CASSAVA MARKETING SYSTEM IN INDIA

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Technical Bulletin Series: 43

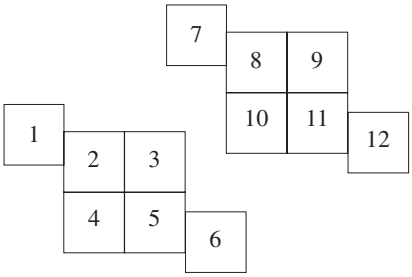
Published by
The Director
Central Tuber Crops Research Institute
Sreekariyam
Thiruvananthapuram 695 017
Kerala, India.

Printed at
St. Joseph's Press
Thiruvananthapuram 14

December, 2005

Front Cover

Cassava, from its traditional role as food security crop, has taken a commercial crop status by diversifying its uses to produce many value added products. Marketing structure of Cassava differs in each sector of its use.



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FOREWORD

Cassava, by virtue of its diversified uses, has become an important commercial crop in the agricultural economy of states like Tamil Nadu and Andhra Pradesh although it was first introduced in Kerala in mid 1870s as a food security crop. Though the processing and production centres for different value added products from cassava viz., Starch, sago, chips, flour from chips, thippi, peel, sago wafers are concentrated in South India, their marketing centres are distributed throughout the country, especially in the western and northern parts. The market structure also differs in each sector of its commercial use.

An unorganised marketing system often results in instability of the prices, exploitation by middlemen and a lower share for the producer in the consumer's rupee. Wide fluctuations in the prices of starch, sago and such value added products are being observed every year in the country and the effect of which is reflected on the prices of tubers and indirectly affect the farmers. These variations are influenced by derived demand for the products, market forces, policy of the Govt. and season of production etc. Therefore the need of the hour is to have a clear policy on marketing of value added products from cassava and a fair price fixing mechanism for tubers so as to sustain interest on the crop by the farmers in the long run. It requires information on how the markets for these products are structured, different functionaries involved in channelling the products from producer to consumer etc.

This technical bulletin entitled "Cassava Marketing System in India" provides information on market structure, market channels, price spread, marketing efficiency in different channels, demand- supply gaps and international trade for cassava and its value added products for use by the policy makers, scientists etc.

I hope this technical bulletin will provide very useful information to those involved in the R & D of tuber crops. I congratulate Dr.T.Srinivas and Dr.M.Anantharaman for their efforts in bringing out this well structured publication.

Thiruvananthapuram
27-5-2005

S. Edison
Director

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1. Introduction

Agricultural marketing comprises all the operations, and the agencies conducting them, involved in the movement of farm-produced foods, raw materials and their derivatives, such as textiles, from the farms to the final consumers, and the effects of such operations on farmers, middlemen and consumers.

-Thomsen, 1951.

Marketing of agricultural commodities is as old as civilization itself. The importance of output marketing has become more conspicuous in the recent past with the increased marketable surplus of the crops following the technological breakthrough.

Cassava (Manihot esculenta crantz) is a staple food crop cultivated in several developing countries. Cassava is consumed either directly as cooked tubers or as the products prepared from cassava.

Globally Cassava is grown in an area of 18.51 million ha producing 202.65 million tonnes with a productivity of 10.95 t/ha. (FAO, 2005). It is grown in 102 countries in the world. African continent occupies first position covering 66.21 per cent of cassava area producing 53.37 per cent of world cassava as it is a staple in many of the African countries. Even though area is more in Africa, its production is low due to low productivity (8.824 t/ha) which is lower than the world average productivity.

Though rice and wheat form a major part of the staple for Asians, it is heartening to note that Asian continent is the second largest in terms of area and production of cassava with a productivity of 16.762 t/ha. South America has 13.44 per cent of the world cassava (Third rank) area producing 16.79 per cent of the world cassava.

Nigeria is having the largest area under cassava (22.25%) among all the cassava growing countries in the world with an annual output of 38.18 million tonnes. Congo Democratic Republic occupies second position in cassava area producing 10.00 per cent of the world production. Brazil occupies the third position in terms of area and second rank in terms of production in the world.

All the major cassava growing countries in the Asian continent have the productivity more than the world average productivity. Indonesia, Thailand and

India are the major countries growing cassava in Asia. India acquires significance in the global cassava scenario due to its highest productivity in the world (27.92 t/ ha.) It is cultivated in an area of 0.24 million ha producing 6.7 million tonnes. Countries covering more than 85 % of the cassava area and more than 88 % of the world production are presented in Table 1.1.

According to FAO classification, Root and tuber crops form staple diet for three per cent of the global population. Cassava is mostly used for human consumption in the African continent and in the South America. Industrial utilization of cassava is prominent in Thailand, Indonesia, Vietnam, India in the form of starch, sago, dried chips, flour etc.

It is a crop of food security in Kerala. By virtue of its diversified uses, it has become an important commercial crop in the agricultural economy of states like Tamil Nadu and Andhra Pradesh. A diverse use of cassava is the major reason for the sustainability of the crop in the country in the context of increased income and standard of living of the people.

Cassava Field View

Starch, sago, chips, flour from chips, thippi, peel, sago wafers are the important value added products from cassava. Wide fluctuations in the prices of starch, sago and such value added products are being observed every year in the country and the effect of which is reflected on the prices of tubers affecting the farmers. Unorganised marketing system results in instability in the prices, lower share of the producer in the consumer's rupee and inefficient marketing system. Therefore the need of the hour is to have a clear policy on marketing of value added products from cassava and the price fixing mechanism for tubers for the benefit of the farmers to sustain interest on the crop in the long run. It requires information on how the markets for these products are structured, different functionaries involved in channelling the products from producer to consumer. An attempt was made to understand the market structure, market channels, price spread, marketing efficiency in different channels and international trade for cassava and its value added products by surveying production, marketing and consumption centers of Cassava in India.

Table 1.1: *Area, Production and productivity of Cassava in major growing countries of the world. (2004)*

Continent	Country	Area (million ha)	% to global area	Production (million tonnes)	% to global production	Productivity (tonnes/ha)
	World	**18.50**	**100.00**	**202.58**	**100.00**	**10.95**
Africa	**Total Africa**	**12.25**	**66.21**	**108.11**	**53.37**	**8.82**
	Nigeria	4.12	22.25	38.18	18.64	9.27
	Congo, Dem. Republic of	1.85	10.00	14.95	7.38	8.08
	Mozambique	1.05	5.67	6.15	3.04	5.86
	Ghana	0.78	4.24	9.74	4.81	12.42
	Tanzania, United Rep. of	0.66	3.57	6.89	3.40	10.44
	Angola	0.64	3.46	5.60	2.76	8.75
	Uganda	0.41	2.20	5.50	2.72	13.51
	Madagascar	0.35	1.91	2.19	1.08	6.21
	Côte d'Ivoire	0.30	1.62	1.50	0.74	5.00
	Benin	0.30	1.62	4.00	1.97	13.33
	Central African Republic	0.19	1.03	0.56	0.28	2.96
Asia	**Total Asia**	**3.52**	**19.00**	**58.92**	**29.09**	**16.76**
	Indonesia	1.27	6.85	19.26	9.51	15.20
	Thailand	1.05	5.67	20.40	10.07	19.43
	Vietnam	0.38	2.07	5.69	2.81	14.83
	Sri Lanka	0.26	0.14	0.23	0.11	8.64
	China	0.25	1.35	4.20	2.07	16.80
	India	0.24	1.30	6.70	3.31	27.92
	Philippines	0.21	1.11	1.64	0.81	7.99
	Malaysia	0.04	0.22	0.43	0.21	10.49
South America	**Total South America**	**2.49**	**13.44**	**34.02**	**16.79**	**13.67**
	Brazil	1.77	9.58	24.04	11.87	13.56

Source: www.fao.org

2. Marketing Structure and Pattern of Cassava and its Value Added Products

Market structure refers to those characteristics of the market which influence the traders' behaviour and their performance (Stifel, 1976). Market structure is influenced by its components like the concentration of the market power, flow of market information, degree of integration etc.

Cassava is used in three sectors viz., human consumption, animal feed and industrial sector. The market structure differs in each sector of its use. Though cassava production and processing centres are concentrated in Southern India, it is interesting to note that marketing centres are distributed throughout the country especially in the western and northern parts for different value added products produced from cassava (Table 2.1 and Fig 2.1 & 2.2).

a. Human Consumption Market

Human consumption of Cassava

Cassava is consumed as baked tubers, as fried chips and as a culinary item in Kerala, Tamil Nadu, Andhra Pradesh and in north eastern states like Meghalaya, Assam etc. Cassava was an important part of the diet of the people living below poverty line in the yesteryears in Kerala. But with the improvement in the standard of living and availability of cereals, people are shifting from cassava to cereals. About 28 % of total tuber production in the country is being utilized for consumption purpose as vegetable by baking, boiling and as fried chips. Cassava along with fish when consumed together forms a very good combination of carbohydrate and protein which is common nowadays to find this combination in big hotels and restaurants especially in Kerala.

Out of the total production in Kerala, 40 % of cassava produced is consumed as vegetable, parboiled and fried chips. Contract merchants or village agents collect the tubers from farmers and supply to wholesalers in vegetable markets like Nedumangadu in Thiruvananthapuram district of Kerala. Retailers purchase from

wholesaler for further distributing to consumers. Some cottage industries are making fried chips in Kerala and are supplied to bakeries, super markets in the surrounding towns for retail sales.

From the foreign trade statistics, it can be observed that raw tubers are exported to Gulf countries to meet the demand of malayalis residing in those countries especially from Cochin sea port, Kozhikode and Nedumbassery air ports in Kerala.

In Tamil Nadu, cassava is consumed as fried chips and boiled tubers. Baked tubers are consumed and fried chips are produced during the harvesting season in Tamil Nadu. Petty vendors purchase tubers from wholesale market or from the farmers directly and use in the production of fried chips and for selling as baked or boiled tubers. It is commonly found in Salem, Erode, Namakkal districts etc.. Quantum of cassava production used for human consumption as baked or boiled tubers is estimated to be 10 % while another 10 % of the cassava production is being utilized in the production of fried chips. Fried chips are mostly sold on the roadside mobile carts, through retail outlets in bakeries, super markets etc.

In Andhra Pradesh, very small quantities of tubers are consumed in the baked form. It was estimated that 0.5 % of tapioca produced is consumed in baked form. Baked tubers are sold in shandies during harvesting season. Another form of consumption is by preparing papads from baked tubers at home level. It is also common to see that farmers are consuming baked tubers in the field itself during the harvesting season.

b. Animal Feed Market

Cassava as an ingredient of cattle feed is gaining popularity in the recent past. Raw tubers, flour made from cassava dried chips, thippi and peel are the most common forms of cassava used as cattle feed. Besides cattle feed preparations, cassava thippi flour is also used in the fish feed and poultry feed preparations. Bharada quality floor is used in making swine feed.

Cassava tubers as cattle feed

In Kerala, it is common to observe the feeding of cattle with raw tubers. It was estimated that nearly 30 % of tubers are being used in feeding cattle in Kerala, while in Tamil Nadu and Andhra Pradesh, very little quantities of raw tubers are fed to cattle. Feeding cattle with dried leaves is also common to see during the production season. Some farmers soak the dried chips and then feed them to the cattle.

Studies conducted on use of cassava as animal/poultry feed revealed that up to 30 % of the total ingredients can be from cassava as a source of carbohydrate in making the feed. But in practice only 5-10 % of the raw material in compound feed is from cassava in the form of cassava thippi (Table 2.2) and that too only in South India where cassava starch and sago industries are concentrated.

Cassava waste (thippi & peel) is used relatively in less quantity than de-oiled rice bran (DOB). Most of the cattle feed preparations contain 5-10 % of cassava waste compared to 35-40 % of DOB as the latter contains 16 % protein in addition to good quantity of carbohydrate as well as its availability throughout the year. Cassava waste is facing stiff competition from DOB, maize and sorghum. Only when price of cereal grains such as maize and sorghum is high, industrialists show interest in using cassava waste. Sand and silica content to the tune of 6 % is the most limiting factor in the usage of cassava waste as cattle feed.

Cassava thippi & peel flour find a good market in Maharashtra, Andhra Pradesh and Tamil Nadu where small dairy farm units are using this flour in the compound feed preparations. Flour millers procure thippi from starch and sago industries and peel from farmers who are making chips, for making flour. Fine, coarse and bharada flour are the three different flours prepared from cassava thippi and peel. Flour millers supply the flour to the wholesalers in Maharashtra and in turn it is supplied to secondary wholesalers through commission agents. Small dairy farms directly purchase from wholesalers. Flour mills are concentrated in East Godavari district of Andhra Pradesh and Salem and Erode districts in Tamil Nadu.

The knowledge of using cassava waste as an ingredient of cattle feed is known to a very few cattle feed industrialists due to lack of publicity. When this factor is taken care of, cassava waste can find a good market in cattle feed industries in the future.

c. Market for Commercial Products

Cassava in the industrial sector is marketed in three forms.

1. As raw material to starch, sago and chip industries
2. As value added products (starch, sago, chips, flour, sago wafers etc.)
3. As by products of starch and sago industries.

1. Market Structure for Raw Material

Cassava in raw tuber form is used as raw material in starch, sago and chips industries. Starch/Sago industrialists procure raw tubers in two different ways.

a. Tie-up b. Middlemen

a. Tie-up: This system is prevailing in Andhra Pradesh. Millers provide financial assistance of Rs.2,500/- per ha to farmers at exorbitant rates of interest i.e., 24% . These farmers in turn have to supply their produce to those millers at the price prevailing at the time of harvest. The average number of farmers for whom tie-up loans are given are approximately 150 to 200 with a total holding of 200 ha.

b. Middlemen: Every miller has some agents in the production centres for supplying the tubers. They identify the supply centres after knowing the demand for tubers by millers. The price depends on the factors like production during season, demand from millers and export demand. Price is fixed by bargaining from both the sides. The responsibility of middlemen is collection of tubers from production centres, loading in gunny bags and then transporting by trucks to the concerned miller. Gunnies are provided by miller himself. Transport expenses are borne by the miller. Generally tubers are procured from within a radius of 50 km from the cassava starch/ sago mills. Marketing of raw tubers through middlemen is widely practised in Kerala, Tamil Nadu and to a certain extent in Andhra Pradesh.

Backward pricing of tubers is prevailing which is not economical for the producer. The prices of tubers depend on the prices of sago/starch prevailing in Kolkata or Mumbai or Salem markets. Farmers have no alternative way to dispose of their produce due to low shelf life of the tuber. Middlemen are exploiting the farmers.

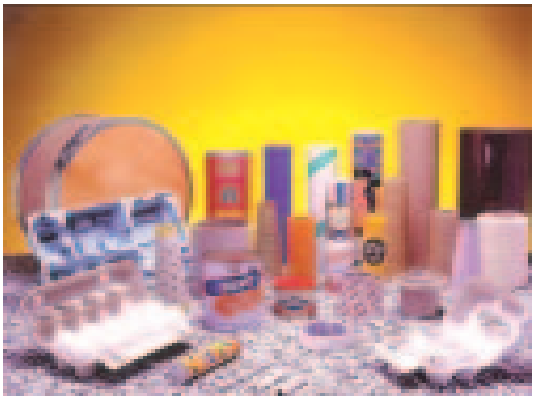
Farmers are not informed or kept in dark about the price at which middlemen sold their produce to miller.

Tuber prices are fixed as per the existing market rate, weight and quality of tubers in Andhra Pradesh while in Tamil Nadu, prices are fixed based on the starch content. Middlemen collect commission both from farmer as well as from miller. This commission ranges between Rs.0.90 per 100 kg tubers in Andhra Pradesh to Rs.2.75 per 100 kg in Tamil Nadu. Taking the advantage of illiteracy of farmers, middlemen purchase at a less price from farmers and supply to millers at a higher price.

Chip industries procure raw tubers both directly from farmers and also from middlemen or village agents.

2. Market Structure for Value Added Products

Starch, sago, chips, flour, sago wafers etc. are the different value added products produced from cassava. It was observed from the survey that different marketing pattern exists in different marketing centres for different products.



Cassava Starch in Paper conversing Industry

a. Starch

It is the most important value added product produced from cassava. Approximately 400-500 starch processing units are located in Salem, Namakkal, Erode, Dharmapuri, Tiruchirapalli districts in Tamil Nadu. Only one industry in Andhra Pradesh produces cassava starch and liquid glucose from cassava starch. Some units in Kerala manufacturing white and yellow dextrins, use cassava starch. Starch is mainly used in the textile industry, in making adhesives, in pharmaceuticals, in paper industry, in confectionery industry etc. 90% of the cassava starch produced in India is from Tamil Nadu while the remaining quantity is from Andhra Pradesh and Kerala.

Sagoserve, Salem, Tamil Nadu

Starch market in Tamil Nadu is semi-organised. 50% of starch is marketed through a well organised co-operative marketing system under the name SAGOSERVE (The Salem Starch and Sago Manufacturers Service Industrial Co-operative Society Ltd.) and the remaining quantity is marketed directly or through commission agents by the millers to the wholesalers. Traders and primary wholesalers participate in the secret auction for purchasing the starch. Prior to the establishment of the SAGOSERVE, middlemen were dominating the trade. SAGOSERVE eliminated the middlemen between processor and primary wholesaler and helped in stabilising the market to a certain extent. Concessional sales tax of 2% is charged for the sago transacted through SAGOSERVE in Tamil Nadu. Vertical integration of processing and trading is observed in Tamil Nadu. Primary wholesalers/traders are from Maharashtra, West Bengal and Gujarat. They further distribute the starch to secondary wholesalers either directly or through commission agents. Secondary wholesalers distribute to retailers in different places who in turn supply to the consumers. Commission agents charge 1 % of the value of the product as their commission. Cassava starch is mainly marketed in Gujarat, Maharashtra, West Bengal and Tamil Nadu. Sago wafer industries located in Namagiripet area of Namakkal district purchase wet starch for the preparation of wafers.

In the recent past, India started exporting cassava starch though in small quantities from Chennai, Mumbai and Kolkata ports to Sri Lanka, USA, Australia, South Africa and the Gulf Countries.

b. Sago

Sago is an important value added product from cassava. Payasam, Kichidi, Upuma, Bonda are the different items prepared using sago. Sago is used mostly as baby food in West Bengal. In the remaining parts of the country, it is consumed mainly in preparing payasam and wafers. Sago production units are located in

Sago samples at display in Sagoserve

Tamil Nadu and Andhra Pradesh. Moti, medium, bada dana and nylon sago are the different types of sago produced in the country. Nylon sago is produced in Tamil Nadu and Andhra Pradesh while moti dana is produced mostly in Andhra Pradesh. Nearly 400 to 500 sago producing units are located in Tamil Nadu and 35 units are located in Andhra Pradesh. Though sago production is limited to Tamil Nadu and Andhra Pradesh, it is consumed throughout the country. 50% of the sago produced in the country is consumed in Maharashtra. Pune and Nagpur in Maharashtra and Kolkata and Siliguri in West Bengal, Patna in Bihar, Kanpur and Varanasi in Uttar Pradesh, Gauhati in Assam are the main marketing centres for sago in India. Demand for sago is generally more during festival seasons and in Sravana month (August) due to more marriages being held then.

