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Food Processing in Andhra Pradesh Opportunities and Challenges

S. Mahendra Dev
N. Chandrasekhara Rao

CENTRE FOR ECONOMIC AND SOCIAL STUDIES

Begumpet, Hyderabad-500016

Telephones : 040-23402789, 040-23416780, Director's Ph : 55570480

Website: www. cess.ac.in, E-mail: postmaster@cess.ac.in Fax: 040-23406808

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Abstract

There has been diversification of Indian diets away from foodgrains to high value products like milk, meat products, vegetables and fruits. Food-processing industry has been registering good growth since the past few decades and particularly after nineties. The conditions are now ideal for the growth of this industry. The central government has taken some steps to deregulate and encourage the sector after 1991. However, the role of states is vital. The government of Andhra Pradesh released a policy in November 2003. There are no major initiatives in the policy and still can be called a good beginning. As against the robust growth at the All-India level, the growth rate in net value - added in the nineties was almost the same as that in the eighties in the state.

Against this background, the study is taken up in the state of Andhra Pradesh with the following objectives

1. *To study the opportunities and challenges in processing of rice, fruits and vegetables, oilseeds and livestock products*
2. *To study the working of contracts between processors and farmers*
3. *To identify the future areas*
4. *To recommend suitable policy options*

The contracts are working, on the whole, well in both oil palm in West Godavari and gherkin in Chittoor district of the state. The firms try to attract with favourable conditions initially, but later tighten them as a part of agribusiness normalization. Therefore caution is needed before a final conclusion can be drawn on the usefulness of contract farming in the state for the farming community. The contracts in oil palm

are widespread, covering many farmers and stabilized. The total extent under gherkin is very low. The contracts work through facilitator in gherkin. There are some signs of some mistrust between the facilitator-company and local farmers. The contracts are also evolving gradually to accommodate both parties. The participation of small farmers in oil palm cultivation is almost negligible. On the other hand, in gherkin, participation of small farmers was considerable. The contracts are oral and price is not assured in oil palm. In oil palm gardens, the depletion of ground water level is faster compared to other crops. In the case of gherkin, the processing industry is totally dependent on exports for sustenance, which may not be ideal.

The establishment of an independent ministry of food processing and department, enacting of contract farming laws and providing for an efficient arbitration in cases of contract violation, encouraging NGOs participation in food processing sector, formation of product-wise farmers' associations, changing the animal slaughter laws and formation of some more agri-export zones for livestock products are some of the recommendations under institutional aspects. In the case of taxes and subsidies, the recommendations are - exemption from sales tax and market cess and relaxation of duties and taxes on packing material industry. Under research and training, large scale publicity to promote processed foods, undertaking demand driven research by developing processable varieties and required equipment, establishing food processing training centers, developing technology for the tiny food processing units, evolving marketing plan covering the recently emerging super markets, DWCRA bazaars, international markets etc., are some of the suggestions. In case of infrastructure, encouraging some large aseptic packaging units, establishment of a radiation technology plant, encouraging private sector in cold storages, pre-cooling units, pack houses etc., establishment of training courses for service and repair of food processing machinery, formation of expert consultant committee and provision of one incubator are the major suggestions. Other major recommendations are provision of insurance facilities to all horticultural crops and livestock products, taking steps to ensure participation of small farmers in the contract farming, launching of a common brand of mango juice and enactment to regulate the feed industry and nurseries in the state.

(This paper is based on a study undertaken for the International Food Policy Research Institute, Washington and Government of Andhra Pradesh)

Food Processing in Andhra Pradesh Opportunities and Challenges

S. Mahendra Dev, N.Chandrasekhara Rao

Introduction: There has been diversification of Indian diets away from foodgrains to high value products like milk and meat products and vegetables and fruits[1]. The increasing middle-class due to rapid urbanization, increasing per-capita income, increased participation of women in urban jobs and impact of globalization has been largely responsible for the diet diversification in India[2]. Hi-value products have caught the fancy of the expanding middle class and the result is visible in the growing demand for hi-value processed products. In this background, food-processing industry has been registering good growth since the past few decades and particularly since early nineties. The annual rate of growth of net value added of agro-industries at constant prices increased from 4.12 percent during the pre-reform period to 6.62 percent during the reform period[3].

The value addition of food fortification is only seven percent in the country compared to as much as 23% in China, 45% in the Philippines and 188% in the U.K. Only two percent of the fruits and vegetables are processed in India. This is against a processing of 30% in Thailand, 70% in Brazil, 78 percent in the Philippines and 80 percent in Malaysia[4]. The Government of India targets to bring it to 10 percent by 2010 and 25 percent by 2025. The ten percent target would call for an investment of Rs. 1,40,000 crores. This is supposed to create employment to 77 lakh persons directly and another 3 crores of people indirectly in the country[5]. The post harvest losses in fruits and vegetables are estimated to be Rs.50000 crores at the national level[6] and Rs 2500 crores in the state. Food processing industries have a crucial role to play in reduction of post harvest losses. The most

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1 See Rao (2000); Dev (2003) and Deshingkar et al 2003 for detailed discussion on changing consumption patterns
2 See Pingali and Khwaja (2003) for more on this.
3 See Namboodiri and Gandhi (2003)
4 See Patnaik (1997)
5 See Padmanabhan (2001)
6 See EPW, (2002)

important point in the food industry is that a substantial portion being rural based it has a very high employment potential with significantly lower investment. The fruits and vegetable farming for processing is not only employment intensive, but also enhances the gross as well as net returns of the farmers[7]. Further, agro-industry generates new demand on the farm sector for more and different agricultural outputS, which are more suitable for processing[8]. On the other hand, the development of these industries would relax wage goods constraint to economic growth by enhancing the supply of their products (Desai and Namboodiri, 1992).

There are some inherent strengths like high production of raw material and large domestic market base. However, there are many problems also. Though the total production is high, the per capita production is very low compared to countries whose share in the world trade of processed fruits and vegetables is high. Added to this, many varieties produced in large quantities are not suitable for processing leading to poor output from unit weight of raw material[9]. The tax levels on the processed foods in the country are among the highest in the world. No other country imposes excise duty on processed foods. There is a distinction between the branded and the unbranded food sectors for taxation. There is an excise duty of 16% in the form of CENVAT levied on food products and in addition to this the sales tax, *octroi, mandi samiti* and entry tax and customs duty on material are levied by central/state/local bodies until recently[10]. Consequently the net effect ranges from 21-23% approximately on various food items.

Major bottleneck is the lack of demand for processed foods in the country due to the tastes of the people. The chain of intermediaries in the marketing of fruits and vegetables is very long and this leads to very small fraction of every rupee of profit[11] to the farmers. Formation of cooperative Marketing Agency owned and controlled by the growers themselves may be indeed ideal to carry out marketing operations.

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[7] See Rao (1994), Acharya (1997), Dileep et al 2002

[8] See Srivastava (1989)

[9] See Kaul (1997) for a detailed discussion on this.

[10] The Government of India waived off excise duty again in 2001 and asked the states to do away with the other tzxes like sales tax, mandi tax etc.

[11] See Pingali and Khwaja (2004) for a detailed discussion

Indian consumers have high price sensitivity and hence a reduction in cost is imperative for raising demand and consumption of food products[12]. Since the net impact of various taxes and duties occurs directly on the price, the off take of processed food items remains quite low[13]. This again leads to low demand and consequently to low capacity utilization and cost escalation. The capacity utilization improved from 30 percent in pre-liberalised era to 51 percent in 1996 and is still very low. The small scale and unorganised sectors, having only local presence without much access to technology and marketing network, account for 99.4 percent of the units, 86.8 percent of employment and 36.4 percent of output of the industry[14]. India is also viewed as an unpredictable and unreliable source of food and agro products. Majority of the food units are engaged in the primary processing and production base of the secondary and tertiary processed food is very low. Development of brands is very poor. A single legal code to govern food processing has become extremely essential. The government has proposed a Processed Food Development Act at the level of All-India. However, it has not materialised[15]. The small agro-processing units also face inadequacy of institutional loans[16]. The financial institutions do not have capability to appraise hi-tech export oriented projects. There are no suitable insurance schemes for hi-tech export oriented projects, most of which deal with export of perishables. The share of this sector in the total bank credit doled out is a meagre 1.5 percent[17]. Cooperative institutions and other parastatal organisations are weak and people's participation, either through Panchayat Raj institutions or NGOs or farmers organisations, industries associations in food sector, remains far from adequate.

Against this background, this study is taken up in the state of Andhra Pradesh with the following objectives

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12 The price elasticity of fruits and vegetables was found to be statistically significant and (-) 0.32 by Viswanathan and Satyasai (1997). The authors further maintained that this may be much higher for lower income groups. This may be true for processed products also.

13 See Singh (2003).

14 See Chadha and Sahu for the structure of agro-industry at the all-India level

15 See Padmanabhan (2001).

16 NABARD (2001), Badatya (2003)

17 See Chawla (2002)

1. To examine the structure of food processing in organized sector
2. To study the opportunities and challenges in processing of rice, fruits and vegetables, oilseeds and livestock products
3. To study the working of contracts between processors and farmers; and
4. To recommend suitable policy options

The study is based on field surveys[18], review of literature, discussions with state ministry of agriculture and authorities, farmers, industry people, interaction with ANGRAU scientists etc. The study is organized as follows. Structure of food processing industry in the state is provided in the second section. The third section gives issues relating to processing of rice. The fourth section examines issues relating to the processing of fruits, especially mango while processing of vegetables is given in the fifth section. The processing of groundnut is discussed in the sixth section. The seventh section gives processing of livestock while thee eighth section describes the working of contracts and benefits to different section of farmers with special reference to oil palm and gherkin in the state. The future thrust areas, infrastructure related issues are dealt in the ninth section. The policy suggestions are given in the tenth section. The final section provides the conclusions.

2.OVERALL POLICY ENVIRONMENT AND STRUCTURE OF FOOD PROCESSING INDUSTRY IN A.P

2.1.Overall Policy Environment : The entire sector was deregulated and no license is required except in the case of alcoholic beverages. Automatic approval for foreign investment up to 100% equity in food processing industries is available except in few cases[19]. The excise duty on food processing items was removed in 1991 and again imposed in 1997. This was again removed in 2001. The concept of food parks, agri-export zones[20] (AEZ), human resource development have been initiated besides several

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18 Detailed sampling procedure for the field surveys was given in the eighth section

19 See Alagh (1995), Padmanabhan (2001)

20 The concept of agri-export zone (AEZ) was started in the exim policy 2001-2002 of Government of India to look at agricultural produce in a comprehensive manner- right from farm to the palate- so as to be able to deliver an appropriately priced and attractively package quality product for sale in the international market. So far, 48 such zones were formed in India and 4 of them are in Andhra Pradesh.

incentive schemes during this period. The role of state is considered vital. Hence the centre has urged the state governments to allow exemption for these sectors from sales tax and other local taxes. The state governments have also been advised to have an exclusive department for food processing industries and announce a comprehensive and cogent policy to promote this sector. It has also advised the states to review Agricultural Produce Market Act and offered assistance for setting up regional commodity exchanges, auction houses and terminal markets[21].

Several state governments are formulating their own food processing policies (Govt. of Karnataka, 2002). The Government of A.P formed four AEZs for different fruits and vegetables. But there are no major initiatives in harnessing livestock potential and exports. Though agro-processing is identified as one of the growth engines in Vision 2020[22], the policy support at state level has been slow. The Government of Andhra Pradesh has released a food processing policy through its Department of Industries and Commerce in November 2003[23] . In the policy, some concessions are given on assistance, power, stamp duty, interest subsidy, mechanisation, driers, sales tax on inputs and air- freight subsidy. The industries are exempted from payment of market cess. However several needed initiatives are left out in the policy of the state government. Some of them are- creation of separate ministry and department; exemption from sales tax; industry research linkages; quality testing laboratories; encouraging future areas like organic farming, neutraceuticals, bio-fuels; feed industry and modernisation of rice mills; encouragement to livestock sector; harmonisation of laws and contract farming policy; and development of electronic trade exchanges. However, a good beginning has been made.

2.2.Structure of Food Processing Industry : The industries in food products have a weight of 19.36 percent in total industrial production in the state (GOAP, 2002b). At the All-India level, Andhra Pradesh is the second biggest in value added in food products and beverages with 10 percent share of the total value added in the country and far ahead of Kerala (6.3), Tamil Nadu (4.1) and Karnataka (3.7) in 1999-2000[24] . The total number of

[21] See GOI (2000)
[22] See GOAP (1999)
[23] See GOAP (2003 a)
[24] Details in Joseph (2003)

factories in organized food manufacturing industries are 5350 in the triennium ending (TE) 1999-2000 with an investment of Rs. 1210 crores (table 1). The growth in the number of factories was very high during eighties than in the nineties. In the nineties, the first part of nineties was far better than the second part. The total number of persons employed was 1.81 lakhs and the net value added came to RS.436 crores in TE 1999-2000. The raw material intensity is very viz., 83 percent signifying the usefulness to farming community. The trend growth rate in food processing industries during 1981-82 to 1990-91 was 5.07 percent per annum and it declined to 1.29 percent during 1991-92 to 1999-2000. The number of industries virtually stagnated after 1992. On the other hand, the growth rate in net value added during the same periods increased marginally from 8.98 percent to 9.01 percent. These trend growth rates were statistically significant also.

Table 1
Details of Food Processing Industries in Andhra Pradesh
(Rs.lakhs at constant 1981-82 prices)

Sl. No	Item	Unit	1981-82	Triennium - ending			
				1986-87	90-91	95-96	99-00
1	Number of factories	Numbers	2877	3433	4277	5282	5350
2	Fixed capital	Lakh Rs.	11215	16655	18172	50961	79302
3	Working capital	Lakh Rs.	7155	10755	15693	24410	41699
4	Outstanding loans	Lakh Rs.	12676	26404	23828	28543	59826
5	Man days workers	In '000s	NA	27732	27014	89495	36277
6	Number of workers	Numbers	127276	81146	98322	63075	134276
7	Man days employees	In '000s	23712	20260	33079	113299	45518
8	Number of employees	Numbers	162274	158019	119680	78166	168461
10	Total employees	Numbers	3783	6748	12486	27776	49001
11	Total persons	Numbers	NA	105862	126766	155765	180708
9	Wages to workers	Lakh Rs.	2427	3796	5671	7107	9414
12	Fuels consumed	Lakh Rs.	1899	2791	4417	7186	12364
13	Materials consumed	Lakh Rs.	61083	106126	160781	236564	342431
14	Total inputs	Lakh Rs.	74533	115449	174125	254827	395511
15	Products	Lakh Rs.	73587	124228	188503	278987	410323
16	Value of output	Lakh Rs.	83291	127792	189614	286279	445660
17	Depreciation	Lakh Rs.	1185	2154	2813	3789	6536
18	Net value added	Lakh Rs.	7573	10190	16955	27663	43612

Source: Calculated from ASI data.

The employment elasticity with respect to output in food processing industries in the state improved from 0.029 percent per annum during 1980-81 to

1991-92 to 0.490 during 1991-92 to 1997-98 (table 2). In the second period, this was higher than that for agricultural manufacturing industries, non-agricultural manufacturing industries and all manufacturing industries.

