SHIFTS IN PERENNIAL CROP ACREAGE IN COIMBATORE TALUK

B Y

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I N T R O D U C T I O N

India's economic development is decided by her agricultural development, since agriculture is a key sector in her economic set up. The predominance of Agriculture is reflected in the fact that it contributes 50 percent of the National Income and gives employment to about 80 percent of the labour force.

Changes in cropping pattern represents responses to changing economic, technological and institutional factors. Farmers change their cropping pattern with some time lag in response to newer production opportunities like use of high yielding cash varieties etc.

In recent times due to economic, social and political reasons, certain changes in the agrarian sector have become evident among these, shifting of crop cultivation is important.

Shifting in crop cultivation has been subject to very many factors. ALhoth Lalitha (1980) proved that returns per acre is responsible for shifting in cultivation. The study by Mishra, et-al (1977) revealed that the size of the farm had nothing to do with the level of production and cost of production. The study by Singh Ram.D. (1979) did not support the generally

expected positive supply price response relationship. Shifting of crops affects both demand and supply position in the long and short run.

Limited knowledge, credit restraints and uncertainity relating to future conditions prevent the farmers from making very significant shifts in their area allocation from annual crop to perennial crop. Cropping pattern changes do occur over a period of 15 years with growth in gross cropped area and unequal distribution of this growth between different crops. In other words the substitution effect on cropping pattern is less significant but the shifts effect on cropping pattern in developing countries brought through could be very significant.

According to Nelliet (1981) apart from coconut the total production of perennial crop in India stood at 1.17 million tonnes and that coconut alone contributed 5,830 million nuts.

The current study on shifts in crops was prompted by a number of reasons. Coconut is a valuable perennial crop and the fluctuations in its production and availability, domestic prices and variation in the prices in the market always hits headlines. Fluctuations in the cultivation of coconut is inevitably reflected in the production of coir, oil, soap and in its domestic

consumption and the price. Consequently a study on shifts in perennial crop acreage would be able to throw light on the extent of fluctuations in the prices, suffered by the shifting in the recent past.

An analysis of the trend in the perennial crop cultivation, in terms of area of production, and productivity would reveal, the extent to which efficient utilisation of human labour had been promoted in agriculture as far as coconut is concerned. The study it is hoped may be useful in indicating the factors influencing the cropping pattern.

Venkataraman, L.S. and Prahaladacher (1978) in their study on cropping changes in Andhra Pradesh had found that the Andra Pradesh farmers did not make very large changes in their cropping pattern in the period 1950-51 to 1974-75. In this context the investigator was interested in finding out the rate of growth of coconut cultivation in the place of annual crops in Valukkaparai and Archipalayam of Coimbatore District through the use of compound growth rate analysis.

The objective of the present study attempts to evaluate the role of both price and non-price factors in determining farmer's decisions affecting shifts in

cultivating perennial crops.

Specifically the investigator intends to

a) Estimate the growth rates of annual and perennial crops.

b) Analyse the production trends in annual and perennial crops over a period of years (1970-1980)

c) Study the factors affecting crop cultivation

d) Determine the total cost of cultivation of both annual and perennial crops.

The Limitation of the Study:

The study was confined to two selected villages (Vallukkuparai & Archipalayam) of Coimbatore District with reference to perennial crops and annual crop.

The farmers did not maintain adequate farm records and they had to recall from their memorywhile giving information. The survey method depended on the memory of the respondent and hence bias would be inevitable even though care was taken during data collection.

REVIEW OF LITERATURE

The literature relating to the study on shifts in perennial crop acreage in Coimbatore taluk is discussed under the following heads.

1. Studies on cost and income of crops.
2. Studies on the factors influencing cropping pattern.
3. Studies on shifting of crops.
4. Studies on suggestions for improving cropping pattern.

1. Studies on Cost and Income of crops:

1. Lokanathan Karnam's (1982) study on "Economic" Analysis of Arecanut Plantation in Coimbatore District" aimed at estimating the profitability of establishing arecanut plantations and the cost of production of arecanut. He inferred that the high yielding variety seedlings namely 'Mangala' gives greater yield and profit in the short run.

2. Madappa P.P. (1970) did a study on the cost of production of Coffee in India. He concluded that the total cost of coffee production should be divided into cost of cultivation, costs of preparing the produce for market, and other costs which included miscellaneous expenditure and depreciations.

3. Venkateswarulu U. and Suryanarayana K.S. (1978) did a study on 'cost structure of Anab-e-shahi-grapes in Hyderabad. It was found that the costs may be divided into five groups fixed assets, working assets, operating assets of pre bearing period, Pre-harvest and post harvest charges of bearing years.

4. Kaboo M.L. (1972) did a study on "Production and Marketing of Apples in Handwara Block of Jammu and Kashimir". He classified the costs into direct costs and indirect costs where the direct costs included maintenance and operational costs, repair charges of dead stock, and the indirect cost included the annual share of the establishment costs upto bearing, the interest and depreciation on fixed capital, working capital and interest on working expenses.

5. Madappa (1970) studed the cost of production of coffee in India and found that the size of the estate had no direct bearing with the cost of production of coffee.

6. Sivanandam (1975) classified the costs into (i) investment cost or establishment cost which included all expenditure incurred upto commercial bearing in cashew and upto the end of first year for eucalyptus and casuarina and (ii) Maintenance costs which included the expenditure incurred on gap filling, plant protection,

manuring, pay of watcher, watering, inter cultivation clearing of thorny growth and wages for collection of nuts.

7. Jayaraman (1981) classified the total cost of cropping into fixed costs and variable costs. Fixed cost included the rental value of land, interest on fixed capital, land revenue, and other taxes, depreciation on fixed capital and annual share of the total establishment costs upto bearing. The variable cost included all cash and kind expenses actually incurred plus the interest on working capital.

8. Patridge (1933) worked out the various cost-factors involved in the production and returns of grapes in south western Michigan. He found that profits were not always the largest in the vineyard where production, costs per hectare were minimum although poor management resulted in higher costs and reduced profits. He also worked out the co-efficient of correlation between total expenses and the amount of fruit harvested as 0.84.

9. Gopakrishna Hebbar and Hiremath (1980) analysed the cost structure and cost economics in Arabia coffee production on small holdings. The analysis of overall costs-structure showed that labour costs constituted

more than 50% of direct input costs. They found that the cost of production could be reduced only by the increase in productivity level but not significantly by changes in size of holdings.

10. Alhoth Lalitha (1980) studied the cost of production of tea for 3 size groups" viz.large (201 acres and more) medium (25 - 200 acres) and small (less than 25 acres)classified based on the area under tea situated at two elevations high grown (estates situated at 1,500 metres and above) and low grown (estates situated at less than 1,500 metres), with the main aim of estimating cost and return. The study showed that large estates in both the elevation categories had higher costs of production, since they manufactured the leaf into tea. It was found that the returns per acre was lower in smaller groups in both the elevations despite that the returns per rupee of investment was higher.

