

RPF III

FINAL REPORT

1. Institute code No. **PI-80/4-ICI-E10/0311, 2110, 2320 Econ.II (443)**
2. ICAR code No. **PI-80/4-ICI-E10/0311, 2110, 2320**
3. Name and address of the Research Institute/ Center **Central Plantation Crops Research Institute
Kasaragod, Kerala 671 124**

4. Project title **Economics of Plantation Crops**

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7. Location of research project with complete address **Agricultural Economics Section
Division of Social Sciences
Central Plantation Crops Research Institute
Kasaragod, Kerala 671 124**
 Division/Section/Sub Station

8. Date of start **1983**
9. Date of termination **2000**
10. (a) Objectives (not more than 150 words) **To conduct research on production, marketing and developmental aspects of coconut, arecanut and cocoa. During the reporting period the major objectives were to analyze the trend in area, production and productivity of coconut and arecanut in India.**
- (b) Practicle utility (not more than 100 words) **The results of this study would be of immense use to the farmers, developmental workers as well as policy planners.**

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|--|--|
| Technical programme
(Indicate briefly plan of procedure, techniques, instruments and special materials, organism, special environments etc.) | Secondary data analysis of area, production and productivity of coconut and arecanut in India |
| 12. Final report on the project: (A summary of research not exceeding five pages precisely and concisely stating the fundamental and/or practical significance there of) | The final report is organized into production aspects, market and price analysis and developmental aspects for and the same are enclosed in separate sheets. |
| 13. Progress of work in relation to the time targeted for completion of work and reasons for non-achievement of targets if any | The progress of work was in tune with the plan of work and the same was completed in time. |
| 14. Publications during the period (Two copies each to be supplied with this proforma)
(a) Research papers
(b) Popular articles | Ten |
| 15. Details (Nos.etc) of field /laboratory note books and their final location | Not Applicable |
| 16. Signature of Principle investigator | |

C. V. Srinivas

17. Signature of Head of Division/Station/Section

[Signature]

18. Signature of Director

V. Rajaram

Final Report of the project

A. Production Aspects of Plantation Crops

I. Cost of production of small-holder's plantation crops

Based on the following assumptions, the estimates on cost of production of different small holder's plantation crops were made.

- a) Labour requirement for different crops are the estimates of the development Directorates, World Bank Teams and Research Stations. Some more labour units have been added for watch and ward.
- b) Planting materials have been estimated taking the recommended spacing into consideration
- c) Fertilizer and plant protection chemical levels are also as per the recommendation of CPCRI
- d) Wage rates and cost of other inputs have been computed as per the current market rates
- e) The yield levels for various years are discounted by 10 to 15 % from the expected yields considering risk factors

Cost of production of small-holder plantation crops

Commodity	Stabilized yield /ha	Cost of production (Rs./unit)
Pepper	1.37 t	9.25
Cardamom	80 kg	102.00
Dry ginger	5.2 t	3.90
Cured turmeric	5.0 t	3.10
Cashew nut	900 kg	3.85
Coconut	10,500 nuts	1.15
Copra	-	9.00
Dry unhusked arecanut	2,700 kg	10.10
Dry husked arecanut	-	10.60
Cocoa (dry beans)	550 kg	9.10

Cost-benefit analysis of plantation crops and farming systems

Crops	Economic life in years	Annuity Value	NPW (at 14% DF)	BCR	IRR
Rainfed coconut	60	3100	22000	1.59	19
Irrigated coconut	60	5400	33700	1.71	21
Rainfed arecanut	40	4600	32700	1.45	21
Irrigated arecanut	40	7900	56300	1.51	22
Cashewnut	25	650	4900	1.29	18
Cardamom	12	2500	13700	1.42	25
Pepper	15	2200	13400	1.28	25

Estimation of labour requirement of plantation crops (mandays/ha)

Operation particulars	Coconut		Arecanut		Cashew		Pepper		Cardamom	
	I year	Adult Stage	I year	Adult Stage	I year	Adult Stage	I year	Adult Stage	I year	Adult Stage
Fencing and repairs	70	8	70	10	8	25	50	8	80	8
Land cleaning, leveling and peg marking	55	-	150	-	70	-	30	-	56	5
Taking pits and planting	43	-	120	-	21	-	50	-	77	18
Shading, mulching, digging and weeding	25	36	105	70	10	15	35	60	25	65
Manuring	16	24	50	80	4	5	18	25	-	16
Watering for establishment	42	-	100	-	-	-	20	-	-	-
Plant Protection	3	12	15	80	2	10	8	20	-	20
Harvesting and drying	-	30	-	90	-	30	-	140	-	75
Total	254	110	610	330	115	85	211	253	-	207

II. Trend in the production and exports of plantation crops in India

In order to study the trends in the growth of small holder's plantation crops in India, the index numbers of area, production and yield for coconut, arecanut, black pepper and cardamom were constructed taking triennium ending 1969-70 as the base period.