Table2
Employment Elasticity with Respect to Output in the Registered Manufacturing Sector of Andhra Pradesh

Industry Code Number	Output		
	1980 - 81 to 1997 - 98	1980 - 81 to 1991 - 92	1991 - 92 to 1997 - 98
20 -21	0.229	0.029*	0.490
Mfg. (2-3)	0.313	0.225	0.355
AGRIND	0.316	0.235*	0.429
N AGRIND	0.430	0.391	0.306

* Statistically insignificant at 5% level of significance;
# Data are available from 1989-90.

Source: Venkatramaiah and Burange, 2003

The percent share of employment of food processing industries in the state has been showing a improving trend since 1980-81, though the share in output was declining (table 3). The share of these industries in employment increased from 13.42 in 1980-81 to 18.28 percent in 1997-98.

Table 3
Percentage Share of Food Products in Output, Employment and Net Value Added in Total Manufacturing Sector in A.P

Year	Output	Employment	Net Value Added
1980-81	20.93	13.42	24.76
1986-87	14.89	13.97	23.60
1991-92	16.15	19.41	26.18
1994-95	16.61	15.11	25.54
1997-98	17.82	18.28	27.36

Source: Chakravarty, 2003

It can be observed from table 4 that the maximum numbers of enterprises are in grain milling in the state. They form around 65 percent of all the food

processing industries in the state in all the time periods. The processing of edible nuts, bakery products and dairy products come next.

Table 4
Number of Enterprises in Organized Manufacturing in Andhra Pradesh

NIC '87 Code	Description of the item	Triennium ending				
		86-87	90-91	95-96	97-98	99-00
201	Manufacture of dairy products	46	50	77	106	94
202	Canning and preservation of fruits	31	47	52	53	54
203	Processing, canning and preserving of fish, crustaceans and similar foods	18	18	27	30	31
204	Grain milling	2245	2887	2460	3433	3566
205	Manufacture of bakery products	57	73	96	100	110
206	Manufacturing and refining of sugar	29	30	36	33	-
207	Production of indigenous sugar, boora, khandasari, gur etc from sugarcane, palm juice etc.	113	47	43	38	-
209	Manufacture of cocoa products and sugar confectionery (including sweets)	10	16	24	22	24
210	Manufacture of hydrogenated vegetable oils and vanaspati ghee etc	7	8	43	14	-
211	Manufacture of vegetable oils and fats (other than hydrogenated)	393	570	750	763	-
215	Processing of edible nuts	11	210	364	400	448
216	Manufacture of ice	26	17	9	10	-
217	Manufacture of prepared animal and bird feed	19	23	49	64	70
218	Manufacture of starch	-	16	18	14	24
219	Manufacture of food products not elsewhere classified	300	218	144	127	-
	All food products	3433	4277	5282	5296	5350

Table 5

Growth Rate of Food Processing Enterprises in Andhra Pradesh

	Item	Raw material Intensity (%)	Growth rate		
			1984-85 to 1990-91	1991-92 to 1990-00	1984-85 to 1999-00
201	Manufacture of dairy products	79	-0.45	4.91*	6.38*
202	Canning and preservation of fruits	66	10.4*	0.58	-3.57*
203	Processing, canning and preserving of fish, crustaceans and similar foods	79	-0.96	3.91	5.36*
204	Grain milling	91	5.63*	1.43*	3.39*
205	Manufacture of bakery products	79	4.80	4.27*	4.60*
206	Manufacturing and refining of sugar	69	2.07	-1.44	1.89*
207	Production of indigenous sugar, boora, khandasari, gur etc from sugarcane, palm juice etc.	76	-20.3*	-1.52	-8.65*
209	Manufacture of cocoa products and sugar confectionery (including sweets)	72	22.7*	1.59	8.61*
210+	Manufacture of hydrogenated vegetable oils and vanaspati ghee etc	89	3.46	-4.05	9.79*
211	Manufacture of vegetable oils and fats (other than hydrogenated)	86	8.73*	2.25*	6.16*
215	Processing of edible nuts	89	62.1*	5.1*	29.2*
216+	Manufacture of ice	46	-15.4	0.18	-10.1*
217	Manufacture of prepared animal and bird feed	89	5.05	10.1*	11.9
218	Manufacture of starch	74			
219+	Manufacture of food products not elsewhere classified	62	-11.4*	-1.12	-8.44
	All products	83	5.05*	1.29*	3.48*

* Indicates significance below 10 percent level; + Growth rate for the second period is from 1991-92 to 1997-98

The growth rates of enterprises of different food processing sectors are given in table 5. As can be seen, the growth rate in number of enterprises during nineties was less than that in the eighties. However, dairy, fishing and feed industries are exception to this.

Table 6

Net Value Added in Food Enterprises in Andhra Pradesh

(in lakh Rs at constant 1981-82 prices)

NIC '87 Code	Description of the item	Triennium ending				
		86-87	90-91	95-96	97-98	99-00
201	Manufacture of dairy products	1286	1371	1952	2538	1832
202	Canning and preservation of fruits	94	84	225	481	474
203	Processing, canning and preserving of fish, crustaceans and similar foods	223	269	1063	2523	3452
204	Grain milling	3720	4560	5138	7796	10223
205	Manufacture of bakery products	245	443	288	412	448
206	Manufacturing and refining of sugar	2126	5031	6526	5744	8004
207	Production of indigenous sugar, boora, khandasari, gur etc from sugarcane, palm juice etc.	150	368	198	263	
209	Manufacture of cocoa products and sugar confectionery (including sweets)	210	402	782	612	1035
210	Manufacture of hydrogenated vegetable oils and vanaspati ghee etc	760	206	350	614	484
211	Manufacture of vegetable oils and fats (other than hydrogenated)	899	1495	360	5225	2196
215	Processing of edible nuts	27	129	365	290	2616
216	Manufacture of ice	153	48	54	39	69
217	Manufacture of prepared animal and bird feed	200	199	212	424	794
218	Manufacture of starch		69	189	432	426
219	Manufacture of food products not elsewhere classified	752	1295	2031	3104	1681
	All food products	7573	10190	16955	27663	43612

Table 7
Growth Rate in Net Value Added in Andhra Pradesh

NIC '87 Code	Description of the item	Growth rate		
		1984-85 to 1990-91	1991-92 to 1999-00	1984-85 to 1999-00
201	Manufacture of dairy products	1.65	9.50*	8.06*
202	Canning and preservation of fruits	-7.13	14.0	1.50*
203	Processing, canning and preserving of fish, crustaceans and similar foods	8.93	20.4*	23.0*
204	Grain milling	8.58	11.7*	7.89*
205	Manufacture of bakery products	9.48	7.3	3.93
206	Manufacturing and refining of sugar	20.6*	4.59	9.23*
207	Production of indigenous sugar, boora, khandasari, gur etc from sugarcane, palm juice etc@.	19.9*	-1.0	3.05
209	Manufacture of cocoa products and sugar confectionery (including sweets)	15.8*	5.97	11.5*
210	Manufacture of hydrogenated vegetable oils and vanaspati ghee etc	-2.08	10.5*	17.7
211	Manufacture of vegetable oils and fats (other than hydrogenated)	-80.4	6.43	47.3
215	Processing of edible nuts	42.1*	33.4*	31.1*
216	Manufacture of ice	-18.6	6.98	-5.12*
217	Manufacture of prepared animal and bird feed	-5.86	19.2*	14.1
219	Manufacture of food products not elsewhere classified@	15.1*	11.5	13.0*
	All food products	13.3*	9.01*	11.0*

Note: @- indicates that the second period is 1991-92 to 1997-98

The net value added in different food processing industries in Andhra Pradesh and growth rates are given in tables 6 and 7 respectively. The net value added in grain milling (25%) is the highest followed by sugars, vegetable oils, fish, edible nuts, feed, starch, fruits, bakery products. Coming to the growth rates in net value added, fruits' processing, fish processing, feed industry, grain milling, vegetable oils and ice creams showed higher growth in the nineties.

Many food- processing industries have been coming up in the state in the last few years with the increasing globalisation of local diets and increasing incomes. There is also a scope to prepare traditional Andhra dishes in a scientific and hygienic way and market them. Some of them can be exported to ethnic population also. These items are chutneys, snacks like sweets, *pootharekulu, papads,* puffs, fried materials (e.g. groundnuts), curd etc. The demand for bakery products is ever increasing and the new entrants are catering to the emerging huge market. Besides, several small and tiny units are preparing these traditional processed foods in a cost effective way by utilising their free labour. However the level of technology is very poor. In Andhra Pradesh, large numbers of self-help groups are focussing on these foods and are even supplying to organised food chains[25]. In many of the South East Asian countries, these small- scale rural food-processing industries also worked as growth engines (Sharma et al 2003). The groups can also produce some items with the rice with high percentage of brokens. Already some groups in districts like Nellore and Krishna are making *Idlee ravva* with this rice. In this context, the role of government must be to strengthen these activities by upgrading the technology and credit facilities and adequate backward and forward linkages. Besides making efforts to increase the exports of processed food products, the state government should also increase awareness among the public on the use of these products and create local demand. This is always necessary to establish and sustain the industry. It is ideal to cover the overheads and other costs with the local sales and look for profits from exports.

3. GRAIN PROCESSING

Grain processing is the biggest component in the organised food sector sharing over 40% of the total value. The total production of foodgrains in the state was 149 lakh tones in the triennium ending 2000-2001. The basic feature of the sector is the predominance of primary processing sector sharing more than 90 percent of the total value with secondary and tertiary sector contributing about 5-10 percent of the total value of production. This area needs to be looked into as it has high potential for growth. In this sector, processing of paddy is the single largest activity in the state.

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[25] There are 427927 women self-help groups in Andhra Pradesh by January 2003 (Galab and Rao,2003).

3.1. Processing of Paddy : Andhra Pradesh is one of the leading rice producers in the country. Rice is the most important crop in the state and it will continue to be the growth engine for the state in the years to come. Rice varieties grown in the state like BPT 5204 and JGL 1798 are very popular and have high export potential. Kurnool Sonamashuri is having a lot of demand in foreign countries and ethnic populations. The state produced 117 lakh tones of rice in the triennium ending 2000-2001. The state needs approximately 100 lakh tones for its consumption. Around 1.7 million tones is the surplus in the state. The state is competitive in superfine varieties. So, research should be centred on evolving varieties. The efforts should be made to use the usual high percentage of brokens.

There are 21744 rice mills in the state. Among these mills, huller type mills are major ones with 63 percent. The other 37 percent are modernised to a certain extent. There is a need to modernise these mills to get better rice, bran and other by-products. This will increase the availability of rice in the state. The milling in the state leads to high percentage of brokens. In the international market, rice with less than 5 percent brokens are preferred. On the other hand, mills in the state give rice with more than 5 percent brokens and go up to 15-20 percent brokens. Some mills are being modernised at places like Kodad and Karimnagar. International standards can be reached if all the mills in the state are modernised. By modernising hullers, yields can be increased by 6.6% and by modernisng shellers the yield can be increased by 2.5%. The existing mills have to replace traditional machinery (huller) with modern machinery (Rubber-Roll Shellers). Under the modern technology the outturn of head rice will be higher. Even the by-products obtained are of high quality. The rice bran obtained in modern rice mill is pure and is not mixed with husk. The rice bran so obtained, when extracted, yields oil at an average rate of 15-20 per cent of rice bran.

At present there is no incentive to modernise. The MSP policy made rice in the state the most uncompetitive in international market. Because of this, the millers can sell this rice (which has more percent of brokens) to Food Corporation of India than modernising the mills and exporting. Some subsidy and cheap credit must be given for modernisation of the mills.

The Rice Milling Industry (Regulation) Act 1958 and Rice Milling Industry (Regulation & Licensing) Rules 1959 have been repealed with effect from

28th May 1997. Further, rice milling and pulse milling sector, which were earlier reserved for the small-scale sector, have now been de-reserved. As such, no license/permission is now required for setting up a rice mill. However, permission from the Department of Health, Industries, Pollution Control Board etc., is required.

It was found that the yield of broken rice in the three regions of the state was 6.28, 7.35 and 5.22 percent in Telangana, Coastal Andhra and Rayalaseema regions, respectively. The recovery percentage of rice in the three regions in the above order was found to be 63.76, 61.29 and 65.18 percent. Further the losses during milling constituted 4.45, 1.65 and 2.80 percent respectively. It was also found that, on an average, 17 persons were employed per unit in rice mills and the total man-days generated per tone of installed capacity worked out to 11646. The net value addition was very much high for puffed rice (19.21%) followed by parboiled rice (18.77%), rice mills (18.59%), poha (16.18%) and rice bran oil (3.52%) (Sailaja, 2001).

Different Products from Paddy : Several products can be made from paddy. At present, scope to produce many of these products is not utilized properly in the state. The by products like husk, bran and straw can be used to produce different products. The processing units for these products must be started in rice production centres. Obsolete milling technology also reduce the possibility of getting quality products from bran, husk etc. Some of the important products are discussed here.

Rice bran oil (RBO) can go a long way in covering the gap between the demand and supply of oil. According to one estimate, there is scope to produce 2-3 lakh tones of rice bran oil in the state. Due to less public awareness of RBO, its market potential is not being optimally tapped. Efforts must be made to use the modern methods in parboiled rice. Flaking with a roller flakers instead of with an edge-runner is good. All varieties of rice do not puff properly. An improved process of parboiling meant for preparing expanded rice should be popularized.

The millers are facing problems due to fixation of maximum loading limit for trucks at 9 m.t, while a truck can easily carry 14-15 mt of cargo. The exporters feel that they are also incurring losses due to absence of uniform taxation system, though ideally all exports should be exempted from domestic

taxes. At times, commodities have to undergo double taxation when moved from one state to another. In A.P, exporters cannot move stock from one warehouse to another even within the state without prior permission of the state civil supplies department. The rice processors are also facing problems in allotment of railway wagons. As a result, they have to go for road traffic, though it is relatively costly. Marketing is the major problem in expansion than raw material availability.

In the modernised mills, plant repair and maintenance causes many difficulties because these mills have imported machines (Sekhon et al 2003). Besides modernisation of the rice mills, there is a need to set up integrated rice processing units of higher capacity in the state. The establishment of such units would ensure good quality rice due to better quality control, efficiency and low cost of operation. In such complexes, the by-products would also be used properly and economically. It is worthwhile to consider the Thailand experience of projecting a rice mill as a complex where white ash production and cement plant installation, particle board manufacturing, energy generation plant, animal feed mill, briquette making plant are all established together with fish pond, poultry farm etc. These rice mill complexes may be developed in select rural areas gradually.

In this connection, contract farming between farmers and exporters or millers can be very much useful. The usage of pesticides should be reduced and care should be taken at all stages of production. However, contract-farming initiatives must be taken in a contiguous block, instead of taking individual farmers. Development of drainage and good infrastructure is very vital in tapping the export potential. The government also needs to give transport subsidy, as other countries are giving.

