

सामयिक निबन्ध - 50
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भारत में काजू की आर्थिक रूपरेखा Economics of Cashew in India

डॉ. शालिनी यादव
Dr. Shalini Yadav



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Department of Economic Analysis and Research
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National Bank for Agriculture and Rural Development
मुंबई
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लेखक

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सहायक महाप्रबंधक

राष्ट्रीय कृषि और ग्रामीण विकास बैंक
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मुंबई - 400 051

Author

Dr. Shalini Yadav
Assistant General Manager

National Bank for Agriculture and Rural Development

Department of Economic Analysis and Research
4th Floor, 'C' Wing, Plot No. C-24,
G-Block, PB No. 8121,
Bandra-Kurla Complex, Bandra (East)
Mumbai - 400 051

पेपर में दिए गए तथ्यों और व्यक्त किए गए विचारों के लिए राष्ट्रीय बैंक उत्तरदायी नहीं है.

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Foreword

India has the maximum area (21.6%) under cashew nut and is the third largest producer (17.3%) of raw nuts in the world. After Vietnam, the country is the second largest exporter, accounting for 34 percent of the world's export of cashew kernels. India has a comparative advantage in the production and processing of cashew nuts on account of its cheap and skilled labour force. But the yield per hectare in India was poor at 860 kg during 2007-08 as compared to 4,125 kg/ha in Vietnam and 2,000 kg/ha in Nigeria. There is a need to expand and fully utilize the potential if India has to keep pace with growing global demand, retain market share and stay ahead of the rapidly emerging competition in the world market. Against this backdrop, NABARD conducted a study in some of the cashew growing States, viz., Kerala, Orissa and Tamil Nadu to examine the issues related to production, processing and marketing of cashew. The Report also covers the by- products of cashew, viz., Cashew nut Shell Liquid and Cashew Apple.

Cashew generates employment in the crop production and processing sectors of India employing over 3 lakh persons with more than 95 percent of them being women. Moreover, cashew assumes importance in view of the fact that it earns a sizeable amount of foreign exchange (Rs. 22,889 million during 2007-08). But the gap between actual production of raw nuts and demand by the processing industries has made India to resort to imports. Import of raw cashew increased steadily from 82,639 tonnes valued at Rs. 1,340 million during 1990-91 to reach 6,05,970 tonnes valued at Rs. 17,468 million during 2007-08. Hence, a policy change in cashew nuts production is imperative to encourage more local production and thereby prevent the outflow of valuable foreign exchange.

This study indicates that the adoption of improved technologies like grafts had enhanced productivity and profitability of cashew in the study area. Investments in processing and Cashew nut Shell Liquid have also been financially viable. Benefits of public- private partnership have been highlighted through the experience of Tamil Nadu Forest Plantation Corporation Limited (TAF CORN). Despite these interventions at the farm level, producers are confronted with constraints like inadequate infrastructure facilities, senile plantations and establishment of plantations in degraded lands with seedling

progenies of nondescript origin- all resulting in low productivity of cashew trees. Some of the other constraints identified on the processing and marketing front were low availability of domestic raw nuts, inadequate working capital, poor quality of processed kernels by small processors, unorganized marketing of cashew nuts, etc, which have adversely affected the cashew industry. Except for Goa, the cashew apple is not being utilized and is being wasted. There is need for research into profitable uses of cashew apple for the processed food industry.

Based on the findings, the study recommends phased replanting of cashew trees with grafts of recommended varieties, increase in domestic raw nuts production, commercial exploitation of cashew apple preparations and value added kernels, high level of hygiene standards to be maintained by the processors, etc. to achieve a higher growth rate of production and processing in future. Setting up of Cashew Export Zones, besides providing other facilities, would make contract farming arrangements feasible for cashew cultivation.

I hope that the report will be useful to all the agencies involved in the development and promotion of the Cashew Industry.

Mumbai

(Umesh Chandra Sarangi)

29 October 2009

Chairman

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EXECUTIVE SUMMARY

Cashew is one of the most valuable processed nuts on global commodity markets and has the potential to generate employment and revenue for developing countries. India is the second largest exporter of cashew kernels in the world and earns a sizeable amount of foreign exchange (Rs. 228890 lakh during 2007-08). Cashew generates employment in the processing and agrarian sector of India employing over 3 lakh persons with more than 95 percent of them being women. Against this backdrop, NABARD conducted a study in some of the major cashew growing States, viz., Kerala, Orissa and Tamil Nadu.

The study, besides estimating the economics of cashew nut cultivation and processing of kernels and Cashew nut Shell Liquid, analyses the issues pertaining to cashew cultivation, processing and marketing in Kannur, Mallappuram and Kollam districts of Kerala, Koraput (Orissa) and Cuddalore (Tamil Nadu). The study covered a sample of 125 cultivators, 17 processing units, 4 Cashew nut Shell Liquid (CNSL) units, 16 traders/ wholesalers/ retailers and 11 export units in the study area. Reference year for the study was 2005-06.

Cashew is mainly cultivated in Asia, Africa and Latin America. Country-wise analysis of area harvested under cashew indicates that although the share of India has declined from 38.72 percent in 1961 to 21.6 percent in 2007, India continues to have the maximum area (8.54 lakh ha) under cashew in the world followed by Brazil (18.5%) and Côte d'Ivoire (16.7%) in 2007. As per FAO statistics, Vietnam topped global production with 12.07 lakh tonnes, followed by Nigeria (6.60 lakh tonnes), India (6.20 lakh tonnes), Côte d'Ivoire (2.80 lakh tonnes), Indonesia (1.46 lakh tonnes) and Brazil (1.40 lakh tonnes) during 2007. However, in terms of area, Vietnam was at the sixth position. The yield per hectare in India was 860 kg during 2007-08 as compared to 4125 kg/ha in Vietnam and 2000 kg/ha in Nigeria. Major reasons attributing to low productivity in the country were sizeable area under cashew in the country being covered with seedling progenies, planting of cashew in marginal and poor fertile land, non-adoption of recommended package of practices and pest infestation (tea mosquito bug and cashew stem and root borer).

In India, cultivation of cashew is confined to Kerala, Karnataka, Goa and Maharashtra along the west coast and Tamil Nadu, Andhra

Pradesh, Orissa and West Bengal along the east coast. Among the States, the compound annual growth rate in area and production under cashew has been positive in all the States except Kerala (-4.20% [area], -5.14% [production]). This may be attributed mainly to the replacement of cashew with remunerative crops like rubber in Kerala. Herfindahl Index normally ranged between 0.14 to 0.17 for area under cashew and 0.15 to 0.18 for production, indicating moderate concentration among the States.

Cashew is primarily an export-oriented commodity in India. The share of kernels exported in the total processed kernels in the country was 40.84 percent in 2007-08. But India does not produce sufficient quantity of raw nuts required by the processing units and resorts to import from African and South East Asian countries. India's share in the global import of raw nuts was 91 percent for the triennium ending 2007.

The domestic cashew processing industry had a total capacity to process an estimated 15 lakh tonnes per annum against the domestic production of 5.73 lakh tonnes of raw nuts (2005-06), pointing to the wide gap between demand and domestic supply. The share of imported nuts in the total volume of raw nuts processed has increased from 34.7 percent during 1995-96 to 47.68 percent during 2007-08.

Cashew nuts are imported in the country mainly for the purpose of re-export of processed kernels since India has a labour cost advantage in this commodity. High cost involved in processing cashew is the major reason for African countries to export raw cashew nuts. Moreover, consumption of cashew kernels in these countries is also low. Using a commonly accepted conversion ratio of raw nuts to kernel at 4.54, the percentage share of imports in the total quantity of nuts processed for exports was worked out. Results indicated that imports which accounted for 36.5 percent of the total quantity of raw nuts processed for exports during 1990-91, had increased to 61.6 percent (2000-01) and 116 percent of the latter during 2007-08, implying that kernels processed from imported raw nuts were also being domestically consumed.

Since the industry is heavily dependent on the imported raw nuts, attempts were made to analyse the net foreign exchange earnings from cashew (1990-91 to 2007-08). Net foreign exchange earnings after increasing till 1999-2000, has declined as the quantity of imported

raw nuts has increased by seven times during the period. During 2007-08, the export of cashew kernels and CNSL was of the value of Rs. 228890 lakh and Rs. 1197 lakh respectively. The value of imported raw nuts was Rs. 174680 lakh and the net foreign exchange earnings were Rs. 55407 lakh. Thus, import of raw nuts cause a drain to the economy.

The Nominal Protection Coefficient (NPC) estimates measuring the degree of export competitiveness of Cashew during 2005-06 suggested less export competitive nature of cashew in the selected States. NPC worked out to 1.41 in Kerala, 1.10 (Orissa) and 1.07 (Tamil Nadu). However, cashew in Tamil Nadu was almost at borderline and can be considered to be promising from export point of view. Export competitiveness of cashew was not efficient due to the ageing trees and declining productivity.

A comparative analysis of seedling and graft varieties of cashew revealed that the net income per ha earned by the sample farmers cultivating grafts was Rs. 28675 (Kerala), Rs. 33325 (Orissa) and Rs. 37150 in Tamil Nadu and the same for traditional seedlings was Rs. 11750 in Orissa and Rs. 16175 (Tamil Nadu). This was mainly because the increase in stabilised yield for grafts was 140 percent in Orissa and 100 per cent in Tamil Nadu. Data for traditional varieties (seedlings) was not estimated for Kerala. Intensive cultivation practices were followed in Tamil Nadu, resulting in higher net income. One of the reasons, which require specific mention for the increase in yield in the study area of Tamil Nadu was that there were Farm Science Clubs organized by the Krishi Vigyan Kendra for dissemination of technologies to the farmers. Investments were financially viable for traditional and grafted varieties of cashew with the financial rate of return ranging from 23 to 38 percent in Kerala, Orissa and Tamil Nadu.

In major cashew growing areas of the country, natural farming is followed. This facilitates adoption of organic farming practices over a period of time to exploit the available marketing avenues. Cost of establishment per ha for organic plantation in Tamil Nadu worked out at Rs.83450, maintenance cost @ Rs. 15100 and the net income was Rs. 38900. Although the cost of establishment for the removal of old plantations and replacing with graft plantations was high at Rs. 1.93 lakh, the net income realized was Rs. 36900 per ha due to the stabilized yield of 1600 kg.

Tamil Nadu Forest Plantation Corporation Limited (TAFCON) in Tamil Nadu and Orissa Forest Development Corporation (OFDC) in Orissa raise and maintain plantations like eucalyptus, cashew, etc and promote the development of forest industries. Net income for the sample contractors of TAFCON worked out to Rs. 16685.25 and the same was Rs. 1112.35 per farmer. This arrangement helped the local people to participate in the development process and get benefited.

The economics of cashew processing per bag of raw nuts (80 Kg) revealed the net income of Rs. 160 in Kerala, Rs. 389 (Orissa) and Rs. 405 (Tamil Nadu). This variation was due to the difference in the recurring cost (roasting/boiling, moisture conditioning, shelling, drying, peeling, grading) incurred, which was Rs. 4191 in Kerala, Rs. 3777 (Orissa) and Rs. 3136 (Tamil Nadu) per bag of raw nuts. Recurring cost in Kerala was high due to the high labour cost.

A Case Study of Micro Enterprises in Cashew Processing in Cuddalore district of Tamil Nadu revealed that the marketing of graded kernels by the sample SHGs was arranged through tie up with the local export houses and traders, thus reducing the marketing risks. Convergence of efforts of stakeholders like financial institutions, State Government Departments and credit cum savings groups (SHGs) led to creation of livelihood opportunities for the rural poor women.

There are two main by products of cashew: Cashew nut Shell Liquid and Cashew Apple. Cashew Nut Shell Liquid (CNSL) is extracted from the shells of raw nuts and has various industrial uses like preparation of type writer rolls, drying enamels, water-proof coating for cement and brick flooring, paint manufacturing, varnishes and plastics. The viability of the sample CNSL units in Orissa and Tamil Nadu was estimated at (>50 per cent) and 15.26 percent respectively.

Cashew apple is produced and processed mainly in Brazil, Madagascar and Mali. In certain parts of India like Goa, cashew apple is used to distil cashew liquor called as feni. But in the main producing areas of India including the sample districts in Orissa and Tamil Nadu, cashew apple was not processed. A case study of cashew apple processing unit in Kannur (Kerala) revealed net income of Rs. 20 per litre from processing cashew apple syrup.

Marketing of raw cashew nuts in India has not yet been organized in a systematic manner except in Goa where co-operative marketing societies have a major stake in raw nuts trade. There was no regulated

market for raw cashew nuts in Kerala and Orissa. Even with the existence of regulated market for cashew in Panruti (Cuddalore district), raw nuts were sold by the farmers to the traders/ commission agents. Payment of cess and taxes in regulated markets deterred the producers from resorting to regulated markets.

A case study of marketing dynamics of cashew in Cuddalore district (Tamil Nadu) revealed that ninety percent of the processed kernels were sold through the export-marketing channel. In the domestic market, the prevalent marketing channel was: Farmers→ Commission Agents→ Processing units→ Wholesalers→ Retailers→ Consumers. The share of producer was 53.54 percent in consumer Rupee and the price spread was Rs. 2342 per bag (80 kg) of raw nuts in Tamil Nadu. The price spread and marketing efficiency for the marketing channels of export market has not been worked out as the intermediaries involved and prices paid by the consumers in the destination countries were not known. Instead, the net margin for the sample exporters was worked out. The average export cost per kg for grades W240 and W320 was Rs. 210 and Rs. 180 respectively and the net margin for the same worked out to Rs. 31 and Rs. 20 per kg.

Cashew futures are available at National Commodity and Derivatives Exchange Limited (NCDEX) and Multi Commodity Exchange (MCX). Although, the commodity futures help the exporters/ processors in hedging against price fluctuations as they can sell the commodity at a price decided months before the actual transaction, thus ironing out any fluctuation in prices that happen subsequently; the sample exporters/ processors were not trading on the future exchange.

The sample cultivators in the selected districts were not availing any institutional finance for maintenance of cashew trees. The sample farmers in Kerala and Orissa had taken up cashew as per their convenience on marginal lands and hence low input cost was involved. Besides, the replacement of cashew with rubber in Kannur and Malappuram districts had led to institutional financing for rubber, rather than cashew. Maintenance cost was being met by own funds in Tamil Nadu.

Strategies/ Suggestions for Cashew Development

- The present level of productivity is 860kg/ ha whereas the new varieties have a potential of 2000 kg/ ha. Technologies like use of vegetative propagated planting materials may be used for

increasing the production and productivity of cashew. Better cultivation practices like pruning, top working for rejuvenating cashew trees, improved planting material, adequate disease and pest control, etc. are required to increase yield.

- Senile plantations adversely affected the productivity and competitiveness of cashew. Production and productivity can be enhanced through a phased replanting programme. Strong extension activity and credit support is required to make the farmers rejuvenate old plantations as well as to practice intensive cultivation practices.
- Organic cashew offers new opportunities for the producers as they command price premium. Concerted efforts are required for promoting certified organic cashew.
- There was no contract farming arrangements for cashew cultivation in the study area, as cashew has not developed into organised plantation. Contract farming can evade middlemen between the farmers and the processors and ensure adequate prices to cashew farmers. It may become feasible by setting up of Cashew Export Zone at Panruti in Cuddalore district, for which a Memorandum of Understanding has been signed between GoTN and APEDA.
- Farm Science Clubs as organized by the Krishi Vigyan Kendra in Tamil Nadu may be encouraged in public/ private sectors for dissemination of technologies to the farmers.
- Infrastructure facilities especially godowns for storing raw nuts by farmers and processing industries will facilitate development of the commodity.
- The share of imported nuts in the total raw nut processing was 48 percent during 2007-08. There is a need to increase domestic production to substitute imported raw nuts in order to derive the maximum benefits from a strong processing and marketing capability developed over the years by the Indian cashew industry. Besides taking up cultivation on a commercial scale, the cultivation can also be taken up in non-traditional States like Jharkhand, Chattisgarh and North Eastern regions.

- Cashew apple preparations like jam, jelly, chutney, juice, syrup, etc need to be popularized and commercially exploited, as it will increase the income of cashew cultivators and also enhance rural employment. Potential for micro enterprises in cashew processing needs to be tapped by SHGs in cashew growing areas.
- Establishment of cashew clusters among the processors may facilitate the expansion of market linkage, setting up of other ancillary units like CNSL, units producing jam, pickles, etc from cashew apples.
- The export of value added cashew kernels like salted and roasted kernels from India is insignificant. Value addition and product diversification should receive adequate attention for having competitive edge and higher returns.
- Cashew is the only major plantation crop that is not regulated by an autonomous board. A separate cashew development board may be set up so as to enhance the cultivation of raw nuts and increase production and export of cashew kernels.
- Cashew cultivation (traditional and graft varieties) and processing including CNSL were financially viable in the sample districts. This indicates the potential of institutional credit for cashew cultivation and processing. Establishment of cashew apple processing units as in Kerala and SHGs undertaking cashew-processing enterprises in Tamil Nadu also open avenues for institutional financing. Although the Government has been providing subsidy under National Horticulture Mission for replantation, etc., it is necessary for the Bankers to consider bringing the cashew farmers into the institutional fold.

Section I

Introduction

Cashew (*Anacardium occidentale L.*), often referred to as 'wonder nut', is one of the most valuable processed nuts traded on the global commodity markets and is also an important cash crop. It has the potential to provide source of livelihood for the cashew growers, empower rural women in the processing sector, create employment opportunities and generate foreign exchange through exports.

Cashew tree is believed to be a native of Brazil, from where it has dispersed to different parts of the world primarily for soil conservation, afforestation and wasteland development. The term 'Cashew' has originated from the Brazilian name 'acajaiba' and the Tupi name 'acaju', which the Portuguese converted into 'caju' and is commonly known as 'kaju' in India. It is known as 'Paragi Andi' in Kerala meaning foreign nut, 'Lanka Beeja' in Orissa assuming its introduction from Sri Lanka, and 'Mundiri' indicating the shape of the nut in Tamil Nadu.

Cashew is cultivated mainly in the Asian, African and Latin American zones. The Asiatic zone includes India and Vietnam as the major producers, besides Indonesia, Philippines, Malaysia, Thailand and Sri Lanka. In the African zone, Nigeria, Côte d'Ivoire and Tanzania are the major producers, besides other countries like Benin, Guinea Bissau, Mozambique, Ghana, Senegal and Madagascar. The primary producers in the Latin American zone is Brazil, besides Columbia, Costa Rica, Honduras and Salvador.

1.1 Nutritional Value of Cashew

Cashew kernels are of high nutritive value. It contains 21 percent of protein, fat (47%), moisture (5.9 %), carbohydrates (22%), phosphorus (0.45%), calcium (0.05%), iron (5%) for every 100 gm and other mineral elements. Cashew kernel contains 47 percent fat but 82 percent of this is unsaturated fatty acid, which lowers the cholesterol level in blood. The most prominent vitamins in cashew are Vitamin A, D and E, which help to assimilate fats and increase the immunity level. Cashew kernel is a rich source of minerals like calcium, phosphorus and iron. Cashew kernel proteins contain all the essential amino acids such as Arginine, Histidine, Lysine, Tyrosine, Phenylalamine, Cytine, Methionine and Valine. Cashew nuts do not add to obesity and help control diabetes (*Source: CEPC*). Annexure I give the nutrients in 100 grams of cashew nuts.

1.2 Cashew in India

In India, the Portuguese introduced cashew in the Malabar Coast in the 16th century and the Malabar Coast served as a locus of dispersal to other centres in the country and South East Asia. In the beginning, cashew was mainly considered as a crop for afforestation. As it can adapt to varied agro climatic conditions, it has become a crop of high economy and commercial value. During 2007-08, cashew covered an area of 8.68 lakh hectares in the country with a production of 6.65 lakh MT (*DCCD, Cochin*).

The coastal States of India are the main cashew producers. It is grown in Kerala, Karnataka, Goa and Maharashtra along the west coast and Tamil Nadu, Andhra Pradesh, Orissa and West Bengal along the east coast.

1.3 Government Initiatives

Economic value of cashew has been realized in India since mid sixties. A central Agency, Directorate of Cashew nut Development was set up in 1966 for promotion of the sector. Centrally aided programmes were started under public and private lands to improve its productivity. Research on cashew was started with the inception of All India Coordinated Cashew Improvement Project under ICAR. Developmental programmes on area expansion, replanting, demonstration, regional nurseries, etc. were started during the plan periods and these measures have supported the growth of cashew production, processing and trade in India. Currently, National Horticulture Mission (NHM), a centrally sponsored scheme has been launched to promote holistic growth of the horticulture sector through strategies like ensuring an end-to-end holistic approach covering production, post harvest management, processing and marketing. All these will ensure appropriate returns to producers, enhance acreage and increase productivity. Besides, extension of appropriate technology, promotion of R&D technologies for production, post-harvest management and processing, setting up of post harvest facilities, etc. would also boost production and productivity. Assistance is provided for plantation infrastructure and development, establishment of new gardens, promotion of INM/ IPM, etc. under the programme.

1.4 Share of India in Global Cashew Area Harvested and Production

India has the largest area harvested under raw cashew nuts in the world. As per FAO statistics, 21.6 percent of the world's harvested area under cashew nut was in India and the country accounted for 17.3 percent of the total world cashew production during the year 2007.

Table 1.1: Cashew Area Harvested & Production
(Area in lakh ha, Production in lakh tonnes)

	1961		2007		% growth		CAGR (%)	
	A	P	A	P	A	P	A	P
World	5.16	2.87	39.53	35.78	666.08	629.41	4.55	5.22
India	2.00	0.85	8.54	6.20	327	116	3.20	1.68

A: Area, P: Production

Source: FAO Statistical Database

Among the countries, Vietnam topped global production with 12.07 lakh tonnes, followed by Nigeria (6.60 lakh tonnes) and India (6.20 lakh tonnes) during 2007. However, in terms of area, Vietnam was at the sixth position. The yield per hectare in India was 860 kg during 2007-08 as compared to 4125 kg/ha in Vietnam and 2000 kg/ha in Nigeria. Details of global area, production and yield of cashew is presented in Section III.

