INTERCROPPING COCONUT LANDS WITH MINOR EXPORT CROPS

(KURUNEGALA DISTRICT RURAL DEVELOPMENT PROJECT)

S. R. BANDARA
H. P. M. GUNASENA

RESEARCH STUDY NO. 56

MARCH 1983

AGRARIAN RESEARCH AND TRAINING INSTITUTE.
114, Wijerama Mawatha, Colombo 7.

SRI LANKA

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FOREWORD

At the request of the Ministry of Plan Implementation and the World Bank, the Agrarian Research and Training Institute agreed to undertake the evaluation of the Kurunegala Integrated Rural Development Project. The evaluation plan consists of a baseline survey to analyse the pre-project situation and several in-depth and management oriented studies. Some of these studies are meant to examine the implementation of some of the important project components with a view to assessing their performance from time to time.

This study on intercropping examines the implementation of this programme under the major Coconut Development Component of the project. The study was requested by the Project Director in view of the slow progress of the intercropping programme and specially to find out why the coconut small holders have not shown much enthusiasm to accept the assistance offered under the project for intercropping. Despite the concerted efforts made by the authorities to promote intercropping the achievements have been much below the desired level. The primary objective of the study therefore, was to assess the performance of the intercropping programme from the inception and to identify the agronomic, economic, social and institutional constraints which inhibit the large scale adoption of the programme with a view to suggesting appropriate measures to overcome the problems.

The study was undertaken by Mrs. S.R. Bandara, Research and Training Officer of the Institute with Professor H.P.M. Gunasena of the Faculty of Agriculture, University of Peradeniya, functioning as a Consultant. My thanks are due to them for their services. It is hoped that this study will provide some insight into the development of coconut lands with intercropping in the Kurunegala District and will be of some use to the project administration to make the programme a success.

T.B. Subasinghe

T.B. Subasinghe
DIRECTOR - ARTI

ACKNOWLEDGEMENT

The authors wish to acknowledge the assistance given by several individuals in the completion of this report.

This study would not have been a reality without the cooperation of the Coconut growers in the Kurunegala district. We wish to thank the Coconut Development Officers for their help during the field survey.

A special word of thanks to Mr. A.B. Perera, General Manager (Technical), Coconut Cultivation Board, District Extension Officers, Department of Minor Export Crops, Kurunegala, the Project Director, Kurunegala IRDP and their staff for providing substantial data which proved to be a valuable source of information for the study.

We appreciate the valuable comments on the earlier days given by Mr. P.J. Gunawardena of the ARTI, Dr. Walter Fernando, Director, Department of Agriculture and Dr. Nimal Sandaratne from the Central Bank.

M/s D.G. Karunaratne, U.G.L. Athula, G.M. Chandrasena, J.K. Nandasena and Miss P.D.M. Dias were employed as investigators for the collection and tabulation of field data.

We wish to thank the Director ARTI for the encouragement extended throughout this study.

Finally, Miss A. Fernando, Miss Deepika Boteju and Miss Saman Vithanage who extended their secretarial assistance and Mrs. Soma Wijewardena who did the final typing also deserve a word of appreciation.

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Chapter One

INTRODUCTION

1.1 GENERAL

Kurunegala District Integrated Rural Development Project is an ambitious undertaking and the first of its kind launched in Sri Lanka. The basic objective of this project can be enumerated as follows:

(a) To organise the development activities at a district level and coordinate with the national development plan;

(b) To increase production of food by promoting agricultural growth by using improved agro-technologies such as crop intensification, rehabilitation and improvement of irrigation facilities;

(c) To create avenues of employment in development activities and thereby increase the income of the rural population;

(d) To promote socio-economic development by improving welfare facilities such as health, education, water supply, highways etc;

(e) To waken the peasants to the wants of the nation and to impart knowledge on the economic development of the country for their participation on a national scale;

(f) To explore the replicability of this pilot development model in other districts (Kurunegala Integrated Development Project – Appraisal Report to World Bank, 1979);

(g) To disseminate scientific and technical knowledge presently concentrated in urban areas to the rural sector and eradicate widespread income disparities among various groups of people.

At the national level the project is to be implemented by the Ministry of Plan Implementation and at the District level there is a Project Office under the authority and supervision of the Hon. District Minister for coordinating and monitoring the progress of the twelve programmed activities.

The implementation of the project is scheduled for five years 1979-1983 with a total investment of Rs. 465 million of which a sum of Rs. 310 million is provided as a loan from the World Bank through the International Development Association (IDA) while the balance is provided by the government of Sri Lanka. The estimated funds will be expanded for 12 interrelated components. The allocation for coconut development and inter cropping with minor export crops is Rs. 81.75 million, while that for livestock development is Rs. 3.1 million.

The project has made provision for an in-depth evaluation of some of the development programme after about two years of their commencement. The main purpose of the evaluation is to assess the progress and to provide the project with key information with a view that it will assist in directing the programme so that benefits will accrue to the farmers who comprise 60% of the project areas. The Agrarian Research and Training Institute, Colombo has been commissioned to undertake the evaluation of such project components on the advice of the Ministry of Plan Implementation, and International Development Association (IDA).

1.2 PRESENT STATUS OF COCONUT

In the Kurunegala District there are 387,000 acres of coconut and comprises of 33.6% of the total coconut area of Sri Lanka (Table 1), which is 1,116 million acres. The Kurunegala district accounts for the largest part of the "Coconut Triangle" and it is also the principal producer of coconut, recording 33% of the total production in the Island. In 1980 the nut production in the Kurunegala District was 668 million (or 33%) when the total production in the island was 2025 million nuts.

Of the total extent approximately - 70% comprise of small holdings or extents less than 25 acres. The nut production in the large extents and small extents differ widely. On the average estate nut production per acre is 2267, while in small holdings it is around 1479.

Table 1 - Districtwise Distribution of Coconut Lands in Sri Lanka

District	Coconut ('000 acres)	Percentage of total acreage
Kurunegala	387	33.7
Colombo	220	19.1
Puttalam	146	12.7
Hambantota	90	7.8
Kegalle	70	6.1
Kalutara	38	3.3
Galle	37	3.2
Matale	21	1.8
Kandy	21	1.8
Ratnapura	28	2.4
Jaffna	30	2.6
Batticaloa, Amparai and Trincomalee	28	2.4
	1116	100.0

Source : Coconut Cultivation Board

During the past few years there has been a decline in nut production in all coconut growing areas of the island while local consumption has shown a steady increase (Table 2). The decline in nut production has been due to many causes of which the most important have been drought, poor management, and non use of chemical fertilisers. The non-adherence to a well directed replanting programme, cutting of trees to obtain timber needed for construction work and land fragmentation due to the past land reform policies have also contributed to the decline. It is heartening to note that at present there is an awareness and an organised programme to replant/rehabilitate and even expand the coconut growing areas by the Ministry of Coconut Industries. Their achievements in the past three years have been substantial in that 7.19 million seedlings are issued for cultivation upto *maha* season of 1981/82, and 4.8 million seed nuts have been planted in nurseries for issue in 1982 *yala* season. The

target acreage for replanting and under planting during the project period is 14,500 acres and that for rehabilitation is 50,000 acres. Of these estimates, 32% have been replanted/underplanted and 77% rehabilitated at the end of 1981 (Kurunegala Integrated Development Project Progress Report, December 1981).

Table 2 - Total Production of Nuts (Million Nuts)

	1973	1974	1975	1976	1977	1978	1979	1980
Production	1935	2031	2598	2330	1821	2207	2393	2025
Consumption	1192	1205	1224	1236	1257	1278	1302	-
Balance for Industry or Export	743	826	1374	1094	564	929	1091	-

Source : Coconut Cultivation Board

1.3 STATUS OF MINOR EXPORT CROP AND LIVESTOCK PRODUCTION

According to the Industrial Potential Survey of the District conducted in 1981, the total extent under minor export crops have been less than 7,000 acres. The crops mentioned in the report include coffee, cinnamon, arecanut, cocoa, cardamom and tobacco. These crops in the present context of the word are not the "Minor Export Crops", although they have a minor export potential. According to the above report their extents have also shown a decrease mainly due to the decline in the arecanut acreage. Thus in 1975 there were 6712 acres which decreased to 2679 in 1978/79. In general, the intercropping of coconut with crops either having a minor export potential or with fruits such as pineapple and banana or with various kinds of food crops has been a common feature in the District. The contribution of these crops to the agriculture sector, however, has been minimal.

With reference to livestock development, the same report mentions that livestock concentrate in two main areas. These are mostly in the AGA Divisions of Ibbagamuwa, Kurunegala, Wariyapola and Kuliyapitiya, which have over 10,000 buffaloes and 10,000 neat cattle in each division. Maharachimulla and Hettipola have 7,000 buffaloes and 7,000 neat cattle each. In the northern part of District IL_3 and DL_1 the concentration

is towards Nikaweratiya - Maho, Galgamuwa where there are over 7,000 buffaloes and neat cattle in each division. However, the potential that exists for livestock development and pasture production has not been dealt within the above report.

Chapter Two

PROPOSED INTERCROPPING PROGRAMME

2.1 THE COCONUT - MINOR EXPORT CROP INTERCROPPING PROGRAMME

Due to the wide range of economic advantages of intercropping of coconut, it is being increasingly recognised in almost all coconut growing countries as against the outmoded practice of monoculture.

As indicated in section 2.1 coconut is the major plantation crop of the Kurunegala District of which about 70% consists of small holdings below 25 acres. The coconut palms are planted entirely on the square system of planting at a distance of 24-26 feet apart, giving a population of 65-70 palms per acre.

The mono-crop coconut stand at the above spacing utilises only 25% of the land area, or 75% of it remains unutilised. This area which in most small holdings and even in some estates remain infested with weeds or utilised to a very small extent for growing some food crops could be profitably used for intercropping. The crops that has a potential includes short duration food crops such as alocasias, colocasias, dioscorea yams, cassava, sweet potato, pineapple, banana, improved pastures and some kinds of minor export crops such as coffee, pepper and cocoa. Generally coconut lands which are about 10 years old could be used for intercropping. If the palms are too young, light interception is insufficient for the growth of intercrops. On the other hand mature stands of coconut should be underplanted with younger seedlings as a replacement series at a later date, to obtain the maximum benefit from coconut lands which are at present underutilised.

As shown in Table 2 there has been a declining trend in coconut production in the district mostly attributed to the neglect of management practices. This could be expected as the production declines and consumption steadily increases, leaving hardly any profit for the improvement of coconut lands. Therefore diversification with minor export crops and pasture could reduce the risk and uncertainty of depending on one crop, particularly, in areas of this district often subjected to seasonal moisture stress.

There is evidence also that intercropping may increase coconut production by the fertilisers added to the intercrops, elimination of weeds and increasing of soil fertility as the mixed cropping system could enhance the microbial activity of both coconut and intercrop rhizosphere (Nelliet *et al*, 1974)[1]. Agronomically a stable cropping system could be established, each crop benefitting mutually with their association leading to the utilisation of both soil and environmental resources to a maximum. The ultimate benefit will be increased incomes for small holders, provide new avenues of employment and uplift the socio-economic status of the rural population of the district.

The intercropping of coconut with minor export crops will be successful only in certain agro-ecological regions of the district receiving a well distributed rain fall with a lower limit of 1750 mm per year. Therefore, the project has selected seven electorates in the district lying in the wet and semi wet zones. In these electorates the climate, primarily rainfall, is suitable for growing coconut as well as the intercrops. The electorates identified are Katugampola, Kuliyapitiya, Dambadeniya, Polgahawela, Mawathagama, Dodangaslanda and Kurunegala lying in the IL_1, IL_3, WM_3, WL_2 and WL_3 and IM_3 agro-ecological regions (Agro-ecological regions of Sri Lanka Land Use Division, Department of Agriculture). These seven electorates 53.84% of the total coconut area

1 E.V. Nelhat, K.V. Bavappa and P.K.R. Nair - Multistorey Storeyed Cropping. A new dimension in multiple cropping for Coconut Plantation. World Crops - November and December 1974.

of the district (Table 3). The emphasis has also been placed on small holdings as they comprise more than half of the total coconut acreage in each electorate. The scope for establishing the coconut - intercrop system is much greater in these severely neglected small holdings than on large scale plantations.

There is no experimental evidence, published documentation or even established practical experience in the technical know-how of growing minor export crops under coconut in the district or in any other parts of the country. In the 1950's then Government has distributed coffee seedlings to the villagers in some electorates and even up to this day they could be seen growing in their back gardens. This clearly indicate the agro-ecological suitability for the cultivation of some minor export crops. Due to the above mentioned valid limitations the initial project target has been a very modest extent of 10,000 acres - cocoa (2,000 ac.), coffee (3,000 ac.), pepper (3,000 ac.) and other crops such as pastures (2,000 ac.).

The project anticipate to develop a solid technical base and package practices for extension services for the future expansion of the coconut-intercrop system by establishing six nurseries which could supply 200,000 plants of coffee, cocoa, and pepper annually and 50 demonstration plots in farmers fields. The establishment of these nurseries and the demonstrations have been commenced in 1979 and are being maintained by the Minor Export Crops Research Station at Matale through its sub-office at Kurunegala. The subsidies to the growers are provided by the Coconut Cultivation Board. The unified extension service of the Department of Agriculture and the Agricultural Development Authority assists in the extension activities and the supporting services respectively.

Table 3 - Electorate-wise Distribution of Coconut Lands in the Kurunegala District

Electorate	Total Coconut acreage	Percentage of total acreage
Galgamuwa	12619	2.98
Nikaweratiya	31836	7.52
Yapahuwa	15192	3.59
Hiriyala	28942	6.84
Wariyapola	26161	6.18
Panduwasnuwara	29694	7.07
Bingiriya	50802	12.01
Katugampola	54000	12.76
Kuliyapitiya	41155	9.73
Dambadeniya	35342	8.35
Polgahawela	29274	6.92
Kurunegala	24175	5.72
Mawathagama	24181	5.72
Dodangaslanda	19551	4.62
	422924	100.00

Source : Coconut Cultivation Board, 1982.

2.2 OBJECTIVE OF THE STUDY

The objective of the present study is to provide an assessment of the performance of the intercropping programme with minor export crops and pastures under coconut in the identified electorates and to provide the project with key information with the view that it will assist in the expansion of the programme so that the benefits will accrue to the coconut small holders.

More specifically the objectives of the study are as follows:

1. Examine the extent of farmer acceptance of intercropping of coconut land with pepper, coffee, cocoa and pasture;
2. Examine the agro-technology, input use etc., and constraints if any in the crop management;

3. Examine the causes for high death rate of minor export crop plants in the early establishment stages and the extent of success achieved with pitcher irrigation;

4. Achievement of targets in the supply of planting materials, maintenance of nurseries and the impact of the demonstrations maintained by the Minor Export Crops Department;

5. Achievement of planting targets in the intercropping programme undertaken by the Coconut Cultivation Board;

6. Examine the availability and efficiency of supporting and extension services;

7. Identify and analyse the agronomic, economic or institutional constraints and make short term and long term recommendations for implementation;

8. Although yet premature, assess the overall impact of the programme for small farmers with operational holdings of three acres or less.

