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Research Article

Value Chain for Marketing of Custard Apple by Cofe Producer Company Limited in Chhindwara District of Madhya Pradesh

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ABSTRACT

Pulp was extracted from custard apples and stored for a period of six months by addition of 1500 ppm of potassium metabisulphite. After six months, various products like squash, nectar, ready-to-serve beverage (RTS) and toffee were prepared All the products stored at cold storage were good physicochemically, microbiologically and organoleptically when compared to the products stored at room temperature.

Key word: *Custard Apples, Pulp, Tribal farm women.*

INTRODUCTION

Custard apple (*Annona squamosa* L.), also known as Sitaphal or Sharifa is an important dryland fruit crop in India and belongs to family 'Annonaceae' having chromosome number 2n = 14. The fruit tree belongs to tropical climate and is native of tropical America and surrounding regions. Annona means year's harvest and squamosa means scaly referring to the scale like structure of the fruit surface. Custard apple tree has been naturalized in the Deccan plateau due to its hardy nature and hence, The treatments comprised of sixty genotypes with different character viz number of alternate leaf, length of leaf (cm), number of flowers per branches, days to 50 % maturity, total number of fruits, fruit width (cm), fruit length (cm), fruit weight (g), length of pedicel (cm), pedicel thickness, length of pericarp (cm), weight of pericarp (g), seed length (mm), seed width (mm), number of seeds per fruit, seed weight(g), pulp weight (g), areole weight(g), number of fruits per tree and fruit yield per plant (kg). Findings of analysis of variance revealed significant mean squares due to genotypes for all the traits under the study indicated the existence of sufficient genetic variability for the traits. It is cultivated in Maharashtra, Gujarat, Madhya Pradesh, Andhra Pradesh, Chhattisgarh, Karnataka, Bihar, Orissa, Assam and Tamil Nadu. Besides India, it is common in China, Phillippines, Egypt and Central Africa.

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In India, it is presently grown in an area of about 29.87 thousand hectares with a production of 228.37 metric tones and the average productivity is 765 q/ha and it ranges from 673 q/ha in Andhra Pradesh to 685 q/ha in Maharashtra (2014-15). Chhattisgarh and Maharashtra occupies 55.74 per cent of the total area in the country. Whereas Gujarat covered 5.34 thousand hectare and the average productivity is 768 q/ha (Chandra, 2010). Chhattisgarh, state of India occupies an area of approximately 7.99 thousand hectare with an annual production of 39.73 metric tones having the productivity of 497.25 q/ha under custard apple. The edible portion or pulp is creamy or custard like, granular, with a good blend of sweetness, possessing pleasant flavor and mild aroma have a universal liking, being rich in carbohydrates 23.0 g per100 g fruits. The fruit is reported to have moisture 70.5 g, protein 1.6 g, fat 0.4 g, minerals 0.9 g, fiber 3.1 g, calcium 17.0 mg, phosphorous 47.1 mg, iron 1.5 mg, thiamine 0.07 mg, riboflavin 0.17 mg, niacin 1.30 mg, Vitamin C 37.0 mg and energy 104 Kcal Gopalan et al. (1987) and Singh (1995). The evolution of custard apple through natural and human selection in diverse elevation zones and under different cropping systems with involvement of honey bees being the carrier of cross pollination has resulted in a wide variety of locally adapted landraces. These landraces have evolved over years to fit into local cropping patterns and diverse end uses and represent a wide range of patterns of crop diversity. The knowledge of patterns of genetic variation of a crop species in any given region or country is very important for planning future germplasm exploration missions and thereafter it's efficient utilization in crop improvement programme. Assessment of genetic variability for yield and its components is useful to predict the extent of improvement possible for fruits yield and other important characters. The heritability estimates and genetic advance proved to be the important parameters for isolating the desirable genotypes. Heritability provides information on contribution of genotypic variance to the corresponding phenotypic variance while, genetic advance reflects genetic architecture of any population. High genetic advance associated with high heritability gives an idea of true heritable traits for better plant selection during breeding programme.

