

Fruit Processing Industries In Krishnagiri District: On Overview

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Abstract: Krishnagiri district is an underdeveloped state. One among the many reasons for its underdevelopment is the low growth rate of industrialization. Industrialization plays a vital role in economic development of any region.10 Development of industries can increase income, output and employment and can accelerate the rate of growth of a backward area. Further industry tends to exercise profound influence on other sectors of the economy including agriculture. That is why industrialization is considered as an indicator of economic growth and hence the underdeveloped countries give highest priority to industrial development. In the traditional Villages, agriculture was the sole occupation. There was no alternative occupation worth mentioning as the village pottery, blacksmith, bamboo works, handicrafts were carried on part time basis. At present about 75 percent of the population is engaged in agriculture. The present study aims to provide solving the problems and concrete the proper ideas and information about all the factors discussed above.

Keywords: Fruit processing, Problem faced, Development.

I. INTRODUCTION

India produces the widest range of fruits processing in the world. It is the second largest vegetable and third largest fruit producer accounting for 8.4 per cent of the world's food and vegetable production. The share of organised sector in fruit processing is estimated to be nearly 48 per cent. India currently produces about 50 million tonnes of fruits, which is about 9% of the world's production of fruits and 90 million tonnes of vegetables, which accounts for 11% of the world's vegetable production. Though India has a strong raw material base, it has been unable to tap the potential for processing and value addition in perishables like fruits and vegetables. Only about 2 percent of the fruits and vegetables in India are processed.

The total production of fruits and vegetables in the world is around 370 MT. India ranks first in the world with an annual output of 32 MT fruits, about 8% of the world's fruit production; also is the second largest producer of vegetables (ranks next to China) and accounts for about 15% of the world's production of vegetables. The current production level is over 71 million MT and the total area under vegetable cultivation is around 6.2 million hectares which is about 3% of the total area under cultivation in the country. The diverse agro-climatic zones in the country make it possible to grow almost all varieties of fresh fruits and vegetables in India.

DEFINITION

A fruit is defined as the developed ovary of a seed plant with its contents and accessory parts, as the pea pod, nut, tomato, or pineapple. It is the edible part of a plant developed from a flower, with any accessory tissues, as the peach, mulberry, or banana. A fruit is the often sweet and fleshy part of a plant that surrounds the seeds, although some fruits like berries bear the seed on the outside of the fruit.

II. REVIEW OF LITERATURE

BERHANE GHEBREMICAHEL (2013) States that co-operative are the best rendering fruitful services to the society concerned especially to women development. It is also helpful to encourage the social and economic integration of women needed for the entrepreneurship and empowering of the small scale industry. Women should play a significant role in the development process of the nation and unquestionably acted as a part of the nation building and development for the future.

SHUSHMAL MAHESHWARI (2012) states that carbonated drinks are popular among the teenagers, hot beverages like tea and coffee are preferred by middle age groups and health conscious people choose the fruit juices.

The market size of non-alcoholic beverage was worth about Rs. 212 billion in 2011 and is projected to grow at a CAGR of about 25 per cent during 2011-2015.

STATE OF INDIA AGRICULTURE (2012) The Indian economy is growing at compound annual growth rate of 8 percent and higher expenditure elasticity for fruits & vegetables and livestock as compared to cereals, there is an increasing pressure on the prices of such high value commodities which are perishable in nature. The per capita monthly consumption of cereals has declined from 14.80 kg in 1983-84 to 12.11 kg in 2004-05 and further to 11.35 kg in 2009-10 in the rural areas. Again, in the urban areas, it has declined from 11.30 kg in 1983-84 to 9.94 kg in 2004-05 and to 9.37kg in the year 2009-10.

