

## **The Role and Impact of Agri Export Zone (AEZ) in Promoting the Exports of Mango Pulp- A Study on AEZ Chittoor in Andhra Pradesh**

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**Abstract :** *India is the leading producer of fruits, vegetables, milk, marine products etc. Due to inadequate facilities for storage, transportation and processing, the post-harvest losses amount to 25-30 percent causing a monetary loss to the tune of several thousand crores. Food preservation and processing help in the proper utilization of the horticulture produce during glut and make it available during off-season. It plays an important role in enhancing the shelf life of the predominantly perishable commodities and in producing a diversified range of value-added products. With the primary objective of boosting the exports of fresh and processed agricultural produce from the country, the Government of India (GoI) announced a policy of setting up of Agri Export Zones (AEZs) across the country in the Export and Import policy (EXIM Policy) 2001-02. It was declared that, these zones would be a part of the effort to provide improved access for India's agricultural and allied products in the International market with a view to provide remunerative returns to the farming community in a sustained manner and also for the purpose of developing and sourcing raw materials and their processing/packaging leading to final exports.*

*Formation of exclusive Agri Export Zones (AEZs) is an important step taken by the Indian Government to focus on agri diversification, value addition and exports. Agri Export Zone (AEZ) - Chittoor was the first project to be sanctioned in Andhra Pradesh for the promotion of mango pulp exports from Chittoor district. AEZ in Chittoor district is focusing on identifying the specific agri product mango pulp enjoying strong export potential and providing comprehensive package of services-beginning at farming end and closing at market end- to make the exports more competitive in the world markets An attempt is made in this research to present an overview of the role of Agri Export Zone (AEZ) in promoting the exports of mango pulp from Chittoor district of Andhra Pradesh.*

**Keywords:** *Inadequate Facilities, Post-harvest losses, Food Preservation, Perishable.*

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### **I. Introduction**

India ranks as the world's second largest producer of fruits and vegetables, next only to Peoples Republic of China. Endowed with various agri-climatic zones, India enjoys the distinct advantage of providing a variety of fruits and vegetables round the year.

These factors have enabled export of several agricultural commodities over the years, such as tea, coffee, cereals, tobacco, spices, cashew, oil meals, meat and meat preparations, marine products, fruits & vegetables and processed fruits and vegetables. India's total exports of agricultural and allied products of \$ 10.5 billion in 2014-15 constitute 10.2% of its export share. But, India's share in the world's agricultural exports was only 1.2%.

Under the present scenario, it is rightly believed that the future of agriculture is safe in increasing the productivity, diversification and value addition. The value addition can be done through primary/secondary/tertiary processing through which the product is transformed into a product which fetches higher prices. Thus, processing is a major value addition activity to the farm produce. Processing also adds value to the by-products, co-products and residues that also have considerable economic importance<sup>3</sup>.

In India, mango production has increased from 8.7 million tonnes to 13.8 million tonnes during 2010-2015. The major mango producing states are Andhra Pradesh, Uttar Pradesh, Karnataka, Gujarat, Maharashtra, Tamilnadu and West Bengal. All the states together are accounted for 74.2 percent of area and 79.6 percent of mango production in the country in 2015.

Mango pulp is produced from specific varieties of mangoes viz., totapuri, alphonso and raspuri. Andhra Pradesh, Maharashtra, Tamilnadu and Karnataka are the major producers of mango pulp in the country. More than 90 percent of mango pulp produced in Chittoor district of Andhra Pradesh is meant for export.

## II. Agri Export Zones (AEZs)

Formation of exclusive Agri Export Zones (AEZs) is an important step taken by the Indian Government to focus on agri diversification, value addition and exports. Keeping in pace with the fast changing international trade environment and to improve India's Balance of Payments, these zones adopt an end-to-end approach in integrating the complete process in which a hub of all activities right from the stage of identifying the potential products and geographical regions, sourcing the raw material, their processing, improving the quality of the product and packaging to the stage where it reaches the final export of product produced in a contiguous area take place.

Under the scheme, the State Government would identify products with export potential, which have comparative advantage in local production. Agricultural and Processed Food Products Export Development Authority (APEDA) is the nodal agency of the Central Government to promote and set up Agri Export Zones (AEZs). An Agri Export Zone or AEZ is a specific geographic region in a country demarcated for setting up agriculture based processing industries mainly for export.