11. Acharya T.K.T. and Patil S.J. (1977) did a study on "Economics of Pomegranate (Punica-granatum) cultivation. They classified the cost of cultivation of pomegrante as cost of plantation (establishment cost) and maintenance cost. The average yearly establishment cost per hectare came to Rs. 240, Rs. 320 and Rs. 309 for small (upto 6 hectare) Medium (6 to 12) and large

(about 12 hect) holdings respectively. The cost of cultivation per hectare worked out as Rs. 6,132.25. The gross income per hectare was highest (Rs. 12,374.76) in cose of medium size farms followed by small (Rs. 10,153.36) and large (Rs. 10,037.36) size farms.

12. Mishra R.S. et-al (1977) evaluated the economic structure of saffron cultivation and worked out the optimum replacement period. The study revealed that the cost of suffron cultivation seemed to have an inverse relationship with the size of the farm. The cultivation required greater proportion of working capital in comparision to fixed capital. Break-even point analysis had shown that the replacement of suffron plants may be considered only after sixth year of plantation.

13. Chengappa P.G. (1976) did a study on "Economics of coffee plantation in Coorg District, Karnataka State". He found that the land value in the coffee estates comprised morethan half of the total investment. The cost of production of arables coffee was high than that of robusta coffee, the yield differences between small and large size groups of plantations were not significant, the growing of inter crops such as organge, Pepper and other produce had no effect on yield of coffee but added to the net income.

I.A.D.P. Districts. He found that in West Godavari area under second Paddy Crop and Pulses had registered increasing while those under first paddy crop had indicated full. In Mandya, a shift had taken place in area under cereals and pulses mixture to ragi. In Palghat, changes were largely confined to coconut and arecanut and other crop including tapiaca. The proportionate area under the farmer increased by about 85% while that under the latter declined by 25%.

2. Ram D.Singh (1979) did a study on shifts in pulses acreage; An inter-Regional Analysis of Dynamic of Farmer's Response, utter Pradesh. The major focus of the study was on examination of the factors responsible for shifts in inter-crop acreage, and to project future acreage under pulses based upon estimated growth rates. His result did not support the generally expected positive supply-price response relationship.

3. Kulandaivelu P. et-al . . (1980) did a study on "Rainfall pattern and cropping system in Coimbatore. They analysed rainfall data for Coimbatore area and the suitable cropping system. They found that the variation of annual rainfall had shown no definite trend or rhytham.

I N C O M E :

1. Anonymous (1972) in his study on 'Explanatory notes on some important Terms relating to crop lands'. Inferred that Gross income is the income from crops grown and the value of both main product(s) and by product(s) were considered in estimating the gross income.

2. According to Tandon and Dhondyal (1971) gross income included cash received on account of sale of farm produce, value of the main production or by product used for home expenses, consumption and for cattle feed or given as wages, in kind, and value of the seed stores for sowing purposes.

3. In the work on 'Report on income, savings and investment in Agriculture". Waghmare R.E. and Moral M.D. (1972) defined the net income as either net profit or net loss to the operator of land after deducting all expenditure such as paid out costs both in kind and cash, depreciation charges, land rent, interest on capital and imputed charges of family labour from the total income.

II. FACTORS INFLUENCING CROPPING PATTERN:

1. Soni P.N. (1979) did a study on 'Cropping Pattern and Crop intensity in various classes of Farmers in some

4. Venkataraman L.S. and Prahaladachar M. (1978) did a study on "Study of Cropping changes in Andhra Pradesh", with the objectives of examining the changes that have occurred in the cropping pattern in Andhra Pradesh during 1950 - 51 to 1974 - 75 and the factors that had been mainly responsible for the growth and relative variations in area under major crops. He found that the Andhra Pradesh farmers did not make very large changes in their cropping pattern in the period 1950-51 to 1974-75 food crops occupied 3/4 of the gross cropped area oil seeds occupied 20% and non-food crops like cotton and tobacco occupied the remaining area.

III. IMPACT OF CROPPING PATTERN:

1. Ranade C.G. (1980) did a "Study on impact of cropping pattern on Agricultural Production". The apprach of this paper was to examine the effect of factors upon agricultural output per hector. He inferred that marginal manipulation in the cropping pattern in a region can increase agricultural productivity significantly even if fertilizer and irrigation used remain unchanged.

2. Dr. Sharad Chandra Jain (1977) did a study on "Possibilities of crop shifts in Indian Agriculture". His aim was to analyse trends in yield per hectare for 3 cereals,

3 millets, 2 pulses, small cereals and millets and other pulses for India for the period of 1949-50 to 1958-59 He had suggested two possibilities for increasing yield per acres (1) either shift or transfer the areas of small millet, and pulses to the higher yielding rabie or Khariff cereals and Millets and pulse or (b) Evolve improved strains of small millets and other pulses so that the yield per acre could increase considerably.

IV. SUGGESTIONS FOR IMPROVING CROPPING PATTERN:

1. Pieris W.V.D. (1961) did a study on "The International approach to coconut improvement". He discussed the measures taken by Food and Agricultural Organization (F.A.O.) concerning the coconut industry, which emphasises the need for increasing international collaboration on research problems. The author reported that during his extensive travels, he did not find any support for the establishment of an international coconut Research Station, where as general support was given to the project for the establishment of an international coconut Bureau.

2. The study on "Working of coconut processing and Marketing co-operatives in Kerala" was done by Kuttappan (1969). He revealed that inadequate working capital, lack of co-ordination and co-operation among different types of societies poor organisation, wide fluctuations in the price

of oil and spread of small producers over a wide area were real bottlenecks affecting the marketing efficiency which are to be avoided which ensures better cropping pattern and increased production.

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DATA AND METHOD

The data base of the study and methods of analysis used therein are described below:

Data base:

Since the subject of the study was on shifts in perennial crop acreage in relation to annual crops, both primary and secondary data were used. Regarding primary data interview schedule was used wherein a questionnaire was formed covering various aspects of cultivation such as area production, reasons for shifting, irrigation facilities, farm expenses, farm receipts problems in the cultivation of annual and perennial crops and problems of marketing the produce. All farmers owning more than 10 acreas of land in Archipalayam and Valukkapparai villages were taken as sample, since in these two areas shifting was observed by the investigator.

Regarding secondary data time series data regarding cultivation in its different aspects like the area under cultivation of different crops, the levels of production, the standard fields rainfall and their farm harvest prices were needed for the study. The data on cultivation of crops in Coimbatore Taluk and its related aspects for the

period 1970-80 were compiled from the Annual season and crop Reports of Tamil Nadu issued by the Director of Statistics, Government of Tamil Nadu and Maintained in the District Statstical Office at Coimbatore.

Construction of Tools:-

The technique of analysis as applied on the consolidated data are:-

1. Index number analysis.
2. Compound growth rate analysis
3. X2 test
4. Analysis of Co-Variation
5. Correlation Analysis.

1. Index number analysis:-

The index of crop output and area under crops were computed using fixed base method. This index number analysis facilitated the determination of changes in the crop output in the reference period and change in the area under cultivation and the growth of these variables over the reference period (1970-1980).

2. Compound growth rate analysis:

The growth rates of area, production and yield of perennial and annual crops over the period under study were computed.

3. X2 test:-

X2 test was used to measure the association between the attitude of the farmers towards the method of cultivation and production.

4. Analysis of Co-variation:-

The percentage of variation in area, production of annual and perennial crops was assessed by using the method of co-variation.