III. STATEMENT OF THE PROBLEM

In developing countries agriculture is the mainstay of the economy. As such, it should be no surprise that agricultural industries and related activities can account for a considerable proportion of their output. Of the various types of activities that can be termed as agriculturally based, fruit processing are among the most important. Both established and planned fruit processing projects aim at solving a very clearly identified development problem. This is that due to insufficient demand, weak infrastructure, poor transportation and perishable nature of the crops, the grower sustains substantial losses. During the post-harvest glut, the loss is considerable and often some of the produce has to be fed to animals or allowed to rot. Even established fruit and vegetable canning factories or small/medium scale processing centres suffer huge loss due to erratic supplies. The grower may like to sell his produce in the open market directly to the consumer, or the produce may not be of high enough quality to process even though it might be good enough for the table. This means that processing capacities will be seriously underexploited. So, the present study aims to provide a concrete and proper ideas and information about all the factors discussed above. This work may prove to be the pathfinder to the new generation who are roaming here and there and chasing after government jobs. This research would be of immense help to the common people, the policy makers, government officials, researchers and also to other nongovernmental organizations who are engaging themselves in the upliftment of the poor in particular and the socio economic development of krishnagiri district as a whole.

IV. SCOPE OF THE STUDY

Krishnagiri district is agriculture dominating state and has very bright scope for setting fruit processing industry to uplift the agri-business system which will ultimately boost all other components of agricultural business system to complete the process. Economic liberalization, globalization, entry of MNC's in processed food segment has tremendously increased the opportunities as well as competition in the market with added advantage to customers. Likely modernization and commercialization of agriculture in post

GATT era with emphasis on value added agro based products for domestic as well as international market, spell a very bright future of krishnagiri fruit processing industry and this study laid emphasis on domestic market, keeping in view the fast changing tastes of consumers and their preference towards processed fruit products. All the leading players of processed fruit processing industry are putting their all out effort to understand the need of each and every marketing perspective irrespective of different levels and structures of the organization. A light has been thrown in this study on this very important aspect of problems and prospects related to the product, consumers' preferences, marketing elements like product itself, brand perception etc. with an effort to analyze the policy of selected fruit processing organization from where it is evident that all the selected companies have given due consideration to this important aspect. All the selected organizations dealing with number of products as their product range and this effort has been tuned to the basic products and study was done in this light.

THE PRESENT STUDY HAS EXAMINED THE FOLLOWING OBJECTIVES

- ✓ To study the economics of fruit processing industries in Krishnagiri district; and
- ✓ To analyse the problems faced by the fruit processing units in the district.
- ✓ To assess the export performance of fruit processing industrial units and the Constraints faced in accelerating the growth of export from the sector.
- ✓ To suggest remedial measure to improve the status of fruit processing industrial units.

V. METHODOLOGY OF THE STUDY

This study based on theoretical research. The study is confined to units in Krishnagiri district having a large number of fruit processing industrial units and constitutes the sample district. This study is based on primary data has well structured questionnaire was administered on the study units to elicit opinion on their perception of production and marketing problems. The period of the study for collecting primary data was one year. The period was purposively selected as it was the season for fruits harvesting and processing.

METHOD OF SAMPLING

Selection of Study Units There is 74 fruit processing units registered with the Fruits and Vegetables Processors Federation in krishnagiri district of Tamil Nadu. All the units were approached with a well structured questionnaire. Information was not forth coming from all. On the basis of responses which were amenable for analysis, some of the units had to be eliminated and the number of units for study was confined to those which had provided the desired data, which numbered 36 units. Of these, 36 units out of 74 units are from Krishnagiri district, which responded were taken for further analysis.

TOOLS USED FOR DATA ANALYSIS

The collected data were classified and tabulated in a systematic manner. Simple percentage analysis, mean and standard deviation, various statistical, mathematical and computational tools and techniques including; Pearson chi-square test, tabulation analysis etc. are being used, using MS-Excel and SPSS software packages (version 16.00) for primary data analysis. And five point scales was used to ascertain the opinion regarding the production and marketing aspects from the producers. Weighted score and rank analysis were used to analyse their opinion and their perception on problems faced.