2.3 THE PROJECT AREA

The project area constitutes seven electorates mentioned in section 2.1 (Fig. 1). The total coconut acreage in the seven electorates is 227,678 or 53.8% of the total extent of the district (Table 3). The population density varies widely within the district being about 620 per sq. mile. In the nothern part it is less than 400 and over 1000 per sq. mile than in the south-eastern part (Gunawardena, *et al*, 1981). The total number of families in the 14 electorates of the district is 21,263, of which 108,303 or 50.93% of them are in the project area (Table 4). The percentage of landless families varies from 17 to 28 while those that own less than 1/2 acre range from 9-33. Those owning less than three acres are in majority in all seven electorates (61-72%) and those owning over five acres comprise only 3.5-12%

Table 4 - Number of Families and Size of Land Holdings

Electorate	Total No. of families in the electorate	No. of families owning no lands	No. of families owning less than ½ acre	No. of families owning ½ acre but less than 3 acres	No. of families owning 3 acres but less than 5 acres	No. of families owning more than 5 acres
Kurunegala	18070	5060 (28.0)	5981 (33.09)	5085 (28.14)	994 (5.50)	950 (5.25)
Dodangaslanda	12114	5233 (26.70)	2941 (24.27)	4836 (39.92)	677 (5.58)	425 (3.50)
Mawathagama	7795	2435 (31.23)	23691 (30.39)	2238 (28.71)	395 (5.06)	358 (4.59)
Polgahawela	11398	2370 (20.79)	3283 (28.80)	4212 (36.95)	851 (7.46)	682 (5.98)
Dambadeniya	16687	2858 (17.12)	4627 (27.72)	7450 (44.64)	969 (5.80)	783 (4.69)
Katugampola	17981	4316 (24.00)	4505 (25.05)	7205 (40.07)	983 (5.46)	972 (5.40)
Kuliyapitiya	24258	4665 (19.23)	6659 (27.45)	9581 (39.49)	1750 (7.28)	1603 (6.60)
Yapahuwa	18408	4571 (24.83)	2292 (12.45)	6705 (36.42)	2979 (16.18)	1861 (10.10)
Bingiriya	12915	2368 (18.33)	2516 (19.48)	6335 (49.20)	1029 (7.96)	667 (5.16)
Hiriyala	18274	5511 (30.15)	3562 (19.49)	6385 (34.94)	1526 (8.35)	1090 (5.96)
Panduwasnuwara	13785	2713 (19.68)	1966 (14.26)	5995 (43.45)	1621 (11.75)	1490 (10.80)
Nikaweratiya	12055	2935 (24.34)	1545 (12.81)	4571 (37.91)	1517 (12.58)	1487 (12.33)
Wariyapola	13074	2107 (16.11)	1835 (14.03)	6028 (46.10)	1736 (13.27)	1368 (10.46)
Galgamuwa	15817	4090 (25.85)	1441 (9.11)	5239 (33.12)	3650 (23.07)	1397 (8.83)
Total	212631	51232	66844	81865	20677	15133

(Figures within parenthesis indicate % of total)

2.4 THE AGRO-ECOLOGY

The climate of the project area is tropical with a minimum variation in temperature ranging from 29.8°C in December to 33.8°C in March (Fig. 2). January, February and upto mid March are dry months and from an intercropping point of view seedling death has been a serious problem whenever there was a continued drought. The relative humidity is lowest during the dry months (55-60%) and build up again with the on set of rain (Fig. 3). The district receives rain in well defined seasons. *Maha* season rains are received from October to December from the North East monsoon, while the *yala* season receives rains from March to June from the South West monsoon (Fig. 4). The rainfall occurrence and drought expectancy is given in Table 5.

Table 5 - Rainfall and Drought Expectancy, Agro-ecological Features - Kurunegala District

8045 A

Agro-ecological Zone	75% expectancy value of annual rainfall (inches)	75% expectancy of dryness for particular months
DL_1	30	Jan. Feb. Mar. Apr. May. June July Aug. Sept.
DL_3	35	
DL_1	40	
IM_3	35	
WL_3	60	
WL_2	75	
WM_3		

On the basis of the rainfall expectancy three agroclimatic zones, namely dry, intermediate and wet zones demarcated as WM_3, WL_3, WL_3, IM_3 IL_1, IL_3, DL_1, WM_3, WL_2, WL_3, and IM_3 are located in the south and south eastern parts of the District (Fig. 5). The characteristic agro-climatic features, soil type and terrain in the project area are given below:

8045 A

WM_3 - Reddish Brown Latosolic soils, Immature Brown Loams and Red Yellow Podzolic soils - Steeply dissected hilly, rolling and undulating terrain.

WL_2 - Red Yellow Podzolic soils, Red Yellow Podzolic soils with strongly mottled sub soils and Low Humic Gley soils -rolling and undulating terrain.

WL_3 - Red Yellow Podzolic soils with soft and hard laterite - rolling and undulating terrain.

IM_3 - Immature Brown Loams, Reddish Brown Latosolic soils and Reddish Brown Earths - steeply dissected hilly and rolling terrain.

IL_1 - Red Yellow Podzolic soils with strongly mottled sub soil, Low Humic Gley soils, Red Yellow Podzolic soils with soft and hard laterite and Regasols on Old Red and Yellow Sands - rolling undulating and flat terrain.

IL_3 Reddish Brown Earths, Non calcic Brown soils and Low Humic Gley soils - undulating terrain.

DL_1 - Reddish Brown Earth and Low Humic Gley soils - undulating terrain.

The dominant soil group in the electorates of the project area is Red Yellow Podsolic soils. A portion in the Kurunegala district contain Reddish Brown Earths while the Katugampola and Kuliyapitiya electorates contain Latosolic soils and Regasols (Fig. 6).

All these soils are deep, good textured and are suitable for growing plantation crops, semi perennial tree crops, forestry tree species and pastures. Therefore, the soils and climatic environment is favourable for the intercropping of coconut with minor export crops and pastures as identified in the project proposal.

2.5 PROCEDURE OF THE STUDY

A preliminary desk survey was conducted during October - January '81 to collect information about the farmers who have already accepted the intercropping of coffee, cocoa, pepper and pasture under coconut in the Kurunegala District. The information in relation to the plant material production programme was collected from the sub station of the Minor Export Crops Department at Kurunegala. The data collected included the

production of plant materials in the six nurseries maintained by the Minor Export Crops Department and issues to the Coconut Cultivation Board in 1980 and 1981. The information on advisory services, such as farmer training classes, demonstration etc. were also obtained from the same departments. The details of the applications for intercropping subsidies and procedure adopted when processing applications were obtained from the project office in Kurunegala and the Agricultural Development Authority (ADA) through discussions with officers who were directly involved in the programme.

A questionnaire survey was conducted in the seven electorates to include 300 farmers. The sample was selected from twenty (20) Agrarian Service Centres within three locations where the intercropping programme has been readily accepted. In each of the A.S. Centres the sample consisted of 10 farmers, who have accepted the intercropping programme and five others who have not accepted it. Initially it was planned to select sample farmers who were actively involved in intercropping from ten Grama Sevaka Divisions of seven electorates of the Kurunegala district where intercropping is widely accepted. However, subsequently it was decided to select the growers on the basis of Agrarian Service Centres instead of Grama Sevaka Divisions due to the practical difficulties experienced in implementing the initially envisaged method.

Non-intercroppers

The study of intercropping in coconut lands is based on two types of samples. One, comprising the coconut land holders who have accepted intercropping and the other, of those who have not accepted the intercropping programme. It was decided to design a separate sample survey for non-intercroppers in order to recognise the problems and difficulties which affected this programme to expand widely. The study sample consisted of one non-intercropper to two of the selected intercroppers. Besides, the non-intercropper should be a person who lived in close proximity to the other intercroppers.

Information was collected in relation to the following:

a. Land utilisation and income earning capacity.
b. Labour availability.
c. Attitude towards intercropping.
d. Problem encountered in intercropping.
e. Efficiency of extension services.
f. Awareness of farmers about intercropping.

Chapter Three

PROGRAMME OF THE MINOR EXPORT CROP DEPARTMENT

3.1 PLANT MATERIAL PRODUCTION PROGRAMME

The Minor Export Crops Department has established six nurseries for the production of planting materials of coffee, cocoa and pepper for distribution among growers in the identified electorates. The nurseries were originally designed to produce a total of 200,000 plants of coffee and pepper annually. The nurseries and their locations are as follows:

Electorate		Location
Katugampola	-	Kandetiya Estate, Pannala
Dambadeniya	-	Mutugala Estate , Morawelpitiya
Kuliyapitiya	-	Mutugala Estate, Horombawa
Mawathagama	-	Modder Estate, Mallawapitiya
Dodangaslanda	-	Holongolla Estate, Dodangaslanda
Polgahawela	-	Serapis Estate, Polgahawela

The nurseries at Katugampola, Dambadeniya and Kuliyapitiya propagate coffee and pepper plants only. The other nurseries produce plants of all three crops. These plants are distributed to the Coconut Cultivation Board for intercropping, and any excess to the Minor Export Crops Department for mono or mixed cropping, and for home gardens.

The expenditure incurred in the establishment of these nurseries have been approximately Rs. 452,123 and all civil work have been completed in 1980. The revenue from the nurseries through the sale of plants amounts to around Rs. 400,000 annually. Thus in 1980 during the

first year of operation the revenue earned through sale of plants to various sources amounted to Rs. 402,355.81. Therefore, 90 percent of the total investment of civil work has been recovered in a short period of one year through plant sales and in subsequent years the nurseries may be able to continue independently and offset the recurrent expenditure.

In addition to the nurseries, there are 16 registered private nurseries (Table 6) and they supply plants to the Minor Export Crops Department, on request if there is a shortfall in their production or directly to the Agricultural Development Authority (ADA) or to the Ceylon Coconut Board and directly to the Growers mostly for filling vacancies and a few plants for home gardens.

The varieties of minor export crops recommended for cultivation are propagated from high yielding and adoptable mother trees/vines. The varieties presently propagated are;

Cocoa - ICS (Imperial College Selections) from Millawana Estate, Malsiripura of the Janatha Estate Development Board. The mother trees are selected among high yielders and seeds are collected for propagation.

Pepper - Paniyur and local selections from high yielding vines. Paniyur propagating materials are usually collected from the Minor Export Crops Research Station at Matale and are rapidly propagated in the nurseries by the bamboo method.

Coffee - Seed of robusta coffee suitable for dry zone conditions selected from Kandy and Nilambe area where proved seed gardens are available.

So far there had been no reports of serious agronomic constraints or pest and disease problems in propagating plants from any of the nurseries, except for the seldom occurrence of phytophthera infestans, a fungus disease on pepper. It is unlikely that in the future there will be any serious pest or disease outbreaks which could hamper plant material production programme.

Table 6 - Registered Private Nurseries

		Number of plants produced		
		Coffee	Pepper	Cocoa
S.D. Chandrasena	1979	83535	157940	9385
Delwita	1980	27830	160965	5935
Kandetiya Farm	1979	116800	350	-
Katugampola	1980	11300	4596	-
Rev. Pusselle	1979	-	19950	2575
Mahinda	1980	-	6225	-
Nilanthi Nawaratne	1979	10495	-	-
Pothuhera	1980	-	-	-
Wilmot Perera	1979	7500	-	-
Kuliyapitiya	1980	-	-	-
Jayasena Silva	1979	8925	1050	-
Weerambagedara	1980	-	-	-
Serapis	1979	5650	-	-
Janawasa	1980	-	-	-
Sebastian Michael	1979	500	300	-
Kurunegala	1980	-	-	-
T.B. Dissanayake	1979	8100	-	-
Pillessa Watta	1980	-	-	-
Rev. Kirimatiyawe	1979	9850	-	900
Panchchasara	1980	-	5500	7000
Rambodagalla R.M.	1979	15100	11325	3485
Punchibanda, Delwita	1980	-	18460	2000
Jayasundara	1979	-	300	-
Kadagalgamuwa	1980	-	-	-
Ceylon Tapioca Co.	1979	-	27550	-
Ridigama	1980	-	-	-
A.M. Wedanda	1979	15000	-	-
Pilessa	1980	-	-	-
Chitrangani Herath	1979	11200	-	-
Kurunegala	1980	-	-	-
A.D. Ariyaratne	1979	7850	-	-
Saragama, Kegalle	1980	-	-	-
Total	1979	300505	218765	16345
	1980	39130	195746	14935
Grand Total		336935	414511	31280

The cost of production and the price paid for them by the Coconut Cultivation Board per plant is as follows:

	Cost of production	Sale price
Pepper	Rs. 1.10	Rs. 1.50
Coffee	Cts. 0.42 - 0.50	Cts. 0.75
Cocoa	Cts. 0.50	Cts. 0.75

The target demand for the seedlings for each of the planting seasons, *yala* and *maha* are fixed by the Coconut Cultivation Board. The Minor Export Crops Department normally produces more than the target requirements for any season. The production of plant materials from various nurseries in 1980 and 1981 are given in Tables 7 and 8. A total of 391,675 plants of coffee, 56,180 pepper and 54,810 cocoa were produced in 1980, in the six nurseries while the registered nurseries also produced a total of 286,467 plants of all crops. In 1981, 552,376 coffee, 67,009 pepper and 29,315 cocoa plants were propagated in the nurseries, besides those produced by the registered growers which amounted to a total of 242,411 plants.

Table 7 - Plant Material Production and Issue, 1980

Name of nursery	Coffee		Pepper		Cocoa	
	Production	Issue	Production	Issue	Production	Issue
1. Serapis Polgahawela	153,450	144,665	20,675	12,513	4,125	1,475
2. Wennaruwa-Dambadeniya	93,350	85,646	11,200	4,271	-	-
3. Modder-Mawathagama	25,575	21,249	8,230	4,654	25,000	7,635
4. Horombawa-Kuliyapitiya	57,800	59,583	8,576	5,375	-	-
5. Holongolla Dodangaslanda	59,500	58,755	7,499	3,147	25,685	11,410
6. Kandetiya-Pannala	-	79,700	-	7,996	-	-
7. Registered nurseries	68,375	-	199,182	-	18,910	-
Total production in nurseries	391,675	449,598	56,180	37,956	54,810	2,052
Total inclusive of registered nurseries	460,050		255,363		73,720	2,052

Table 8 - Plant Material Production and Issues, 1981

Name of nursery	Coffee Production	Coffee Issues	Pepper Production	Pepper Issues	Cocoa Production	Cocoa Issues
1. Holongolla (Dodangaslanda)	75,003	73,384	3,339	2,789	7,100	5,495
2. Wennoruwa (Dambadeniya)	93,503	74,812	8,739	6,987	-	-
3. Serapis (Polgahawela)	152,368	94,470	14,360	12,976	1,900	1,777
4. Modder (Mawathagama)	126,927	76,972	21,915	17,350	20,315	5,055
5. Horombawa (Kuliyapitiya)	70,000	49,649	13,840	12,073	-	-
6. Kandetiya (Katugampola)	33,805	33,805	4,906	4,906	-	-
7. Registered nurseries	134,684	134,684	99,079	99,709	8,648	8,648
Total production in nurseries	552,376	403,092	67,099	57,081	29,315	12,327
Total inclusive of registered nurseries	686,290	537,776	166,178	156,160	37,963	20,975

The Minor Export Crops Department have already propagated planted materials for issue during 1982. Based on their estimates, following will be available in the nurseries for issue in the current year, *maha* season.

Table 9 - Planting Material Available for Issue in 1982

	Coffee	Pepper	Cocoa
1. Serapis - Polgahawela	97,000	1,800	-
2. Wennoruwa-Dambadeniya	70,000	3,000	-
3. Modder-Mawathagama	49,000	3,000	10,000
4. Horombawa-Kuliyapitiya	75,000	4,000	-
5. Kandetiya-Pannala	-	-	-
6. Holongolla-Dodangaslanda	54,000	1,500	2,000
Total	345,000	13,300	12,000

The supply of planting material to the Coconut Cultivation Board are shown in Tables 10(a) and 10(b)

In 1980, 460,058 coffee plants were produced by the Department of Minor Crops. This is 23 percent more than the target requirement set by the Coconut Cultivation Board. But only 250,095 coffee plants were purchased by the Coconut Cultivation Board which was 54.4 percent of the total production. In the case of pepper, total production amounted to 255,362 plants of which 81,525 or 32 percent was purchased by the Coconut Cultivation Board. Similarly for cocoa, production was 73,720 plants while that purchased was only 14.5 percent. The purchases by the Coconut Cultivation Board were less than they had applied for which shows that the cultivation target achievements were less than anticipated. A similar situation existed in 1981. During this year cultivation target acreages have been increased and in response to this the production of plant materials of all three crops have been stepped up by the Minor Export Crops Department. In coffee 687,000 plants were produced while purchases were 247,566 or 40 percent which was less than that in 1980. In cocoa out of a total of 37,963 plants, 4,325 plants or 11 percent was purchased by the Coconut Cultivation Board. In pepper the total plant production was 376,793 of which 234,386 or 62 percent was purchased by the Board.

The tables also show the supply of excess plants to the Minor Export Crops Department for mono and mixed cropping in other areas. These quantities are also substantial and in both years these excess plants amounted to 408,023 coffee, 994,629 pepper and 44,704 cocoa plants. The Tables 10(a) and 10(b) show that a large proportion of plants remained unissued.

The excess plants have caused considerable problems to the Minor Export Crops Department, firstly in maintaining them in the nurseries until the next season. They also interfere with the plant material production programme in the subsequent season. The usual method adopted is to arrange with the Head Office of the Minor Export Crops Department at Kandy and issue them for mixed or mono cropping elsewhere.