1.5 Importance of Cashew to Indian Economy

Cashew: An Export-oriented Commodity

Cashew is primarily an export-oriented commodity in India. Using a commonly accepted conversion ratio of raw nuts to kernel at 4.54, the volume of processed kernels in the country was worked out. By deducting the quantity of exported kernels from the total processed kernels, domestic consumption of kernels has been derived. Table 1.2 indicates that although the domestic consumption of processed kernels has increased during 2000-01 to 2007-08, the share of kernels exported in the total kernels processed in the country was still 40.84 percent during 2007-08.

**Table 1.2: Export and Domestic Consumption of Processed
Kernels in India**

Quantity (MT)

Year	Processed Kernels [^]	Export*	Domestic Consumption	% of Exported Kernels to Total Processed Kernels
2000-01	154034	89155	64879	57.88
2001-02	182063	97550	84513	53.58
2002-03	198383	104137	94246	52.49
2003-04	217598	100828	116770	46.34
2004-05	247331	126667	120664	51.21
2005-06	250748	114143	136605	45.52
2006-07	267093	118540	148553	44.38
2007-08	279949	114340	165609	40.84

[^]Conversion ratio of raw nut to kernel has been taken at 4.54

*Source: CEPC

Foreign Exchange Earnings

India is the premier exporter of cashew kernels and earns a sizeable amount of foreign exchange. India is the second largest exporter after Vietnam, accounting for 34 percent of the world's export of cashew kernels. During 2007-2008, India exported 114340 MT of cashew kernels and 7813 MT of Cashew nut Shell Liquid (CNSL) valued at Rs. 228890 lakh and Rs. 1197 lakh respectively. Due to the stagnancy in raw cashew nut production in the country, the processing industries are forced to depend on imported raw nuts. A total quantity of 605970 MT of raw nuts valued at Rs. 174680 lakh were imported during 2007-08.

Employment Generation

Cashew generates employment in the processing and agrarian sector of India employing over 3 lakh persons with more than 95 percent of them being women (*DCCD, Cochin*).

1.6 Rationale for the Study

Due to the aforesaid importance of cashew in the Indian economy, a study was undertaken in Kerala, Orissa and Tamil Nadu to examine the issues related to production, processing and marketing of cashew.

Three main cashew products are traded on the international market, viz., raw nuts, cashew kernels and CNSL. The fourth product, cashew apple is generally processed and consumed locally. The Paper gives an overview of all these four products.

1.7 Structure of the Paper

The paper is organized into nine Sections. Section one provides introduction. Section two contains the methodology of the study. Section three deals with the trends of cashew area, production, productivity and prices in the domestic and world market. In the fourth section, the cultivation aspects have been discussed. Details on cashew processing including the by products of cashew has been examined in the fifth section. Section six focuses on the marketing aspects of cashew and Section seven analyses the cashew trade. Section eight discusses the financing details of cashew. Main issues and the strategies to be followed for cultivation, processing and marketing are presented in the last section.

Section II

Objectives and Methodology

2.1 Objectives of the Study

The specific objectives were to study the following:

- Trends in area, production, yield and price of cashew in the domestic and world market
- Production aspects including net income, constraints/ issues in production at farm level
- Post harvest management- processing, value addition, methods of processing, bottlenecks faced, etc.
- Marketing aspects, identification of different channels of marketing, estimation of price spread and suggest measures to improve farmers' share
- Credit aspects - present mode of financing activities, access to institutional credit, constraints and potential for extending institutional credit in each segment of supply chain
- Export potential - export competitiveness of the crop, present quality standards, role of agri-export zones and issues relating to export marketing; and
- Strategies for Cashew development.

2.2 Selection of States and Districts

The study was conducted in some of the cashew-producing states of India, viz, Kerala, Orissa and Tamil Nadu. District- wise area, production and yield of cashew nuts in Kerala, Orissa and Tamil Nadu are given in Annexure II to IV.

Kannur and Malappuram districts in Kerala had 32 and 11 percent of the total area under cashew nuts and contributed 43 and 11 per cent of the total production during 2005-06. Kollam district in south Kerala is the hub of cashew nut processing units, hence was selected for the study of processing units. In Orissa, Koraput district had the maximum area (16%) under cashew nuts during 2005-06 and is also a major player in cashew processing industry in the State.

Area under cashew nuts in Tamil Nadu during 2005-06 was the

highest in Perambalur district (35%) followed by Cuddalore (30%) and Pudukottai (11%). But in terms of production, Cuddalore ranked first with 52 percent of the total cashew production in the State. Moreover, there were a number of processing units functioning in and around Panruti, Cuddalore and there were about 17 export houses functioning in the area. A Cashew Export Zone was to be set up at Panruti, for which a Memorandum of Understanding was signed between GoTN and APEDA in April 2005. Activities like processing, sorting, grading, packing and export of cashew were to be undertaken in the AEZ. Hence, Cuddalore district in Tamil Nadu was selected for the study.

2.3 Sample Design

To study the various aspects of cashew, viz., cultivation, processing, marketing, credit and exports, the sample covered during the study is indicated in Table 2.1.

Table 2.1: Sample Design

Sample Category	No. of Sample		
	Kerala	Orissa	Tamil Nadu
Cultivators	60	35	30
Processing Units	2	5	10
CNSL unit	-	1	3
Traders/ wholesalers/ retailers	3	5	8
Export Units	2	5	4

Besides, the study in Tamil Nadu also covered a Farm Science Club promoted by Krishi Vigyan Kendra (KVK), Vridhachalam, contractors of Tamil Nadu Forest Plantation Corporation Limited (TAFCORN) and SHGs involved in Cashew Processing.

2.4 Methodology

The study is based on both primary and secondary data. Primary data were collected from producers, processors, traders, etc. through the interview method using pre- designed questionnaires. Secondary data were collected from the Directorate of Cashew and Cocoa Development, Cashew Export Promotion Council of India (CEPC), Cashew Research Stations, Agriculture Departments, Forest Departments, District Industries Centre, Directorate of Horticulture, Directorate of Economics and

Statistics and Directorate of Agricultural Marketing of the selected States. Discussions were also held with the bankers to know about the credit aspects and with different cashew associations of growers, processors, exporters, etc. to have their viewpoints.

2.5 Analysis of Data

Data collected were tabulated and analysed using standard statistical tools like mean, percentage distribution, growth rates and graphic presentations. Case studies have also been presented in the Report.

Global trends and growth rates for area, production and yield under cashew have been estimated for the period 1961 to 2007. Share of major countries in the global cashew area and production has also been analyzed for the same period. Similarly, country- wise productivity of cashew (1961- 2007) has been presented to know the variations across various countries. Trends in prices of raw nuts have been examined for the period 1991 to 2006.

State-wise trends in area, production, yield and prices of cashew nuts in India has been analyzed for the period 1993-94 to 2007-08 by using statistical tools like arithmetic mean and coefficient of variation. Herfindahl Index has been used to know the concentration of States in terms of area and production under cashew in India.

$$HI = \sum_{i=1}^N S_i^2$$

Where, HI= Herfindahl Index

s_i is the share of states i ,

and N is the number of states.

Herfindahl index below 0.01 indicates a highly concentrated index

HI below 0.1 indicates an unconcentrated index

HI between 0.1 to 0.18 indicates moderate concentration

HI above 0.18 indicates high concentration

Cost of Cultivation for cashew has been estimated by taking the paid out cost. Financial viability of investment was assessed in terms of financial rate of return by using discounted cash flow method.

Price spread refers to difference between price paid by the consumer and price received by the producer. The difference is accounted for by various costs particularly the marketing costs incurred by the market intermediaries and the margins retained by them.

The producer's share in consumer's rupee was worked out by using the following formula:

$$P_s = P_f / P_c * 100$$

Where, P_s = Producer's share in consumer's rupee

P_f = Price of the produce received by the farmer

P_c = Price paid by the consumer

Export Competitiveness of Cashew in the selected States was assessed by using Nominal Protection Coefficient (NPC). NPC is the ratio of domestic price to the border price.

$$NPC = P_d / P_b$$

Where, NPC = Nominal Protection Coefficient

P_d = Domestic Price of Commodity

P_b = Border or Reference price of commodity

Domestic price is the wholesale price in the post harvest season. Border price has been calculated by using international price adjusted for freight charges, marketing and packaging costs. If the resulting NPC is less than unity, the commodity is treated as globally more competitive and vice versa.

2.6 Reference Year

The reference year for the study was 2005-06. All the costs, benefits and related data have been collected and estimated with respect to the reference year prices.

Section III

Trends in Area, Production, Yield and Price of Cashew

3.1 Global Area Harvested under Cashew nuts

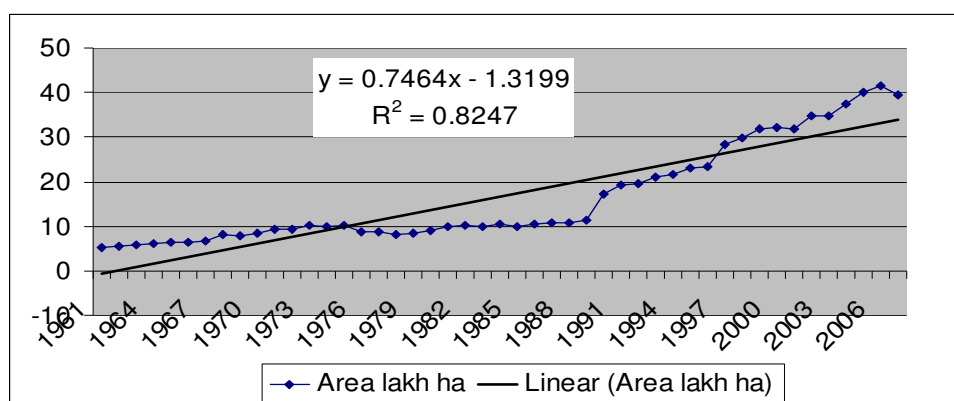
Cashew is mainly cultivated in Asia, Africa and Latin America. The global area harvested under cashew increased by 665 percent, from 5,16,550 ha in 1961 to 39,53,175 ha in 2007 (FAO). The annual growth rate during this period was 4.55 per cent with variations ranging from 8.22 percent to 20.08 percent. Trends in global cashew area harvested (1961-2007) is shown in Fig. 3.1.

Table 3.1: Growth and Variability in Area Harvested under Cashew nuts

Years	Mean (ha)	CAGR (%)	CV
1961-71	666496	5.44	17.08
1971-81	919633	2.04	8.22
1981-91	1115644	3.99	19.75
1991-2001	2499141	6.62	20.08
2001-07	2598030	4.17	13.41
1961-2007	1659350	4.55	67.91

Computed on the basis of data downloaded from FAO Statistical Database

Fig. 3.1: Trends in Global Cashew Area Harvested



3.2 Share of Major Countries in Area Harvested under Cashew nuts

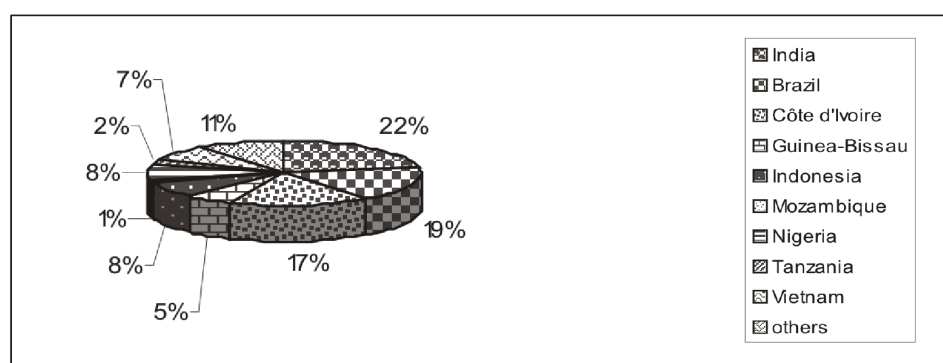
Country-wise analysis of area harvested under cashew indicates that although the share of India has declined from 38.72 percent in 1961 to 21.6 percent in 2007, India continues to have the maximum area under cashew in the world (8.54 lakh ha) in 2007. Area under cashew has shown a decline in Mozambique from 1,80,000 ha in 1961 to 55,000 ha in 2007. The share of Tanzania has also declined from 16.07 percent to 2.35 percent during the same period. Brazil's share declined from 33.65 percent in 1991 to 18.5 percent in 2007. Côte d'Ivoire, Nigeria, Guinea Bissau and Vietnam have improved their share in the global cashew area during the same period (Table 3.2).

Table 3.2: Share of Major Countries in Area Harvested under Cashew nuts (%)

Country	1961	1971	1981	1991	2001	2007
India	38.72	32.51	47.11	27.76	21.98	21.6
Brazil	NA	NA	NA	33.65	20.05	18.5
Côte d'Ivoire	1.55	0.86	1.32	2.09	4.19	16.7
Guinea Bissau	1.94	1.29	2.23	3.37	6.59	5.36
Indonesia	NA	NA	14.04	8.35	17.87	7.80
Mozambique	34.85	34.37	13.19	2.82	1.57	1.39
Nigeria	2.9	4.3	7.61	3.91	8.32	8.35
Tanzania	16.07	22.55	9.84	2.87	2.83	2.35
Vietnam	0.19	0.54	0.56	8.09	6.26	7.4
others	3.78	3.58	4.10	7.09	10.34	10.55
Total	100	100	100	100	100	100

Source: FAO Statistical Database

Fig. 3.2: Share of Major Countries in Global Area Harvested under Cashew nuts (2007)



3.3 Global Production of Cashew nuts

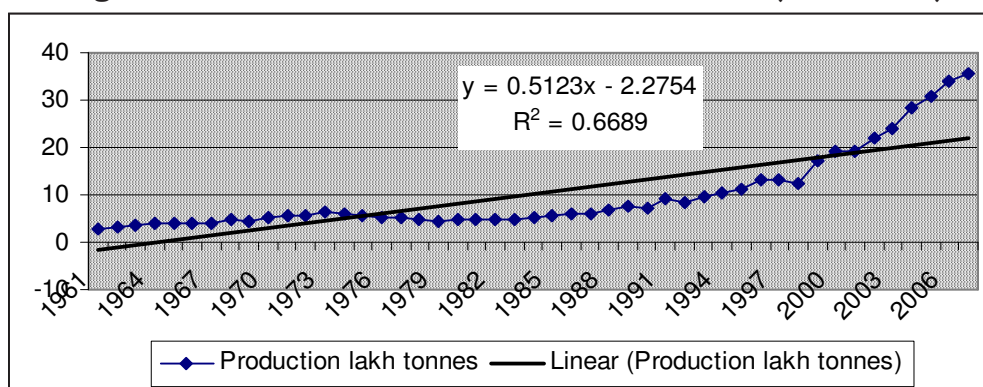
The world production of cashew nuts increased from 2.87 lakh tonnes in 1961 to 35.78 lakh tonnes in 2007 (FAO). Trends show that there was a positive growth with mean compound annual growth rate of 5.22 percent during this period. There was only an increase of 11.26 percent in the mean production of raw nuts during 1981-91 over the decade 1971-81 as there was a decline in production in Mozambique and Tanzania (*Jaffee and Morton, 1995*). During the 1990s, production picked up and continued to increase gradually. The mean cashew production was 19.48 lakh tonnes during 2001-07.

Table 3.3: Growth and Variability in Production of Cashew nuts

Years	Mean (tonnes)	CAGR (%)	CV(%)
1961-71	394851	5.71	18
1971-81	532812	5.66	14
1981-91	592821	5.61	17.27
1991-2001	1240414	6.02	28.40
2001-07	1948641	5.97	22.23
1961-2007	1002029	5.22	85.71

Computed on the basis of data downloaded from FAO Statistical Database

Fig. 3.3: Trends in Global Cashew nut Production (1961-2007)



3.4 Share of Major Countries in Production of Cashew nuts

During 1961, Mozambique contributed 37.21 percent of the world production of raw nuts followed by India (29.56%), Tanzania (17.39%), Nigeria (2.43%) and Vietnam (0.24%). But the share of major countries in production of raw nuts shifted in 2007. Mozambique's contribution of raw nuts dropped to 2.08 percent, Tanzania (2.59%) while Nigeria and Vietnam's contribution increased to 18.44 and 33.75 percent

respectively. Figure 3.4 illustrates the country-wise share in cashew nuts production in 2007.

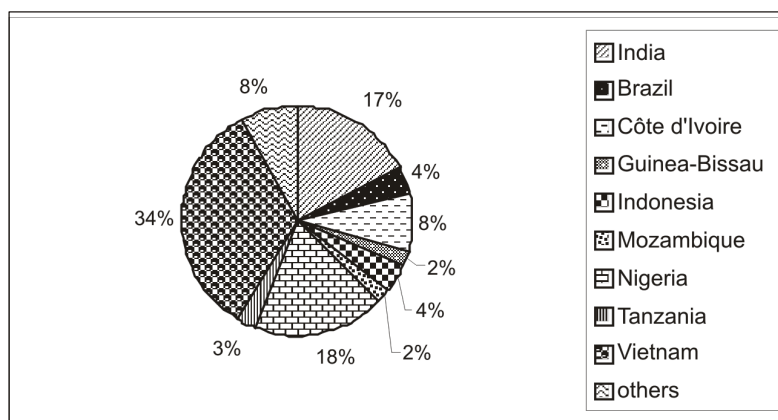
As per FAO statistics, Vietnam tops global production with 12.07 lakh tonnes, followed by Nigeria (6.60 lakh tonnes), India (6.20 lakh tonnes), Côte d'Ivoire (2.80 lakh tonnes), Indonesia (1.46 lakh tonnes) and Brazil (1.40 lakh tonnes) during 2007. Cashew nuts production in Vietnam during 1991 was 1.60 lakh tonnes, which increased to 12.07 lakh tonnes in 2007 showing a 654 percent growth (13.4 percent compound annual growth). But the growth increment in India during the corresponding period was low, registering 110 percent growth with 4.76 percent compound annual growth.

Table 3.4: Share of Major Countries in Cashew nut Production (%)

Country	1961	1971	1981	1991	2001	2007
India	29.56	22.77	37.49	32.41	23.30	17.33
Brazil	NA	NA	NA	9.63	6.42	3.93
Côte d'Ivoire	0.14	0.07	0.22	0.83	4.53	7.82
Guinea Bissau	0.70	0.45	1.01	2.29	4.40	2.26
Indonesia	NA	NA	2.32	6.30	4.74	4.08
Mozambique	37.21	36.15	14.39	3.42	3.00	2.08
Nigeria	2.43	4.47	5.06	4.95	25.11	18.44
Tanzania	17.39	22.62	12.95	3.28	6.32	2.59
Vietnam	0.24	0.63	1.32	17.60	15.16	33.75
Others	12.33	12.84	25.24	19.29	7.00	7.71
Total	100	100	100	100	100	100

Computed on the basis of data downloaded from FAO Statistical Database

Fig. 3.4: Share of Major Countries in Production of Cashew Nuts (2007)



3.5 Global Cashew nut Productivity

The average productivity of cashew nuts declined over the decadal period 1961-71 to 1991-2001. However, it improved to 742 kg/ha during 2001-07.

Table 3.5: Growth and Variability in Productivity of Cashew nuts

Years	Mean (kg/ha)	CAGR (%)	CV (%)
1961-71	591.84	0.26	30.88
1971-81	579.16	(-)1.15	23.43
1981-91	536.16	1.54	23.91
1991-2001	491.46	2.10	119.38
2001-07	742.70	6.68	141.02
1961-2007	578.41	0.15	169.37

Computed on the basis of data downloaded from FAO Statistical Database

3.6 Cashew nuts Productivity in Major Countries

Country-wise productivity of cashew during 1961-2007 is presented in Table 3.6. It may be observed that the productivity was the highest in Vietnam (4125 kg/ha) followed by Nigeria (2000 kg/ha) and Mozambique (1352 kg/ha). India's productivity at 725.9 kg/ha was lower than the world average of 905.20 kg/ha in 2007. Better planting material in Nigeria and Mozambique may have led to increase in productivity (*Nomsima, 1994*).

Table 3.6: Cashew nut Productivity in Major Countries (kg/ha)

Country	1961	1971	1981	1991	2001	2007
India	425	420.2	398.8	553.8	642.8	725.9
Brazil	NA	NA	NA	288.4	194.3	192.3
Côte d'Ivoire	50	50	84.6	187.5	657	424.3
Guinea Bissau	200	208.3	227.2	322.4	404.7	382
Indonesia	NA	NA	52.6	357.7	160.9	474.2
Mozambique	594.4	631.2	546.9	576.5	1160	1352.6
Nigeria	466.6	625	625	600	1830.1	2000
Tanzania	602.4	601.9	659.7	542.7	1355.5	995.6
Vietnam	700	700	684.2	1032.2	1469.8	4125.7
World	556.65	600.16	501.23	474.51	606.47	905.20

Source: FAO Statistical Database

3.7 Price Trends of Cashew nut

Price trends in raw nuts in major cashew producing countries are given in Table 3.7.