There are over 4000 fruit processing units in India with an aggregate capacity of more than 12 lakh MT (less than 4% of total fruits produced). It is estimated that around 20% of the production of processed fruits is meant for exports, the rest caters to the defence, institutional sectors and household consumption. Mango and mango-based products constitute 50% of exports. The fruits and vegetables considered important by the Horticulture Board of India are mostly grown in the areas of Jammu & Kashmir, Himachal Pradesh, hilly regions of North Uttar Pradesh, Tamil Nadu, Maharashtra, Karnataka, Gujarat, Andhra Pradesh, Assam, Madhya Pradesh, Rajasthan, Punjab, Tripura, West Bengal and Orissa.

FRUIT AND VEGETABLE % SHARE IN GLOBAL PRODUCTION:

Mangoes 54%, cauliflower 30%, bananas 23%, green peas 36%, onions 10%

According to National Horticulture Board the main fruits grown in India are apple, banana, lime/lemon, mosambi, orange (mandarin), grapes, mango and papaya. In case of vegetables, potato, tomato, onion, cabbage and cauliflower account for around 60% of the total vegetable production in the country. Vegetables are typically grown in India in field conditions; the concept is opposed to the cultivation of vegetables in green houses as practiced in developed countries for high yields. Only 2% of these crops are processed into value-added products. Hence, there is a need for maximum commercial utilization of fruits and vegetables and to adapt production and marketing activities to the requirements of the world market and to cater to domestic demand which, over the past few years, has been increasing because of various socio-economic factors. If the nutritive value of the processed food products could be maintained, this sector would emerge as a major value-added food industry.

GLOBAL VEGETABLE & FRUIT INDUSTRY STATISTICS

Part of the wider food sector, the world fruit and vegetable market is expected to exceed \$735 billion by 2015, representing 25% growth over five years, reports Market Line. By 2015, the market is predicted to reach over 690 million tons in volume, up 5% compared with 2010. Exports of fruit and vegetables generate around \$45 billion, reports the Food and Agriculture Organization of the United Nations (FAO).

The global fruit and vegetable market is concentrated, with the 50 top companies accounting for 70% of revenue. The industry includes goods under various forms like canned, frozen, concentrated and dehydrated products. Fruit and vegetables are processed to make juices, jams, chutneys, pickles and jellies. Vegetables represent almost 65% of the overall market, according to research from Market Line.

VI. JUICE MARKET IN INDIA - CURRENT SCENARIO & PROSPECTS

A dynamic and emergent sector of the economy, the juice market in India has grown at a rapid pace in recent years. The juice market is dominated by the fruit drinks segment that currently accounts for the lion's share of sales, followed by fruits juices and nectars categories. With newer brands and variants being introduced at frequent intervals, the growth in the Indian juice market has been truly dynamic. The growth in the domestic juice market has largely been the result of three main factors. These include the rising level of disposable income among Indian consumers, increased health and nutrition awareness among the current population in India and growing fruit imports into the country. With India having one of the most rapidly advancing economies in the world, the real household disposable income within the country has more than doubled since 1985. This has led to a situation where consumers are able to afford packaged fruit juices that are in fact, costlier than non-packaged ones.

DEMAND FOR NON-CARBONATED DRINKS

At the same time, non-carbonated drinks are usually preferred by Indian consumers, that has in turn led to their dominance vis-à-vis carbonated ones. The increased preference for non-carbonated drinks has been fuelled by a rising level of awareness about health-related issues that has been particularly noticed among teenagers and young adults within the country. Some of these health-related issues are linked to obesity and heart problems. Out of this population segment, metropolitan consumers have displayed the maximum preference for non-carbonated drinks. But there is a common perception that fruit juices contain much less sugar than aerated drinks. Meanwhile, the Indian market has witnessed a recent surge in the imports of fruits and vegetables that have gone up by as much as 70% during the fiscal year ended March 2012. Fruit imports have risen at a fast pace, fueled by increasing demand for imported fruits by health-conscious consumers. This increased competition has again forced domestic fruit juice producers to raise their standards of quality.