5. Correlation analysis:-

This method of correlation was used to find out the relationship between production of annual and perennial crops and the area contributed to annual and perennial crops.

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C. Structure of Coconut plantations

The age wise distribution of coconut palms is given in Table I.

TABLE I

AGE-WISE DISTRIBUTION OF COCONUT PALMS

Age (in years)	Acres under coconut (in per centage)
Below 5	15
5 - 7	25
7 - 9	48
above 9	12

The classification of coconut plantations on the basis of age indicates that 60% of these plantations had already attained maturity.

The interview with the farms also supports the fact that shifting had taken place in the year 1972 and the area allotted for coconut cultivation during the last decade (1960) was low (15%) as compared with 1971-80 (85%)

D. Plants and Plantings:

The seedlings used for planting was both local variety and farm produced of age between 1 - 1½ years. The planting of seedling had taken place during June - July (before the commencement of South West Monsoon), the study also indicates that 20% of the farmers had purchased seedlings from the agricultural centres.

E. Inter crops

During 1971 cotton and sugarcane were considered to be the main intercrops and in 1975 60% of the cultivators had cultivated turmeric and banana as intercrops. A change had taken place in the case of inter crops and in the year 1980, turmeric occupied the predominent place as an intercrop by 50% of the farmers.

F. Cost:

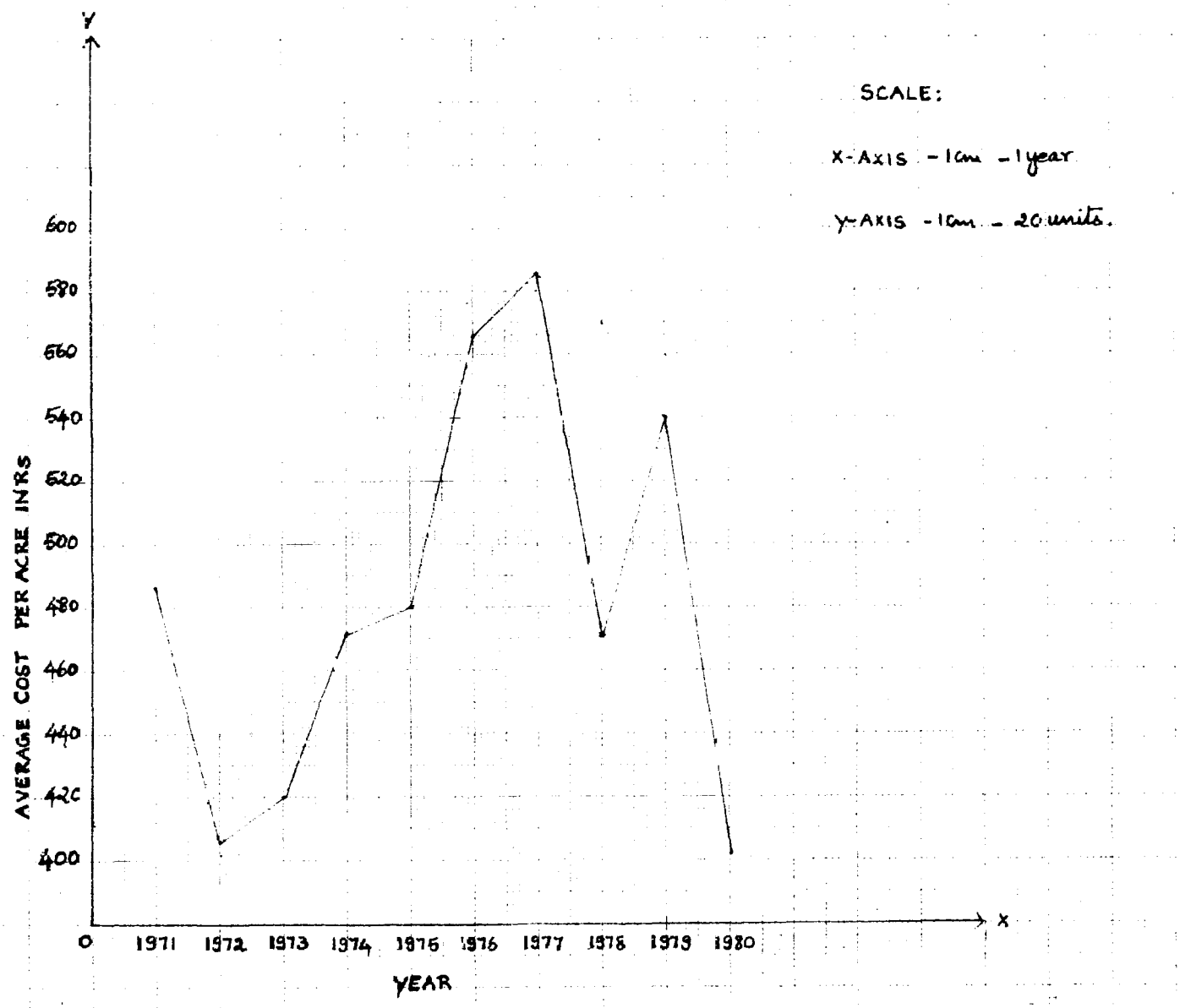
The cost structure of the coconut plantations is given in table II.

TABLE II

Year	Acreage (acres)	Total Cost (Rs.)	Average cost (per acre) (Rs.)
1971	206	1,00,000	485.44
1972	234	95,000	405.98
1973	262	1,10,000	419.85
1974	280	1,32,000	471.43
1975	302	1,45,000	480.13
1976	318	1,80,000	566.04
1977	351	2,05,000	584.05
1978	446	2,10,000	470.85
1979	499	2,70,000	541.08
1980	698	2,80,000	401.15

The acrege under coconut cultivation and the total cost of cultivation has shown and increasing trend through-out the reference period 1971-80. The average cost of cultivation (per acre) has however shown fluctuations between 1971-1975 and an increasing trend from 1976 onwards. The fluctuations of the average cost of cultivation has been shown graphically in Figure I.

THE COST STRUCTURE OF THE CCCONUT PLANTATION.



The cost structure of annual crop is given in Table III.

TABLE III

THE COST STRUCTURE OF ANNUAL CROP

Year	Acreage (in acres)	Total cost (Rs.)	Average cost (per acre) (Rs.)
1971	1,300	8,35,000	642.31
1972	1,300	9,80,000	753.85
1973	1,310	9,70,500	740.84
1974	1,325	10,00,000	754.72
1975	1,330	11,05,000	830.82
1976	1,330	10,75,000	808.27
1977	1,335	11,05,000	827.72
1978	1,335	12,00,000	936.33
1979	1,335	13,75,000	1,029.97
1980	1,337	12,85,000	961.11

Table III indicates that the acreage under annual crop cultivation has shown an increasing trend during 1971 - 1980. But the total and average cost of cultivating annual crop (including inter crops) has shown a continous fluctuation. These fluctuations lead to uncertainity so far as the farmer is concerned with reference to his income and profits. The uncertainity is mainly due to fluctuations in price of inputs. Returns from annual crops are given in Table IV.