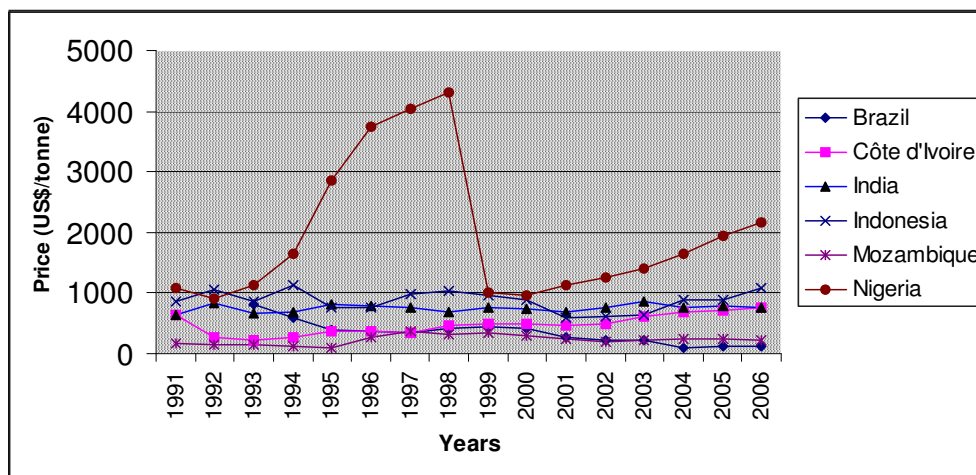
**Table 3.7: Price Trends in Major Cashew Producing Countries
(US\$/tonne)**

Year	Brazil	Côte d'Ivoire	India	Indonesia	Mozambique	Nigeria
1991	-	646.97	638.50	859.64	171.71	1079.77
1992	-	258.88	837.60	1063.84	141.92	906.27
1993	820.29	230.38	660.70	860.44	139.20	1121.8
1994	592.84	270.17	693.54	1122.07	120.65	1651.89
1995	390.12	380.65	812.10	755.38	108.66	2850.62
1996	378.07	371.42	797.90	759.24	260.47	3741.11
1997	356.22	342.66	764.82	990.39	373.75	4048.29
1998	412.75	475.82	678.49	1022.84	317.91	4302.98
1999	452.96	490.50	759.97	965.28	338.03	1003.51
2000	416.36	491.51	748.08	884.80	299.36	957.81
2001	273.15	477.39	689.39	603.25	252.39	1121.07
2002	218.09	504.09	762.51	619.07	196.39	1249.28
2003	211.89	626.34	850.74	646.62	210.12	1393.03
2004	92.56	695.21	756.10	892.23	236.01	1643.83
2005	111.94	715.73	787.36	898.47	237.89	1950.66
2006	126.83	760.86	766.38	1082.64	224.86	2165.79
CV	57.48	34.86	8.32	18.71	34.87	59.37

Source: FAO Statistical Database

It may be seen that the prices during 2006 were the highest in Nigeria (2165 US\$/tonne) and lowest in Brazil (126.83 US\$/tonne). The variations in the prices of cashew nuts was the maximum in Nigeria (59.37%), whereas, the same in India have been relatively low at 8.32 percent.

Fig. 3.5: Price Trends of Cashew nut in Major Countries



3.8 Cashew Apple

Cashew apple is produced and processed in Brazil, Madagascar, Mali, etc. Brazil was the major producer with an area of 6.10 lakh ha and production of 16600 lakh tonnes in 2007. The prices were 750.46 US\$/tonne indicating generation of additional income for the farmers.

Table 3.8: Area, Production, Yield and Prices of Cashew Apple in Major Countries

		1961	1971	1981	1991	2001	2007
A	Brazil	50000	105000	202589	616674	590000	610000
P		251550	543464	735214	1500000	1550000	1660000
Yield		5031	5176	3629	2432	2627	2721
Prices		NA	NA	NA	29.86	128.09	750.46
A	Madagascar	18000	20000	24000	25000	26000	26000
P		42000	47000	57015	65000	68000	68000
Yield		2333	2350	2376	26000	7000	5000
Prices		NA	NA	NA	181.88	74.95	71.15
A	Mali	3500	15000	18000	21000	36000	43500
P		7000	45000	54000	63000	110000	120600
Yield		2000	3000	3000	3000	3055	2772
Prices		NA	NA	NA	277.92	186.75	333.32

Source: FAO Statistical Database

A = Area (ha), P = Production ('000 tonnes), Yield (kg/ ha), Price (US\$/tonne)

3.9 State-wise Trends in Area under Cashew nuts in India

In India, cultivation of cashew is confined to Kerala, Karnataka, Goa and Maharashtra along the west coast and Tamil Nadu, Andhra Pradesh, Orissa and West Bengal along the east coast. To a limited extent it is being cultivated in Chattisgarh, North Eastern States and Andaman & Nicobar Islands. Area under cashew nuts in India increased by 53 percent from 5.65 lakh hectares during 1993-94 to 8.68 lakh hectares during 2007-08.

Table 3.9: State-wise Area under Raw Cashew nut in India ('000 ha)

Year	Kerala	Karnataka	Goa	Maharashtra	Tamil Nadu	Andhra Pradesh	Orissa	West Bengal	Others	Total	HI
1993-94	156	74	46	51	97	72	60	7	1	565	0.17
1994-95	156	75	47	58	97	73	61	7	2	577	0.16
1995-96	118	84	49	67	77	118	102	9	10	634	0.15
1996-97	119	85	51	80	79	121	105	9	10	659	0.14
1997-98	120	87	52	103	80	121	109	9	16	701	0.14
1998-99	122	89	53	119	83	101	114	9	16	706	0.14
1999-2000	122	91	54	121	85	103	84	9	17	686	0.14
2000-01	100	91	55	121	86	130	90	8	19	700	0.14
2001-02	100	90	55	143	90	135	110	9	18	750	0.14
2002-03	100	92	55	148	92	136	120	9	18	770	0.14
2003-04	101	94	55	148	95	136	124	9	18	780	0.14
2004-05	102	95	55	160	105	150	126	9	18	820	0.15
2005-06	80	100	55	160	121	170	120	10	21	837	0.15
2006-07	80	102	55	164	123	171	125	10	24	854	0.15
2007-08	84	103	55	167	123	171	131	10	24	868	0.15
CAGR(%)	-4.20	2.08	1.20	8.70	2.63	5.53	4.41	1.86	16.96	2.97	
Mean	110.67	90.13	52.80	120.67	95.53	127.20	105.40	8.87	15.47	727.13	
CV(%)	21.16	9.43	5.95	33.40	16.58	24.71	21.34	10.32	44.65	13.12	

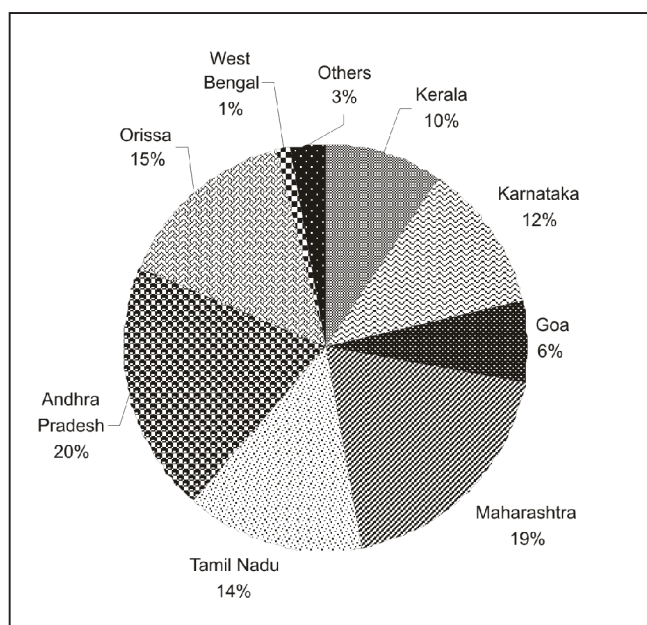
Source: DCCD, Cochin

Among the States, the compound annual growth rate in area under cashew (Table 3.9) has been positive in all the States except Kerala (-4.20%). In 1993-94, Kerala had an area of 1,56,000 hectares under cashew cultivation, which declined to 84,000 ha during 2007-08. This may be attributed mainly to the replacement of cashew with remunerative crops like rubber in Kerala. Unlike certain States like Maharashtra, where cashew was promoted with State Government support, in Kerala no incentives were given to this crop as other plantation crops. This had also become a dissuading factor for farmers to cultivate cashew.

The compound annual growth rate in area under cashew was the highest in Maharashtra (8.70%) followed by Andhra Pradesh (5.53%) and Orissa (4.41%). Government interventions for plantations in wastelands, watershed areas and subsidy support for private plantations were the major reasons for increased area under cashew plantations in these states. HI ranged between 0.14 to 0.17, indicating moderate concentration among the States. During 1993-94, Kerala had the maximum area (27.6%) followed by Tamil Nadu (17.17%) and Karnataka (13.1%). But in 2007-08, Andhra Pradesh had maximum area (19.7%) followed by Maharashtra (19.24%) and Orissa (15.09%).

Figure 3.6 portrays the share of States in area under cashew in India for the triennium ending 2007-08. Andhra Pradesh had the maximum cashew area (20%) followed by Maharashtra (19%), Orissa (15%) and Tamil Nadu (14%). Share of Kerala under cashew area reduced from 28 percent in 1993-94 to 10 per cent during 2007-08.

Fig. 3.6: Percentage distribution of Area under Cashew nuts in different States (TE 2007-08)



3.10 State-wise Trends in Production of Raw Cashew nuts in India

Production of cashew nuts broadly depends on cashew area, yield rate, area under fruit bearing trees, age of plantations and breed of plantations. The Directorate of Cashew and Cocoa, Cochin and the Agricultural Universities across the states have been continuously intervening for the development of high yielding varieties of seeds, grafts and planting systems for augmenting the production of quality cashew nuts in our country. Cashew nuts production increased steadily from 3.48 lakh MT during 1993-94 to 6.65 lakh MT during 2007-08 (Table 3.10) with variation of 20 percent.

Table 3.10: State-wise Production under Raw Cashew nuts in India ('000 MT)

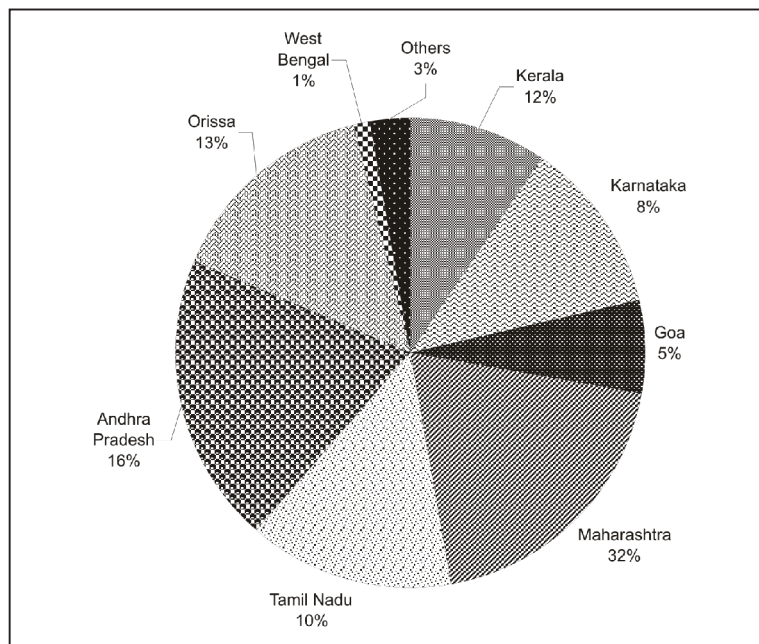
Year	Kerala	Karna taka	Goa	Maha- rashtra	Tamil Nadu	Andhra Pradesh	Orissa	West Bengal	Others	Total	HI
1993-94	140	32	16	47	19	47	43	4	0.36	348	0.17
1994-95	119	26	17	38	22	59	37	3	0.3	322	0.21
1995-96	140	37	18	69	30	72	43	7	0.84	418	0.19
1996-97	134	52	20	80	30	60	40	6	8	430	0.18
1997-98	100	35	25	60	30	50	40	6	9	360	0.16
1998-99	130	40	20	85	35	80	50	8	12	460	0.17
1999-2000	100	60	30	125	45	100	40	8	12	520	0.16
2000-01	76	42	25	98	59	75	59	6	10	450	0.15
2001-02	87	40	30	103	46	86	59	7	12	470	0.15
2002-03	90	40	30	110	50	90	70	8	12	500	0.15
2003-04	95	46	32	120	51	95	71	9	16	535	0.15
2004-05	64	43	26	174	53	88	74	8	14	544	0.18
2005-06	67	45	27	183	56	92	78	10	15	573	0.18
2006-07	72	52	29	197	60	99	84	10	17	620	0.18
2007-08	78	56	31	210	65	107	90	10	18	665	0.18
CAGR(%)	-5.14	3.16	4.55	11.60	8.31	4.99	6.76	6.51	28.40	4.47	
Mean	99.47	43.07	25.07	113.27	43.40	80.00	58.53	7.33	10.43	481.00	
CV(%)	27.05	21.24	21.98	48.48	33.78	23.57	30.95	28.54	56.07	20.50	

Source: DCCD, Cochin

Among the major cashew producing States, the compound annual growth rate was the maximum in Maharashtra (11.60%) followed by Tamil Nadu (8.31%) and Orissa (6.76%). In Maharashtra, the

plantations are of recent origin and of improved high yielding varieties. Even those with seedling origin were raised with selected seeds of known varieties. Herfindahl Index (0.15 to 0.18) indicates moderate concentration among various States, except in 1994-95 and 1995-96 when there was a high concentration in Kerala.

Fig. 3.7: Percentage distribution of Cashew nuts Production in India (TE 2007-08)



3.11 State-wise Trends in Productivity of Cashew nuts in India

Although the yield of Cashew nuts in India increased from 694 kg/ha during 1993-94 to 860 kg/ha during 2007-08, it was much lower when compared to the level of more than 2000 kg/ha reported to be realised by the latest varieties. As can be seen from Figure 3.8, it varied across the states with the maximum in Maharashtra at 1433 kg per hectare followed by West Bengal (983 kg/ha), Kerala (900 kg/ha), Andhra Pradesh (890 kg/ha) and Orissa (860 kg/ha) for the triennium ending 2007-08. Improved management adopted by the farmers in Maharashtra has led to increase in productivity of over one tonne per ha.

Major reasons attributing to low productivity in the country are:

- Sizeable area under cashew in the country being covered with seedling progenies
- Planting of cashew in marginal and poor fertile land
- Non- adoption of recommended package of practices
- Pest infestation (tea mosquito bug and cashew stem and root borer) leading to yield reduction upto 30-40 percent
- Non- adoption of spacing norms

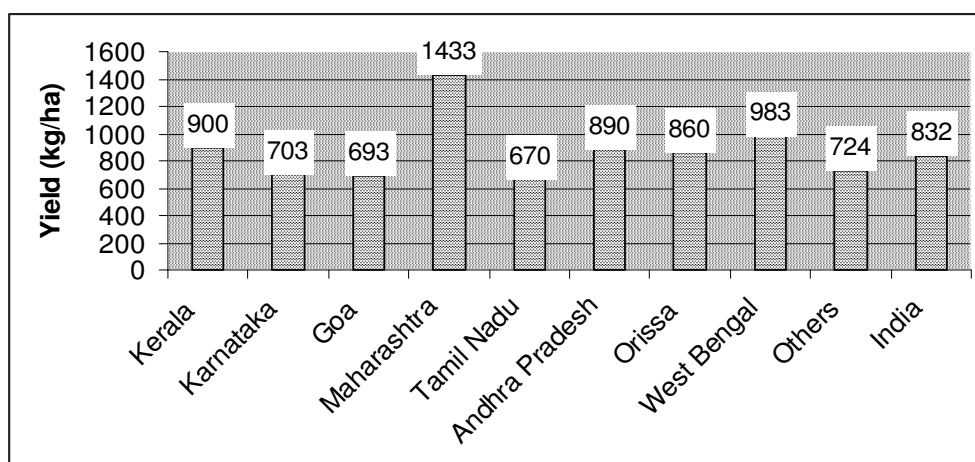
Table 3.11: State-wise Productivity of Raw Cashew nuts in India

(kg/ha)

Year	Kerala	Karna- taka	Goa	Maha- rashtra	Tamil Nadu	Andhra Pradesh	Orissa	West Bengal	Others	Total
1993-94	925	500	370	1246	203	723	812	596	299	694
1994-95	781	400	390	1100	232	880	679	490	250	631
1995-96	1000	550	410	1440	330	1000	720	870	560	720
1996-97	1140	690	430	1570	390	830	670	870	870	835
1997-98	850	460	530	1500	390	690	750	860	610	740
1998-99	1100	500	420	1500	460	800	750	890	860	800
1999-2000	850	700	610	1470	540	1100	670	900	800	900
2000-01	765	500	500	1050	750	650	700	900	750	710
2001-02	870	470	590	880	570	720	570	780	760	710
2002-03	890	470	660	1000	570	740	810	890	760	760
2003-04	890	500	690	1100	600	750	850	760	790	800
2004-05	900	680	660	1200	610	840	810	800	800	810
2005-06	900	700	690	1300	640	880	860	950	714	815
2006-07	900	700	690	1500	670	890	860	1000	708	820
2007-08	900	710	700	1500	700	900	860	1000	750	860
CAGR(%)	-0.38	2.42	5.08	-0.24	8.14	0.24	1.38	2.71	5.14	1.25
Mean	910.73	568.67	556.00	1290.40	510.33	826.20	758.07	837.07	685.40	773.67
CV(%)	11.17	19.82	22.65	17.35	33.02	14.69	11.69	16.63	27.10	9.32

Source: DCCD, Cochin

Fig. 3.8: Yield of Cashew Nuts in India (TE 2007-08)



3.12 State-wise Trends in Prices of Raw Cashew Nuts in India

As huge quantity of raw cashew nuts are imported apart from domestic production; the volatility in the prices of raw cashew nuts is expected. Besides, the pressures from the processing industry, which is almost dependent on exports of kernels, affect the prices of raw cashew nuts. Price of cashew nuts in regional market also varied depending on the size and quality of nuts, demand from the processing industries, etc. The trends in the price levels of raw cashew nuts during 1993-2008 are given in Table 3.12 and Fig. 3.9.

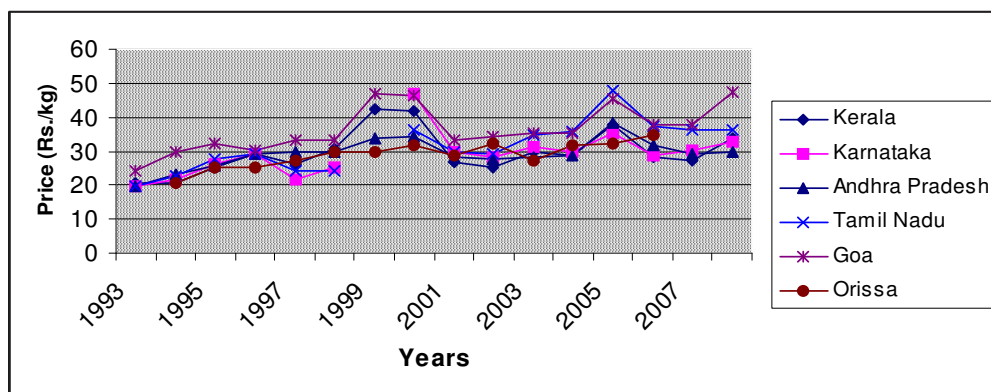
It may be observed that cashew prices in Goa were higher as compared to other states because of the large size of nuts as compared to the nuts of other states. The variation in cashew nut prices was relatively less in Orissa (13.64%) and Andhra Pradesh (14.91%) as compared to other States.

Table 3.12: Price Trends of Raw Cashew nuts in different States
(Rs./kg)

Year	Kerala	Karnataka	Andhra Pradesh	Tamil Nadu	Goa	Orissa
1993	20.63	19.50	19.50	19.60	24.13	NA
1994	20.50	21.50	23.20	22.80	29.50	20.75
1995	25	26	25.5	27.50	32.30	25
1996	29	29	29	29	30.15	25
1997	26.4	21.50	30	24	33.10	27
1998	30.6	25	30	24	33.10	29.50
1999	42.3	NA	33.75	NA	47	29.50
2000	42	47	34.50	36.20	46.50	32
2001	26.75	29.9	28.25	29.6	33.50	28.50
2002	25	28	27.75	29.14	34.10	32.50
2003	29.75	31.50	28	35	35.5	27
2004	28.5	30	28.75	35.63	35.10	32
2005	37.88	35.20	38.10	47.75	45.20	32.50
2006	28.35	28.70	31.70	37.20	37.60	35
2007	27.1	30.50	29.40	36.25	37.70	NA
2008	34	33	30	36.50	47.20	NA
CV	22.01	22.83	14.91	23.49	18.83	13.64

Source: DCCD, Cochin

Fig. 3.9: Price Trends of Cashew Nuts in India (1993-2008)



Section IV

Economics of Cashew nut Cultivation

Cashew is a hardy crop and can be grown in almost all types of soil from sandy to laterite including wastelands of low fertility. 'It's very nature and adaptability to diverse soil and climatic conditions have been to an end responsible for a misconception that the crop does not need much attention' (Rao, 1957). Cashew Cultivation Practices have been discussed briefly in Annexure V.

Most of the plantations developed in the country from the early part of this century till late 1980s were of seedling origin. The primary consideration was to cover area rather than increase the productivity of the crop, resulting in non-productive plantations. As cashew is a hardy plant, often it has been thought to be highly suitable for afforestation, soil conservation and wasteland development. Unfortunately, the plantations raised with this objective, did not receive any management or inputs, thereby resulting in low productivity.

Cashew nut is cultivated in most of the cashew producing countries, individually by small holders. In India, more than 70 percent of cashew area is under small and marginal holdings and hence, plays an important role in the development of small and marginal farmers. The average cashew holdings in the sample districts of Kerala were 0.7 ha. In Koraput district, Orissa, cashew cultivation was limited to marginal lands. 26 percent of the sample farmers in Cuddalore district of Tamil Nadu were small and marginal.

In Brazil, the large plantations were first started by the private enterprises while in Tanzania, it was started on a co-operative basis. In India, the forest corporations started large-scale cashew plantations on forestlands. In Orissa and Tamil Nadu, Orissa Forest Development Corporation and TAF CORN are undertaking large cashew plantations in their respective States.

4.1 Economics of Cashew nut Cultivation

The economics of cultivating seedlings, grafts, organically cultivated plants and replantation of old plantations in the sample States has been discussed below. Economic bearing of nuts commences after third year of planting and stabilized yield starts from the tenth year. Inter crop is planted during the first three years of planting. By introducing an inter crop during the first three years, farmers realize

returns thereby meeting expenditure for raising cashew plantations to a certain extent. Blackgram, Groundnut and Tapioca were the most familiar intercrops found in Cuddalore district of Tamil Nadu. Short duration crops like vegetables, tapioca, pumpkin, chillies, etc. were cultivated as inter crops in Kerala. But these inter crops were cultivated by the farmers for their own consumption. In Orissa, the sample farmers were not cultivating any crop as inter crop.