Sixty to 70 % of sago produced in India is from Tamil Nadu. 60 % of sago produced in Tamil Nadu is marketed through SAGOSERVE and the remaining through direct sales. Most of the sago millers are members of the society. Traders, primary wholesalers participate in the secret auction for purchasing the sago. Nowadays in the retail market, sago is marketed through attractive consumer packets of one kg and two kg size.

In Andhra Pradesh traders and middlemen are dominating the sago trade. It is a buyers market in Andhra Pradesh resembling oligopoly market. 2 to 5 % of the value of the goods transacted is charged as commission by middlemen. Of the total sago produced, 20% is sold within the state and 80% is sold in other states (West Bengal - Kolkata, Siliguri; Maharashtra - Nagpur, Mumbai, Sangli, Pune, Nanded). Demand for medium dana is more in Maharashtra and for moti dana, demand is more in West Bengal.

Sago processors of Andhra Pradesh were sending the sago samples to the commission agents/traders in Kolkata till 2000 A.D. Wholesalers in Kolkata market

quote the price for the product after assessing the sample. This price is communicated to the processor and if this price is acceptable to him, the processor delivers the product through the commission agent to the concerned party. Commission agent charges the commission for the brokerage made. Processors do not know whether the price communicated by the commission agents to processors is correct or not. Traders/commission agents did not reveal whether or not they are getting brokerage from the other party also (buyers). Traders are dominating the trade. Now processors are realising the importance of association which made them to establish the trade centre in the lines similar to Sagoserve in Tamil Nadu on experimental basis.

Another practice in vogue in Andhra Pradesh was "Consignment sales or Sale patti or For sale system". In this method, processor sends the lot to the commission agent/trader in Kolkata market. Trader assumes the price for the lot approximately and gives 75% of the value as advance to the processor. Trader sells the product in Kolkata market whenever good price is prevailing. Remaining 25% of the value is given to the processor after deducting commission and other miscellaneous charges viz., expenses on phone, hamali charges, godown rent, incidental charges, Demand Draft (DD) commission etc. after the product is sold out. Commission to the commission agent varies from 2 to 5% of the value of the product based on two factors.

1. Based on payment by cash or credit basis to the processor.
2. Based on the number of days produce is stocked in the godown, D.D commission, incidentals, hamali charges for loading and unloading etc.

Sales tax @ 4% is paid for the sago sold from Andhra Pradesh while in West Bengal, there is no tax for sago as it is considered as baby food. It is also exported from Mumbai, Kolkata and Chennai ports under different names viz, Sago Appalam, Sagopith etc.

c. Dry Chips

Chips are used mainly to produce chip flour for further using in textiles, in making different food items, in adhesive industry, in corrugation industries etc. Cassava dried chips are produced in Andhra Pradesh, Kerala and Tamil Nadu. East Godavari

Cassava chips in the drying yard

district in Andhra Pradesh, Salem, Erode districts in Tamil Nadu and Thrissur (Chalakudy, Irrity,), Malappuram (Perinthalmanna, Thaliparamba) Thiruvananthapuram (Kattakkada) districts in Kerala are the centers of chips production in India. Chip production has declined in Kerala due to decline in cassava area, low export demand for chips and high cost of labour involved. Chips are prepared during the harvesting season by farmers and chip producing units. Millers procure chips from farmers either directly or through middlemen. The agents of flour millers will make a small survey around the villages where chips are produced and then identify the places where good quality chips can be obtained. The agents of flour millers also contact the chip brokers in those villages and ask them to assemble at a particular place with samples. After seeing the samples, the agents quote prices for the produce. If that price is acceptable to the brokers then they will be asked to supply the required quantity. Millers purchasing chips directly from farmers, have to bear the expenses of transport, bagging, loading, weighing, gunny bags, twine etc. Some hoarders purchase chips directly from farmers and stock in their godowns in anticipation of higher prices during the off-season. Chip prices depend on factors like quality of chips, competitiveness from millers, artificial scarcity created by stockiest and export demand.

If export demand is there, farmers convert tubers into chips limiting the tuber availability to sago industries. Chips are also exported to European countries like Belgium, Italy etc.. Chips are exported mainly from Kakinada, Chennai and Cochin sea ports in Andhra Pradesh, Tamil Nadu and Kerala respectively. General problem expressed about the quality of chips from Andhra Pradesh is high percentage of sand and silica content.

d. Chip Flour

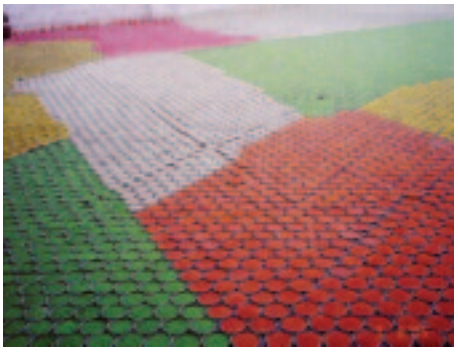
Chip flour units are concentrated in Andhra Pradesh, Tamil Nadu and Kerala. Ichhilakaranji in Maharashtra is a big centre for using chip flour as stiffening agent

in textile industries. It is also used for making kumkum in Chennai, for making colours in Hathrus district of Uttar Pradesh, as adhesive in cracker industry at Sivakasi in Tamil Nadu and for making food items called `Muruku' in Tamil Nadu and Andhra Pradesh.

Marketing of flour is by direct contact of processor with the consumer (binding, gum, animal feed mix plants etc.). Another method is by giving samples to commission agent/trader, Wholesaler in the market quotes the price for the sample, which is communicated back to the processor. If the price is acceptable to him, processor will deliver the product to the concerned party through the commission agent. Commission agents charge 1 to 2 % of the value of the goods transacted as commission.

Barada quality flour is the flour prepared from small pieces of tubers. These tubers are peeled, chipped and dried and then ground to coarse powder. This powder is mixed with thippi and peel flour and is mostly used in animal feed industries. It is mainly marketed to lchhilakaranji and Mumbai in Maharashtra. The price of this quality flour is less than that of flour from chips. (100 kg of Barada quality flour = Rs.350/- in 2000 A.D). It was told that gum quality prepared with barada quality flour is superior to that made out of maida.

e. Sago Wafers

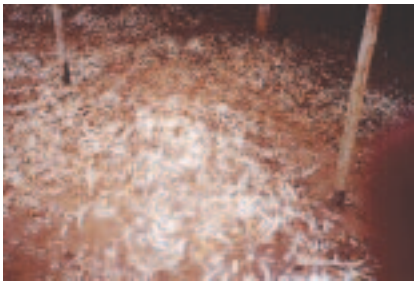


Sago wafers getting dried

It is another important value added product from cassava starch; one hundred wafer making cottage industries are functioning at Namagiripet taluk of Namakkal district in Tamil Nadu. These wafers are marketed through WAFERSERVE, (The Namagiripet Tapioca By-products Industrial Cooperative Service Society Ltd.) It has eliminated middlemen. Demand for wafers is more in northern states like Delhi, Gujarat, Uttar Pradesh and wafers are sold in attractive consumer packets. Involvement of brokers is limited in this trade.

3. Market Structure for By-Products of Starch and Sago Industries

a. Thippi and Peel



Cassava Peel for Animal Feed

Thippi and peel are the by-products of starch and sago industries. Thippi is the fibrous waste obtained after extracting starch from fresh tubers. Peel is the outer skin removed from the tubers during chip making and starch preparation. Dried thippi and peel are mainly used in making flour (rough and fine quality). These flour mills are located in Andhra Pradesh and Tamil Nadu. This flour is mainly used in animal feed mix plants and also in gum/adhesive industries.

Cassava flour millers purchase dried thippi directly from starch and sago manufacturers in bulk after the crushing season. Some brokers also purchase the dried thippi in bulk and stock in godowns to sell during off season when the prices are higher and demand is more as no thippi will be available a few months after the crushing season. Role of middlemen is less in thippi procurement. Some farmers also purchase thippi for using it as cattle feed. Farmers don't use peel for cattle feed as it contains high sand and silica content.

Table 2.1: *Production and marketing centres for cassava and its value added products in India*

Categories	Cassava product	Major production centres	Consumer	Marketing centers
A	Raw tubers	Kerala, Tamil Nadu and Andhra Pradesh	Human consumption	Kerala, Tamil Nadu and Andhra Pradesh
B	Sago: Moti dana & Medium, Bada dana Nylon sago Sago waste	Andhra Pradesh & Tamil Nadu Tamil Nadu Andhra Pradesh & Tamil Nadu	Human consumption Human consumption For sizing in textile industry	West Bengal, Maharashtra Uttar Pradesh, Andhra Pradesh, Tamil Nadu Assam, Tripura ..... North India Maharashtra, West Bengal
C	Starch	Tamil Nadu & Andhra Pradesh	Textile industry Adhesive manufacturers Liquid glucose, Dextrin manufacturers Confectionary Foundry Laundry Pharmaceuticals	Gujarat, Maharashtra, West Bengal
D	Chips & flour	Andhra Pradesh & Kerala	Gum manufacturers Sizing clothes Animal feed industry Snack food manufacturers	Maharashtra, Andhra Pradesh
E	Wafers, chips & pappad	Tamil Nadu	Human consumption	Gujarat, Delhi, Maharashtra, Tamil Nadu, Kerala

Table 2.2: *Composition of Compound Cattle Feed in a Feed Mix plant in Andhra Pradesh*

Ingredient	Content as per cent in		
	Formulation I	**Formulation II**	**Formulation III**
Maize	10	10	8
Ground nut cake	—	—	3
Cotton seed cake	5	5	5
Sunflower cake	10	10	7
Rice bran	5	—	10
Wheat bran	5	10	—
Ground nut hul bran	5	5	3
Tapioca waste	4	5	8
Deoiled Rice bran	37.5	36.5	37.5
Molasses	13	13	13
Urea	1.5	1.5	1.5
Calcite	2.0	2.0	2.0
Salt	2.0	2.0	2.0

Fig. 2.1: MAP SHOWING MAJOR PRODUCTION CENTRES OF VARIOUS CASSAVA PRODUCTS IN INDIA

Fig. 2.2: MAP SHOWING MAJOR MARKETING CENTRES FOR VARIOUS CASSAVA PRODUCTS IN INDIA

3. Channels of Marketing for Cassava and its Value Added Products

Marketing channels are the routes through which agricultural products move from producers to consumers. The length of the channel varies from commodity to commodity and depends on the market structure, nature of demand etc. Channels of marketing for cassava and its value added products viz., raw tubers, sago, starch, flour from chips, flour from thippi and peel and sago wafers are identified separately. Various market functionaries viz., processor, primary wholesaler, commission agent, secondary wholesaler, semi-wholesaler and retailer are functioning between producer and consumer. Commission agents are dominating the trade especially during procurement of raw tubers from farmers, between processor and primary wholesaler and primary wholesaler and secondary wholesaler. These channels are presented schematically in Fig.3.1 and 3.2.

a. Raw Tubers

Starch, sago & chip manufactures procure raw tubers from farmers either directly or thorough village agents. Manufacturers of fried chips and baked tubers procure raw tubers from farmers during production season. Wholesalers collect tubers from village agents for export to Gulf countries. Fried chips are sold through retail outlets in Kerala.

b. Starch

In India 90 % of cassava starch is produced in Tamil Nadu. Remaining quantities of starch is produced in Andhra Pradesh & Kerala. 50 % of the starch produced in Tamil Nadu is marketed through SAGOSERVE and only a limited quantity is sold either directly or through commission agents to primary wholesalers. Secondary wholesalers purchase from primary wholesalers and distribute to consumers through retailers. Involvement of commission agent between primary and secondary wholesaler is also observed. Some starch processors and primary wholesalers are exporting starch though in small quantities. Wafer industries purchase starch from starch processors.

c. Sago

Sago processor after procuring raw tubers from farmers either directly or through their agents, processes them to produce sago. 60 % of sago produced in Tamil Nadu

is routed through SAGOSERVE. Primary wholesalers who are members of the SAGOSERVE purchase sago by participating in the secret tender system and the remaining is sold either directly or through commission agents to primary wholesalers. Sago processors in Andhra Pradesh are wholly dependent on commission agents. Secondary wholesaler purchase from primary wholesaler either directly or through commission agent and distribute to consumer through retailer. Some sago processors and primary wholesalers export sago as and when export demand is there.

d. Dry Chips

Farmers and chip processors producing chips supply to flour miller through commission agents. Some stockiest are purchasing chips in bulk during production season, store in their godowns and sell them during non-season, anticipating higher prices. Whenever there is an export demand, wholesalers collect chips from farmers and stockiests and export. Farmers purchase chips from shandies for feeding to cattle in Kerala.

e. Flour (chips, thippi and peel)

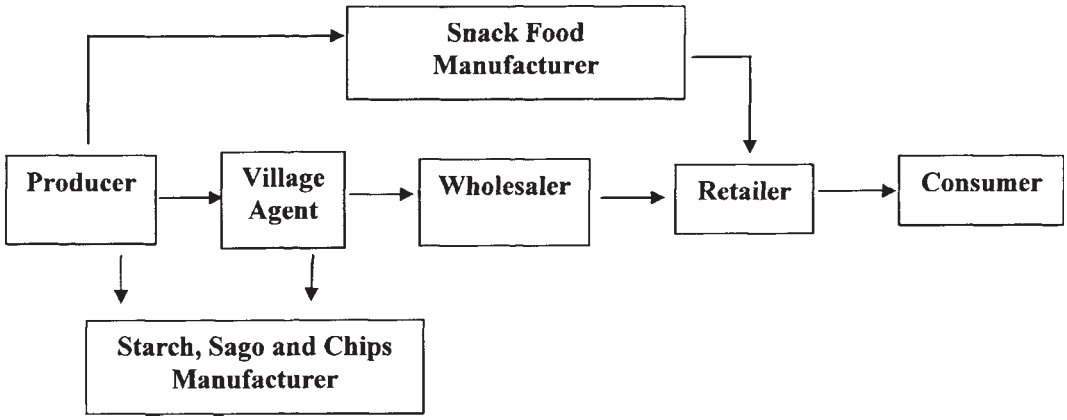
Flour millers procure chips from farmers, chips stockiest and chips processor. Thippi & peel are supplied to flour mills by processors. Flour is marketed to wholesalers through commission agents. Flour is also purchased for use in animal feed mix plants.

f. Sago Wafers

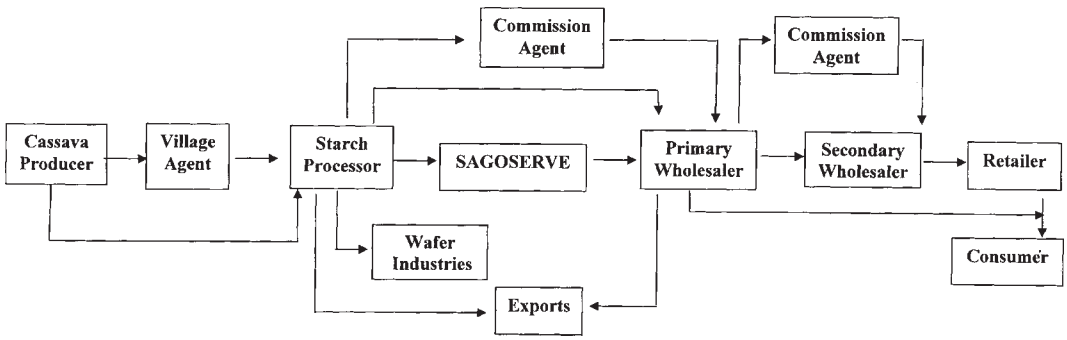
Sago wafer manufacturers market wafers through WAFERSERVE. At present 50 % of the wafer production is routed through WAFERSERVE. Though production center is located in Tamil Nadu, only 10 % of production is marketed in Tamil Nadu while 90 % is sold in states like Madhya Pradesh, Uttar Pradesh, Delhi, Maharashtra, Gujarat, Karnataka, Andhra Pradesh and West Bengal. Primary wholesaler located in these marketing centers supply to retailer for further distribution to consumer.

