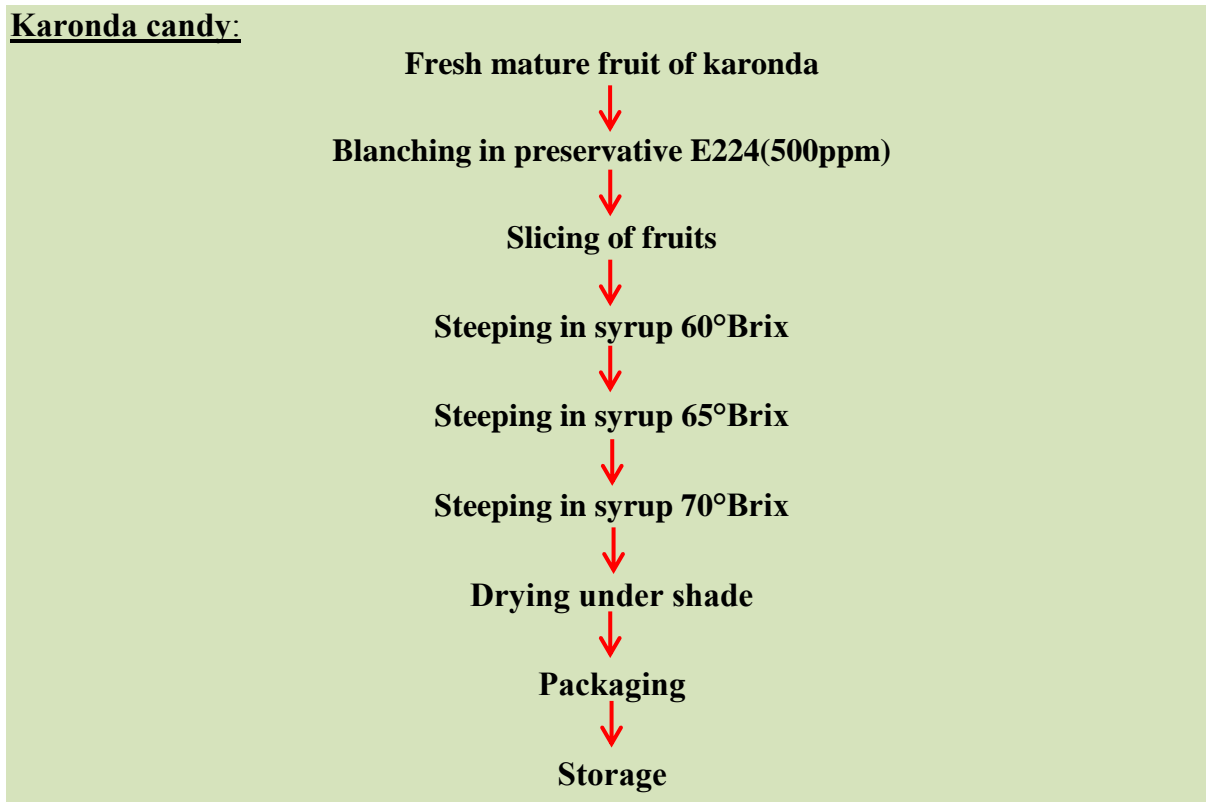


Fig.4: Process flow chart of karonda candy

What farmers can do?

Karonda is a hardy, evergreen, spiny and indigenous shrub which is one of richest source of iron mineral among the fruit crops can solve malnutrition problem of Indian rural population if it is made an integral part of diet. Strengthening post-harvest infrastructure is utmost importance which is possible by forming FPO/Farmers association can do more effective work and solve the problems of farmers. Such type of association may create facilities like establishment of cold storage, processing facilities etc. for export purpose of karonda fresh as well processed food fruits. Because a single farmer cannot afford the costs but by joint adventures farmers can start supply management chains at a small or their local regions. Small scale processing is also a better option to modify the commodity and to add variety to the market. This processing and value addition may change the scenario of the farmers.