Case Study 4.1: Intercropping in Cuddalore district (Tamil Nadu)

Blackgram was the most preferred intercrop cultivated by the sample farmers in Tamil Nadu. The cost of black gram cultivation as inter crop in cashew plantations included seeds, labour, weeding, pesticide spray and harvesting. The net income worked out to Rs. 8750/ha during the 1st year and reduced to Rs. 6625/ha during 2nd year and Rs. 4288/ha during the 3rd year due to the reduction in yield (Table 4.1). There was reduction in yield from 1st to 2nd year and further reduction in 3rd year because the space available for intercrop was reduced due to the growth of cashew trees.

Table 4.1: Yield, Cultivation Cost & Income of Intercrop (Black gram)

Particulars	Years		
	1	2	3
Yield (kg/ ha)	500	400	300
Selling price (Rs./kg)	25	25	25
Income (Rs./ ha)	12,500	10,000	7,500
Cultivation cost (Rs./ ha)	3,750	3,375	3,212
Net Income (Rs./ ha)	8,750	6,625	4,288

4.2 Economics of Traditional Varieties (Seedlings)

As stated above, initially, cashew was mainly considered as a crop for afforestation and soil binding to check erosions. Due to the absence of high yielding varieties initially, inderscript seedlings were used for planting purposes.

Table 4.2: Economics of Cashew Cultivation for Seedlings*
(Rs./ha)

Particulars	Orissa	Tamil Nadu
Cost of Establishment#	11595	36215
Maintenance Cost	1750	10825
Average stabilised Yield (kg/ha)	450	800
Price of Raw nuts (Rs./kg)	30	33.75
Gross Income	13500	27000
Net Income	11750	16175
FRR (%)	23	38^

*Data not estimated for Kerala

#Capitalized for a period of 5 years

^FRR worked out by including Intercrop

Cost of Establishment for cashew included costs mainly on land development, planting, fencing, weeding, manuring, fertilizers and irrigation. The investment cost was Rs. 11595 per ha in Orissa whereas; the same was Rs. 36215 per ha in Tamil Nadu. Cost of establishment was less in Orissa, as the farmers did not spend much to develop the marginal lands (7% of establishment cost) and relatively less (7% of establishment cost) on application of manures and irrigation. Expenditure on the same was 10 and 12 percent of establishment cost in Tamil Nadu.

Maintenance cost per ha worked out to Rs. 1750 in Orissa and the same was Rs. 10825 in Tamil Nadu. Low cost of cultivation in Orissa was due to the fact that under traditional practices cashew was planted on wasteland/ marginal lands and farmers did not spend much on the cultivation practices. Cashew plantation in Orissa is still limited to the marginal lands and commercial cultivation of the crop has not yet taken off in the State. This resulted in variation of the yield and net income in the study areas. Details of establishment cost and maintenance cost has been indicated in Annexure VI & VII.

Case Study 4.2: Economics of Seedlings with Irrigation in Cuddalore district (Tamil Nadu)

The economics of seedlings under irrigated conditions was also worked out for sample farms in Cuddalore and the results revealed that the

cost of establishment and maintenance cost was Rs. 40715 and Rs. 14025 per ha respectively (Annexure VI & VII). The stabilised yield was 1200 kg and the net income derived was Rs. 26475 per ha. Thus, irrigation has a positive impact on the yield of cashew.

4.3 Graft Varieties

Large areas of cashew plantation have been raised by seedling progenies of low genetic potential resulting in low productivity. Efforts have been made by Research organizations to develop grafted varieties of cashew. Some of the cashew varieties developed by KAU, OUAT and TNAU is given in Annexure VIII. The Department of Horticulture is promoting such plantations in order to make the farmers get good yield and high returns. The cultivation requires intensive care leading to higher cost.

Table 4.3: Economics of Cashew Cultivation for Graft Varieties
(Rs./ha)

Particulars	Kerala	Orissa	Tamil Nadu
Cost of Establishment*	32220	27765	77700
Maintenance Cost	3325	4475	16850
Average stabilised Yield (kg/ha)	1000	1080	1600
Price of raw nuts (Rs./kg)	32	35	33.75
Gross Income	32000	37800	54000
Net Income	28675	33325	37150
FRR (%)	29	38	31 [^]

*Capitalized for a period of 5 years

[^]FRR worked out by including Intercrop

It may be observed from Table 4.3 that the cumulative establishment cost incurred during the initial five years for plantation ranged between Rs. 27765 to Rs.77700 per ha. Average maintenance cost per ha per year was Rs. 3325 in Kerala, Rs. 4475 (Orissa) and Rs. 16850 (Tamil Nadu). Cultivation was intensive in Tamil Nadu, resulting in higher yield and net income. Details of establishment cost and maintenance cost for grafts have been indicated in Annexure IX & X.

Investments were financially viable for grafted varieties of cashew with the financial rate of return ranging from 29 to 38 percent in Kerala, Orissa and Tamil Nadu.

4.4 Yield Gap (Graft Varieties)

An analysis of yield gap has been attempted by comparing the actual yield with the potential yield. The potential yield has been derived by taking an average of the yield for the major varieties developed by the Agricultural Universities (Annexure VIII). Plant population per hectare has been taken as 200.

Table 4.4: Yield Gap for Graft Varieties (kg /ha)

State	Potential	Actual	Gap
Kerala	2703	1000	1703
Orissa	2100	1080	1020
Tamil Nadu	1752	1600	152

It may be seen from Table 4.4 that the yield gap per ha was 1703 in Kerala, 1020 (Orissa) and 152 (Tamil Nadu). Better cultivation practices led to minimal yield gap in Tamil Nadu.

4.5 Traditional (Seedling) and Graft Varieties of Cashew - A Comparison

Comparison of cashew grafts with seedlings has been made and the results revealed that:

- The cost of raising cashew plantations with grafted varieties was cost intensive. The cost of establishment in grafts was more than double than that of crop raised through seedlings. This may be attributed to the cost incurred on planting of grafts and intensive cultivation practices like higher dose of manures and fertilizers and intensive pest management. The cost of cultivation per ha was also more in grafts due to the same reasons.
- The stabilised yield was more in grafts than seedlings. There was an increase in yield by 140 percent in Orissa whereas; the increase was 100 per cent in Tamil Nadu.
- Variations in the price realised was observed in Orissa. There was a difference of Rs. 5 per kg between seedlings (Rs. 30/kg) and grafts (Rs. 35/kg). Such variations were not observed among the sample farms in Tamil Nadu.

- Variations in yield and prices have led to variations in the net income realised. There was an increase in net income by 183 percent in Orissa whereas the increase was 130 percent in Tamil Nadu.

4.6 Organic Cashew

As per FAO/WHO Codex Alimentarius Commission (FAO, 1999), 'Organic farming is a holistic production management system which promotes and enhances agro ecosystem health including bio-diversity and soil biological activity'. Brazil is the largest producer of organic cashew nuts in the world and produces 30 percent of its total production as organic cashew (Hubballi, N & Balasubramanian, P.P, 2003). Considering the trend of organic growth in the world, organic cashew will have a demand in the organic food market.

4.7 Scope for Organic Cashew in India

In major cashew growing areas of the country, natural farming is followed. It is estimated that not more than 20 percent of cashew holdings in India use chemical fertilizers/pesticides (Sivaraman, K. & Hubballi, N., 2002). This facilitates adoption of organic farming practices over a period of time without additional efforts. Thus, there is a vast potential of bringing these areas under organic farming practices to exploit the available marketing avenues.

Case Study 4.3: Organic Cashew Cultivation in Cuddalore (Tamil Nadu)

The Department of Horticulture in Tamil Nadu is promoting the use of organic inputs like bio fertilizers, neem cake, vermi compost, etc. The sample farmers were found to use the organic inputs initially but later used the chemical fertilizers; hence they were considered as partially organic farms. Since the sample organic cashew farms were 2-3 years old, the economics was worked out by assuming the same yield as that of grafts. Cost of establishment per ha for the partially organic plantation worked out at Rs.83450, maintenance cost @ Rs. 15100 and the net income was Rs. 38900 (Table 4.5). Details are indicated in Annexure XI & XIII.

Case study 4.4: Replantation of Cashew in Cuddalore (Tamil Nadu)

Removal of senile plantations is required for improving productivity. With an average of 50 old trees in one hectare, replantation programme was carried out with the removal of 10 trees in a year

and planting new grafts. Hence, the entire area of 1 ha was covered with new trees in 5 years.

The removal of old plantations and replacing with graft plantations included establishment costs on removal of old trees (37.12% of the total costs), grafts, pit making, stacking, maintenance of existing old trees, etc. during the five years. The crop started yielding marginally from third year onwards and the yield stabilized from 10th year. Although the cost of establishment was high at Rs. 1.93 lakh, the net income realized was Rs. 36900 per ha due to the stabilized yield of 1600 kg.

Table 4.5: Economics of Organic Cashew and Replantation in Cuddalore (Rs./ha)

Particulars	Organic Cashew	Replantation
Cost of Establishment*	83450	193950
Maintenance Cost	15100	17100
Average stabilised Yield (kg/ha)	1600	1600
Price of raw nuts (Rs./kg)	33.75	33.75
Gross Income	54000	54000
Net Income	38900	36900
FRR (%)	29	>50

*Capitalized for a period of 5 years

Case Study 4.5: Farm Science Clubs in Tamil Nadu

One of the reasons, which require specific mention for the increase in yield in the study area of Tamil Nadu was that there were Farm Science Clubs organized by the Krishi Vigyan Kendra for dissemination of technologies to the farmers. It was revealed by the convenor of the club that training on various aspects like crop cultivation practices, etc. were being imparted by KVK and after attending the training programme, the convenor held a meeting in the village for fellow farmers. In this way, the training inputs were disseminated to the farmers. It is necessary that institutions like Farm Science Clubs may be encouraged in other districts also.

Case Study 4.6: TAFCORN/ OFDC in Cashew Development

Tamil Nadu Forest Plantation Corporation Limited (TAFCORN) in Tamil Nadu and Orissa Forest Development Corporation (OFDC) in Orissa

raise and maintain plantations like eucalyptus, cashew, etc. and promote the development of forest industries. The right to collect and remove raw nuts from the cashew area was sold once in a year through tender cum auction sales in its regions. In order to take part in the sales, the intending participants had to register themselves as a registered contractor in the regions where they wanted to participate and the contract was given for a period of 3 months. The contractors had the right to collect and sell nuts. Cost pertaining to harvesting and spraying only had to be borne by the contractors and the other maintenance cost was borne by the Corporation.

The raw nuts collected by TAFCON from no bid plantations were stored in godowns in each region and sold by tender. In order to take part in the sales, the intending participants had to register themselves as a registered contractor in the regions where they wanted to participate and the registration fee was Rs. 2100, which had to be renewed every year by remitting an amount of Rs. 500. The contract was given for a period of 3 months (April to June). The sample main contractor was found to take a contract of an average of 30 ha every year and had an informal agreement with 15 farmers in the village who shared the expenditure and income.

Table 4.6: Cost and Income of Sample TAFCON Contractors (Rs./ha)

Particulars	Amount
Maintenance cost	5276
Other Costs*	3638.75
Income @ Rs. 32 per kg of raw nuts	25600
Net Income for Contractors	16685.25
Net Income per farmer	1112.35

* Cost on lease (Rs. 3000/ha), renewal fee (Rs.500),
IT @ 2.5% (Rs. 75), surcharge on IT@ 5% (Rs. 3.75), cess@ 2% (Rs. 60)

The net income for the sample contractors of TAFCON worked out to Rs. 16685.25 and the same was Rs. 1112.35 per farmer (Table 4.6). This arrangement helped the local people to participate in the development process and get benefited.

Section V

Processing of Cashew nuts

Processing of nuts is the recovery of kernels from raw nuts by manual or mechanical means. India has been a pioneer in cashew processing. The growing demand for kernels in the world market and the availability of cheap labour mainly of women possessing the requisite skills are the favourable factors for the rapid growth of processing industry in the country and it has a monopoly over the manual processing of cashew. Though mechanization is introduced in cashew processing, the availability of skilled and cheap labour in India and better quality of kernels under manual processing, limits the scope for extensive mechanization. Factories in general have mechanization in roasting/ boiling and packing. Predominance of manual labour continues in the processes like shelling, peeling and grading.

5.1 Demand vs Domestic Supply of Raw nuts

The domestic cashew processing industry had a total capacity to process an estimated 15 lakh tonnes per annum (2005-06) whereas;

**Table 5.1: Processed Cashew Kernels and Raw Nuts in India
(1995-96 to 2007-08)**

(Quantity in MT)					
Year	Domestic Raw nuts	Imported Raw Nuts	Total	% share of Imported Raw nuts	Total quantity of Processed Cashew Kernels*
1995-96	418000	222819	640819	34.77	141149.55
1996-97	430000	192285	622285	30.90	137067.18
1997-98	360000	224968	584968	38.46	128847.58
1998-99	460000	181009	641009	28.54	141191.41
1999-2000	520000	200584	720584	27.84	158718.94
2000-01	450000	249318	699318	35.65	154034.80
2001-02	470000	356566	826566	43.14	182063.00
2002-03	500000	400659	900659	44.48	198383.04
2003-04	535000	452898	987898	45.84	217598.68
2004-05	544000	578884	1122884	51.55	247331.28
2005-06	573000	565400	1138400	49.67	250748.90
2006-07	620000	592604	1212604	48.87	267093.39
2007-08	665000	605970	1270970	47.68	279949.34

*Conversion ratio of raw nuts to kernel has been taken at 4.54

Source: DCCD & CEPC

the domestic raw nuts production was only 5.73 lakh tonnes. Even during 2007-08, the domestic production was 6.65 lakh tonnes. This points to the wide gap between the demand and domestic supply of raw nuts. Due to this, the processing industry is highly dependent on imported raw nuts. The share of imported nuts in the total volume of raw nuts processed has increased from 34.77 percent during 1995-96 to 47.68 percent during 2007-08 (Table 5.1). There is a need for increasing the domestic production of raw cashew for achieving self-sufficiency and ensuring maximum capacity utilisation.

5.2 Cashew Processing Units in India

The status of cashew nut processing units in India during 2005-06 is given in Table 5.2. The number of cashew processing units in India has increased rapidly from 170 in 1959 to 3650 in 2005-06. The cashew processing industry was highly localised in Kerala with 170 units until 1959 (*Source: Industries, Industrial Labour and Infrastructure, State Planning Board and Bureau of Economics & Statistics, Govt of Kerala, 1976*).

Table 5.2: Cashew nut Processing units in India (2005-06)

State	Processing Units (No.)	%	Capacity ('000 MT)	%	Utilisation ('000 MT)		
					Indigenous	Import	Total
Kerala	432	11.8	700	46.7	67	320	387
Karnataka	266	7.3	65	4.3	45	20	65
Goa	45	1.2	21	1.4	21	-	21
Maharashtra*	2200	60	20	1.3	20	-	20
Tamil Nadu	417	11.4	565	37.7	294	225	519
Andhra Pradesh	175	4.8	95	6.3	92	-	92
Orissa	60	1.7	11	0.73	11	-	11
West Bengal	30	0.8	8	0.53	8	-	8
Chattisgarh	3	0.1	-	-	-	-	-
NE States	22	0.6	15	1	15	-	15
Total	3650	100	1500	100	573	565	1138

* Includes 1850 small scale cottage industries

Source: DCCD, Cochin

As may be seen from Table 5.2, Maharashtra has the maximum number of cashew nut processing units (60%) followed by Kerala (11.8%) and Tamil Nadu (11.4%). Orissa had 60 units (1.7%) with a capacity of 11000 MT. The total processing capacity of 3650 units in India was 15 lakh tonnes out of which only 11.38 lakh tonnes (76%) was utilised. In Kerala, there were 432 processing units with a total installed capacity of 7 lakh tonnes, out of which 3.87 lakh tonnes (55%) was utilised. The utilization level in Orissa and Tamil Nadu was 100 and 91.8 percent respectively.

At the all India level, the imported raw nuts accounted for 49.64 percent and the domestic raw nuts were 50.36 percent of the total utilised capacity. However in Kerala, the imported nuts accounted for 83 percent of the utilised capacity. This was mostly due to the decline in local raw nuts production and low productivity of the crop. The domestic raw nuts processed were higher as compared to the imported nuts in Tamil Nadu (56.64%) and Karnataka (75%).

5.3 Cashew Processing: Methods

Cashew nut processing involves roasting/boiling, moisture conditioning, shelling, drying, peeling, grading and packing. It is done by any of the four methods- sun drying, drum roasting, oil bath roasting and steaming. Under roasting method the nuts are burnt which makes the shell brittle so that it can be broken to extract the kernel. Open Pan Roasting, Drum Roasting and Hot Oil Bath Roasting are the popular methods of roasting. Steaming is an improved method adopted in cashew processing. The nuts are steamed so as to make the shells soft and then cut open to get the kernels. The sample units in Kerala practiced drum roasting and steam boiling was practiced in Orissa and Tamil Nadu. Steam boiling method has the advantage of recovering CNSL. However, the storage or shelf life of kernels extracted under roasting method is longer than the kernels extracted under boiling method but chances of breaking the kernels while extracting is very high thus it requires more skillful hands for removing the kernels from the roasted nuts. Again, roasting of kernels emit obnoxious smoke and thus invite objections from the residential areas in the vicinity.

5.4 Cashew Grades

Grading is done based on "counts" or number of kernels per lb. Based on the shape, size and colour of the kernel, cashew kernels are graded into white or scorched wholes, pieces, splits, butts, etc. The

Government of India Act prescribes 33 different grades of cashew kernels of which only 26 grades are commercially available and exported (Annexure XIV). W- 320 are the most popular among cashew kernels and also the most available, worldwide. Butts, splits and pieces are priced low and are used for cooking, preparation of sweets and savory snacks. Packing was usually done by vita pack method (exhausting the air inside the packing tin, pumping in carbon dioxide and sealing).

Table 5.3: Grades of White Whole Kernels

Grade	No./lb
W 180 (Known as the ' King of Cashew ', are larger in size)	160-180
W 210 (Popularly known as 'Jumbo' nuts)	200-210
W 240 (an attractive grade which is reasonably priced)	220-240
W 280	260-280
W 320 (Most popular variety among cashew kernels and highest in terms of availability, worldwide)	300-320
W 400	350-400
W 450 (smallest and cheapest white whole kernels and hence the favourite among low priced whole grades)	400-450
W 500	450-500

5.5 Procurement of Raw Nuts

Procurement of raw nuts is an important operation for the cashew processing units. The sample cashew processing units in Kerala procured locally available raw nuts and imported nuts from countries like Tanzania. 60 percent of the sample cashew processing units in Orissa was importing raw nuts from African countries like Guatemala, Zambia, Ivory Coast, etc. Cashew nuts were also procured from neighbouring states of Andhra Pradesh and Chattisgarh apart from procuring the same from the local areas. The average price of raw cashew nuts for the sample units was Rs.35 per kg. The sample processors without boilers including the sample SHGs in Tamil Nadu were procuring raw nuts only from the domestic market (Perambalur, Pondicherry, Nellore and Panruti) whereas; the sample processors with boilers were procuring imported raw nuts through Tuticorin port besides procuring raw nuts from the above mentioned places. The average cost of procuring raw nuts in the domestic market and imported nuts by the sample processing units in Tamil Nadu is depicted in Table 5.4.

**Table 5.4: Average Cost of Domestic/ Imported Raw Nuts in Tamil Nadu
(Rs. per bag*)**

Particulars	Domestic Raw Nuts	Imported Raw Nuts
Purchase Price of Raw Nuts	2700	2400
Brokerage	25	24@
Purchase Tax @ 10%	270	-
Transport Cost	12	81.81**
Labour Cost for loading/ unloading	5	5
Total	3012	2510.81

*1 bag= 80 kg

@ 1% of Realizable Value

** From Tuticorin Port

The average cost per bag of domestic and imported raw nuts were Rs. 3012 and Rs. 2510.81 respectively. The difference in the cost was mainly due to the difference in the purchase price of the raw nuts. The size and quality of the local variety was considered to be relatively better by the processing units as they were larger and whiter. Ninety percent of the purchase cost was towards payments for domestic raw nuts and the same was 95 percent for imported nuts. Remaining cost incurred was towards brokerage, purchase tax, transport cost, and loading/unloading.

5.6 Economics of Cashew Processing

The economics of cashew processing per bag of raw nuts (80 Kg) is depicted in Table 5.5. The sample processors obtained a total of 23 kg of processed kernels, 55 kg of shells and 2 kg husk from a bag of raw nuts of 80 kg. The shells were sold to the CNSL units @ Rs. 2 per kg (Orissa) and Rs. 2.72 per kg (Tamil Nadu). Similarly, the husk was sold to the traders @ Rs. 8 per kg in Tamil Nadu and the same was used to mix in tea leaves. The sample units in Orissa and Kerala were not making regular sale of the husk.

The Financial Rate of Return (FRR) worked out to 35 percent for the sample units in Kerala and the same was (> 50%) in Orissa and Tamil Nadu. This variation was due to the difference in the costs and processing capacity, which was an average of 2400 MT in Kerala, 818 MT (Orissa) and 160 MT (Tamil Nadu).

**Table 5.5: Economics of Cashew Processing
(Rs. per bag of 80 kg)**

Particulars	Kerala	Orissa	Tamil Nadu
Average Processing Cost*	735.5	977	374.5
Cost of Raw nuts	3455.5	2800	2761.4
Total Cost	4191	3777	3135.9
Gross Income (including Cashew Kernels, Shells, Husk)	4351	4166	3541.25
Net Income	160	389	405.35
Financial Rate of Return (%)	35	> 50	> 50

*Include costs on boiling/roasting, electricity, labour charges for shelling, peeling, grading, etc.

50 percent of the sample processing units in Tamil Nadu had boilers and drier and 50 percent had only drier and were getting the raw nuts boiled at other units having boilers @ Rs. 25 per bag. The sample processors without boilers were procuring only domestic raw nuts. Average processing cost per bag of raw nuts comprising the hired boiling was Rs. 348.18; net income was Rs. 181 per bag and the FRR worked out to 35 per cent. This variation with the processors having boilers was due to the difference in the number of bags of raw nuts processed per month, which were 200 and 100 bags per month for the sample processors with and without boilers respectively.