To be competitive in international market, the cost of production should be reduced; post-harvest and milling losses to be reduced; and productivity should be increased. Pesticidal sprays in paddy are next only to cotton in the state. The post harvest losses are estimated to be around 25 percent in paddy. Appropriate care must be taken in threshing, drying, storage and processing to reduce these losses. Farmers must be educated in this regard. The taxes collected on rice produce are 1% market cess, 4% sales tax and 5% rural development tax. These work out to around Rs. 60 on each bag. There is also a need to change the research strategy. Besides evolving

varieties with high productivity, specific characteristics should be aimed. There is also need to study in detail the purchasing habits, consumer tastes, preferred packing methods of the importing countries. Different non-basmati varieties should be developed to suit different importing countries. Genetic modification methods may be used where there is a specific need. Mainly Iran, Philippines, Indonesia, Brazil, Nigeria, Bangladesh, China and West African countries are importing non-basmati rice. Demand, supply and price trends in the importing countries should be studied. There is also a good export market for Japonica varieties of rice. Therefore, these varieties may be evolved and grown for the purpose of export.

4. PROCESSING OF FRUITS AND VEGETABLES

Andhra Pradesh is the second largest producer of fruits and vegetables in the country. The state has 8.4 lakh hectares under various horticulture crops (Table 8) and ranks first in the production and productivity of mangoes, sweet orange, oil palm, chilli and turmeric. Only two percent of fruits produced are processed. The state stands first in productivity in case of papaya and grapes. It is the fourth largest producer of coconuts with 1125 million nuts. It is the hub for processable crops like mango, grapes, banana, papaya, sweet orange, pomegranate, onions, tomato, okra etc. The production of fruits and vegetables is spread through out the state. The annual per capita consumption of fruits and vegetables increased from 27 to 61 kg in rural areas and 46 to 84 kgs in urban areas in the country as a whole. However, to meet the basic nutritional requirements of the population, production of fruits and vegetables needs to be doubled in the next five years. The productivity of fruits and vegetables and livestock products is very low and there is scope to improve (Table 9). The net availability of fruits and vegetables is slightly surplus and deficit, respectively after accounting for 30% losses after harvesting, when the minimum per capita needs of fruits and vegetables are taken at 120gms/day and 280 gms/day as per the recommendations of Indian Council of Medical Research (Table 10). However, fruits and vegetables in fresh form and to some extent in processed form are exported presently.

Table 8

Area Under Fruits and Vegetables in Andhra Pradesh

Crop	TE 1992	TE 1995	TE 2001
Mango	2.1	2.5	3.0
Orange	0.2	0.3	0.4
Lemon	0.2	0.3	0.4
Banana	0.2	0.3	0.4
Cashew	0.9	1.1	1.4
Total fruits	4.1	4.8	6.1
Tomato	0.4	0.5	0.7
Onion	0.2	0.2	0.3
Tapioca	0.2	0.2	0.2
Vegetables	1.0	1.6	2.3
Chillies	2.2	2.1	2.4
Turmeric	0.5	0.6	0.7
Coconut	0.7	0.8	1.0
Fruits and vegetables	5.5	6.4	8.4

Table 9

Comparison of Average Yields of Different Products in A.P, India and World

Crop	Unit	World highest	India average	A.P.average
Tomato	Mt/ha	467	15	8.0
Onion	Mt/ha	82	11	15.50
Grape	Mt/ha	20	1.8	37.3
Milk	Kgs/animal	6815	877	700
Buffalo meat	Kgs/animal	253	138	150
Mutton and lamb	Kgs/animal	33	12	13
Pig meat	Kgs/animal	140	35	35

Table 10

Population, Production, Availability, Requirement and Shortage of Fruits and Vegetables in Andhra Pradesh

Sl.No	Item	Fruits	Vegetables
1	Production (million tones)	5.00	3.67
2	Post-harvest losses (30%)	1.50	1.10
3	Net availability (million tones)	3.50	2.57
4	Minimum per capital needs (gms/day)	120	280
5	Net requirement for 75.7 million population (million tones)*	3.30	7.71
6	Net shortage / surplus (million tones)	0.20 (+)	5.14 (-)

* Further additional provision has to be made for population growth of 2% per annum and also exports.

Source: GOAP (2003)

Table 11
Post Harvest Losses at Various Stages and Crops in India and Andhra Pradesh

Sl.No	Stage	Percentage Of losses	Crop	Percent losses
1	Field level	10	Grape	25
2	Transport	5	Mango	20
3	Packing	2	Pomegranate	10
4	Storage	9	Sweet orange	20
5	Processing	4	Banana	30
	TOTAL	30	Sapota	20
			Onion	25

Source: GOAP (2003)

The loss of fresh produce in post harvest is 30% of the production in the state (Table 11). In some crops like banana and sapota, the loss is as high as 30 percent. Cashew apple goes into wastage despite having processing potential. There is abundant scope for processing of fruit crops like papaya, guava, pomegranate, banana, grapes, etc and vegetable crops like gherkins, tomato, peas, tapioca etc. The products manufactured are mainly fruit pulps of tomato and mango; juices, canned fruits, jams, pickles and squashes. The recent inclusions are frozen fruits, pulps, dehydrated and freeze dried vegetables, fruit powders, fruit juice concentrates and canned mushrooms. The future inclusions are carbonated fruit drinks, dehydrated and freeze dried fruits. There is scope to produce a variety of processed products from the fruits and vegetables grown in the state.

4.1. Processing of Mango

The Mango plantations are concentrated in three pockets basically - around Vijayawada, Chittoor and Hyderabad. Presently two key value added products made in the state are mango pulp and mango pickles (Sunsip, Allana, Vinsari Fruitech, Parle International, Concept Foods are major processors of mango fruit pulp and concentrates in AP). The advantage with mango pulp processing is that the same facility can be used to process several fruits and vegetables like guava, papaya, tomato. Though U.P has the highest area under mango, production is the highest in Andhra Pradesh.

Presently, mangoes from the state could not be exported to countries like U.S, Japan and Europe due to the problem of fruit fly and stone weevil. The varieties grown in Uttar Pradesh (U.P) like *Dasheri* and *Longra* are with thick rind and suitable for export. The varieties grown in A.P are different from those of Uttar Pradesh. Most (90%) of the mango gardens in the state are having Benishan variety, which is not a pulp variety. The remaining ten percent is accounted for by Totapuri (Collector) and *Suvarnarekha*. The percentage of mango production in the state being processed is estimated to be around 6 percent only.

There are a number of products in mango like squash, bars, jelly etc. Canned mango pieces, canned mango pulp, mango juice, nectars and drinks, freezed pulp, wine, pulp in aseptic packing, mango powder, mango bar, carbonated beverage, tauffes etc. Kernel oil, patika, vinegar, fibre etc are the products from mango waste (table 16). In East Godavari, villages like Sarpavaram, Atreyapuram, Rajanagaram, Bhupalapatnam, Kanavaram, Korukonda etc, *Thandra* making is done as a cottage industry by sun drying. But, they do not maintain proper hygiene. There are also problems of storage and maintenance. Solar driers can be used to make *Thandra* at village level. The subsidy being given by organizations like KVIC can be used for this.

Issues in Mango Processing: Primitive crop management facilities, erratic yields (Table 12), diverse practices for assessing fruit maturity and high incidence of pests are the problems for the processors. At the processors level, most of the units do not confirm to HACCP standards, poor hygienic levels and most of the operations are done manually. There is also no sufficient process control and it leads to variations in product quality. There is no regulation for the nurseries and these do not have qualified personnel. Jellies, jams and juices' preparation must increase to absorb the additional production. Chittoor district is the home of mango canning in the state. Jelly making is carried out as a cottage industry with traditional sun-drying technique using moderate levels of capital investment and scale of operation. While jelly making is operated by lower middle-income families, fruit canning is undertaken by rich business families as the latter involved considerable capital outlay in fixed assets like plant and machinery. For jelly making units, credit is required for working capital, whereas the canning industries require loans for machinery and working capital.

Table 12
Production of Mango in A.P

Year	Production in lakh tones
1995-96	31.64
1996-97	14.8
1997-98	3.2
1998-99	18.77
1999-00	6.65
2000-01	22.34
2001-02	11.26

At present, mango jelly is produced through the conventional drying process involving spreading of mango pulp in layers, one after another for about 25-30 days in an open area. The product produced is exposed to dust, insects and flies thereby affecting the quality of the product. There are about 70 units in the organised sector in A.P. These units can be set up in all mango growing tribal areas of A.P. The project cost will be Rs. 130000. For both jelly making and canning, *Totapuri, Alphonso* and *Raspuri* are the varieties. Unlike other branches of industry, these units use low and intermediate technologies. Alternate bearing of mango is causing supply and price fluctuations. The profits in the 'on' year have to be split in order to take care of the 'off' year. Water and power are essential inputs in canning industry and Chittoor is deficient in these inputs. Each canning unit has to set up its own generator and water lifting system adding to the cost of manufacturing.

In a NABARD study in 2001, it was found that the profit margin was 14.45% in jelly making and 16% in canning units and the ratio of net profit to sales is low. It highlights the fact that the activities offer only nominal profits and revenues will be under strain if demand for the mango products is not sustained. The net margin realised by farmers was estimated at 21.5% if mango is sold to processing units as compared to 4.6% if traditional consumer is targeted. Packaging constitutes 27 percent of manufacturing cost. The labour absorption in jelly making units is high. The macro-impact of mango processing was considerable. The addition to GDP was Rs.9.72 crore while the value addition was Rs.64.80 crore from 400 jelly units and 33 canning units (NABARD, 2001).

A limited domestic market is a serious constraint facing the processed mango industry. High prices of the products due to middlemen margins, taxes, packaging cost etc., deter consumption in the domestic market. Estimates of supply-demand position for major processed foods both in the country and overseas are also not available and the industry is in information vacuum. Every effort is needed to provide this information through electronic media and frequent get-together of farmers, unit owners, technologists, bankers, government officials etc. The other problem pertains to extension services, cold storages and quality control laboratories. Further, credit is a limiting factor in mango processing. Financing of agro-industry is a specialised job. Banks are not coming forward to give credit because of higher risk.

Other products like mango powder can be a substitute for tamarind and it has got a good demand in the international market. In mango, the old type of planting creates problems in taking care of fruit bearing at the topmost branches. Therefore, the focus now is on growing more plants per acre (up to 100) and encouraging small plants by pruning. This will make it possible to get as much percent of good fruits as in grape. Now, the problem is that the farmer cannot get twenty percent of fruits of export quality. In mango, the uneconomical and inferior trees can be converted to the choice and commercial varieties by top working of inferior seedling trees. This technique saves at least 4-5 years. The same can be used in case of old and undesirable fruit plants of tamarind, sapota and many other fruit plants.

By-products: Mango kernel oil, kernel flour, peels juice and fried peels are the by-products from mango, which have a good commercial potential. At present, these are not commercially exploited. The problems in tapping the potential include- unorganised sector unlike for oilseeds, scatteredness, low price, lack of scientific know-how and coincidence of the collection with the monsoon. The total potential of 20 lakh tonnes of mango kernel has been assessed by the trade in India and out of this, 5 lakh tones could be easily utilised as per the Technical Group constituted in India. It can be assumed that nearly 40 percent of this can be from the state. The mango kernel oil can add to the export earnings. The steps needed to be taken are- organising the sector, provision of market information system, policy measures to increase the trade in seed collection, transfer of post harvesting technologies and extension services.

Agri-Export Zone, Chittoor: The canning units in Chittoor are performing well in the purview of Agri-Export Zone. In fact, this AEZ is the most successful one in the country. The canning industries increased from 39 to 46 in this short period. Among these units, one is exclusively for vegetables and two are for both mango and vegetables. All others are exclusively for mango only. The exports from this district were of the order of Rs.75 crores before the start of AEZ and now it was Rs. 116.63 crores by October 2003. Some of the steps taken in Chittoor AEZ include- starting of a common testing laboratory, exemption from market cess, HACCP certification for 27 units, 17 units modernised, liquid effluent treatment for 27 units, posting of special staff for horticulture. The Government of A.P has exempted from the levy of sales tax on all the inputs used for exports including containers used for packing by the units in AEZs. However, what the processors request is total exemption from sales tax on the processing industry and also packing industry. A common solid waste treatment facility, aseptic packaging unit, cold storage units, intermediate (ripening) sheds, warehousing facility at Chittoor to avoid carrying the produce to Chennai, construction of market yards at proper places, amendment of the contract farming rules in case of mango (to be eligible for the scheme to strengthen of backward linkages of food processing of GOI[26]), waiving of sales tax for local sales are the other issues to be solved for further development of the industry, as per the members of the processors federation. The Markfed or Marketing department can also conduct studies and provide information on the prospective buyers and demand in the international market.

The processors are also demanding the construction of a 'Mango Complex' on the lines of Mother India, where all types of processing for mango viz., pulp, juice, pickles, jams, squash etc can be done in one place. Though the MFPI provides assistance to the FP units for upgradation of technology, the rules are so cumbersome and the processors told that they had to surpass so many procedural difficulties. The processors are also asking for opening an office in the Middle East for liaison and monitoring with the

[26] The government of India has a scheme to promote contract farming. The processor must take up contract farming to be eligible under the scheme. The processors argue that in perennial crops like mango, one can only take the gardens on annual contract and they do so regularly to ensure sufficient and quality product for the industry. They are asking the government to consider it also as a way of contract farming and extend the benefits under contract farming scheme of ministry of food processing industries.

importers. The A.P. Electricity Regulatory Commission has agreed to declare it as a seasonal industry and charge 30% of the minimum in the off-season for units using more than 75 H.P. But in Karnataka, it is 100%, the processors pointed out. On the whole, it can be said that the processing industry in Chittoor showed that it could respond well if infrastructure, credit, extension and other policy support were provided.

The state needs to establish one vapour heat treatment plant to sort out the problem of fruit fly, which is the main hindrance for exporting mangoes to U.S and European countries. Due to this problem, Japan did not import mangoes from our country. There should be provision for the export of mangoes in modified atmospheric containers in ships to private parties also. Though there are plans to construct 18 cold storages exclusively for mango, they are not yet materialised. The railways must allot more wagons for transporting to other parts of the country. The farmers have long been demanding mango board similar to those of tobacco, coconut etc. Going by the acreage under the crop, which is more than three lakh hectares, the demand may be considered. Pulp varieties may also be produced organically. The states like Himachal Pradesh, Kerala and Maharashtra evolved products from their main fruit crops of their states viz., apple, coconut and oranges and popularised them. Now, there is a lot of demand for these products in these states and the market is extended for the farmers. The same can be done in Andhra Pradesh with the available mangoes. Some other juices like sugarcane, pink guava juices can also be tried. This will pave the way for better prices for the farmers mango produce. A lot of publicity is also needed. Initially, these products should be used in government schools, hospitals, government functions etc. This is a good way to integrate with the market. The synthetic drinks are losing market world wide, because of ever growing health consciousness and increase in purchasing power. Therefore, there is every likelihood of these initiatives becoming successful.

5. PROCESSING OF VEGETABLES

Poor farm management practices, small land holdings, non-uniform quality due to early or late harvesting, non-availability of varieties suitable for processing are the problems in procurement of raw material. Most of the existing SSI units use traditional preservation and processing technologies like sun drying, chemical preservation using vinegar, acetic acid etc. Village

level grading should be done to eliminate damaged and other produce. This also gives some employment at the village level. Grading standards should be prepared for all vegetables. The ANGRAU scientists have developed a manual for 18 vegetables. These grades should be popularised among farmers. Some persons can be trained in grading vegetables at village level and certificates may be given. The Horticulture Department may take this responsibility. A good idea will be to develop 'cut and frozen' vegetables market for different vegetables. Reducing pesticide residues in chillies and turmeric is very important, since export consignments are rejected on this basis. The crop of chillies is very important from the point of view of farming communities in Guntur, Warangal, Khammam and Prakasam. This crop can also be used to develop natural colours. Paprica can be grown for the purpose. Farmers in Warangal district have taken up this crop in a large scale. Some varieties are released by LAMFARM, Guntur. However, decline productivity is the problem in this crop. This should be addressed by means of research. These natural colours have a lot of demand in the international market. Sauces can also be made with vinegar and soybean. However, microbial problem is hindering it.