In spite of nearly 14 % expansion in the area of coconut the productivity has declined by around 11 %, as a result the production of nuts in the country has remained almost static. In the case of arecanut, even though the productivity remained almost static around the base period, the rise in production by 29 to 40 per cent in these years is due to increase in the area. The area under pepper, after considerable decline during 1907's has again increased to the level of base period. In recent times cardamom production could rise to nearly 85-90 per cent, while the increase in area was 35-40 per cent from the base.

IV. Economic analysis of arecanut and cocoa sector

During the year 1987-88, the production of arecanut in India registered an increase of 88,000 t over 1970-71. The economic analysis reveals that the relative shares of area expansion and efforts to increase productivity of arecanut were 26.7 per cent and 45.7 per cent, respectively while the interaction effect was found to be 25.7 per cent. The significant contribution of the research input in the production sector of arecanut in the disease-free areas is well established through this analysis.

Contribution of area, yield and their interaction to increase in production of arecanut in India

Period	Increase in production ('000 t)	% increase	Percentage contribution of		
			Area	Yield	Interaction
1960-61 to 1969-70	42.0	43.75	96.46	-32.55	36.10
1960-61 to 1979-70	94.0	97.92	62.85	-3.37	40.51
1966-61 to 1987-88	133.0	138.54	55.21	9.33	35.45
1970-71 to 1979-80	49.0	34.75	23.28	35.10	41.61
1970-71 to 1987-88	88.0	62.41	26.74	45.74	27.53
1980-81 to 1987-88	33.0	16.84	39.23	51.02	9.76

Secondary data analysis of the state wise area, production and productivity of cocoa for the period 1983-84 to 1993-94 indicated that the area under cocoa in the country had declined by about 50 % and the production had increased by 19 %, indicating an increase in the average productivity. The CGR (%) for area, production and productivity were 6.34, 1.34 and 8.2 respectively. Kerala and Karnataka continue to dominate Indian cocoa production sector with a share of about 99 % in area and production. Kerala exhibited a CGR (%) of 7.7 for area and 1.89 for production and for Karnataka the respective figures were 0.14 and 0.93.

V. Cost of production and cost-benefit analysis of plantation crops

The estimated cost of production, net profit and benefit cost ratio in respect of coconut, cashew pepper and cardamom under the 1985-86 factor product market situation suggest that the production that the production of these crops under good management condition is quite profitable.

Compound Growth Rates of area, production, yield, export, import value and unit value of different crops during the period 1971-72 to 1980-81 (%/annum)

Crops	Area	Production	Yield	Export quantity	Export value	Unit value
Pepper	-1.10	1.16	1.26	-0.47	9.55	10.08
Cardamom	3.05	6.10	2.96	4.10	24.60	18.20
Ginger	7.15	11.27	3.86	5.05	18.73	10.21
Turmeric	3.50	3.67	0.20	5.20	19.83	13.80
Cashew	4.06	-2.18	-5.95	8.31	7.80	17.57
Coconut	0.13	-1.05	-0.91	-	-	-
Arecanut	0.34	2.91	2.75	12.07	17.86	5.17

* The estimate for cardamom is for the period 1970-71 to 1979-80

III. Study on the declining trend in the productivity of coconut in Kerala

Secondary data on the coconut productivity indicated declining trend in most of the district of Kerala State. The major reasons are

- i) Spread of root(wilt) disease
- ii) Lack of timely replanting and increase in the number of senile palms throughout the state
- iii) Vast expansion of coconut area even in unsuitable marginal and sub-marginal lands and resultant rise in the number of non-bearing or poor yielding palms
- iv) Increasing tendency for underplanting
- v) Overcrowding of coconut gardens due to closer planting
- vi) Area response favouring rubber for coconut in Kottayam, Quilon and Allepey district
- vii) Lack of application of organic manures
- viii) Price uncertainty for coconut products
- ix) Increasing nature of absentee landlords in certain pockets of Kerala

Compound growth rates of coconut productivity (% per annum)