Table 10(a) - Supply of Plants to the Coconut Cultivation Board, 1980

	Coffee	Pepper	Cocoa
1. Quantity supplied by the CCB Target : 1000 ac. coffee) 500 ac. pepper) 125 ac. cocoa)	360,000	180,000	36,250
2. Quantity raised in the MEC nurseries	460,050	255,362	73,720
3. Quantity purchased by the CCB	250,095	81,525	10,728
4. Balance left over	192,405	173,837	62,995
5. Quantity sold to the MEC Dept.	192,223	152,222	37,784
6. Quantity unissued	182	21,615	25,211

Table 10(b) - Supply of Plants to the Coconut Cultivation Board, 1981

	Coffee	Pepper	Cocoa
1. Quantity supplied by the CCB Target : 1690 ac. coffee) 899 ac. pepper) 148 ac. cocoa)	608,400	32,400	42,920
2. Quantity raised in the MEC nurseries	687,060	376,793	37,963
3. Quantity purchased by CCB	247,566	234,386	4,325
4. Balance left over	366,934	172,814	24,375
5. Quantity sold to the MEC Dept.	215,800	142,407	6,920
6. Quantity unissued	151,034	30,407	17,455

3.2 EXTENSION AND ADVISORY SERVICES

The Minor Export Crops Department in addition to their responsibility for supplying plant materials has also undertaken a number of activities to encourage the intercropping of coconut lands with minor export crops. The major activity in this regard is the establishment of field demonstrations. These are generally established in small holdings in extents varying from 2-2½ acres in keeping with the specific objective that most of the project benefits should accrue to the small holders of the district. Any small holder has been given an opportunity to establish demonstration plots and it is not restricted only to the approved permit holders. The project supplies a sum of rupees five thousand (Rs. 5,000/-) for the establishment of each demonstration plot which could be expanded for the purchase of barbed wire not exceeding 2 cwts. stakes, fertiliser and pitchers for irrigation. The Minor Export Crops Department supplies the plant material and other inputs needed for the demonstration. The labour and subsequent maintenance of the demonstration is the responsibility of the owner who is also entitled to the produce of the demonstration.

In the 1979 *maha* season 13 demonstrations have been established of which 12 are located in the project area, and the other in the Hiriyala electorate, at the Kuraliya Estate (Table 11).

Table 11 - Demonstrations Established in 1979, 1980 and 1981

Electorate and location of demonstration		Minor export crops grown
1979 - Maha		
Mawathagama	1. Visaka Mount	coffee, pepper
	2. Galapita Muduna	coffee, pepper
Kuliyapitiya	3. Nettipolagedara	coffee, pepper
	4. Medaline	coffee, pepper
Dambadeniya	5. Welikumbura	coffee, pepper
	6. Boyawalana	coffee, pepper
Katugampola	7. Pannala	coffee, pepper
	8. Illukuyaya	coffee, pepper
Dodangaslanda	9. Rideoyawatta	coffee, pepper
	10. Raddegoda	coffee, pepper
Polgahawela	11. Serapis	coffee, pepper & cocoa
	12. Theodore	coffee, pepper
Hiriyala	13. Kuratiya	coffee, pepper
1980 Maha		
Mawathagama	1. Daisy Mount	coffee, pepper
	2. Uyandana	coffee, pepper
Kuliyapitiya	3. Thalahimulle	coffee, pepper
	4. Margeland	coffee, pepper
	5. Medawe	coffee, pepper
Dambadeniya	6. Meewewa	coffee, pepper
	7. Kuilagedara	coffee, pepper
	8. Wennaruwa	coffee, pepper
	9. Wewala	coffee, pepper
Katugampola	10. Gannaketa	coffee, pepper
	11. Makandura	coffee, pepper
	12. Kandetiya	coffee, pepper
Hiriyala	13. Melsiripura	coffee, pepper
Dodangaslanda	14. Elwelapitiya	coffee, pepper
Wariyapola	15. Malevenna	coffee
Polgahawela	16. Watuyaya	coffee, pepper
	17. Saraswathie	coffee, pepper
	18. Cloves	coffee, pepper
1981 Maha		
Bingiriya	1. Walauwatta	coffee

Most of these demonstrations were coffee and pepper, exception being in the Dodangaslanda electorate (Rideoya Estate and Raddegoda Estate) and Polgahawela Electorate (Serapis Estate) where cocoa demonstrations have also been established. In the 1980 *maha* season another 18 nurseries were established, of which 16 were in the project area, and one each in the Hiriyala electorate adjoining Dodangaslanda and Kurunegala electorates and the other in the Wariyapola electorate adjoining the Kurunegala and Polgahawela electorates. In 1981 *maha* another coffee demonstration has been established in the Bingiriya electorate at Walauwatta. The purpose of establishing nurseries outside the project is to study the feasibility of extending the intercropping programme to the other electorates of the district. The Minor Export Crops Department is planning to establish 21 more demonstrations making up to a total of 50 in all electorates.

As clear from the foregoing facts,the preference among smallholders has been to open up coffee and pepper demonstration plots except in the Dodangaslanda and Polgahawela electorates. The preference for the former two crops may be because of their better ecological adaptability in most electorates, ease of cultivation, processing and marketing. From this point of view it could be said that cocoa should be restricted to the wet zone electorates while the coffee and pepper could be extended over most of the other electorates.

3.2.1 Farmer Training

Although many other horticultural crops are grown in the district, traditionally, they need no special management techniques like coffee, pepper and cocoa. Therefore, coconut small holders have not been exposed to special techniques or cultivation methods relating to early establishment, pruning, removal of water shoots, fertiliser application, disease control etc. as required by minor export crops.

Although the Coconut Cultivation Board is in charge of the intercropping programme, Minor Export Crops Department provides advisory services by holding farmer training classes.

The farmer training classes commenced in December 1980. The plan has been to hold 15 farmer training classes per month in the whole

district, so that at least 2 classes will be held in each electorate per month. The number of farmer training classes held in 1980 were 13, with a total of 150 farmers attending the classes. In 1981, sixty four (64) classes were held and 707 farmers have attended the training classes which is significant when considering the tremendous organisation ability of the Minor Export Crops Department in motivating the growers to attend these classes (Table 12). The training classes held during 1980-81 and the number of farmers who have attended these classes is a definite clue to the farmer interest in this field and benefit that could be accrued from intercropping minor crops under coconut.

The training classes are conducted by one specialist officer with the assistance of the extension officer of the electorates. The classes are usually held in the Agrarian Services Centres. After the classes the growers are taken to the field demonstration sites and the nurseries to expose them to the correct method of culture. As indicated earlier, training class has had excellent response, both permit holders and non-permit holders turning up for the classes. Because of the logistics involved, particularly with respect to transport and accommodation, the classes were later restricted to the permit holders only, who are the potential growers of intercrops. According to the Minor Export Crops Department 90% of the permit holders have been already trained.

3.2.2 Advisory Booklets

As a means of further strengthening the intercropping programme the Minor Export Crops Department has produced an advisory booklet enumerating the importance of the intercropping of coconut lands with detail accounts of the agronomic practices for growing coffee, pepper and cocoa.

The booklet is printed both in Sinhala and English and is available for sale at Rs. 1/-. It can be obtained from the Experimental Officer of the respective division of the district.

Table 12 - Farmer Training Classes

	No. of Classes	No. of Farmers attended
1980	13	150
1981	64	707
Total	77	857

3.2.3 Pitcher Irrigation System

Another important aspect in the establishment and growth of intercrop is the extent of shade provided by the coconut stand. This will be an important factor in selecting small holdings for intercropping particularly with reference to early establishment phase of the intercrop. The death of seedlings of cocoa, coffee and pepper has been a serious problem in the establishment phase of the intercrop. The observation during field investigation showed even 100 casualties due to drought in some seasons. In 1981, during the drought from January to March even fully established pepper plants in the Katugampola electorate had died due to severe water stress although the coffee was not so badly affected. This has been one of the major factors that discourage the farmers in the expansion of intercropping under coconut. The extent of seedling death is also associated with soil type. The heavy soil having a high water holding capacity has a relatively less death rate.

As a means to reduce the number of casualties a pitcher irrigation system has been attempted. In this method a pitcher of one gallon capacity made of clay is used. One side of the pitcher is paved with tar to prevent water loss while the other side facing the seedling is able to slowly leak water to the root zone. The use of the pitcher irrigation has been beneficial specially during prolong droughts and refilling of the pitcher once in two weeks appear to be a satisfactory arrangement depending on receipt of rainfall. The pitcher could be obtained at Rs. 1.50 and for large extents of intercrops pitcher irrigation would mean considerable expenditure.

In areas where rainfall is uncertain even during the planting season the use of the pitcher irrigation will be beneficial during the first year. Thereafter the pitcher should be discontinued to allow the

root system to proliferate, so that it could develop some resistance to help in tiding over short period of drought.

Field observations indicate that the pitcher irrigated plants were able to withstand drought compared with other plants although large scale use of pitcher irrigation is very cumbersome, labour consuming and expensive. In some areas where water is limited refilling a pitcher during drought period also can be problematic.

Another way to overcome the effect of drought is to encourage the use of organic matter from the first year itself. The use of coir dust which is available freely in the coconut growing areas as a mulch mixed with weeds and other materials available will be beneficial. In most instances it will be desirable to leave a mulch near the base of the plant at the time of establishment to prevent excessive moisture evaporation from the root zone. The importance of filling the planting hole with organic materials such as compost farm yard manure and other animal manure need to be stressed.

Chapter Four

PROGRAMME OF THE COCONUT CULTIVATION BOARD

4.1 TARGET ACREAGE SET BY THE COCONUT CULTIVATION BOARD

The target acreage for the cultivation of minor export crops in the *yala* and *maha* season of each year are fixed by the Coconut Cultivation Board. The original project targets over the entire project period were as follows:

Coffee	- 3,000 acres
Pepper	- 3,000 acres
Cocoa	- 2,000 acres
Other crops (Pasture)	- 2,000 acres
Total	-10,000 acres

The target acreage for which Coconut Cultivation Board has applied for planting materials in 1980, were 1000 acres of coffee, 500 acres of pepper and 125 acres of cocoa. Similarly the target acreages in 1981 were 1690 for coffee, 899 for pepper and 148 acres for cocoa. The project targets differ from that of targets for which plant materials have been requested. Thus in 1981 the project has fixed a target acreage of 600 acres of coffee, 300 acres of pepper, 200 acres of cocoa and 400 acres of pasture based on the potential that exists in the identified electorates for intercropping. Some other targets have also been fixed in consultation with the Hon. District Minister and in 1981 they were 1100 acres of coffee, 500 acres of pepper, 200 acres of cocoa and 3000 acres of pasture.

The targets for cultivation and achievement are given in Tables 13&14. In 1980 the annual target for coffee was 625 acres, while the amended

acreage was an extra 375 acres making a total of 1000 acres. The total acreage anticipated for growing in the seven electorates (Project area target) was 979 acres. The actual area grown to coffee or the extents for which the first instalment of the subsidy was paid for was 566.25 acres, which shows an achievement of 90.6% of the annual target and 58.8% of the project target. In 1981 the annual target was increased to 1100 acres of coffee while the project area target was 1299 acres. Unlike in 1981, the actual extent grown was less than that of the previous year and amounted to 372.5 acres. The achievement was only 33.9% of the annual target and 28.7% of the project area target.

In the case of pepper, the annual target for 1980 was 250 acres, while the project area target was 551.5 acres. The actual extent cultivated was 227.5 acres, indicating an achievement of 91% of the annual target and 41.25% of the project area target. In 1981 the annual target was increased to 300 acres and the project area target remained at 452.75 acres. As in the case of coffee the achievement was 88% of the annual target and only 19.4% of the project area target.

In cocoa, 1980 annual target was 125 acres, but the actual area cultivated was 170 acres. The targets were therefore exceeded by 36%. Most of the cocoa acreage was found in the Mawathagama electorate (124.5 ac.). Again in 1981 annual target was increased to 200 acres, but the project area target remained at 75.5 acres. The achievements were far below expectations of the annual target, (23.75%) and the project area target (62.9%).

Pasture intercropping set an annual target of 200 acres in 1980, while the actual acreage cultivated was 558, mostly concentrated in the Kuliyapitiya electorate (467 acres). In this instance also the project target were exceeded by 79%. As in the case of other inter crops the project targets were amended in the subsequent year while the annual target was 400 acres, and the project area target was 263 acres. The achievements were 55.6% of the annual and 84.5% of the project area target. As in the previous year most of pasture intercropping was concentrated in the Kuliyapitiya electorate.

Table 13 - Targets for Cultivation and Achievement in 1980
(For Kurunegala, Mawathagama, Polgahawela, Dambadeniya, Kuliyapitiya and Katugampola electorates)

Subsidy scheme	Coffee ac.	Pepper ac.	Cocoa ac.	Pasture ac.
Annual target	625	250	125	200
Amended target	375	250	125	-
Project target	979	551.5	122	200
Acreage approved for cultivation	1164.5	395.5	157.5	314
Cultivated acreage	566.25	227.5	170	558
Cultivated percentage of annual target	90.8%	41.25%	139.3%	279%
Amount paid Rs.	363,894.03	336,772.79	93,528.70	78,425.00

Table 14 - Targets for Cultivation and Achievements, in 1981
(Same electorates as in Table 13)

Subsidy scheme	Coffee ac.	Pepper ac.	Cocoa ac.	Pasture ac.
Annual target	1100	300	200	400
Amended target	1100	500	200	300
Project target	1299	452.75	75.5	263
Acreage approved for cultivation	726.5	185.0	40.25	956.5
Cultivated acreage	372.5	88.0	47.5	222.25
Cultivated percentage of annual target	33.9%	29.3%	23.75%	55.56%
Cultivated percentage of project target	28.7%	19.4%	62.9%	84.5%
Amount paid Rs.	240,309.81	90,268.44	26,704.00	89,100.00

The progress as at December 1981 shows that the achievements are far below the expectations. This is shown in Table 12.

Table 15 - Target Acreage and Achievements

	Target 1981	Progress as at December 1981	% achievement
Coffee	600 (1100)	415	69
Pepper	300 (500)	85	29
Cocoa	200 (200)	48	24
Pasture	400 (3000)	426	115.5

(Figure in paranthesis have been fixed in consultation with the Hon. District Minister, Kurunegala).

According to the data available there has been a considerable interest among small holders for intercropping in the first year of the project and for various reasons a decreasing trend has arisen in the subsequent year. A perusal of the information on the applications for permits, their approval and the payments of the first instalment of the subsidy explains the reasons why the set targets by the Coconut Cultivation Board were not achieved (Table 16 - 19).

In 1980, 1299 growers have applied for permits to cultivate coffee in 1256.5 acres of which 1251 permits were approved for 1164.5 acres (Table 16). The subsidy was paid for 489 permit holders for 566 acres. Similarly in 1981 there were requests for 1149 permits with an acreage of 816.5 of them 1098 permits were approved for 726.5 acres.

Table 16 - Requests for Permits, Approval and First Subsidy Payments

COFFEE - 1980

Electorate	Target Acreage	Requests Permits	Requests Acreage	Approval Permits	Approval Acreage	Payments Permits	Payments Acreage	Amount Rs.
Kurunegala	164	149	159	149	159	86	114	71688.18
Mawathagama	71	41	57½	41	84½	13	21½	12873.49
Dodangaslanda	111	186	205½	186	205½	49	80½	52731.15
Polgahawela	152	125	107	125	107	49	51½	33460.48
Dambadeniya	156	533	266½	533	266½	223	180¾	119915.00
Kuliyapitiya	105	164	220	137	171	43	49¾	31868.00
Katugampola	220	101	241	80	171	26	68¼	41277.73
Total	979	1299	1256.5	1251	1164.5	489	566.25	363814.03

COFFEE - 1981

Kurunegala	118½	122	77¼	122	77¼	47	18¾	16094.87
Mawathagama	82½	94	58½	94	58½	23	18	14090.15
Dodangaslanda	417	255	165¾	255	165¾	61	52¾	44848.37
Polgahawela	165	162	98½	162	98½	91	60	40097.76
Dambadeniya	125	97	84½	82	63	79	71	38600.67
Kuliyapitiya	180	154	187½	118	119	44	61¼	54955.96
Total	1088	884	672	833	582	345	282	208687.78

As shown earlier the subsidy payment was made for 460 permit holders and for 372.5 acres. Similarly for pepper in 1980 total requests for permits was 360 for 426.25 acres of which 349 permits were approved for 395.5 acres but the payment of the subsidy was made only for 172 permit holders with an acreage of 227.5 (Table 17). In 1981 only 237 applications were made for 222 acres of which 221 permits were approved for an acreage of 185 acres. The subsidy was paid for 87 permit holders having an extent of 88 acres.