Pesticide residue elimination and aflatoxins reduction in case of chillies, onions, groundnut and turmeric must be stressed. Farmers in the state use chemicals excessively and sometimes indiscriminately to control pests and diseases. This should be reduced by following practices of integrated pest management. The emphasis must also turn to green manures instead of more and more chemical fertilisers. The farmers cultivating vegetables are not following the prescribed waiting period between pesticidal sprays and harvesting. They should be educated to follow these periods. Otherwise, it will be difficult to sell even in the domestic market in view of the ever - increasing consumer consciousness.

5.1. Tomato

Tomato is the crop with maximum area of 70000 hectares in TE 2001 among vegetable crops in the state. Since tomatoes can be produced throughout the year in the state, a good tomato product manufacturing industry can be developed. Glut in tomato production became a routine affair in the state. This came to a stage, where the farmers throw tomatoes on the roads and sometimes leave without harvest because the prices are

not good enough to cover harvesting costs. Transporting them to places, where there is no production is one solution. The other and sustainable solution is to process them. There are some tomato processing units in Chittoor. The varieties with more pulp are required for processing. Good processing varieties and hybrids that are high yielding, early or late, uniform maturity, rich in lycopene (reason for red colour of the fruit), vitamin C, total soluble salts (TSS) and acidity are required. Contrary to tastes of the consumers for table purpose, oblong types are suitable for processing. Fruits harvested at temperatures more than 300 C do not turn fully red. Recently, FPO banned use of synthetic colour to tomato products. Therefore, full red tomatoes are only useful for processing. Research must focus on this area. The idea of incorporating slow ripening genes may also be tried. Some companies like Nestle are coming forward for contract farming in case of papaya and tomato. Ketch-up is made with tomato. The agricultural university (ANGRAU) has developed a technology, where the tomatoes' shelf life can be extended for 20 days by treating with chemicals. The cost of this treatment works out to not more than 25 paise per kilogram. The government can give this much of subsidy. National Horticulture Board gives the crates, required on 50 percent subsidy.

6. PROCESSING OF GROUNDNUT AND OIL PALM

6.1. Processing of Groundnut

It occupies the second largest cropped area in Andhra Pradesh. The area under groundnut has been declining in the state mainly because of the cheaper imports of palm oil and its gradual acceptance of people as an alternative to groundnut oil. The rising health consciousness also makes palm oil, rice bran oil and other oils more popular in the state. It decreased from 21.28 lakh hectares in the triennium ending 1992-93 to 18.87 lakh hectares in 2000-2001. Of this area, around 14 lakh hectares are in the four drought prone districts of Rayalaseema. It is cultivated under low input system by resource poor small and marginal farmers with no inputs other than land and labour. There is no other commercial crop more resistant or tolerant to drought and erratic rainfall than groundnut. It also grows well on low fertility soils. This crop cannot be replaced by more remunerative crop in Rayalaseema. The production of groundnut oil declined at a rate of 7-8 percent during 1994-95 to 1999-2000. The crisis in South East Asian countries led to decline in the export of HPS (hand picked seeds) groundnut to those countries. The quality restrictions in Europe made it practically

impossible to export to European countries. The European Commission has specified tolerance limits for aflatoxins contamination in peanuts. The proposed levels are 5 parts per billion (PPB) in place of 10 PPB earlier for raw material. These levels for consumer ready products are reduced to 2 PPB from the earlier levels of 4 PPB. The new proposed sampling plan (3 test Dutch Code Methodology) would lead to a higher rate of rejection. Europe is accounting for 47% of world's imports of groundnuts and groundnut products. A multi-test plan will increase the cost of testing by $ 4 million. Under these circumstances, export of HPS groundnut declined by 80% and came to 123 crores. Therefore, there is a need to change the structure of production and processing in case of groundnut.

The major products from groundnut in the world are peanut butter, peanut milk and other such products like packaged snack nuts (salted, flavoured, honey roasted), *Bal-ahar* etc. Consumption of confectionery groundnut is growing and demographic and income growth prospects suggest that fastest growth in consumption will come from confectionery and related products. There is not a single industry in the state that produces these products. Unless, the production and processing industry diverts itself away from oil production, there is no future to groundnut in the state[27]. In some districts, especially Rayalaseema, it is the only crop for their livelihoods. There is also no scope to dispense with the crop. However, the existing varieties do not suit for these products and they are developed to have high oil content. Further for confectionery purpose, the weight of 100 seeds must be more than 80 gms. So, suitable varieties must be developed for peanut butter, peanut milk etc. There is a need to take-up education campaign on the availability of nutritive values in the kernels and the ensuing products. Producers' organisations have to come up and concentrate on producing and marketing of the new products. There will be considerable payoffs to research efforts in developing high quality confectionery varieties. Efforts to control aflatoxins need to be intensified in view of growing importance of groundnut for confectionery and processed foods. Only around 17 percent of the groundnut area is irrigated. This area can be utilised for growing confectionery varieties, as these varieties do not come up well in rain-fed conditions. Testing for aflatoxins in groundnut is presently done in Mumbai. The state also needs a quality -testing laboratory.

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[27] See Dev and Mahajan (2001) for detailed discussion on this

6.2. Oil Palm

Oil palm was introduced in the nineties in the state in a big way. Various committees (Chadha Committee, Rethinam Committee) identified a potential of 4.00 lakh hectares in Andhra Pradesh out of a total potential of 7.96 lakh hectares in India under oil palm cultivation in irrigated conditions. However, only a small part of this potential could be realized in the state. By 2003, only 40000 hectares of area could be covered under oil palm. West Godavari and East Godavari districts alone account for more than 60 percent of the total area. Though the government did well to encourage oil palm cultivation, several problems still haunt the farmers and processing companies. There is no consistency and commitment on the part of government either in case of import duties or allotment of zones to factories. The areas allotted are not contiguous and without any regard to operational efficiency for the companies and the old DBT plantations and other plantations are still managed by other players. In many areas, the factories could not get sufficient input to run up to minimum profitable capacity. Even the capacities are low here compared to competing countries like Malaysia and the capacity utilization is still low. This naturally makes the processing cost per unit very high in the state. The machinery being used is also very obsolete and there is need to upgrade the technology.

The processing factories are not given the same benefits as other industries under Target 2000 (Sukumar, 1999) and other schemes. Ironically, both the processors and the growers want the implementation of the Oil Palm (Regulation of Production and Processing) Act, 1993. Rules and regulations are not formed and only bureaucrats are having a say in the decision making process. There is no role for the processors and growers. As a result of all these problems, several entrepreneurs left the business leading to inexplicable difficulties to the growers. Non- availability of power connections and proper supply, credit, regular monitoring, supervision and lack of harvest equipment are the major problems faced by the farmers. This crop requires very high quantity viz., 160-200 lts of water per day and is basically a crop, which is grown in very high rainfall zone of around 2000 mm. The farmers cultivated oil palm in the state in open irrigated system, where the loss of water due to evapo-transpiration is very huge. Therefore, the ground water depleted in many gardens by fifth year and the crop could not be sustained. By March 1999, an area of 3600 hectares of oil palm crop

was uprooted and out of this, 1783 hectares were in West Godavari only (Rani and Rethinam, 2001). By 2002, it was around 5000 hectares.

The government banned the import of seed material from other countries with the assumption that the available three seed gardens in the country can supply enough seed material to the growers. However, this became the major hurdle in area expansion. The ban imposed after 1998-99 was temporarily relaxed up to April 2004 and this may be re-imposed. More than the availability of seed material, the ban made it impossible to get state-of-the art technologies from other countries. The seed material used in the state is from varieties developed decades back and lags behind Malaysia and Thailand. Further, this meant that the country could not be benefited from international research in this regard. The subsidies extended by the government are limited to an extent of 6 hectares per each cultivator up to the very recent period. This was increased to 15 hectares recently. The extension machinery of the Horticulture Department specially created to provide services to oil palm growers was disbanded in the year 2000 leading to lack of guidance to the farmers. Though the Horticulture Department conducted a demand survey of farmers in 2002, no concrete steps were taken based on this survey. A detailed case study is presented later in this study. Based on the experiences of different stakeholders and studies, the following steps have to be taken urgently to achieve the growth potential in oil palm sector in the state.

The current seed material requirement cannot be met locally and hence import may be permitted on a consistent basis, instead of ad-hoc decisions. The duty structure should not be altered frequently. A minimum price must be assured to the farmers and market intervention must be in place. Purchase tax for fresh fruit bunches as well as sales tax may be exempted for a few years till the oil palm does well. Permission may be accorded to grow oil palm on degraded forest lands and government waste lands under *tree patta* scheme, so that landless labour can be part of this programme. Subsidy for growing of inter-crops in the initial three years, as in the case of coconut, will encourage small farmers. Central and state governments may work out the possibility of creating Price Stabilisation Fund with contributions from farmers, processors and Government. Quality standards may be developed for fresh fruit bunches as are available in Malaysia. Technologies for value addition and bye product use may be developed. Different stakeholders

like farmers, processors, officials and scientists may be exposed to oil palm growing countries like Malaysia, Indonesia and France for acquiring knowledge and skill. The issues are discussed in detail based on field survey in eighth section.

7. LIVESTOCK SECTOR

The potential and constraints of processing of meat, poultry, fish and dairy are dealt in this section. It is not correct to equate food processing with the processing of fruits and vegetables alone. The livestock sector has immense potential to contribute as far as processed products are concerned.

7.1 Processing of Meat

Less than two percent of meat is converted to processed products. These are value added products (ready-to-cook, ready-to-eat and ready-to-serve) or the products that may require less time for preparation. The state has 10.6 million cattle, 9.6 million buffaloes, 9.7 million sheep and 5.2 million goats. The state ranks second in buffalo and sheep population, 7th in cow and 8th in goat population in the country. The sheep in the state are of superior quality with minimum fat level, good taste and good keeping quality. Livestock production is an integral part of farming systems in the state thus it plays a very important role in the state economy. However, the productivity and production is not satisfactory. The production of meat is 3.8 lakh tones. This forms 8.37% of total meat production in India. In spite of having the largest livestock population, only 4% of the buffalo population and 2% of the cattle population is culled for meat at the national level. The same may hold good in case of the state also. Cows and buffaloes are not reared for meat production. Now, the male buffaloes are used for insemination mainly. The farmers are neglecting them. They can be used for good meat, after de-worming. They should be allowed to be reared and sold. The slaughter laws do not permit cutting young animals and therefore, the old and infirm animals are only slaughtered. So, the quality of meat is not good enough to be exported. Further, most of the breeds in the country are developed to suit the production of milk and not from production of meat angle.

With growing urbanisation and increasing quality consciousness, the market for scientifically produced meat products is expected to grow rapidly. There is also a growing domestic demand for ready to eat and semi processed

meat products on account of changing life styles as also for export to neighbouring countries. Meat processing has recently become one of the thrust sectors in the state. The technical upgradation needed is in the areas of building up organised facilities for rearing meat producing animals and proper storage and refrigerated transport system. Live bird slaughtering in open is the major problem in the development of meat processing industries. Many municipalities in the state have banned this. It should be made a law. Several countries like Sri Lanka did this. Disease free or pest free zones in a 100 kms should be developed, especially for foot and mouth disease. All animals in this zone should be vaccinated. Because of this scare, the state is unable to export to European countries. Organisations like Al-Kabeer are exporting to Southeast and Middle East countries only. In future, organic livestock may have to come to cater to the changing consumer tastes. A Meat Export Development Authority is also needed. The local products like *Biryani, haleem* etc can also be canned and exported.

By-products form an important component (55-60%) of animal slaughter. Effective recovery and utilisation of by-products and wastes is the lifeline of the meat industry as the by-products can be processed into high value added products. It is estimated that there is a loss of 20-25% of by-products at production point annually due to poor abattoir conditions, improper recovery, non- utilisation and under utilisation of by-products. Improving abattoir conditions can correct this. The industry needs trained personnel at different levels starting from floor operators to the top managers with different type of skills.

7.2. Processing of Poultry Birds

Andhra Pradesh is the country's largest egg (6933 million eggs per annum) and poultry meat producer, contributing to about a third of country's egg and about one fifth of broiler meat production. The growth rate of poultry is very high. The layer population is 500 lakhs and broilers are 1000 lakhs per annum. The increasing awareness of the need for balanced nutrition has led to changes in eating habits with vegetarians accepting eggs as part of their diet. Simultaneously, there has been an increase in purchasing power, and more money is available for spending on food. With the changing food habits and increasing availability of eggs, there has been an increase in demand, which is growing at a fast rate. The growth of poultry in the state

is spectacular by any standards during the last two decades. During this period, this industry transformed itself from backyard farming into a dynamic and sophisticated agri-based industry. The per-capita egg consumption is very low in the country in general and it applies to the state as well. Per capita egg consumption is in the range of 36 and that of poultry meat around 850 gms in the country. In urban areas, the per capita consumption is 100 eggs and 1200 gms of poultry meat per annum while in rural areas it is 15 eggs and 150 gms per annum in the country. Poultry meat consumption constitutes around 22% of the total meat consumption in the country. Around 1% of the egg production is used for egg powder. The processed poultry meat constitutes a paltry 5% of the total poultry meat consumption in the country.

There are two modern integrated poultry processing plants functioning in the state. Besides, there are good number of small plants although not very modern working in the state. These plants are producing dressed frozen chicken and cut parts. While the poultry industry is gradually taking shapes, poultry dressing and processing is still in its infancy in the state. Poultry industry in Andhra Pradesh is efficient. The productivity levels are among the best in the world, with hen-housed egg production of 310 per year and 1:1.8 feed conversion ratio in broilers (GOAP, 2002).

Frozen eggs, egg powder have a lot of potential in the state, because of excessive production than what the market can absorb. Though some entrepreneurs have come to the state, they walked out of the state for want of adequate water supply, whereby the state lost investment worth one thousand crore rupees. The two egg powder plants in the state produce whole egg, yolk and albumen powders. The demand for egg powder is increasing every year. These egg powder plants will certainly help to boost egg production. However, the problems in the way are high taxes, excise duty, quality control labs etc. The state sales tax for egg powder is 10% and central sales tax is 4% against 'C' -form. An excise duty of 12.5% is being charged for sale of egg powder in domestic market. These taxes increase the cost of egg powder prohibitively high. The restrictions on the value of domestic sales in respect of export- oriented units should be relaxed as they are creating problems. Refrigerated containers may be provided on a subsidised basis. Quality control labs may be set up in public domain to undertake tests at nominal costs.