District	Compound Growth Rate
Trivandrum	-3.38
Quilon	-4.01
Allepey	-3.37
Kottayam	-3.72
Idukki	-8.33
Ernakulam	-1.32
Trichur	+0.26
Palghat	-1.74
Malappuram	-1.54
Kozhikode	-2.53
Cannanore & Kasaragod	-0.55
Kerala State	-1.60
India	-0.80

Estimated cost of production and net return of plantation crops

Crops	Yield/ha	Cost of production (Rs.)	Net Returns (Rs./ha)	Benefit-Cost Ratio
Coconut rainfed	10, 500 nuts	1.34/nut	6,900	1.30
Coconut irrigated	15,750 nuts	1.37/nut	11,400	1.73
Cashew rainfed	900 kg	5.20/kg	7,200	1.25
Pepper rainfed	1,100 kg	15.70/kg	26,700	2.62
Cardamom rainfed	150 kg	103.0/kg	7,000	1.12
Cardamom irrigated	250 kg	85.0/kg	16,300	1.20

VI. Socio-economic survey of coconut holdings

To study various socio-economic factors affecting coconut production in Kasaragod district of Kerala, a survey was conducted using random sample technique in two villages viz., Mogral Puthur and Madhur. From each village, 60 farm families were interviewed through a pre tested interview schedule by personal interview method. In Mogral Puthur, about 43 % of the sample farmers were in the middle aged group and around 42 % above 50 years while in Madhur village they were 62 % and 36 % respectively. About 90 % of the sample farmers had only primary education. The family depending on farming alone were respectively 42 % and 30 % in the villages, and the rate of under-adoption for chemical fertilizers are respectively 90 % and 97 % respectively. About 57 % of the farmers apply correct or excess amount of organic manures in Mogral Puthur and the same was 32 % in Madhur. Krishi Bhavans are their prime source of information and farmers sell their produce through traders, who have a perfect market intelligent net work with Calicut market for coconut.

VII. Coconut production and productivity in the major producing states

Based on the statistics on the area, production and productivity in the major coconut producing states, the Compound Growth Rates (CGR) were worked out on five year periods for the last four decades starting from 1950-51 onwards. There was an overall increase of 144 % in area and 180 % in production during 1991-92 as compared to 1951-52 figures. Tamil Nadu recorded the maximum growth with 264 % in area and 495 % in production over a period of 41 years. In Karnataka, the expansion in area was of the order of 156 % but the production increase was 232 %. In Kerala, the area under coconut recorded an increase of 107 % and production by 108 %. The CGR's worked out for each of the five year period were positive for all the states with regard to area as well as production.

VIII. Cost-benefit analysis of coconut production in Northern Kerala under ideal management

A detailed financial accounting was attempted based on the common indicators viz., the Benefit-Cost Ratio (BCR), Net Present Worth (NPW) and the Internal rate of Return (IRR) for WCT under rainfed conditions, WCT under irrigated conditions and for hybrids under irrigated conditions. The respective BCR were found to be 1.29, 1.45 and 1.85 and NPW and IRR (%) are respectively 19, 20 and 25 which are higher than the bank interest rates. From this it is evident that coconut continues as a profitable crop and hybrids perform better as compared to local cultivars in terms of economic benefits.

IX. Estimation of cost of cultivation of coconut under optimum management conditions

The estimated cost of cultivation of coconut based on 1994-95 prices under rainfed conditions based on 1994-95 prices under rainfed conditions with optimum management in North Kerala is Rs.21,250/ha during the first year. It gets reduced to Rs.12,000/ha during the second year and raised about Rs.16,000/ha during the third year. Between fourth and seventh years, it is only Rs.11,800/ha/year and from eighth year onwards it is about Rs.16,300/ha/year. The major reason for inter year fluctuation in the cost of cultivation, especially in the establishment phase, is the variation in labour requirement. In the case of irrigated gardens, the estimated cost of cultivation per hectare for the first year is about Rs.23,450/ha while the same for the second and third year is Rs.14,000 and Rs.18,000/ha. Between fourth and seventh years it is only Rs.14,900/ha. The average cost of cultivation during the established phase (from eighth year onwards) is about Rs.20,200/ha.