MATERIALS AND METHODS

Livelihood of Tribal families who lives in the forest or adjacent to forest is highly dependent on forest produce. In context of Chhindwara, tribal women collect 18-20 kg raw custard apple in per daag (locally bamboo made basket) from forest and then walk on forest pathway for more than 14 km to sell it to the local haat. But while working in the remote area like Mohkhed block of Chhindwara District of Madhya Pradesh, SRIJAN realized that with the advancement of science and technology, based on study of market situation and practical experience of SRIJAN's own custard apple initiatives in Pali, Rajasthan, it is possible to get assured income by developing value added products through naturally available forest produce custard apple.

There are following reasons to "Establishment of value chain on marketing of custard apple" with COFE Producer Company Limited, which is promoted by SRIJAN in the villages of Chhindwara district of Madhya Pradesh:

• Tribal families collect the fruits and sell to middle man at the average rate of Rs 3 per kg in the local markets but this intervention will help them in selling their produce at fare price.

• Secondly due lack of transport facility from villages to market and additional cost of transporting fruit from village to market, limit the farmers from selling the fruit. But due to community managed Village level collection centre (VLCC), they can

harvest and sell ample number of fruits in their own village.

• It will also help in reducing the number of intermediaries between producer and consumer and increasing their bargaining strength through volume negotiation.

• It will also help in increasing the shelf life of produce through processing and sell it at right time with value addition when prices are better.

• It will also create the employment opportunities to tribal women in their own business venture.

• It will also give the motivation to SHG members for manage their own resources and can be develop as the community based business model which can be replicate in whole Chhindwara district.

Our Experience: SRIJAN has promoted the 151 SHGs in 49 villages of Chhindwara district but due to new intervention, team decided to start in some villages of Mohkhed block. From the beginning, team worked with strategy to involve the community in the each activities of value chain, started with community participation in decision making, which helped them in developing the ownership. So after the initial meeting in SHGs, team followed the cluster meetings and then various night meetings in the villages .In Kg Day-wise Pulp Extraction (In Kg) where SRIJAN team and SHG leaders collectively organized the village meeting where SRIJAN team told them about the concept and vision building of this new activity while SHG leaders facilitated the decisions making process of selection of venue of VLCC, who will be in-charge of VLCC in a particular village, how payment will be done and when raw fruit will come to VLCC etc. As demand of raw fruits was less at the pulp processing centre, so COFE leaders decided that they will purchase the fruits from SHG members only in this season. While on the other side, to manage the processing plant of this short duration fruit was the challenge as well as learning activity for SRIJAN, Chhindwara. As our team is small and engaged in other activities, so executing the plan was really a challenge for us. During the team meetings, question raised that who will lead all these activities. So we decided to divide the responsibilities and come up with concept of four leaders and its team i.e. Field leader, MIS leader, Accounts leader and CPU leader (Central Processing Unit). This concept helped in clearing the role and responsibility of every team members and how each team can work collectively. But due to unseasonal rain custard apple came before two weeks of their normal season, while pulper and hardener machine could not delivered by vendors. So we missed the two week's starting seasons of custard apple. We were not expecting this kind of poor start and finally hardener machine delivered on 16th and we started the pulp processing manually on 17th Oct but it was difficult to extract pulp manually and the pulp production was very less. First day pulp extraction was 34.5 kg pulp only and next day 50.5kg. But as pulper machine delivered and pulping was started with full swing from 23rd Oct and final pulp extracted volume is 2242 kg.

RESULTS AND DISCUSSION

Village Level Collection Centre (VLCC): Tribal women harvest the custard apple in raw form from forests, grade the fruits in A and B categories as per size of fruits and then collect it the at the village level collection centre. Village level collection centre was established between two or three village.

• Total 5 VLCCs was decided but due to short duration of season, only 4 were the functional where total 13465 kg of raw fruits was procured.

• Total 4 SHG members were selected as the VLCC in-charge at all four VLCC, who was responsible for procurement of

fruits, proper grading, and record keeping and then ensure the weekly payment to collectors.

• Rate of Custard apple was decided the Rs 5 and Rs 6 for grade A and grade B raw fruits respectively and payment was made in weekly basis in cash to SHG members.

• Procurement of raw fruits was started on 15th Oct 2015 and closed on 4 th Nov 2015.