Setting up of AEZs for specific fruits and vegetables will therefore enable Indian farmers and entrepreneurs to produce superior quality products for export markets. It will also enhance their competitive capabilities through forging backward and forward linkages, promoting value addition and cost optimization.

## III. Agri Export Zones (AEZs) in India

Agri Export Zones (AEZs), a gateway to the world of flourishing opportunities in international market, is a concept that works with an encyclopedic approach. It is believed that phasing out agriculture related subsidies for developed countries, under WTO agreements provide an opportunity to build a position in the international market for its fresh and processed foods. Till December 2006, 60 Agri Export Zones (AEZs) of different products had been set up in different parts of the country with an investment of Rs. 1717.95 crores.

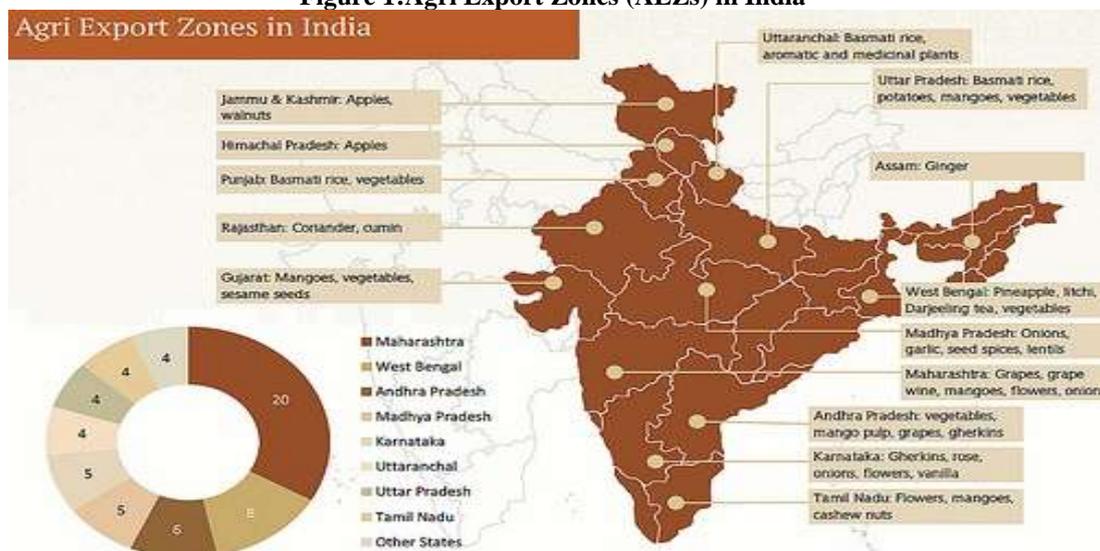
**Table 1: Establishment of 60 AEZs in India (State wise)**