TABLE IV

RETURNS FROM ANNUAL CROP

Year	Acreage	Total cost of annual crop (Rs.)	Total income (Rs.)	Profit (Rs.	Average income per acre (Rs.)
1971	1,300	8,35,000	9,03,500	68,500	52.69
1972	1,300	9,80,000	10,40,000	60,000	46.15
1973	1,310	9,70,500	10,30,500	60,000	45.80
1974	1,325	10,00,000	11,07,000	1,07,000	80.75
1975	1,330	11,05,000	12,90,000	1,85,000	139.10
1976	1,330	10,75,000	12,10,000	1,35,000	101.50
1977	1,335	11,05,000	12,92,000	1,87,000	140.08
1978	1,335	12,50,000	14,54,000	2,04,000	152.80
1979	1,335	13,75,000	15,45,000	1,70,000	127.34
1980	1,337	12,85,000	15,35,000	2,50,000	186.98

Table IV indicates that both the total cost of cultivating annual crops and the income earned from annual crop had been increasing continously during the period under consideration resulting in a rising trend in profits too. But the average income $\left(\frac{\text{total profit}}{\text{total acreage}}\right)$ from the annual crop fluctuates between 1971-80. It recorded a minimum in the year 1973 and maximum in the year 1980. It may be due to climatic conditions or the response of farmers to the modern methods of cultivation.

The overall rising trend in average income from 1971 (Rs. 52.69) to 1980 (Rs. 186.98) is not a spectacular as it seems but due to the rising costs of inputs and to the rising costs of living. Returns from coconut palms are given in Table V.

TABLE V

RETURNS FROM COCONUT PALMS

Year	Acreage (in acres)	Total cost of coconut palms (in Rs.)	Total income (in Rs.)	Profit (in Rs.)	Average income per acre (in Rs.)
1971	206	1,00,000	1,05,000	50,000	24.27
1972	234	95,000	1,32,000	37,300	159.40
1973	262	1,10,000	1,62,000	52,000	198.47
1974	280	1,32,000	1,90,000	58,000	207.14
1975	302	1,45,000	2,20,000	75,000	248.34
1976	318	1,80,000	2,85,000	1,05,000	330.17
1977	351	2,05,000	4,50,000	2,45,000	698.00
1978	446	2,10,000	5,22,000	3,12,000	699.55
1979	499	2,70,000	5,70,000	3,00,000	601.20
1980	698	2,80,000	7,95,000	5,15,000	737.82

Table V indicates that total cost of cultivating coconut palms and total income from those palms have recorded a rising trend reflecting an upward trend in profits ($\frac{\text{total profit}}{\text{total acreage}}$) also. It also shows that average income of cultivating coconut palms has increased thirty five fold. From the year 1976, it has started increasing at a faster rate. The investigator infers that from 1976 onwards most of the coconut palms had reached maturity.

Comparision of Table IV and V reveals that cultivating coconut palms is more remunerative as compared to the cultivation of annual crop. This may be one of the main causes for shifting in cultivation.

G. Nature of labour:

Casual, permanent and contract labours were used in the cultivation of both annual and perennial crops. The wages per day was Rs. 5/- for the causal labour force, and Rs. 10/- for the permanent labour force.

The survey reveals that very often the annual crops such as cotton, sugarcane and turmeric had been affected by diseases whereas the perennial crop such as coconut had become the victim of reinforce betel which

could easily be controlled by pesticides. The fact that not much of care is required in the cultivation of perennial crops may be one of the causes for shifting to coconut cultivation.

H. Marketing:

The survey indicates that the main problems of the farmers in marketing the produce were low price of the products accompanied by poor demand, inadequate transport facility, unorganised markets, and lack of market information. However, inspite of the un-organised nature of the perennial crops, the price paid for their produce is satisfactory to the farmers who had marketed their coconut at the farm gate, since it does not involve transport and other marketing costs.

I. Problems in the cultivation of annual and perennial crop

Regarding annual crop the problems were high input expenses (70% of the sample) followed by low price (20%)

Regarding perennial crop, specifically in the cultivation of coconut crop, no major problems were spelt. It is inferred that due to shortage of labourers and the high input expenses in the cultivation of annual crops farmers had started shifting their cultivation from 1975 from annual to perennial crops which had fewer problems.

II. GROWTH OF ANNUAL & PERENNIAL CROP CULTIVATION DURING 1971-1980

A An overview of the position of cultivation of coconut in relation to perennial crop in Coimbatore is presented below. These figures have been collected from the Annual Season and Crop Reports of Tamil Nadu issued by the Director of Statistics, Government of Tamil Nadu and maintained in the District Statistical Office at Coimbatore.

TABLE VI

COCONUT CULTIVATION IN RELATION TO OTHER PERENNIAL CROPS

Year	Area under Perennial crop (hect)	Area under coconut (hect)	Column 3 as % of 2
1971	14,519	13,638	93.93
1972	15,383	14,068	91.40
1973	15,081	14,193	94.11
1974	15,039	14,139	94.02
1975	15,098	14,202	94.07
1976	15,989	14,708	91.99
1977	15,986	15,083	94.35
1978	14,349	13,450	93.73
1979	15,757	14,510	92.09
1980	13,790	12,080	87.60

The area under coconut cultivation fluctuated from year to year. The share of coconut plantation to the total area under perennial crop had gone down from 93.9% (1971) to 87.6% (1980). This may be due to the need for clearing old plantation which were uneconomic.

B. Share of coconut in total perennial crop production is discussed in Table VII.

TABLE VII

SHARE OF COCONUT IN TOTAL PERENNIAL CROP PRODUCTION IN COIMBATORE (1971-80)

Year	Perennial crop production (in nuts)(lakhs)	Coconut production (in nuts)(lakhs)	Column 3 as % 2
1971	2039	992	48.65
1972	2352	1524	64.80
1973	2234	1577	70.59
1974	2324	1610	69.28
1975	2884	2202	76.35
1976	2895	2280	78.76
1977	2402	1764	73.43
1978	2305	1693	73.45
1979	2380	1692	71.09
1980	2545	1781	69.98

Table VII indicates that the production coconut during the period under consideration had been fluctuating continously and it had more than doubled in the year 1976. The share of coconut production to the total production of perennial crop had increased from 48.65% (1971) to 69.98% (1980) It shows that coconut cultivation had become lucrative.

C. Index number of area under cultivation and crop out help in determining the changes in the behaviour of these variables over a period of time. Accordingly the investigator constructed the indicies of area nad and production levels under coconut and arecanut to find out the changes in the area under perennial crop grown in Coimbatore. The indices of area under crop are given in Table VIII.

TABLE VIII

INDICES OF AREA UNDER PERENNIAL CROP IN RELATION TO ANNUAL CROPS

Year	Perennial crop	Annual crop
1974	100.00	100.00
1975	100.39	106.10
1976	106.32	99.67
1977	106.30	92.03
1978	95.41	83.48
1979	104.77	94.63
1980	91.69	91.07

The above table shows that in both perennial and annual crops the area under cultivation shows a decline. In the case of perennial crop the area was maximum in the year 1977 and minimum in the year 1980. In the case of annual crop the area was maximum in the year 1975 and minimum in the year 1978. In the case of annual crop right from 1975 it had started declining continously.