X. Survey on cost of cultivation of coconut in Kasaragod district of Kerala

A field survey was conducted using pre-tested interview schedule to estimate the cost of cultivation of coconut in Kasaragod district of Kerala. Accordingly, two villages viz., Kunjathur and Kalanad were selected at random and farmers were identified based on double sampling procedure. The results of the 40 farmers were finally considered after eliminating the outliers. Based on the operational holding size, the farms were classified as <0.04 ha, 0.04 to 1.00 ha, 1.00 to 2.00 ha and > 2.00 ha. The final results indicated that the cost of cultivation varied with the size of holdings, type of holdings, irrigation status and level of technology adoption. The plant population per hectare was above 175 in almost all categories of holdings and the cost of cultivation during the established phase varied between Rs.11,000 and Rs.12,000/ha in Kalanad irrigated gardens, whereas it was only between Rs.7,500 – 9,000/ha under rainfed conditions. In case of Kunjathur, it was between Rs.10,000 and Rs.14,000/ha under irrigated conditions.

XI. Economics of copra making by using hot-air dryer and solar dryer

The profitability of copra making was studied by observing the performance of CPCRI Hot-Air Dryer of 400 nut capacity both at the copra maker situation and institute situation, and by conducting trials on Solar Dryer of 100 nut capacity in the institute premises. The cost of processing of nuts to get one kg copra with the help of Hot-Air Dryer comes to Rs.1.13 while it is Rs.1.33 in the case of Solar Dryer. The net profit from copra making in wet and dry seasons through Hot-Air Dryer and in dry seasons using Solar Dryer is estimated at Rs.179 and Rs.150 per 1000 nuts, respectively considering the average cost of coconut as Rs.2.50 and price of copra as Rs.19/kg

Economics of copra dryer with Hot-Air dryer

Particulars	Rs.
Fixed cost per year	450
Cost of Rs.24,800 nuts @Rs.2.50/nut	62,000
Operational cost	7,818
Gross cost for making 3720 kg copra	70,268
Net cost of 3720 kg copra	66,238
Net cost of 1 kg copra	17.80
Processing cost of 1 kg copra	1.13
Gross return from sale of copra @Rs.19/kg	70,680
Net return	4,442
Net return from converting 1000 nuts	179

Economics of copra dryer with solar dryer

Particulars	Rs.
Fixed cost per year	500
Cost of Rs.3,000 nuts @Rs.2.50/nut	7,500
Operational cost	704
Gross cost of 450 kg copra	8,704
Net cost of 450 kg copra	810
Net cost of 1 kg copra	17.80
Processing cost of 1 kg copra	1.33
Gross return from sale of copra @Rs.19/kg	8,550
Net return	446
Net return from converting 1000 nuts	150

XII. Estimation of cost of cultivation of coconut in Kannur district of Kerala

A field survey was undertaken in Kannur district of Kerala to estimate the cost of cultivation of coconut under farmers' field conditions. The sample size was 200 coconut farmers spread over in 20 Panchayats. Simple random sampling technique was adopted for the selection of farmers. Apart from the general particulars of the farm and the farmer, details were collected on land area, operational area, labour and other variable capital used for coconut cultivation both under rainfed as well as under irrigated condition. The average cost of cultivation varied between Rs.8,500/ha to Rs.9,750/ha under rainfed and Rs.12,300/ha to Rs.15,000/ha under irrigated conditions.

XIII. Trend in State-Wise area and production of coconut

Secondary data on state-wise area and production of coconut in India indicated that during the period 1990-91 to 1996-97, the share of Kerala in total area under coconut has marginally declined from 57 % to 53 % and that of Tamil Nadu has marginally increased from 14 % to 17 %.and there was no significance change in the case of Karnataka and Andhra Pradesh. During the same period, the share of Kerala in total production has marginally increased from 24 % to 29 %.

Annual Compound Growth Rates (%) of area and production of coconut in major coconut growing states

Sl.No.	Particulars	ACGR (%) for Area	ACGR (%) for Production
01	India	4.15	5.67
02	Kerala	2.89	5.28
03	Tamil Nadu	7.86	8.27
04	Karnataka	3.78	3.88
05	Andhra Pradesh	7.58	15.30

Note: All the ACGR values are significant at 5 % level

XIV. Trend in State-Wise area and production of arecanut

The secondary data for the period 1970-71 to 1995-96 on state wise data on area and production of arecanut in India indicated that Kerala, Karnataka and Assam accounted for more than 90 per cent of both area and production of arecanut. The area under arecanut is increasing despite of Government policy to discourage such a trend. In case of production, similar trend is observed in case of Karnataka whereas the growth rate of arecanut production has declined both in Kerala and Assam.