States	Focus products	Geographical area
Andhra Pradesh	Mango pulp	Chittoor
	Mango and grapes	Ranga Reddy, Medak and Mahaboob Nagar
	Mango	kishna district
	Gherkins	Mahaboob Nagar, Ranga Reddy, Medak, Karim Nagar, Warangal
	Chilli	Guntur
Assam	Fresh and processed ginger	kamrup, Nalbari, Barpeta, Darrang, Nagaon, Morifoon, Nkrbi
Gujarat	Mango & vegetables	Bharuch and Namada
	Dehydrated onion and garlic	Bhavnagar, Surendra Nagar, Amreli, Rajkot, Junagadh and Jamnagar
Jharkand	Vegetable	Rabchi, Hazaribagh and Lohardaga
Kerala	Horticulture products	Thrissur, Ernakulam, Kottaya, Alappuzha, Pathanamthitta, Kollam,
	Medicinal plants	Kollam, Pathanamittha and Thiruvananthapuram
Madhya Pradesh	Potatoes, onion and garlic	Malwa, Ujjain, Indore, Dewas, Dhar, Shajapur, Ratlam, Nimach
	Seed spices	Guna, Mandsaur, Ujjain, Rajgarh, Ratlam, Sharjapur and Neemuch
	Wheat	Ujjain, Neemuch, Ratlam, Mandsaur, Indore, Dhar, Shajapur
	Orange	Chhindwara, Hoshangabad and Betu
Maharashtra	Lentils & Grams	Shivpuri, Guna, Vidisha, Raisen, Narasinghpura and Chhindwara
	Grapes and grape wine	Nasik, Sangli, Pune, Satara, Ahmednagar and Nasik
	Alphonso mango	Ratnagari, Sindhudurg, Reigarh and Thane
	Keasr mango	Aurangabad, jalna, Beed, Latur, Ahmednagar and Nasik
	Flowers	Pune, Nasik, Kolhapur and Sangli
	Onions	Nasik, Ahmednagar, Pune, Satara and Solapur
	Pomegranate	Solapur, Sangli, Ahedabagar, Pune, Nasik, Osmnahad, Latur
	Banana	jalgaon, Dhule, Nandurbar, buldhana, Parbhani, Hindoli
	Oranges	Nagpur and Amraoti
Orissa	Ginger and Turmeric	Kandhamal
Punjab	Vegetables	Fatehgarh Sahid, Patiala, Sangrur, Ropar and Ludhiana
	Potatoes	Singhpura, Zirakpur, Rampuraphaul, Muktsar, Ludhiana, Jallandhar
	Basmati Rice	Amritsar, Gurdaspur, Kapurthala, Jalandhra, Hoshiarpur and Nawanshahr
	Coriander	Kota, Bundi, Baran, Jhalawar
	Cumin	Bagaur, Barmer, Jalore, Pali and Jodhpur
Sikkim	Flowers (orchids) & Cherry	East sikkim
	Ginger	North, East, South & West Sikkim
Tamilnadu	Cashewnuts	Cuddalore, Thanjavur, Pudukotti and Sivaganga
	Flowers	Dharmapuri, Nilgiri
	Mangoes	Madhurai, Theni, Dindigul, Virudhunagar and Tirunelveli
Tripura	Organic pineapple	Kumarghat, Manu, Melaghar, Matabari and Kakraban Blocks
Uttar Pradesh	Potatoes	Agra, Hathra, Farrukhabad, Kannor, Merrut, Aligarh and Bagpat
	mangoes and vegetables	Luknow, Unnao, Hardoi, Bijnaur, Merrut, Bhagpat and Bulandshahar
	Basmati Rice	Bareilly, Shahajahanpur, Pilibhit, Rampur, Badaun, Bijnor,
Uttaranchal	Lychee	Udhamsingh Nagar, Nainital and Dehradun

	Flowers	Dehardun and Pantnagar
	Basmati rice	UdhamsinghNagar,Nainital, Dehradun and Haridwar
West Bengal	Lychee	Murshidabad, Malda, Darjeeling, Uttar Dinajpupr, Jalppaiguri
	Potatoes	Hoogly, Burdwan, UdayNarayanpur and Howrah
	Mangoes	Malda and Murshidabad
	Vegetables	Nadia, Murshidaba
	Darjeeling tea	Darjeeling

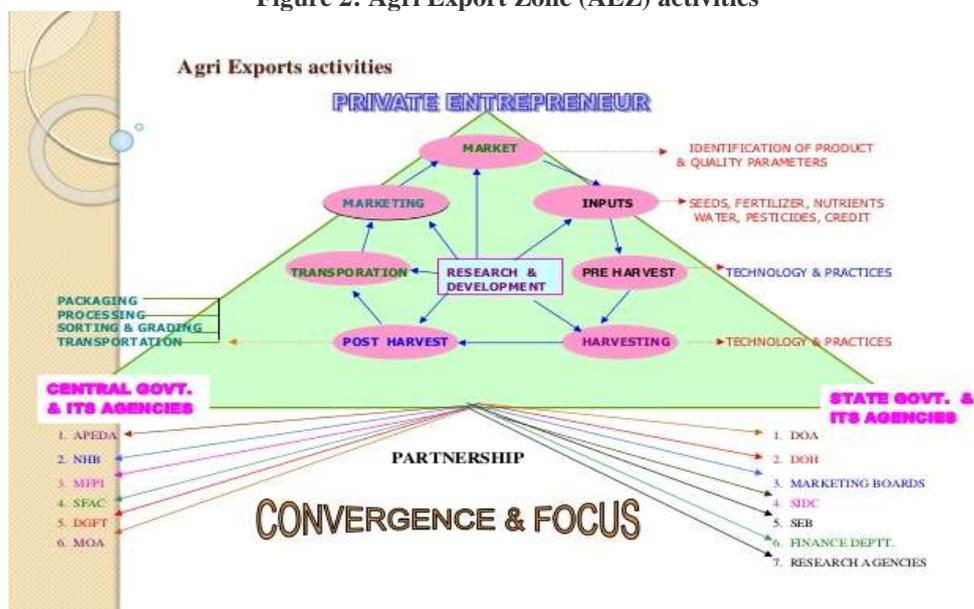
Source: APEDA annual report on AEZs, 2010