The sanitary conditions in poultry farms in the state are very poor. Some pathogens and toxins remain in the ordinary chicken centres in the state. The maintenance of quality is very important in poultry export. Toxins enter the chicks through feed with high pesticide residue and toxins, untreated water and use of antibiotics. The high pesticide residues and toxins are hampering exports. These should be avoided by quality regulation in the feed industry and educating the poultry farmers on the use of antibiotics and treated water. The feed industry also needs to undertake contract farming for soybean and maize. The standards for domestically sold chicken must be set and grading system must be established for poultry meat. The cost of production is very low in the state. However, since other countries are extending subsidies, there is a need to provide subsidies to the poultry sector in the state also. The industry should concentrate on export of breast chicken. The ready to eat chicken is the latest product and this technology should be developed. Already CFTRI, Mysore has developed this technology and steps should be taken to popularise the technology. Some of the big players in the field like MTR and Priya are using the technology. For domestic consumption in rural areas, small units with deep litter system (1000-2000 birds) should be promoted. This will give employment, additional income and organic matter for crops. The strategies should be different for rural as compared to urban centres.

In case of poultry, safety is the major issue with the presence of salmonella. The export needs and indigenous needs are different. So far, the development of poultry sector is not in keeping with the exporting needs and demand. There is also no policy support in that direction. So, total revamping is needed. The tastes of the people are to eat meat immediately after cutting and not processed and stored meat. In Sri Lanka, people consume frozen food to the extent of 80 percent. Therefore, the market is stabilised there now after eight years of sustained efforts. The public in general has doubts about the taste of the frozen chicken. They should be educated about this false notion. Though two egg processing firms have been established in the state for poultry meat with a plan for vertical integration including contract farming. These plants followed in house farming and HACCP standards. However, this contract farming for poultry could not take off because the plants never reached full capacity running. There is no regulation in poultry farms, even in case of farms meant for export. The state does not have a laboratory for quality control measures. Only

Vimta laboratory is available and this makes a costly solution. Some poultry technology parks with state-of-the art technology may be set-up in some of the production centers of Andhra Pradesh.

7.3. Processing of Fish

Andhra Pradesh occupies important place in the fisheries map of India. The state has 974 kms length of coastline, 33227 sq. kms of continental shelf, 4 lakh hectares of fresh water bodies and 1.50 lakh hectares of brackish water area. The state is making rapid progress in fish production, moving from 2.52 lakh tones in 1991-92 to 6.76 lakh tones in 2001-2002. It ranks fifth among the Indian states in marine fish production, after Kerala, Gujarat, Maharashtra and Tamil Nadu. In 2001-2002, the fish production in the state comprised 4.27 lakh tones of inland fish, 1.81 lakh tones of marine fish and 0.68 tones of shrimp from both inland and marine sources and this is projected to increase to 9.00 lakh tones by 2006-2007. The state has immense potential in this sector. Inland and brackish water sectors are land-oriented activities. There are two lakes in the state. Kolleru is a fresh water lake with a water spread area of 1.90 lakh hectares and Pulicat Lake is a brackish water lake with a water spread area of 0.46 lakh hectares. There are 102 reservoirs with a water-spread area of 2.34 lakh hectares. The state also has more than 74000 numbers of perennial, long seasonal and seasonal tanks with a water spread of 6.23 lakh hectares and 1.50 lakh hectares of potential brackish water lands. Exclusive ponds have been constructed in an area of 0.90 lakh hectares for fresh water fish culture and in 0.787 lakh hectares in case of brackish water ponds.

The fastest growth is anticipated in case of inland fish production, and fresh water prawn production. The productivity in fresh water ponds is as high as 10-12 tones per hectare per annum in the state. The state has a good network of infrastructural facilities like hatcheries, feed mills and processing plants. The state ranks second in inland fisheries, first in coastal aquaculture, first in fresh water prawn production and fifth in marine fish production when compared to other states in India. Fishery is a potential income-generating sector with 14.05 lakh persons employed in different activities. The value of output of fisheries increased from Rs.1698 crores in 1998-99 to 3904 crores in 2000-2001. The share of fisheries is around 1 percent GSDP of the state. The total value of exports from the sector is to a tune of Rs.2300 crores (GOAP, 2002). There is good scope for increasing

production from the inland resources also. In addition to this potential of fish production through aquaculture and shrimp farming has to be tapped to in the right manner. Traditionally, the vast marine and inland water resources of the state have been tapped only by local fishermen to supply domestically. Over the last decade or so the organized corporate sector has become involved in preservation and export of coastal fish. Processing industry is not developed. The use of antibiotics is on a very high scale. Boneless fish must be prepared. All the species are not suitable for this product. Meat of Rohu and Katla is not hard and is not useful for this purpose. Diseases of virus are plaguing fish production. These should be addressed. In prawns, IQF (individual quick frozen) technology should be developed, as the importing countries prefer this way. There are already some units in existence, which have adopted this technology. The importers are insisting on the quality parameters in all stages, starting from nets, gloves, packaging method etc. These things need certification.

The fish in raw form may not be well preserved and may not attract the consumers. There are different types of value added products, which are liked by the consumers and can fetch more price. Bulk of the present exports is raw fish and processing is done at the importing end. Hereafter, the focus will be on shipping value-added products to all major markets including Europe (Venkateswaran, 2003). Pickles and canned food will also reduce the cost of preservation as freezing the fish/shrimp is a costly enterprise. There is a good scope for value added products, ready to eat fishery items in the domestic markets also. Marine products face the problem of automatic detention by USA when they were not meeting the SPS standards of that country. European Union countries are not accepting imports of fishery products if products from other countries do not confirm to their specific legislation (EU and national levels) concerning, for example pesticide residues (maximum residue levels, MRLs) heavy metals, polychlorinated biphenyls (PCBs), food additives and packaging. The European standards are more stringent than the HACCP warrant. European Commission approved plants with bigger capacities of more than 10 tones per day. Thus, there are 90 approved processing units out of a total of 404 processing units in the country. It is difficult for many of the processing units to raise loans to upgrade their facilities to meet the regulations and the EU ban has eroded their financial strength adversely. The power tariff for

aquaculture is more than the power tariff to agriculture. There is a demand from the aqua farmers that all taxes levied must be on par with agriculture. The inspection of marine products by the export inspection agency, clearances for food exports are to be liberalised. A disease diagnostic laboratory was set up at State Institute of Fisheries Technology, Kakinada and three more centers with Dot blot testing were also planned. The Marine Products Exports Development Authority is extending assistance to set up PCR (Polymerase Chain Reaction) laboratories to detect the white spot syndrome virus. There is a need to detect the presence of the virus immediately in different regions. The laboratories set up by the association of the food industries, NGOs and universities may have to be recognised as authorized with regulation.

7.4. Dairy Production

Andhra Pradesh is the fifth largest milk producer in the country. The milk production in the state increased at higher rate in the nineties, much in line with the all-India trend. On the other hand, the milk production in the world declined by 2 per cent in the last three years, according to FAO estimates. The state has a target to become one of the three top milk-producing states in the country and presently produces 54.60 lakh tones of milk per year. This will result in higher surplus and the need to process considerable percent of production to value-added products becomes all the more important. At the all-India level, consumption of liquid milk accounts for about 46% of the total production of milk. The remaining 54 % is utilized for conversion to milk products, out of which the share of the organized sector is only 10%. Though there are no available estimates on the utilization of the total milk for processing, the figures for All-India provide a hunch.

Among the products manufactured by the organized sector are ghee, butter, cheese, ice creams, milk powders, malted milk food, condensed milk infants' foods etc. The processed milk food sector is slowly expanding with new products like casein, lactose, dairy whiteners and different type of cheese. Of these ghee (clarified butter) alone accounts for around 85%. The state has the advantage of large number of good animals. Chaff cutters are to be used to reduce waste of fodders. In the state, fodder crops are not grown unlike Punjab and Haryana. While poultry is mainly in the hands of big players, dairy is still dominated by small and marginal farmers. The milk

production is done in scattered, unorganized and small livestock holdings. So, phyto-sanitary standards cannot be maintained. There are no organised farms for milk/meat except marine products. In milk, presence of *Escheritia coli* and endotoxins due to poor hygiene is a problem. The present consumption levels are less than the minimum standards set by Indian Council of Medical Research in the state. If the levels of living increase, the available milk production falls short. However, a lot of surplus milk is available now. Indian milk sweets are liked in the Middle East and African countries. The land for fodder is impregnated with pesticides etc. The feed formulations contain around 5 percent toxins. Many pesticides are used in India, which are banned in other countries. For example, FPA act identified 24 pesticides as harmful, while the WTO gives 80 such chemicals. The segregation of product lines for local and export should be different. The need for this purpose will be organised dairying and corporate dairying.

The production, storage, transportation and processing of milk is not clean due to lack of necessary infrastructure. Majority of the villages where milk is produced are without clean potable water, assured power supply and all-weather roads. Further, general household sanitation condition is poor. When payment is made, there is no criterion to check the bacteriological quality of the milk. The traditional Indian milk products as well as western products like powder, butter, and cheese are produced manually and in unhygienic conditions. There is a need to produce them mechanically by harnessing and developing new technologies. The major problem for the competitiveness of dairy products is higher cost of production due to low productivity, production and higher operating cost. Organised sector milk sales is mostly in the form of toned milk- resulting in surplus fat. Low fat prices at present are affecting the viability of the dairy industry. The dairy industry will have to face still higher costs on implementing of HACCP, CODEX standards etc. There are no patents for indigenous dairy products.

7.5. Feed Industry

Organized sector accounts for only ten percent of the Indian feed industry. Out of the total production of 3.63 million tones in the organized manufacturing, poultry feed accounts for 53 percent and the remaining is cattle feed. Given the direct links between feed and the safety of foods of animal origin, it is essential that feed production and manufacture be

considered as an integral part of the food production chain. Feed production must therefore be subject to, in the same way as food production, quality assurance including food safety systems based on the HACCP system. There is a need to regulate the sector for quality and to remove the burden of sales tax[28].

8. CONTRACT FARMING IN FOOD PROCESSING

The procurement of raw materials with right quantity and quality, minimum cost and time poses a serious problem for the food processing industries. On the other hand, the small and marginal farmers find it difficult to cultivate lucrative and new processable crops because of the marketing problems and price risks involved. Contract farming can be a possible solution for this[29]. The procurement by contract farming is a better option than open market or corporate farming for processors (Asokan and Singh, 2003). Contract farming can be defined as an agreement between farmers and processing and/ or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices (Singh, 2000 a). It reduces production risk to the processors and price risk to the farmers. However, it is essentially an agreement between unequal parties and caution is needed. There is also a danger of violation of contracts by both parties. In this connection, the state should enact legal provisions for enforcing contracts easily and provide an effective and trustworthy arbitration.

In India, contract farming can be traced back to the 19th century, when farmers produced commodities like cotton, indigo, tobacco etc on contracts. Seed production has been carried out through contract farming by the seed companies quite successfully in the state over the past two to three decades (GOAP, 2002 b). Contract farming is evolving during the past decade in different forms in India to take care of the processing industry needs and farmers, for whom negotiating the price risk in open trade regime became a prime task[30]. However, the available evidence shows that the processing companies are favouring large farmers mainly for undertaking contract

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[28] This is based on Singh et al (2003)

[29] See Eaton and Shepherd, 2001

[30] See Asokan and Singh, 2003

farming[31]. Contract farming practices are so diverse in different countries that no generalization can be made on the positive or negative effects. The impact depends on the physical, social, economic and political background of the country in which contract farming is practiced. Therefore, it has to be studied for each particular case.

Methodology for Field Survey

This study is taken up in the state of Andhra Pradesh and is based on field surveys. Small field surveys in oil palm and gherkin areas were undertaken with an intention to see mainly the working of contracts. However, profitability in terms of costs and returns are also worked out. The field survey for oil palm was undertaken in Tadikalapudi village of K.Kota Mandal5 of West Godavari district based on the highest area in the village and district. The growers are selected purposively to include all sizes and social categories. The Kuppam block of Chittoor district was selected purposively since gherkin cultivation is being taken up in that area for the past few years on contract basis. The farmers are selected randomly. The sample size in both the cases was more than 100. Detailed information was elicited on nature and working of contracts, profitability of farmers etc with a pre-tested schedule. Some open ended questions on the impact on employment; problems; interventions required etc are also included in the schedule. The net returns in unit area of these crops are compared with the net returns in unit area from other crops of the respective growers, since these crops are not grown except under contract to processors. Information collected pertained to oil year 2001-2002 in oil palm and 2002-2003 for gherkin.

8.1.Contract Farming in Oil Palm

Details of Sample Oil Palm Growers

The details of sample growers are presented in Tables 13 and 14 for different size groups and social categories of growers. The average age of plantation is 7.71 years and the gardens of SCs seem to be the older ones relatively. The average extent under oil palm is nearly 4 acres in the sample growers with large farmers growing at an average of 6.29 acres. The distance of FFBs collection center from the gardens is less than 2 kilometers. The

[31]See Singh (2000 a&b); Dileep et al 2002

growers are mostly literate with around 80 percent literacy level. The level of literacy in case of marginal farmers and SCs is very low at 41.67% and 40.0% percent respectively. Most of these growers (76%) sold their FFBs in the study period to M/s. Godrej Ago Vet Ltd and Oilfed is the other player with a processing factory at Pedavegi near Eluru. They are mainly purchasing FFBs from the Department of Biotechnology (DBT) plantation in the area. However, some other farmers are also selling to Oilfed.

Table 13
Details of Sample Oil Palm Growers in West Godavari District of Andhra Pradesh By Size Groups

	Item	MF	SF	Md.F	LF	All
1	No.of sample cultivators	12 (11.54%)	32 (30.77%)	28 (26.92%)	32 (30.77%)	104 (100.0%)
2	Average size of family	4.83	4.47	4.39	4.63	4.54
3	Percentage of illiterate	41.67	31.25	10.71	9.38	20.19
4	Literate up to High School (%)	58.33	53.13	78.57	68.75	65.39
5	Average size of land holding (owned) in ac	1.46	4.32	8.17	19.56	9.62
6	Average extent in ac. under oil palm	2.46	2.38	3.83	6.29	3.96
7	Age of the plantation	9.15	7.91	7.06	7.65	7.71
8	Distance from collection center (kms.)	1.54	1.72	1.77	2.51	1.98
9	%Farmers selling to Godrej company*	75.0	75	67.86	84.38	75.96
10	Time taken to settle bills	15	17	16	16	17

* The other company in the region is Oilfed.

Table 14
Details of Sample Oil Palm Growers in West Godavari District of Andhra Pradesh By Social Groups

	Item	SCs	BCs	OCs	All
1	No.of sample cultivators	25 (24.04%)	15 (14.42%)	64 (61.54%)	104 (100.0%)
2	Average size of family	5.16	5.00	4.19	4.54
3	Percentage of illiterate	40.00	33.33	9.38	20.19
4	Literate up to High School (%)	48.00	60.00	73.44	65.39
5	Average size of land holding (owned) in ac	3.92	5.96	12.75	9.62
6	Average extent in ac. under oil palm	2.26	2.53	4.98	3.96
7	Age of the plantation	8.14	7.88	7.52	7.71
8	Distance from collection center (kms.)	1.64	1.75	2.16	1.98
9	%Farmers selling to Godrej company*	84	60.0	76.56	75.96
10	Time taken to settle bills	16	17	16	17

* The other company in the region is Oilfed.