Case Study 5.1: Micro Enterprises in Cashew Processing in Cuddalore

Two processing units managed by Self Help Groups (SHGs), who may be considered as micro entrepreneurs was analysed in Cuddalore district of Tamil Nadu. 'Desire to start their own enterprise' was the main reason for investment by the SHG members. One of the processing units was managed by four SHGs as a combined venture whereas the other processing unit was managed by a single SHG. All the SHGs were women groups with 20 members in each group and all the members worked together to make a successful enterprise. The sample SHGs, managing the processing units were credit linked to a branch of Regional Rural Bank in the area. The amount borrowed per group was Rs. 2.29 lakh with a subsidy of Rs. 114500 @ 12 percent rate of interest under Swarnajayanti Gram Swarojgar Yojana which had to be repaid in 60 monthly installments. Repayment of SHG loans was found to be regular.

The loan amount was used for purchasing machineries and raw nuts for processing. One unit had purchased a cashew drier and a second hand boiler whereas the other unit had purchased only a cashew drier and was getting raw nuts boiled from nearby units @ Rs. 25 per bag. The sample SHGs preferred only domestic raw nuts due to their small scale operations and consequent inability to access international markets.

Marketing of the graded kernels was arranged through tie up with the local export houses and traders. The whole graded kernels were sold to the local export houses and the other kernels like splits and butts were sold to the traders locally.

The monthly net income worked out to Rs. 18107 and Rs. 30950 for the SHG units without and with boilers respectively. This variation was due to the difference in the number of bags of raw nuts processed per month. The profit was shared among the members of the SHGs over and above the wages paid to the members for the processing operations. Thus, the resource poor women could get access to financial services in terms of savings and institutional credit through SHGs. Convergence of efforts of stakeholders like financial institutions, State Government Departments (premises for establishing these units) and credit cum savings groups (SHGs) led to creation of livelihood opportunities for the rural poor women. Potential for similar micro enterprises needs to be tapped by women SHGs in the cashew growing areas.

5.7 Employment Generation in Cashew Processing

The processing of cashew in India is a highly labour intensive activity. Employment generation in cashew processing units was 11 person days in Orissa and 7 person days in Tamil Nadu and Kerala for processing 1 bag of raw nuts of 80 kg and was mainly (90%) for women. This was because women were considered to be hard workers and more reliable. Moreover, the work in the processing units involved lesser physical labour, in comparison to agricultural labour. Since the share of women in this sector is large, the growth of this sector will contribute towards women's employment.

5.8 Risks in Cashew Processing and Mitigation Strategies Adopted

Cashew processing involved a number of risks at various stages of operations and the processing units including those owned by SHGs took necessary steps to mitigate most of them. Primary risk was

related to the consistent procurement of raw nuts and stock piling of sufficient raw nuts to operate the units on a regular basis. The raw cashew nuts were purchased at the time of harvest from the local market, procured from nearby districts/ states and were also imported.

Two major considerations in the decortications of cashew nuts involve avoidance of contamination of kernels by the toxic CNSL and minimization of kernel's breakage. Second risk pertained to difficulties in shelling cashew nuts, which was due to the irregular shape of the nut, the tough leathery outer shell, and the CNSL within the shell that must not be allowed to contaminate the kernel or burn the hands of the worker/s during its removal from the shell. The processing units including the SHGs fine-tuned the process by employing skilled workers in order to achieve quality kernels.

Cashew kernels were expected to have moisture content of not more than five percent. This risk was avoided by employing a permanent labour to operate the electric borma efficiently and storing in clean and dry place with sufficient protection and packed with utmost care in tins to preserve their quality.

Quality including safety, reliability and acceptability of the product to the consumer has emerged, ahead of price, as the most vital criterion. The sample processors made efforts to match the standards set by the local export houses.

The prices of cashew nuts were subjected to market fluctuations that affect the small processors. The sample SHG units in Tamil Nadu managed this price risk and procured sufficient raw nuts by using a part of the loan amount and their savings as working capital.

The SHG units were situated in the DRDA and Panchayat Building and had a godown, which was used for storing raw nuts as well as graded kernels. The SHGs faced a risk of running their units if the facility of godown and premises was withdrawn by the concerned Government department and the Panchayat.

5.9 Value Added Nuts

Value addition in cashew can be done through preparing sweetened and flavoured cashew from cashew kernel baby bits. Cashew kernel baby bits could be coated with combination of different colours (apple green, chocolate brown, kesari, lemon yellow, orange red and raspberry red) and flavours (vanilla, cardamom, ginger and clove) (*Source: Cashew Vision 2025, NRCC, Puttur*).

The value added cashew products in Cuddalore included salted and roasted kernels with chilly or pepper flavours. The average cost incurred per kg for the kernels was Rs. 220 and was being sold at Rs. 300.

The export of value added cashew kernels from India is insignificant. This is mainly due to the reason that the importers and packers in the major markets like United States do not want the Indian suppliers to send value added products, which they consider, would adversely affect their packing industry. However, there is a scope for increasing the export of value added cashew kernels in the non- traditional markets like West Asian countries.

5.10 By- Products of Cashew

There are two main by-products of cashew: cashew nut shell liquid and cashew apple. Details of these by- products are discussed below.

5.11 Cashew Nut Shell Liquid (CNSL)

Cashew Nut Shell Liquid (CNSL) is an important economic product of the plant, which is extracted from the shells of the raw nut and has various industrial uses like preparation of type writer rolls, drying enamels, water-proof coating for cement and brick flooring, manufacture of paints, varnishes and plastics. CNSL is a by- product of cashew industry, which is obtained from the shells. It is one of the few natural resins that is highly heat resistant and is used in the paint, automobile and foundry industry. Some of the advantages of CNSL based polymers are that it has improved flexibility, termite and insect resistance and anti microbial property.

5.12 Extraction Process

The sample units in Orissa and Tamil Nadu were following the expeller method for the extraction of oil from the shells. The extracted oil was filtered with the help of a filter press and then weighed and packed in barrels. Recovery of oil as percentage of 1 bag of shells (55 kg) was 19.38 percent in Orissa and 21.8 percent (Tamil Nadu) and the remaining were shell cakes. Expeller method being used was considered to be better than other methods like hot oil bath, kiln method, etc.

5.13 Economics of CNSL

Investment cost included costs on machinery like oil expeller, electric motor, accessories, weighing scales, storage tanks, etc and building.

Table 5.6: Economics of CNSL Units* (Rs./kg)

Particulars	Orissa	Tamil Nadu
Shell cost	2.00	3.10
Operational cost [^]	2.30	3.87
Selling price of CNSL oil (Rs./ltr)	15	13
Selling price of shell cakes	0.60	2.30
Gross income	3.78	4.51
Net Income	1.48	0.64
FRR (%)	>50	15.26

* Data not estimated for Kerala

[^]Cost on raw materials, electricity, packing material, wages, maintenance, etc.

Cashew nut shell, the main raw material for CNSL plants, constituted the maximum of total operational cost (88% in Orissa and 80% in Tamil Nadu) and the remaining costs were incurred on wages, electricity, maintenance, packing, etc. Cashew shells crushed/ year was 48,00,000 kg in Orissa and 4,95,000 kg (Tamil Nadu). The average operational days were 300 and 250 in Orissa and Tamil Nadu respectively.

The sample units were operating on a single shift of 8 hours a day and the average operational days for the units in Orissa and Tamil Nadu were 300 and 250 respectively. Full utilization of capacity of the unit was not realized in Orissa as CNSL processing was new to the region and the scarcity of raw materials also affected the functioning of the unit.

The net income derived was Rs. 1.48 and Rs. 0.64 per kg of cashew. The viability of the sample CNSL units in Orissa and Tamil Nadu was estimated at (>50 per cent) and 15.26 percent respectively, which should encourage banks to finance such units and the entrepreneurs to undertake the activity on a commercial scale.

5.14 Employment in CNSL Units

CNSL processing was being done more mechanically due to its irritant effect and the extraction as well as processing involves high temperature, boiling, drying, filtering, etc. The sample units were found to work on a single shift basis for 25 days in a month. The sample units were processing 900 bags of shells per month. Labour (skilled and unskilled) employed was 5 per day in Tamil Nadu and the same was 13 in Orissa.

5.15 Potential for CNSL and Cashew Processing

Though the country processes more than 1 million of raw nuts annually, the production of CNSL is limited. Cashew processing is a potentially lucrative activity that can be exploited by small-scale processors as it was found to be financially viable. Further, processing activity generated employment opportunities for rural women, especially for the weaker sections of the society.

5.16 Cashew Apple

Cashew apple, the swollen peduncle to which the nut is attached, is noted for its high ascorbic acid content (vitamin C), which is five times more than that of any citrus fruits. The astringency is due to the presence of tannins, which can be removed by addition of suitable additives before processing. A number of processes have now been developed for converting the cashew apple into various products such as juice, jam, syrup, chutney and beverage (*Winterhalter, 1991*). The ability of cashew apples to supply and fortify the nutritional requirement for vitamin C, particularly in Africa was reported by Akinwale (2000). The author carried out a physico-chemical analysis of some tropical fruits and compared them with those of cashew apple. Cashew apple juice was found to contain the highest amount of vitamin C (203.5mg/100ml.) of edible portion and when cashew apple was blended with other tropical fruits it boosted their nutritional quality. Cashew apple is normally not eaten due to its high astringency. The astringency is due to the presence of tannins, which can be removed by addition of suitable additives before processing.

In certain parts of India like Goa, cashew apple is used to distil cashew liquor referred to as feni. But in the main cashew producing areas of India, 95 percent of cashew apple is not consumed, as the taste is not popular. Although, KVK, Vridhachalam in Tamil Nadu had been organizing various training programmes for the processing of cashew apple, the sample farmers were not making use of cashew apple in any form of processing. Instead, it was mostly used as a manure or

fodder. Similarly, in Koraput district (Orissa), little efforts had been made for value addition to cashew apple and the apples were discarded at the time of collecting raw nuts. Even in Kerala, cashew apple processing had not been taken up on a large scale, except for Madakkathara research station of KAU and very few processors in Kannur.

Case Study 5.2: Cashew Apple Processing in Kannur (Kerala)

A cashew apple processing unit located in Iritty, Kannur, producing variety of value added products like cashew apple syrup, juice, jam etc., started its operations with a term loan of Rs 4 lakh from a commercial bank branch at Iritty. The local cashew traders procured the cashew apple from farmers @ Rs 1.25 per kg, which the sample unit procured from these traders @ Rs 2 per kg. The cashew apple was preserved with citric acid and can be utilised for one year without spoilage. The equipments required for cashew apple processing included the boiling cauldron, hand operated juicer, steel container, pulper, etc.

The cost incurred by the sample unit on the machinery was Rs 1.5 lakh and the total cost of the unit inclusive of the construction cost and machinery cost was Rs.12 lakh. Bank loan was Rs 4 lakh, loan from industries department was Rs. 2.5 lakh and the remaining amount of Rs. 5.5 lakh was margin money. The recurring expenditure consisted of labour charges, electricity, bottles, raw materials, etc. The production cost of cashew apple syrup was Rs. 56 per litre and it was sold @ Rs. 76 per litre.

Cashew apple processing is still in the nascent stage in the State and more such units are required to be set up. Banks and Government departments may promote the use of such value added products through credit support, training and proper marketing avenues.

Section VI

Marketing of Cashew

Marketing in respect of cashew involved several players and channels. Marketing begins from the sale of raw cashew nuts by farmers and reaches the level of exporters/ retailers for selling of processed and graded kernels to the ultimate consumers. The sample cashew growers sold a major portion of the produce to local traders, who in turn supplied the nuts to large traders and processing units located in Kollam (Kerala), Cuddalore (Tamil Nadu), Mangalore (Karnataka), etc. There are several entities in the marketing channels that get good share in the total spread between the producer and consumer. This Section analyses in detail the marketing aspects of raw nuts and kernels in the study area.

6.1 Marketing of Raw Cashew nuts

Marketing of raw cashew nuts in India has not yet been organized in a systematic manner except in Goa where co-operative marketing societies have a major stake in raw nuts trade. These co-operatives, where the producers were the major stakeholders acted as intermediary between the producers and the processors. The society had collection centres located in the production areas and procured cashew nuts from the growers. The sales price was fixed at Rs. 1.50 per kg above the procurement price and the processors had to lift the produce and bear the transportation cost from the society/ collection centres. There was another co-operative set up, which directly procured raw nuts from producers and also had a processing unit on lease. Through this mode, the supply chain was further shortened and was beneficial both to producers and processors (*Technical Digest, NABARD, 2007*).

6.2 Marketing of Raw nuts through Regulated Markets

There was no regulated market for raw cashew nuts in Kerala and Orissa. Due to the absence of regulated markets, the farmers were forced to sell the raw nuts at prices determined by the local traders, who took a margin ranging from Re. 1 (Kerala & Tamil Nadu) to Rs. 2 (Kerala) per kg of raw nuts.

Even with the existence of regulated market for cashew in Panruti (Cuddalore district), raw nuts were sold by the farmers to the processors as well as commission agents, who visited the villages and collected the raw nuts from the farmers. Payment of cess and taxes in regulated markets deterred the producers from resorting to regulated markets.

6.3 Seasonality of Cashew nut Prices

Prices of cashew are linked to seasonality pattern like most other agricultural crops. The domestic prices of the crop are linked to new crop supply seasonality pattern at other origins, which supply raw nuts to India. As regards seasonal production, the harvest period in a growing region is quite short. Since the nuts can easily be dried and stored for at least a year, the processing industry is not very sensitive to finding continuous supplies. The relevance of seasonality is mostly to the anticipation of availability and therefore pricing of raw nuts. The peak seasons of output in different regions are approximately:

India, Vietnam, West Africa: March - June

Brazil: July - February

East Africa: October - December

The cashew nut arrivals of India, Vietnam, Côte d'Ivoire, Nigeria and Ghana coincide with one another whereas the arrivals of Brazil, Indonesia and other African countries like Tanzania, Benin, Mozambique, Kenya coincide. Senegal and Guinea Bissau supply cashew nuts to the World during July and August.

The seasonal index of imported raw nut prices in India has shown that the prices peak during September and October. The price of the locally produced cashew nuts is also influenced by the price and availability of imported nuts. When there is large inflow of imported cashew nuts, which are available at cheaper prices, the demand for locally produced nuts decline, thereby bringing down the prices.

6.4 Price Variations between Domestic and Imported Nuts in India

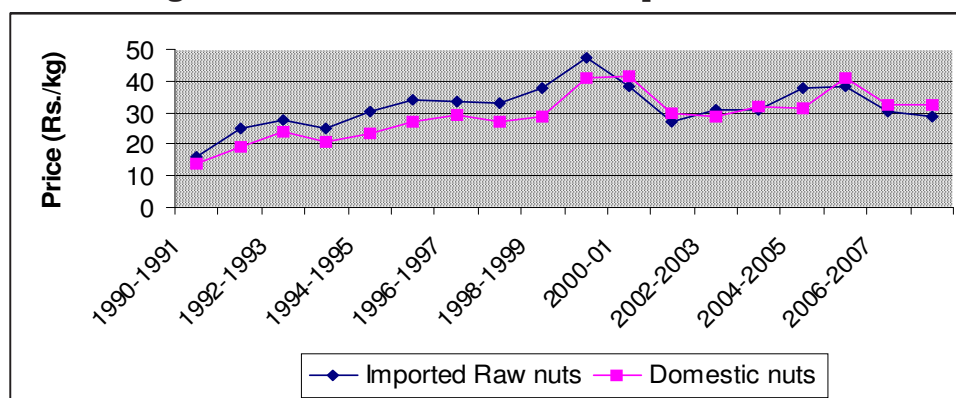
Table 6.1 gives the average price variations between domestic and imported nuts. The unit value of imported raw nuts has been higher than the domestic nuts during 1990-91 to 1999- 2000 and 2004-05. During 2007-08, the domestic raw nut prices were Rs. 32.19 per kg as against the imported raw nut prices (Rs. 28.83).

**Table 6.1: Domestic & Imported Raw nut Prices
(Rs./Kg.)**

Year	Price of Imported Raw nuts	Price of Domestic nuts
1990-1991	16.22	13.94
1991-1992	25.14	19.20
1992-1993	27.88	24.16
1993-1994	25.23	20.67
1994-1995	30.29	23.50
1995-1996	34.11	27.26
1996-1997	33.32	29.23
1997-1998	33.07	27
1998-1999	37.58	28.54
1999-2000	47.54	41.02
2000-2001	38.54	41.24
2001-2002	26.92	29.60
2002-2003	30.86	28.80
2003-2004	30.93	31.95
2004-2005	37.71	31.60
2005-2006	38.26	40.83
2006-2007	30.57	32.71
2007-2008	28.83	32.19

Source: DCCD & CEPC

Fig. 6.1: Prices of Domestic and Imported Raw Nuts



6.5 Marketing Channels for Cashew

The prominent marketing channel prevalent in the sample districts is depicted below:

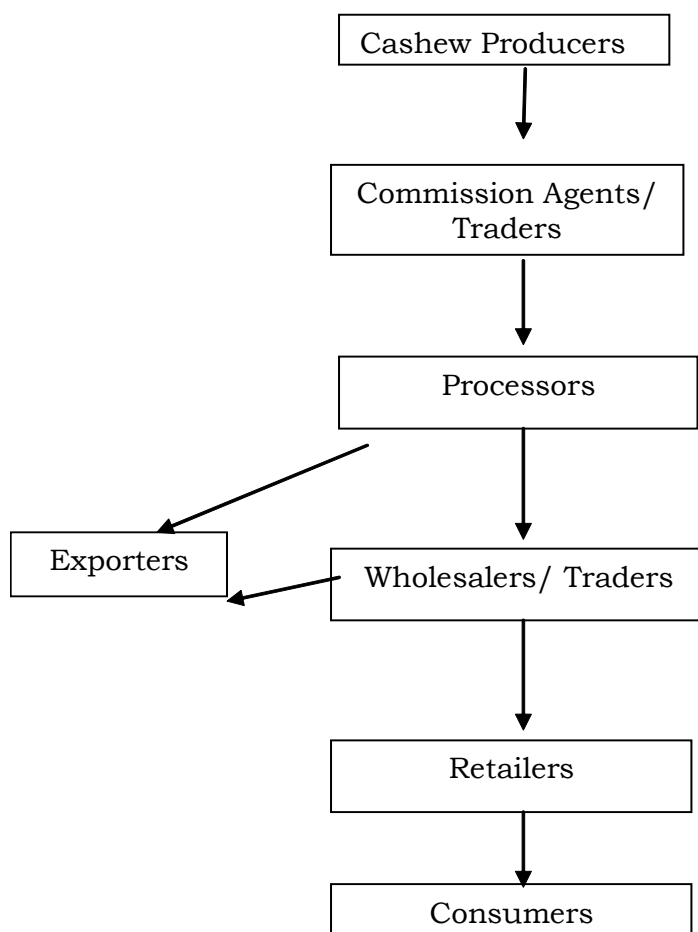


Fig. 6.2: Marketing Channel for Cashew

Case Study 6.1: Price Spread in Cashew Supply Chain in the Domestic Market in Cuddalore (Tamil Nadu)

A case study of marketing dynamics of cashew in Cuddalore district revealed that ninety percent of the processed kernels were sold through the export-marketing channel. In the export market, some of the other channels were similar to the above except that some of the exporters also owned processing units and the processing units/exporters were also directly procuring raw nuts from the farmers.

Marketing of graded kernels by small cashew processors in Tamil Nadu were arranged through tie up with local export houses and traders; thus reducing their marketing risks.

In the domestic market, the price spread has been worked out for the prevalent marketing channel depicted in Fig. 6.2 above.

Table 6.2: Price Spread in Cashew Supply Chain

Particulars	Amount (Rs./bag*)	Share in Consumers' Price (%)
Producers' Selling Price	2700	53.54
Commission charges	25	0.50
Processors' Margin	405.34	8.04
Wholesalers' Margin	782.80	15.52
Retailers' Margin	326.09	6.47
Miscellaneous charges (packing, handling, etc)	803.52	15.93
Price paid by Consumer	5042.75	100

*1 bag = 80 kg of raw nuts; 23 kg of kernels were processed from 1 bag of raw nuts

Despite the length of channel, the share of producer was 53.54 per cent in consumer Rupee and the price spread was Rs. 2342.75 per bag (80 kg) of raw nuts in Tamil Nadu. In the other marketing channel (Farmers--> Processing units---> Wholesalers--> Retailers--> Consumers), which was not widely prevalent, the share of the commission agents was only reduced. The commission agents charged Rs. 25 per bag (80 kg) of raw nuts as commission from the processors and acted as a link between the farmers and processors. Wholesalers purchased desired graded kernels from the processors and packed in different sizes of 1 kg, 500gm, 250gm, etc. and also in tins. Another category of wholesalers purchased the ungraded kernels (mixed grades) from the processors and graded and packed the kernels. Some wholesalers gave their own brand names to the pack.

The share of processors and wholesalers in the consumer rupee was 8.04 percent and 15.52 percent, respectively. No value addition was reported by the sample retailers but their share in consumer Rupee was 6.47 percent.

Traders/ wholesalers controlled cashew markets for both raw cashew as well as kernels. The cashew growers did not have any control over the market due to the absence of coordination and integration among themselves. As there were a number of intermediaries operating in the field between the primary producer and the processing unit, the different costs and margins in the total spread between the producer and the processing unit are quite significant and the producers' share in the price paid by the processing units is generally low.

Case Study 6.2: Net Margin for Sample Exporters in Cuddalore (Tamil Nadu)

The price spread for the marketing channels of export market has not been worked out as the intermediaries involved and prices paid by the consumers in the destination countries were not known. Instead, the net margin for the sample exporters was worked out. Among the different grades of cashew kernels, only W240 and W320 were being exported. The total cost (costs on transport to Tuticorin port, labour, certificates from Cashew Export Promotion Council of India, pouch packing, shipping agents, etc) per kg for grades W240 and W320 was Rs. 210 and Rs. 180 respectively and the net margin for the same worked out to Rs. 31 and Rs. 20 per kg (Annexure XV).