Figure 1: Agri Export Zones (AEZs) in India



Source: APEDA Annual Report 2010

Figure 2: Agri Export Zone (AEZ) activities



Source: APEDA Annual Report 2010

#### IV. Review of Literature

Pradeep Kumar (2003)<sup>1</sup> reported that, the progress towards setting up of Agri Export Zones (AEZs) was rather slow. Of the 45 such zones notified, only 16 could become operational so far, some of those have already left their mark on boosting agro-exports. To speed up their progress, the new EXIM policy (2003-04) envisaged corporate participation and ownership of these zones. The Chittoor AEZ (Andhra Pradesh) could generate fruit exports, mangoes in particular, worth Rs. 750-800 million in its life of less than two years.

Sudhakar (2004)<sup>2</sup> suggested that, the Chittoor AEZ for mango pulp and fresh vegetables has been adjudged as one of the five AEZs among 48 AEZs set up in the country so far.

Rajasekhar Mamilla (2005)<sup>3</sup> in his study on AEZ suggested that, the major interventions proposed for development of domestic and export markets for mango pulp by both AEZ as well as APEDA. Raj Kumar S (2006)<sup>4</sup> opined that, modern production practices are introduced for production of exportable quality produce and improved productivity. Similarly, there is an emphasis on setting up of AEZs in the country for creating appropriate produce-specific post harvest infrastructure and introduction of post harvest practices right from farm all the way to market.

Venugopal N. Dhoot (2007)<sup>5</sup> pointed out that, due to lack of co-operation among agencies appointed by the promoters, 54 out of 60 notified Agri export Zones (AEZs) have not been able to achieve the envisaged exports and investment targets.

Jaggaiah T, Priyanka M.N.K (2014)<sup>6</sup> in their article stated that, with the establishment of AEZ, the export value of mango pulp showed increased trend from 75 crore rupees to 190 crore rupees. With regard to export of mango pulp AEZ helped the 30 processing units in Chittoor district to get HACCP certificate and Aseptic packing units increased to six from the existing level of one unit. AEZ helped in establishment of two quality testing labs with 100 percent fund from Ministry of Food Processing Industries (MFPI) for helping in export business. Similarly, it also helped in the establishment of two cold storage units in Chittoor district.

Rawat D.S.(2015)<sup>7</sup> in his study stated that, private and public partnership is needed in the development and expansion of Agri Export Zones in the country. Utilization of information and communication technology is also expanding the services of AEZs in the country.

## **V. Need of The Study**

Mango is the major horticultural crop of Chittoor district with an average of 1,19,539 acres crop and providing 3,58,617 M.Tonnes per annum. There are 54 fruit processing industries in small and medium scale sector. 90% of the Mango Pulp produced in the District is being exported mainly to the Gulf countries like Kuwait, Saudi Arabia, Dubai and also to the European Countries.

The development of Chittoor fruit processing industry assumes significance considering the inherent strengths and weakness of the units. The strengths relate to the presence of a dependable raw material base, good export potential for tropical and sub-tropical fruit pulps and juices, expanding urban markets within the country for natural fruits juices, easy accessibility to better technologies, major domestic markets for end products and a sea port for exports<sup>20</sup>. The weaknesses relate to highly seasonal operations of the units, narrow product mix, inadequate effort to enhance product range and explore domestic markets, lack of cost optimization effort, limited inter-firm interaction, absence of critical common facilities, varying product quality, excessive dependence on merchant exporters, lack of alternative market effort, no waste utilization and objectionable practices of waste disposal.

## **VI. Statement of the Problem**

The mango pulp processing units in the Andhra Pradesh are concentrated mainly in Chittoor district due to availability of raw materials and the chance to leverage the existing status and strengths of the district with regard to production and processing of fruits. The fruit processing units in Chittoor district are performing their activities in the purview of Agri Export Zone (AEZ). In spite of all the advantages, the fruit processing industry in the district is not free from problems. This sector is continuously facing multifarious problems irrespective of its size. Out of 54 fruit processing units in Chittoor district only a few units are exporting the mango pulp because of lack of capital requirements and experience in tapping the export market. Majority of the fruit processing units in the cluster are surveying doing job work by processing for exporters and aseptic packaging exporters. Most of the cluster units are from farming community and are not able to invest huge amounts on infrastructure development and modernization of technology as desired by the exporters and import buyers. The major problems of fruit processing units in Chittoor district are finance, machinery, aseptic packaging, electricity, raw material and disposal of mango waste products. Mango pulp being a food product, utmost care should be taken in maintaining the quality.