CHALLENGING FACTORS

Indian farmers generally tend to display an aversion towards fruit farming which is the result of a combination of factors. To start with, there is a problem with the entire mindset as crop farming is usually perceived to be a far more respectable profession than cultivation of fruits and vegetables within the farming community. The latter products are also

vulnerable to adverse weather conditions and face a continuous risk of high price volatility. Farmers also suffer due to lack of proper storage facilities for fruits and vegetables which in turn, lead to high chances of spoilage. As such, fruits and vegetables are not considered to be financial assets, unlike stored crops. Added to this is the fact that an overwhelming section of the domestic fruits and vegetables market is largely unorganised by nature. Indian consumers often prefer fruit juices prepared by roadside vendors as they are perceived to be more 'fresh' than packaged drinks. One good thing in this regard has been the support provided by the government to the food processing industry, including the fruits segment. As per government policies, up to 100 per cent foreign direct investment (FDI) is permitted under the automatic route in the country's food infrastructure comprising food parks, cold storage chains and warehousing, among others. Moreover, the government has also reduced corporate taxes and custom duties on food processing plant and related equipment, apart from setting up free trade zones and export processing zones for the industry.

BRIGHT FUTURES OF FRUIT JUICE MARKET

The juice market in India is set to have a bright future as evidenced by the emergence of certain key trends. The first of these is the concept of 'juice bars' that have become popular among Indian consumers at present. Juice bars are the direct outcome of Western influences on Indian society, coupled with the increased awareness about health-related issues among consumers. These juice bars usually combine a variety of fruits that are available throughout the year such as apples, oranges and bananas with other exotic varieties such as apricots, kiwis and berries to create a range of fruit juices with interesting names that have become popular particularly among young adults these days. The juice bars sell products such as exotic juices, energy boosters, masala smoothies and energisers. Two of the reputed juice bars in India comprise the HAS Juice Bar and Juice Lounge in Mumbai. Apart from the increased level of health awareness among consumers, there are several other factors that have contributed to the success of fruit juice sales in the market. Fruit juices are being portrayed as a holistic solution for improving a person's health and increasing immunity against diseases. What has helped is the increased affordability of juice-based products such as fruit drinks, nectars and juices. Recently, a number of fruit juice manufacturers are targeting the children's market by promoting the product as a healthy option during the growing age. For instance, 'Notty' – a fruit drink launched recently, has proved popular among child consumers within the country.

TAMIL NADU

Tamil Nadu with Seven agro-climatic conditions and varied soil types is better placed for production of fruits, vegetables, spices, plantation crops, and flowers, medicinal and aromatic plants. Tamil Nadu is one of the largest producers of agro and horticulture products in India.

THE MARKET

At present, India's Per capita consumption is one of the lowest. The growing per capita income has increased the purchasing power thereby offering huge potential to investors.

According to the India Food and Drink Report Q3 2008 by research analysis firm Research and Markets, by 2012, India's processed food output is likely to grow by 44.2 per cent to touch US\$ 90.1 billion, while packaged food sales will increase by 67.5 per cent to reach US\$ 21.7 billion. On a per capita basis, per capita packaged food spending is expected to grow by 56.5 per cent to US\$ 18.06 by 2012. India has the largest irrigated land in the world. It is also world's largest producer of milk, tea and pulses. India has large marine product and processing potential with varied fish resources along the 8,041 km coastline, 28,000 km of rivers and millions of hectares of reservoirs and brackish water. India also possesses the largest livestock population in the world with 50 per cent of world's buffaloes and 20 per cent of cattle.

All these agro resource endowments offer significant investment potential. With only 2.2 percent of processing levels for Fruit and Vegetable (F&V), 35 percent for milk, 21 percent for meat, 6 percent for poultry products and 38 percent for agri-produce, India's levels are significantly low compared to international levels offering huge potential for value-added processed products. The market for alcoholic beverages has been growing consistently. 'The Future of Wine', a report on the state of the wine industry over 50 years, suggests that the market for wine in India was growing at over 25 per cent per year.