6.6 Marketing Channel for CNSL

CNSL oil, extracted from cashew shells is widely used by the resin units in the fields of friction materials, adhesives, etc. The prevalent marketing channel for CNSL was:

Farmers ----->Commission agents ----->Processing units ----->CNSL Plant----->Resin Plant----->Paint Industry

The sample units in Tamil Nadu were selling the manufactured CNSL oil @ Rs. 13 per litre directly to the resin units in Chennai and Hyderabad and the same was supplied to the traders in Kolkata @ Rs.15 per litre by the sample units in Orissa. Cashew shell cake is another by-product of the CNSL unit and was sold as fuel @ Rs. 0.60 and Rs. 2.30 per kg in Orissa & Tamil Nadu respectively. In Tamil Nadu, the operational cost for processing CNSL worked out to Rs. 212.97 per bag (55 kg shells). The selling price was Rs. 248 for the output that included 12 kg filtered oil and 40 kg shell cakes. Thus, a margin of Rs. 35.03 was available for CNSL plant in Tamil Nadu from 1 bag (80 kg) of raw nuts. The sample CNSL units were selling oil to the resin units who incurred a cost of Rs. 30 per litre and sold to the paint industry @ Rs. 35 per litre.

6.7 Futures Trading in Cashew

Cashew futures are exchange traded contractual obligations to make or accept delivery of a specified quantity and quality of cashew during a specified time in the future at a price agreed upon at the time the commitment is made. At present, futures are available in cashew at National Commodity and Derivatives Exchange Limited (NCDEX) and MCX. MCX was the first commodity exchange in the world to start futures trading in cashew. NCDEX has launched a cashew futures contract in Kollam, Kerala since March 2005. The price quote is on net basis and net weight of each carton is 22.68 kg. Trading is done for white wholes, with a count of 300-320 nuts per 454 gm. It is stipulated that the kernels should be free from infestation, insect damage, mould rancidity, adhering testa and extraneous matter. The delivery centres are located at Kollam, with an additional delivery centre at Mangalore.

Although, the commodity futures help the exporters in hedging against price fluctuations as they can sell the commodity at a price decided months before the actual transaction, thus ironing out any fluctuation in prices that happen subsequently; the sample processors/ exporters were not trading on the future exchange.

Section VII

Global Cashew Trade and Export Competitiveness of Cashew

Global trade is significant in raw cashew nuts, kernels and CNSL, which is a by- product of the cashew industry. Cashew apple is not traded in the international market. This Section deals with cashew trade in the world and India.

7.1 Global Trade in Raw Cashew nuts

The world export of raw nuts increased from 138143 tonnes valued at US\$ 19319 in 1961 to 575374 tonnes valued at US\$ 317679 in 2007, registering an annual growth rate of 2.23 percent (Table 7.1). Similarly, the import of raw nuts increased from 133499 tonnes in 1961 to 604125 tonnes in 2007, an increase of 352 percent.

Table 7.1: Export and Import of Raw Cashew nuts in the World (1961-2007)

Year	Export		Import	
	Quantity	Value	Quantity	Value
1961	138143	19319	133499	24545
1971	182790	35519	185643	60473
1981	44632	56136	48140	194665
1991	123526	113826	169309	197414
2001	364851	227787	168021	114131
2007	575374	317679	604125	604125
CAGR (1961-2007)	2.23	6.55	1.41	4.84

Quantity in tonnes, Value in '000 US\$
Source: FAO Statistical Database

7.2 Country- wise Trade of Cashew nuts

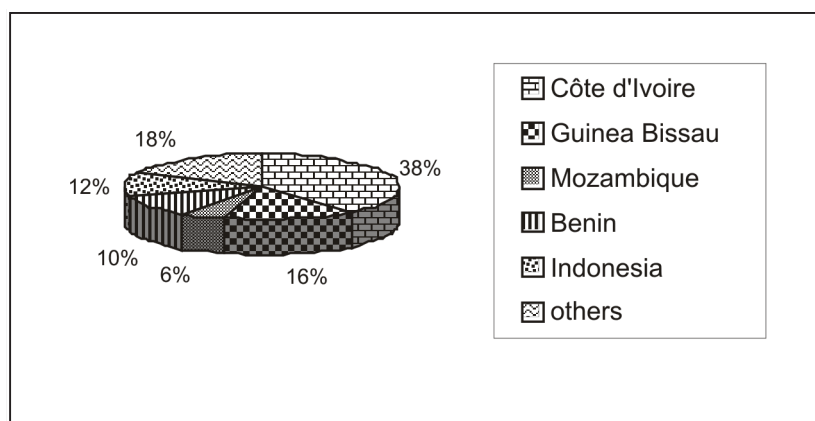
Major countries exporting raw nuts were Côte d'Ivoire with 38.48 percent of the volume and 29.13 percent of the value followed by Guinea Bissau with 15.88 percent of the quantity and 18.44 percent of value for the triennium ending 2007. Other important exporters in terms of volume included Indonesia (11.89%), Benin (10.32%), and Mozambique (5.51%),

Table 7.2: Quantity and Value of Cashew nut Exports by Major Countries (TE 2007)

Country	Quantity	Share (%)	Value	Share (%)
Côte d'Ivoire	209730.67	38.48	97272.33	29.13
Guinea Bissau	86574.33	15.88	61603.00	18.44
Mozambique	30072.00	5.51	21643.00	6.48
Benin	56278.66	10.32	32743.33	9.80
Indonesia	64805.33	11.89	51916.33	15.54
Others	97474.66	17.88	68735.33	20.58
Total	544935.67	100.00	333913.33	100.00

Source: FAO Statistical Database Quantity in tonnes, Value in '000 US\$

Fig. 7.1: Share of Major Countries in Export of Raw nuts (TE 2007)



7.3 Share of India in Global Import of Raw nuts

India's share in the import of raw nuts was 91 percent for the triennium ending 2007. Other importers included France, Australia, Cambodia, Saudi Arabia, etc.

Table 7.3: Share of India in Import of Raw nuts (TE 2007)

	India	World	Share (%)
Import Quantity (tonnes)	534118.3	582722	91.65
Import Value ('000 US\$)	429592.3	456762.7	94.05

Source: computed on the basis of data downloaded from FAO Statistical Database

7.4 Global Trade in Cashew Kernels

The world export and import of cashew kernels was 3.83 lakh tonnes and 3.47 lakh tonnes in 2007. The exports and imports in terms of volume increased at the annual compound growth rate of 3.74 and 4.72 per cent respectively.

Table 7.4 : Export and Import of Cashew Kernels in the World (1961-2007)

Year	Export		Import	
	Quantity	Value	Quantity	Value
1961	43301	41209	30568	29226
1971	84802	110678	60564	78481
1981	72735	405597	45842	235684
1991	114604	460050	85336	445185
2001	186290	720144	180908	739585
2007	383000	1689992	343785	1556771
CAGR (1961-2007)	3.74	7.66	4.72	8.64

Quantity in tonnes, Value in '000 US\$

Source: FAO Statistical Database

7.5 Country- wise Trade in Cashew Kernels

Vietnam was the major exporter of cashew kernels with 37.19 percent of the volume followed by India (34.04%) and Brazil (13.03%) for the triennium ending 2007. Vietnam, a late entrant to cashew nut processing, is in a position to offer competitive rates due to sufficient raw material as well as high level of productivity.

Table 7.5: Quantity and Value of Export of Cashew Kernels by Major Countries (TE 2007)

Country	Quantity	Share (%)	Value	Share (%)
India	118968	34.04	555241	36.12
Vietnam	130000	37.19	553083	35.98
Brazil	45548	13.03	199953	13.01
Others	54996	15.74	228915	14.89
Total	349512	100	1537192	100

Source: FAO Statistical Database Quantity in tonnes, Value in '000 US\$

Fig. 7.2: Country-wise Export of Cashew Kernels (TE 2007)

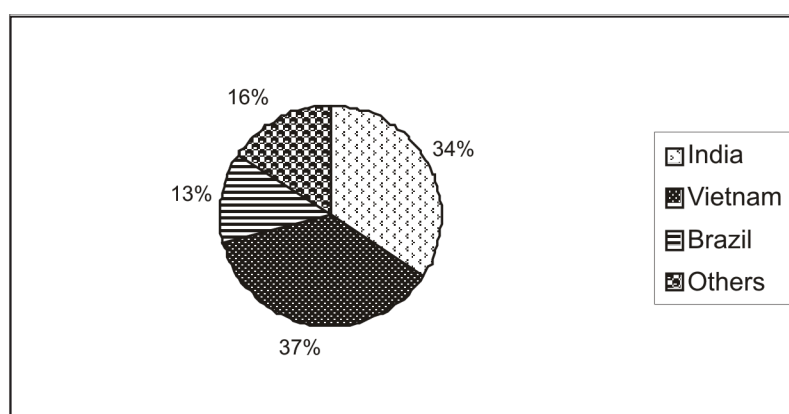


Table 7.6 depicts that USA was the major importer with a share of 38.24 percent in the total volume followed by Netherlands (14.03%). Other important importers of cashew kernels were UK, Germany, Australia, and Canada.

Table 7.6: Quantity and Value of Import of Cashew Kernels by Major Countries (TE 2007)

Country	Quantity	Share (%)	Value	Share (%)
USA	118166	38.24	539296	38.23
UK	22480	7.27	93263	6.61
Netherlands	43361	14.03	203906	14.46
Germany	14969	4.84	76605	5.43
Australia	13805	4.47	63282	4.49
Canada	10146	3.28	46737	3.31
Others	86109	27.86	387468.33	27.47
Total	309036	100.00	1410557.3	100.00

Source: FAO Statistical Database Quantity in tonnes, Value in '000 US \$

7.6 Global Trade in CNSL

The approximate annual production of CNSL is estimated at 40,000-50,000 MT. Brazil is the largest producer with 20,000 tonnes followed by India (12,000 tonnes) and Vietnam (7000 tonnes). Other producers include Indonesia, Côte d'Ivoire, Nigeria, etc. The major buyers of CNSL include USA, UK, Japan, etc. (*Stonis, A.M, 'Current status of CNSL Market' in World Cashew Congress, CEPC, 2001*).

7.7 Cashew Trade in India

Cashew is primarily an export-oriented commodity and accrued an export earning of Rs. 228890 lakh (cashew kernels) and Rs. 1197 lakh (CNSL) during 2007-08. Although the share of cashew exports to agricultural exports has declined from 7.08 percent in 1990-91 to 3.02 percent in 2007-08 (Table 7.7), yet its foreign exchange earnings has increased from Rs. 44780 lakh to Rs. 230087 lakh during the same period, indicating a growth of more than five times during the period.

Table 7.7: Share of Cashew Exports to total Agricultural Exports (%)

Year	Cashew Exports (Rs. crore)	Agricultural Exports (Rs. crore)	Share of Cashew Exports to total Agricultural Exports (%)
1990-91	447.80	6317	7.08
2000-01	2053.64	28582	7.18
2005-06	2521.95	46703	5.39
2006-07	2464.35	58959	4.17
2007-08	2300.87	76006	3.02

Source: Economic Survey, various issues; CEPC

7.8 India's Export Pattern in Cashew Kernels and CNSL

The total export of cashew kernels from India during 2007-08 was 114340 MT valued at Rs 2288 crore. Export earnings from cashew kernels declined by 6.80 per cent during 2007-08 from a year ago. The average unit export price realized during 2007-08 was Rs. 200.18 per kg as against Rs. 207.15 per kg during 2006-07 indicating a decrease of 3.34 percent. This may be due to the appreciation in the value of the rupee.

India is the second largest cashew exporter with 29 percent of the world market share in 2007. The major markets of Indian cashew are USA, UK, Japan, Netherlands, Australia, Canada and Middle East countries. Vietnam has emerged as a major competitor to India in international cashew trade. Most cashew kernels exported from India are plain kernels packed in pouch/ tin with net weight of 11.34 kg (25 lb). During 2001-02, the export of roasted and salted kernels from India was 120.56 MT valued at Rs.152.56 lakh.

Similarly, Cashew Nut Shell Liquid, which is a by-product of the cashew industry, is exported mainly to countries like USA, Korea, Japan and Zimbabwe. The growth rate worked out for the period 1990-91 to 2007-08 revealed that growth in value terms increased at the rate of 12.46 percent and in terms of quantity it was 11.08 percent.

The export of cashew nut shell liquid from India during 2007-08 increased to 7813 tonnes valued at Rs. 1197 lakh as compared to 5589 tonnes valued at Rs. 920 lakh during 2006-07.

Table 7.8: Export of Cashew Kernels and CNSL during 1990-91 to 2007-08
(Quantity in MT, Value in Rs. lakh)

Year	Cashew Kernels		CNSL	
	Quantity	Value	Quantity	Value
1990-91	49874	44224	5658	556
1995-96	70334	124050	760	145
2000-01	89155	204975	2246	389
2005-06	114143	251486	6405	709
2007-08	114340	228890	7813	1197
CAGR (1990-91 to 2007-08)	5.49	8.98	11.08	12.46

Source: Directorate of Cashew nut and Cocoa Development, Cochin

Fig. 7.3: Export of Indian Cashew Kernels

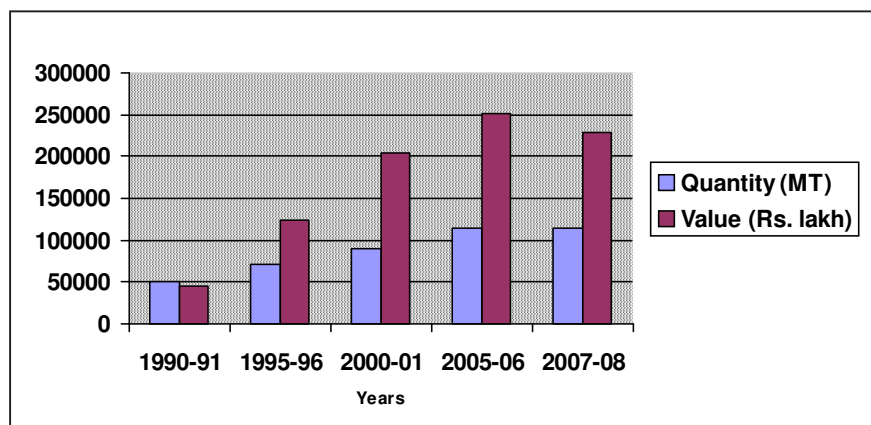
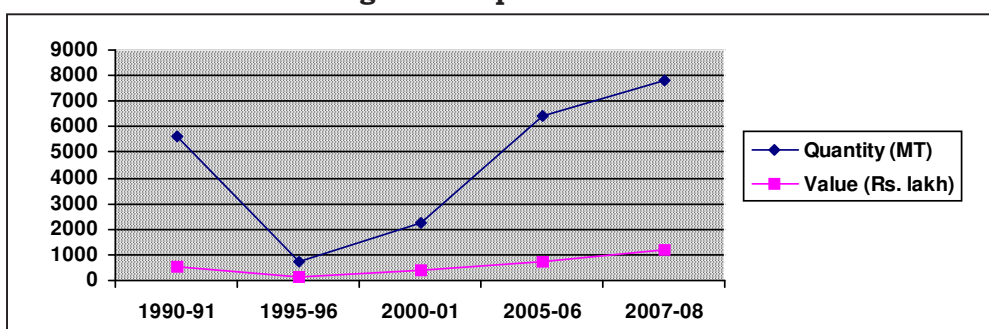


Fig. 7.4: Export of CNSL



There has been an increase of 129 and 38 percent in the volume of export of cashew kernels and CNSL respectively during the period 1990-91 to 2007-08. The unit value price of CNSL has increased from Rs. 9.82 during 1990-91 to Rs. 15.32 during 2007-08. Realization of good prices would encourage the production of this by-product. The value of export of cashew kernels has also increased considerably from Rs. 88.67 per kg to Rs. 200.18 per kg during the same period. There has been a decline in the exports during 2005-06 from the country due to the increased availability in the world market at low prices.

7.9 Country- wise Trade in Cashew Kernels and CNSL from India

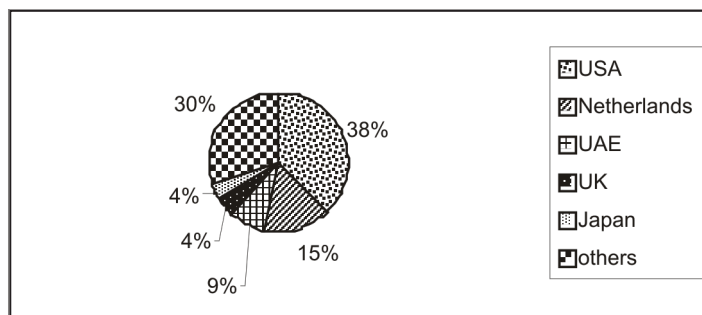
Analysis of destination wise export of cashew kernels as given in Fig. 7.5 indicate that USA accounted for 38 percent of the total exports followed by Netherlands (15%) and UAE (9%) for TE 2007-08. Countries like Spain, Canada, Hong Kong, Belgium, Germany, Saudi Arabia, Bahrain, Greece, Norway, Italy, etc. have also been importing cashew kernels from India and they have been clubbed together under 'others'. The cashew exports to USA, Netherlands and UK has declined during 2007-08, which may be due to these countries being hit by the economic crisis (Table 7.9).

Table 7.9: Country-wise Export of Cashew kernels from India
(Quantity in MT, Value in Rs. Crore)

Country	2005-06		2006-07		2007-08	
	Quantity	Value	Quantity	Value	Quantity	Value
USA	43149	958.33	46246	969.51	42690	838.35
Netherlands	18736	408.82	19360	385.06	13627	256.27
UAE	8274	184.41	9523	207.62	12690	275.68
UK	6238	140.88	4715	95.5	3758	78.39
Japan	4685	110.2	4279	91.26	5114	106.51
Others	33061	712.22	34417	706.2	36461	733.7
Total	114143	2514.86	118540	2455.15	114340	2288.9

Source: CEPC

Fig. 7.5: Country-wise Quantity of Cashew kernels Exported from India (TE 2007-08)



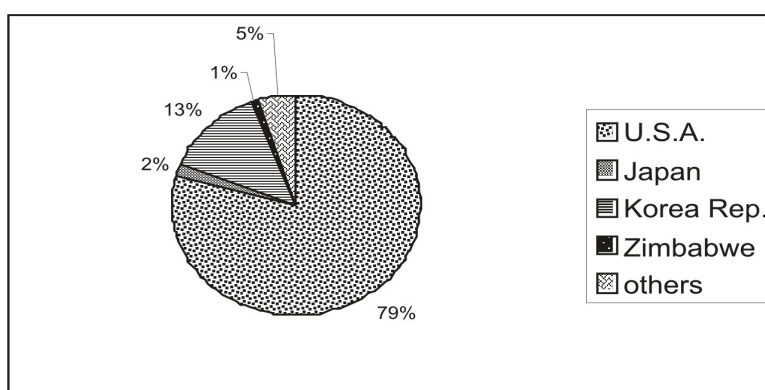
Similarly, CNSL also has an international market and the country was exporting 79 percent of CNSL to USA followed by Korea (13%) for TE 2007-08.

Table 7.10: Country-wise Export of CNSL from India
(Quantity in MT, Value in Rs. Crore)

Country	2005-06		2006-07		2007-08	
	Quantity	Value	Quantity	Value	Quantity	Value
U.S.A.	5834	5.97	4780	7.35	5511	7.59
Japan	31	0.09	148	0.3	206	0.36
Korea Rep.	524	1	1115	2.37	1010	1.95
Zimbabwe	16	0.03	64	0.19	80	0.21
others	0	0	32	0.06	1006	1.86
Total	6405	7.09	6139	10.27	7813	11.97

Source: CEPC

Fig. 7.6: Country-wise Quantity of CNSL Exported from India (TE 2007-08)



7.10 Import of Cashew nuts in India

India does not produce sufficient quantities of raw nuts required by the processing units and resorts to import from African countries and South East Asian countries. Country-wise import of cashew nuts in India (Annexure XVI) indicates that during 2007-08, the major portion of cashew nuts to India came from Côte d'Ivoire (34%), Guinea Bissau (16%), Tanzania (13%), Benin (9%), Indonesia (6.7%), Ghana (5%) and Mozambique (4.37%). The share of African countries in India's cashew nut imports during 2007-08 was 93 percent.

Cashew nuts are imported in the country for the purpose of re-export of processed kernels since India has a labour cost advantage in this commodity. High cost involved in processing cashew is the major reason for African countries to export raw cashew nuts. Moreover, consumption of cashew kernel in these countries is also low. Using a commonly accepted conversion ratio of raw nuts to kernel at 4.54, the percentage share of imports in the total quantity of nuts processed for exports was worked out. Results indicated that imports which accounted for 36.5 percent of the total quantity of raw nuts processed for exports during 1990-91, had increased to 61.6 percent (2000-01) and 116 percent of the latter during 2007-08, implying that kernels processed from imported raw nuts were also currently being consumed in the domestic market (Table 7.11).

Import of raw cashew nuts increased from 82639 MT in 1990-91 to 605970 MT in 2007-08, an increase of 633 percent (Table 7.11). The annual growth rate in the volume of cashew import was 11.32 percent for the period 1990-91 to 2007-08. A comparison between the domestic production and import of raw cashew nuts indicates that the dependence of the Indian cashew industry on the imported cashew nuts has increased over the years. During 2007-08, as against the domestic production of 665000 MT, the volume imported was 605970 MT.

7.11 Net foreign exchange earnings

Since the industry is heavily dependent on the imported raw nuts, attempts have been made to analyze the net foreign exchange earnings from cashew kernels. Net foreign exchange earnings after increasing till 1999-2000, has declined. Although, the volume of exports for kernels has increased, the unit value realization for exported kernels from the country has declined from Rs. 265/kg during 1999-2000 to Rs. 200/kg during 2007-08.