Annual Compound Growth Rates (%) of area and production of coconut in major arecanut growing states

Sl.No.	Particulars	Annual Compound Growth Rates (%)					
		1970-71 to 1979-80		1980-81 to 1990-91		1990-91 to 1995-96	
01	India	0.69	2.30	1.25	2.91	2.51	3.22
02	Karnataka	2.79	1.61	3.69	1.69	4.51	4.49
03	Kerala	-0.25	1.45	1.79	4.38	2.01	3.98
04	Assam	-	-	2.39	5.36	2.94	-5.25

Note: All the ACGR values are significant at 5 % level

B. Market and Price analysis of Plantation Crops

I. Trend in wholesale prices of plantation crops

The wholesale price trends for plantation crops were estimated based on secondary data for the period 1980-81 to 1985-86. The results were found to be highly unstable. Besides violent fluctuations of the prices, the real prices in fact, have tended to decline even though the absolute prices have shown a substantial rise over these years.

Trends in wholesale price indexes and price relatives (Base: 1970-71 = 100)

Year	Wholesale price index for all commodities	Coconut		Pepper		Cardamom	
		Index Number	Price Relative	Index Number	Price Relative	Index Number	Price Relative
1980-81	257	257	100	216	84	195	76
1981-82	281	220	78	197	70	229	81
1982-83	289	244	84	196	68	317	110
1983-84	315	369	117	240	76	730	232
1984-85	337	505	150	397	118	394	117
1985-86	357	235	66	624	175	260	73

II. Price analysis in coconut and arecanut sectors

The trend in the wholesale prices of coconut, copra and coconut oil in Kerala was studied. The regression equations are as follows:

Origin: 1970-71

Coconut $308+98.31 t$ ($r^2 = 0.71$)

Copra $295.49+79.98 t$ ($r^2 = 0.71$)

Coconut oil $416.47 + 120.80 t$ ($r^2 = 0.71$)

The Compound Growth Rate of wholesale prices for coconut, copra and coconut oil are found to be around 10 percent per annum between 1970 and 1988. The price trends however reveals that the relative-price of these commodities is declining even though the absolute prices show significant growth. The correlation coefficients r between wholesale prices of coconut products are assessed as 0.99. Further analysis indicated that the coconut markets in Kerala as well as in Bombay are highly competitive. The coefficient of variation of the average monthly prices of coconut in Kerala varied between 5.2 per cent and 42.8 per cent during 1981-88 suggesting higher instability in the commodity prices.

Year	Absolute price (Rs.)			Absolute price indices			Relative price indices		
	Coconut /1000	Copra /t	Coconut oil/t	Coconut	Copra	Coconut oil	Coconut	Copra	Coconut Oil
1971-72	370	3400	5400	72	70	77	68	66	73
1972-73	400	4200	5650	78	86	81	67	74	70
1973-74	775	6500	10200	150	133	146	107	95	105
1974-75	850	7050	11150	163	144	159	94	82	91
1975-76	655	5050	8000	127	103	114	73	60	66
1976-77	820	6650	10550	159	136	151	90	77	85
1977-78	935	8050	11000	181	165	157	97	89	84
1978-79	1000	8650	11200	194	177	169	104	95	91
1979-80	930	8600	12200	180	176	174	83	81	80
1980-81	1325	11600	15800	257	238	226	100	93	88
1981-82	1135	8900	13200	220	182	189	78	65	67
1982-83	1260	10200	15450	244	209	221	84	72	76
1983-84	1905	15900	23850	369	326	341	117	103	108
1984-85	2605	21850	32500	505	448	464	150	133	133
1985-86	1215	11520	17100	235	236	244	66	66	68
1986-87	1920	15900	24140	372	326	345	97	85	90

A study on the price trend of coconut oil showed that the average world price of this commodity had ruled much lower (US\$ 592/MT) than that of India (US\$1941) during the period 1980 to 1989. It was also observed that the price trends in both the markets were almost same over the years.