OTHER PROCESSED FRUITS & VEGETABLES

Fruit and vegetable processing industry in India is highly decentralized having wide capacities. The diverse agro-climatic zones make it possible to grow almost all varieties of fresh fruits and green vegetables in India. India is the second largest producer of fresh vegetables in the world (ranks next to China) and accounts for about 15% of the world's production of vegetables. Since liberalization and withdrawal of excise duty on fruit and vegetable products there has been significant rise in the growth rate of the industry. Out of 370 million tons of fruit production in the world, India accounts for 30 million tons. Country has exported 3, 16,059.43 MT of processed fruits and vegetables to the world for the worth of Rs. 2,569.93 crores during the year 2014-15.

KRISHNAGIRI FRUIT PROCESSING INDUSTRIES

Today has 32 fruit and vegetable processing units out of which 30 is in Dharmapuri and Krishnagiri district. Of the 1.20 lakh tonnes of mango pulp produced in the country, 35,000 tonnes come from these units. The 30 units have a combined capacity of 60,000 tonnes and a turnover of Rs100 crore. "Most of the manufacturers cater to the export market and FMCG majors in India. The consumption of mango pulp is very less in the country and awareness has to be created," says Venkatasamy. India exported 96,000 tonnes of mango pulp last year. There is a very good demand for fresh mango and mango pulp in the Western and Gulf countries. Major

varieties processed in Tamil Nadu are alphonso, raspuri and totapuri.

Mango pulp manufacturers in Tamil Nadu employ sophisticated technology and maintain high quality standards. Almost all the manufacturers are certified with HACCP (an internationally recognised quality assurance system for manufacturing units engaged in the food industry). Mass production of mango pulp, the area under mango cultivation in the Krishnagiri was just 4,000 hectares. With the setting of processing units in the district, the area under mango cultivation has shot up to 40,000 hectares. In the mango season, 400 skilled and unskilled workers are employed in a single unit per day in two shifts. Around 10000-12000 workers are employed in all the 30 units in Krishnagiri.

In order to promote the Krishnagiri cluster as the hub for mango pulp production, the federation has forwarded a proposal to the Government of India for availing assistance under the Industrial Infrastructure Up gradation Scheme. The project envisages setting up of common infrastructure for R&D, training, solid waste management, aseptic plant, tetra and pet bottle plant. The project also has provision for promoting common brand and product promotions.

Mango pulp units begin production in Krishnagiri: Unfazed by the decline in prices of mango pulp in the International market, fruit processing units in Krishnagiri have begun their own production. International buyers have not confirmed their orders to pulp units this year because of increase in prices of mangoes when compared to the previous year. Instead of waiting for buyers pulp units have booked packaging materials including cans on credit with companies located in Hosur.

There are 30 mango pulp processing units in the district. All the industries are privately owned. Nearly 35000 metric tonnes of fruit juices is extracted every year. Nearly 40,000 persons were employed in this industries, apart from this, there are 150 private mango nursery units producing saplings in Krishnagiri district. The district exported mango based products worth of Rs.100 crores in 2003-2004. This is the largest export of horticultural product in the state. It provides employment to rural women workers as well.

EXPORT MARKET

As the prices quoted by buyers were similar to that of the year 2004, pulp units have begun production anticipating a better selling price in the International market. On an average, about 2,500 containers of mango pulp are processed in Krishnagiri district every year which is about 40 per cent of the total mango pulp production in the country. As more than 90 per cent of the production goes for exports, survival of the industry depends only on the stability in the export market. But pulp units have not been able to forecast the exact price for a carton (18.6 kg) or get confirmed orders from buyers.

"The price of tothapuri pulp which was Rs. 3,000 for a tonne has now increased to Rs. 6,000 a tonne. Similarly price of Alphonso pulp has increased to Rs. 18,000 a tonne. Buyers who earlier paid \$ 11 to 11.5 for a carton are now demanding \$ 10 for a carton and have decided to wait and watch so that the prices go below \$ 10. But pulp units have decided not to go below \$ 11", according to the president of the Dharmapuri

District Fruit and Vegetable Processors Federation G. Venkatasamy.