Fig. 3.1: Market Channels for Cassava and its Value added products in India

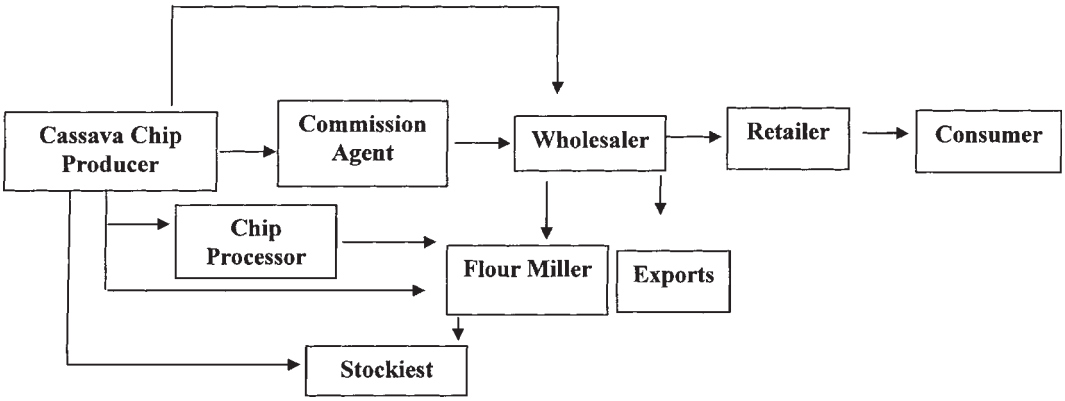
a. Raw Tubers



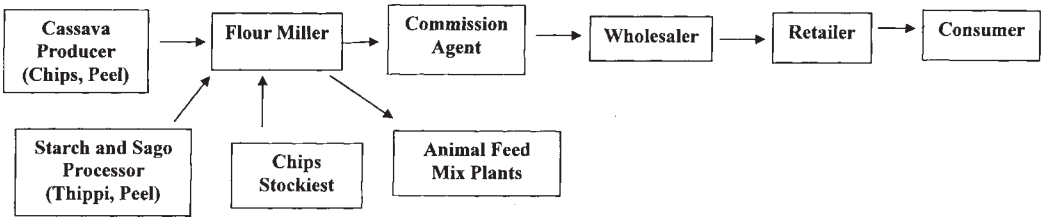
b. Starch



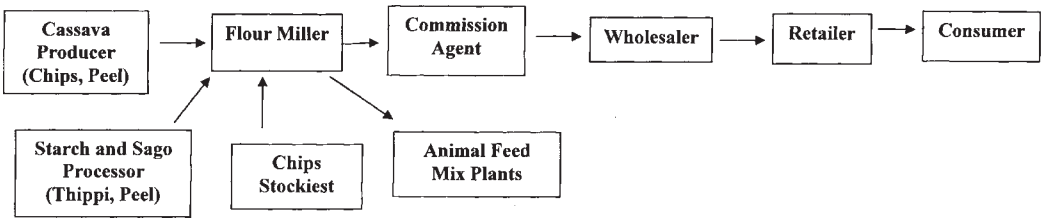
c. Sago



d. Chips



e. Flour (Chips, Thippi and Peel)



f. Sago wafers

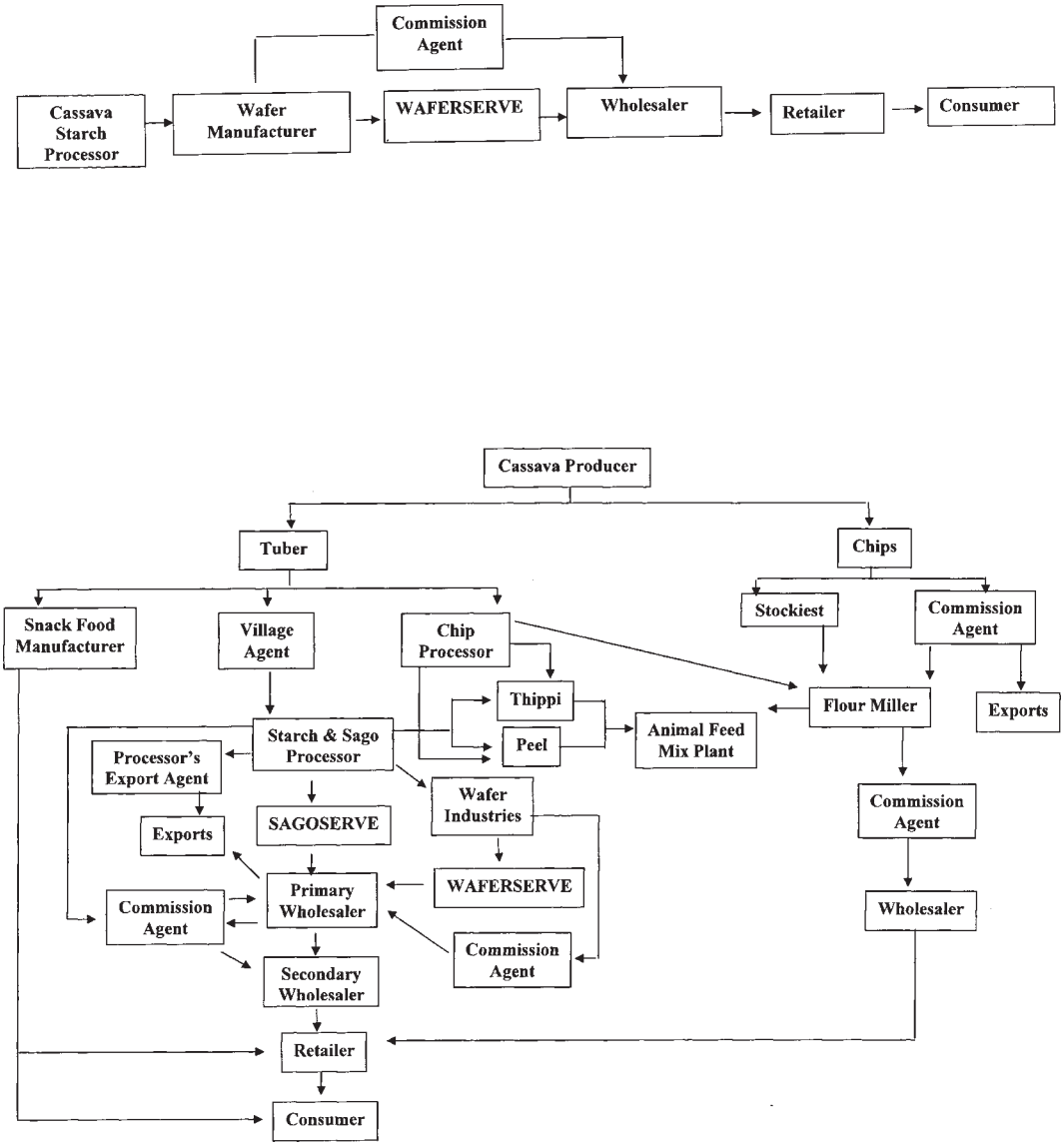


Fig 3.2 : *Schematic Representation of Market Channels for Cassava and its Value Added Products in India.*

4. Sago Wafers

Sago wafers, a thin pre-gelatinised value added product from cassava (*Manihot esculenta* Crantz) which is normally deep fried and eaten, produced at cottage level, is a flourishing industry at Namagiripet taluk of Namakkal district in Tamil Nadu. Wafer production dates back to 1950s'. Reportedly Mr. Srinivasa Chettiyar was the first person to produce wafers in a traditional method in Namagiripet and marketed in Tamil Nadu. He was preparing wafers by steaming the sago globules prepared from wet starch in a boiler and then sun drying. Slowly many wafer industries were established and started producing wafers in a commercial way. Currently 100 wafer industries are functioning in and around Namagiripet and Arivagoundampatti villages in Namakkal district in Tamil Nadu. These wafers are marketed throughout the country mostly in northern states making a business of four to five crores of rupees per annum. These industries are mostly at the household and cottage level providing employment to more than 1000 labourers of which 90% are women. It is an efficient value added product from cassava and a good source of income generation at household industry sector in villages. Hither to, systematic documentation on the economic aspects of wafer industry which is having a bright future and the potential was very much lacking.

a. Infrastructure of the Factories

The wafer industries could be classified into three categories as large, medium and small/ household depending on the per day production capacity of the industry. There were nearly 15 large industries each producing more than 100 kg of wafers per day; medium size industries were to the extent of 50 with a per day production capacity of more than 50 kg of wafers. Remaining industries were of small size with a production capacity of less than 50 kg of wafers a day.

Sago Wafers from Cottage Industry

Each wafer producing industry irrespective of the production capacity requires a starch storage

tank, drying yard, boilers, dies, stand, tray, mesh, sieve, cloth, weight scale and scaling machine. 50 % of the factories are located in rented buildings with a rent range of Rs.200/- to Rs.1,000/- per month depending on the size of the factory. Remaining 50 % of the factories are in their own buildings. Machinery requirement for different sizes of factories are given in Table 4.1.

b. Cost of Production of Sago Wafers

Details of cost of production of one box of wafers (14.400 kg) are presented in Table 4.2. Production cost of wafers includes expenditure on labourers, raw materials and other miscellaneous expenses. Mostly women labourers are employed in these industries. It is estimated that the cost of production of one box of wafers is Rs.235.66 in the case of colour wafers and Rs.232.16 in the case of white wafers. Of this, labour cost accounted for Rs.20.30 in all the varieties of wafer production. Material costs were estimated to be Rs.199.05 and Rs.195.55 for colour and white wafers respectively. Miscellaneous expenditure includes expenditure on electricity, depreciation of the machinery, imputed value of rent, WAFERSERVE service charge and transport cost of wafers from wafer industry to WAFERSERVE godown. All this amounted to Rs.16.31 per box of wafers.

Labour costs include expenditure incurred for different operations such as pulverizing starch cakes, globule making, arranging globules in dies and boiling, drying and packing of wafers. Among the various labour costs, drying and packing operation incurred higher expenditure to the tune of Rs.12.50 per box of wafers. One box of wafers requires nearly six hours of manufacturing time.

Different types of Sago Wafers

Material costs include expenditure on wet starch, colour, salt, polythene bags, labels, wooden box with belts, firewood and chilly powder, cumin, garlic, green chillies, tomato juice. Expenditure on wet starch is the major component of material costs involving an expenditure of Rs.140.00.

Among the three types of wafers, production cost is more for chilly wafers as additional ingredients such as chilly powder, cumin, garlic, tomato juice, green chillies are added. It requires an additional expenditure of Rs.50/- per one box of wafers. Thus the cost of production of chilly wafers amounts to Rs.282.16 per 14.4 kg box.

Different types of Sago Wafers

Thus the cost of production per one kg of wafers was estimated to be Rs.16.30, Rs.16.10 and Rs.19.60 in the case of colour, white and chilly wafers respectively.

c. Sensitivity Analysis

Sensitivity analysis was done to understand the extent up to which wafer manufacturers can sustain the production of wafers due to fluctuations in the starch prices. It enables the manufacturer to suitably adjust the quantum of production in correspondence to the fluctuating wet starch price. This analysis was carried out considering the violent fluctuations in the prices of cassava starch. For carrying out sensitivity analysis, it was assumed that producer's price and retail price remain unchanged. Cost of wet cassava starch was Rs.5.50 per kg during December 1998. Price of the wet starch is the only major factor that determines the profit of the wafer manufacturer. This analysis enables the manufacturer to decide what type of wafers to be produced to run the business without incurring loss. Results of sensitivity analysis were presented in Table 4.3 and represented in Fig 4.1, 4.2 and 4.3 for white, colour and chilly wafers respectively.

Wafer manufacturers can sustain the production of white wafers till 24 % increase in the price of wet starch (Fig 4.1). There will be no profit or loss at this percentage increase in the price of wet starch. Colour and chilly wafers can be produced with profit even at this increase in the price.

Producing colour wafers will be profitable up to 28 % increase in price of wet starch and beyond 28 % increase, it will not be economical to produce wafers (Fig

4.2). Chilly wafer production will be profitable up to 30 % increase in wet starch price (Fig 4.3).

d. Marketing of Sago Wafers

Though wafer production is concentrated at Namagiripet taluk of Namakkal district in Tamil Nadu, its consumption centers are spread over many northern states. Traders/brokers of sago and starch are also trading in wafers. Middlemen/ brokers were exploiting the wafer industrialists in marketing of wafers during the earlier period in wafer production as industrialists don't have any knowledge in wafer trading and its consumption centres. Taking the success of SAGOSERVE into consideration in eliminating middlemen domination in sago and starch trade, wafer manufacturers also started a co-operative marketing society in the lines of SAGOSERVE with Sri N.P.Balasundaram as its founder president. The society was registered on 10.03.1987 as WAFERSERVE (The Namagiripet Tapioca By-products Manufacturers Industrial Co-operative Service Society Ltd.). The society has a President, 11 Directors and 64 wafer manufacturers as members. Each share value is Rs.500/-. There is no involvement of middlemen when wafers are sold through WAFERSERVE. Goods are delivered on payment of the total value of the goods ordered to the society. Society is charging Rs.5/- per box as service charge and also collecting Rs.1/- per box as thrift deposit from the producer which will be repaid after one year.

Different states have demands for different varieties of wafers in different periods in a year. During sravana month (August), only white colour wafers are in demand in Gujarat. In Maharashtra, colour wafers are preferred. During festivals like ramjan and holi, colour wafers are in demand in Uttar Pradesh, Madhya Pradesh and Andhra Pradesh. Wafers are in demand during Radha Yatra period in West Bengal every year. There is no sales tax on wafers. Margin of processor varies from Rs.20/- to Rs.80/- per box of wafers depending on the price of wet starch.

Table 4.1: *Machinery/Infrastructure requirement of sago wafer industries.*

Machinery/Infrastructure	Large	Medium	Small
Starch storage tank	1	1	1
Boiler	3	2	1
Stand	5	2	1
Tray	75	40	20
Dies (Number)	35,000	20,000	10,000
Sieve	2	1	1
Mesh (60 x 90 cm)	1	1	1
Weight scale	1	1	1
Scaling machine	1	1	1
Drying yard (Sq.ft.)	1000	500	300

Table 4.2: *Cost of production of sago wafers.* *(in rupees per one box of 14.4 kg)*

S.No.	Particulars	Type of wafers		
		Colour	**White**	**Chilly**
1.	Pulverizing starch cakes and mixing ingredients	1.56 (0.66)	1.56 (0.67)	1.56 (0.55)
2.	Making globules	3.12 (1.32)	3.12 (1.34)	3.12 (1.11)
3.	Arranging globules in dies and boiling	3.12 (1.32)	3.12 (1.34)	3.12 (1.11)
4.	Drying and packing	12.50 (5.30)	12.50 (5.38)	12.50 (4.43)
I.	**Gross labour costs**	**20.30 (8.61)**	**20.30 (8.74)**	**20.30 (7.19)**
1.	Wet starch @ Rs.5.50 per kg (including starch transport expenses)	140.00 (59.41)	140.00 (60.30)	140.00 (49.62)
2.	Colour	3.50 (1.49)	0	0
3.	Salt	2.00 (0.85)	2.00 (0.86)	2.00 (0.71)
4.	Plastic bags	7.00 (2.97)	7.00 (3.02)	7.00 (2.48)
5.	Labels	3.05 (1.29)	3.05 (1.31)	3.05 (1.08)
6.	Wooden box with belts	24.00 (10.18)	24.00 (10.34)	24.00 (8.51)
7.	Fire wood	17.50 (7.43)	17.50 (7.54)	17.50 (6.20)
8.	Chilly powder, pepper, jeera, tomato juice, garlic, green chillies	0	0	50.00 (17.72)

9.	Electricity for globulator	2.00 (0.85)	2.00 (0.86)	2.00 (0.71)
II	**Gross material costs**	**199.05** **(84.46)**	**195.55** **(82.72)**	**245.55** **(87.03)**
1.	Depreciation	3.31 (1.40)	3.31 (1.43)	3.31 (1.17)
2.	Imputed value of rent	6.00 (2.55)	6.00 (2.58)	6.00 (2.13)
3.	Transport cost of wafers from factory to Waferserve	2.00 (0.85)	2.00 (0.86)	2.00 (0.71)
4.	Waferserve service charges	5.00 (2.12)	5.00 (2.15)	5.00 (1.77)
III.	**Gross miscellaneous expenses**	**16.31** **(6.92)**	**16.31** **(7.03)**	**16.31** **(5.78)**
IV.	**Gross cost of production /box**	**235.66** **(100.00)**	**232.16** **(100.00)**	**282.16** **(100.00)**
V.	**Cost of production / 100 g packet**	**1.63**	**1.61**	**1.96**

* Figures in parentheses indicate percentage to total

Table 4.3: *Sensitivity analysis of sago wafer production per one box of 14.400 kg* (in rupees)

Particulars	Colour wafers	White wafers	Chilly wafers
Gross cost (excluding starch cost)	95.66	92.16	142.16
Starch cost (at Rs.5.50/- per kg)	140.00	140.00	140.00
Gross cost of production	235.66	232.16	282.16
Wholesale rate in the market	**275.00**	**265.00**	**325.00**
Cost of production at 10% increase in starch price	249.41	245.91	295.91
Cost of production at 15% increase in starch price	256.29	252.79	302.79
Cost of production at 20% increase in starch price	263.16	259.66	309.66
Cost of production at 24% increase in starch price	268.66	**265.16**	314.66
Cost of production at 25% increase in starch price	270.04	266.54	316.54
Cost of production at 28% increase in starch price	**274.16**	270.66	320.66
Cost of production at 31% increase in starch price	278.29	274.79	**324.79**

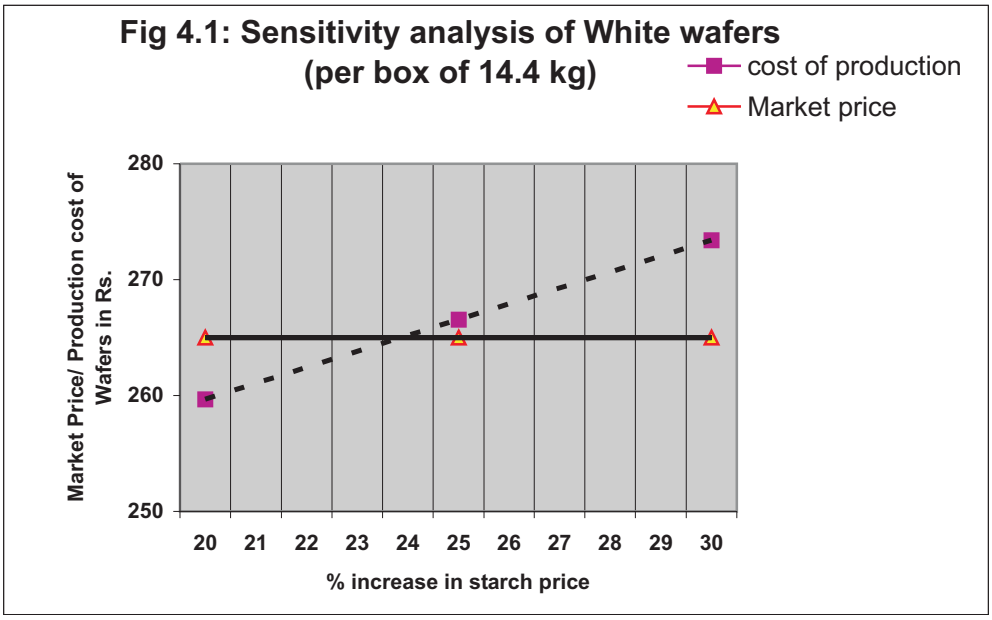


Fig 4.1: Sensitivity analysis of White wafers
(per box of 14.4 kg)
cost of production
Market price
Market Price/ Production cost of Wafers in Rs.
280
270
260
250
20 21 22 23 24 25 26 27 28 29 30
% increase in starch price

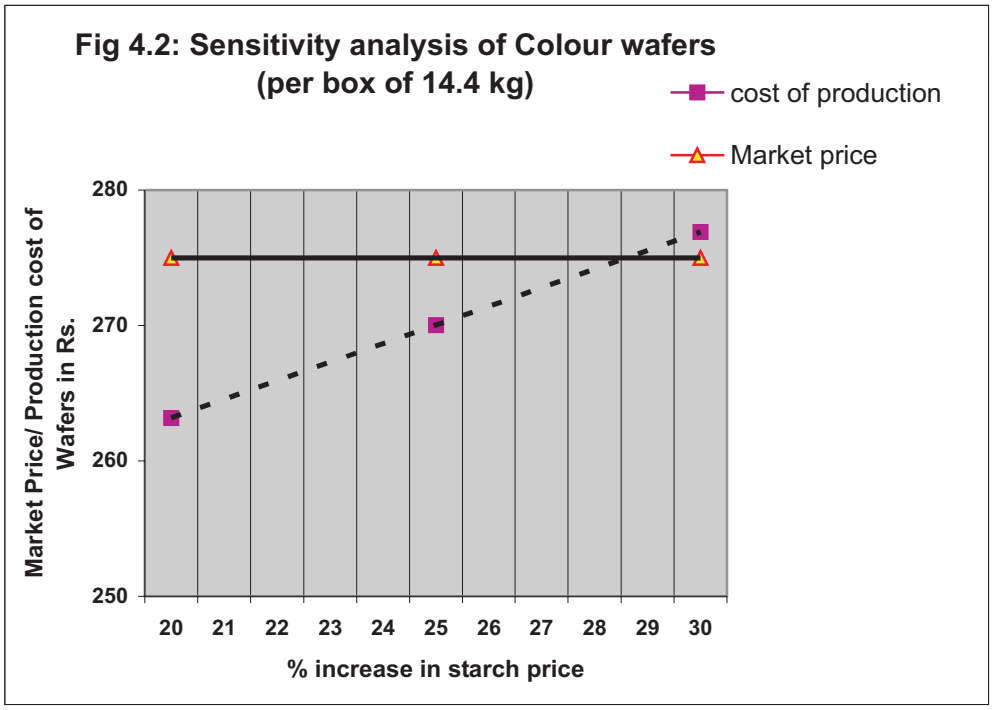


Fig 4.2: Sensitivity analysis of Colour wafers
(per box of 14.4 kg)
cost of production
Market price
Market Price/ Production cost of Wafers in Rs.
280
270
260
250
20 21 22 23 24 25 26 27 28 29 30
% increase in starch price