E. Indicies of area under coconut in relation to arecanuts is discussed in Table IX

TABLE IX

INDICES OF AREA UNDER COCONUT IN RELATION TO ARECANUT

Year	Coconut	Arecanut
1971	100.00	100.00
1972	103.09	150.17
1973	104.06	100.79
1974	103.67	102.16
1975	104.13	101.70
1976	107.85	145.40
1977	110.60	102.50
1978	98.62	102.04
1979	106.39	141.54
1980	88.58	194.10

The area under arecanut utmost doubled while the cultivation of coconut had gone down by about 12% upto 1977 cultivation of coconut increased and the declining trend has started from 1978. In the case of arecanut the peak year was 1980. Arecanut cultivation gained importance as a preferred crop.

F. The indices of production of Coconut and arecanut are given in Table X.

TABLE X

INDICIES OF PRODUCTION OF COCONUT AND ARECANUT

Year	Coconut	Arecanut
1971	100.00	100.00
1972	153.63	79.08
1973	158.97	62.75
1974	162.30	68.19
1975	221.98	65.14
1976	229.84	58.74
1977	177.28	60.94
1978	170.67	58.45
1979	170.56	65.71
1980	179.54	72.91

The indices of cocomut production had shown an upward trend. The total production of coconut was at its peak in 1976 followed by 1980. In the case of arecanut it had by and large shown a downward trend. It fluctuated over the year 1971 and 1980 and it recorded its minimum in the year 1976. The year 1976 can be designated as the year of 'Minimax' because of the fact that the year 1976 realised bumper production in the case of coconut and scarce production in the case of arecanut. The upward trend in the production of coconut emphasising the response of the farmers.

Comparing Tables IX and X it is observed the fluctuation in the indicies of area under cultivation and production are greater in the case of arecanut than in the case of coconut.

G. Indices of area under coconut cultivation and production are given in Table XI and Table XII

TABLE XI

INDICES OF AREA UNDER COCONUT IN VALUKKAPARAI AND ARCHIPALAYAM

Year	Total land (acres)	Index
1971	206	100.00
1972	234	113.59
1973	262	127.18
1974	280	135.92
1975	302	146.60
1976	318	154.37
1977	351	170.39
1978	446	216.50
1979	499	242.23
1980	698	338.83

The indices of area under coconut cultivation in the sample villages shows that the area under coconut cultivation had increased more than three fold, whereas it had declined by 12% for the same reference period for Coimbatore taluk as a whole. This shows that shifting has been realised in the sample villages.

TABLE XII

INDICES OF PRODUCTION OF COCONUT IN ARCHIPALAYAM AND VALUKKAPARAI

Year	Total production (in nuts) (in thousands)	Index
1971	1,08,000	100.00
1972	79,000	73.15
1973	1,82,000	168.52
1974	2,35,000	217.59
1975	2,41,700	223.80
1976	3,35,000	310.19
1977	4,92,000	455.56
1978	6,33,000	586.11
1979	8,12,000	751.85
1980	11,55,000	1,069.44

The indicies of coconut production in Archipalayam and valukkaparai Villages had shown an upward trend continuously during the reference period and it had increased more than 10 times. The upward trend in the production of coconut coincides with the upward trend shown by the coconut production in the Coimbatore taluk. The upward trend in production of coconut of the sample villages emphasis the good response and the adjustment in the production of the farmers to the market conditions.

H. Indices of area and production of annual crop are given in Table XIII and Table XIV.

TABLE XIII

INDICES OF AREA UNDER ANNUAL CROP IN ARCHIPALAYAM AND VALUKKAPARAI

Year	Total land for annual crop (In acres)	Index
1971	1,300	100.00
1972	1,300	100.00
1973	1,310	100.77
1974	1,325	101.92
1975	1,330	102.31
1976	1,330	102.31
1977	1,335	102.69
1978	1,335	102.69
1979	1,335	102.69
1980	1,337	102.85

Table XIII shows a small increase in area allotted for the cultivation of annual crop in Archipalayam and Valukkaparai Villages over a period of ten years (1971-80). But for Coimbatore taluk as a whole it had started declining continously from 1975.

This could be an indication of the better use of inter cropping practices in the areas devoted to perennial crop in these two villages.

TABLE XIV

INDICES OF PRODUCTION OF ANNUAL CROP IN VALUKKAPARAI AND ARCHIPALAYAM

Year	Total production of annual crop (in Quintal)	Index
1971	20,248	100.00
1972	20,444	100.97
1973	20,555	101.52
1974	17,684	87.34
1975	17,631	87.08
1976	16,122	76.62
1977	16,787	82.91
1978	15,500	76.55
1979	15,525	76.67
1980	17,197	84.93

Table XIV indicates a continuous fluctuation in the production of annual crop in Archipalayam and Valukkaparai Villages supporting the trend in the district.

The difference in the response to annual crop indicates that these annual crop may not be getting adequate care or the weather condition might have been adverse or the labour availability may have been inadequate in their case while compared to the perennial crops.

In general Tables XI to XIII indicate a better response to the cultivation of perennial - coconut - crops in the sample villages, than to the cultivation of annual crops.

3. MAGNITUDE OF VARIABILITY OF PERENNIAL CROP.

The magnitude of variability of area and production of perennial crop coconut, arecanut as a whole from their mean values were computed by the method of co-efficient of variation.

TABLE XV

MAGNITUDE OF VARIABILITY OF PERENNIAL CROP, COCONUT AND ARECANUT

S.No.	Crop	Co-efficient of variation	
		Area	Production
1.	Perennial crop	6.3 (1.42)	10.57 (2.37)
2.	Coconut	5.61 (1.27)	19.84 (4.61)
3.	Arecanut	24.74 (5.86)	17.25 (3.97)

Foot Note: Figures in parenthesis stand for standard error.

The large amount of variation in the case of production of coconut (19.84) showed that it was conditioned by many factors. In the case of area maximum variation was witnessed in arecanut (24.74) A comparision between arecanut and coconut in respect of area and production indicates that in addition to area contributed for cultivation, other factors may also influence the total output produced.

B. Magnitude of variability of annual crop is discussed in Table XVI.

TABLE XVI

MAGNITUDE OF VARIABILITY OF ANNUAL CROP

S. No.	Particulars	Co-efficient of variation	
		Production	Area
1.	Coimbatore	18.3 (4.73)	4.32 (1.08)
2.	Archipalayam and Valukkaparai	7.3 (1.64)	1.06 (.2371)

Foot Note: Figure in Parenthesis stand for standard error.

Table XVI indicates that the maximum variation in production and area of annual crop was witnessed in Coimbatore Taluk as compared with the sample villages (Archipalayam and Valukkuparai). This may perhaps shows that area contributed for cultivation was an additive influence for output produced.

TABLE XVII

MAGNITUDE OF VARIATION OF INCOME - ANNUAL CROP AND PERENNIAL CROP

S.No.	Income from	Co-efficient of variation
1	Annual crop	19.46 (4.57)
2	Perennial crop	29.27 (7.07)

Note: Primary data (Archipalayam and Valukkaparai village)

Table XVII indicates that a large amount of variation (29.27) in respect of income had taken place in case of perennial crop as compared with annual crops (19.46). It is inferred that the factors affecting the returns from perennial crop especially the price fluctuation and the amount of input required by perennial crop after its maturity is less and the fluctuations in the input expenses is also very mild.