Fresh fruits

Though the district has more than 30,000 hectares under mango cultivation export of fresh fruits remains untapped. With value addition high for fresh fruits when compared with mango pulp the Mango Growers Association in Krishnagiri has planned to export fresh fruits as a separate wing. A salubrious climate, proximity to an Airport in Bangalore has made Krishnagiri an ideal destination for promotion of choice varieties of mangoes especially Alphonso which is cultivated on a large scale in Karnataka. At present, Alphonso is procured from neighbouring State to meet their requirements of the processing industry. Establishment of a cold supply chain, a vital link in export industry, grading and van with refrigeration facility and phytosanitation facilities would have a huge potential for development of direct exports of fresh fruits in the coming year, sources here point out. An economic analysis of mango pulp agro based industry in Krishnagiri District, Tamil Nadu.

VII. IMPORTANT FUNCTION OF FRUIT & VEGETABLE JUICES

NUTRITIONAL BENEFITS

- ✓ Fruit & vegetable juices are naturally fat free
- ✓ Fruit & vegetable juices provides fruit energy: Fruits, vegetables & their respective juices provide substantial amounts of fruit carbohydrates, which supply energy to power all body work -- from heartbeats and household work to school homework and office work, even for the smile that spreads across our face
- ✓ Fruits and vegetables contain significant amounts of vitamins & minerals. Vitamins are required for carrying out many vital functions of the body and many of them are involved in the utilization of the major nutrients like proteins, carbohydrates and fats. Minerals and microelements are necessary for the nerve and muscle function and are the building material for some body tissue

PROTECTIVE BENEFITS

- ✓ Fruits, Vegetables & their respective juices contain substantial amount of biologically active non-nutrient compounds called phytochemicals. These protective components exert various beneficial roles in the body
- ✓ Fruit Juices are naturally rich in potassium & low in sodium. Research indicates that diets rich in potassium & low in sodium helps in maintaining heart health
- ✓ Fruit juices are rich in antioxidant nutrients that help strengthen body's natural defences
- ✓ Fruit and vegetable juices are a perfect food supplement. They are far more powerful than the isolated nutrients found in vitamin pills. Nutrients influence each other and, therefore, they should not be separated because nutrients combined naturally in food work together more

effectively than when they are separated as a single supplement

- ✓ The health benefits of fruits guarantee you optimum health and a well-built body in the long run. Fruits benefit your body immensely as they are natural sources of vitamins and minerals, which are essential for the proper functioning of the body. Rich in dietary fiber, fruits also help to improve the functioning of the digestive tract. Fruits are an important part of a healthy diet for those who want to lose weight; they give ample energy and nearly every nutrient that your body needs to curb weight gain, without adding any unnecessary fats.
- ✓ Moreover, fruits help you to stay away from health complications like heat stroke, high blood pressure, cancer, heart ailments, and diabetes. Fruits effectively fight skin disorders and promote healthy hair growth. It is always suggested to eat raw, fresh and ripe fruits because then you experience the real health benefits, rather than consuming them after processing or cooking.

VIII. CONSTRAINTS FACED BY THE PROCESSORS

Even though mango pulp processing is highly profitable, it has its own problems. The major constraint in the units as reported by the entrepreneurs is the high wage experienced by most of the processors in the district. More than 80 per cent of the processors felt that declining trend in the supply of raw materials from the domestic market. High purchase tax is another hurdle. Other constraint expressed by the processors is the frequent power cuts during the processing period and wide fluctuations in the prices of mangoes. In the study area as a whole, the results indicated that declining availability of mangoes in the domestic market as the supply has plateaued over the years, declining export and competition from the other countries were the major constraints faced by the processors.