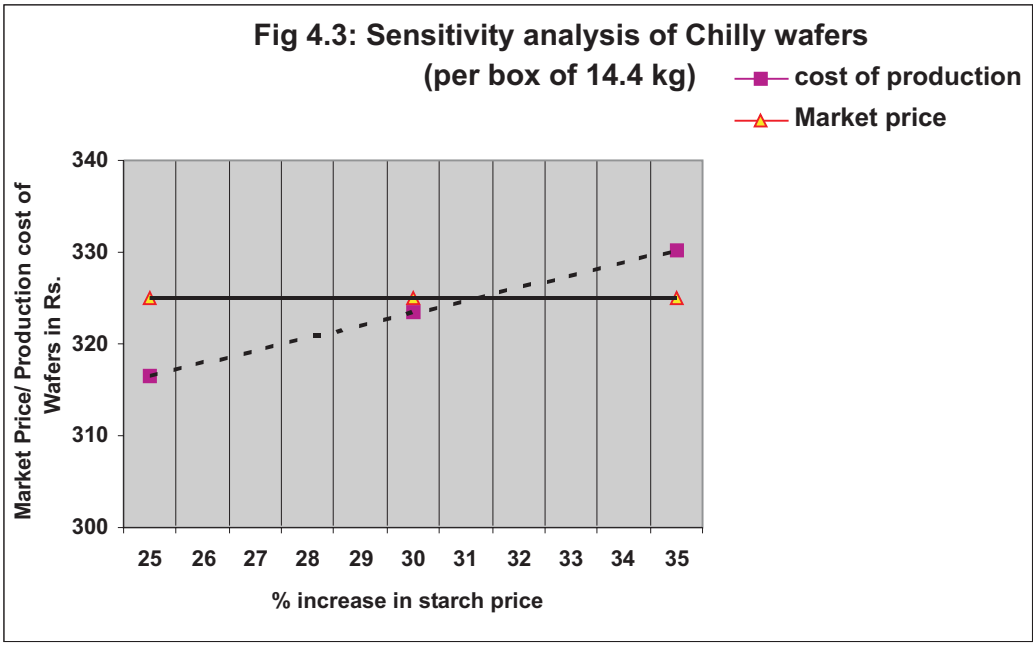


Fig 4.3: Sensitivity analysis of Chilly wafers
(per box of 14.4 kg)
cost of production
Market price
Market Price/ Production cost of Wafers in Rs.
340
330
320
310
300
25
26
27
28
29
30
31
32
33
34
35
% increase in starch price

5. Price Spread for Value Added Products from Cassava

Sago and starch are the two important value added products from cassava. These products are marketed throughout the country from the production centres such as Salem and Samalkot through various channels. It involves many market functionaries incurring marketing costs and marketing margins. Primary data was collected from the production as well as marketing centres of sago and starch (Pune, Mumbai and Kolkata) on price spread, marketing costs and marketing margins by contacting farmers, processors, commission agents, primary and secondary wholesalers and retailers. Price spread on sago wafers was collected from Kolkata market.

Pune, Mumbai and Kolkata are the important marketing centres from the point of view of quantity of sago marketed in these centres and the number of traders/ wholesalers involved besides Salem which is both production and marketing centre for sago in India. Therefore Salem was considered as local market while Pune, Mumbai and Kolkata were considered as national markets for sago. Similarly Salem is the production and local marketing centre for starch and Pune and Mumbai are the important national marketing centres for starch in India. Marketing costs, margins, price spread, producer's share in consumer's rupee and marketing efficiency were estimated both in local and national markets for sago and starch. In general, sago is transacted in 90 kg bags while starch in 100 kg bags. Price spread for starch, sago and sago wafers were presented in Table 5.1, 5.2 and 5.3 respectively and represented in Fig. 5.1 and 5.4 for starch and sago respectively. Market functionary wise marketing costs and marketing margins incurred in different marketing centres for starch and sago were represented in Fig. 5.2, 5.3, 5.5 and 5.6 respectively.

a. Sago-Local Market

Processor, primary wholesaler, secondary wholesaler, semi-wholesaler, retailer, middlemen/commission agent were the market functionaries involved in marketing sago from producer to consumer. Gross marketing cost was estimated to be Rs.265.54 while gross marketing margin was Rs.558.47 for sago marketed locally. It was interesting to note that marketing costs were declining and marketing margins were increasing as the product moves from producer to consumer. Marketing cost

incurred by the processor was the highest and that of the retailer was the lowest. Market margin was the highest for retailer while it was the lowest for primary wholesaler. Price spread was estimated to be Rs.1,050.97 and producer's share in consumer's rupee was 48.10 % which was the highest among the local and national markets. It may be due to low marketing cost in the local market compared to national markets.

b. Sago-National Markets

Pune, Mumbai and Kolkata are the important marketing and consumption centres for sago in India. In Pune, sago is being sold in one kg attractive consumer packets.

Price spread was estimated to be the highest for the sago sold in consumer packets in Pune market (Rs.1,580.47 per 90 kg) while in Mumbai, it was Rs.1,337.58 per 90 Kg . High price spread in Pune and Mumbai markets was due to high transport costs, octroi, State Govt. sales tax. Sago is exempted from sales tax in Kolkata considering it as baby food. Octroi was not present in West Bengal. Marketing cost was the highest for the sago sold in Pune and Mumbai markets due to high transport expenditure, taxes and high wages of labourers. Gross marketing margin was estimated to be Rs. 496.72, Rs.701.22 and Rs.571.22 for sago sold in Pune (both for 90 kg bag and one kg consumer packet sales) and Mumbai markets respectively. Marketing margins increase as the product moved from producer to consumer. Gross marketing margin was the highest in Pune market due to high profit margin of secondary wholesaler, semi- wholesaler and retailer.

Producer's share in consumer's rupee was the highest in Salem market (48.10%) and the lowest in Pune market for sago sold in consumer packets (38.13%). The difference in producer's share in consumer's rupee between Salem and Pune markets can be attributed to the high marketing cost due to high transportation costs and marketing margins involved in Pune market.

c. Starch-Local Market

Price spread was estimated for 100 kg bag of starch. Salem is the main production centre for starch. Length of the channel was observed to be longer as retail sales are more in the local Salem market involving semi-wholesalers and retailers. Sizing

industries, laundries, corrugation industries and foundries purchase starch through retail outlets. It was estimated that price spread for starch was Rs.711.87 in Salem. Producer's share in consumer's rupee was more in the market where there was less marketing cost due to fewer taxes and less transport costs and less marketing margins. The situation in Salem corresponds to this fact. Producers' share in consumer's rupee was estimated to be 54.08 in Salem. Salem market involves primary, secondary wholesaler, semi wholesaler, retailers and brokers.

d. Starch-National Market

Pune, Mumbai are the major national marketing centres for starch. Starch is largely sold in large quantities mainly to gum manufactures, sizing plants, pharmaceuticals, paper industries etc. These industries mainly purchase from secondary wholesaler and semi-wholesalers. Retail sales of starch are very much limited.

Marketing costs in Mumbai (Rs.447.57) and Pune (Rs.454.67) markets was more due to high transport costs. Gross marketing margin was less in Mumbai market due to involvement of less number of market functionaries.

It was estimated that price spread for starch was Rs.934.29 and Rs.809.49 in Pune and Mumbai markets respectively. Gross marketing cost and marketing margin were the highest in Pune market.

Producers' share in consumer's rupee was estimated to be 47.36 and 50.88 % in Pune and Mumbai markets. Involvement of retailers is limited in Pune and Mumbai market. Even though Mumbai is far off from Salem than Pune, producer's share in consumer's rupee was more due to involvement of less market functionaries compared to Pune market.

Shepherd index of marketing efficiency was estimated to be the highest in local markets than in national markets for starch and sago. This may be due to low transport costs and taxes involved in local marketing. Pune market was more efficient than Mumbai market amongst the national markets for sago sold in 90 kg bag due to less expenditure incurred on transportation and taxes. Sago sold in one kg consumer packets rendered Pune market inefficient with high marketing cost than Mumbai market.

Mumbai market for starch was found to be more efficient than Pune market as most of the starch was marketed to the consumers through secondary wholesalers.

e. Sago Wafers

Price spread for sago wafers in Kolkata market was estimated to be Rs.152/- per 14.4 kg and producer's share in consumer's rupee was high (64.81%) indicating efficiency in marketing of wafers. This is possible due to functioning of WAFERSERVE, a co-operative organisation which helped in eliminating middlemen. Gross marketing cost and margins were estimated to be Rs. 87 and Rs. 95.84 respectively.

Fig. 5.1 : Producer's price, Price spread and Consumer's price in local and national markets for cassava starch in India

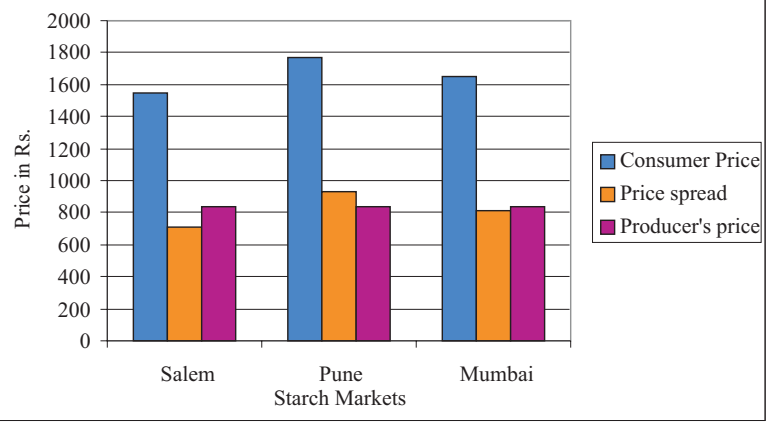


Fig. 5.2 : **Market functionary wise marketing costs incurred in marketing cassava starch in India**

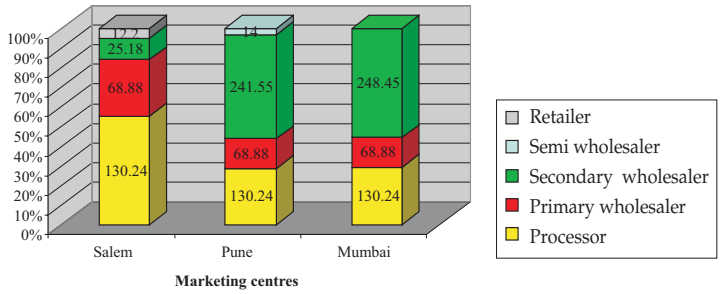


Fig. 5.3 : **Market functionary wise marketing margin incurred in starch marketing in major cassava starch markets in India.**

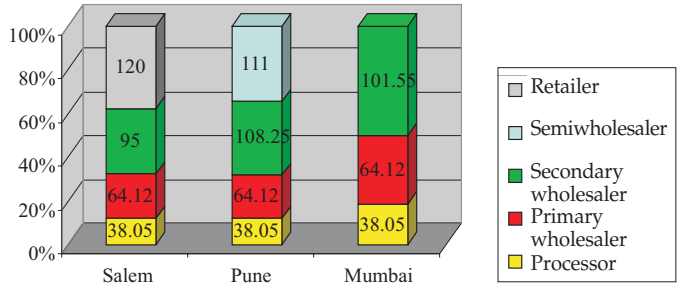


Fig. 5.4 : Producer's share, Price spread and Consumer price of sago in local and national markets for sago in India.

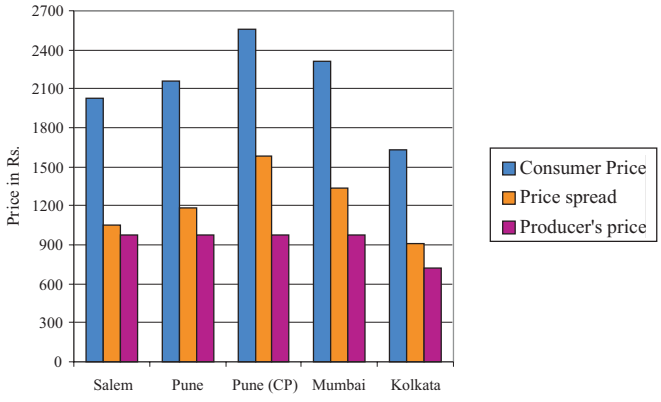


Fig. 5.5 : Market functionary wise marketing costs incurred in different marketing centres for sago

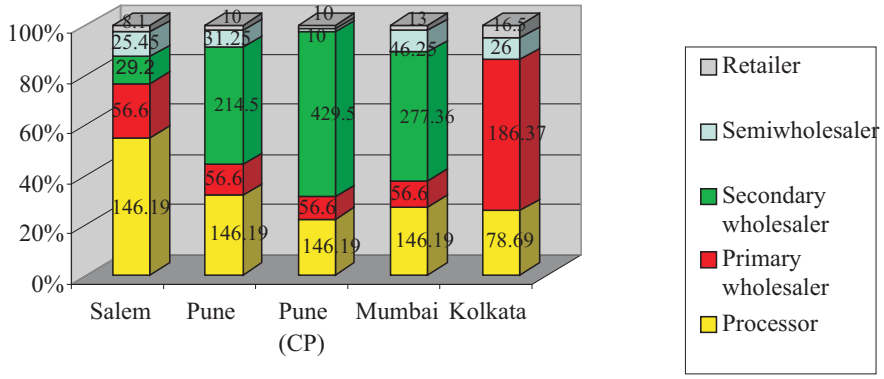


Fig. 5.6 : Market functionary wise marketing margins incurred in marketing sago in India

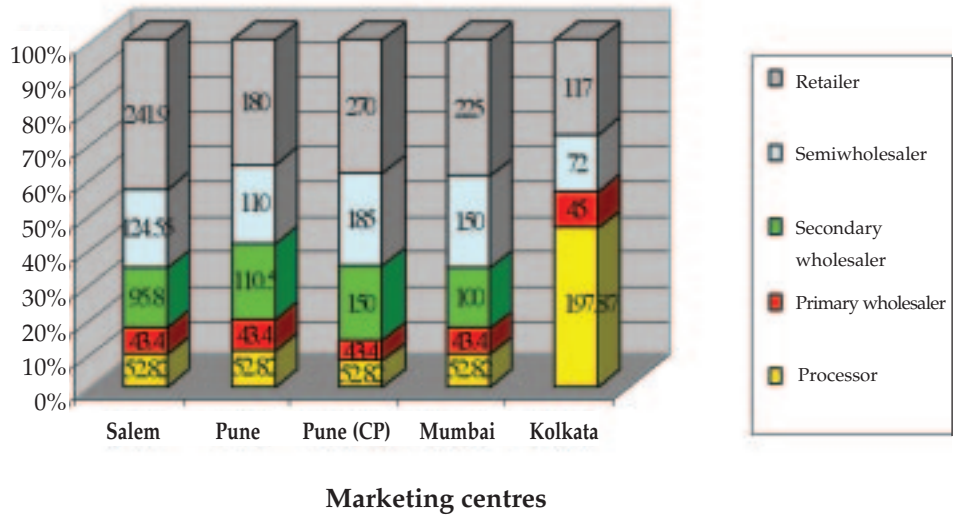


Table 5.1: *Price spread and producer's share in consumer's rupee of starch in major marketing centers in India.* *(in rupees per 100 kg)*

Particulars	Salem (Local market)	National markets	
		Pune	Mumbai
Price of raw material @ Rs.158.12 per 73 kg	838.51	838.51	838.51
Harvesting, loading and transport expenditure @Rs.15/- per 73 kg tubers	82.05	82.05	82.05
Village agent commission @Rs.2/- per bag	10.94	10.94	10.94
Marketing cost incurred by processor during purchase of tubers	**92.99**	**92.99**	**92.99**
Purchase price of raw material by processor	931.50	931.50	931.50
Processing cost	158.20	158.20	158.20
Marketing costs incurred by processor			
Loading charges	1.10	1.10	1.10
Transport expenditure from factory to sagoserve	12.00	12.00	12.00
Unloading charges at sagoserve	0.90	0.90	0.90
Bag weighment charge	0.40	0.40	0.40
Sagoserve service charge @ 1.1% on sale value	12.84	12.84	12.84
Sagoserve godown rent/bag/week	0.75	0.75	0.75
Insurance / bag	1.00	1.00	1.00
Interest on advances given by sagoserve @ 17% per year	8.26	8.26	8.26
Marketing costs incurred by processor	**37.25**	**37.25**	**37.25**
Margin of processor	**38.05**	**38.05**	**38.05**
Sale price of processor/ purchase price of primary wholesaler	1165.00	1165.00	1165.00

Marketing costs incurred by primary wholesaler			
Sales tax @ 2% on purchase value	23.34	23.34	23.34
Sagoserve service charge @1.5% on purchase value	17.51	17.51	17.51
Loading charges	1.10	1.10	1.10
Transport expenditure from factory to grinding mill	3.15	3.15	3.15
Unloading	1.10	1.10	1.10
Grinding charges	18.75	18.75	18.75
Cost of plastic cover inside bag	0.55	0.55	0.55
Loading charges	1.80	1.80	1.80
Weighment charges	1.58	1.58	1.58
Marketing costs incurred by primary wholesaler	**68.88**	**68.88**	**68.88**
Margin of primary wholesaler	**64.12**	**64.12**	**64.12**
Sale price of primary wholesaler/ purchase price of secondary wholesaler	1298.00	1298.00	1298.00
Marketing costs incurred by secondary wholesaler			
Transport expenditure to Pune	--	105.55	---
Transport expenditure to Mumbai	--	--	110.00
Transport expenditure	10.00	--	--
Octroi	--	39.00	29.25
Sales tax @ 5.4% on purchase value	--	70.00	70.20
Unloading charges	1.10	1.00	4.00
Godown rent	--	5.00	6.00
DD expenses	--	6.00	6.00
Bank interest	--	13.00	13.00