**Table 7.11: Net Foreign Exchange Earnings from Cashew
(1990-91 to 2007-08)**

(Quantity in MT, Value in Rs. lakh)

Year	Export of Cashew Kernels		Export of CNSL		Import of Raw Nuts		Net Foreign Exchange	Raw nut equivalent for Processing Exported Kernels*	% share of Imports in Total Exported Processed Kernels
	Quantity	Value	Quantity	Value	Quantity	Value			
1990-91	49874	44224	5658	556	82639	13400	31380	226428	36.50
1991-92	47738	66909	4542	402	106080	26668	40643	216730.5	48.95
1992-93	53436	74549	4258	381	134985	37633	37297	242599.4	55.64
1993-94	69884	104602	3625	290	191322	48270	56622	317273.4	60.30
1994-95	77000	124602	3807	244	228109	69094	55752	349580	65.25
1995-96	70334	124050	760	145	222819	76008	48187	319316.4	69.78
1996-97	68663	128550	1735	277	192285	64060	64767	311730	61.68
1997-98	76593	139610	4446	717	224968	74400	65927	347732.2	64.70
1998-99	75026	160990	1572	326	181009	68024	93292	340618	53.14
1999-2000	92461	245145	764	184	200584	95352	149977	419772.9	47.78
2000-01	89155	204975	2246	389	249318	96080	109284	404763.7	61.60
2001-02	97550	177680	1814	419	356566	96001	82098	442877	80.51
2002-03	104137	193302	7215	925	400659	123657	70570	472782	84.74
2003-04	100828	180442	6926	703	452898	140093	41052	457759.1	98.94
2004-05	126667	270924	7474	791	578884	218324	53391	575068.2	100.66
2005-06	114143	251486	6405	709	565400	216295	35900	518209.2	109.11
2006-07	118540	245515	5589	920	592604	181162	65273	538171.6	110.11
2007-08	114340	228890	7813	1197	605970	174680	55407	519103.6	116.73

*Conversion ratio of raw nut to kernel has been taken at 4.54

Source: DCCD

7.12 Export Competitiveness of Cashew in Select States

Estimation of export competitiveness of Indian cashew is based on NPC for 2005-06. Table 7.12 depicts the NPC of cashew for Kerala, Orissa and Tamil Nadu. Domestic price is the average of wholesale price of exportable grades (W 240 & W 320) in the three States collected from the sample processors. The unit value of FOB has been derived from the annual export data.

Table 7.12: NPC of Cashew

State	NPC
Kerala	1.41
Orissa	1.10
Tamil Nadu	1.07
Average	1.19

The NPC estimates measuring the degree of export competitiveness of Indian Cashew during 2005-06 suggest less export competitive nature of cashew in the three States. Cashew in Tamil Nadu was almost at borderline and could be considered to be promising from export point of view. However, more information for other years would be required to substantiate the export competitiveness. Export competitiveness of cashew in Kerala, Orissa and Tamil Nadu are not efficient due to the ageing trees and declining productivity. High Yielding Varieties of cashew have to be introduced and promoted on a large scale through public private participation.

7.13 Cashew Export Promotion Council (CEPC)

The Cashew Export Promotion Council of India set up in 1955 with the processors and exporters as members is actively engaged in the export promotion of cashew kernels and cashew nut shell liquid. The Council undertakes publicity abroad to highlight the quality of Indian cashew and also participates in international fairs and exhibitions. High quality is a major criterion for success in the world market. Quality control is administered through the Cashew Export Promotion Council. It also helps in settling complaints amicably in matters related to export/import. The Cashew Export Promotion Council of India is to implement a scheme titled 'Modernisation & Diversification Scheme' with the following four components during the eleventh plan (CEPC).

- Process Upgradation/ Modernization of Cashew Processing units
- Setting up facilities for Value Addition/ Consumer Packing of Cashew Kernels
- Adoption of New Packaging Systems
- Implementation of Internationally Accepted Quality Systems (ISO, organic, etc).

The grant assistance would be 25 percent of the total eligible investment, of which civil works should not constitute more than 50 percent subject to a maximum total grant of Rs. 50 lakh per exporter for all components put together. Exporters who are members of the Cashew Export Promotion Council of India are eligible for assistance under this scheme. Some of the items eligible for grant assistance are indicated below:

- Process Upgradation/ Modernisation of Cashew processing units include boiler, cutting machines & accessories, oil expeller for CNSL extraction, Hot Air Generator & Accessories Trolleys, steel/ aluminium trays, etc.
- Setting up facilities for Value Addition / Consumer Packing of Cashew Kernels- Cashew kernels roasting machinery, salting / coating / flavouring machinery, heating and cooling equipment for production processing, consumer packaging machines, printing machines for consumer packs, labeling machines, etc.
- Adoption of new packaging system- Flexible packaging machine, accessories mould & former filling system, Air Compressor, conveyor vibratory table with vibratory motor, electronic weighing machine, grading machines, automatic packing systems, pouch-forming machines, etc.
- Implementation of internationally accepted quality systems- ISO / organic consultancy charges, certification charges, air curtain, vacuum cleaner, building and related civil works, laboratory equipments, etc.

7.14 Specifications for Cashew Exports

Government of India has laid down standard specifications for the cashew kernels for export under the Export Control and Inspection Act, 1963. The Act prescribes 33 different grades of cashew kernels but only 26 grades are commercially available and exported. Cashew kernels are selected on the basis of the number per unit weight, generally per pound of weight. They are also graded into white / scorched wholes, pieces, splits, butts, etc depending on the shape, size & colour of the kernel. White or ivory kernels are preferred over brown ones. There is a maximum permitted moisture level of 5 percent (both for raw cashews and cashew kernels) and the product must be free from insects, mould and extraneous materials.

Quality Control and Pre- shipment Inspection

The export of cashew kernels from India is subject to voluntary quality control and pre- shipment inspection. Under inspection, it is ensured that the product is processed and packed as per the standards prescribed.

Packing and Standard weight

The standard net weight of cashew kernels packed in tins is 11.34 kg or 25 lbs and the net weight of each carton containing two such tins is 22.68 kg or 50 lbs.

Shipping Specifications

Cashew shipments from India are mainly in 20 ft containers, which have 650-700 cartons. Freight is charged per cubic metre on volume basis.

Contract Terms

The contracts are normally made on FOB or C&F basis, cost of insurance to be borne by the buyer, export dealings are finalized on the basis of opening of 100 percent irrevocable LC by the buyer in favour of the shipper. Besides, fumigation certificate, certificate of origin, etc. are also required.

7.15 Agri Export Zone for Cashew in Cuddalore District (Tamil Nadu)

To set up a Cashew Export Zone at Panruti in Cuddalore district, a Memorandum of Understanding was signed between GoTN and APEDA (Agriculture and Processed Food Products Export Development Authority) at a project cost of Rs.17 crore in April 2005. M/s Sattva Agro Export Pvt. Ltd. has been selected as the anchor promoter for cashew Agri Export Zone through private participation. The work for AEZ commenced in 2006-07 with the construction of infrastructure facilities. Modern nursery has been established for providing quality seedlings to the farmers and the construction of processing unit and pack house has been completed (*Agriculture Policy Note 2009-10, Government of Tamil Nadu, 2009-10*).

Section VIII

Credit Aspects of Cashew

Credit is an essential requirement for the development of Agriculture and helps in the better allocation of resources and growth. Credit requirements for the cashew sector are for cultivation, processing and exports and these are met by institutional agencies through loan (short and long term), cash credit and working capital.

8.1 Institutional Finance for Cashew Cultivation

The sample cultivators in Tamil Nadu and Orissa were not availing any bank finance for the maintenance of cashew crop. Major reason being cited in the study area of Tamil Nadu was that the sample farmers had availed the subsidy under NHM and hence loan was not availed from the financial institutions. Similarly, most of the cashew plantations in Koraput district in particular and Orissa in general were developed under Government initiatives. Moreover, farmers had taken up cashew as per their convenience in the marginal lands. Cashew cultivation usually taken up by the sample farmers was involved with low input cost and was being met by their own funds. Besides, the replacement of cashew with rubber in Kannur and Malappuram districts had led to institutional financing for rubber, rather than cashew.

8.2 Institutional Finance for Processing

The credit requirements of the processing units include term loan for the purchase of plant and machinery and the working capital, which is required for meeting the recurring expenses of procuring raw nuts, etc. The average bank loan availed by the sample units in Koraput was Rs. 12.8 lakh as working capital under cash credit limit and Rs. 22.4 lakh was availed as term loan. Apart from the bank loan, the units had also used substantial amount of their own funds and borrowed from informal sources at 18 to 24 percent rate of interest, especially, for meeting the short-term working capital needs.

In Kollam district, the cash credit facility for working capital was provided but the term loan was not provided by the banks for these units. For the capital investment and other operations, the units incurred considerable expenditure from own funds or through informal sources.

20 percent of the sample processing units in Cuddalore district had availed term loan for the purchase of cashew drier and boiler. None

of the units without boilers (small processors) had availed any working capital from the banks. Since they were supplying the graded kernels to the export houses in the area, it was revealed that their credit requirements were being met by them. On the other hand, the big processing units had an average working capital limit of Rs. 4 lakh at the rate of 13 percent. 33 percent of the sample units extracting CNSL oil were found to avail term loan from the bank and all the sample units had an average working capital limit of Rs. 3 lakh @ 13 percent.

The sample SHGs in Cuddalore had availed a loan amount of Rs. 2.29 lakh under SGSY loan and the total subsidy amount was Rs. 1.15 lakh for cashew processing. The rate of interest charged was 12 percent and the repayment period fixed was 60 equated monthly installments.

8.3 Institutional Credit for Export

All the sample export units covered in Cuddalore district availed packing credit from the banking institutions. The packing credit limit was Rs. 3 crore @ 7 percent rate of interest.

8.4 Potential of Institutional Credit for Cashew Cultivation and Processing

Cashew cultivation (traditional and grafted varieties) and processing including CNSL were financially viable in the sample districts. This should encourage banks to finance such units. Investment in plant and machinery for the cashew processing and CNSL units increases the credit requirement for the sector. The processing units also require working capital limit, as raw nuts have to be procured in large quantities. Establishment of cashew apple processing units as in Kerala and SHGs undertaking cashew processing enterprises would open avenues for institutional financing.

Section IX

Issues and Strategies for Cashew Development

9.1 Issues in Cashew Cultivation

Low Productivity

Large area under cashew is covered with non-descript genetically inferior seedling progenies. Compared to other plantation crops, cashew is still confined mostly to marginal and poor fertile lands and is considered as a wasteland crop. Moreover, cashew has been considered as 'maintenance free' crop and the recommended package of practices are not followed. All these factors lead to low yield.

Senile Plantations

About 40 percent of the existing cashew areas have become senile resulting in uneconomic production (*Singh, H.P & Balasubramanian, P.P, 2003*). These plantations generated from indiscreet seedlings are least responsive to the technological packages and have adversely affected the productivity and competitiveness of cashew.

Poor quality of Raw Cashew nuts

Incidence of pests and diseases like tea mosquito, cashew stem and root borer, unsatisfactory drying of raw nuts and inadequate storage of dried nuts have resulted into poor quality of raw nuts produced. The yield loss due to tea mosquito bug infestation ranged between 30 and 50 percent in different years, while the stem and root borer infestation in neglected plantations ranged around 8 to 10 percent (*NRCC, Puttur*). Poor quality of raw nuts in turn leads to inferior quality of processed kernels.

Unorganized Cultivation

Cashew is predominantly a small holder crop in India as 70 percent of cashew is grown by small farmers. The remaining 30 percent are grown under re-forestation programmes. Hence, it is not cultivated as an organised plantation crop.

Infrastructural Facilities

Godowns for storing raw nuts are inadequate. Deterioration rate is low for properly dried nuts. Drying the nuts immediately after

harvesting is essential to preserve their quality and reduce moisture content. Russell (1969) considered whole nut moisture content of 9 percent or below to be safe for storage. Sun drying of raw nuts is usually done and after drying they need to be stored and protected from rain and stored in local godown as soon as possible. Processing industries also require storage facilities for storing raw material for a year's production. Thus, godowns will facilitate buying operations and nuts may be marketed regularly.

Non-availability of Grafts

There was no cashew nursery in Koraput district (Orissa) due to which grafted varieties were not adequately available in the district. Krishi Bhavans could meet only part of the requirements of farmers. The Cashew Development Corporation and Horticultural Department supplied the grafts by procuring from other districts and states like Goa and Maharashtra.

9.2 Issues in Cashew Processing

Insufficient Domestic Raw nuts

As per the estimates of DCCD, the production of raw nuts in India during 2005-06 was 5.73 lakh tonnes as against the requirement of 15 lakh tonnes by the cashew processing industries. Thus, the availability of domestic raw nuts was only 38.2 percent of the processing capacity. Even with the present level of production with 6.65 lakh tonnes (2007-08), the availability is only 44 percent of the processing capacity. This has led to dependence on imported nuts. Cashew producing countries in Africa and South East Asia, which were traditional suppliers of raw nuts to India are developing their cashew processing facilities to process and export kernels. Development of cashew processing in these countries will affect the availability of raw nuts for import into India.

Working Capital Requirements

Working capital is required for purchasing raw cashew nut inventory. Small processors without boilers had constraint in accessing working capital limits from the banks. Access to working capital would induce entrepreneurs to invest in cashew processing facilities.

Traditional Cashew Processing

In India, most of the processing takes place on a small scale and is highly labour intensive. The main advantage of manual conversion is low cost. However, mechanization to improve the recovery and quality of kernels, better extraction of CNSL have not taken place unlike other countries.

Inadequate Skilled labour for Processing

Shortage of power supply and inadequate skilled labour for processing activities like shelling, drying, etc. becomes a constraint for the processing units. Main difficulties in shelling cashew nuts are the irregular shape of the nut and the CNSL within the shell, which must not contaminate the kernel during the process. Drying of shelled kernels is necessary to avoid pest and fungal attack and to facilitate peeling. Kernels are dried to moisture content of 3 percent and should not be excessively dried resulting in high breakage percentage.

9.3 Issues in Cashew Marketing

Competition from other Countries

Vietnam is the major competitor for India for cashew kernels. In order to promote domestic processing and exports, Vietnam Government imposed 15 percent tax on export of raw nuts in 1995, which resulted in decrease of export of raw nuts. Brazil and Vietnam compete with India in purchasing raw nuts.

Declining Domestic Raw nut Prices

Raw nuts are imported mainly from African countries like Nigeria, etc. at a cheaper rate than that of local nuts. This has posed a problem for the farmers. During 2007-08, the price of raw nuts declined to Rs. 32.20/kg from Rs. 40.89 kg in 2005-06.

Poor Quality of Processed Kernels

The quality of the processed kernels is not good, as the small processors do not maintain hygienic conditions in their factories. This affects the marketability of kernels in the international market.

Competition from other nuts

One of the major factors that affect the consumption of cashew kernels in the world market is the competition from other nuts. The major importers in developed countries contract their requirements for the whole year based on the sales from previous years. Since cashew cultivation is not organized on a plantation scale in most of the producing countries, there is a fluctuation in the yield every year, which leads to wide price fluctuations of cashew kernels. On the other hand, other nuts like almond and pistachio are grown in large plantations and thus their prices are steady.

Intermediaries in Supply Chain

Traders and middlemen dominate the market for raw cashew nuts and kernels. Since procuring raw cashew is the largest component of the operating costs in cashew processing sector, a slight increase in cashew price adversely affects the entire economics of cashew processing. The individual farmers were in a disadvantageous position as they were forced to sell the produce at a price determined by the traders / leaseholders. Farmers did not use the regulated markets in Cuddalore, as taxes/ cess had to be paid by the traders if it was sold through the Marketing Committee.

Drain on Foreign Exchange Reserves

During 2007-08, the country imported 6.05 lakh tonnes of raw cashew nuts to meet the requirements. This has considerable drain on the country's foreign exchange reserves.

9.4 Strategies for Cashew Development

- Technologies like use of vegetative propagated planting materials may be used for increasing the production and productivity of cashew. The present level of productivity is 860 kg/ha whereas the new varieties have a potential of 2000 kg/ ha. Efforts need to be taken for replacement and new plantation with clones of these varieties. Trials with different density and spacing in cashew have proved that net profit realised from high tree density planting (384 trees/ha, 6.5 x 4m) was high for the first 10 years compared to normal tree density (156 trees/ha). Better management practices like pruning, top working for rejuvenating cashew trees, improved planting material, adequate disease and pest control, etc. are required to increase the yield.

- Senile plantations adversely affected the productivity and competitiveness of cashew. Production and productivity can be enhanced through a phased replanting programme. Farmers were hesitant to take up replantation in the study area due to the expected crop loss and negative returns during the initial years. Inter cropping may be practiced by cashew growers as it helps in obtaining returns from cashew. Crops and trees like groundnut, cowpea, tapioca, casuarina, turmeric, black gram, etc. can be effectively grown as inter crop during the initial 4-5 years. Strong extension activity and credit support is required to make the farmers rejuvenate old plantations as well as to practice intensive cultivation practices.
- Southeast Asian countries have taken up cashew cultivation in the recent years and pose a threat to India's share in international market. Therefore, developing eco-friendly cultural practices like IPNM, planting with grafts of improved high yielding varieties in new areas and also replanting with grafts of improved varieties in the areas which are already planted with senile and seedling origin cashew is the need of the hour. Thus, evolving high yielding hybrids with high shelling percentage and kernels with better nutritive value are important to step up production and competitiveness in the international trade.
- Organic cashew offers new opportunities for the producers as they command price premium. With the support of the State Department of Horticulture in Tamil Nadu, the farmers had taken up partial organic cashew cultivation. But concerted efforts are required for promoting certified organic cashew. Though most of the cashew produced in India are organic as very less / no fertilizers are used in the plantations, they need to be certified as organic.
- There was no contract farming arrangements for cashew cultivation in the study area. This was mainly because cashew has not developed into organised plantation. It may become feasible by setting up of Cashew Export Zone at Panruti in Cuddalore district, for which a Memorandum of Understanding has been signed between GoTN and APEDA. Contract farming can evade middlemen between the farmers and the processors and ensure adequate prices to cashew farmers.

- Better transfer of technology may bridge the gap between the potential and actual yields of cashew. The farmers may be educated about the potential of cashew sector and encouraged to adopt advanced farming techniques so that they can earn maximum benefits.
- Cashew is the only major plantation crop that is not regulated by an autonomous board. Other plantation crops such as tea, coffee, cardamom and rubber all have efficient and autonomous boards and as a result have experienced much faster growth in productivity than cashew. Considering the importance of the crop, setting up of the Board may be made by the Commerce Ministry. A separate cashew development board may be set up so as to enhance the cultivation of raw nuts and increase the production and export of cashew kernels.
- Over the years, the share of imported nuts in the total raw nut processing has been 40-45 percent. There is a need to increase domestic production to substitute imported raw nuts in order to derive the maximum benefits from a strong processing and marketing capability developed over the years by the Indian cashew industry. Besides, taking up cultivation on a commercial scale, the cultivation can also be taken up in non-traditional States like Jharkhand, Chattisgarh and North Eastern regions. Increased domestic production would reduce imports, which will in turn reduce the volatility in the prices of raw nuts.
- Cashew apple preparations like jam, jelly, chutney, juice, syrup, etc. need to be popularized and commercially exploited, as it will increase the income of cashew cultivators and also enhance rural employment. Except in Goa, cashew apple is wasted in almost all the states in India. There is also a need to popularise the techniques of manufacturing the value added products from cashew apple among the SHGs.
- Scientific processing techniques to recover cashew shell liquid oil may be used in the processing of raw nuts.
- Major export from India is only through cashew kernels at present. The export of value added cashew kernels like salted and roasted kernels from India is insignificant. This is mainly due to the reason that the importers and packers in the major markets like United

States do not want the Indian suppliers to send value added products, which they consider, would adversely affect their packing industry. However, there is a scope for increasing the export of value added cashew kernels in the non- traditional markets like West Asian countries. Value addition and product diversification should also receive adequate attention for having competitive edge and higher returns in the years to come. Sweetened and flavoured cashew spread, etc. may be prepared from cashew kernel baby bits.

- Cashew kernels are high value commodity. In order to compete directly in the world market, high level of standards, branding and marketing is required to be maintained by the processors. Standards for raw nut quality like moisture content, and cleanliness of nuts are needed to improve trade. Farmers should be informed about the required production methods like regular harvesting, sun drying, etc.
- Recently, Cashew Export Promotion Council (CEPC), Cochin organised "Kaju India 2006" and launched "Mission 2020" programmes, with the objectives of achieving self sufficiency in raw nut production. More such programmes may be organized to create awareness among the stakeholders.
- Establishment of cashew clusters among the processors may facilitate the expansion of market linkage and improvement of quality of kernel. Cluster approach would also facilitate setting of other ancillary units like CNSL, units producing jam, pickles, etc. from cashew apples.
- As Cashew cultivation and processing is financially viable, bankers may consider bringing the farmers in the institutional fold by providing loan both for establishment and maintenance of plantations. Adequate working capital from the banks and power supply may further improve the viability of the processing units. Establishment of cashew apple processing units as in Kerala and SHGs undertaking cashew-processing enterprises in Tamil Nadu also open avenues for institutional financing.
- Branding and promotion highlighting health and nutritional values of cashew may be made. Nutritionally, cashew compares well with other tree nut crops. It is a commodity rich in

unsaturated fatty acids with high protein and low levels of saturated fats and soluble sugars. Higher levels of polyunsaturated fatty acids, which lower blood cholesterol, are of high nutritional significance. Moreover, it is gaining acceptance in many western markets where consumers are more health conscious. This aspect needs to be marketed.

- The role of middlemen in the market should be reduced and Government procurement system should be strengthened so as to motivate farmers to grow this crop on a sustainable basis and ensure a better price.
- Infrastructural facilities like godowns for storage of raw nuts may be constructed. If godowns are used, the factory will need small storage capacity and will facilitate buying operations of nuts. Development of infrastructure like nurseries and extension services can pursue the cashew growers to accept cashew as a commercial plantation crop.
- Institutional support and co-ordination among various developmental and promotional agencies such as DCCD, CEPC, Agricultural Universities, etc. would help in promoting cashew processing and marketing.