IX. RECOMMENDATIONS

Recommendations India the second largest producer of fruits (contributing to 9.54 percent of world production and growing at the CGR of 3.04 percent) and the topmost producer of mango (contributing to 45.47 percent of world production but growing at CGR of - 0.86 percent), has a competitive advantage over other countries in terms of natural endowments namely;

- ✓ India has the right soil to grow almost all varieties of fruits.
- ✓ India has the right climatic condition, quiet ideal to grow fruits of almost all kinds.
- ✓ India has abundant source of spring water (underground source) that is required to grow fruits.
- ✓ India has a rich and vast biodiversity, making it an ideal destination to grow fruits.

Moreover Indian 'Alphonso' is the most sought after fruit in the world. There is a great demand for fresh mangoes (exports are growing at the CGR of 8.03 percent) and also the processed mango products (exports are growing at the CGR of

12.87 percent) in the international markets. Indian fruit cultivators and fruit processors should realize the tremendous potential of this particular industry and exploit the same.

Following recommendations which are based on the findings of the research work undertaken will help krishnagiri district cultivators and processors in reaping benefits, which this sector has in store for them.

A. RECOMMENDATIONS TO FRUIT CULTIVATORS IN GENERAL AND MANGO CULTIVATORS IN PARTICULAR

- ✓ Only one variety, i.e., 'Tom Atkins' which is similar to 'Alphonso' of krishnagiri district accounts for 75 percent (approximate) of total production in Tamil Nadu. Whereas 'Alphonso' and 'Totapuri' which are supposed to be ideal for processing, together account for around 5 percent (approximate) in India. Krishnagiri cultivators grow finger count varieties, whereas we will find more than 3,000 varieties being grown in India.

This clearly reveals the severity of the problem. Hence krishnagiri district fruit cultivators, especially mango cultivators should grow right variety of fruits like 'Alphonso' which are ideal for processing and also have a great demand (for both fresh fruit and processed fruit products) in not only international markets but also domestic markets. Growing such varieties will fetch a better price for their produce and strengthen their financial position.

- ✓ 2. krishnagiri district cultivators, especially mango cultivators should buy /procure the certified seedling/sapling of the right quality and right variety from the qualified suppliers only. Because once planted nothing much can be done and cultivator has to suffer losses due to lower yield, poor demand and lower price throughout the life of that plant.

So it has become must for krishnagiri fruit cultivators (large scale), to grow fruits in an organic environment and to have the basic infrastructure facilities like VHT (Vapor Heat Treatment) facility which will preserve the freshness of the fruits for a very long time. It has become mandatory for krishnagiri fruit cultivators (large scale) to have necessary facilities to grade, clean and pack the fruits properly and to have an access to; cold chain facility for storing their produce for a longer duration and air cargo facility for enabling quick shipment of fruits.

B. RECOMMENDATIONS TO FRUIT PROCESSORS IN GENERAL AND MANGO PROCESSORS IN PARTICULAR

- ✓ krishnagiri district fruit processors in general and mango processors in particular should capitalize on the phenomenal growth which this sector has experienced in terms of exports of processed fruit products (CGR of 12.87 percent aggregate) and exports of processed mango products (CGR of 13.25 percent aggregate) in the past years. The big Indian business houses like; Reliance, TATA, ITC, etc., and also the processors should redirect/re-allocate the resources with a strategic re-

orientation to meet this increasing global demand. India should reposition herself in the global market as a prime supplier of processed (high value added) fruit products and not just fresh fruits.