Brokerage	12.98	--	--
Miscellaneous	--	2.00	2.00
Loading	1.10	--	8.00
Marketing costs incurred by secondary wholesaler	**25.18**	**241.55**	**248.45**
Margin of secondary wholesaler	**95.00**	**108.25**	**101.55**
Sale price of secondary wholesaler/purchase price of semi-wholesaler	1418.80	1647.80	**1648.00**
Marketing costs incurred by semi-wholesaler			
Transport expenditure	--	10.00	--
Unloading	--	1.00	--
Loading and weighing charges	--	3.00	--
Marketing costs incurred by semi-wholesaler	**--**	**14.00**	**--**
Margin of semi wholesaler	**--**	**111.00**	**--**
Sale price of semi-wholesaler/purchase price of consumer	--	**1772.80**	--
Marketing costs incurred by retailer			
Transport expenditure	10.00	--	--
Unloading	1.10	--	--
Loading and weighing charges	1.10	--	--
Marketing costs incurred by retailer	**12.20**	**--**	**--**
Margin of retailer	**120.00**	**--**	**--**
Purchase price of consumer	1550.38	--	--
Gross marketing cost	**236.50**	**454.67**	**447.57**
Gross market margin	**317.17**	**321.42**	**203.72**
Price spread	**711.87**	**934.29**	**809.49**
Producer's share in consumer's rupee (%)	**54.08**	**47.30**	**50.88**
Index of marketing efficiency	**1.18**	**0.90**	**1.04**

Table 5.2: *Price spread and producer's share in consumer's rupee of sago in major marketing centers in India.* *(in rupees per 90 kg)*

Particulars	Salem (Local market)	National markets			
		Pune	Pune (Consumer packets)	Mumbai	Kolkata
Price of raw material @ Rs.158.12 per 73 kg	974.03	974.03	974.03	974.03	---
Price of raw material @ Rs.360/- per 225 kg (including transport cost) in Samalkot	--	--	--	--	720.00
Commission of village agent paid by farmer	--	--	--	--	2.22
Miscellaneous expenditure by farmer(taddicut, khaida, clerk tax, market cess and sales tax on tubers)	--	--	--	--	62.78
Harvesting, loading and transport expenditure @Rs.15/- per 73 kg tubers	92.40	92.40	92.40	92.40	--
Village agent commission @Rs.2/- per bag	12.33	12.33	12.33	12.33	--
Marketing costs incurred by processor during purchase of tubers	**104.73**	**104.73**	**104.73**	**104.73**	**65.00**
Purchase price of raw material by processor	1078.76	1078.76	1078.76	1078.76	785.00
Processing cost	226.96	226.96	226.96	226.96	166.77
Marketing costs incurred by processor					
Loading charges	1.10	1.10	1.10	1.10	2.22
Clerk charge during loading	--	--	--	--	0.50

Loading and taddicut	--	--	--	--	1.11
Transport expenditure to railway station	--	--	--	--	3.00
Loading from lorry to wagon	--	--	--	--	1.11
Society service charge @ 0.5 % of the sale value	--	--	--	--	5.75
Transport expenditure from factory to sagoserve	12.00	12.00	12.00	12.00	--
Unloading charges at sagoserve	0.90	0.90	0.90	0.90	--
Bag weighment charge	0.40	0.40	0.40	0.40	--
Sagoserve service charge @ 1.1% on sale value	15.40	15.40	15.40	15.40	--
Sagoserve godown rent/ bag/week	0.75	0.75	0.75	0.75	--
Insurance / bag	1.00	1.00	1.00	1.00	--
Interest on advances given by sagoserve @ 17% per year	9.91	9.91	9.91	9.91	--
Marketing costs incurred by processor	**41.46**	**41.46**	**41.46**	**41.46**	**13.69**
Margin of processor or	52.82	52.82	52.82	52.82	197.87
Sale price of processor or purchase price of primary wholesaler	1400.00	1400.00	1400.00	1400.00	1163.33
Marketing costs incurred by primary wholesaler					
Sales tax @ 2% on purchase value	28.00	28.00	28.00	28.00	--
Sagoserve service charge @1.5% on purchase value	21.00	21.00	21.00	21.00	--
Loading charges	1.10	1.10	1.10	1.10	--

Charge for sago mixing	2.50	2.50	2.50	2.50	--
Charge for putting address on bag	0.45	0.45	0.45	0.45	--
Cost of plastic cover inside bag	0.55	0.55	0.55	0.55	--
Stitching sacks	0.40	0.40	0.40	0.40	--
Stacking	1.50	1.50	1.50	1.50	--
Loading charges	1.10	1.10	1.10	1.10	--
Railway freight to Kolkata	--	--	--	--	53.07
Transport expenditure from railway station to market including loading from wagon to lorry	--	--	--	--	11.00
Unloading from lorry to wagon	--	--	--	--	5.00
Godown rent	--	--	--	--	5.00
Weighment	--	--	--	--	3.25
Sales tax @ 4% of sale value of sago	--	--	--	--	46.53
DD commission	--	--	--	--	15.00
Muddat @ 2% of the sale value of sago	--	--	--	--	23.27
Hundi	--	--	--	--	14.25
Miscellaneous	--	--	--	--	10.00
Marketing costs incurred by primary wholesaler	**56.60**	**56.60**	**56.60**	**56.60**	**186.37**
Margin of primary wholesaler	43.40	43.40	43.40	43.40	45.00
Sale price of primary wholesaler/ purchase price of secondary wholesaler	1500.00	1500.00	1500.00	1500.00	1394.70
Marketing costs incurred by secondary wholesaler					
Transport expenditure to Pune	--	95.00	95.00	--	--

Transport expenditure to Mumbai	--	--	--	111.11	--
Octroi	--	4.50	4.50	33.75	--
Sales tax @ 5.4% on purchase value	--	81.00	81.00	81.00	--
Unloading charges	1.10	1.00	1.00	4.75	--
Godown rent	--	5.00	--	5.00	--
DD expenses	--	6.00	--	6.00	--
Bank interest	--	15.00	15.00	7.50	--
Brokerage	--	3.00	8.00	15.00	--
Miscellaneous	--	4.00	--	2.00	--
Brokerage on purchase price @ 1%	15.00	--	--	--	--
Insurance/bag (0.25%)	--	--	--	3.75	--
Shortage @ 0.5 kg /bag	--	--	--	7.5	--
Local transport expenditure	12.00	--	--	--	--
Loading charges	1.10	--	--	--	--
Consumer packing charges	**--**				
Cost of one kg consumer pouch @Rs.1.25 per pouch	--	--	112.50	--	--
Labour charge for packing	--	--	18.00	--	--
Cost of carton	--	--	72.00	--	--
Shortage @1.5 kg /qtl. packing	--	--	22.50	--	--
Marketing costs incurred by secondary wholesaler	**29.20**	**214.50**	**429.50**	**277.36**	**--**
Margin of secondary wholesaler	95.80	110.50	150.00	100.00	--
Sale price of secondary wholesaler /purchase price of semi-wholesaler	1625.00	1825.00	2079.50	1877.36	--

Marketing costs incurred by semi- wholesaler					
Brokerage on purchase price @ 1%	16.25	---	--	--	--
Brokerage	--	5.00	--	18.50	6.00
Local transport expenditure	7.00	20.25	7.00	20.00	10.00
Unloading charges	1.10	3.00	3.00	4.75	5.00
Loading charges	1.10	3.00	--	3.00	5.00
Marketing costs incurred by semi- wholesaler:	25.45	31.25	10.00	46.25	26.00
Margin of semi-wholesaler	124.55	110.00	185.00	150.00	72.00
Sale price of semi-wholesaler purchase price of retailer	1775.00	1966.25	2274.50	2073.61	1492.70
Marketing costs incurred by retailer					
Unloading charges	1.10	3.00	3.00	3.00	3.25
Local transport expenditure	7.00	7.00	7.00	10.00	10.00
Loading charges	--	--	--	--	3.25
Marketing costs incurred by retailer	**8.10**	**10.00**	**10.00**	**13.00**	**16.50**
Margin of retailer	241.90	180.00	270.00	225.00	117.00
Sale price of retailer/consumer price	**2025.00**	**2156.25**	**2554.50**	**2311.61**	**1626.20**
Gross marketing cost	**265.54**	**458.54**	**652.29**	**539.40**	**307.56**
Gross market margin	**558.47**	**496.72**	**701.22**	**571.22**	**431.87**
Price spread	**1050.97**	**1182.22**	**1580.47**	**1337.58**	**906.20**
Producer's share in consumer's rupee (%)	**48.10**	**45.17**	**38.13**	**42.14**	**44.28**
Index of marketing efficiency	**0.93**	**0.82**	**0.62**	**0.73**	**0.79**

Table 5.3: *Price spread and producer's share in consumer's rupee of sago wafers in Kolkata market.*
(in rupees per 14.4 kg)

Particulars	Kolkata
Price of raw material @ Rs. 7/- per kg	175.00
Processing cost	79.16
Marketing cost incurred by processor	7.00
Marketing margin of processor	18.84
Sale price of processor	280.00
Marketing cost incurred by wholesaler	60.00
Marketing margin of wholesaler	25.00
Sale price of wholesaler	365.00
Marketing cost incurred by retailer	20.00
Marketing margin of retailer	52.00
Sale price of retailer	432.00
Gross marketing cost	87.00
Gross market margin	95.84
Price spread	152.00
Producer's share in consumer's rupee (%)	64.81

6. Seasonal Variations in the Prices of Value Added products from Cassava

Instability in commodity prices fails to serve as an adequate guidance to production planning and the distorted price movements does create demand and supply gap for most of the agricultural commodities. Variations in the prices of agricultural commodities are so violent affecting the overall interests of farmers. These variations are influenced by derived demand for the products, market forces, policy of the Govt. and season of production etc. Cassava farmers are not an exception to this phenomenon.

Even though many industries are depending on this crop and crores of business is going on, farmer, the raw material producer doesn't have any say on the price of raw tubers. They don't get any remunerative price for their produce. There is no support from the Govt. in the form of minimum support price as in the case of cereals, pulses and oilseeds. Prices of starch and sago in the market, demand for these products, prices of cassava starch substitutes, influence of traders etc. are the factors determining the price of cassava tubers. Prices of starch and sago are also not stable. They are highly fluctuating during different periods in a year in turn influencing the prices of raw tubers. It is essential to understand the variations in the prices of these products which would help the farmers in making crop production plans and the policy makers for formulating long term planning on price adjustments. An attempt is made to understand the seasonal variations in the prices of cassava and its value added products in Tamil Nadu by constructing the seasonal indices and also to know the influence of starch and sago prices on the price of cassava tubers.

Secondary data on monthly prices of cassava tubers, cassava starch and sago were collected for the period of 13 years from 1983-95 from SAGOSERVE, starch and sago manufacturers and farmers as monthly sago and starch data are available from this year onwards from SAGOSERVE. The study is confined to Tamil Nadu due to non-availability of monthly price data for cassava tubers, cassava starch and sago for other important cassava producing states like Kerala and Andhra Pradesh. The data was presented in Tables 6.1 to 6.3. Monthly data was transformed into quarterly data for each year. These quarters are

I Quarter: April to June; II Quarter: July to September; III Quarter: October to December and IV Quarter: January to March.

Seasonal indices were constructed using ratio to trend method for cassava tuber, cassava starch and sago prices for the period under consideration. Seasonal indices for the quarterly data were worked in such a way by adjusting seasonal indices to 400. Linear regression analysis was done to study the influence of starch and sago prices on cassava tuber price. Price parity indices were constructed to know the behaviour of cassava tuber prices in relation to starch and sago prices for the period covering 1983-95. Price parity index was worked out by taking the average prices of sago, starch and cassava tubers and converting them into indices. Index of cassava tuber price was divided by index of starch and sago prices to get the parity index for starch and sago.

a. Seasonal Price Indices

Seasonal price indices of cassava and its products estimated by ratio to trend method were presented in Tables 6.4 to 6.6.

It could be observed from table 6.4 that during I and IV quarters, price index for cassava was below 100 indicating that price of cassava tubers is not favourable to the farmers during these quarters. The lower price indices in I and IV quarters may be due to the fact that these quarters coincides with the harvesting of rainfed and irrigated cassava respectively. While the seasonal index was found to be highest during the II quarter (July to September) i.e., 102.28.

From Table 6.5, it could be observed that seasonal price index for starch prices was found to be lowest in IV quarter (January to March). The highest value of price index for starch prices was recorded during April to June (104.18). The range of difference between the minimum and maximum values of price indices was worked out to be 11.09 indicating significant price fluctuations.

Seasonal price indices for sago prices presented in Table 6.6 showed that price index was the lowest in III quarter (96.67) and highest during I quarter (102.74) leaving a difference of 6.07 during the period. Thus sago prices were favourable to the manufacturers during April to September months while unfavourable between October and March months.

b. Price Trend

In order to determine the nature of trend movement in the prices of cassava products and cassava tuber price, the prices of tubers, starch and sago were deseasonalised separately in such a way to remove short period seasonal effects. In other words, price trend is defined as that component of price variation which revealed the general direction of price movements. The fitted regression equations for the prices of cassava tubers, starch and sago along with their coefficient of determination are given below.

$Y1 = 43.769 + 5.714^{**}\ Tp \qquad R^2 = 0.68$
(SE=1.183)

$Y2 = 245.808 + 41.753^{**}\ Sp \qquad R^2 = 0.78$
(SE=6.675)

$Y3 = 192.269 + 26.401^{**}\ STp \qquad R^2 = 0.67$
(SE=5.497)

Where Y1, Y2, Y3 are the trend equations for cassava tubers (Tp), sago (Sp) and starch (STp) respectively. The coefficients of the equations along with their standard errors reveals that there was 5.7 % increase in tuber prices, 41.75 % increase in sago prices and 26.40 % increase in starch prices over a 13 year period of time.

Sago, starch industrialists and cassava farmers expressed that cassava tuber prices are largely influenced by the prices of sago and starch. Therefore it was felt to understand the influence of starch and sago prices on tuber price through regression analysis. As there was very high correlation between sago and starch prices, regression analysis was done separately with sago and starch prices on tuber prices. Regression results are presented in Table 6.7. Regression analysis indicated that starch and sago prices were influencing the cassava tuber price. It was interesting to note that variation to the extent of 63 and 65 % in tuber price was explained by starch and sago prices respectively. For every one unit change in sago price, 1.18 % variation was observed in tuber price while there was 1.72 % variation in cassava tuber price for every one unit change in starch price.

c. Price Parity Index

Price parity indices constructed were presented in Table 6.8.

Parity index between cassava tuber and starch prices vary between 82.45 % in 1993-94 and 158.19 % in 1992-93 while it was between 78.20 % in 1984-85 and 155.62% variation in 1992-93 in the case of sago prices. If the parity index is below 100, it leads to the conclusion that prices are not favourable during these periods to cassava growers. It could be observed from the parity indices that only during 1987-88 to 1989-90 and 1992-93, prices were favourable to cassava growers.

The study indicated that cassava tuber prices were not favourable during January to June in a year while it was favourable between July to December. There were significant fluctuations in the prices of cassava and its products during different quarters in a year. Prices of starch, sago and market forces were influencing the price determination process for cassava tubers. Though maximum transaction of starch and sago takes place through SAGOSERVE, it has limited role in controlling the market forces. Thus there is every necessity for the Govt. to intervene in controlling the market forces like traders and middlemen and steps have to be taken to fix the minimum support price for cassava tubers based on the cost of production to protect the interests of cassava farmers atleast in Tamil Nadu in future. Then only it will be possible to control the wide seasonal fluctuations in cassava based products.

Table 6.1: *Monthly cassava prices in rupees per 90 kg bag*

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1983	72	83	87	75	77	76	75	80	53	48	45	46
1984	50	56	56	37	24	31	23	29	25	24	34	33
1985	27	29	30	40	50	66	60	62	66	61	67	68
1986	68	66	65	73	70	74	81	81	74	75	74	75
1987	76	76	76	70	72	71	72	72	73	71	71	71
1988	71	71	71	49	51	51	52	55	55	53	52	52
1989	52	38	37	111	111	111	109	109	110	113	111	113
1990	111	110	103	89	89	91	89	120	89	90	89	88
1991	89	89	88	95	95	92	98	98	95	95	93	95
1992	96	95	103	148	148	148	143	148	143	148	143	149
1993	143	144	143	86	86	86	85	87	85	85	86	86
1994	87	89	86	125	130	115	112	115	105	100	100	102
1995	87	89	86	125	130	115	112	115	105	100	100	102

Source: SAGOSERVE and various starch and sago industrialists in Salem district of Tamil Nadu.