Table 17 - Request for Permits, Approval and First Subsidy Payment

Electorate	Target acreage	Requests Permits	Requests Acreage	Approval Permits	Approval Acreage	Payment Permits	Payment Acreage	Amount Rs.
PEPPER 1980								
Kurunegala	76	43	55	43	55	32	41¾	32716.75
Mawathagama	41	21	28½	21	28½	10	17½	18632.00
Dodangaslanda	100	42	58½	42	58½	8	32½	137603.00
Polgahawela	94½	55	48½	55	48½	16	14½	15892.00
Dambadeniya	100	127	107	127	107	86	75¾	83174.75
Kuliyapitiya	70	39	63¾	29	33	08	13½	16598.29
Katugampola	70	33	65	32	65	12	32½	32158.00
Total	551.5	360	426	349	395.5	172	227.5	336774.79
PEPPER 1981								
Kurunegala	42¾	36	36½	36	36½	9	6	6826.00
Mawathagama	33	34	20¾	34	20¾	6	9	10272.00
Dodangaslanda	77	35	31¼	35	31¼	9	12	13152.00
Dambadeniya	80	32	18½	32	18½	26	23	25441.78
Katugampola	55	32	66	18	32	2	2	2370.25
Kuliyapitiya	45	15	13½	13	10½	14	17	12655.87
Polgahawela	119	53	35½	53	35½	21	19	19540.54
Total	452	237	222	221	185	87	88	90258.44

In the case of cocoa 38 requests for permits were received for 147.5 acres and all were approved (Table 18). The payment of the study was made for 24 permits and 170 acres have been grown. In 1981 all 23 requests for permits were approved for 40.25 acres, but only 8 permit holders received the first subsidy for 47.5 acres. (The excess acreage than that is stipulated in the permits for 1980/81 and due to overlapping of permits for 1979 applications).

Table 18 - Requests for Permits, Approval and First Subsidy Payment

COCOA 1980

Electorate	Target acreage	Request Permits	Request Acreage	Approval Permits	Approval Acreage	Payment Permits	Payment Acreage	Amount Rs.
Kurunegala	15	3	17	3	17	4	14	7580.00
Mawathagamá	17	5	76	5	76	6	124½	71365.00
Dodangaslanda	36	5	5	5	5	4	9	4913.50
Polgahawela	34	12	15	12	25	7	6	3118.00
Dambadeniya	20	13	34½	13	34½	3	16½	6552.00
Total	122	38	147.5	38	157.5	24	170	93528.70

COCOA 1981

Kurunegala	-	3	2½	3	2½	-	-	-
Mawathagama	10	5	13½	5	13½	3	34	19334.00
Dodangaslanda	45	11	20¼	11	20¼	1	1	546.00
Polgahawela	13	1	1½	1	1½	-	-	-
Dambadeniya	7½	3	2½	3	2½	4	12½	6824.00
Total	75.5	23	40	23	40	8	47.5	26704.00

Intercropping with pasture showed similar trend and in 1980 all 62 requests for permits were approved, although only 26 permit holders received the payment of the subsidy was made only for 17 permit holders with an extent of 222.25 acres.

Table 19 - Requests for Permits, Approval and First Subsidy Payment

PASTURE 1980

Electorate	Target acreage	Request Permits	Request Acreage	Approval Permits	Approval Acreage	Payment Permits	Payment Acreage	Amount Rs.
Kurunegala	20	10	22	10	22	5	11	1575.00
Mawathagama	33	1	5	1	5	1	3	612.50
Dodangaslanda	11	1	2	1	2	-	-	-
Polgahawela	29	4	16	4	16	-	-	-
Dambadeniya	17	9	18	9	18	-	-	-
Kuliyapitiya	50	23	310½	23	168	14	467	64375.00
Katugampola	40	14	124	14	83	6	77	11962.50
Total	200	62	497.5	62	314	26	558	78524.00

PASTURE 1981

Kurunegala	45	9	36¾	9	36¾	6	29½	12000.00
Mawathagama	9	3	11½	3	11½	-	-	-
Dodangaslanda	8	2	4½	2	4¼	1	10	4000.00
Polgahawela	42	16	65½	16	65½	-	-	-
Dambadeniya	19	4	22	4	22	1	1	400.00
Kuliyapitiya	60	24	1550¼	24	383	6	173¾	69900.00
Katugampola	80	44	1094¼	44	433½	3	7	2800.00
	263	102	2785	102	956.5	17	222	89100.00

Except in a very few cases and for all four intercrops the requests for subsidy in the first stage has been approved. The problem has been that the first subsidy was paid only to a very small proportion of the approved permit holders. The percentage of approved permit holders receiving the subsidy are shown in Table 20.

Table 20 - Percentage of Approved Permit Holders Receiving Subsidy Payment

	Coffee	Pepper	Cocoa	Pasture
1980	48	57	63	41
1981	63	47	34	16

The bottleneck has been at the stage of the payment of the first instalment of the subsidy. The ownership of land, agronomic unsuitability of soil, excess shade due to the age of coconut trees, improper methods of planting, discouragement due to delays in the payment of the subsidy, and the dependence of other sources of income by the growers etc. could be listed as possible causes as gathered from the interviews held with the project personnel.

4.2 SUBSIDIES

The Coconut Cultivation Board provides subsidies to the growers as a means to encourage intercropping. The subsidies are provided over a period of 3 or 4 years as follows:

Table 21 - Provided Amounts of Subsidy

	Coffee	Pepper	Cocoa	Pasture
1st year	775.00 (1200.00)	1250.00 (1750.00)	700.00 (1050.00)	175.00 (400.00)
2nd year	350.00 (550.00)	375.00 (525.00)	300.00 (650.00)	125.00 (400.00)
3rd year	250.00 (375.00)	250.00 (350.00)	250.00 (550.00)	- -
4th year	-	-	250.00	
Total	1375.00 (2125.00)	1875.00 (2625.00)	1500.00 (2250.00)	300.00 (800.00)

The subsidy was increased in 1981 and figure in parenthesis shows the enhanced subsidy. The subsidy payments have been based on the approximate cost of cultivation of the intercrops. A more reliable estimate of the cost of cultivation of the intercrops are shown in Tables 22-25.

Table 22 - Cost of Cultivation of Coffee under Coconut

A. Input cost	1st year	2nd year	3rd year	4th year
1. Planting materials	270	-	-	-
2. Pesticides	100	100	-	-
3. Cattle manure	40	-	-	-
4. Fertilisers	130	165	260	260
Total	540	265	260	260
B. Labour cost	1380	735	890	990
Total (A + B)	1920	1000	1150	1250

Table 23 - Cost of Cultivation of Pepper under Coconut

A. Input cost	1st year	2nd year	3rd year	4th year
1. Planting materials	540	-	-	-
2. Pesticides	75	100	100	100
3. Gliricides stakes	180	-	-	-
4. Fertilisers	100	125	160	200
5. Cattle manure	40	40	60	60
Total	935	265	320	360
B. Labour cost	1400	1040	1020	1200
Total (A + B)	2335	1305	1340	1560

Table 24 - Cost of Cultivation of Cocoa under Coconut

A. Input cost	1st year	2nd year	3rd year	4th year
1. Planting materials	270	-	-	-
2. Cattle manure	40	-	-	-
3. Pesticides	100	50	50	50
4. Fertilisers	120	200	225	260
Total	530	250	275	310
B. Labour cost	1380	735	700	715
Total (A + B)	1910	985	975	1025

Table 25 - Cost of Cultivation of Pasture under Coconut

	1st year	2nd year	3rd year	4th year
A. Labour cost				
1. Ploughing (Tractor)	400	-	-	-
2. Harrowing (Tractor)	225	-	-	-
3. Planting	125	-	-	-
4. Weeding	175	35	35	-
5. Fertiliser application	35	35	35	-
6. Cutting of grass	250	450	450	-
Total	1210	520	520	-
B. Input cost				
7. Planting material	30	-	-	
8. Fertilisers	155	290	290	
Total (A + B)	1395	810	810	

The expenditure has been categorised into input cost and labour cost, with the assumption that most of labour will be provided by the grower himself. If labour is provided by the grower for intercropping with coffee, pepper and cocoa, the new subsidy appears to be sufficient. This will be particularly so as the extents of coffee, pepper or cocoa grown are very small. The exception is in the case of pasture, which is a completely different intercrop than the three perennial crop species mentioned above. Generally pasture extents are large and need 4 or 2 wheeled tractors for land preparation, the cost of hire which at present day charges amounts to about Rs. 625/- per acre. Further the establishment of the pasture also needs labour and the grower will be unable to handle the planting operation himself. Weeding, inputs as well as harvesting of the grass during the year also needs monetary provisions. Therefore, our view is that the pasture subsidy should be further increased to at least Rs. 1000/- per acre in the first year with second year and third year allocations of Rs. 800/-. As pasture could open up new avenues for employment in the villages besides its effect on family income and human nutrition and this step will be of considerable importance for the upliftment of the rural population of the district.

Chapter Five

COFFEE

5.1 SURVEY DATA

Sixty six growers engaged in the cultivation of Coffee as an intercrop were surveyed during the months of November and December 1981. The selected growers belong to five electorates in the Kurunegala distrtict.

Electorate	Number of growers
Dodangaslanda	15
Dambadeniya	23
Katugampola	14
Polgahawela	10
Mawathagama	04
	66

5.1.1 Size of land owned by the cultivators

The holdings when examined on an electoral basis, Mawathagama had the lowest number of Coffee growers, while Dambadeniya had the highest. In Mawathagama electorate 75% hold less than 10 acres of land. The distribution of the size of the land holdings on an electorate basis is indicated in the table below:

Table 26 - Size of Land Holdings of Cultivators

Area	0-2 ac.	2-5 ac.	5-10 ac.	10-25 ac.	25 ac.	Total
Dodangaslanda	11	-	1	1	2	15
Dambadeniya	9	7	1	3	3	23
Katugampola	11	1	-	-	2	14
Polgahawela	-	7	3	-	-	10
Mawathagama	-	2	1	-	1	04
Total	31	17	6	4	8	66
Percentage	47	26	9	6	12	100

5.1.2 Land Utilisation Pattern

Table 27 - Total Extent of Coffee under Coconut in the Sample

Holdings	% of cultivators	Total Ac. of coconut	Ac. under coffee	% of coffee Ac.
2 Ac.	47	46	24	34
2- 5 Ac.	26	55	11	16
5-10 Ac.	9	45	6	8
10-25 Ac.	6	70	5	7
25 Ac.	12	693	25	35
Total	100	909	71	100

The total extent of land under coconut in the sample is 908 acres. Out of the total acreage only 7.73% has been intercropped with coffee (Table 27). From the table it is clear that smaller the holding size larger is the area allocated for the cultivation of coffee. As the holding size increases the land allocated for coffee has decreased (Table 28). The government policy in allowing subsidies and lack of interest on the part of large owners has caused this situation.

The intercropping of coffee when examined on the electoral basis indicates that Mawathagama electorate has devoted smallest extent of their coconut land for intercropping with coffee.

Polgahawela and Katugampola electorates had the highest percentage of land intercropped with coffee. The highest acreage however was in Dambadeniya electorate (Table 28).

Table 28 - The Percentage of Land Allocated for Coffee Cultivation - Electoratewise

Electorate	Total Coconut acreage	Total acreage under Coffee	Percentage
Katugampola	150	19.25	12.83
Dodangaslanda	202.5	18.00	8.89
Dambadeniya	439.75	23.25	5.29
Polgahawela	41.00	5.50	13.41
Mawathagama	85.00	4.25	5.0

5.1.3 Space Available for Intercropping

The space between palms varied in the growers fields and its distribution is given below:

Table 29 - Space Available for Intercropping with Coconut

Space between palms	Percentage of growers
20 x 20	24.49%
22 x 22	28.57%
24 x 24	32.65%
25 x 25	14.29%

Although there is a variation, the space between palms was sufficient to permit coffee cultivation. The selection of growers for the payment of subsidy for coffee cultivation in part has depended on its spacing of the coconut palms.

5.1.4 The Present Situation of Coffee as an Intercrop

Among the selected growers little over 50% have expressed their willingness to expand and improve the cultivation. Eight percent of the

selected growers were interested in its cultivation but faced with difficulties in acquiring technical know-how from the relevant officers. A similar number indicated drought as the limiting factor. Another 6% of the growers complained about the scarcity of planting material. Among those not interested, 17% complained about the unsuitability of land. A group of 10% reflected hazards such as unavailability of irrigation water. Another 13% were interested in growing other crops such as banana while 4% have looked upon cultivation of coffee as troublesome and tedious. Surprisingly, increase in the price of fertiliser, high labour wages and lack of time were not reflected as limiting factors.

The lack of knowledge about its potential, non availability of suitable land, uncertainty of rain, procedural difficulties in getting subsidies are some of the pressing issues, for which the respondents anticipate remedial measures, if coffee is to be successfully intercropped with coconut.

5.1.5 Plants Establishment and Survival

The selected growers have planted 25,198 plants and 87% of them have survived. The age of plants as at the time of survey was about three years. Therefore, the survival rate of coffee has been higher (94%) when plants are at the age group of 0-½ year. The death rate has increased to 23% when they are ½-1 year old. When the plants are 1-2 years old the death rate is only 8%. When the plants reach the age of two years the death rate has again increased and some of the occurrence of continuous drought during various years and it cannot be attributed to any physiological causes.

Table 30 - Survived Rate of Coffee Plants

Age group of Coffee	No. planted	No. established	Survived	Dead %
0-½ yr.	4358 (17%)	4115 (19%)	94%	6
½-1 yr	7660 (30%)	5880 (27%)	77%	23
1-2 yrs.	9840 (39%)	8070 (42%)	92%	8
2 yrs.	5340 (21%)	2775 (13%)	83%	17
Total	27198	20840	87	13

5.1.6 Age of Plants

The age of plants, at the time of survey, varied from two weeks to three years depending on the date of planting.

Table 31 - Age of Plants with Acreage

Age	No. of growers	Acreage	No. of plants	%
0-½ yr.	15	12	4115	19
½-1 yr.	25	21	5880	27
1-2 yrs.	18	28	9070	41
Over 2 yrs.	08	9.30	2775	13
Total	66	70	21840	100

5.1.7 Source of Plants

The Coconut Cultivation Board obtain seedlings from the Minor Export Crops Department and privately owned nurseries and distribute them through the cultivation officers of the Board to the growers. The Board has obtained 78,995 plants during *yala* and 147,155 plants during *maha* 1981 from the department and private nurseries. According to the growers the officers concerned have attended to the farmers' problems and have offered valuable advice. About 98.5 of the growers have received such advice annually.

5.1.8 Attitude of the Neighbour Cultivators

The attitudes of the non-growers towards intercropping of coffee varies accordingly with the success and failure of the neighbours. Ninety percent of the selected growers have taken up the cultivation of coffee due to the success achieved by the neighbour. Cultivation of coffee was more common in small holders, mostly to improve their living standards by having better income. But most of them were unable to venture into it due to lack of initial capital that was needed before first subsidy payment. Because of this they had grown other cash crops to meet their financial requirement. At this stage selection of crop became a problem to the grower. The experiences and hardships faced by the grower such as non availability of water, difficulties encountered

in acquiring technical know how, unsuitability and lack of land and unsuccessfulness in cultivation among some of the neighbours had made them inactive. Most of the small holders were of the view that coffee cultivation will be a success provided a proper start is made without any *ad hoc* arrangements.

5.1.9 Extension Services

Most growers reported that they have frequent contact with extension personnel. Since the growers lack knowledge pertaining to intercropping, the Department of Minor Export Crops has organised training courses for their benefit. The Department had its demonstration plots in the lands of selected growers who took part in this programme. This type of training classes and demonstration are very valuable to growers to update their knowledge on intercropping. Due to the persuasion of the extension officers the selected growers have started cultivating coffee. Another 3% have started this cultivation by observing others growing coffee in the neighbourhood.

5.1.10 Factors Affecting the Selection of a Particular Crop

Several factors influence the decision to select a suitable intercrop. The first factor being that it should be an approved intercrop by the Coconut Cultivation Board. This has influenced 40% of the growers. Twenty four percent of the growers selected this as it is suitable for the area. Another 20% selected this crop because of their previous experience. A few of them started this through experience gained from neighbours.