- ✓ Indian mango processors (especially large scale enterprises and MNCs) should strengthen their R&D facilities so that they can look for various applications like; facial creams, mango butter, etc., from such intermediary products or by products like; mango kernel, mango kernel oil, mango flour, etc. This strategic move will have a strong and positive impact on Indian economy in terms of employment generation, increased exports, stronger BoP (Balance of Payments) position, and reduction in postharvest losses to international standards (from existing level of 35- 40percent to 20percent). India needs to follow the footsteps of krishnagiri district this regard.
- ✓ Indian fruit processors should undertake and speed up technology up gradation. They should bring in advanced technology from the developed countries or the leading countries like krishnagiri. Mechanization, automation, computerization, and integration of the processes involved have become mandatory if the fruit processors want to compete in the international markets. (Thirty percent of Brazilian imports pertaining to FPI constitute food processing machines and other agricultural machines, whereas the same is 10 percent for India). Simultaneously the processors should adopt all sorts of best management practices like SPC (Statistical Process Control), SQC (Statistical Quality Control), KAIZEN, Six Sigma, TQM (Total Quality Management), etc., to make the processes error free and fool-proof, which will subsequently result in final products with zero defects. Once the fruit processors adopt the practices mentioned above, they become eligible for ISO certification.
- ✓ Having basic facilities like; fully fledged laboratory, basic R&D facility, tie-up with cargo handling companies, water purification plant, etc., are all must for fruit processors to flourish in this industry. Ongoing improvements in the processes and products can be made possible through developing such kind of facilities. So fruit processors of India (especially large scale processors) should make tangible investments in creating/developing such kind of facilities, which will definitely provide them the competitive edge over processors of other countries.
- ✓ Indian processors will be better off if they export processed fruit products to developed countries like; UK, USA, Netherlands, etc., which yield higher value contribution than developing countries like Bangladesh and Nepal and Middle East countries. Even though the quality standards of the developed countries are much stringent than the developing and Middle East countries, they are very rewarding.

C. RECOMMENDATIONS TO GOVERNMENT DEPARTMENTS/NODAL BODIES/OTHER CONCERNED INSTITUTIONS

- ✓ Concept of RBHs (Rural Business Hubs) as discussed in chapter 5, which is aimed at identifying rural pockets (potential centers) and developing them in to 'Business Hubs' through infusion of critical inputs and services and also providing an assured market for their produce need to be implemented on top priority. This will curb the 'middle men menace', a serious problem facing this industry.
- ✓ Certified good quality seedling/sapling of the right variety should be made available to cultivators at the time of plantations. Cultivators should also be made aware about the drawbacks associated with growing available varieties other than recommended varieties, which are ideal for processing. Conducting awareness campaigns, field shows, Krishimel as, etc., at village levels is required. All concerned institutions, nodal bodies and Govt. departments should come together and address this issue.
- ✓ All concerned Government departments and nodal bodies including; NHB, NHM, HOPCOMS, State Horticulture Department, APEDA, MOFPI, etc., should work in an integrated manner under one banner like 'EMBRAPA' of krishnagiri district. Objectives of a particular agency should not conflict with the other. There has to be synergy amongst all concerned departments.
- ✓ An extensive awareness campaign/program to disseminate information about consumers' preferences of the importing countries, suitable export quality varieties, advanced post harvest technologies, phytosanitary measures like VHT (Vapor Heat Treatment), etc., need to be conducted for both cultivators and processors. Modern methods of processing like aseptic packaging, vacuum concentration, aroma recovery, etc., are preferred by the importing countries. So processors should be made aware about all such technological advancements through conducting regular workshops for processors.

D. RECOMMENDATION TO AGRICULTURE MINISTRY, GOVERNMENT OF INDIA

Government of India should seriously think of importing the krishnagiri district model 'EMBRAPA' to India. A team of experts (comprising all the stake holders) have to be sent to Brazil on a study tour for one full year (at least) to study and analyze how the entire system works during different times (plantations, nurturing, flowering, fruit bearing, ripening, harvesting, post harvesting, etc.) in krishnagiri district. The similar model with required alterations/modifications based on the advice of team, to suit to Indian context, can be developed and implemented in India. 'EMBRAPA' can also act as a consultant for Indian Government in this regard.

X. CONCLUSIONS

The growth of the fruit processing industries in Krishnagiri district will bring large benefits to the people by way of employment and income. It will enable appropriate

environment for entrepreneurs to set up food processing industry in the district. For making a quantum jump in exports there is a need to formulate a suitable export strategy and strengthening of infrastructure facilities. Efficient handling of post-harvest losses to improve cold storage facilities in the district is a must. Better and improved packing technology for the exporters and setting up of more quality control laboratories in the export processing zones in the district is necessary for the growth of the industry.

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