Table 6.2: *Monthly starch prices in rupees per 90 kg bag*

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1983	72	83	87	75	77	76	75	80	53	48	45	46
1983	245	458	306	333	336	332	334	342	324	304	273	252
1984	247	205	188	185	184	177	173	170	159	148	121	117
1985	149	153	151	175	216	245	257	235	237	271	291	319
1986	382	363	337	347	329	339	365	367	402	367	350	342
1987	310	269	287	323	332	328	311	324	345	317	262	264
1988	262	248	257	269	258	246	236	226	215	196	195	196
1989	247	295	299	321	351	382	396	396	447	462	505	466
1990	502	509	502	498	461	443	490	565	527	487	493	483
1991	457	430	428	449	462	475	464	441	416	389	360	391
1992	392	369	351	364	353	358	394	401	397	407	410	394
1993	384	409	444	499	527	541	640	628	661	688	624	539
1994	608	653	624	624	574	588	577	512	505	512	517	516
1995	457	445	428	439	493	487	502	492	496	493	489	513

Source: SAGOSERVE

Table 6.3: *Monthly sago prices in rupees per 90 kg bag*

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1983	328	332	467	467	470	480	482	476	414	381	347	319
1984	338	310	298	296	300	299	276	252	230	218	202	179
1985	211	224	224	282	337	382	389	338	316	362	359	385
1986	493	472	425	442	407	443	485	492	571	477	483	467
1987	447	399	395	461	465	463	453	472	472	424	390	359
1988	373	374	396	388	381	346	357	353	330	314	300	300
1989	323	405	395	455	497	505	506	534	645	681	641	613
1990	714	741	716	725	668	617	679	695	751	707	691	630
1991	653	600	600	620	650	637	651	665	567	606	507	552
1992	533	523	504	535	526	566	607	579	578	620	611	605
1993	617	649	680	761	799	796	881	856	846	975	950	817
1994	853	1015	948	944	868	798	777	781	749	725	711	687
1995	671	684	655	712	701	752	819	790	742	745	741	777

Source: SAGOSERVE

Table 6.4: *Seasonal index for cassava prices*

YEAR	I Quarter (April-June)	II Quarter (July-Sept.)	III Quarter (Oct.-Dec.)	IV Quarter (Jan.-Mar.)
1983	151.56	141.64	111.91	160.23
1984	54.81	46.33	62.10	97.51
1985	84.21	101.33	116.07	47.45
1986	107.08	115.19	117.17	101.34
1987	96.80	96.78	99.76	107.82
1988	63.59	66.51	66.57	94.01
1989	130.67	124.75	130.54	52.55
1990	98.81	105.57	95.19	126.17
1991	97.36	96.48	93.46	97.83
1992	144.60	135.22	135.33	102.43
1993	79.52	75.52	73.97	142.32
1994	108.23	92.31	81.67	82.59
1995	83.51	102.90	114.77	92.97
Seasonal index	97.36	101.33	99.76	97.83
Adjusted Seasonal index	98.27	102.28	100.70	98.75

Table 6.5: *Seasonal index for starch prices*

YEAR	I Quarter (April-June)	II Quarter (July-Sept.)	III Quarter (Oct.-Dec.)	IV Quarter (Jan.-Mar.)
1983	150.97	145.06	133.80	154.71
1984	73.71	64.99	54.93	88.38
1985	77.77	85.45	111.62	57.02
1986	113.31	121.24	120.91	125.06
1987	101.23	96.41	87.67	92.48
1988	73.78	61.65	56.15	76.12
1989	93.50	104.82	126.58	77.74
1990	116.44	125.06	120.15	131.26
1991	108.26	98.04	87.41	107.40
1992	79.12	83.36	87.20	85.95
1993	109.17	127.67	125.45	90.46
1994	118.09	99.99	98.96	131.02
1995	89.32	89.00	90.72	88.05
Seasonal index	101.23	98.04	98.96	90.46
Adjusted Seasonal index	104.18	100.89	101.84	93.09

Table 6.6: *Seasonal index for sago prices*

YEAR	I Quarter (April-June)	II Quarter (July-Sept.)	III Quarter (Oct.-Dec.)	IV Quarter (Jan.-Mar.)
1983	152.73	145.96	132.97	142.00
1984	85.61	71.27	64.86	103.10
1985	86.06	87.86	104.37	63.27
1986	100.87	118.11	119.32	119.26
1987	99.32	97.41	88.06	96.25
1988	73.54	66.77	62.25	80.87
1989	89.17	100.22	120.60	73.05
1990	114.75	117.74	116.51	130.68
1991	102.02	97.65	88.71	103.80
1992	81.88	85.97	91.21	81.71
1993	111.94	118.74	127.58	95.72
1994	117.44	100.35	92.90	130.55
1995	92.52	97.05	93.45	88.12
Seasonal index	99.32	97.65	93.45	96.25
Adjusted Seasonal index	102.74	101.02	96.68	99.56

Table 6.7: *Regression analysis of cassava product prices on cassava price*

Cassava product	Constant	b coefficient	R^2
Sago price	20.315	0.118**	0.646
	(14.893)	(0.026)	
Starch price	18.901	0.172**	0.634
	(15.594)	(0.039)	

Table 6.8: *Price parity index for starch and sago*

Year	Price index			Parity index	
	Cassava	Starch	Sago	Starch	Sago
1983	137.42	146.34	143.97	93.90	95.45
1984	63.41	70.59	81.08	89.82	78.21
1985	85.37	82.88	85.43	103.00	99.93
1986	109.57	120.19	114.09	91.16	96.03
1987	100.91	94.36	95.25	106.94	105.94
1988	73.03	66.73	70.72	109.44	103.26
1989	112.21	101.04	96.08	111.06	116.79
1990	108.40	123.18	119.86	88.00	90.44
1991	98.74	100.03	97.98	98.71	100.78
1992	132.79	83.94	85.33	158.20	155.62
1993	93.79	113.74	113.74	82.46	82.45
1994	94.36	111.57	109.93	84.57	85.83
1995	89.79	89.27	92.82	100.59	96.73

7. International Trade in Cassava

India's share in the global production of several agricultural commodities is quite significant while its share in their trade is low especially for fruits and vegetables either in their raw form or in the processed form. In the early sixties, the share of agricultural commodities was 45 % in the country's total exports. But this share has declined to 16 % by early nineties. In the changed global economic scenario with (General Agreement on Trade and Tariff (GATT) agreement leading to globalization and liberalisation, agricultural exports are expected to play an important role in the national economy of agrarian country like India.

Roots and tubers are the staple food for $1/6^{th}$ of the global population. With the development of technologies to produce value added products, Cassava has changed its status from just feeding the population to meeting the industrial needs. At present many value added products are produced using cassava as raw material.

Cassava finds place in the international trade either in its raw form or in its processed form. India has been exporting cassava products since 1950's in different forms. Cassava products are exported in the form of raw tubers, frozen cassava, cassava chips, Manioc starch, Tapioca & Substitutes, Manioc flour, Sago pith and sago flour. Indian cassava exports declined after 1960's due to domestic food situation especially in Kerala. However in the late eighties, the exports picked up momentum.

a. Forms of Cassava Exports

1. Raw Tubers and Frozen Cassava

Very small quantities of cassava raw tubers are being exported to Middle East and Gulf countries in two forms.

a. Raw tubers b. Frozen cassava

These exports are routed through Kochi sea port and from Kozhikode and Thiruvananthapuram air ports. Raw tubers are exported in cartons packed and filled with saw dust. The frozen cassava is exported after peeling the tubers and cutting into small pieces and freezing at $-18^{o}C$ in the frozen containers of ship. These exports are meant to meet the demand of ethnic Indian population in the Gulf and Middle East countries.

2. Cassava Chips

Dried cassava chips were exported mainly to European countries like the Netherlands, Belgium, Italy and Russia. Even though published data showed that cassava chips were exported between 1972-73 and 1985-86, recent trade enquiries in Andhra Pradesh revealed that even in 1987-88,1992-93, 1993-94 and 1995-96, dried chips continued to be exported from Kakinada port to the European countries. Some of the export specifications for chips are:

1. Moisture content of chips should not exceed 11%.
2. Chips with fungus attack should not be more than 2%.
3. Percentage of thin roots, chips with stem portion should not exceed 2%.
4. Dust in the chips should not exceed 1.5 to 2%.

Trade enquiries indicated that high percentage of sand and silica in the chips is the general problem in the quality of chips exported from India. If there is export demand, then the chips collected by middlemen, commission agents and traders are exported through chips. The importers accept the produce only when the quality controllers (SJS and Geocum) certify that it meets the export specifications.

3. Manioc Starch

Manioc starch exports started only recently from India i.e. from 1992-93 onwards. It is exported from Chennai, Mumbai and Kolkata ports to European countries and South East Asian countries. Our major problem in starch exports is the inconsistency in the quality of starch. During 1997-98 India exported 3,385.47 tonnes of starch earning Rs. 2.89 crores in foreign exchange. However, India is facing a stiff competition in (manioc) starch export from Thailand. India is not able to compete in the international market for cassava starch due to its poor quality and high price. Due to recession in Thailand in the recent years, starch prices are less in Thailand in the global market compared to Indian prices.

4. Tapioca & Substitutes

Under this group, various value added products prepared from cassava starch in the form of flakes, grains, pearls and siftings in smaller forms are exported. This group has a major share among the cassava exports from India. These products are

routed through Chennai, Mumbai and Kolkata ports. During the period under study quantity exported ranged between 2.4 tonnes to 35,232.55 tonnes.

5. Sago Pith and Sago Flour

Published data showed that products under the headings Sago pith and Sago flour are exported from India. There are no reports that India is importing any sago and starch. Therefore it is assumed that sago pith and sago flour are the products prepared using cassava starch. These exports are destined to Bangladesh and Middle East countries from Mumbai and Kolkata ports.

b. Compound Growth Rates of Cassava Exports

Cassava exports from India showed wide fluctuations over the years. Inconsistency in the quality of the product, competition from other countries like Thailand inability to compete with international prices are found to be some of the reasons for the wide fluctuations in the quantity of cassava exports.

Compound growth rates were estimated for different value added products exported from India using the following model.

$Y = b_0 b_1 t$

Where Y = Cassava product for which growth rate is calculated.

b_0 = Constant

b_1 = Growth rate

t = Time variable.

Compound growth rates were estimated for different periods as follows.

Period I: 1970-71 to 1979-80

Period II: 1980-81 to 1989-90

Period III: 1990-91 to 1997-98

Period IV: 1970-71 to 1997-98

Period V: 1972-86

As per the published information available, cassava chips were exported between 1972-73 and 1985-86. Afterwards no published data is available about cassava chips

export. Therefore growth rate for chips was estimated only for the aforesaid period only.

Cassava and its value added products exported from different ports of the country are shown in Table 7.1 and represented in Fig. 7.1. Compound growth rates for different value added products from cassava were given in Table 7.2.

1. Cassava Chips

Dried cassava chips were exported mainly to European countries like Netherlands, Belgium, Italy and USSR. Even though published data showed that cassava chips were exported between 1972-73 and 1985-86, trade enquiries in Andhra Pradesh revealed that even in 1987-88, 1992-93, 1993-94 and 1995-96, dried chips were exported to European countries from Kakinada port. An annual export growth rate of 1.45 % was observed for dried cassava chips between 1972-73 and 1985-86. Trade enquiries indicated that high percentage of sand and silica in the chips is the general problem in the quality of chips exported from India.

2. Manioc Flour

Manioc flour is exported to European countries. It is estimated that Manioc flour exports are increasing at the rate of 1.17 % per annum in Period IV. Significant export growth rate is observed in Period I and II. But the export growth rate is not significant in Period III. It is exported mainly from Mumbai and Kolkata ports.

3. Manioc Starch

Manioc starch exports started only recently from India i.e., from 1992-93 onwards. It is exported to European countries, South East Asian countries. Major problem in starch exports is inconsistency in the quality of starch. It is exported from Chennai, Mumbai and Kolkata ports. During 1997-98, India exported 3,385.47 tonnes of starch earning 2.89 crores of foreign exchange.

4. Tapioca & Substitutes

Tapioca & Substitutes export has shown significant growth in Period I and 0.74 % growth in Period II. But in Period III, the growth rate is not significant. It may be due to the reason that exports of tapioca & substitutes was fluctuating very much.

5. Sago Pith

Sago pith exports have shown significant growth of 1.57 % per annum during period IV. It showed significant growth of 2.02 and 1.52 % during Period II and III respectively. It is exported mainly to Bangladesh, Middle East countries from Mumbai and Kolkata ports.

6. Sago Flour

These exports have shown a growth of 1.75 % per annum during the whole period under study. During Period I, II and III, it showed significant growth at the rate of 1.62, 1.99 and 1.32 % per annum respectively. It is routed from Mumbai and Kolkata ports to Bangladesh and Middle East countries.

The study revealed that trade liberalisation after 1991 facilitated in improving the quantum of exports of cassava compared to the period prior to the trade liberalisation. But the export growth rate for cassava & substitutes, cassava flour is not significant due to wide fluctuations in the quantity exported. Inconsistency in the quality of the product, competition from other countries like Thailand, inability to compete with international prices are found to be some of the reasons for the wide fluctuations in the quantum of cassava exports.

Some suggestions for improving the exports are

1. Special facilities for handling and disposal of these produce at the air and sea ports need to be created. Quick handling of the products will help in reaching the products to destinations in good quality.
2. The quality of the product demanded in the international market is different from those demanded for domestic markets. Efforts should be made for improving the quality of the product and also to maintain the consistency in the quality of the product.
3. Export promotion for cassava products is weak. In a competitive marketing environment, sales promotion efforts constitute an essential requirement for improving cassava exports.
4. There is always threat to our native cassava starch industries from Thailand as the starch production cost is much lower than that is produced in India. There

will be a possibility of dumping cassava starch by Thailand in our markets. Therefore starch production costs have to be reduced in order to compete with the prices in the international market.

Table 7.1: *Cassava and its value added products exported from different (Sea & air) ports of India.*

Name of the port	Commodities exported	Export destination
Cochin	Frozen cassava Starch	Gulf countries
Chennai	Sago Starch Pappad	Sri Lanka (Colombo) Australia (Sydney) USA (New York)
Kakinada	Cassava chips/pieces	Italy, Belgium, Holland, U.K
Mumbai	Sago (Appalam, Vermicelli Viboothy) Starch. Pappad	Gulf countries Australia USA
Kolkata	Sago	Bangladesh
Kozhikode & Trivandrum	Raw tubers	Middle East countries

Table 7.2: *Compound growth rates of cassava exports from India.*

Commodity exported	Period I 1970-79	Period II 1980-89	Period III 1990-97	Period IV 1970-97	Period V 1972-86
Cassava & substitutes	1.2224**	0.7410**	0.8392	1.1924**	----
Cassava flour	0.5454**	0.9369**	3.0401	1.1730**	----
Sago pith	1.3743	2.0516**	1.5208**	1.5654**	----
Sago flour	1.6174**	1.9883**	1.3223**	1.7479**	----
Cassava chips	-----	------	-----	-----	1.4500**

Fig. 7.1: MAP SHOWING MAJOR EXPORTING CENTRES FOR VARIOUS CASSAVA PRODUCTS IN INDIA

8. Demand Assessment for Cassava and its Value Added Products

a. Human Consumption Demand

Kerala, Meghalaya, Mizoram and Arunachal Pradesh are the states reported to have relatively high cassava tuber consumption. National Sample survey Organisation (NSSO) under Central Statistical Organisation is the lead agency in the country for collecting primary data on consumption expenditure by rural and urban people in different income strata in different states and union territories in the country in different years and in various rounds. NSSO data on consumption expenditure in different rounds collected in 1973-74, 1977-78, 1983, 1993-94, 1994-95, 1995-96, 1996-97, 1998 and 1999-2000 was used for assessing the changes in the demand for cassava in human consumption sector in India over the years. Expenditure on cassava is collected under the item "Cereal Substitutes" in the survey schedule on consumption expenditure used by NSSO. Other food items included under cereal substitutes are Jack fruit seed, Mahua kernel, Mango kernel etc. As these items are consumed in relatively small quantities throughout the country, it is assumed that the quantity reported under cereal substitutes as equivalent to cassava consumption in the country.

Quantity (kg) of cereal substitutes consumed per person for a period of 30 days in different years reported by NSSO in different rounds were presented in Table 8.1. From Table 8.1, it was clear that over the years, the quantity of cereal substitutes consumption is declining at a rapid rate. During 1973-74, cereal substitutes consumption in Kerala in rural and urban areas was reported as 6.99 and 3.64 kg per person respectively where as by 1999-2000, the consumption of cereal substitutes had come down to 0.96 and 0.45 kg respectively in rural and urban areas.

After Kerala, consumption of cereal substitutes was reported to be more in Meghalaya (0.96 kg and 0.45 kg per 30 days in rural and urban areas respectively). For the country as a whole, the cereal substitutes consumption had come down from 0.56 kg and 0.18 kg in 1973-74 to 0.05 and 0.03 kg in 1999-2000 per person in rural and urban areas respectively. It implies the fact that consumption of cereal substitutes has been declining rapidly both in rural and urban areas possibly owing to the high per capita income, increased purchasing power and availability cereals.

Expenditure elasticities for different expenditure groups on cereal substitutes in Kerala and in India in 1999-2000 were calculated and compared with the expenditure elasticities available for the period 1977-78 and 1983 (Table 8.2). As proceeded from top in Table 8.2, expenditure group 1 includes the group of people spending less while the group of people spending more are included in the expenditure group 12.

Expenditure elasticities for both rural and urban areas in low expenditure groups were found to be more positive indicating the willingness to spend more on cereal substitutes in 1977-78 and 1983. But in the case of higher expenditure strata, the elasticities were declining at a rapid rate in rural areas and turned to be negative in urban areas indicating the fact that population with increased income/expenditure in rural and urban areas have the tendency to spend less on cereal substitutes.

But in 1999-2000, expenditure elasticities remained more or less same in both rural and urban areas both in Kerala and in India. There was not much influence of rural or urban difference in the consumption behaviour of cereal substitutes and most of the expenditure elasticities in different expenditure groups are less than 0.5 indicating very less elastic nature of consumers for cereal substitutes.

Demand for fresh tubers for human consumption was worked out using the following formula based on the expenditure elasticities of consumption, population growth and growth in per capita income with 1993-94 as base year,

$$D_{ct} = [d_{c0} + n_j (\underline{a} Y / Y_0)] P_t$$

Where D_{ct} = demand for cassava at time t

d_{c0} = Per capita consumption of cassava in the base period

n_j = income/expenditure elasticity of demand for cassava

$\underline{a} Y$ = Change in per capita income between time t and 0.

Y_0 = Per capita income at the base period.

P_t = Population at time t

Projected human consumption demand for cassava in Kerala was presented in Table 8.3. It shows that the demand for cassava by 2005-06, 2010-11 and 2015-16

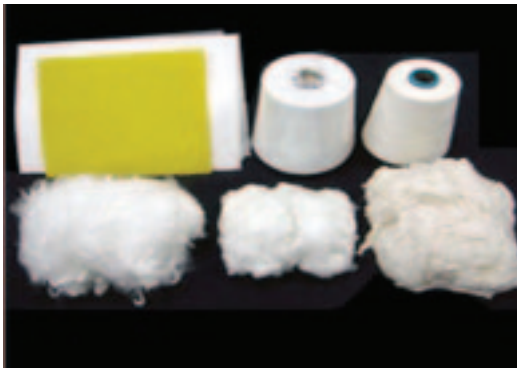
will be 2.93, 3.27 and 3.76 lakh tonnes respectively. Steep decline in human consumption demand for cassava may be due to increase in per capita income growth.

b. Industrial Demand

Cassava starch finds applications in wide range of industries like textiles, corrugation box industries, paper conversion industry, liquid gums for domestic sector, paper industry etc., besides food industry i.e. sago production industries. Surveys were made to collect data on cassava starch demand in all these industries. Demand for cassava starch is being influenced by many factors such as Govt. policy on the industries where cassava starch finds application, availability of cheaper substitutes, fluctuating growth of the industries using cassava starch, population growth, international trade in the context of WTO regime etc.

1. Textile Industry

In the textile industry, starch is required for sizing of cotton yarn before weaving. Yarn of different counts (from 0's to above 80's) are produced from cotton fibre for the production of different cloth varieties i.e., coarse cloth in making dhotis, towels etc. to fine cloth to be used in making dress materials. Maize starch is the major competitor for cassava starch during sizing. Sizing industries located at Somanur area near Coimbatore and Ichhilakaranji indicated that cassava starch was preferred for sizing coarse yarn i.e., from 0 to 40's count while maize starch was preferred for sizing fine yarn i.e., 40's to above 80's counts. Average count of cotton spun yarn production in the country points towards high production of coarse yarn. Ratio of coarse yarn to fine yarn production during the last decade was 86:14 indicating more of coarse yarn production in the country. During the last two decades, production trend of cotton yarn has shown an increase by 4%.