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Abbreviations

AEZ	: Agri Export Zone
APEDA	: Agricultural & Processed Food Products Export Development Authority
CAGR	: Compound Annual Growth Rate
CEPC	: Cashew Export Promotion Council of India
CNSL	: Cashew nut Shell Liquid
CV	: Coefficient of Variation
DCCD	: Directorate of Cashew nut and Cocoa Development
FAO	: Food and Agriculture Organisation
FRR	: Financial Rate of Return
GoTN	: Government of Tamil Nadu
Ha	: Hectare
HI	: Herfindahl Index
ICAR	: Indian Council of Agricultural Research
INM	: Integrated Nutrient Management
IPM	: Integrated Pest Management
Kg	: Kilogram
KAU	: Kerala Agricultural University
KVK	: Krishi Vigyan Kendra
MCX	: Multi Commodity Exchange
MT	: Metric Tonne
NABARD	: National Bank for Agriculture and Rural Development
NCDEX	: National Commodity and Derivatives Exchange Limited
NHM	: National Horticulture Mission
NPC	: Nominal Protection Coefficient
OFDC	: Orissa Forest Development Corporation
OUAT	: Orissa University of Agriculture & Technology
R&D	: Research & Development
Rs.	: Rupees
SHGs	: Self Help Groups
TAFORN	: Tamil Nadu Forest Plantation Corporation Limited
TE	: Triennium Ending
TNAU	: Tamil Nadu Agricultural University

Annexure I

Nutrients in 100g of Cashew nuts		
Nutrient	Units	Value
Calories	Kcal	570
Protein	g	15
Total Fat	g	46
Saturated Fat	g	9
Monounsaturated Fat	g	27
Polyunsaturated Fat	g	8
Linoleic acid (18.2)	g	7.66
Linolenic acid (18.3)	g	0.16
Cholesterol	mg	0
Carbohydrate	g	33
Fibre	g	3
Calcium	mg	45
Iron	mg	6.00
Magnesium	mg	260
Phosphorus	mg	490
Potassium	mg	565
Sodium	mg	16
Zinc	mg	5.60
Copper	mg	2.22
Manganese	mg	0.83
Selenium	mcg	11.70
Thiamin	mg	0.20
Riboflavin	mg	0.20
Niacin	mg	1.40
Pantothenic acid	mg	1.22
Vitamin B6	mg	0.26
Folate	mg	69
Vitamin K	mcg	34.70
Tocopherol, alpha	mg	0.92
Total Phytosterols	mg	158
Lutein + Zeaxanthin	mcg	23

Source: USDA National Nutrient Database for Standard Reference, Release 17, 2004
g = gram , mg = milligram; mcg = microgram

Annexure II

District wise Area and Production of Cashew nuts in Kerala

(Area in ha, Production in tonnes, Yield in kg/ha)

District	2004-05			2005-06		
	Area	Production	Yield	Area	Production	Yield
Thiruvananthapuram	2061	761	36.92	1869	1087	581.59
Kollam	4666	3160	677.24	4271	3003	703.11
Pathanamthitta	1141	636	557.41	1048	528	503.82
Alappuzha	3749	1016	271.01	3525	1182	335.32
Kottayam	688	222	322.67	638	269	421.63
Idukki	1270	677	533.07	1197	746	623.22
Ernakulam	1167	545	467.01	1130	507	448.67
Thrissur	3541	1862	525.84	3350	1687	503.58
Palakkad	4814	2436	506.02	4391	1785	406.51
Malappuram	9601	3876	403.71	9123	7394	810.48
Kozhikode	3552	2063	580.80	3368	2200	653.21
Wayanad	1275	892	699.61	1235	697	564.37
Kannur	25681	25230	982.44	25066	29252	1167.00
Kasargod	18341	17208	938.23	18068	17925	992.09
Total	81547	60584	742.93	78285	68262	871.97

Source: Agriculture Statistics, Govt of Kerala

Annexure III

District-wise Area under Cashew nuts in Orissa ('000 ha)

District	2004-05	2005-06
Balasore	0.50	0.50
Bhadrak	0.00	0.02
Bolangir	0.00	0.04
Cuttack	2.80	2.85
Jagatsingpur	0.00	0.01
Jajpur	2.30	2.35
Kendrapara	0.30	0.30
Dhenkanal	4.70	4.78
Anugul	2.00	2.06
Ganjam	13.60	13.69
Gajapati	4.60	4.64
Kalahandi	0.80	0.84
Nawapara	0.10	0.19
Keonjhar	2.90	2.99
Koraput	14.20	14.24
Malkangiri	0.10	0.10
Nawarangpur	13.10	13.13
Rayagada	2.50	2.54
Mayurbhanj	1.60	1.69
Phulbani	0.20	0.29
Boudh	0.00	0.08
Puri	2.60	2.65
Khurda	11.20	11.27
Nayagarh	2.90	2.95
Sambalpur	1.80	1.80
Deogarh	0.00	0.02
Jharsuguda	0.20	0.22
Sundargarh	3.10	3.15
Total	89.30	89.39

Source: Directorate of Agriculture and Food Production, Orissa

Annexure IV

District-wise Area, Production and Yield of Cashew nuts in Tamil Nadu

District	2004-05			2005-06		
	Area	Production	Yield	Area	Production	Yield
Chennai	0	0	0	0	0	0
Kancheepuram	456	165	362	479	181	378
Thiruvallur	234	85	362	365	138	378
Cuddalore	29,831	26,585	891	30150	22952	761
Villupuram	4,788	949	198	4797	1163	242
Vellore	45	16	362	23	9	378
Thiruvannamalai	12	4	362	2	1	378
Salem	595	215	362	25	9	378
Namakkal	0	0	0	4	2	378
Dharmapuri	1	0	362	1	0	378
Krishnagiri	3	1	362	2	1	378
Coimbatore	292	106	362	303	115	378
Erode	94	34	362	143	54	378
Tiruchirapalli	800	289	362	781	295	378
Karur	56	20	362	50	19	378
Perambalur	34,993	5,904	169	35607	7942	223
Pudukottai	10,676	2,669	250	11041	2584	234
Thanjavur	2,451	759	310	2447	364	149
Thiruvarur	16	6	362	5	2	378
Nagapatinam	584	211	362	590	223	378
Madurai	267	97	362	310	117	378
Theni	4,840	1,246	257	5520	1413	256
Dindigul	555	201	362	589	223	378
Ramanathapuram	261	94	362	375	142	378
Virudhunagar	72	26	362	82	31	378
Sivagangai	4,770	1,999	419		1776	386
Tirunelveli	5,114	2,105	412	5019	3458	689
Thoothukudi	824	298	362	811	307	378
Nilgiris	0	0	0	0	0	0
Kanyakumari	2,029	413	204	1938	337	174
Total	104,659	44,497	425	100648	43858	435.756

Area in (ha), Production in tonnes, Yield (kg/ha)
Source: Season and Crop Report, GoTN

Annexure V

Cashew Cultivation Practices

Cashewnut is attached to the lower portion of the cashew apple. The seed has a whole kernel inside and the kernel is covered by a testa membrane and a thick outer shell, which protects the kernel from the time of harvesting to processing. It flowers once a year, between the months of November and January and the fruit ripens fully within 2 months. The lateral root system makes the cashew plant to conserve the soil.

Cashew is a tropical crop and is found growing from sea level to an altitude of 700 metres. It requires equable climate, which is neither very hot nor cold. Cashew is a hardy crop and can be grown in almost all types of soil from sandy to laterite including wastelands of low fertility.

Climatic Conditions

Cashew is a drought resistant plant, thriving under a variety of soil and climatic conditions. But high temperature and too much of rain affects the fruiting of the trees. It is grown in areas with rainfall ranging from 600 - 4500 mm per annum. Fruit setting in cashew is affected if rains are abundant during the time of flowering and nuts mature in dry period. Cashew is a sun-loving tree and does not tolerate excessive shade. It tolerates temperature of more than 36° C for a shorter period but the most favourable temperature lies between 24° C to 28° C. The climatic factors influence the cashew growth and production as follows: -

- Dry spell during flowering and fruit setting ensures better harvest.
- Cloudy weather during flowering enhances scorching of flowers due to tea mosquito infestation.
- Heavy rains during flowering and fruit set damages production.
- High temperature (39-42°C) during stage of fruit set development causes fruit drop.

Irrigation

In India, cashew is grown mainly under rainfed condition. However protective irrigation especially during summer months at fortnightly intervals @200 litres/ plant improves fruit set, fruit retention, thereby

increasing the nut yield.

Spacing and Method of Planting

Normal spacing recommended for cashew is 7.5m X 7.5m. Two systems of planting, square and triangular are in vogue in cashew. The plant population per ha at a spacing of 7.5m X 7.5m in square system is 177 and in triangular system are 204. Planting of grafts is done in pits of 60 cm cube. Staking should be done immediately after planting to protect the grafts from wind damage.

Season of Planting

Under rainfed conditions, planting is done during monsoon (June-August). If irrigation is assured, planting can be taken up at any time during the year.

Application of Manures and Fertilizers

The fertilizer recommendation for cashew is 750g N, 325g P₂O₅ and 750 g K₂O per plant per year in Kerala and the same is 500g N, 250g P₂O₅, 250g K₂O (Orissa) and 500g N, 200g P₂O₅ and 300 g K₂O per plant per year in Tamil Nadu (*Salam, Abdul, et al. Cashew Cultivation, DCCD*). The fertilizer application is immediately after the cessation of heavy rains and with available soil moisture. During the 1st and 2nd year of planting, one third and two third of fertilizers is applied and from 3rd year onwards full quantity is applied.

Weeding

Weeding is done, either manually or chemically depending upon the type of weed growth. Application of paraquat and glyphosate controls all types of weed.

Plant Protection

Tea mosquito, stem borer, thrips, leaf minor and leaf blossom webber are the important pests of cashew. Tea mosquito bug (*Helopeltis antonii* s.) causes yield reduction to the tune of 30-40 percent damaging tender shoots, inflorescence and immature nuts at various stages of development. It attacks the tree in all the seasons during flushing, flowering and fruit setting period but the peak period of infestation is from October to March. To control the pest, spray schedule involving three sprays synchronizing new flushing (October-November), flowering (November-December) and fruit setting (January - February) is done with the chemicals, Quinalphos (25% EC) - 0.05%,

Carbaryl (50% WP) - 0.01% Phosphamidon (85% WSC) - 0.03%. Stem and root borer (*Placaederus ferrugineus* L.) is also a dangerous pest and kills the entire plant. Pesticides like carbaryl, sevidol, etc. are used to control the pest.

Pruning

Pruning is an important horticulture practice to make better frame work of cashew plant. As an orchard management technique to improve the sanitation, removal of water shoots, lower branches, crisscross branches and dry branches are found to be beneficial to enhance flowering and the yield.

Top Working

Top working is a technique to rejuvenate the unproductive cashew trees. Top working can rejuvenate poor yielding trees of 5-20 years. Under this method, the unproductive trees are to be beheaded at a height of 0.75 to 1 metre from the ground level. The top worked trees start yielding from the second year of top working.

Harvest and Yield

Economic bearing of nuts commences after 3rd year of planting. Stabilised yield starts from tenth year and continues for a further period of 20 years. In India, the main harvesting season is March to May.

Generally, harvesting consists of reaping the nuts that have dropped to the ground after maturing. If the apples are used for processing, picking from the tree is preferred to reaping as the apples may burst and lose a considerable quantity of juice after falling to the ground. The quantity, which can be harvested per unit of time, depends on the yield of the trees. Nuts are dried in sun for 2 to 3 days on cement floor and stored in gunny bags in 80 kg capacity. The yield starts from 1 kg in 3rd-4th year and goes on increasing as the canopy develops. The yield of more than 10 kg of nuts is harvested in 8 to 10 years old plant depending on management.

Intercropping

Inter crop is planted during the first three years of planting. By introducing an inter crop during the first three years, farmers realize returns thereby meeting expenditure for raising cashew plantations to a certain extent. Inter cropping also helps to reduce the pest attack on cashew nut during the initial stages of growth.

Annexure VI

Cost of Establishment for Traditional Varieties (Seedlings) (Rs. /ha)

Items	Orissa	Tamil Nadu (Seedlings- rainfed)	Tamil Nadu (Seedlings- Irrigated)
Land Development	860 (7.42)	3,815 (10.53)	3,815 (9.37)
Pit making, planting, stacking	1605 (13.84)	2600 (7.18)	2600 (6.39)
Fencing	1200 (10.35)	7,500 (20.71)	7,500 (18.42)
Farmyard Manures	900 (7.76)	4,500 (12.43)	4,500 (11.05)
Labour	5600* (48.30)	4,100 (11.32)	4,100 (10.07)
Fertilizers	-	1,500 (4.14)	3,000 (7.37)
Weeding	1430 (12.33)	1,250 (3.45)	1,250 (3.07)
Pruning	-	3,750 (10.35)	3,750 (9.21)
Watering	-	4,000 (11.05)	6,000 (14.74)
Pesticides	-	1,200 (3.31)	1,200 (2.95)
Harvesting & Packing	-	2,000 (5.52)	3,000 (7.37)
Total	11595 (100)	36,215 (100)	40,715 (100)

*Including watch & ward

Figures in parentheses indicate percentage to total

Annexure VII

Maintenance cost for Traditional Varieties (Seedlings) (Rs. /ha)

Items	Orissa (rainfed)	Tamil Nadu (rainfed)	Tamil Nadu (irrigated)
Farmyard Manures	-	1,800 (16.63)	1,800 (12.83)
Fertilizer Application	-	1,250 (11.55)	3,000 (21.39)
Irrigation	-	-	1,000 (7.13)
Pesticides	-	900 (8.31)	1,350 (9.63)
Weeding	-	625 (5.77)	625 (4.46)
Pruning	-	500 (4.62)	500 (3.57)
Labour	-	750 (6.93)	750 (5.35)
Harvesting	550 (31.43)	5,000 (46.19)	5,000 (35.65)
Others (watch & ward)	1200 (68.57)	-	-
Total	1750 (100)	10,825 (100)	14,025 (100)

Figures in parentheses indicate percentage to total

Annexure VIII

Cashew Varieties in Kerala, Orissa & Tamil Nadu

Cashew Varieties	Year of Release	Mean nut yield/ tree (kg)	Nut weight (gm)	Kernel weight (gm)	Export grade
KAU					
Anakkayam 1	1982	12	5.95	1.67	W 280
Madakkathara 1	1990	13.8	6.2	1.64	W 280
Kanaka	1993	12.8	6.8	2.08	W 280
Dhana	1993	10.66	8.2	2.44	W 210
Dharasree	1996	15.02	7.8	2.4	W 240
Amrutha	1998	18.35	7.18	2.24	W 210
Anagha	1998	13.73	10	2.9	W 180
Akshaya	1998	11.78	11	3.12	W 180
Orissa University of Agriculture & Technology (OUAT)					
Bhubaneswar 1	1989	10.5	4.6	1.47	W 320
TNAU					
Vridhachalam 1	1981	7.2	5	1.4	W 320
Vridhachalam 2	1985	7.4	5.1	1.45	W 320
Vridhachalam 3	1991	11.68	7.18	2.16	W 210

Source: Cashew Varietal Wealth of India, DCCD, Cochin

Annexure IX

Cost of Establishment for Grafts

(Rs. /ha)

Items	Kerala	Orissa	Tamil Nadu
Land Development	2000 (6.21)	990 (3.57)	5,000 (6.44)
Farmyard Manure	1000 (3.10)	1800 (6.48)	10,800 (13.90)
Labour	3560 (11.05)	3470 (12.50)	3,750 (4.83)
Graft cost	5500 (17.07)	3300 (11.89)	3,400 (4.38)
Pit making, Planting, Stacking	5020 (15.58)	2530 (9.11)	5,000 (6.44)
Fencing the land area	4000 (12.41)	3500 (12.61)	7,500 (9.65)
Irrigation	-	1500 (5.40)	16,800 (21.62)
Fertilizer Application	1540 (4.78)	2325 (8.37)	5,250 (6.76)
Weeding	3000 (9.31)	-	4,000 (5.15)
Pruning	-	-	6,000 (7.72)
Mulching	-	-	3000 (3.86)
Pesticides	2850 (8.85)	1750 (6.30)	1,200 (1.54)
Harvesting	3750 (11.64)	800 (2.88)	6,000* (7.72)
Watch & ward	-	5800 (20.89)	-
Total	32220 (100)	27765 (100)	77,700 (100)

*Includes packing

Figures in parentheses indicate percentage to total

Annexure X

Maintenance cost for Grafts

(Rs. /ha)

Items	Kerala	Orissa	Tamil Nadu
Farmyard manure	300 (9.02)	300 (6.70)	3,600 (21.36)
Fertilizer application	500 (15.04)	650 (14.53)	3,000 (17.80)
Watering	-	-	1,400 (8.31)
Weeding	550 (16.54)	-	1,000 (5.93)
Pruning	-	-	750 (4.45)
Pesticides	475 (14.29)	450 (10.06)	1,350 (8.01)
Labour	-	875 (19.55)	750 (4.45)
Harvesting	1500 (45.11)	1000 (22.35)	5,000 (29.67)
Others (watch & ward)	-	1200 (26.82)	-
Total	3325 (100)	4475 (100)	16,850 (100)

Figures in parentheses indicate percentage to total

Annexure XI

Cost of Establishment for Organic Cashew (Tamil Nadu)

(Amount in Rs./ha)

Items	Amount
Land Preparation/ploughing	5,000 (5.99)
Farmyard Manure	10,800 (12.94)
Labour	3,750 (4.49)
Graft cost (Rs 17/graft)	3,400 (4.07)
Neem cake	600 (0.72)
Vermicompost	1,100 (1.32)
Manure application	1,000 (1.20)
Pit making, Planting, Stacking	5,000 (5.99)
Fencing the land area	7,500 (8.99)
Watering	16,800 (20.13)
Bio-fertilizer	3,000 (3.59)
Fertilizer Application	4,250 (5.09)
Weeding	4,000 (4.79)
Pruning	6,000 (7.19)
Mulching	3000 (3.59)
Bio-pesticide	2,250 (2.70)
Harvesting & Packing	6,000 (7.19)
Total	83,450 (100)

Figures in parentheses indicate percentage to total

Annexure XII

Cost of Establishment for Replantation with Grafts (Tamil Nadu)

(Amount in Rs./ha)

Items	Amount
Uprooting cost	72,000 (37.12)
Loading/unloading of wooden logs	24,000 (12.37)
Ploughing	7,200 (3.71)
Land leveling	2,500 (1.29)
Farmyard Manure	14,400 (7.42)
Labour	3100 (1.60)
Graft cost	3,400 (1.75)
Pit making, Planting, Stacking	5,000 (2.58)
Irrigation	16,550 (8.53)
Fertilizer	8,250 (4.25)
Weeding	5,000 (2.58)
Pruning	5,000 (2.58)
Pesticide	2,550 (1.31)
Harvesting & Packing	25000 (12.89)
Total	193950 (100)

Figures in parentheses indicate percentage to total

Annexure XIII

Maintenance cost for Organic Cashew & Replantation (Tamil Nadu)

(Rs. /ha)

Items	Organic	Replantation
Farmyard Manure	3,600 (23.84)	3600 (21.05)
Irrigation	1,400 (9.27)	1400 (8.19)
Bio-fertilizer	600 (3.97)	-
Fertilizer Application	1,250 (8.28)	3000 (17.54)
Weeding	1,000 (6.62)	1000 (5.85)
Pruning	750 (4.97)	750 (4.39)
Biopesticide	750 (4.97)	-
Pesticide	-	1350 (7.89)
Labour	750 (4.97)	1000 (5.85)
Harvesting	5,000 (33.11)	5000 (29.24)
Total	15,100 (100)	17100 (100)

Figures in parentheses indicate percentage to total

Annexure XIV

Grades of Cashew Kernels



White wholes-180



White wholes-210



White wholes-240



White wholes-320



White wholes-450



White wholes-500



Scorched
Wholes(SW)



Scorched
Wholes(SW)-180



Scorched
Wholes(SW)-210



Scorched
Wholes(SW)-240



Scorched
Wholes(SW)-320



Scorched
Wholes(SW)-450



Scorched Wholes-
500



Scorched Wholes
Seconds(SSW)



Dessert Wholes(DW)



Butts(B)



Splits(S)



Large White Pieces(LWP)



Small White Pieces(SWP)



Baby Bits(BB)



Scorched Butts(SB)



Scorched Splits(SS)



Scorched Pieces(SP)



Scorched Small Pieces(SSP)



Scorched Pieces Seconds(SPS)



Dessert Pieces(DP)

Source : CEPC

Annexure XV

Average Export Cost and Net Margin per kg (Rs.)

Particulars	Amount (Rs.)
Average Purchase Price for W 240	190
Average Purchase Price for W 320	160
Electricity Cost for Borma	0.32
Grading	2
Labour cost	0.30
Agent Commission @ 1% of realizable value for W 240	2.42
Agent Commission @ 1% of realizable value for W 320	2.00
Carton material Cost	0.97
Transport cost to Tuticorin Port	1.30
Certificates from CEPC	1.38
Shipping agent for phyto sanitary, fumigation, C&F, etc to USA	2.51
Pouch Packing	1.95
Rate of interest on Packing Credit	7
Miscellaneous	0.75
Total Cost for W 240	210.9
Total Cost for W 320	180.48
Average Export Price for W 240	242
Net Margin for W 240	31.10
Average Export Price for W 320	200
Net Margin for W 320	19.52

Annexure XVI

Import of Raw Cashew nuts into India

(Quantity in MT, Value in Rs. crore)

Country	April 2006 – March 2007		April 2007 – March 2008	
	Quantity	Value	Quantity	Value
Ivory Coast	187612	547.71	205405	485.15
Tanzania	66600	225.51	79109	338.47
Guinea Bissau	76126	240.90	98056	256.66
Indonesia	60959	213.81	40659	161.37
Mozambique	26367	77.25	26489	101.83
Benin	65420	205.16	57982	165.22
Nigeria	21154	55.73	18991	39.91
Senegal	10084	31.47	10064	24.71
Gambia	22508	70.21	21662	54.12
Ghana	39804	118.34	30595	74.65
Kenya	1719	5.43	6071	18.02
Madagascar	2243	4.79	171	0.56
China	0	0	350	1.05
Guinea	4388	11.89	8937	20.90
El Salvador	259	0.90	183	0.61
Philippines	249	0.81	0	0
Singapore	0	0	802	2.23
Panama	149	0.48	100	0.24
United Kingdom	0	0	18	0.04
Togo	403	1.17	122	0.36
Egypt	0	0	16	0.03
Hongkong	0	0	152	0.49
Taiwan	0	0	36	0.17
Total	586044	1811.62	605970	1746.80

Source: CEPC