5.1.11 Utilisation of Subsidy

The amount of subsidy allocated per acre is Rs. 1367/- and it is paid to the grower in three instalments. Seventy Four percent of the selected growers have obtained their first instalment and the others have not received any. Another 14% of the earlier mentioned group have received their second instalment, this when compared with the first instalment recipients was very negligible. In connection with the payment of subsidy, the growers had to face various problems. Approximately 14% of the selected growers who obtained the subsidy reported the long delay in the payment of subsidy, another 16% had the difficulty in

obtaining the recommendation from the relevant officers while others had no difficulty in obtaining subsidies. The selected growers who did not obtain the subsidy were faced with various problems. Seventeen percent of them reported the delay on the part of relevant officer visiting their block, 12% of the growers abandoned the idea of getting the subsidy because of the long time lapse. Similar percentage assumed it to be a difficult task and another 6% were under the impression that officers concerned will not extend their cooperation. However, 47% of the growers have planted coffee recently and the time gap is too short to obtain the recommendation of the relevant officer regarding the payment of the subsidy. Others have shown no interest in getting subsidy as it was not compulsory to every grower.

5.1.12 Agronomic Practices

(a) use of fertiliser

Among the selected growers 77% have applied fertiliser to the intercrop. The type of fertiliser used varies, 33% of the growers used special coconut mixture on the instruction of the Coconut Development Officers. Approximately 18% of the growers had used Urea and another 16% had used MEC mixtures. The less use of the MEC mixture was due to its non availability. Farm yard manure and V_1 mixture were used only by few growers. Most of the selected growers have used coconut husks for soil and moisture conservation.

Among the growers 39% have fertilised their crop biannually, while 28% annually, 12% quarterly and rest occasionally. Some growers have manured the crop once after replanting. All growers were advised by the Coconut Development Officers to use one ounce in the first year and to increase the dose with the age of the plant.

(b) Use of agro-chemicals

The growers have not used any pesticides although some incidences of pest attacks had occurred. Due to unawareness of remedial measures the growers have not used any insecticides. According to this study even the officers concerned were not aware of the remedial measures and this had been a problem to both officers and farmers.

(c) Irrigation

Most growers watered the plants by drawing and pumping water from wells. Very few of the growers used other methods, but they were not appropriated with climatic condition of the area.

Table 32 - Watering System of Plants

Watering Source	No. of growers
Drawn from well	45
Pumped from well	02
Drawn from streams and canals	04
Pitcher irrigation	04
No irrigation	11
Total	66

5.1.13 Problems Associated with Intercropping with Coffee

Of the selected growers 68% expressed drought as the main problem for growing coffee. Besides this, the growers ranked increased price of fertiliser as another problem. The third factor has been unsuitability of land for growing of coffee. This accounted for 11% and for 6% of the growers this was a secondary problem. The scarcity of land, lack of capital and high wage rates have also been mentioned by few farmers.

5.2 COCOA

Fourteen growers selected were from southern and eastern electorates of the Kurunegala district. These areas have been rated as suitable for the cultivation of cocoa, while the rest of the district is agro-ecologically unsuitable for its cultivation (Table 33). Electoratewise distribution of the sample is given below:

Table 33 - Electorates and Survey Sample

Electorate	Number of growers
Dodangaslanda	6
Mawathagama	2
Dambadeniya	4
Polgahawela	2
Total	14

5.2.1 Size of Holdings Owned by the Cultivators

The coconut is the main crop in these electorates and the owners have accepted cocoa as the most suitable intercrop. According to the data obtained from these growers, the land holdings can be categorised into five groups (Table 34).

It reveals from the study, that more than 86% of the growers who have undertaken to intercrop cocoa on their land own less than 5 ac. and this is in accordance with the project objectives.

Although more than 64% of the growers in the district hold lands less than 2 ac. in extent, Mawathagama electorate presents a special case where one of the selected growers owned more than 25 ac. of land. Similarly in the Polgahawela electorate too one of the selected growers hold land grouped under 5-10 ac. Therefore these two growers cannot be considered as representatives of the electorates concerned as they are estate owners.

Table 34 - Size of Land Holding of the Selected Growers

Area	0-2 ac.	2-5 ac.	5-10 ac.	10-25 ac.	Over 25 ac.
Dodangaslanda	3	2	1	-	-
Polgahawela	2	-	-	-	-
Dambadeniya	3	1	-	-	-
Mawathagama	1	-	-	-	1
Total	9	3	1	-	1
Percentage	64	22	7	-	7

5.2.2 Land Utilisation Pattern

The selected growers from the four electorates owned 122.75 ac. of land. Out of these is 16.5% of cocoa and it extends to 17 ac. This extent is significantly small when compared with that devoted for intercropping with coffee. In general, owners below 2 ac. have utilised 53% of their coconut land for intercropping with cocoa, those owning 2-5 ac. has used 48% and those owning 5-10 ac. has used 33% for intercropping. The group which owns land above 25 ac. has utilised only 1% for cocoa. This indicates that when acreage increases, the percentage

of land under cocoa decreases in all four electorates. This may have been partly due to the

(i) policy adopted by the Coconut Cultivation Board in approving lands below 5 ac. for intercropping with cocoa;

(ii) as the crop acreage increases the risk involved is high and the growers has to face many problems in managing the plantations.

The pattern of land utilisation also differs among electorates. Thus in the case of Dambadeniya electorate the utilisation of land for intercropping is as follows:

(i) Below 2 ac.	-	80% of the coconut land
(ii) 2-5 ac.	-	73.33% "
(iii) 5-10 ac.	-	33.33%

A different situation exists in Polgahawela electorate where those owning 2 ac. and below, have utilised only 25% of their coconut land for cultivating cocoa. The reason attributed was the unsuitability of land and the increase in the price of fertilisers and other inputs.

5.2.3 Suitability of Coconut Land for Intercropping with Cocoa

The suitability of coconut land for the cultivation of cocoa was considered on an electorate basis. In the Dodangaslanda electorate among the growers there were 10½ ac. of land suitable for intercropping, where the age of coconut plantation is either above 25 years or below 5 years, and the spacing between coconut plants 24 x 24 feet which is considered a pre-requisite for the cultivation of cocoa. The Polgahawela electorate had only one acre of land under cocoa because the lands in that area were unsuitable for intercropping due to spacing and age of the coconut palm. The extent of land over 25 years and below 5 years is 25% and the spacing is 23 x 23 ft. Dambadeniya and Mawathagama electorate was highly suitable for intercropping because both the electorates had correctly spaced palms which are more than 25 years old, besides their agro-climatic suitability and some previous experience among growers.

5.2.4 Plants Establishment and Survival

The selected fourteen growers have planted 4286 cocoa plants in the 17 acres and 2950 plants or 67% had survived.

It is clear that the percentage of survival increased with increase in holding size. The growers having less than ½ acre retained only 42% of the plants, while those owners of ½-2 ac. had a survival of 59.5%. In the holding of 2 ac. and above plants survived was 88.5%. This may be due to the low economic status of the smallholder. According to the small holders the low survival rate was due to drought and virus diseases,high price of fertiliser and unsuitability of land (Table 35).

Table 35 - Plant Establishment and their Survival

Acreage	Percentage of growers	Total inter-cropped area	No. of plants estab.	No. of plants remaining	% survived
Below 0-5	43	3	940	395(42%)	14
0-5 to 2	38	6	1410	840(60%)	28
Over 2	21	8	1936	1750(84%)	58
Total	100	17	4286	2985(69%)	100

5.2.5 Age of Plants

In general the surviving plants of the selected growers belonged to different age groups due to the different planting times. Some were only 3 to 4 weeks old, when the survey was undertaken, while others are over two years old (Table 36).

The majority of the plants surviving belonged to the age group of 1-2 yrs.(39%) and lowest were in the age group of ½ to 1 yr (12%). Plants which belong to the age group of over 2 yrs. or 20%, were distributed at the commencement of the subsidy scheme. Instances where the growers have lost all established plants were also reported. Two cases of 100% casualties have been reported from Dodangaslanda electorate when death occurred they were in the age group of ½-1 yr and 1-2 yrs. old. The reason for the death was the persistent drought which prevailed in 1981. The Mawathagama electorate has only 415 plants in the age group of 6 months or less and 310 plants in the age group of below 1 yr.

Table 36 - Age of Cocoa Plants with Acreage

Age group	Percentage of farmers	Acreage	No. of plants	% of plants
0-½ yr.	21	3	830	28.14
½-1 yr.	36	3	355	12.03
1-2 yrs.	29	7.5	1165	39.33
Over 2 yrs.	14	3.5	635	20.50
Total	100	17.0	2985	100.00

Considering the age and death of plants it is seen that the percentage of survival of plants in the age group of six months is 91% and it decreases with age. Normally the seedlings are planted with the onset of rains and plants establish themselves well at the initial stage, but later, when the rains fail the death rate increases. This may be the possible reason for a smaller number of surviving plants in the age group of ½-1 yr. and even at the later stages of growth (Table 37).

Table 37 - Number of Plants Established and Survival

Age group	No. of plants established	No. of plants surviving		% dead plants
		No.	%	
Below ½ yr.	888	830	90.84	9.16
½-1 yr.	650	355	54.62	45.38
1-2 yrs,	1750	1165	66.67	33.33
Over 2 yrs.	1030	635	58.74	41.26
Total	4318	2985	Av. 68.83	Av. 31.17

5.2.6 Spacing of Plants

Even though the spacing between the coconut palms differ with estates (25'x25') and homesteads (22'x26 or 22'x22') in all electorates, the growers have planted their cocoa plants correctly at a spacing of 8'x10' or 10'x10' and they have adopted the triangular or rectangular method of planting. The knowledge for this must have been made available to the grower by the Coconut Development Officers of the respective electorates. This is also a requirement for the approval of the subsidies.

5.2.7 Source of Plants

The Coconut Cultivation Board obtains the seedlings from the Department of Minor Export Crops and privately owned nurseries and distributes them to the grower through the cultivation officers of the Board. The Coconut Cultivation Board has obtained 1805 plants during *yala* and 8923 plants during *maha* 1980 from the Department and private nurseries.

5.2.8 Extension Services

Due to the pursuasion by the Coconut Cultivation Board Officers, a high percentage of the selected growers have taken up to the cultivation of cocoa as an intercrop. The percentage is about 42%. Out of this 21% of the growers have selected this crop in order to utilise their land for intercropping and 14% of growers cultivate cocoa as a source of extra income. The others have taken it up at their own interest.

Coconut Development Officers have made available their experience and knowledge essential for intercropping and have extended their fullest corporation to make this effort a success. Ninety three percent of the growers have followed the advice given by the officers and the rest 7% were not satisfied with their advice. About 43% reported that these officers visit them monthly and 21% reported that they visit once in two months, 14% complained that these officers never visited since they planted cocoa in the field. The others state that these officers visit them once in three months or in six months. The cultivators visiting the Coconut Cultivation Board Officer is very rare and only in one instance that a farmer had visited an officer to seek advice.

The Department of Minor Export Crops has organised training courses for the benefit of the intercrop growers, only 25% of the selected growers have attended those classes, 75% of them were unable to attend even though some of them were invited, which shows the disinterest on the part of the growers.

About 86% of the growers were benefitted through the instructions and 7% of them were not benefitted. The rest did not take any interest over the instructions.

5.2.9 Factors Affecting the Selection of Cocoa

The previous experience gathered in growing this crop and its suitability to the environment made the selected growers to have this crop as an intercrop. Twenty nine percent (29%) of the selected growers perferred this crop just because they had experience in growing it, another 29% selected it owing to its ecological suitability, 14% of the growers selected merely because the officers recommend it as an intercrop and 7% as a means to obtain better income. The other growers too had interest in growing it because of extra income but lack of land, price increase of fertilisers, lack of irrigation facilities etc., prevented their growing and expansion of cocoa as an intercrop.

5.2.10 Expectations of Expansion of Cocoa as an Intercrop

About 57% of the growers intend expanding cultivation of cocoa, while 43% do not intend to do so. The growers who intend expanding the cultivation are faced with problems like lack of land, unsuitability of existing land, increase in price of fertiliser and high labour wages. The growers who are dissatisfied with the cultivation of this crop are faced with problems such as lack of land (33%) and administrative problems (17%). These growers while appreciating the value of intercropping, plans to change over to other crops which are easy to manage and those that do not require any processing.

5.2.11 Utilisation of Subsidy

Forty three percent (43%) of the selected growers enjoyed the benefit of the subsidy until November 1981. When this study was in progress, 57% of the selected growers had not shown keen interest to obtain the subsidy as it was not essential for them. Among those not interested, 25% stated, that officers concerned were not interested in helping them.

Another 13% of the growers revealed considerable delays in getting it, 13% stated that their plantation were not upto standards fixed by the Coconut Cultivation Board to get the subsidy. Rest of the growers who has not taken any interest over subsidy has planted the intercrops now and, are awaiting their subsidy. Forty three percent (43%) of the selected growers have received the first payment while 57% have not

received even the first premium. No grower has received the second payment of the subsidy.

5.2.12 Agronomic Practices

(a) Uses of Fertiliser

Sixty four percent (64%) of the selected growers have used fertiliser while others have not used any fertilisers or manures. Of selected growers who used fertilisers 33% have used coconut manure and rest have used V_1 paddy fertiliser mixture.

With reference to time of application, 33% have used fertilisers once a year, 22% have used twice an year and 11% have used once in three months. At the first application they have used 01 oz. per plant and on second $1\frac{1}{2}$ - 2 ozs. per plant and, as the plant grows they have increased the dosage per plant although the exact quantity applied, cannot be obtained.

(b) Use of Agro-chemicals

Agro-chemicals are not used much at present and only 29% of the selected growers used Malathion as an insecticide. Apparently there has been no occasion to use agro-chemicals except for the control of white ants.

(c) Irrigation

When well water was available 64% of the growers have used well water to irrigate plants. Seven percent (7%) have used water from various sources by pumping and 29% have not watered the plants. In the drought period of 1981 the scarcity of water was so severe that it was not even available for drinking purposes.

5.2.13 Problems Associated with Intercropping with Cocoa

The growers indicate four major constraints in the intercropping with cocoa. During the past two years drought has been the major problem and 36% of the plants have been adversely affected due to drought. The second problem is the difficulties in obtaining fertilisers because of irregular availability, the third problem is unsuitability of land

selected for growing cocoa and lack of alternate land for the expansion of their cultivations. The fourth is the incidence of pest and diseases while the scarcity of labour and high wage rates have also been mentioned by a few growers. Some growers complain about the delay in getting subsidy, difficulties in encashing cheques and delays involved in the office routine. But majority of the growers had no problems mentioned above.

5.3 PEPPER

5.3.1 The Sample

Seventy growers engaged in cultivation of pepper as an intercrop were surveyed during November and December, 1981. The selected growers belong to five electorates in the Kurunegala District (Table 38).

Table 38 - The Survey Sample - Pepper

Electorate	Number of growers
Dambadeniya	36
Dodangaslanda	18
Mawathagama	10
Katugampola	3
Polgahawela	3
Total	70

5.3.2 Size of Holding owned by the Cultivators

The highest percentage of the growers had the holding sizes of 0-2 acres (46%), followed by 2-5 acres (26%) both accounting for 72% among the selected growers (Table 39). Of the remainder, 12% constituted large estates. The holdings when examined on an electoral basis, Dambadeniya had the highest number of pepper growers, while Katugampola and Polgahawela had the lowest. In Dambadeniya and Dodangaslanda electorates 80% hold less than 10 acres of lands, of which 50% owned less than 2 acres.

Table 39 - The Sizes of Coconut Land Holdings of the Cultivators

Electorate	0-2 ac.	2-5 ac.	5-10 ac.	10-25 ac.	Over 25 ac.	Total	%
Dambadeniya	18	8	5	1	4	36	52
Dodangaslanda	10	7	1	o	o	18	26
Mawathagama	1	4	3	1	1	10	14
Katugampola	2	1	0	0	0	3	4
Polgahawela	1	1	1	0	0	3	4
Total	32	21	10	2	5	70	100
Percentage	46	30	14	3	7	100	-

5.3.3 Land Utilisation Pattern

The total extent of land under coconut belonging to the selected growers is 535.5 acres, cultivated with coconut. The coconut land use ration for intercropping with pepper in the sample is 14%. Among the selected growers, in the smallest coconut land holdings the ratio is higher and in the largest coconut holdings the ratio is smaller (Table 40).

Table 40 - Size of Land Holdings and Distribution

Land holding ac.	% of growers	Total coconut acres	Pepper acres	% pepper extents	Coconut land use ratio for intercropping
0- 2	45.7	42.25	18.00	23	43%
2- 5	30.0	76.75	22.25	29	29%
5-10	14.3	83.5	23.5	30	28%
10-25	3.0	34.5	1.25	2	4%
Over 25	7	298.5	12.5	16	4%
	100.0	535.5	77.5	100	14%

The government policy and lack of interest on the part of large land owners has caused this situation. The intercropping of land with pepper was also examined on electoral basis (Table 41).