Wholesale prices of coconut oil in different oil producing countries (Rs.'000/t)

For the year 1989	Philippines	Indonesia	Sri Lanka	India
January	8.0	8.7	10.9	30.5
February	8.0	8.4	11.2	22.0
March	8.3	8.8	9.7	25.0
April	8.4	8.7	10.2	23.5
May	9.5	8.7	9.7	23.5
June	10.6	9.0	13.8	30.3
July	9.7	10.0	13.0	30.2
August	9.7	9.3	12.8	30.1
September	9.5	9.0	12.3	32.2
October	9.8	9.1	11.1	33.3
November	10.1	9.5	11.1	34.5
December	9.9	9.4	12.2	32.8
Average	9.3	9.0	11.5	29.0

III. Market studies on coconuts and copra in Karnataka

A study on the marketing of coconuts and copra in the major primary markets of Karnataka for the period 1979-80 to 1988-89 revealed that the peak period of market arrivals for coconuts was July to October in Hassan market and June to October in Arsikere market. The wholesale prices of coconuts ruled high during the lean season of market arrivals and ruled low in the peak season.

Seasonal indices of copra arrivals and prices in respect of Arsikere and Tiptur markets revealed that April to October was the peak arrival months for copra in Arsikere and May to October in the case of Tiptur market. Copra prices however showed rising trend from September and reached peak during January and then started declining. Copra prices were at their lowest during June to August because of the peak arrivals in the market.

IV. Seasonal behaviour of coconut prices

The monthly wholesale prices of coconut and its products from the year 1970 to 1990 exhibited a distinct seasonal pattern. The coconut prices ruled higher during December-May and low during June-November. The trend in monthly prices of copra was different from that of coconut and was high during October-February and low during April-September. The coconut oil prices showed a trend almost similar to that of copra.

Seasonal indices of wholesale prices of coconut and its products at Calicut market (1970 to 1990)

Months	Coconut	Copra	Coconut oil
January	113.45	106.81	102.46
February	118.13	103.27	97.83
March	112.59	100.18	92.25
April	109.42	93.02	94.53
May	100.81	91.02	92.86
June	91.25	93.15	95.82
July	88.01	95.36	98.69
August	87.57	96.23	98.44
September	91.01	99.46	102.11
October	90.58	103.46	104.56
November	90.36	106.29	108.22
December	100.71	105.00	105.86

Note: Trend and cyclic components are eliminated

V. Price spread of coconut in North and South Kerala

Studies conducted on this aspect in two representative villages of Kerala – one in the North and the other in South showed that at Ayinikad village, in Badagara (North Kerala) a farmer gets 67 % of the end prices while his counterpart in Haripad village in Alappuzha district (South Kerala) gets only 64 %. Transport and handling charges, which are met by village merchants, wholesale consignors and retailers accounted for 11.3 % in North Kerala while it was 7.8 % in the South. As margin, these agencies get 21.7 % of the end price in North Kerala, while in South Kerala it is about 28.2 %.

Despite the higher growth in arecanut production, the growth in the prices of processed nuts is positive and significant. The Compound Growth Rate for matured dried and dehusked nuts (chali or supari) in Mangalore market was 2.9 per cent per annum during the decennial ending 1988-89, while it was as high as 10.7 per cent for the processed tender nut. This trend indicated that the scented betel nut manufacturing industry has created a sizeable demand for the processed tender nuts.

Compound Growth Rates of arecanut prices during 1979-80 to 1988-89 (% per annum)

Market	Variety	Compound Growth Rate
Mangalore	Supari	4.46
Shimoga	Saraku	10.75
Shimoga	Bettle	10.18
Shimoga	Gorabalu	5.91

Seasonal trend in the farm gate prices of arecanut indicated that the contradictory to the general price behaviour, the prices ruled higher in the peak arrival months (March to May) in Mangalore markets. This shows that arecanut growers are well organized as well as protected under the institutional support mainly coming from co-operative agencies like CAMPCO.

Seasonal indices of arecanut arrivals and prices in Mangalore during 1979-80 to 1988-89

Month	Index of market arrival	Index of wholesale prices
January	96.46	92.51
February	104.90	109.50
March	135.27	142.09
April	127.61	120.85
May	129.84	134.45
June	109.11	108.65
July	94.53	81.27
August	76.37	72.98
September	88.07	84.85
October	85.83	90.78
November	77.44	81.81
December	74.57	80.26

VI. Price analysis of major vegetable oils in India

The time series analysis of secondary data on wholesale prices of major vegetable oils in India indicated that between 1970-71 and 1993-94, the increase in prices were 433, 697, 501 and 483 per cent respectively for coconut, groundnut, sesame and mustard oils. The Compound Growth Rates indicating the percentage increase for the same period was 8.94, 9.40, 7.86 and 8.54 for coconut, groundnut, sesame and mustard oils respectively. However, barring mustard oil, the rates of increase in prices were more for all the other major oils between 1970-71 and 1982-83, and for mustard oil the rate of increase was higher between 1983-84 and 1993-94. The coefficient of variation of prices was maximum for groundnut oil (62%), followed by coconut oil (60%), mustard oil (59%) and sesame oil (53%), indicating better price stability for sesame oil.