## **VII. Objectives of The Study**

- (1) To review the role and impact of Agri Export Zone (AEZ) Chittoor in the promotion of mango pulp exports.
- (2) To study the performance, present status and future prospects of mango pulp manufacturing units in Chittoor district.

## **VIII. Research Methodology**

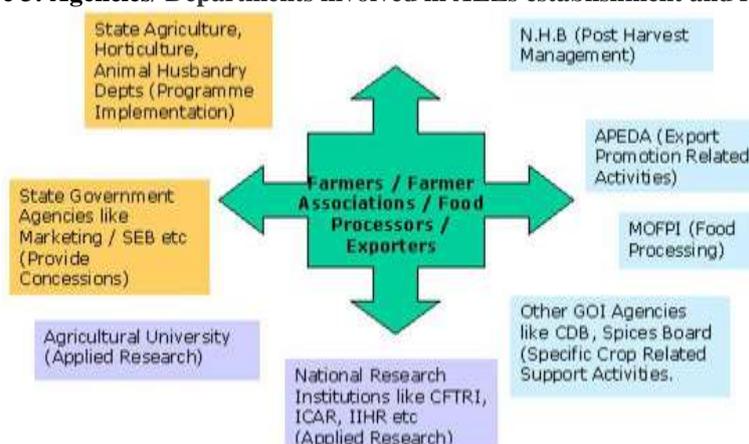
In view of the specific objectives of the present study, makes use of published reports of APEDA, Ministry of Food Processing Industry (MFPI), National Horticulture Board (NHB), Department of Horticulture, Chittoor District Industries Center (DIC) and the like.

### 9. Role of Government of India and its organizations/agencies towards AEZs in the country

Government of India has established a number of organizations/ agencies to assist and fund the AEZs in the country. Apart from the organizations established exclusively for export promotion, there are also a number of other institutions which assist and fund the activities of AEZs in the country. They are-

1. APEDA (Agricultural and Processed Food Products Export Development Authority).
2. DFPI (Department of Food Processing Industries)
3. MoC&I (Ministry of Commerce & Industries).
4. NHB (National Horticulture Board)
5. MoA (Ministry of Agriculture)
6. IIP (Indian Institute of Packaging)
7. IIHR (Indian Institute of Horticulture Research)
8. CFTRI (Central Food Technology Research Institute)
9. NIN (National Institute of Nutrition)
10. IIFT (Indian Institute of Foreign Trade)

**Figure 3: Agencies/ Departments involved in AEZs establishment and funding**



Source: APEDA annual report, 2010

### IX. AEZ Chittoor Benefits

The establishment of AEA-Chittoor project in 23<sup>rd</sup> January, 2002 contributes positively to improvement of yields, strengthening of value chain, enhancement of exports and domestic sales and above all minimization of post-harvest losses both in mango and mango pulp.

### X. Exports of Mango Pulp from AEZ, Chittoor

The major export from AEZ Chittoor is mango pulp. Mango pulp exports from Chittoor district were worth Rs.56 crores in 2000-2001 and they rose to Rs.603.24 crores in 2015-16. The major destinations for exports are the Middle East, the Netherlands, Germany, UK and USA. Nearly 90% of the mango pulp exports from the country originate from the Chittoor fruit processing cluster.

**Table 2: Impact of AEZ-Chittoor**

S.No	Name of the item	Status before AEZ	Status after AEZ
1	Mango productivity per hectare	8 tons per .ha	18-20 tons per. hectar
2	Area under mango	44,950 ha	85,670 ha
3	No. of processing units	36	54
4	Mango pulp production	50,000 MT	1,48,000 MT
5	Export value	75 crores	445 crores
6	Processed vegetables	1.5 crores	13.41 crores
7	Mango stone weevil infestation	17%	Reduced to 2%
8	Area under IPM	—	39,188 acres
9	Area under drip irrigation	0.67%	10.5%
10	Post harvest losses	23-25%	Reduced to 12.15%
11	Farmers training / seminars / export visits	—	14,347 number of farmers
12	Aseptic packing units	3	6
13	Plastic crates supply	—	1,70,285 no's
14	Intermediate ripening sheds	—	54
15	ETP's	6	33
16	HACCP certification	5	33
17	Quality testing lab	—	1
18	No. of cold storage units	2	6
19	Pack houses	—	1