Table 41 - Coconut Land Intercropped on Pepper

Electorate	Total coconut acreage	Total acreage under pepper	Percentage
Dambadeniya	354.75	42.5	12
Dodangaslanda	43.25	17.25	40
Mawathagama	121.25	14.25	12
Katugampola	6.00	1.75	29
Polgahawela	10.25	1.75	17
Total	535.50	77.5	14

On this basis Dambadeniya electorate had more coconut land under pepper but the percentage of the (intercropped) land with pepper was low due to large size land holdings. Whereas in Dodangaslanda the total area under this intercrop was low but the percentage allocated was higher due to small size land holdings.

* The Government Policy = The subsidy facilities are limited upto 5 acres of monocrops land.

5.3.4 Suitability of Coconut Land for Intercropping with Pepper

The space between palms varied in the growers field and its distribution is as follows:

Table 42 - Space Variation between Palms

Space between palms in feet	Total acreage
20x20	28.5
21x21	34.5
22x22	93.25
24x24	193.0
25x25	33.25
26x26	191.0

Although there is a variation, the space between palms was sufficient to permit pepper cultivation (Table 43).

5.3.5 Present Situation of Pepper as an Intercrop

5.3.5.1 Plant establishment and survival

The drought that prevailed in 1980 affected large number of pepper plants. The well established plants were less adversely affected by drought (Table 43).

Table 43 - Plant (Pepper) Establishment and their Survival

Age group of pepper	No. of plants planted	No. of plants survived	% of dead plants
0-½ yr	2550 (11%)	2062 (15%)	19
½-1 yr.	8885 (37%)	4975 (36%)	44
1-2 yrs.	11333 (47%)	6055 (43%)	47
Over 2 yrs.	1260 (5%)	864 (6%)	31
Total	24028 100	13956 100	58

5.3.5.2 Age of plants

The age of plants at the time of survey varied from 2-3 months to about 3 years. About 11% of pepper plants in the sample belongs to the age group of below ½ an year and their survival rate has been higher because they were looked after well immediately after transplanting. The old plants belong to the age group of over 3 years and because they were well established, their survival rate was also high (69%). The majority of plants were in the age group of ½-1 year and 1-2 years which consisted of 84% of transplanted plants and had a survival rate of 56% and 53% due to the failure to tolerate the continuous drought.

5.3.5.3 Source of plants

The Coconut Cultivation Board obtained seedlings from the Minor Export Crops Department and privately owned nurseries and distribute them through the Cultivation Officers of the Board to the growers.

5.3.5.4 Attitude of the neighbours

The attitude of the growers towards intercropping of pepper varies accordingly with the success and failure of the neighbouring growers

because this enterprise is new for them. Most of the smallholders were interested in intercropping in order to improve their living standard by having better income levels. But they were unable to venture into it due to lack of land. Only 37% of them however had some extent of land for intercropping. Another 13% were interested but due to lack of water they were reluctant to commence intercropping. Most of the others were unable to venture into it due to lack of initial capital that was required before the subsidy payment. Because of this they had grown other cash crops to meet their food and subsistent needs. Some of them are under the impression that the ecological condition of that area are not suitable to the particular crop. The other reasons were unsuitability of land and lack of time.

5.3.6 Extension Services

About 83% of the selected growers have been encouraged to intercrop coconut with pepper by the Extension Officers. A few of them have started on their own as they have previous experience in cultivating it. Among the growers 39% have grown pepper with special preference due to the influence of the Extension Officer, 23% as it suits the environmental condition and 17% with an idea of getting better income. The Extension Officers have made available the technical know-how essential for intercropping.

As usual the growers have been contacted by the Extension Officer in the field and some growers have contacted the Extension Officer in their offices. Further, Department of Minor Crops had organised Farmer Training Classes and 41% of the pepper growers have participated in them.

5.3.7 Utilisation of Subsidy

The amount of subsidy allocated per acre is Rs. 1875/- and it is paid to the growers in three instalments. Sixty Nine percent (69%) of the selected growers have obtained their first instalment and the rest have not received any. Most of the growers were unaware of the second and third subsidy payments. Further, few of them lacked interest after receiving the first payment because the amount paid in the second and third instalments were very low. In addition, the drought which prevailed also had affected their plantations and fields were not upto the required standard to receive second and third subsidy payments.

Among the group which has not received the subsidy, 31% have planted pepper but the time gap is too short to obtain necessary recommendations of the relevant officer, for 5.5% of them at the time the survey was held. About 11% have not collected the subsidy due to their own carelessness. Seven percent (7%) of the cultivations have failed and the officers have not recommended it. Another 7% complained about the delay in payment on the part of the officials concerned.

5.3.8 Agronomic Practices

5.3.8.1 Application of fertiliser

Most of pepper growers have used various fertiliser mixtures. They preferred using special MEC fertiliser but due to its unavailability they have used whatever fertiliser available locally. All the growers were advised by the Extension Officers to use one ounce in the first year and later to increase the dosage with the age of the plants (Table 44).

Table 44 - Application of Fertiliser

Types of fertiliser used	% of growers
Urea	12.9
Coconut Fertiliser Mixture	11.4
Special MEC Mixture	20.0
V_1 mixture	5.7
Farm yard manure	4.3
Others	5.7
Non users	40.0
Total	100.0

5.3.8.2 Irrigation

During those days when well water was available 70% of the growers have drawn water manually from the wells to irrigate their plants. Very few people have used well water by pumping. Some growers have pumped water from the nearby streams or channels and a small number of farmers have adopted the pitcher irrigation system. The rest have not watered their plants during drought.

5.3.9 Future Expansion of the Cultivation

Among the selected growers 50% expressed willingness to expand their cultivation. A similar percentage do not intend expanding their cultivation due to the following constraints (Table 45).

The scarcity of land, growing of other crops and unsuccessful previous experience were the major constraints.

Most of selected growers expressed drought as the first serious problem while for some, it was a secondary problem. The other problems were increased price of fertiliser, unsuitability and lack of land, lack of initial capital and technical know-how.

Table 45 - Problems Affecting the Future Expansion of Pepper Cultivation

Problems	% of growers as primary reason	% of growers as secondary reason
Scarcity of lands	31.45	-
Interest for another crop	22.66	2.86
Personnel management problems	5.71	-
Unsuitability of land	8.57	2.86
Unsuccessful previous experience	20.00	-
Lack of water resources	5.71	-
Lack of capital expenditure	5.71	-
Lack of time	-	2.86

5.4 PASTURE

5.4.1 The Sample

Fifty growers were selected from Kurunegala, Polgahawela, Kuliyapitiya, Katugampola, Dambadeniya and Mawathagama electorates. These electorates were selected as most of the coconut holders were engaged in the cultivation of pasture and livestock development activities. This has been a traditional farming activity in these electorates.

5.4.2 Size of Holding owned by the Cultivators

According to the acreage owned by the growers, the holding can be categorised into five groups. The holdings less than 10 ac. were considered here as small, 10-25 acres as medium and above 25 acres as large.

At the beginning of the subsidy scheme majority of the pasture growers were owners of medium and large size coconut holdings. Subsequently with the commencement of the Rural Development Programme in the Kurunegala district, many of the small and medium land holders also commenced growing pasture, due to the publicity and extension services provided by the Government agencies. The " Village Reawakening" Movement also supported these activities and certain allotments of the villagers are being used mainly for growing pasture and maintaining livestock (cattle). As a result significant number of small land holders have taken up intercropping pasture under coconut (eg. Weeragama) (Table 46).

Table 46 - Size of Land Holdings owned by the Pasture Growers

Sizes	0-2 ac.	2-5 ac.	5-10 ac.	10-25 ac.	Over 25 ac.	Total
No. of growers	16	14	11	5	4	50
Percentage	32	28	22	10	8	100

5.4.3 Land Utilisation Patterns

It is clear that small holders have used at least 50% of the holding for growing pasture. As the holding size increases the land allocated for pasture decreases. The reason being the land owners were not permitted to intercrop more than 5 ac. under the subsidy scheme provided by the Coconut Cultivation Board. The other reasons were unsuccessful in cultivation and drought. Further, larger holdings were owned by the rich and they were not keen to undertake the risky and intensive activities as they had many other profitable alternate activities.

Of the entire pasture extent concerned in the study 51% were owned by large land owners. Since the extent of land used for intercropping depend on the size of the holding, the small holders were unable to allocate big portions of their land for intercropping like the large holders, due to the limited land area. This made the large holders to maintain their own livestock development activities together with pasture.

Kuliyapitiya, Katugampola and Dambadeniya electorates are agro-ecologically suitable for growing pasture, and mostly pasture is cultivated in large holdings (estates). This was initiated with a subsidy scheme in 1973 and many private land owners were involved in it. As a result of the implementation of land reform act, some of the big estates were acquired by the government which resulted in the spread of skilled labour force who worked in these estates to surrounding areas. Many of the skilled workers started growing pasture and rearing livestock on their own lands. The holding size of these growers varied from 5 ac. to 10 acres. In addition, these land owners had sufficient technical know-how on livestock industry. The Department of Livestock Development also assisted these growers to expand their cultivation by providing technical know-how (Table 47).

Table 47 - Land Utilisation Pattern on Pasture

Land holding (acres)	No. of growers	Total coconut acreage	Extent under pasture		Ratio of the utilised land holding (%)
			acres	%	
0- 2	16	22	13.75	8.0	62.5
2- 5	14	50	24.75	14.0	50.0
5-10	10	83	33.50	17.0	38.0
10-25	5	73	18.60	10.0	25.0
Over 25	4	302	93.00	51.0	31.0
Total	49	530	183.6	100	35

5.4.4 Factors Influencing Pasture Cultivation

About 80% of the pasture growers commenced on intercropping with pasture to feed their own livestock. Another 10% of the growers had taken up to pasture cultivation since they were asked to grow it by certain government authorities on the promise of giving dairy cattle.

Only 6% of the monocroppers were growing pasture traditionally and the other 4% took up to pasture cultivation since it helped to obtain some additional income and as a source of moisture and soil conservation.

5.4.5 Extension

At the inception of the pasture cultivation (1973) the extension services were provided by several government agencies. Firstly, the extension work on pasture cultivation was undertaken by Livestock Development Board and it was directly responsible for the animal husbandry development of these areas. Later under the Rural Development Projects the extension work was taken over by Coconut Cultivation Board and presently the extension services are provided by the Coconut Development Officers.

In the recently commenced pasture cultivation, mostly small and medium size land holdings the extension services are generally provided by Coconut Development Officers and Cultivation Officers.

However, in some places, yet the Development Officers of the Livestock Board have been involved in the extension work. Almost all (96%) the selected growers have met one or all of those officers and only 4% have not met any of those officers. Normally the officers and farmers meet at the farm as well as in the office. The farmers who went to meet the officers were very few. The officers have visited 24% of the growers regularly, 27% once a month, 8% once in two months, 10% once in three months and 12% once in six months. Another 18% of the growers were not visited at all. Though there was a special farmer training class only 9% of them had the opportunity to participate.

5.4.6 The Attitudes of the Neighbours

Ten percent (10%) of the neighbours have good breeds of animals and they are keen in joining this venture. Another 20% are prepared to grow pasture on their lands. The rest of the neighbours complained about the hardships and difficulties encountered by his neighbour who is a pasture grower.

5.4.7 Utilisation of Subsidy

About 57% of the selected growers enjoyed the benefit of subsidy, but some of them faced many problems in getting it. The problems faced were difficulties in meeting officers concerned, getting the approval, difficulty in cashing the cheques and unfamiliarity with the procedures. However, the majority (82%) did not face any difficulty in obtaining it. The other 43% related many problems concerned with subsidy. About 24% of them were not interested in getting subsidy as it was not essential. Another 19% were not keen and according to them the expenses incurred in getting subsidy is more than the amount allocated as subsidy payment. While another 14% complained about the delay in the office routine, another similar percentage did not respond to the subsidy scheme. Yet another 10% were unable to get subsidy because they had not cultivated pasture successfully and the officer has not recommended the payment. The rest of them have established the pasture recently and are awaiting to receive the subsidy.

5.4.8 Application of Fertiliser

About 76% of the growers have applied fertiliser while others have not used any fertiliser or manures. Out of the selected growers who used fertilisers 32% has used urea as they were advised to use it. About 27% of them had used coconut fertiliser mixture and 21% had used pasture fertiliser mixture. When the special mixture was not available growers have used whatever fertiliser available in the market. Normally, when urea and coconut fertiliser mixture were freely available, the growers have applied them after the pasture was harvested without considering the kind of fertiliser actually needed. The Coconut Cultivation Officers have advised the growers to use any kind of fertiliser available.

5.4.9 Future Expansion of the Cultivation

Among the selected growers 37% expects to expand their cultivation, while the rest (83%) do not intend expanding their cultivation. The growers of the farmer category revealed many problems, which need immediate attention for future development of pasture.

Seventeen percent (17%) of the growers lack initial capital, 11% complained about lack of land, a similar percentage were burdened with increased cost of fertiliser and labour, 6% had unsuitable land, 6% does not have suitable breeds of cattle, 6% had transport difficulties, 6% had problem in protecting their cultivation from stray cattle and another 6% complained about the unexpected prolonged droughts.

The latter category too had problems which prevented them from expanding the cultivation. Majority (35%) does not own land for future expansion, 16% complained about the difficulties in the management of dairy farms, another 13% had intention of cultivating some other crop and others had problems such as marketing of dairy products, lack of irrigation and initial capital each amounted to 6% of this group.

5.4.10 Problems faced by Pasture Growers

Majority (37%) of the selected growers had their pastures severely affected by drought in 1981. The next problem (14%) was the lack of land. This problem was more common among small and medium land holdings. The other problems faced were, increased price of fertilisers, lack of labour, lack of planting material, unsuitable soil condition, rejection of application for subsidy, lack of finance, lack of time and technical know-how.

Chapter Six

SURVEY OF NON-INTERCROPPERS

6.1 INTRODUCTION

The intention of studying the non-intercroppers was to evaluate the potential future expansion of intercropping under coconut. Since it was a programme which was launched as a source of extra income generation activity, it is expected to replicate intercroppers in other possible electorates as well. Therefore it is very useful to study the opinion of the present non-intercroppers towards intercropping with coconut especially because it is a new programme. This survey was conducted during the same period using a questionnaire.

6.2.1 Time Availability

Fifty three percent (53%) of the non-intercroppers was involved in farming activities as their main occupation. Both coconut and paddy land owners were included in this group. The rest were engaged in other occupations namely teaching, business and as labourers in the industrial and semi-industrial sectors. Some others were employed as field level officers in government institutions. Most of these non-intercroppers were employed close to their villages accounting to approximately to 80%. The few who were employed in distant areas did not represent a significant percentage. Approximately a half of the non-intercroppers in the sample, were not involved in any gainful secondary occupation.

6.2.2 Land Availability and Suitability

Of the total acreage approximately 359 acres belonged to the non intercroppers. Further about 58.5 acres of lands in this category were not suitable owing to age of the existing coconut plantation which need replanting or rehabilitating rather than intercropping.

Hence, the balance extent of 300 acres, 84% of the total sample acreage, could be considered as potential extents for intercropping.

6.2.3 Suitability of Soil

Approximately 4% of the total acreage was not suitable for intercropping due to unsuitability of soil, another 20% of the sample acreage was unsuitable due to both age of coconut trees and the soil condition. Sixty two point five percent (62.5%) was suitable for intercropping while 17.5% was moderately suitable.

6.2.4 Managerial Arrangements

About 94% of the lands in the sample had been managed by the owners themselves and the rest 6% has been handed over to a second party for management or any other farming activity.

6.2.5 Labour Availability

The average members in a family of non-intercroppers who qualified for the labour force varied according to the size of the family and age of its members. On this basis each family has an average 3.23 persons who were eligible for the work force. Of this average work force in a family approximately 36% were employed and the balance 64% remained unemployed. Since the unemployed numbers in the sample stood higher than those employed there is a possibility that they would accept any gainful activity such as intercropping.

6.3 RELATIONSHIP BETWEEN INCOME AND LAND OWNERSHIP

Table 44 indicates the land ownership and the income level. Those owning large extents of land earn a fair income throughout the year. Ownership has been concentrated to a few elites who lived in surrounding areas, and in urban areas like Colombo, Negombo and Kurunegala. Only a very small proportion of the coconut lands, were owned by the villagers and fragmentation of these lands was very high. Therefore, the gap between the poor and the rich is wide and as a result income distribution was prevailing at an unsatisfactory level (Table 48).