GROWTH RATE OF ANNUAL AND PERENNIAL CROP IN RELATION TO AREA AND YIELD

The growth rate analysis is an important tool in studies on shifting. The compound growth rate in area and production of annual and perennial crops were estimated by applying expenential function. The result arrived at is given in table XVIII.

TABLE XVIII

COMPOUND GROWTH RATES OF AREA AND PRODUCTION OF ANNUAL AND PERENNIAL CROP

Nature of crops	Area		Production	
	Initial Co-efficient	Parameter	Initial Co-efficient	Parameter
*Perennial crop	15,200	1.1	2,470	1.1
**Annual crop	1,08,400	1.1	74,640	1.2
*Coconut palms	14,030	1.01	1,775	1.02
**Coconut palms	354.9	1.13	3,50,500	1.02
**Annual crop	1,392	1.02	17,410	1.03

Note: ** Primary data (Sample villages)

* Secondary data (Coimbatore taluk)

Regarding the sample villages the compound growth rate in area under coconut is high when compared to area under annual crop and in the case of production, compound growth rates of annual crop is higher than coconut. It shows the increasing popularity of coconut as against the annual crop. Even though the growth rate of coconut in respect of area is high as compared to the annual crops, still the production indicates that coconut trees take time to come to maturity.

Regarding Coimbatore taluk the compound growth rates in area under perennial crops and annual crops were equal (1.1) In the case of production, the compound growth rate of annual crop was higher than the corresponding trend in perennial crop and in coconut cultivation.

IMPACT OF TOTAL AREA ON PRODUCTION

Area is the main factor determining the volume of agricultural production other than rainfall etc. So the association between these two variables for perennial crop and annual crop was found using the correlation method for both Coimbatore taluk and the sample villages. The derived result is given in table XIX.

TABLE XIX

CORRELATION BETWEEN AREA AND PRODUCTION

S.No.	Crop	Co-efficient of variation	Co-efficient of determination
1.	* Perennial crop	.30	0.0900
2.	** Annual crop	.53	0.2809
3.	** Perennial crop	.92	0.8464
4.	** Annual crop	.87	0.7569

Foot Note: * Secondary data (Coimbatore taluk)

** Primary data (Archipalayam and Valukkaparai)

For Coimbatore taluk, the co-efficient of correlation between area and production was high (.53) in the case of annual crop, and minimum in the case of perennial crop indicating that only 9% of variation in production in perennial crop has been explained by area. This fact reveals that area allotted for cultivation had played only an insignificant role. Compared to area other factors such as rainfall prices etc.,had occuped a predominent role in the case of perennial crops as compared to annual crop.

Unlike this in the sample villages, the high co-efficient of correlation of perennial crop reveals that 84% of variation in production has been explained by area allotted for perennial crop cultivations. It is inferred that area had palyed a very signficant role in the case of perennial crop as compared with annual crop.

7. Association of attributes between the Method of cultivation followed and the behaviour in production.

To have the association of attributes between the method of cultivation followed and the behaviour in production X2. test was adopted with the hypothesis "Mode of cultivation" and the volume of production are independent.

At 5% level of significance with one degree of freedom P (3.84 lz< ∞) = 0.5 the rejected region is X2 > 3.84. Since the derived result of X2 is 12.8, we reject the null hupothesis and conclude that the mode of cultivation influences the volume of production. In other words a majority of these [illegible] who were interviewed had a clear picture that the two variables are not independent of each other.

SUMMARY AND CONCLUSION

The current study on shifts in crops was prompted by a number of reasons. Coconut is a valuable perennial crop and the fluctuations in its production, availability and prices in the market always hits the headlines. Fluctuations in the cultivation of coconut is reflected in the production of soap, oil in its price and domestic consumption.

A study on 'Shifts in Perennial crop acreage was therefore undertaken with the following objectives to:

1. Analyse the various aspect of annual and perennial crop cultivation.
2. Examine the trend and magnitude of variability in acres and production of annual and perennial crop over a period ofl 10 years (1971 to 1980)
3. Examine the rate of growth of annual and perennial crop in respect of area and production.
4. Quantify the impact of area on production of annual and perennial crop.

For this study the investigator used both primary and secondary data. Regarding the secondary data the

investigator used the data available to the Annual season and crop Reports of Tamilnadu, issued by the Director of Statistics Government of Tamil Nadu. Regarding primary data all farmers of Archipalayam and Valukkaparai villages owing more than 10 acres were taken as sample.

1. The average size of the sample farm in Archipalayam and Valukkaparai villages was 20.74 acres and the average size of garden land was 13 acres.
2. Fifty four percent of the garden land was devoted to coconut plantation.
3. Garden lands were used for both annual and perennial crop cultivation.
4. Eighty per cent of the sample surveyed had adopted modern methods of cultivation.
5. The average size of coconut plantation holding in the sample villages was 6.98 acres.
6. Sixty percent of the coconut plantation already had attained maturity.

7. In the early 70s cotton and sugarcane and later Banana and Turmeric were found to be the main intercrops in the sample villages.

8. In the case of annual crop the average cost (per acre) it had witnessed continuous fluctuations leading to uncertainity. The average cost (per acre) of cultivating coconut palms had also shown fluctuations between 1971-75 and an increasing trend from 1976 onwards.

9. The average return (per acre) from annual crop recorded a minimum in the year 1973 and maximum in the year 1980. The average return (per acre) from perennial crop (coconut palm) recorded a rising trend throughout the reference period.

10. Casual peremanent and contracted labour was used for both annual and perennial crop cultivation.

11. Low price of the products, inadequate transport facilities and lack of marketing informations were the main problems faced in marketing the produce of both annual and perennial crops.

12. The main problem mentioned by the farmers in the cultivation of annual crops was high input cost. Regarding perennial crop no specific reason was spolt out.

A comparison of Primary and Secondary data revealed the following

II. 1. For Coimbatore taluk the area under coconut cultivation had fluctuated from year to year, and it had declined by 12 percent whereas in the sample villages the area allotted for coconut cultivation had increased three fold during the period under consideration.(1971-80)

2. The upward trend in the production of coconut in the selected villages is similar to the trend in Coimbatore taluk.

III. 3. The association between area and production was high (.53) in the case of annual crop and (.30) in the case of perennial crop with regard to the sample villages, the association between area and production was high (.92) in the case of perennial crop (coconut and (.87) in the case of annual crop. In the case of annual crop 28% of the variation in the production

was explained by the changes in area whereas in the case of perennial crop only 9 percent variation in production was explained by the changes in area whereas in the case of perennial crop 85 percent variation in production was explained by changes in area.

III. 1. The variation on area for Coimbatore taluk was more in the case of perennial crop when compared to annual crop where as the variation in area for selected villages was more on in the case of annual crop when compared to perrinal crop.

2. The variation in production for Coimbatore taluk was more in the case of annual crop when compared to perennial crop. Whereas the variation in production for selected villages was more in the case of perennial crop when compared to annual crop.