Sizing of Textile Yarn

Currently textile industry is stagnant. There is shift in the consumption expenditure from cloth to other consumer durables. The ratio of cotton and synthetic fabrics at present is 70: 30 compared to 90: 10 during 1980's indicating the shift from cotton cloth to synthetic fabrics usage over the period of past two decades in the country. Leaving aside these negative factors, if looked into the projected per capita cotton cloth availability and the positive growth trend in the production of cotton yarn during the last two decades, a favourable picture for cassava starch requirement in the textile sector can be observed. Sizing industries indicated that sizing materials constitute 10-12 % of the weight of yarn sized. Starch (cassava or maize), binder, softener, water, wax, oil are the important raw materials used during sizing of yarn. Nearly 3,500 sizing units distributed throughout the country were meeting the requirements of 17 lakh looks in the country. There is no record of sizing units existing in India.

It was estimated that cotton yarn sizing industry is currently consuming nearly 50,000 tonnes of cassava starch. Projection of cassava starch demand in the sizing industry, based on population projections (Census Commissionarate, Govt. of India) and projections of per capita availability of cotton cloth, were presented in Table 8.4. The study indicated that sizing industry would require 60,877 tonnes, 69,208 tonnes and 78,253 tonnes of cassava starch by 2005-06, 2010-11 and 2015-16 respectively.

2. Adhesive Sector

By virtue of its good adhesive properties, cassava starch has become an important raw material in the adhesive sector. Cassava starch based adhesives find important application in corrugation box industry, paper conversion industry and liquid gum industry for domestic use. Maize starch is one of the competing raw materials in adhesive sector for cassava starch.

a. Corrugation Box Manufacturing Industry

Kraft paper and starch (either cassava or maize) are the important raw materials in making corrugation boxes. These corrugation boxes are being used in all the industries like textiles, consumer durables, processed foods etc. These corrugation

box manufacturers have an association "Federation of Corrugated Box Manufacturers of India" (FCBM) with nearly 1300 units as members. Currently eight lakh tonnes of kraft paper is being used in making 6,050 million sq. mt length corrugation boxes. Most of the units use cassava starch in making corrugation gums due to good adhesive properties and its low price over maize starch. Currently this industry consumes 46,000 tonnes of cassava starch.

Cassava starch demand in corrugation box industry is a derived demand from total industrial growth in the country. The Indian economy has maintained robust growth for the past seven years. At the end of year 2000 A.D., the mood was very upbeat with industrial production slated to grow at more than 10% and the corrugated industry due to grow at around 10-12%. Considering these factors, cassava starch demand in the corrugation box industry sector shows a very favourable trend. Projected cassava starch demand in corrugation box industry by 2010, 2015 and 2020 are presented in Table 8.5. It is projected that 1.19 lakh tonnes, 1.92 lakh tonnes and 3.09 lakh tonnes will be the cassava starch demand by 2010, 2015 and 2020 respectively by this industry.

b. Paper Conversion Industry

Paper cones and paper tubes are the important paper conversion products which finds place in textile industry. Kraft paper, cassava starch or maize starch, yellow dextrin are the raw materials in making paper cones and paper tubes. Starch is used in making paper cones while yellow dextrin is used in making paper tubes. There are nearly 600 paper cone making units and 400 paper tube making units in India. South based units consume cassava starch and its yellow dextrin while north based units use maize starch and yellow dextrin made from maize starch. On an average 10 % of the weight of cone or tube is the weight of either glue or yellow dextrin. Currently the industry consumes 34,500 tonnes of cassava starch.

Paper conversion products

Demand for paper conversion products is a derived demand from the textile industry requirement. Paper conversion industry is stagnant due to unremunerative prices and stiff competition. At a nominal growth of 1%, projected demand of cassava starch by 2020 A.D. will be nearly 42,000 tonnes.

c. Liquid Adhesives for Office Use

Industrial survey indicated that cassava starch is the mostly used raw material in making liquid gums for office use. Camlin Ltd. having monopoly with nearly 80% of market share in liquid gum sector use cassava starch for making these gums. Currently this industry consumes 200 tonnes of cassava starch per annum.

Liquid Adhesives

3. Paper Industry

Data collected from the different starch and paper industries and from Central Institute for Research on Cotton Technology (CIRCOT), Mumbai were compiled and estimated the demand for cassava starch in paper industry (Table 8.6). Cassava starch and maize starch are being used in paper industry mainly to produce coated papers. Cultural paper, industrial paper, security paper and newsprint are the four different groups of paper produced in India (Table 8.7). Nearly 50% of the paper requirement in India is of cultural paper requiring starch coating. Demand for paper depends on factors like GDP growth rate, increase in per capita income, literacy rate, growth of service sector, advancement of printing technology in the country and development of packaging industry and development of paperless transaction. At present, starch is used @ 2%, 2.5% and 3% in paper production. Assuming that

Cassava starch in paper industry

per capita consumption of paper and paper board grows at 6% per annum, starch requirement for different types of paper at different use levels were worked out. By 2005-06 A.D., 1.33, 1.67, 1.99 lakh tonnes of starch will be required at 2%, 2.5% and 3% level of use of starch in paper production respectively; while by 2010-11, 1.91, 2.39, 2.86 lakh tonnes of starch will be required at 2%, 2.5% and 3% level of use of starch in paper production and by 2015-16, 2.75, 3.44, 4.13 lakh tonnes of starch will be required at 2%, 2.5% and 3% level of use of starch in paper production respectively. Assuming that 50 % of the starch used in the paper industry is from cassava, it can be projected that by 2005-06, 0.66, 0.83, 0.99 lakh tonnes will be the demand for cassava starch at 2% , 2.5% and 3% level of starch use; by 2010-11, 0.95, 1.19, 1.43 lakh tonnes and by 2015-16, 1.37, 1.72 and 2.06 lakh tonnes will be the cassava starch requirement at 2.0%, 2.5% and 3% level of starch use respectively.

c. Animal Feed Sector Demand

Surveys were made in animal feed industries in Tamil Nadu and Andhra Pradesh and collected information on use of cassava in animal feed making. Information from Animal nutritionists in Tamil Nadu University of Veterinary and Animal Sciences (TANUVAS) regarding the use of cassava in animal and poultry feed industries were collected through opinion survey.

Cassava cattle feed

There is a large gap between demand and supply of animal feed in the country. The total feed production in the organized sector is around five million tonnes against the total demand of 42 million tonnes. More than 80 % of the compound animal feed produced by the members of the Compound Livestock Feed Manufacturers Association (CLFMA) is being consumed in Southern and Western regions of the country. Based on the livestock population growth, total demand for animal feed by 2010 A.D. is estimated to be 68 million tonnes. Studies conducted on use of cassava as animal/poultry feed revealed that up to 30 % of the total ingredients can be from cassava in making the feed as a source of carbohydrate. But in practice only 5-10 % of the raw material in compound feed is from cassava in the form of

cassava thippi and that too only in South India where cassava starch and sago industries are concentrated. Assuming that cassava waste to the extent of 5 to 10 % will continue to be used in the compound feed industry in south India, it is estimated that 0.07, 0.10, 0.13 million tonnes will be the demand for cassava thippi by 2005-06, 2010-11 and 2015-16 respectively at 5% use level of cassava thippi. While at 10 % use level of cassava thippi in the compound feed making, projected demand is estimated to be 0.15, 0.20, 0.27 million tonnes by 2005-06, 2010-11 and 2015-16 respectively (Table 8.8).

Table 8.1: *Quantity (kg) of cereal substitutes consumed/person for a period of 30 days in different years reported by NSSO*

Year/ state	Kerala		Meghalaya		Mizoram		Arunachal Pradesh		All India	
	R	U	R	U	R	U	R	U	R	U
1973-74	6.99	3.64	--	--	--	--	--	--	0.56	0.18
1977-78	5.55	2.59	--	--	--	--	--	--	--	--
1993-94	1.62	0.68	0.42	0.06	0.11	0.02	--	--	0.06	0.04
1994-95	1.10	0.82	--	--	--	--	--	--	0.05	0.04
1995-96	1.05	0.43	--	--	--	--	--	--	0.04	0.03
1996-97	0.87	0.40	--	--	--	--	--	--	0.03	0.03
1998	1.09	0.54	--	--	--	--	--	--	0.05	0.03
1999-2000	0.96	0.45	0.40	0.12	0.05	--	0.22	0.14	0.05	0.03

R = Rural, U = Urban

Table 8.2: *Expenditure elasticities for different expenditure groups on cereal substitutes in Kerala*

Expd. Group	1977-78		1983		1999-2000	
	R	U	R	U	R	U
1	2.304	5.725	2.347	3.249	0.003	-0.025
2	1.058	2.787	1.601	2.156	-1.796	0.966
3	0.770	1.789	1.210	1.477	0.834	0.761
4	0.522	0.956	0.953	1.074	1.076	0.104
5	0.402	0.511	0.789	0.786	0.411	1.649
6	0.342	0.327	0.629	0.536	-0.360	0.739
7	0.279	0.119	0.498	0.310	0.257	0.499
8	0.220	-0.076	0.377	0.115	0.275	0.704
9	0.177	-0.219	0.269	-0.064	0.450	0.601
10	0.149	-0.318	0.175	-0.216	0.467	0.357
11	0.118	-0.423	0.092	-0.358	0.166	0.665
12	0.075	-0.568	0.036	-0.447	0.519	0.491
All	0.145	-0.457	0.253	-0.086	0.357	0.356

R = Rural, U = Urban

Table 8.3: *Projected Demand for cassava in Kerala in human consumption sector. (1993-94 as base period)*

Projected Year	Projected Demand (Lakh tonnes)
2005-06	2.93
2010-11	3.27
2015-16	3.76

Table 8.4: *Projected cassava starch demand in textile (sizing) industry.*

Year	Projected population (crores)	Projected per capita availability of cotton cloth (sq. mt.)	Projected cassava starch demand (tonnes)
2001-01	101.24	16.04	49,412
2005-06	109.41	16.89	60,877
2010-11	117089	17.82	69,208
2015-16	126.35	18.80	78,253

Table 8.5: *Projected cassava starch demand in corrugation box industry*

Year	Projected cassava starch demand (tonnes)
2010	1,19,000
2015	1,92,000
2020	3,09,000

Table 8.6: *Projected demand for starch in paper industry in India*

Year	Projected population (crores)	Projected per capita consumption of paper & paperboard in kg @ 6% growth	Projected demand for paper & paperboard (million mt)	Starch requirement for different types of paper at different use levels (lakh tonnes)			Cassava starch requirement at different use levels (lakh tonnes)		
				2%	2.5%	3.0%	2%	2.5%	3.0%
2000-01	101.24	4.55	4.61	0.92	1.15	1.38	0.46	0.57	0.69
2005-06	109.41	6.09	6.66	1.33	1.67	1.99	0.66	0.83	0.99
2010-11	117.09	8.15	9.54	1.91	2.39	2.86	0.95	1.20	1.43
2015-16	126.35	10.90	13.78	2.75	3.44	4.13	1.37	1.72	2.06

Table 8.7: *Types of paper produced in India.*

Name of the paper	% of total consumption	Main varieties
Cultural paper	46	Creamwove, Maplitho, Bond, Chromo paper
Industrial paper	48	Kraft paper, Paper boards, Chromo board, art board
Speciality paper	6	Security paper, Grease proof paper and Electrical grade paper
News print	--	Glazed and Non- Glazed

Table 8.8: *Projected cassava demand in organized animal feed sector (million tonnes)*

Year	Projected compound feed production by CLFMA in		Compound feed with cassava waste at	
	All India	South India	5%	10%
2000-01	2.2	1.14	0.05	0.11
2005-06	3.0	1.52	0.07	0.15
2010-11	4.0	2.03	0.10	0.20
2015-16	5.4	2.70	0.13	0.27

9. Demand - Supply for Cassava in India

Utilization of cassava produced in the country in 1999-2000 was shown state wise and sector wise in Table 9.1. In the total cassava produced during 1999-2000, 15% is considered as wastage at different stages of hauding tubers and therefore only 85% of cassava produced is shown under different sectors.

a. Human Consumption and Animal Feed Sectors

It was estimated that 16.43% (8.70 lakh tonnes) of the cassava produced in the country during 1999-2000 was used for human consumption as fresh tubers after deducting 15% of the total tuber production as wastage during handling in different market chains from harvesting to till consumption. Nearly 5.44 lakh tonnes of fresh tubers were estimated to be consumed in Kerala, 2.91 lakh tonnes in Tamil Nadu especially in tribal areas, 0.35 lakh tonnes in Andhra Pradesh and other north eastern states of the country. Human consumption demand for cassava is subject to further decline at a rapid rate due to increase in per capita income, availability of cereals and other high calorie foods. Besides fresh tuber consumption, cassava is also consumed as parboiled chips and fried chips in Kerala and as fried chips in Tamil Nadu and Andhra Pradesh. Nearly 6.54 lakh tonnes of fresh tubers were estimated to be fed to cattle mostly in Kerala.

b. Industrial Utilization of Cassava

1. Kerala

Based on the information collected from industries located in Kerala and Tamil Nadu, it was observed that even though there was no industrial utilisation of cassava tubers in Kerala, tubers produced from the Kerala districts bordering Tamil Nadu were supplied to sago and starch industries located in Salem, Namakkal, Erode etc. districts. It was estimated that nearly 4.34 lakh tonnes of tubers constituting 20 % of the cassava production in Kerala in 1999-2000 were supplied to sago and starch industries in Tamil Nadu. It was also estimated that 0.22 lakh tonnes of tubers were converted into dry chips for supplying to flour millers in Tamil Nadu and Andhra Pradesh.

2. Tamil Nadu

80% of the cassava production in Tamil Nadu was estimated to be used industrially for the production of sago, starch, dry chips etc. Sago industries are

consuming major quantity of cassava production in Tamil Nadu i.e., 9.75 lakh tonnes of tubers constituting 33.5% of the tuber production. Starch industries are consuming 9.64 lakh tonnes constituting 33.11% of the tuber production in Tamil Nadu. 13.41% of the cassava production in Tamil Nadu in 1999-2000 was estimated to be utilized in the production of dry chips.

3. Andhra Pradesh

In Andhra Pradesh, 99% of the cassava production was being utilized in the production of sago, starch and dry chips. Sago industries consume 0.6 lakh tonnes of tubers while starch industries were consuming 0.25 lakh tonnes of tubers and 39.3 % of tubers were converted to dry chips.

A few sago industries are functioning in Maharashtra, Gujarat and Assam. Nearly 0.34 lakh tonnes of tubers are being utilized in the production of sago.

Thus in India nearly 60 % of cassava is used industrially in the production of sago, starch and dry chips. 28 % of the total cassava production is estimated to be used for human consumption and 12 % of the tubers are used in animal feed sector.

c. Demand-Supply Projections for Cassava Starch in India

Cassava starch requirement in different industries of its use in the year 1999-2000 and the projected starch requirement for 2005-06, 2010-11 and 2015-16 are presented in Table 9.2.

Currently cassava starch is being used in large scale in adhesive industry in the form of corrugation, paper conversion and stationery adhesives then followed by paper and textile industry. The use of cassava starch as adhesive is likely to go up in future due to its suitability to make good adhesive. Cassava starch requirement projections are based on the possible growth of the respective industries and the use of cassava starch as raw material and also on the population growth rate in India.

It was projected that by 2015-16, cassava starch required in adhesive sector alone will be 3.5 lakh tonnes followed by paper industry (2.0 lakh tonnes), textile industry (78, 000 tonnes) and other sectors like food, laundry, pharmaceuticals etc. shall be 40,000 tonnes. Thus there will be a total demand of 3.12, 4.30 and 6.05 lakh tonnes

of cassava starch for various industrial applications by 2005-06, 2010-11 and 2015-16 respectively.

From the supply side, it was estimated that only 2.65 lakh tonnes, 3.09 lakh tonnes and 3.54 lakh tonnes of cassava starch can be produced in India by 2005-06, 2010-11 and 2015-16 respectively. These projections are based on the growth rate of starch sales through SAGOSERVE, growth rate of starch industry in Tamil Nadu, Andhra Pradesh in traditional states and in non-traditional areas like Maharashtra, Gujarat and North Eastern states.

It was estimated that there will be a gap of 0.47, 1.20 and 2.50 lakh tonnes between demand and supply of cassava starch in India by 2005-06, 2010-11 and 2015-16 respectively. (Table 9.3)

d. Demand-Supply Projections for Sago in India

Demand -Supply projections for sago in India for 2005-06, 2010-11 and 2015-16 were presented in Table 9.4. From the table 28, it can be observed that there will be a demand of 2.62, 2.85 and 3.05 lakh tonnes of sago by 2005-06, 2010-11 and 2015-16 respectively. Demand projections were based on the population growth rate and per capita availability of sago in India.

Supply projections were based on the growth rate of sago sales through SAGOSERVE, growth of sago industry in Tamil Nadu and Andhra Pradesh in traditional states and in non-traditional areas like Maharashtra, Gujarat and North Eastern states. It was estimated that there is a possibility of supply of 2.09, 2.41 and 2.74 lakh tonnes of sago by 2005-06, 2010-11 and 2015-16 respectively.

Thus there will be a gap of 0.55, 0.44 and 0.32 lakh tonnes of sago between demand and supply by 2005-06, 2010-11 and 2015-16 respectively in India.

Table 9.1: *Utilization of cassava in India in 1999-2000* *(tonnes)*

Sector	Cassava is utilized as	Kerala	Tamil Nadu	Andhra Pradesh	Other states	All India
	Actual produced (t)	25,63,500	34,25,500	1,66,100	80,600	62,35,700
	Wastage (15%)	3,84,525	5,13,825	24,915	12,090	9,35,355
	Actual available	21,78,975	29,11,675	1,41,185	68,510	53,00,345
Human consumption	As fresh tubers	5,44,744 (25%)	2,91,168 (10%)	706 (0.5%)	34,255 (25%)	8,70,873 (16.43%)
	As parboiled chips	1,08,949 (5%)	---	---	---	1,08,949 (2.05%)
	As fried chips	2,17,898 (10%)	2,91,168 (10%)	---	---	5,09,066 (9.6%)
Industry	Sago	2,17,898 (10%)	9,75,000 (33.5%)	60,000 (42.5%)	34,255 (50%)	12,87,153 (24.28)
	Starch	2,17,898 (10%)	9,64,000 (33.11%)	25,000 (17.71%)	---	12,06,898 (22.77)
	Dry chips	21,789 (10%)	3,90,340 (13.41%)	55,479 (39.3%)	---	6,63,717 (12.5%)
Animal feed	As fresh tubers	6,53,693 (30%)	---	---	---	6,53,693 (12.33%)

Note : Figures in the parenthers indicate the percentage to the actual available.