Source: AEZ, Chittoor Report, 2013-14

The table 2 interprets how the AEZ have enhanced the agricultural and horticultural growth and progress in Chittoor district. As per the mango productivity per hectare, in particular, it rose from 8 tonnes per hectare before AEZ to 18-20 tonnes per hectare after the establishment of AEZ. In respect of the area under mango gardens; it has doubled the area from the pre-AEZ period to Post-AEZ period. With regard to mango pulp, it has almost tripled (50,000MT to 1, 48,000 MT).As for the value of exports, there is steep and the tremendous rise in it (from mere 75 crores to 445 crores). The weevil infestation is also reduced to 2 percent from 17 percent.

The drip irrigation also amazingly increased form mere 0.67 percent to 10.5 percent the post harvest losses have been reduced by 50 percent. Prior to the advent of AEZ in Chittoor district, the farmers were not trained or ever attended any seminars on export expertise. The number of aseptic packaging units has been doubled after the advent of AEZ in Chittoor district. Earlier plastic crates were not supplied to farmers, but after advent of AEZ, a large number of plastic crates (1, 70,285) have been supplied to facilitate for safe packaging. Similarly, there were no intermediate ripening sheds earlier, but as many as 54 units have come up after the AEZ establishment.

As per the ETPs and HACCP certification, the 6 units have risen to 33. There was not a single quality testing lab in the pre AEZ period, but now there is one quality testing lab to test the quality of mango pulp. The cold storage units have also been tripled after the advent of AEZ in Chittoor district. To consolidate the total interpretation in several aspects, in each and every respect and aspect, it has witnessed multiple growth rates.

Establishment of Agri Export Zones (AEZs) concept can not only help in achieving the goal of increasing the export earnings, but also provide several benefits like improvement of agricultural output, productivity, quality, reduction in post-harvest losses, up-gradation of technology, improvement of farmers' skills and increase of their income. Besides it also facilitates development of internationally competitive production base and creation of employment.

## **XI. Conclusion**

In Chittoor district mango orchards are neglected and no inter-cultivation operations on scientific lines are taken up. Heavy load of pests and diseases is built up leading to reduced yield and poor quality of fruits. Farmers suffer post-harvest losses due mainly to the unscientific and crude management practices and lack of marketing facilities. On an average 25-40 percent post-harvest loss occurs due to poor production and post-harvest handling practices. To minimize these losses, it is essential to understand and control various factors that contribute to such losses. The magnitude of these losses is going to increase with the expansion of area under mango cultivation, if proper pre and post harvest interventions are not engineered. Therefore, the research in the field of post harvest facilities such as grading/storing systems, curing/ripening houses and complete cool chain with sufficient cold storage capacity for buffering and efficient marketing mechanism is important.

The major problems of fruit processing units in Chittoor district are finance, machinery, aseptic packaging, electricity, raw material and disposal of mango waste products. Mango pulp being a food product, utmost care should be taken in maintaining the quality.

In mango pulp preparation manual operations, extensive use of various chemicals and their quantities for maintaining the quality of mango pulp, unscientific and unethical mode of production, incorrect packaging and storage affect the quality and the durability of mango pulp. To overcome all these problems faced by the fruit processing units in Chittoor district, research is essential.

The marketing of mango pulp seems to be an insurmountable problem for fruit processing units in the district. Marketability of a product depends upon its quality and price. In spite of the liberalized export trade, the export of mango pulp has been dwindling mainly due to poor quality in international market. Low quality of pulp produced and exported by some fruit processing units may be one of the reasons for declining exports.

Out of 54 fruit processing units for declining in Chittoor district only a few units are exporting the mango pulp because of lack of capital requirements and experience in tapping the export market. Majority of the fruit processing units in the cluster are surveying job work by processing for exporters.

Most of the cluster units are from farming community and are not able to invest huge amounts in infrastructure development and modernization of technology as desired by the exporters and import buyers. If the Government does not solve these problems the fruit processing industry in Chittoor district will soon be closed.