8.1.1. Working of the Contracts

The Screening Committee of the government allots zones to the processing factories, who in turn shall enter into an Memorandum of Understanding (MoU) with the government. They will have to follow the rates fixed by the government for Fresh Fruit Bunches (FFB), maintain seedlings' garden for supply to farmers and provide extension services to the farmers. In addition, there is a Price Fixation Committee (PFC) in the state with government officials to fix the price. Now the prices are fixed on a quarterly basis. These entrepreneurs are involved fully in the oil palm development right from the import of planting material, raising seedlings in their own nurseries, distribution of the seedlings to the identified farmers, helping them in the layout of the plantation, arranging inputs like fertilisers, providing technical advice through periodical visits, establishing collection centers and processing the fresh fruit bunches (Rethinam 1999). They deduct the cost of inputs from the payment to be made for the fresh fruit bunches. They also claim the subsidy amount from the government. There are no written contracts between the factory and the farmers. The farmers are free to sell

to whomever he wants. Because of the perishable nature of the product, the grower has to dispose of the produce immediately after the harvest. The Government of Andhra Pradesh allotted each growing zone to a particular processing company and others are not allowed to set up factory in that area. Moreover, the produce does not have any alternate uses or alternate channels of marketing. Therefore, the growers depend on the factory only. In the initial years, the growers used to take the produce to the factory using their own means of transport, which added to the cost very heavily. On the request of the farmers, the factory management opened collection centers at different places, so that they are near to the gardens.

The processor appoints an 'Agent' in the collection center. Generally, the Agents are from the same village and one of the big oil palm growers. He collects the FFBs from the growers in the collection center after weighment and gives a receipt to the farmers. He later sends the produce to the factory immediately. The processors pay the commission to the Agent at the rate of a fixed amount for each tone of the produce sent to the factory. The transport of the produce from the collection center to the factory is taken care of by the management only. The factory managers send the payment by cheques. The factory management deploys its own technical personnel to give technical guidance. Besides, the Department of Horticulture of the state created a special structure for extension services to oil palm. This does not exist now. Further, the National Research Centre for Oil palm (NRCOP) was set up at Pedavegi, a place nearer to the study area. They conduct research into the different aspects of oil palm cultivation. They also conduct meetings at specific intervals and impart technical guidance to the farmers, extension personnel, processors etc. The NRCOP formed a Society for Promotion of Oil Palm Research and Development (SOPOPRAD) to cater to the wide-ranging demands of the oil palm community. On the whole, the contract arrangement between the processor and the growers seem to be working well for both.

1.2. Costs and Returns in Oil Palm

The study of costs and returns show that the farmers are getting a net returns of Rs.5756 per annum on one acre of land from oil palm and Rs.6129 from inter crops (Table 15). The farmers are taking up maize, banana, groundnut, ragi, cotton etc as inter-crops. Very few of them are

taking up high value crops like cocoa, pepper, vanilla etc., as intercrops, even though the state government is keen on it. The return over variable cost is Rs.11227 per acre per annum. The oil palm grower is better off getting nearly Rs. 17500 per acre per annum with oil palm than getting Rs.8239 (returns over variable cost per acre) without oil palm. The risk element in agricultural production and marketing is considerably eliminated with a garden crop like oil palm, which gives yield for 25 long years. The contract farming eliminated the price risk considerably and the farmers need not worry on how to market all the time.

Among the size classes of farmers, all the sizes of farmers are able to get higher returns than 'without oil palm' situation from the main crop and intercrops. The large farmers are getting the highest profit. They are getting the highest net returns and return over variable cost of Rs.8661 and Rs.13343, respectively. They are also getting Rs.11247 from intercrops per acre per annum. On the other hand, their net income over variable cost from other crops was Rs.14285. However, even the marginal, small and medium farmers were covering all costs fully and earning a net profit and the returns from main crop and intercrops outweigh the 'without oil palm' situation. On the other hand, the returns over variable cost (Rs.7963) and income from intercrops (Rs.889) was less than the returns over variable cost from 'without oil palm' situation (Rs.8927) for BCs, who are 14.42% (15 numbers) in the sample (Table 16). But, they are also covering all costs and getting a net profit of Rs. 2445 per acre per annum. Their cost of production per quintal was the highest at Rs.309 per quintal. However, they do not get the same income from other agricultural crops in all the years and there will be considerable production and price risks. In the case of oil palm, they are eliminated considerably. All other social groups viz., SCs and OCs are very comfortable with oil palm with the OCs getting the maximum benefit.

The cost of production per quintal worked out to be Rs.243 on an average and it was Rs.262 for the small farmers. The efficient producers are the SCs (Rs. 226/qtl) followed by OCs (Rs.271/qtl) and BCs (Rs. 309/qtl). The average price realized by the growers was Rs.370 per quintal and it ranged between Rs.367 -374.

Table 15

Costs and Returns from Oil Palm in West Godavari District of Andhra Pradesh for Different Size Groups Per Acre

Sl. No	Item	Marginal farmers	Small Farmers	Medium farmers	Large farmers	All
1	Total variable cost	8678	9752	9174	10837	9863
2	Risk &management cost	868	975	917	1084	986
3	Rental value	2000	2000	2000	2000	2000
4	Total cultivation costs	12170	14138	13241	14689	13827
5	Transportation charges	1096	734	718	538	658
6	Total cost	13266	15983	13957	15519	15334
7	Gross returns	18500	19818	20460	24180	21090
8	Net returns	5234	3835	6503	8661	5756
9	Return over variable cost	9822	10066	11286	13343	11227
10	Benefit cost ratio over variable cost	2.13	2.03	2.23	2.23	2.14
11	Benefit cost ratio over total cultivation Cost	1.52	1.40	1.55	1.65	1.53
	Benefit cost ratio over total cost	1.39	1.24	1.47	1.56	1.38
12	Cost of production per quintal	243	262	241	226	243
13	Net income from inter crops	4075	4402	2410	11247	6129
14	Net income from other crops	1783	5851	7042	14285	8239
15	Price received per quintal (Rs)	370	367	372	372	370

Other Aspects: Many farmers (64.08%) reported higher employment for family labour. Employment opportunities to other labourers are also reported to be high by 55.34 percent of growers (Table 17). However, 16.51% of the growers reported that the emplodsxyment opportunities to women are lower in oil palm cultivation. Among the natural calamities, crop loss due to cyclone was reported by 49.51 per cent of farmers. These farmers incurred huge losses due to damage by cyclonic winds in 1996. Crop losses due to low rainfall and high temperatures were reported by 3.88 and 5.83 percent of farmers. The processors also informed that due to severe temperatures and low relative humidity, the oil recovery percentage is going down. Among the problems expressed by farmers, delay in payment, delay in fixation of price and fluctuation in prices are the major ones. The growers felt

Table 16
Costs and Returns from Oil Palm in West Godavari District of Andhra Pradesh for Different Social Groups Per Acre

Sl. No	Item	SCs	B.Cs	O.Cs	All
1	Total variable cost	7858	10737	12402	9863
2	Risk &management cost	786	1074	1240	986
3	Rental value	2000	2000	2000	2000
4	Total cultivation costs	11744	15431	16521	13827
5	Transportation cost	713	825	628	658
6	Total cost	13341	16255	17423	15334
7	Gross returns	19448	18700	22448	21090
8	Net returns	6107	2445	5025	5756
9	Return over variable cost	11590	7963	10046	11227
10	Benefit cost ratio over variable cost	2.47	1.74	1.81	2.14
11	Benefit cost ratio over total cultivation Cost	1.66	1.21	1.36	1.53
12	Benefit cost ratio over total cost	1.46	1.15	1.29	1.38
12	Cost of production per quintal	226	309	271	243
13	Net income from inter crops	3373	889	8364	6129
14	Net income from other crops	4618	8927	9512	8239
15	Price received per quintal (Rs.)	374	374	368	370

that the oil palm cultivation could be improved by enhancing drip subsidy for oil palm growers, provision of sophisticated harvesting equipment, provision of technical advice, increased interaction with factory management by monthly meetings, training, supply of quality seedlings and constant price. An overwhelming majority of the growers wanted the government to intervene and provide power for 15 hours a day instead of the present 7 hours. Provision of remunerative prices, subsidy for bore-well digging, loan facility and crop insurance are the other areas, where the growers requested government intervention. On the whole, the farmers are satisfied with the contractual arrangement.

Table 17
Responses of Oil Palm Growers on Different Aspects of Contract Farming

Sl. No	Item	% of farmers
1	% of farmers reporting higher employment of family labour	64.08
2	% of farmers reporting higher employment opportunities	55.34
3	% farmers reporting lesser employment to women	16.51
4	% of farmers reporting crop loss due to cyclone	49.51
5	% of farmers reporting yield loss due to low rainfall	3.88
6	% reporting yield loss due to high temperature	5.83
7	% reporting the problem of delay in payment	8.74
	% reporting problem due to delay in fixation of price	8.74
	% reporting problem due to fluctuation in prices	7.77
	Suggestions for improvement	
8	% suggesting enhanced drip subsidy as required for improvement of the system	17.48
9	% suggesting provision of harvesting instruments	9.71
10	% suggesting of provision of technical advises and training	6.80
	% suggesting monthly meeting with factory officials and training	4.85
	% suggesting supply of quality seedlings	7.76
	% suggesting provision of constant price	4.85
	Governments interventions requested	
	% requesting increase in power supply from 7 hours to 15 hours	85.44
	% requesting provision of remunerative price	32.04
	% requesting supply for borewell digging	19.42
11	% requesting government intervention for drip subsidy enhancement	7.77
12	% requesting government intervention for loan facility	6.80
	% requesting crop insurance	2.91

The growers are apprehensive about the price fixation method. They want that some independent organisation like NRCOP must be asked to judge the oil recovery percentage, instead of relying on the processors report alone. Further, they want some minimum price to be assured, because their cost of production is Rs.241, on an average and it is as high as Rs311 per quintal for some of the growers. If the price falls below Rs.3500 per tone of FFBs, many of them cannot cover variable costs. This could be the reason for large scale uprooting after 1998 and distress among the growers

at that time. Therefore, the price fluctuation must be reduced in case of oil palm. There is a need for government intervention in this regard. Otherwise, the area under this crop cannot increase and reach the potential of 4.00 lakh hectares. Further, it was observed that the water table is going down fast in the oil palm gardens. Many growers told that they noticed a decline of one foot for each year. This fact also should be kept in mind in further development of oil palm. To overcome this problem, drip irrigation must be made mandatory in oil palm and research on development of drought tolerant varieties must be intensified and accelerated with immediate effect.

8.2. Contract Farming in Gherkin

Gherkin is an exotic crop and is being grown in Kuppam area of Chittoor for export of the semi-processed product. It is a short duration and labour intensive crop. The introduction of gherkin on contract basis in Kuppam area was preceded by interventions in agriculture by the state government to modernize the sector in semi-arid region and where agriculture is undertaken in a conventional manner. They also introduced drip irrigation for vegetables and other crops9. Later, the processing factory was started at Tummisi near Kuppam. This crop attracted attention of the farmers in the state and became popular. The crop is relatively older in Karnataka. The results of the present study are presented hereunder.

8.2.1. Working of the Contracts: The BHC Agro (India) Ltd (BHCAI) acts as a facilitator. The field staff of this company collects the list of farmers, who are willing to take up gherkin cultivation. The processors will assess the demand for exports and informs their requirement grade-wise to the BHC Agro (India) Ltd. Later, the BHC officials allot this requirement among farmers and inform them about the requirements of the processors. They also supply seeds, fertilisers and pesticides to the allotted farmers on loan basis without any interest at market rates. The BHCAI also provides some advance money, if the farmer wants. They deduct this amount from the payment to be made to the farmers. The processing factory does not depend exclusively on the supplies from BHCAI and they have their own farms for supply of raw materials. They arrange vehicles to collect the fresh gherkins from farmers every day. The farmers collect the fruits every day and bring to the adjacent main road. The farmers grade them there itself before being collected by the factory people. After taking the produce, the factory people

give receipt for the quantity grade-wise. Later, they will grade it according to their processing needs. Then, they will add some preservatives to the product and bottle it. This semi- processed product will be exported. The importing country will de-brine it and process it again for consumer use. The processors informed that at any given point of time, 150-200 acres of crop will be allowed on the field. The payment will be made through BHCAI and the BHCAI takes a certain percentage of the price as charges for facilitation.

8.2.2. Details of Sample Gherkin Growers

Many small (37%) and marginal (10%) farmers also cultivated gherkin in the area along with medium (30%) and large farmers (23%) (Table 18). Majority of the sample farmers are BCs viz., 68% (Table 19). The average size of the family is very high in case of large farmers compared to others. The average extent under the crop is very low viz., 1.03 acres and ranged from 0.40 acres for marginal farmers to 1.41 acres for large farmers. The farmers are mostly literate with a literacy level of 83.5%. However, the small farmers (50%) and SC farmers (40%) have low levels of literacy. Almost all the large farmers (96%) and OC farmers (86%) have drip irrigation facility. None of the SC farmers, 50% of marginal farmers and 55% of small farmers are having drip facility. The average time taken to settle the bills was 17 days. The storage losses are negligible. The collection centers are very near to the fields.

Table 18

Details of Sample Gherkin Farmers in Chittoor District of Andhra Pradesh

	Item	MF	SF	Md.F	LF	All
1	No.of sample cultivators	10 (9.71%)	38 (36.89%)	31 (30.10%)	24 (23.30%)	103 (100%)
2	Average size of family	5.70	5.84	6.77	7.50	6.50
3	Percentage of illiterate	50.00	18.42	9.68	8.33	16.50
4	Literate up to High School (%)	40.00	57.89	70.96	79.16	65.05
5	Average size of land holding (owned) in ac	1.75	3.84	6.93	14.63	7.08
6	Average extent in ac. under gherkins	0.40	0.75	0.95	1.41	1.03
	Percent farmers with drip	50.00	55.26	74.19	95.83	69.90
7	Distance from collection center (kms.)	1.00	1.05	1.06	1.00	1.04
8	Rate received for all grades	695.73	712.68	724.31	714.83	714.99
9	Storage loss in qutls.	0.02	0.00	0.11	0.00	0.03
10	Time taken to settle bills	17	16	18	15	17

Table 19

Details of Sample Gherkin Farmers in Chittoor District of Andhra Pradesh Across Social Groups

	Item	S.Cs	B.Cs	O.Cs	All
1	No.of sample cultivators	5 (4.85%)	70 (67.96%)	28 (27.18%)	103 (100%)
2	Average size of family	6.20	6.56	6.39	6.50
3	Percentage of illiterate	40.00	20.00	3.57	16.50
4	Literate upto High School (%)	40	60	82.14	65.05
5	Average size of land holding (owned) in ac	4.00	6.22	9.79	7.08
6	Average extent in ac. under gherkins	0.70	0.94	1.37	1.03
	Percent farmers with drip	0.00	68.57	85.71	69.90
7	Distance from collection centre (kms.)	1.40	1.01	1.04	1.04
8	Rate received for all grades	660.0	713.25	726.89	714.99
9	Storage loss in qutls.	0.00	0.05	0.00	0.03
10	Time taken to settle bills	16	17	16	17

8.2.3. Costs and Returns from Gherkin

The analysis of costs and returns from gherkin shows that cultivation of gherkin crop is profitable from the point of view of farmers (Table 20). All the sample farmers, on an average, got a net return of Rs. 6871 per acre per crop and Rs. 14166 over variable cost. This is against a net return of Rs.11016 per acre per annum over variable cost from other crops. In addition, the crop being a short duration crop, farmers can go for another one or two crops in the same year. It was observed that 34%, 9% and 3% of the sample farmers went for the second, third and fourth crops, respectively. Even if the farmer cannot go for the second or third crop of gherkin, the farmer has the chance to take up other crops, as gherkin vacates the field in less than 80 days. The other crops grown by the farmer include high value crops like tomatoes, chillies, potatoes, flowers, sugarcane, paddy etc as majority of them have drip irrigation facility. The cost of production per quintal was Rs. 600 and the average rate received per quintal was Rs.717. The benefit cost ratio was 1.19. The average physical yield obtained was 72 quintals per acre. The farmers told that the yields increased after the contract system because of extension services and also because of the drip irrigation.