Central Pulp Processing Unit (CPU): Central processing centre is place where all raw fruits collected, ripened, processed and then frozen in the packet of 1 kg each. COFE Producer Company Ltd explored the building for central processing unit and after lot of hard work, finally established in a rented building of Temni Khurd village. The reason behind selecting the Temni Khurd village is that it situated where all three route of project villages of Mohkhed block meet, have the less power cut and mobile network connectivity which help in better coordination between central processing unit and VLCCs. As per the nature of technology involved and equipments, COFE Producer Company Ltd divided the building in four major sections, which are given below:

a. Store and ripening section: When the VLCC procured the custard apple then a vehicle go and collect the raw fruit from all VLCCs and come back to store room where store in-charge do weighing and store in the ripening chamber. The next morning women sort the ripen fruits and send it to scooping room.

b. Scooping and pulping section: Custard apple become very soft after ripen, so careful handling is need. As the fruit ripened, it comes to scooping room, where women, with gloves, mask and cap on head, scooped the fruit from peel and then put in the pulper machine where pulp and seed is separated.

c. Packaging section: After pulp is processed and quality check, it's time to weight the pulp and packed it in the size of 1 Kg pack.

d. Harden and Frozen section: Packed pulp is then send to the next section and put in the hardener machine where it is hardened for at-least 12 hours at the temperature of 32 degree Celsius and then transferred in the deep freezer and finally stored in the cold storage in the Chhindwara.

Scooping: Separation of peel from fruit Pulper machine: Separation of Pulp and Seeds Custard apple utilization (Raw, pulp and its waste):

Total CA purchased is 13466 kg but we did not process all the fruits. We explored the vendors for sell the Grade "A" raw fruits at premium rate. So vendor of Jabalpur of MP and Wardha and Nagpur of Maharashtra contacted us and we fixed the deal in Wardha to sale at the rate of Rs 15 per kg with advance payment but due to some reasons, we finally sold the 817 kg of raw fruits at the rate of Rs 10/- Kg in Nagpur. It was a great learning experience to sale the raw fruits.

Total 7668 kg of fruit was used for processing, while 4980 kg of fruits, we could not process and dumped in compost pit because moth larva found in the fruits during the scooping. When we explored the reason then learnt that it was due to two reasons i.e. three days of unseasonal rain and more fruits was stocked.

On the other hand processing of custard apple produces the two type of solid waste mainly – a waste of peel/skin and seeds. In the case of custard apple the discarded portion was around 70%, so it is important to explore the possibilities for use of peel and seeds. While, if we do not deal with waste disposal correctly, then it can lead to problem of flies and mosquitoes.

The table given below gives the details of different produce of 7668 kg of fruits, which was used Actually in processing and its utilization:

Particular	Utilization	Quantity	Expected Revenue Generated (in Rs.)	Remark
Pulp Extracted	Frozen pulp has demand in ice-cream Industry. Also consumed in form of flavor of sweets in home as well as weeding	2242	291460	2242 kg @ Rs 130 per kg
Peel/ skin	Waste peel is dumped in compost pit for organic manure preparation and then sale it to farmers	3160	4000	800 kg organic manure @ Rs 5 per kg
Seed	After removal of moisture from seeds, it was stored in dry place. It has high demand in shampoo, dye maker and agriculture pesticides industries	Wet seed: 2292 Kg Dry Seed: 339 Kg	8475	339 dry seeds @ Rs 25 per kg
			Rs 303935	

Impact:

- SHG women are selling the raw fruits on VLCC at the rate of Rs 5 and Rs 6 for Grade A and Grade B respectively. Role of middlemen has started to reduce and community is getting the more than 40% incremental income.
- After opening of VLCC in village, SHG women sold their produce in their own village (with in one or two km), so they are selling more fruits, as it save their whole day. No need to walk for 14 km and go to local market to sell custard apple.
- Due to introducing the new concept of procurement through Kg, middlemen have started to pay little more to community, if they did get the fruit. Now a fair competition is started and monopoly of middlemen is going to be end soon (middlemen have started to realize).
- Women don't have the employment in the forest area and if they got the labour work in others farm then they earn only Rs 60 per day after working of 8 hours hard work. But after this intervention, 25 to 34 women worked at the central processing unit to extract the pulp from raw fruits, which created the employment to SHG members and they are getting the very fair payment for working in CPU. In the central processing unit, women are coming on time in processing unit, managing the raw fruits, handling the machines and packing the pulp etc.

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