Table 9.2: *Industry wise projections of starch requirement*

Industry	1999-2000 (t)	2005-06 (t)	2010-11 (t)	2015-16 (t)
Textile	50,000	60,877	69,208	78,253
Corrugation adhesives	46,000	1,19,000	1,92,000	3,09,000
Paper conversion	34,500	36,800	38,700	40,600
Liquid adhesives	200	220	240	260
Paper at 2%	46,000	66,000	95,000	1,37,000
2.5%	57,000	83,000	1,20,000	1,72,000
3%	69,000	99,000	1,43,000	2,06,000
Others	25,000	30,000	35,000	40,000
Total demand 2%	2,01,700	3,12,897	4,30,148	6,05,113
2.5%	2,12,700	3,29,897	4,55,148	6,40,113
3%	2,24,700	3,45,897	4,78,148	6,74,113

Table 9.3: *Demand-Supply projections for starch in India*

Projected period	Demand (t)	Supply (t)	Gap (t)
2005-06	3,12,897	2,65,387	47,510
	(15,64,485)	(13,26,936)	(2,37,549)
2010-11	4,30,148	3,09,791	1,20,357
	(21,50,740)	(15,48,957)	(6,01,783)
2015-16	6,05,113	3,54,196	2,50,917
	(30,25,565)	(17,70,978)	(12,54,587)

Note: Figures in the parentheses indicate cassava tubers equivalent of starch in the respective box.

Table 9.4: *Demand-Supply projections for sago in India*

Projected period	Demand (t)	Supply (t)	Gap (t)
2005-06	2,64,793 (16,25,245)	2,09,441 (12,56,644)	55,352 (3,68,601)
2010-11	2,85,341 (17,51,372)	2,41,724 (14,50,342)	43,617 (3,01,030)
2015-16	3,05,819 (18,77,054)	2,74,007 (16,44,040)	31,812 (2,33,014)

Note: Figures in the parentheses indicate cassava tubers equivalent of sago in the respective box.

10. Problems and Policy Issues

a. Problems in Marketing Cassava and its Value Added Products

Problems identified during marketing of raw tubers, starch and sago by farmers, processors, traders and consumers were as follows.

1. A major constraint in the post-harvest utilization of cassava tubers is the rapid perishability of tubers. Normally cassava cannot be stored without spoilage for more than 7-8 days. This has often created problems to farmers who are unable to dispose the produce immediately after harvest. The market value of the tubers is reduced due to an unacceptable appearance and a reduction in the cooking quality of tubers. High cost preservation techniques seem to have limited the practical value since the cost of the tuber itself is low.

2. No suitable price policy from the Govt. for raw cassava tubers as well as for value added products from cassava such as sago and starch. Middlemen and dominant traders influence the price fixation. There is no minimum guaranteed price for raw tubers.

   The average price of sago and starch varies from month to month and year to year in an unpredictable manner. A study on cyclical variations in the prices of raw tubers conducted by Central Tuber Crops Research Institute indicated that tuber prices decline once in every 4-5 years.

3. Backward pricing of cassava tuber is prevalent in the industrial centres of cassava. Farmers are paid based on the prices of starch and sago in the market. This method is advantageous to the processors but not to the farmers while industrialists in Tamil Nadu fix tuber prices based on the starch content. Here also the price of starch points was fixed based on the price of starch and sago.

4. Agmark is a symbol of quality and purity. Even though Agmark guidelines are laid-out for grading of sago, very few sago producers follows and sell their produce under Agmark label. Though 2.0 lakh tonnes of sago is produced in the country annually, only very meagre quantity of sago (less than 1000 M.T) is sold under Agmark grade.

5. Producers' share in consumer's rupee was found to be low in channels of distant markets (other than local markets) due to high marketing costs. The reason for this is attributed to the geographical distance barrier between the production centres and the consumption centres. Involvement of many middlemen also lead to low producer's share. Large proportion of marketing cost was due to taxes and labour expenditure incurred during the process of marketing.

6. Market intelligence is not well developed with regard to cassava and its products. Due to lack of information published on prices of sago and starch at cassava production centres, middlemen and processors exploit the farmers, quoting low prices for raw tubers minimising the positive backward pricing effect.

7. There is no consistency in the quality of dried chips, starch and sago produced. It resulted in the inability of these products to meet the quality standards in the international market.

b. Policy Issues:

The study has clearly indicated that the future of cassava in India lies in its diversified uses in the industrial sector. Cassava demand in the human consumption sector has declined drastically. Even in the animal feed sector, only thippi and peel are in demand. In the industrial sector, projected cassava demand is more in adhesive sector especially in the corrugation gums and paper conversion industry. It finds good demand in the paper industry also. R & D efforts meeting the quality standards of these industries have to be strengthened.

The projected demand-supply gap in the industrial sector alone is worked out to be 1.5 million tonnes of cassava tubers requiring another 0.75 lakh ha to be brought under cassava cultivation. New and potential areas in the non-traditional states are to be considered for area expansion under the crop.

New sago industries started in Gujarat, Maharashtra, Assam etc. will act as stimulator to the local farmers to bring more and more area under cassava cultivation.

In Kerala, area under the crop is declining year after year as the importance of cassava in the food basket of the people of Kerala has been declining. It is the need

of the hour on the part of the State Govt. to encourage potential entrepreneurs and industrialists to start industries to produce diverse value added products from cassava. R & D institutions like CTCRI will always help the entrepreneurs to give consultancy on technological issues.

In the era of declining subsidies, the Govt. is restricting the number of crops for which minimum support prices are announced. Even under this circumstance, considering the economic potential of the crop in the region covering states like Tamil Nadu and Andhra Pradesh, it is necessary to announce minimum support price for cassava starch units based on specific gravity machine to protect the interests of the farmers in the long run. It will protect the poor cassava farmers from the existing uncertainty in the tuber prices. Once the minimum returns are assured, farmers may even go for capital investment in the form of developing irrigation infrastructures etc.

As far as cassava exports are concerned, it will be a tough time ahead in the current situation of globalisation and liberalisation unless the quality of the value added products from cassava is given due care to meet the international standards. Facilities created and to be created under Agro-Export Zones established recently in Kerala will form very good environment for boosting cassava exports from South India. Production costs have to be reduced in order to compete with the prices in the international market.

11. Summary and Conclusions

Semi-organised to organised marketing system with well established marketing channels for cassava and its value added products was observed in India. Pune, Mumbai and Kolkata are the important national markets for Sago and Starch in India. High Marketing costs in the national markets may be due to the distance between the production centers and consumption centers for these commodities. Sago marketing in one kg consumer packets resulted in high marketing cost. Marketing costs were declining while marketing margins were increasing for sago in the Salem local market while both marketing costs and margins were increasing in the national market. Number of market functionaries involved are very less in starch trading in the national market of Mumbai. Producer's share in consumer's rupee has to be improved in the national markets for starch and sago. Suitable price policy for cassava tubers in the form of announcing minimum support policy may be the only way out for minimizing the fluctuations in the prices of cassava tubers and reducing the backward pricing effect on cassava tuber prices and for sustaining interest of farmers on the crop in the long run.

Cassava tuber prices were not favourable during January to June in a year while it was favourable between July to December. There were significant fluctuations in the prices of cassava and its products during different quarters in a year. Prices of starch, sago and market forces are influencing the price determination process for cassava tubers. Though maximum transaction of starch and sago is taking place through SAGOSERVE, it has limited role in controlling the market forces. Thus there is every necessity for the Govt. to intervene in controlling the market forces like traders and middlemen and steps have to be taken to fix the minimum support price for cassava tubers based on the cost of production to protect the interests of cassava farmers in future. Then only it will be possible to control the wide seasonal fluctuations in cassava based products.

In Kerala, area under the crop is declining year after year as the importance of cassava in the food basket of the people of Kerala has been declining. It is the need of the hour on the part of the State Govt. to encourage potential entrepreneurs and industrialists to start industries to produce diverse value added products from cassava. R & D institutions like Central Tuber Crops Research Institute will always be there to help these entrepreneurs to give consultancy on technological issues.

As far as cassava exports are concerned, it will be a tough time ahead in the current situation of globalisation and liberalisation unless the quality of the value added products from cassava is given due care to meet the international standards. There is always threat to our native cassava starch industries from Thailand as the starch production cost is much lower than that is produced in India. There will be a possibility of dumping cassava starch by Thailand in our markets. Therefore efforts have to be made to reduce starch production costs in order to compete with the prices in the international market.

The future of cassava in India lies in its diversified uses in the industrial sector. Cassava demand in the human consumption sector has declined drastically. Even in the animal feed sector, only thippi and peel are in demand. In the industrial sector, projected demand is more in adhesive sector especially in the corrugation gums and paper conversion industry. It finds good demand in the paper industry also. R & D efforts in modifying starch for meeting the quality standards of these industries have to be strengthened.

The projected demand-supply gap in the industrial sector alone is worked out to be 1.5 million tonnes of cassava tubers requiring another 0.75 lakh ha to be brought under cassava cultivation. New and potential areas in the non-traditional states are to be considered for area expansion under the crop. New sago industries started in Gujarat, Maharashtra, Assam etc. will act as stimulator to the local farmers to bring more and more area under cassava cultivation.

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Annexure

Addresses of the Govt. Organizations, Associations, Industries Persons visited/contacted during market survey of Cassava

S.No.	Name and Address	Phone	Fax	Email/web
		Govt. Organisations		
1.	Special Officer/ Managing Director, SAGOSERVE, Jagirammapalayam (Post) Omalur Main Road, Salem-636 302.	0427-535446, 5535447, 5535448, 5535449, 5536455. M.D. Personal Number: 0427-2345673 & 5536600	0427-2345428	slm_mdsago@sancharnet.in; www.sagoserve.com
2.	Directorate General of Commercial Intelligence and Statistics 1, Council House Street, Kolkata 700 001	2483111, 2483112, 2483113, 2483114	033-2486528	---
3.	Central Institute for Research on Cotton Technology (CIRCOT) Adenwala Road, Mumbai 19.	022-4146002	--	--
4.	Dept. of Animal Husbandary Economics Madras Veterinary College, (TANUVAS) Chennai 600 007	044-25381506/507/509	044-25389445	--

Associations:				
5.	All India Starch Manufacturers Association Private Ltd. New Pushpa Vihar No. 3, 159, Colaba Road, Opp. Colaba Post Office, Colaba, Mumbai-400 005	2150091	--	--
6.	Federation of Corrugated box Manufacturers of India, 138, Bldg.No.3, Rahul Mittal I.E., Andheri, Kurla Rd., Mumbai-59	28500687	28504523	admin@ fcbm.org; www.fcbm. org
7.	Compound Livestock Feed Manufacturers Association of India, 111, Mittal Chamber, 11th Floor, Nariman Point, Mumbai - 400 021, India	91-22-22026103	91-22-2288 0128	clafma@bom4 .vsnl.net.in
8.	The South India Textile Research Association, Post Bag No: 3205, Coimbatore Aerodrome Post, Coimbatore - 641 014, Tamil Nadu.	2574367-8-9	0422 2571896	sitra@vsnl.com; www.sitra india.org

9.	M/s Powerloom Service Centre 12/63-d, Nachimuthu Gounder Street, Ganeshapuram, Somanur - 641 668 Tamil Nadu.	0421-2833158	--	--
Starch, Sago and Flour Industries:				
10.	M/s SVS Classic Foods, **Factory:** Mallur, Namakkal Dt. - 636 203, Tamil Nadu. **Office:** No.8, Gandhi Road, Salem-7, Tamil Nadu.	0427 2852466 0427 2416280	2852355 2 418854	ddsago@eth.net
11.	M/s Varalakshmi Starch Industries Ltd. Varalakshmi Tower, 7, Gandhi Road, Salem-7	0427-2316280 81	--	vsil@vsnl.com, www.varalakshmistarch.com
12.	M/s Spac Tapioca Products (India) Ltd. Poonachi, Bhavani TK, Erode - 638 314,	91-4256-257901, 257902	91-4256-257903	spac@md3.vsnl.net.in; www.spacgroup.com
13.	M/s Santosh Maize & Industries Ltd. Santosh Complex, 43/5, Meyyanur Road, Salem - 636 004, Tamil Nadu.	2449401-02	0427 2330403	--
14.	M/s Selvakumar Sago Factory, 136-A,	0427-2215755, 2215955		rsivakumar@sancharnet.in

	Manikavasakar Street, Balaji Nagar, Fairlands, Salem 636 016	Mob. : 9842710666		
15.	M/s Universal Starch-Chem Allied Ltd., Mhatre Pen Building, 'B' Wing, 2nd Floor, Senapati Bapat Marg, Dadar (W), Mumbai - 400 028.	24362210, 24363418	022 24305969	usaltd@vsnl.in
16.	Raja Sago Factory (ARG & Co.) P.O.Box No. 220, 71-D, Sandaipet Main Road Shevapet, Salem 636 002	2216600, 2216699, Mob. : 9843062118	--	--
17.	M/s Bharathi Sago, Starch and Modern Rice 181, Kamarajanar Rd. Attur Tk, Salem - 636 102, Tamil Nadu	235077	--	--
18.	M/s Sri Gopal Starch Mills Peddapuram - 533 437 East Godavari Dt. (A. P)	241278	---	--
19.	M/s Sri Lakshmi Sago Manufaturing Company Vetlapalem - 533 434, Samalkot Mandal, East Godavai District (A. P)	222423	--	--

20.	M/s Pavansuth Starch & Agricultueral Products Industries ISI Grade Tapioca Flour, Thippi flour and Cattle feed Ingredients, 8-2-38, Nalam Bhimaraju Road, Rajahmundry - 533 101 (AP)	(O) 2473912 (F) 2475677	--	--
21.	M/s Gowthamy Enterprises Jaggampeta Road, Peddapuram - 533 437, E. G. Dist. A. P	241143	--	--
22.	M/s R.B.Industries Balaramapuram Thiruvanantha-puram dt.	0471-2400260	--	--
23.	M/s Jemsons Starch & Derivatives Aroor 688 534 Alleppey dt.	0478 - 2874582 (Aroor)	0478 - 2872482	--
24.	M/s James Starch (P) Ltd. Industrial Estate Erumathala Aluwa Ernakulam dt.	0484-2677147	--	--
25.	M/s Rahmath Starch Products P.O. Thekkumuri 679 506,	0492-2682685	--	rehmath@ yahoo.com

	Cherpulassery Palakkad, Kerala, India			
26.	M/s Kwality Starch Products P.O Thekkumuri 679 505, Cherpulassery Palakkad, Kerala, India	0492-2681667, 2681662	--	--
Animal Feed Industries:				
27.	M/s Kamadhenu Feeds (P) Ltd., Narakoduru, Guntur (A.P.)	0863-2534457, 2534438	--	--
28.	M/s Kaveri's Bio Proteins Pvt Ltd., No.2, Dr. Sankaran Road, Namakkal - 637 001	04286 221218, 230236	4286 230808	kbplfeed@ md3.vsnl.net.in
29.	M/s Mahalakshmi Oils (P) Ltd. Sangadigunta, Guntur - 522 003	2220111, 2222727	0863-2290075	--
Other Industries:				
30.	M/s K.U.Sodala-muthu & Co. Pvt. Ltd., 428, Mettupalayam Road, Coimbatore 641 043, India	2441223, 2441805	422 431279	sodaltech @vsnl.com; www.sodal tech.com
31.	Dr.Joshi, M/s Dura Labs India, P.Box No. 8207 Dashisar Cheknaka Mumbai 400 068	28455602, 28455621	28455518	--

32.	M/s Camlin India Ltd. Camlin House J.B.Nagar, Andheri (E) Mumbai 400 059	--	--	--
33.	M/s Sahyadri Starch and Industries Ltd. Dhiraj Chambers 2nd Floor, 9, Hazarimal Soamni Marg Fort, Mumbai.	---	--	--
34.	M/s Spectrum Polymers Pvt. Ltd., 1-B, Vaibhav Industrial estate Sion-Trombay Road Deonar, Mumbai 400 088	--	--	--
35.	M/s Industrial Starch Products, Hill View 2nd Floor, Mumbai 58.	--	--	--
36.	M/s Singh Chemicals, Thergaon, Chinchwad, Pune - 411 033.	27273681	--	--
37.	M/s Giriraj Trading Company, 1656/57, New Shukrawar Peth, Pune - 411 002	24476920	020 24476454	girirajsheetal @ip.eth.net
38.	M/s Tamil Nadu Newsprint and Papers Limited	04324-275480	04324 - 275680/ 275814	pmc@tpn.co.in

	Kagithapuram - 639 136, Karur Dist., Tamil Nadu			
39.	M/s Pudumjee Pulp & Paper mills Ltd. Thergaon, Chinchwad Pune 411 033	--	--	--
40.	M/s National Adhesives & Chemicals Kollam 691 009	0474-2793515	0474-2796516	--
41.	M/s Hindustan News Print Ltd. News Print Nagar 686 616, Kottayam Kerala	0482-2656211	0482-2656777	hnl@vsnl.com
		Traders:		
42.	M/s Shri Rajlaxmi Traders Koik Building Near Sarwoday Niketan, Vardhaman Chowk, Ichalkaranji - 416 115, Kolhapur	0230-2433583 2437593		
43.	M/s Samrat Middle East Exports Pvt.Ltd. 18/75 Parry Junction Thoppumpady Cochin 682 005	2234851, 2234852	2232020	--
44.	M/s K.V.Moosakoya & Co., 9/526, Copra Bazar	2366216, 2366021	--	--

	P.Box No. 26 Kozhikode-1			
45.	M/s Southern Starch Products, 9-c, Ram Nagar, Salem 636 007 Tamil Nadu	0427-2411522	0427-2413144	raajravi@eth.net
46.	M/s Sri Lakshmi Traders, 37/1, Senier Street, Namagiripet - 637 406, Namakkal, Tamil Nadu.	04287 240826	--	--
47.	M/s Nemichand Nirmal Kumar, 8, Amratolla Street, Kolkata - 700 001.	22387825	--	--
48.	M/s Waghji Lakhmidas & Co., 47, Ayyasamy Road, Shevapet, Salem 636 002.	210922, 212106	0427 212106	--
49.	M/s Pabolu Satyanandam 8-3-12, Vankayalavari Street, Rajahmundry - 1	2464679, 2446144	2463204	--
50.	M/s Balaji Trader 8-16-6/2, Sivalal Lane, Vakayalavari Street, Rajahmundry - 533 101	2 464679	--	--
51.	M/s Darabshaw B. Cursetjee's Sons (Guj.) Pvt . Ltd	262023, 262416, 265343	0884 - 262416	--

	Main Road, Jagannaicpur, Kakinada - 533 002			
52.	M/s Sri Gopi Brokers D. No. : 32-2-21, 1st Floor, Khida Kolta Street, Near Chember Of Commerce, Rajahmundry - 533 101	274360	--	--
53.	M/s Sri Ramakrishna Trading Company Industrial Estate, Samalkot - 533 440, E. G Dist. (A.P)	0884-227991(o)	--	--
54.	M/s Southern Starch Industries, Mini Industrial Estate Vellanad - 695 543 Thiruvananthapuram Kerala	2882072	--	--