VII. Trend in production of major vegetable oils in India

The time series analysis of secondary data on estimated production of major vegetable oils in India indicated that between 1969-70 and 1994-95, the increase in production were 131, 49, 65 and 268 % respectively for coconut, groundnut, sesame and mustard oils. The Compound Growth Rate indicating the percentage increase for the same period was 2.78, 1.63, 2.05 and 2.78 for coconut, groundnut, sesame and mustard oil respectively. The rate of increase higher during the period 1983-84 and 1994-95 as compared to 1969-70 and 1982-83 for all the major vegetable oils.

VIII. Price and market analysis of coconut and arecanut

The monthly wholesale prices of coconut in India exhibited a distinct seasonal pattern between 1970 and 1990. In general, the coconut price was higher during December-May as compared to June-November. The secondary data analysis of the monthly wholesale prices of coconut in Kozhikode market indicated that the degree of variation exhibited a lower CV for the period 1995-96 (6.63 %) as compared to 1990-91 (27.28 %) and 1980-81 (15.96 %). In case of copra the seasonal variation of coconut prices during the period 1970-71 and 1995-96 had remained constant (13.6 % CV) whereas for coconut oil the CV had declined from 21.9 % during 1970-71 to 12.9 % in 1995-96. However over the years the degree of seasonal variation in the monthly wholesale prices of coconut and its products exhibited a fluctuating trend.

The secondary data of the monthly wholesale prices of arecanut chali in Mangalore market indicated that the degree of seasonal variation had marginally declined and the CV, which was 14.47 % during 1983-84, had declined to 10.67 % during 1995-96. However the monthly prices were more stable during 1991-92 (7.53 % CV).

IX. Price analysis of cocoa

A comparative analysis of Indian and international prices of cocoa for the period 1982-83 to 1995-96 indicated that the wholesale prices of dry cocoa beans had increased from Rs.15/kg to Rs.48.96/kg in Indian markets (by 226 %) and from Rs.17.26/kg to Rs.43.86/kg in international markets (by 154 %). The wholesale prices of cocoa in India had high degree of positive correlation (0.796) with that of international prices. The CGR of prices of dry cocoa beans was 6.24 % in India and the same at international level was 5.56 %.

X. Spatial and Temporal Variation of Coconut and Arecanut Prices

The secondary data analysis of wholesale Prices of coconut in different markets for the period 1982-83 to 1997-98 indicated that the Annual Compound Growth Rates (ACGR) was 6.71 % for coconut with husk in Kochi market. The same was 7.23 % and 4.60 % and 5.71% respectively in the case of Alappuzha, Kozhikode and Mangalore markets. The ACGR for dry coconut at Kozhikode market was 6.89

The secondary data analysis of average annual Wholesale Prices of Arecanut in different markets for different types for the period 1989-90 to 1998-99 indicated that the annual compound growth rate was maximum for Sun dried type in Calcutta (15.13 %) followed by Sirsi Safed in Mumbai market (10.94 %). The lowest growth rate had occurred in Delhi market for Mettupalayam variety. The point to point estimation of Wholesale Price Index (base year 1989-90) indicated that the respective increase of to esale prices were 262 %, 353 %, 313 %, 235 % and 414 % for Choor, Supari, Sirsi Safed, Mettupalayam and Sun Dried types of arecanut.

C. Developmental Aspects of Plantation Crops

I. Economic Evaluation of Development Project

The coconut plantation scheme on canal embankment of Puri district in Orissa State was started as a pilot scheme in 1970-71 with 2000 palms. The present scheme began in 1977-78 to cover the proposed area of 400 km of main canal and another 400 km out of 2400 km of minor canal. The plm density considered for this scheme was 500 palms/km of main canal and 320 plms/km of minor canal which amount to a total potential of 3,28,000 palms. However, by the end of 1985-86, 2,31,218 palms were planted.

The scheme was operated by the Horticulture Department of the Government of Orissa, with the support of the Coconut Development Board and CD Department. It was observed that three different scales of finance for the first year of planting were followed by different agencies – Rs.20/palm by Horticulture department, Rs.25/palm by Coconut Development Board and Rs.31/palm by CD Department. The maintenance of palms is then carried out by the Government agencies for four years. So, far, only 65,280 palms are allotted to 3264 palms @ 20 palms/family.