6.4 PRESENT STATUS AND FUTURE POTENTIAL

Most of the non-intercroppers were aware of the Government subsidy scheme extended for intercropping of coffee, cocoa, pepper and pasture in coconut lands. Approximately 85% of the non-intercroppers came to know about the subsidy scheme through Cultivation Officers and Coconut Development Officers in the area. Some others have obtained the information through the various leaflets published by the Government Institutions and newspapers, but the percentage in this category was very little. The balance 11% did not have adequate knowledge even to understand the mode of operation of the scheme. Nevertheless, about 92% of the total sample had a fair awareness of material benefits of the subsidy scheme provided by the Government for the intercropping under coconut. The balance 8% did not have any clear understanding about the subsidy scheme.

Although the non-intercroppers knowledge on the subsidy scheme was inadequate, they were aware that higher incomes could be obtained by intercropping than when coconut is grown as a monocrop.

When inquired from the non-intercroppers of their interests in intercropping approximately 73% expressed their willingness. They also expressed many constraints which affect directly or indirectly the future potential of intercropping. The other category of coconut holders who did not show any interest, were aware of the obstacles faced by those who have already commenced intercropping in the area.

The non-availability of funds with the non-intercroppers as an initial capital for intercropping, unsuitability of the coconut lands due to thick shade, irregular planting of coconut trees, rocky and hard soil conditions, difficulty in maintaining livestock when intercropping as it requires more land for pasture and maintaining the animals are the major factors. According to some of the land owners, agro-ecological conditions of the area were found to be unsuitable for the intercrop that has been already grown (eg. some of coffee and pepper growers - Sirigala).

The another reason which influenced the growers to avoid intercropping with minor export crops was the cultivation of short

aged cash crops and semi-perennial fruit trees in their lands. These crops give quick returns than those recommended for intercropping. The lack of irrigation facilities is another reason which has discouraged the intercropping with minor export crops.

About 10% of the sample was not aware of the technical know-how and facilities provided for the intercropping programme. Further, protecting the cultivation from cattle is another problem which discouraged the cultivators. Though this can be avoided by fencing, it may be an expensive input which most farmers cannot afford. The difficulty in obtaining pasture cuttings and marketing the dairy products were the major factors which limits the expansion of intercropping of coconut with pasture.

Table 48 - The Relationship between Family and Land Ownership of Non-growers

Income	% of the families	Average no. of members in a family	Average No. of persons in 18-65 yr. group	Average No. of persons employed	% employed (18-65 yrs. age group)	Land availability per family (suitable for IC)	Full time labour availability per family	Land availability per family (total COC. average)
1. 5000	20.38	5.71	2.71	0.95	35.08	0.625 ac.	1.76	1.79 ac.
2. 5000-10000	33.98	5.37	3.25	1.02	31.57	1.407 ac.	2.23	2.08 ac.
3. 10000-15000	20.38	5.61	3.71	1.14	30.76	1.916 ac.	2.57	3.80 ac.
4. 15000-20000	11.65	4.66	3.09	1.41	50.00	2.113 ac.	1.63	2.52 ac.
5. 20000-30000	5.82	4.66	3.33	1.33	40.00	5.083 ac.	2.00	7.16 ac.
6. 30000-50000	3.88	6.25	4.25	2.00	47.05	4.50 ac.	2.22	6.56 ac.
7. 50000	3.88	4.5	3.25	2.00	61.53	6.75 ac.	1.25	17.12 ac.

Total No. of families	Average no. of members in a family	Average no. of persons in 18-65 yr. age group	Average no. of persons employed per family	% employed (18-65 yrs. age group)	Land availability per family (suitable for IL)	Full time per family (suitable for IL)	Land availability per family (total COC average)
103	5.36	3.28	1.17	36.33	1.96 ac.	2.06	3.48 ac.

Chapter Seven

CONCLUSION AND RECOMMENDATIONS

GENERAL

The Kurunegala District Integrated Rural Development Project has achieved considerable success in its intercropping programme under coconut. Although the Coconut Cultivation Board which implements the programme has not kept to its original target acreage due to various practical reasons, the plant material production and supply organised by the Minor Export Crops Department has shown tremendous achievements. The occurrences of drought from January to March from the commencement of the programme in 1979 has been primarily responsible for the setback and discouragement among growers and the failure to achieve planting targets. Yet, the potential remains high for intercropping with pepper, coffee, cocoa and pasture and an efficient land utilisation system could be evolved which will benefit the people of this district.

Certain constraints in relation to agronomic management of crops, extension services, project coordination etc. have been identified for careful consideration in the future implementation of the programme.

PEPPER, COFFEE and COCOA

1. Most electorates in the project area and others in the district are agro-ecologically suitable for pepper and coffee intercropping. Cocoa intercrops, however, should be restricted only to the mawathagama, Dodangaslanda and Polgahawela electorates.

2. To achieve envisaged targets the following aspects should be given serious consideration.

a) Particularly in view of the capital investment and perennial nature of the crops, land selection should be entrusted to competent officers only. Some lands selected for intercropping have been found unsuitable.

b) The growers owning less than $\frac{1}{2}$ acre should be discouraged from intercropping. They should be encouraged to undertake the cultivation of other subsidiary food crops and fuel wood trees. This will be more important in the case of cocoa where large extents will be needed to make the units economically viable.

c) The present policy of restricting subsidies and other facilities to extents below five acres should be revised. It is suggested that subsidies etc., are also made available to medium and large estate owners. The risk and delay in returns in growing intercrops could be easily cushioned by them, while processing and marketing facilities could also be organised with less government participation. This will be of prime importance in the case of cocoa which needs scientific processing, and pasture which forms an integral part of a livestock industry.

d) The procedure involved in the payments of subsidies should be simplified, and delays should be avoided as far as possible. The causes of delays such as ownership of land, unsuitability of soil, excess shade due to closer spacing of coconut trees etc., should be examined at the initial stages of issuing permits and not subsequent to the payment of the first instalment of the subsidy.

e) The most important ecological factor responsible for crop failure has been drought, and from the commencement of the project, drought from January to March has been a consistent feature. There is no other serious constraint than drought for intercropping in the entire district. It is also clear that mortality is more serious when plants are at the seedling stage. To avoid the seedling mortality the following could be recommended:

(1) As stated earlier proper selection of lands, and heavier soil would be better than lighter sandy soils.

(2) The filling of planting holes with organic material such as compost, farm yard manure etc., and the use of a dead mulch near the base of the plant. Coir dust and weeds growing on coconut estates will be suitable for this purpose. The organic matter use should be encouraged from the commencement of intercropping for both moisture and soil conservation.

(3) Early establishment of shade (Gliricidia for coffee and pepper and other shade tree species for cocoa intercrops) should be encouraged.

(4) Irrigation where possible should be attempted. The pitcher irrigation system will be beneficial during the initial phase of intercrop establishment and growth on small extents, while for large extents it will be less practical and cumbersome. The pitcher irrigation should be used only in the first year. Thereafter, it should be discontinued to allow the root system to proliferate and excavate a large volume of soil and develop drought resistence to tide over short period of drought.

(5) Time of planting of the intercrops should begin with the commencement of the rains to avoid seedling mortality due to occurrence of drought.

f) Agronomic management of crops has been a neglected area and need strengthening. It should be emphasised that all three crops need special cultural techniques which are unfamiliar to coconut growers of the Kurunegala district. The area needing immediate attention are:

(1) Use of fertilisers - The use of fertiliser at the correct rate, method and time of application is stressed. The present practice of using coconut or paddy fertiliser mixtures should be discouraged.

(2) Pruning and training of trees to obtain high yields.

(3) Pest and disease control.

(4) Organic matter management as a means of soil renovation and moisture conservation.

g) The unified extension service of the Department of Agriculture should have a continuous dialogue with the Coconut Cultivation Board and the Department of Minor Export Crops in the implementation of the T & V system of extension with a view to overcome drawbacks in the service.

3. The project implementation has been the responsibility of the Coconut Cultivation Board, Minor Export Crops Department, Department of Agriculture and Agricultural Development Authority. The Coordinations among those is below the level of requirement and reorganisation rather than attempting to improve it should receive serious concern.

PASTURE

1. The pasture/livestock development appears to be a promising enterprise on medium to large sized coconut estates. Due to the nature of operations involved in the management of livestock and the need to grow subsidiary food and short term cash crops, the coconut small holdings are less suitable for pasture intercropping. The small holders are unable to allocate a big portion of their land to undertake a risky, labour and capital intensive activity as they have other profitable alternate means of utilising their lands.

2. The success in pasture/livestock production will depend on the following considerations:

a) The subsidy and other extension facilities should not be restricted to extents less than 5 acres. It should also be available to medium and large estate owners, who could undertake livestock development which is both capital and labour intensive which they could afford.

b) Pasture intercrop should be permitted only on land suitable and care should be exercised in land selection. In the project area Kuliyapitiya, Katugampola, Dambadeniya, Mawathagama, Polgahawela, Kurunegala are most suitable for the development of livestock industry. The feasibility of extending it to other electorates of the district should be examined.

c) The subsidy for pasture intercropping should be increased to Rs. 3000/- over a period of 3 years, and the first instalment should be at least Rs. 1000/- per acre, assuming that labour is to be provided by the land owner.

d) The procedure in obtaining the subsidy should be simplified and delays whatsoever should be avoided.

e) Suitable breeds of cattle should be available to obtain the maximum profits. If individual land owners are unable to obtain their own stocks, government assistance will be required to achieve best results.

f) Marketing facilities for liquid milk (Milk collection centres) and other dairy products should be provided. It will be important to sponsor dairy industries on a small to medium scale to create new employment opportunities and better income.

g) Use of fertiliser should be encouraged and recommended fertiliser should be made available in areas of pasture production.

h) The extension services presently provided by the Coconut Cultivation Board should be discontinued. It should be handled by the Department of Animal Production and Health which is better equipped with modern technical know-how on pasture and livestock production.

3. The other government organisation eg. National Livestock Development Board, Coconut Research Institute and the Agricultural Development Authority should be involved in the programme and close coordination should be developed.

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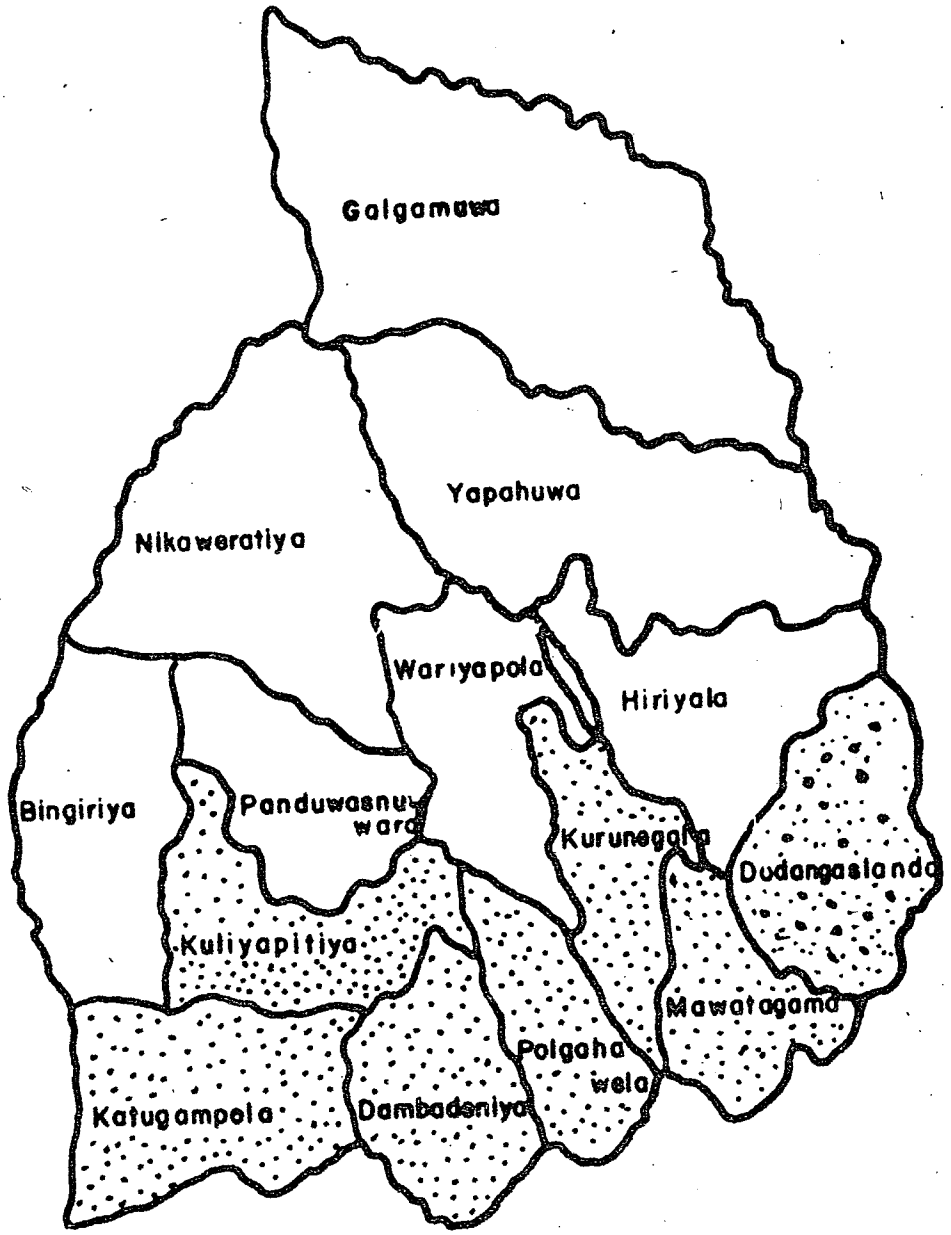

Fig 1. Electorates of the Kurunegala District.

(Dotted electorates include the Project area)

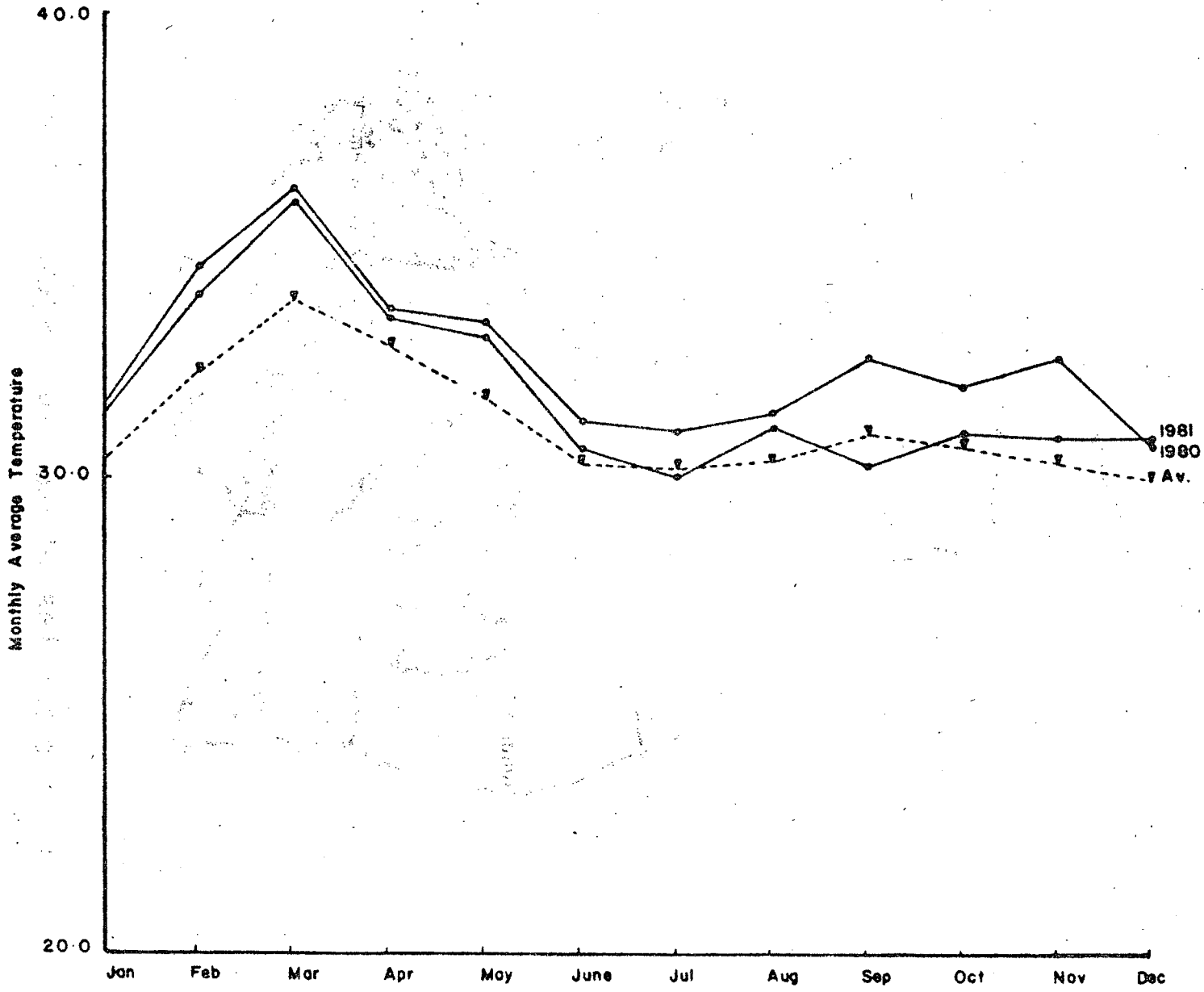

Fig. 2. Monthly Average Temperature - Kurunegala District.