Among the size groups, all the size groups covered all the costs and earning net profits. All the size groups got higher returns from gherkin per acre per crop than the returns in an acre of land from other crops. The net returns to the large farmers were the highest at Rs.25175 per acre, as they are the most efficient producers with a cost of production of 370 per quintal. Further, 96% of the large farmers have drip irrigation in their fields and their literacy levels were also high. Some of the farmers reported virus problem for the crop and that resulted in considerable reduction of the yield.

Coming to the social groups, BCs and OCs covered all costs and got net returns whereas SCs could not cover all costs (table 21). In both these groups of farmers, return over variable cost from gherkin crop per acre was more than that from other crops grown by farmers. However, even the SCs covered variable costs and got a return of Rs. 4980 over variable cost. However, the percentage of SC farmers in the sample was only 4.85. Here, the OCs were found to be the efficient producers with a cost of production of Rs.506 per quintal.

Table 20

Costs and Returns from Gherkin in Chittoor District of Andhra Pradesh for Different Size Groups Per Acre

	Item	Marginal farmers	Small farmers	Medium farmers	Large farmers	All
1	Total variable cost	37191	42072	36858	22376	37458
2	Risk &management cost	3719	4286	3686	2238	3746
3	Rental value	2000	2000	2000	2000	2000
4	Total cultivation costs	42910	48358	42544	26614	43204
5	Grading cost	2093	1886	1351	1059	1549
6	Total cost	45003	50244	43895	27673	44753
7	Gross returns	48720	57196	47771	52848	51624
8	Net returns	3717	6952	3876	25175	6871
9	Return over variable cost	11529	15124	10913	30472	14166
10	Benefit cost ratio over variable cost	1.31	1.36	1.30	2.36	1.38
11	Benefit cost ratio over total cultivation cost	1.14	1.18	1.12	1.99	1.19
12	Net income from other crops	10724	9256	8385	17473	11016
13	Rate Received per Qtl	696	724	713	734	717
14	Cost of production per quintal	613	612	635	370	600
15	Cost of production per quintal over variable cost	531	533	550	311	520

Table 21

Costs and Returns from Gherkin in Chittoor District of Andhra Pradesh for Different Social Groups Per Acre

	Item	SCs	B.Cs	O.Cs	All
1	Total variable cost	24720	38940	33600	37458
2	Risk &management cost	2472	3894	3360	3746
3	Rental value	2000	2000	2000	2000
4	Total cultivation costs	29192	44834	38960	43204
5	Grading cost	1946	1252	2240	1549
6	Total cost	31138	46086	41200	44753
7	Gross returns	29700	51408	56903	51624
8	Net returns	-1438	5322	15703	6871
9	Return over variable cost	4980	12468	23303	14166
10	Benefit cost ratio over variable cost	1.20	1.32	1.69	1.38
11	Benefit cost ratio over total cultivation cost	1.02	1.15	1.46	1.19
12	Net income from other crops	5582	9883	14823	11016
13	Rate Received per Qtl	660	714	739	717
14	Cost of production per quintal	649	623	506	600
15	Cost of production per quintal over variable cost	549	541	436	520

8.2.4. Other Aspects

The crop increased employment opportunities to family labour as well as other labourers and also wages (Table 22). Major problems in cultivation were virus attack and yield loss to gherkin (38 % of respondents) and low rainfall for the past few years (11% of respondents). The other problems relating to the contract were delay in payment (65% of respondents) and of rejects (27% respondents). As noted above, the average time taken to settle the bills was only 17 days in the study. The respondents told that the problem was there previously and it seemed all right during the study period as far as time taken for payment was concerned.

Table 22

Responses of Farmers on Different Aspects of Contract Farming

Sl. No	Item	% of farmers
1	% of farmers reporting higher employment of family labour	100
2	% of farmers reporting higher employment opportunities	100
3	% of farmers reporting increase in wages	19.42
4	% of farmers reporting crop loss due to virus	37.86
5	% of farmers reporting yield loss due to low rainfall	10.68
6	% reporting the problem of delay in payment	65.05
7	% reporting problem of rejects	27.18
	Suggestions for improvement	
8	% suggesting drip subsidy as required for improvement of the system	14.56
9	% suggesting finalisation of grading at the collection center itself	20.39
	Government interventions	
10	% requesting government intervention for supply of power for minimum of 10 hours instead of 6-7 hours	76.70
11	% requesting government intervention for crop insurance to gherkin	30.10
12	% requesting government intervention for quality pesticides	17.48

The respondents felt that the contract system is working well and solved the problem of marketing, input purchase and extension services. The respondents (20%) told that the contracts could be improved by finalizing the grading process at the collection center only. They told that the processors are grading again at the factory and reject the shriveled fruits.

This, according to them, is leading to a variation of weight of up to 10-20% and they want that the grading be completed at the collection center itself. Some of the respondents (15%) felt that that drip subsidy could be extended for increasing production of the crop. Around 77 percent of the farmers wanted the government to supply power for a minimum of 10 hours in place of the present 6-7 hours. They also asked for crop insurance (30% of the respondents) and quality pesticides (17% of the respondents).

Concluding Observations

The contracts are working, on the whole, well in both the crops. The firms try to attract with favourable conditions initially, but later tighten them as a part of agribusiness normalization (Glover and Ghee 1992). Therefore caution is needed before a final conclusion can be drawn on the usefulness of contract farming in the state for the farming community. The contracts in oil palm are widespread, covering many farmers and stabilized. There are nearly 5000 oil palm growers on contract to the company from which sample study was done. According to one estimate there are more than 30000 oil palm growers under contract to different companies in the state. Presently, the total coverage under gherkin is very low. However, it is likely to expand in future.

The contracts work through facilitator in gherkin. This is a type of contract farming called 'intermediary model' in the literature. This model is mostly found in Southeast Asia. In this model, there is no direct link between the processor and the farmer; and the sponsor may lose the control of production and quality as well as prices received by farmers resulting in lower income to the farmers (Eaton and Shepherd 2001). There are some signs of mistrust between the facilitator company and local farmers. Since gherkin is also being encouraged in agri-export zone for gherkins10 and also in some other districts by the facilitator company, this model of contract farming may be the dominant model in the state in the coming period, which may not be desirable. Though the processors of oil palm procure the FFBs from collection centers by an Agent, the role of the agent is very limited unlike in case of gherkin. It starts with procurement of FFBs and ends with sending the material to the factory. Further, contract farming in gherkin has one of the characteristics of 'nucleus model' of contract farming viz., maintaining their own gardens for guaranteeing regular supply of raw material without

interruption. The contracts are also evolving gradually to accommodate both parties. To cite a few examples, oil palm processors did not have any collection centers initially and the farmers had to take the fruit bunches all the way to factory on their own. Later, with pressure from the growers, the processors opened number of centers and they bear the transport charges from collection centre to factory now.

The participation of small farmers in oil palm cultivation is almost negligible. However, it is surprising to note that the crop was introduced in the state with an intention to help the small farmers get additional income11. That was the reason for the higher average age of plantations of marginal farmers and S.Cs. But later, sensing good profits, large farmers entered the cultivation. On the other hand, the long gestation period (4 years), high investment needed for the crop despite subsidies, no special package for cultivation of intercrops as in coconut and the lack of separate line of credit seem to have alienated the small farmers from oil palm cultivation. In gherkin, participation of small farmers was considerable. This may be because of labour intensive nature of the crop and drip irrigation facility created in their fields with subsidies as part of the Kuppam Project. There are instances in other countries where the processors favoured small farmers for contract farming because of low cost production in some crops and areas, directions of the government and availability of family labour (Singh 2000b). Further, it was found that the participating large farmers in gherkin have higher family size. The state government did not make legislation either to enforce contracts or to provide for arbitration. But the A.N.G.R. Agricultural University has undertaken research on gherkin and National Research Centre on Oil Palm in West Godavari is engaged in research and trainings to farmers. The yields of gherkin increased after the farmers started cultivating under contract to the processors because of their technical advice and also supply of inputs in time. Besides, drip irrigation system has been introduced in their fields at the same time.

The contracts are oral in both the cases and price is not assured in oil palm. The price fixation committee of the government announces price for each quarter in oil palm based on a criterion, which includes oil recovery percentage to be reported by processors. The processors have to pay the rate fixed by the government. However, there is no transparency in the system and it works to the advantage of the processors by being able to

show low recovery percentage of oil. In both the crops, there are cases of violation of contracts by farmers in the lure of higher prices. The contribution of processors to the local economy is almost negligible except increase in employment for family labour and casual labour in both the cases to some extent. In oil palm gardens, the depletion of ground water level is faster compared to other crops and in many of the gardens, the bore wells are drying up after 5 years. Some corrective measures like compulsory use of drip for oil palm and intensification of the research for drought resistant varieties are needed. Otherwise, the plantations may not be sustainable in the long run. In the case of gherkin, the processing industry is totally dependent on exports for sustenance, which may not be ideal. There is a need to make efforts to create local demand for the product.

The institutional arrangement of contract farming was found to solve the problem of supply of quality raw material to the processors to a great extent. On the other hand, the participation of small farmers in contract farming is not automatic and state should take steps to ensure their participation, as it was observed that public investments in creation of drip facilities enabled small farmers to take up gherkin crop under contract in the study area. Further, it needs to be mentioned that contract farming cannot be a panacea for all the problems of food processing sector in the country. Several policy initiatives are needed in this direction. There is a need to create ministries and departments of food processing industries at the state level also so that the entrepreneurs need not go round number of ministries and departments for clearance. The problem of high incidence of taxes can be solved if the state governments also exempt the sector from sales tax and market cess till a minimum mass is created. This can be justified in view of the employment and poverty reduction effects in rural areas. The agricultural research in the country, which is till now concentrated on increasing productivity, should now be geared up to the challenges in the processing by developing processable varieties and aiming specific characteristics. The inadequacy of rural infrastructure like power, rural roads, cold storage units, pre-cooling units, quality testing laboratories, refrigerated vans etc must be addressed immediately by raising public investments. The availability of credit, extension services, packing material at low cost and feed is crucial in the development of processing activities in the rural areas. The participation of civil society organizations needs to be encouraged. If these issues are addressed, food-processing sector can create additional

jobs with relatively lower investments12 and can arrest the declining growth rates of employment in the rural areas13.

9. FUTURE AREAS AND INFRASTRUCTURE

9.1. Future Projects

Organic farming in some crops in a small scale, neutraceuticals and functional foods, dehydration and freeze dried industry, new crops like Annato, vanilla, pepper etc., Biofuels, dried flowers, coconut complexes etc., are the future thrust areas for the state. The government needs to move in this direction by creating an enabling environment. Some of these projects are discussed below.

9.1.1. Organic farming

The importance and market for organically produced agricultural products is increasing. In several developed countries organic agriculture has come to represent a significant portion of the food system (10 percent in Australia, 7.8 percent in Switzerland) and many others are experiencing growth rates that exceed 20 percent annually (e.g. USA, France, Japan, Singapore). Some of the developing countries have begun to seize the lucrative export opportunities presented by organic agriculture (e.g. exports of Mexican coffee, Ugandan cotton). Though only a small percentage of farmers are expected to become organic producers, consumers demand for organically produced food and fiber products provides new opportunities for farmers and business around the world. The companies are buying certified organic products.

The term 'organic' is a process claim and not a product claim. The FAO/ WHO Codex Alimentarius Commission adopted guidelines for the production, processing, labeling and marketing of organic foods in June 1999. The major organic crops identified for export promotion are spices and herbs, nuts, cashew nuts and peanuts, processed tropical fruit, dried/frozen concentrated or aseptically bottled and packed, cocoa, coffee, coconut, tea, cotton, soya, rice and other edible crops, processed vegetables like gherkins and pickles and white sesamum seeds. The problems for farmers in this cultivation is uncertain premiums, no organized market, reduction in yields during the conversion period, availability of organic materials and organic fertilisers, impact on variable costs, institutional support and standards. The conversion period is 3-5 years and it needs intensive application of organic

fertilisers, green manure, vermicompost, bio-fertilisers and bio-pesticides. Certification cost is an issue of concern. The cost of certification varies. It generally costs $350 per day for the inspection visit. Presently, Spices Board and the Coffee Board are subsidizing the cost of certification. The premium, on an average is around 20% for all the commodities. However, for rare crops like vanilla, cashew etc, a premium of very high level (sometimes 200-300%) is also possible.

Productivity in organic paddy is not low. By third year, the per acre yield will be normalized. In a study conducted in a sample of 120 sample farms in Shimoga district of Karnataka, it was found that the organic farms produced 22 and 18 percent higher yield of paddy and sugarcane respectively over those of inorganic farms. Non-availability of required quantity of organic fertilisers and high cost of transportation were major problems faced by the organic growers. It indicates the necessity of large-scale multiplication of biofertilisers, vermicompost, bio-control agents etc (Huchhappalavar and Kunnal, 2002). A Task Force or High Level Committee may be constituted to encourage and remove hurdles to organic farming.

In the initial years, it may not be possible for the farmers to grow organic products on their own given the complicated procedures of certification and marketing. The reduction of yields in the transition period also poses a burden on the farmer. Therefore, contract farming is required in this sector to encourage certain select items, which may be decided based on the opinions of the experts in the field. Another innovative option would be to develop some organic farming areas depending on the availability of organic matter. For example, Karnataka government declared two districts nearer to forests as organic districts. There is a case for this type of decision in the state, keeping in view the large availability of organic matter in many of the districts with large areas under forests. However, organic farming has its own limitations and cannot be recommended in the immediate future as a general prescription and should be confined to cases, where there is assured market. There is also a need to set an accreditation agency for the purpose in the state.

9.2. Infrastructure

The level of infrastructure in the state is very poor. Provision of regular and sufficient power and water is the foremost difficulty. Rural connectivity is

another major issue. Specifically, for the food processing industries to come up, cold storages, pre-cooing units, refrigerated vans, refrigerated containers, credit, technical guidance, pack houses, packing material at lower cost, quality control laboratories, radiation facilities, training facilities, repair facilities for the machinery are to be provided. Many of the issues are covered in foregoing analysis. However, problems in cold storage facilities, establishment of radiation technology, packing, trainings are elaborated here.