A follow up study indicated that only few beneficiaries have been found to take some care of their allotted palms and were getting as high as 75 nuts/palm. The net returns from 20 palms come to Rs.1500-2000/annum. Another small proportion of beneficiaries was leased out their palms to some

other middlemen for a small amount of Rs.500/annum. The remaining lot seems to be indifferent and does not have any sort of interest on this scheme. These palms suffer very badly giving very low yield. It is suggested that this scheme may be converted into a commercial project, which could give more beneficial returns to the local people through employment and earnings from the plantations as wage earners instead of involving them merely as palm watchers.

II. Studies on involvement of women in plantation sector

A general survey of employment in plantation crops reveals the importance of farm women both in production and processing sectors. Some of the specific areas of operations where the women workers were preferred to men are: weeding and manuring in all plantation crops; desuckering and BHC swabbing in coffee; mulching and pot watering in coconut and arecanut gardens; plucking, picking and sorting in tea and coffee; collection of rubber latex; collection and transport of coconut and arecanut after harvest; splitting, sun drying and shelling of coconuts for copra making; drying, husking and grading of ripe arecanut; cutting, boiling, blending and drying of tender arecanut; plucking of cashew apples and nuts; drying, peeling and grading of cashew kernels; picking and cleaning of cardamom capsules and harvesting, drying, cleaning and packing of black pepper. In coir sector, women are exclusively used in beating of husks and spinning of coir yarn.

Depending on the nature of the crops and their operational requirements, the share of women workers in the total employment in production sector falls within a range of 30 to 54 per cent while it varies between 20 to 80 percent in processing sector. It was estimated that about 16 million labourers are employed in production and processing of the plantation sector. The role of women in marketing sector is however marginal.

Labour force involved and percentage share of men and women labour in plantation crops

Crops	Labour force (in million)	Production sector		Processing sector	
		Men (%)	Women (%)	Men (%)	Women (%)
Tea	0.8	51	49	80	20
Coffee	0.4	67	33	20	80
Rubber	0.3	64	36	64	36
Coconut	10.0	70	30	28	72
Arecanut	4.0	77	23	44	56
Cashew	0.2	50	50	16	84
Pepper	0.2	80	20	30	70
Cardamom	0.1	46	54	68	32
Total	16.0	-	-	-	-

III. Credit structure of plantation crops: Scale of finance to plantation crops

The scale of finance refers to the amount of credit given to farmers as crop loans every year by commercial crops, Co-operatives and Grahmin banks in all the districts throughout the country. The cost of cultivation is the criteria adopted to fix them annually. The estimated cost of cultivation under optimum management conditions based on 1993-94 prices for the established rainfed and hybrid coconut gardens (after eight years of planting) are Rs.14,322 and Rs.18,022 respectively. However, the average scale of finance fixed for the hybrid coconut under irrigated conditions is Rs.7000 (as cash) and Rs.3,000 (as kind) which covers about 60 per cent of the total cost.

IV. Survey on credit acquisition and utilization of coconut farmers in Kasaragod district

A survey was undertaken during the year 1996-97 in farmer's field to study the credit acquisition and utilization pattern of coconut farmers. Random sampling technique was followed from the list of beneficiaries of the Nekhraje Service Co-operative Bank in Kasaragod district. The survey was conducted based on personal interview method using a pre-tested interview schedule in 60 farm families in Nekhraje village of Kasaragod district. Information on general particulars of farm families, type of loan availed, cost of cultivation of coconut as compared to the scale of finance, credit utilization pattern and the constraints in availing the credit facilities were collected. The salient findings of the study are

- i) 60 % of the sample farmers had more than 50 % of the monthly income from agriculture and 94 % of the families were having a land holding of less than two hectares
- ii) 98 % of them are members in various social institutions and 75 % of them are having contact with the Department of Agriculture
- iii) 46 % of the farmers are members in other financial institutions like Primary Agricultural Co-operative Society, Land Development Banks and Grahmin Banks and 80 % of the respondents avail crop rural loan from the Service Co-operative Bank
- iv) The average cost of cultivation of coconut (excluding the fixed cost) was Rs.13,500/ha, while the scale of finance was fixed as Rs.10,000/ha as cash and Rs.5,000/ha as kind component and
- v) Between 1994-95 and 1997-98, the scale of finance (including the kind component) for coconut has increased steadily from Rs.10,000/ha to Rs.18,000/ha.