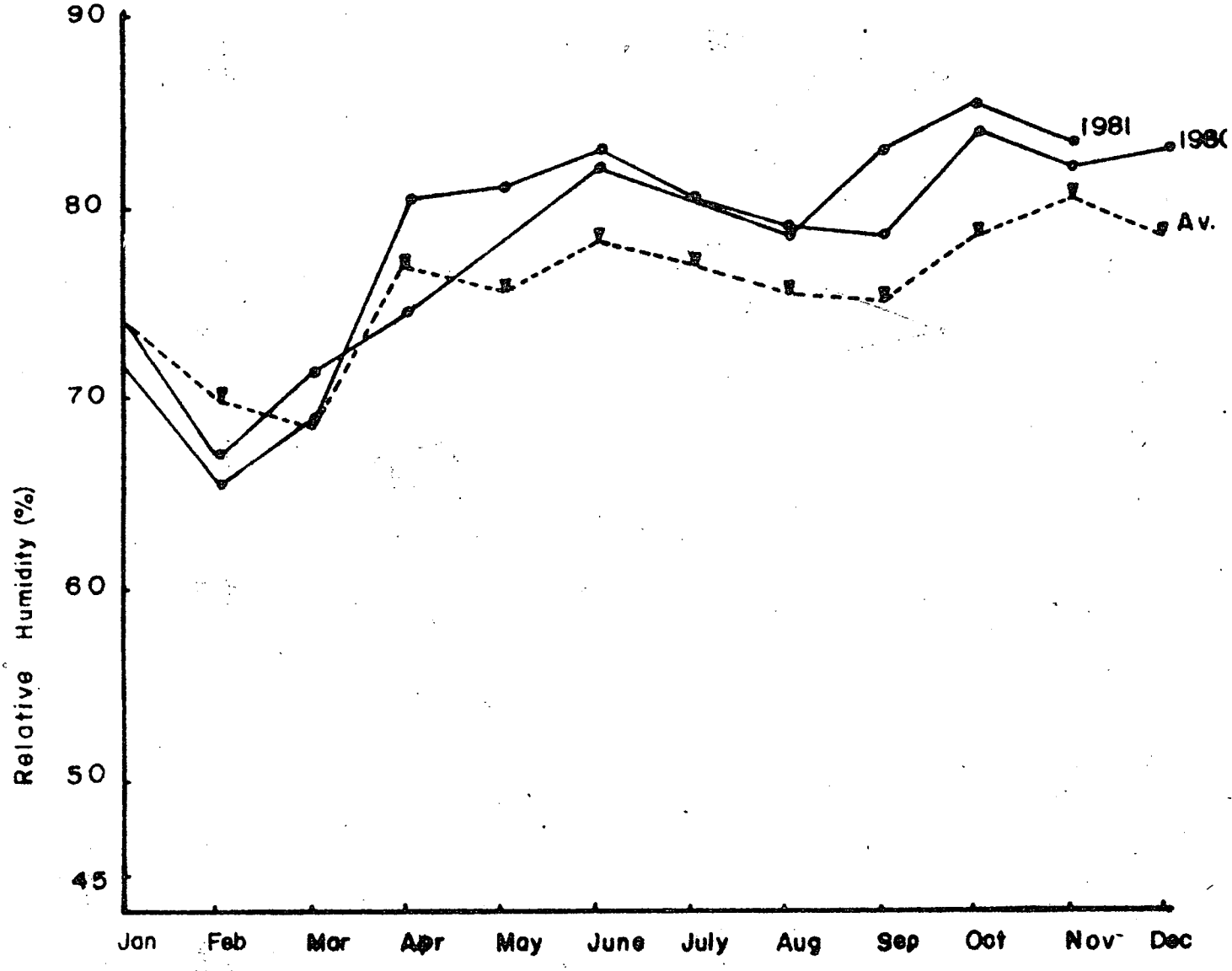

Fig. 3 Monthly mean relative humidity - Kurunegala District

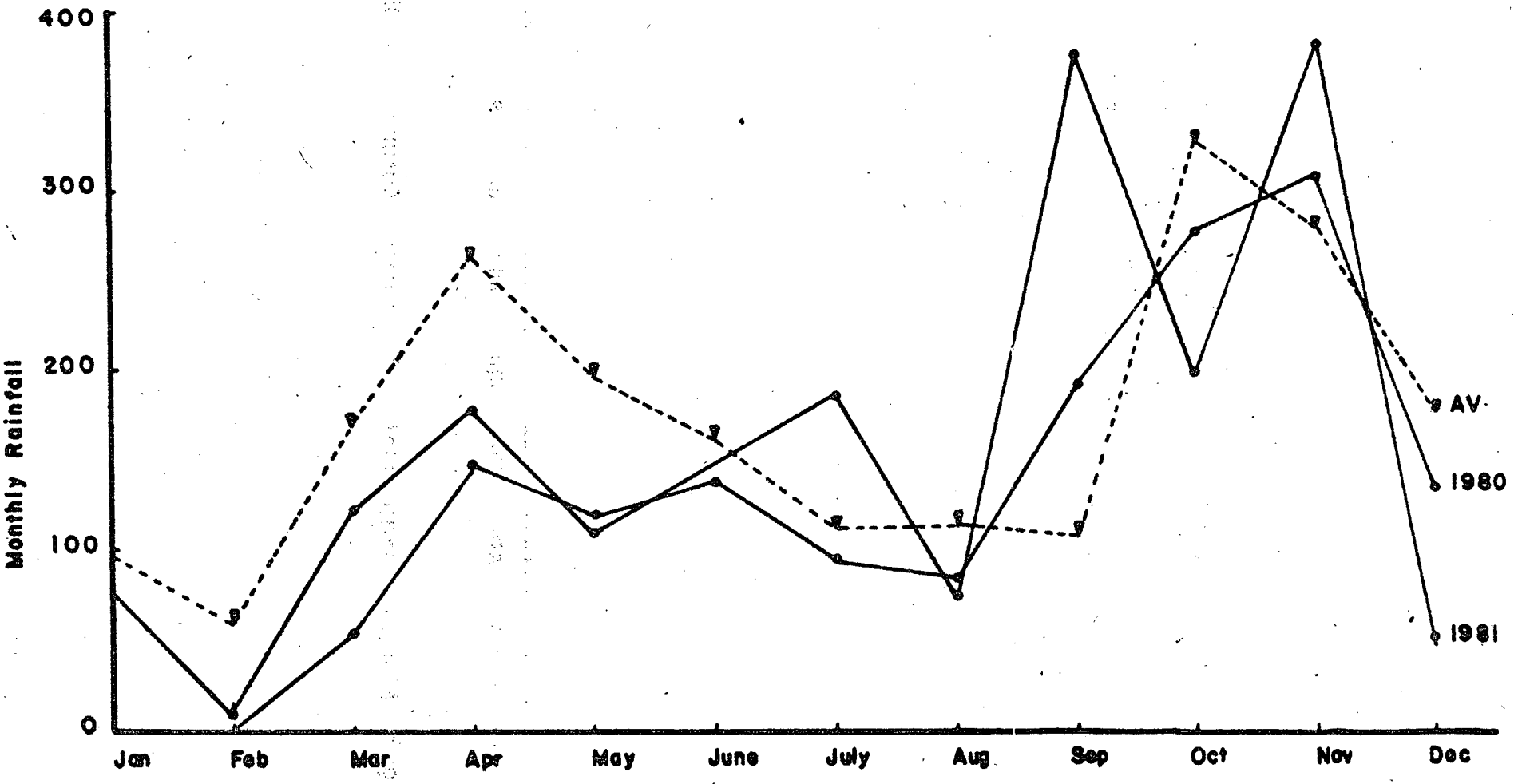

Fig. 4 Monthly rainfall - Kurunegala District

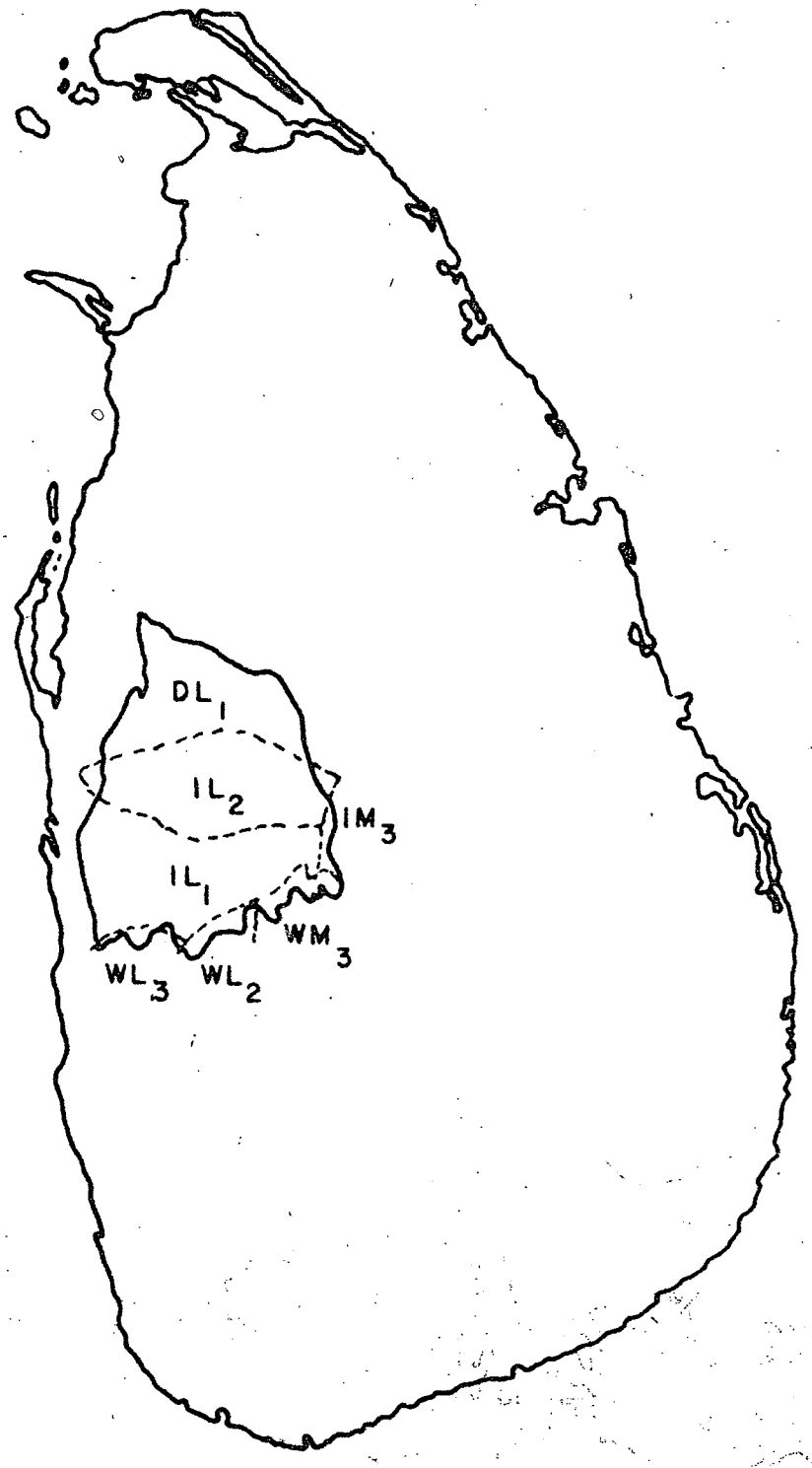

Fig 5· Agro-ecological regions - Kurunegala District·

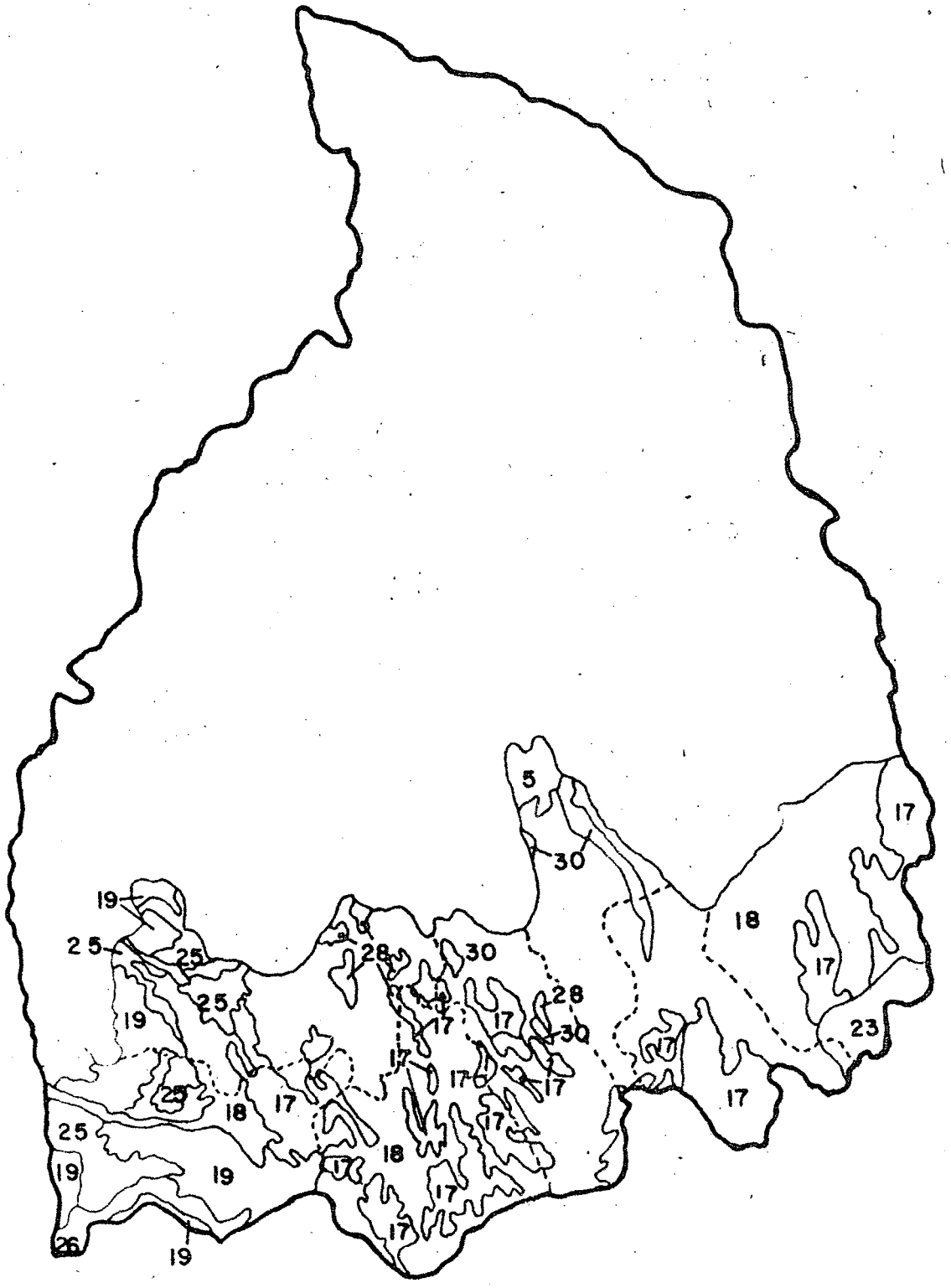

Fig 6 · Soil map of the project area

L E G E N D

DL_1 - Low Country Dry Zone.

IL_1)
IL_2) - Low Country Intermediate Zone.

IM_3 - Mid Country Intermediate Zone

WM_3 - Mid Country Wet Zone.

WL_2)
WL_3) - Low Country Wet Zone.