3. Regarding income variation it was greater in the case of the perennial crop (coconut plantation) and less in the case of annual crop.

IV. The compound growth rate with reference to area under perennial crop and annual crop were equal, but in the case of production the growth rate of annual crop is slightly higher than perennial crop. The statistics with reference to selected sample villages indicates that the compound growth rate in area under perennial crop was higher (1.13) when compared with that of annual crop. (1.02) The production growth rate indicates that the annual crop was lower (1.03) when compared to perennial crops (1.35).

V. The mode of cultivation influences the volume of production.

VI. Coconut fibre had provided a subsiding income to the concerned farmers.

VII. The farmers were aware of the application of high variety seeds, which ensures increased production.

In conclusion the study shows that the main reason for shifting of crops are investment required, the amount of labour force required, problems involved in both the cultivation and marketing the products,price levels of final products, input expenses and income viability of

practising inter cropping method, better response from cultivation etc. The cultivators were responsive to the factors influencing and causing shifting. The farmers adjusted production in-terms of shifting according to the market condition.

The casual relationship between the price and production, rainfall and production could form subject matter for further studies as such research would help in throwing light on the inter relations between price, rainfall and production.

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APPENDIX I

TABLE I

AREA UNDER CULTIVATION OF ANNUAL AND PERENNIAL CROPS, COIMBATORE TALUK (1971-1980) (IN HECTARES)

Year	Annual Crop	Perennial Crop	Coconut palms
1971	-	14,519	13,638
1972	-	14,383	14,060
1973	-	15,081	14,193
1974	46,535	15,039	14,139
1975	49,375	15,098	14,202
1976	46,381	15,989	14,708
1977	42,826	15,986	15,083
1978	38,849	14,349	13,450
1979	44,040	15,757	14,510
1980	42,380	13,790	12,080

Source:

Compiled from the various Annual Season and crop report of the Madras State.

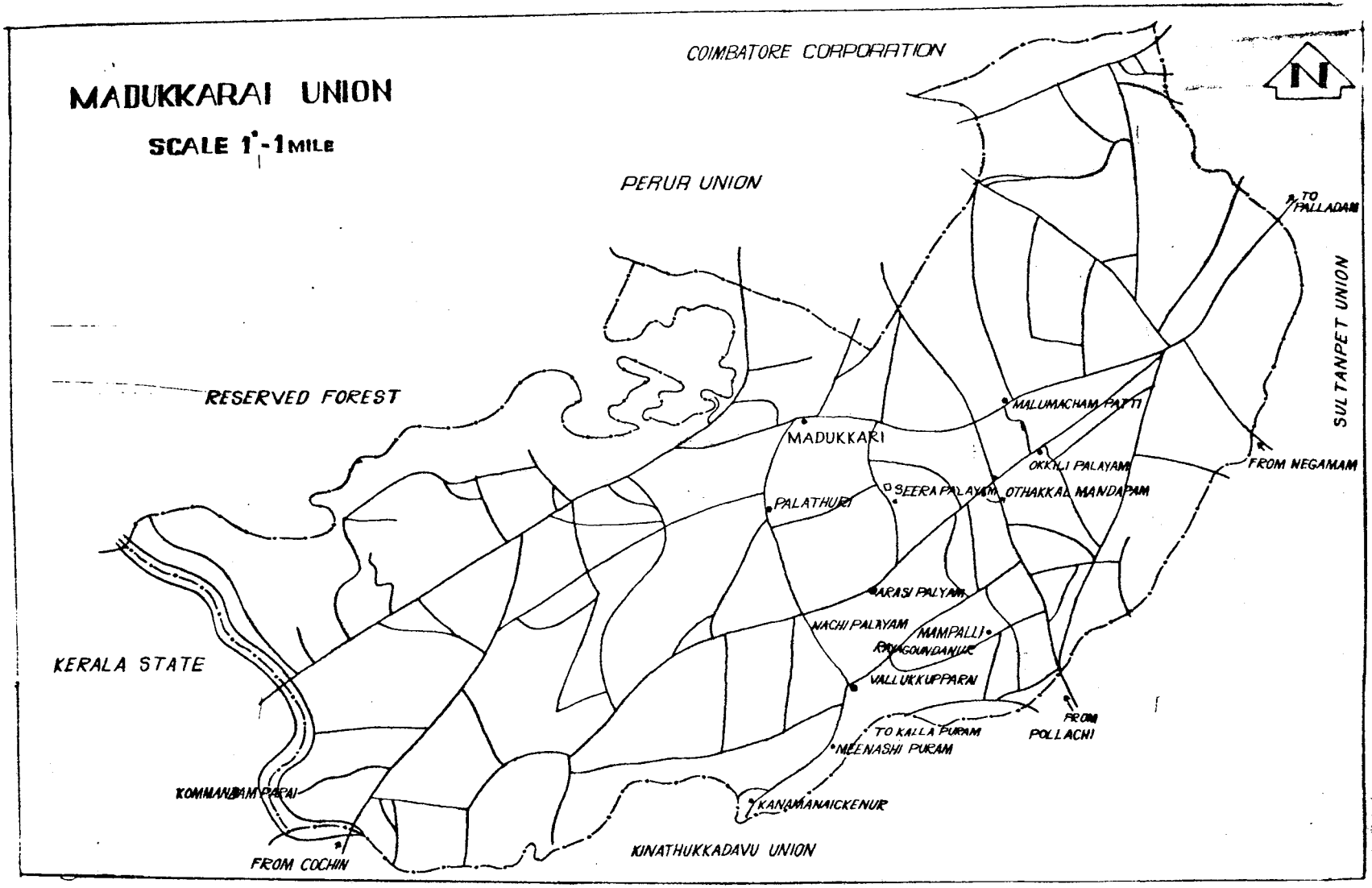
TABLE II

CROP OUTPUT OF ANNUAL AND PERENNIAL CROPS - COIMBATORE TALUK (1971-80)

Year	Annual crop (in Quintal)	Perennial crop (in lakhs of nuts)	Total production of coconut (in lakhs of nuts)
1971	-	2,039	992
1972	-	2,352	1,524
1973	-	2,234	1,577
1974	10,61,722	2,324	1,610
1975	9,13,479	2,884	2,202
1976	8,29,768	2,895	2,280
1977	6,51,120	2,402	1,764
1978	5,92,459	2,305	1,693
1979	7,70,699	2,380	1,692
1980	7,71,971	2,545	1,781

Source:

Complied from the various Annual season under crop Report of the Madras State.


MADUKKARAI UNION
SCALE 1"-1 MILE
COIMBATORE CORPORATION
PERUR UNION
N
TO PALLADAM
SULTANPET UNION
RESERVED FOREST
MALUMACHAM PATTI
MADUKKARI
OKKILI PALAYAM
FROM NEGAMAM
SEERA PALAYAM
OTHAKKAL MANDAPAM
PALATHURI
ARASI PALYAM
NACHI PALAYAM
MAMPALLI
KERALA STATE
VALLUKKUPPARAI
FROM POLLACHI
TO KALLAPURAM
NEENASHI PURAM
KANAMANAICKENUR
KINATHUKKADAVU UNION
FROM COCHIN

QUESTIONNAIRE TO ELICIT INFORMATION ON THE CULTIVATION OF ANNUAL AND PERENNIAL CROPS.