There is a strong case for the development of the Chittoor fruit processing cluster. A planned development of the cluster with the Central and State Government assistance and the active participation of the firms enable them to overcome the operational constraints, produce quality products and compete effectively in domestic and export markets.

Although a number of studies have been conducted, quite a large number of seminars and conferences were organized and volumes of information was published on export marketing of mango pulp, yet due to wide

fluctuations in production price and marketing, most of the studies failed to provide time- tested market solutions.

Mango is a tropical crop and it is grown in a limited agro climatic zone/region. On the other hand, natural conditions, market accessibility, lack of infrastructural facilities, pre-harvest and post-harvest losses, mango processing problems and locational variations show marked advantages or disadvantages because of perishable nature of the mango produce.

In this context, location of specific or district level studies focus the problem more effectively than the State or Country wide studies. Chittoor district of Andhra Pradesh is one of the largest mango and mango pulp producing centers in India. Incidentally, there is no comprehensive study on export marketing of mango pulp in the district.

Hence, it is proposed in this research, to further study and identify the major constraints of fruit producing units and the problems in export marketing of mango pulp and the role played by Agri Export Zone (AEZ) in Chittoor district for the promotion of mango pulp exports in Chittoor district.

### References

- [1]. Pradeep Kumar Mehta (2003), Foreign Trade Review, quarterly Journal of Indian Industries of Foreign Trade, 'tools for promoting exporters', pp no. 53-54.
- [2]. Sudhkar T (2004), Assistance General Manager, APEDA (Hyderabad) an article 'India: AEZs boosting Exports' A Journal of fresh world international, 2004, pp 13-14
- [3]. MamillaRajasekhar and Suresh Babu.G (2005) Evaluation of AEZs in India- A SWOT analysis, southern Economist, Vol. 44, Number 10, September, 2005, PP.21-22
- [4]. Raj Kumar S. Adukla (2006), 'Manual on SEZ, FT & WZ, IPSC-developers and entrepreneurs, October, 2006, pp 4-5.
- [5]. Venugopal N. Dhoot (2007), President, ASSOCHAM, The Economic Times, New Delhi, dated, 04-05-2007.
- [6]. Jaggaiah T, Priyanka M.N.K, Deshmukh S (2014), An article in International Journal of Sales and Marketing Management Research and Development (IJSMMRD) Vol. 4, issue no.4, august, 2014, pp 33-40.
- [7]. Rawat D.S (2015), Report on "A study on AEZ,s in India", National Secretary General, ASSOCHAM
- [8]. Annual Report of Food Processing Industry (2009), Ministry of Food Processing, Government of India, New Delhi.
- [9]. Sectoral Constraints "Vision 2015", Strategy & Action Plan for Food Processing Industries in India - MOFPI, GOI
- [10]. Singh, H.P., Fruit and Vegetable Processing Industry in India, Yojana, Vol.38.No.24, January 15, 1995
- [11]. Sectoral Constraints "Vision 2015" Strategy & Action Plan for Food Processing Industries in India - MOFPI, GOI.
- [12]. Strategy and Action plan for Food processing Industries in India, Ministry of Food Processing Industries, Government of India, 2006, p.9
- [13]. Annual report on Food Processing Industry 2008-09, APEDA, Government of India.
- [14]. R.K. Khatkar,(1996), Status and Prospects for Food Processing Industry in India, *Indian Journal of Agriculture Marketing*, 10(2),pp. 25-30.
- [15]. APITCO (2001), Feasibility Report on Establishment of Agri Export Zone (AEZ) for mango pulp in Chittoor district, Andhra Pradesh.
- [16]. The Government of India, Ministry of Commerce and Industry (vide public Notice No.73 (RE-01)/1997-2202, New Delhi, the 8<sup>th</sup> march, 2002) on AEZ for mango pulp.
- [17]. APEDA, report on AEZs, 2006, Hyderabad.
- [18]. DGFT (2001), Report on AEZs establishment, January, 2001
- [19]. SrinivasaRao. S (2014), Fruit Processing Industry in Andhra Pradesh-Scope and Modernization, *Indian Journal of Marketing*, Vol.(I), pp.23-70.
- [20]. APITCO (1999), Diagnostic Study Report on Chittoor Fruit Processing Cluster (Vol.I) , August, 1999.
- [21]. APITCO (2003), Detailed Project Report on Agri Export Zone (AEZ), Chittoor for mango pulp (Vo.II), July, 2003.