9.2.1.Cold Storages: There are 119 cold storage units in the state with a total capacity of 4.87 lakh metric tones capacity (table 23). Further, a cold storage and cargo handling facility for perishables has been set up at Rajiv Gandhi International Airport, Hyderabad over an area of 445 sq.mts. This has the capacity to store 6 built up aircraft pallets and provision for building up the aircraft pallets on a hydraulic operated lowerable workstation. All the cold storages in the state control temperature and humidity in the air. But fruits and vegetables can be stored for much longer periods, if we can control oxygen, carbon dioxide and nitrogen gases and avoid 'chilling injury'. These storages are called modified atmosphere storages. Further, pre-cooling should be done to prolong the storage life effectively in cold storages. This is especially so for fresh fruits, vegetables and cut flowers. The harvested produce of these things must be brought down to 0-1 degree Celsius within 8 hours. Then they may be graded based on size, colour and quality and either stored in cold storages or transported through refrigerated vans for export. In Guntur, all the cold storages are used to store dry chillies; storages at Punganoor, Madanapalle are used to store tamarind mainly and potatoes, mango and processed tomato products to some extent; and storages at Hyderabad are used to store grapes, pomegranate and sweet orange.

There are some difficulties in maintenance of cold storages. Levels of tariff, erratic supply and cut are the major problems. These necessitate use of generators, which is a costly affair. In the state, it was observed that these storages are used mostly by business people than farmers. The awareness of the farmers in this regard is also very poor. The cold storages are not occupied round the year. Therefore, the cost per unit will be very high. The cost per unit of storage is kept at Rs. 800-1000 per tone for one year. This does not change even when one stores for shorter periods. Then, the

stored products must be reached to the consumers in a short time. Because of the huge investment, farmers are unable to start cold storage units. However, if the farmers form into cooperatives or registered associations, the subsidies from different organsiations like National Horticulture Board, APEDA, Ministry of Food Processing Industries can be accessed to establish cold storages.

Table 23
Cold Storage Facilities in A.P.

Sl. No	District	Number of cold storages	Capacity (tones)
1	Srikakulam	1	3600
2	Vizianagaram	4	24500
3	Visakhapatnam	8	40800
4	East Godavari	2	4000
5	West Godavari	1	4200
6	Krishna	8	48230
7	Guntur	42	169774
8	Prakasam	3	11000
9	Nellore	4	15600
10	Anathapur	7	24750
11	Kurnool	1	4700
12	Chittoor	5	13200
13	Nizamabad	2	9400
14	Khammam	7	18700
15	Warangal	8	27000
16	Medak	1	1500
17	Rangareddy	10	46700
18	Mahaboobnagar	1	3500
19	Hyderabad	4	16330
	TOTAL	119	487384

Note: There are no units in Kadapa, Karimnagar, Adilabad, Nalgonda

Source: Government of A.P, 2001.

There is a vast scope to build and maintain cold storages near the production centers. The government on its part showed willingness to allot one ace of land in the marketing yards on long lease basis. The facility of pre-cooling and cold storage available at Vijayawada is being utilised by mango and chilly exporters and facility at Hyderabad is being utilised by grape growers. There is also a need to set up pre-cooling units and refrigerated vans for vegetables and refrigerated containers for exports.

9.2.2.Radiation Technology: Radiation processing technology could be used for preservation and hygienisation of food products. The safety of this technology to treat foods has been endorsed by WHO, Codex Alimentarius Commission, U.S. Department of Agriculture, and Food and Drug Administration of the U.S (Kakodkar, 2003). Under the Montreal Protocol, the use of traditional chemicals like Methyl Bromide, Ethylene di bromide, Ethylene di chloride, Ethylene oxide for fumigation of grains and other materials are phased out by the year 2005. Some of the countries like U.S.A, Japan and many in Europe have already banned the use of several common fumigants. Radiation technology provides an effective alternative to fumigants, which are being banned. The problem of dis-infection of pre packed foods cannot be solved by fumigation and irradiation is the only answer. Further, the changing consumer tastes in the Western countries increase the importance of fresh fruits and vegetables and the concept of minimum processing. For this, the shelf life of fresh fruits and vegetables needs to be increased by irradiation (BARC, 2001).

Radiation technology can be harnessed in several ways depending on the need (table 24). With adequate packaging and storage regimes, it increases possibilities of handling and distribution of farm produce, thereby improving its supply and management. Because of the lack of irradiation facilities, A.P shrimp is being taken to Vietnam for irradiation. The technology can overcome quarantine barriers in exportable agricultural commodities including cut flowers. Counties including USA, Australia and New Zealand have already amended their regulations allowing import of radiation processed fruits and vegetables.

A technology demonstration plant (KRUSHAK) was established by Bhabha Atomic Research Centre at Lasalgaon, a premier onion growing area in Maharashtra. Radiation processing plants need to be established in the state for harnessing the technology. It costs nearly seven crore rupees to establish one unit. The government may install one plant in the public domain for use of processing industries and further popularization.

Table 24

Different Uses of Radiation Technology in Food Processing Approved by Government of India

Sl. No	Name of food	Purpose	Dose (kGy)	
			Minimum	Maximum
1	Onion	Sprout inhibition	0.03	0.09
2	Potato	Sprout inhibition	0.06	0.15
3	Ginger, garlic, Shallots (small onion)	Sprout inhibition	0.03	0.15
4	Mango	Disinfestation (Quarantine) (also stone weevil)	0.25	0.75
5	Rice, semolina (rawa), Wheat flour (atta), maida, dried sea foods and pulses	Insect disinfestations	0.25	1.00
6	Raisins, figs and dried dates	Insect disinfestations	0.25	0.75
7	Meat and meat products including chicken	Shelf-life extension & pathogen control	2.50	4.00
8	Fresh sea foods	Shelf- life extension under refrigeration	1.00	3.00
9	Frozen sea-foods	Pathogen control	4.00	6.00
10	Spices	Microbial decontamination	6.0	14.0

Source: BARC, 2001.

10. POLICY RECOMMENDATIONS

Based on the analysis in this study, we provide the policy recommendations are provided under the following broad headings- institutional, taxes and subsidies, research and training, infrastructure and other suggestions.

10.1. Institutional Issues: All food processing industries may be brought under an independent ministry of food processing industry at state level to coordinate with food processing ministry at the Centre and to avail the benefits of various schemes and programmes promoted by centre. A Department of food processing industries must be formed under the ministry of food processing industries. The insurance facilities may be extended to all the horticultural crops and livestock products. Laws may be framed to enforce contracts and provide for trustworthy and effective arbitration in case of violation by either party. The civil society organisations (NGOs)

may be encouraged to participate in food processing sector. The animal slaughter laws may be amended to allow cutting of even the young animals. The farmers growing fruits and vegetables may be encouraged to form into growers associations separately for each product so as to be able to utilize incentives from National Horticultural Board, APEDA, NCDC etc. Regulation and development of plant biotechnology for the food processing sector and other applications may be undertaken by the ministry of agriculture and horticulture. The Governing body of the agricultural university may accommodate different stakeholders like industry representatives from fruits and vegetables, meat, poultry and fish processing industries. The oil palm growers may be provided a minimum guarantee price and their representative may be involved in price fixation process. AEZs may be established for poultry in East and West Godavari, fisheries in Nellore or Prakasam, meat in Medak etc. AEZ for chillies at Guntur, for banana at Pulivendula etc., APEDA should also deal with export of non-basmati rice in its list of items. Crop centric processing zones for pomegranate, papaya, guava, cashew apple, banana, vegetables etc., may be started. Encourage contract farming for major feed ingredients like maize, soybean etc. The establishment of Mango Board, National Poultry Development Board may be considered.

10.2. Taxes and Subsidies: The sales tax and market cess on food processing industries may be removed up to the time of formation of critical mass. The duties and taxes on packing material used by food processing industry may be relaxed. The government may subsidise pack houses, packaging material, pre-cooling units, and small cold storage units for some time. Poultry sector may be treated continuously on par with agriculture for electricity tariff and taxes. The purchase tax for fresh fruit bunches as well as sales tax may be exempted for a few years till the oil palm area is stabilized.

10.3.Research and Training: Large- scale publicity may be given to use of processed fruits, vegetables, meat, chicken, fish etc to educate the general public. The university may intensify research on suitable varieties for processing and machinery. There is also a need to develop technology to cater to the needs of small and tiny units in the unorganized sector. The university may undertake demand driven research to promote food-processing industry in the state. The post-harvest technology department of the university must be strengthened with required personnel and funds to

develop and demonstrate the technologies. The research institutions must plan to supply organic seeds. Crop/product specific strategies must be developed. Marketing plans may be evolved to encourage food processing products manufactured within the state covering the recently emerging super markets, institutional sales, DWCRA bazaars, international market etc. The government may take up a scheme to educate and promote use of post-harvest equipment among the farmers. The state government may establish food processing training institutes atleast one per each district.

10.4. Infrastructure: Expert consultant committee may be formed comprising of specialists from food technology and management to provide ready assistance in terms of free consultancy for promising entrepreneurs and advising state government. One incubator[32] may be provided to advise on food processing ventures in the state. Some large aseptic packaging units may be encouraged to be set up in the state. A radiation technology plant may be established by the government to cater to the needs of food processors (for disinfection and extension of shelf life) and popularization of the technology. The power supply to cold storage units may be priced on par with the agriculturists. One analysis laboratory may be located at Hyderabad. The Marketing Department may arrange refrigerator vans, refrigerator containers etc., Some Industrial Training Institutes may be set up to give training courses on service and repairs to food processing machinery. Private sector investments may be encouraged in small pre-cooling units, medium to small cold storages having multi-product, multi-chamber facilities and also built in pre-cooling, high humidity and controlled/ modified atmosphere, ripening chamber and display cabinets.

10.5.OTHER SUGGESTIONS: There is a need to make special efforts to involve the small farmers participate in contract farming. There is an urgent need to encourage organic farming in some of the crops with assistance for certification and compensation for the initial loss of returns due to yield decline. Neutraceuticals and functional foods, dehydration and freeze drying industries, processing of new crops like *Annato*, vanilla and pepper and medicinal plants, Biofuels, dried flowers, coconut complexes may be

[32] Incubator is one place where the prospective entrepreneurs in food processing can get access to information on the opportunities, availability of infrastructural facilities, incentives etc., in the state at one place. This will facilitate the investors to plan easily and take investment decisions.

encouraged as future thrust areas. One common brand of mango may be launched for pulp and juice to cater to local demand and export market. Agri Food summits may be organized by the state government to encourage potential investors. A few large players in fruits and vegetables, meat and poultry sectors must be encouraged to establish large chain. Internal movement of eggs and other products should be liberalised. Regulations are needed to control the activities of fruit nurseries in the state

11. CONCLUSIONS

There are some advantages like high production of raw material, cheap labour, manpower etc, for food processing industry in the country. However, many problems hinder the growth of this industry and it needs government support. However, there has been some change since the last few years and especially after 1991. The central government has taken some steps to deregulate and encourage the sector. However, the role of states is vital. The Government of Andhra Pradesh released a policy in November 2003. There are no major initiatives in the policy and still can be called a good beginning. As against the robust growth at the All-India level, the growth rate in net value - added in the nineties was almost the same as that in the eighties in the state. The study examined the opportunities and challenges in processing of paddy, mango, vegetables, oilseeds and livestock products. There is a good scope to process paddy and mango into different products by encouraging processing units in the centers of production. Groundnut should be processed into different products like peanut butter etc to sustain the small and marginal farmers cultivating the crop. The identified potential under oil palm can be achieved if the problems facing the industry are solved. There is a scope to export fish, meat, poultry production and dairy products in that order.

The contracts are working, on the whole, well in both oil palm in West Godavari and gherkin in Chittoor district of the state. The contracts in oil palm are widespread, covering many farmers and stabilized. The total extent under gherkin is very low. The contracts work through facilitator in gherkin. There are some signs of some mistrust between the facilitator- company and local farmers. The contracts are also evolving gradually to accommodate both parties. The participation of small farmers in oil palm cultivation is almost negligible. On the other hand, in gherkin, participation of small farmers was considerable.

The oil palm growers are better off with oil palm than without situation. All the sizes of farmers and all categories of farmers are able to get higher returns than 'without oil palm' situation from the main crop and intercrops. The large farmers and O.Cs are getting the highest profit. Among the problems expressed by farmers, delay in payment, delay in fixation of price and fluctuation in prices are the major ones. The growers felt that the oil palm cultivation can be improved by enhancing drip subsidy for oil palm growers, provision of sophisticated harvesting equipment, provision of technical advise, increased interaction with factory management by monthly meetings, training, supply of quality seedlings and constant price. An overwhelming majority of the growers wanted the government to intervene and provide power for 15 hours a day instead of the present 7 hours. Provision of remunerative prices, subsidy for bore-well digging, loan facility and crop insurance are the other areas, where the growers requested government intervention. On the whole, the farmers are satisfied with the contractual arrangement.

The analysis of costs and returns from gherkin show that cultivation of gherkin crop is profitable from the point of view of farmers. It was observed that 34%, 9% and 3% of the sample farmers went for the second, third and fourth crops also, respectively. All the size groups and social categories covered all costs and earning net profits. The net returns to the large farmers were the highest, as they are the most efficient producers. The farmers of SCs could not cover all costs, but covered variable costs. Major problems in cultivation were virus attack and yield loss to gherkin and low rainfall for the past few years. The other problems relating to the contract were delay in payment and of rejects. Around 77 percent of the farmers wanted the government to supply power for a minimum of 10 hours in place of the present 6-7 hours. They also asked for crop insurance and quality pesticides.

The contracts are oral and price is not assured in oil palm. The contribution of processors to the local economy is almost negligible except increase in employment for family labour and casual labour. In oil palm gardens, the depletion of ground water level is faster compared to other crops. In the case of gherkin, the processing industry is totally dependent on exports for sustenance, which may not be ideal.

Organic farming in some crops in a small scale, neutraceuticals and functional foods, dehydration and freeze dried industry, new crops like *Annato*, vanilla,

pepper etc., Biofuels, dried flowers, coconut complexes etc., are the future thrust areas for the state. The government needs to move in this direction by creating an enabling environment. All the cold storages in the state control temperature and humidity in the air. But fruits and vegetables can be stored for much longer periods, if we can control oxygen, carbon dioxide and nitrogen gases and avoid 'chilling injury'. It was observed that these storages are used mostly by business people than farmers. There is also a need to set up pre-cooling units and refrigerated vans for vegetables and refrigerated containers for exports. The government may install one plant of radiation technology in the public domain for use of processing industries and further popularization.

Based on the analysis in the study, we have provided the policy recommendations under five broad headings- institutional, taxes and subsidies, research and training, infrastructure and other suggestions. The establishment of an independent ministry of food processing and department, enacting of contract farming laws and providing for an efficient arbitration in cases of contract violation, encouraging NGOs participation in food processing sector, formation of product-wise farmers' associations, changing the animal slaughter laws and formation of some more agri-export zones for livestock products are some of the recommendations under institutional aspects. In the case of taxes and subsidies, the recommendations are - exemption from sales tax and market cess and relaxation of duties and taxes on packing material industry. Under research and training, large scale publicity to promote processed foods, undertaking demand driven research by developing processable varieties and required equipment, establishing food processing training centers, developing technology for the tiny food processing units, evolving marketing plan covering the recently emerging super markets, DWCRA bazaars, international markets etc., are some of the suggestions. In case of infrastructure, encouraging some large aseptic packaging units, establishment of a radiation technology plant, encouraging private sector in cold storages, pre-cooling units, pack houses etc., establishment of training courses for service and repair of food processing machinery, formation of expert consultant committee and provision of one incubator are the major suggestions. Other major recommendations are provision of insurance facilities to all horticultural crops and livestock products, taking steps to ensure participation of small farmers in the contract farming, launching of a common brand of mango juice and enactment to regulate the feed industry and nurseries in the state.

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