I. General Information:

1. a) Name of the farmers :

   b) Postal address :

      Name of the village :

      Taluk :

II. Details of Land hold/Cultivated as on

Wet acres  Dry acres 

Garden acres 

Area cultivated Self				Area leased out				Area follow	
Owned		Taken on lease	Total			Owned		Taken on lease.	
Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry

III. Cropping Pattern:

1. What were the crops that you had cultivated during 1970-80?

Year	Season			Nature of Crops			Area (acreage)			Variety			Duration			Total Annual production		
	Wet	Dry	Gar	W.	D.	G.	W.	D.	G.	W.	D.	G.	W.	D.	G.	W.	D.	G.
1971																		
1972																		
1973																		
1974																		
1975																		
1976																		
1977																		
1978																		
1979																		
1980																		

2. Do you prefer cultivating perennial crop or annual crops?
If perennial/annual, give reasons.

IV. 1. What are the methods you adopt for cultivation?

a) For annual crops

b) Perennial crops.

2. What was the total cultivating expenses over the past 10 years?

Year	Name of the crop		Acreage	Item	Expenses
	Annual	Perennial			

3. What was the total income from crops for the past 10 Years?

Year	Name of the crops		Total Income
	Annual	Perennial	
1971			
1972			
1973			
1974			
1975			
1976			
1977			
1978			
1979			
1980			

4. A) What are the problems involved in the cultivation of annual crops?

1) High input expenses
2) Labour problems
   a) Wages
   b) Non-availability of labourers
3) Not getting expected price for the produce
4) Others.

b) What are problems involved in the cultivation of perennial crops?

1. High input expenses
2. Labour problems
   a) Wage
   b) Non-availability of labourers
3. Not getting expected prices
4. Others

6. a) What are the problems in marketing the produce of annual crops?

1) Un-Organised markets
2) Low price
3) Poor demand
4) Inadequate transport facility
5) Inadequate market information

b) What are the problems in marketing the produce of perennial crops?

1) Un-organised markets
2) Low price
3) Poor demand
4) Inadequate transport facility
5) Inadequate market information.

6. Changes in area under Co-conut plantation.

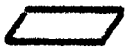
Year	Operated area	Area under coconut cultivation	Line / border plantation		
			Line planting	Spacing	
			No.of trees	Tops	Line planting
1971					
1972					
1973					
1974					
1975					
1976					
1977					
1978					
1979					
1980					

7. What factors made you to extend the area under coconut cultivation? Specify

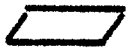
a) Profitability of the crop ▱

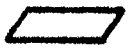
b) Supply of coconut seedlings at subsidies ratio ▱

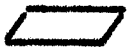
c) Steady income from coconut plantation ▱

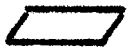
d) Easy in cultivation 

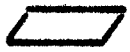
e) Low incidence of pests and diseases 

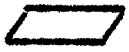
f) Suitability of soil for coconut 

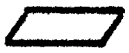
g) Assured market for coconuts 

h) High keeping quality 

i) Labour needs are low + availability of labour difficult 

j) Labour inefficiency 

k) Supply of coconut for domestic requirements plus oils 

l) High cost of cultivation of annual crops 

m) Other Management problems 

8. What are the costs involved in planting one acre of coconut?

Year	Digging pits Rs.	No.of labour required	No. of seedlings	Cost of seedlings	Total
1971					
1972					
1973					
1974					
1975					
1976					
1977					
1978					
1979					
1980					

9. What are the changes in wages rates for labour over the years.

Year	Per labour (Rs.) per day		Permanent labour per month		Perequisites
	Male	Female	Male	Female	
1971					
1972					
1973					
1974					
1975					
1976					
1977					
1978					
1979					
1980					

10. What are the changes in the cost price of coconut seedlings over years.

Year	Cost for seedlings	cost for 100 seedlings

11. From where did you obtained the seedlings over years? Specify?

	In Numbers									
	1971	'72	'73	'74	'75	'76	'77	'78	'79	'80
a) From your own farm										
b) From Panchayat Union										
c) From Agricultural Office										
d) From other sources										

12. Value of manures and Fertilizers

Year	Quantity of Manual		Quantity of Fertilizers	
	Coconut Plantation	Applied value	Coconut Plantations	Value
1971				
1972				
1973				
1974				
1975				
1976				
1977				
1978				
1979				
1980				

13. Inter Crops:

What intercrops did you raise till the coconut came to maturity.

Year	Inter Crops						
	Turmoric	Banana	Cotton	Sugar-cane	Ground nut	Onion	Vege-table
1971							
1972							
1973							
1974							
1975							
1976							
1977							
1978							
1979							
1980							

14. State the income from such crops over the years (in Rupees)

Year	Turmeric	Banana	Cotton	Sugar Cane	Ground-nut	Onion	Vege-tables	Total income.
1971								
1972								
1973								
1974								
1975								
1976								
1977								
1978								
1979								
1980.								

VI. Other information

15. What are the main diseases which affect your crops?

	Types of crops	Pests / Disease
Annual		
Perennial		

16. Have you noticed any change in your income after changing the cropping pattern?

17. Are you satisfied with the income you get in relation to the effort put in for the following crops?

Crops	Annual	Perennial	Yes	No	Remarks

18. a) Over how many years did the coconut trees bear fruit?

b) In which year was the maximum yield obtained by you?

Yield of coconuts :

Value of Coconuts :

19. a) What are the annual maintaince charges for coconut plantation?

Inter cultivation	Weeding	Manu-ring	Ferti-lising	Irri-gation	Harve-sting	Other charges	Total

(In Rupees)

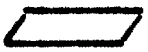
b) Specify who manages the coconut plantation

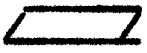
1. Yourself :
2. Other family members :
3. By engaging serperrser; and if so wages salaries paid

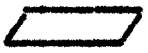
20. Nature of the labour employed.

	Wages paid (in Rs.)			
1. Casual Labour	Male:	Female:	Male:	Female:
2. Permanent	Male:	Female:	Male:	Female:
3. Contracted labour	Male:	Female:	Male:	Female:

24. How do you market your coconuts?

a) Contract sale : 

b) Sale after harvest by you or farm gate : 

c) Sale at the market centres 

29. Value of coconut fibre over years:

Year	Sale of coconut husks	Coconut fronds	Other materials	Total value in Rupees
1971				
1972				
1973				
1974				
1975				
1976				
1977				
1978				
1979				
1980				

25. How is harvesting done?

a) Engaging labour by yourself: Yes / No

If' Yes' what are the changes for harvesting over years?

Years	Charges (in Rs.)
1971	
1972	
1973	
1974	
1975	
1976	
1977	
1978	
1979	
1980	

If 'no' who does the harvesting?

b) What is the selling price of coconut for 1000 nuts?

c) How many extra nuts are given to merchants?

24. How many trees are for coconuts, toddy, and for nearer market?

Year	Purpose in numbers			Charges per tree	Licence charges per tree	Total
	Coconut	Toddy	Naree			
1971						
1972						
1973						
1974						
1975						
1976						
1977						
1978						
1979						
1980						