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**CINNAMON CULTIVATION
IN
THE MATARA DISTRICT**

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AGRARIAN RESEARCH AND TRAINING INSTITUTE
Colombo, Sri Lanka

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CINNAMON CULTIVATION
IN
MATARA DISTRICT

ARTI/Wageningen
Project on
Agricultural Planning

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FOREWORD

"Cinnamon Cultivation in the Matara District" is the second ARTI publication devoted to cinnamon. The first, "The State and the Cinnamon Industry in Sri Lanka" (Occasional Publication No. 15) which was published in 1978 and presents a detailed analysis of the cinnamon husbandry in Sri Lanka.

This study is more policy oriented and has been undertaken in the framework of the Integrated Rural Development Programme (IRDP) of the Matara District which is one of the major cinnamon growing areas in the country. It was done under the ARTI - Agricultural University of Wageningen Joint Research Project on Agricultural Planning when the Ministry of Plan Implementation requested the Project Team to formulate proposals for the agricultural sector in the Matara IRDP. Cinnamon being one of the crops of major importance in the district demanded a special study for this purpose.

As a consultant to the ARTI-Wageningen Project, Dr.H.M.W.Herath, Head of the Department of Agricultural Biology of the University of Peradeniya conducted an agronomic and socio-economic survey among cinnamon cultivators in the district. The recommendations and project proposals for the development of the cinnamon cultivation presented in this report are mainly based on the survey findings. These proposals cover such areas as replanting and rehabilitation subsidy programmes, a peeler's training programme, a subsidy programme for processing of cinnamon oil and make a case for the establishment of a specialized government institution geared to promotion of cinnamon cultivation.

It is hoped that the project proposals and recommendations put forward in this report will induce a process of development of cinnamon cultivation in the Matara District in particular and in the other cinnamon growing districts in general.

Dr.Herath and the Agricultural University of Wageningen which financed the study are thanked for their respective contributions.

T.B.Subasinghe
Director
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Field survey was carried out with the assistance of Mr. R.M. Bandara, Mr. Ranjith Samarasinghe and Officers of the Departments of Agriculture and Minor Export Crops at Matara. Data analysis and preparation of report was done with the assistance of Mr. Piyasena Abeygunawardena and Mr. H.B. Kotagama. All those who helped are gratefully acknowledged. We also acknowledge with thanks the services rendered by Miss. Anne Fernando in the preparation of the final script for publication.

TABLE OF CONTENTS

	Page
Foreword	i
Acknowledgements	ii
Contents	iii
List of Tables	v
1. INTRODUCTION	1
1.1 Terms of references of the study	1
1.2 Background	2
1.3 Cinnamon	5
1.4 Aims of the study	8
2. THE SURVEY	8
2.1 Preparation of the questionnaire	9
2.2 Area selection	9
2.3 Sample selection and size	9
2.4 Data collection	9
2.5 Processing and tabulation of data	10
2.6 Sample characters	10
3. PRESENT STATE OF CINNAMON CULTIVATION IN THE MATARA DISTRICT	11
3.1 Land	11
3.2 Management practices of the crop	13
3.3 Fertilizer use	13
3.4 Weed control	15
3.5 Pests and diseases	15
3.6 Soil and moisture conservation	15
3.7 Pruning and training	16
3.8 Yield	16
3.9 Replanting	18
3.10 Harvesting and peeling	18
3.11 Peelers' wages	20
4. MARKETING OF CINNAMON	21
4.1 Cinnamon quills	21
4.2 Cinnamon leaf oil	23
4.3 Peeled sticks	24
5. WORLD MARKET PROSPECTS FOR CINNAMON	24

	Page
6. RECOMMENDATION FOR THE IMPROVEMENT OF CINNAMON INDUSTRY IN MATARA DISTRICT.	28
6.1 Improvements in agronomic aspects	28
6.2 Extension and institutional supported services	33
7. PROJECT PROPOSALS	35
7.1 Problem setting and description of the project	35
7.2 Objectives	37
7.3 Project details	38
7.4 Location and target groups	44
7.5 Summary of project costs and benefits	47
Appendix I Correlation study between input and yield	53
Appendix II Cost-benefit analysis of replanting	53
Appendix III Cost-benefit analysis of rehabilitation	58
Appendix IV Marginal profitability analysis	60
References	62

LIST OF TABLES

TABLE	PAGE
1.1 Major crops and acreage in Matara District	4
1.2 Distribution of cinnamon according to AGA divisions in Matara District	4
3.1 Size of holding and percent distribution of ownership	11
3.2 Percent distribution of income from cinnamon, other crops and off-farm sources	13
3.3 Percentage distribution of yields obtained by cinnamon growers in Matara District	16
3.4 Basis for selection of peelers by cultivators	19
3.5 Problems associated with availability of labour	19
3.6 Prices of transactions of cinnamon quills	23

FIGURES

1.1 Export earnings 1953 - 1978
1.2 Production 1953 - 1978
1.3 Average price per cwt of quills 1953 - 1978
3.1 Distribution of cinnamon land holdings and cinnamon and other land holdings
3.2 Distribution of cinnamon plantations by age
3.3 Diagram showing flow of cinnamon products

1. INTRODUCTION

This study was undertaken at the request of the University of Wageningen Research Team on Agricultural Planning in Sri Lanka. The purpose of this study is to contribute to the integrated rural development plan for Matara district.

1.1 TERMS OF REFERENCES OF THE STUDY

The study on Cinnamon cultivation in the Matara District had to cover the following areas:

a) THE PRESENT STATE OF CINNAMON CULTIVATION IN THE MATARA DISTRICT i.e.:

- Importance of cinnamon cultivation in the economy of Matara district.
- Acreage cultivated and geographical locations of cinnamon cultivation in the district.
- Description of farm types.
- Present state of cinnamon peeling in the district particularly concerning problems with regard to peelers, socio-economic condition of peelers and alternative employment sources of peelers.

b) PRESENT STATE OF CINNAMON MARKETING i.e.:

- Organisation of trade and marketing systems of cinnamon and cinnamon products;
- Processing of cinnamon;
- Role of state institutions in cinnamon marketing and processing.

c) **WORLD MARKET PROSPECTS FOR CINNAMON i.e. :**

- Prospects for cinnamon and cinnamon products in the international market;
- Impact of international market prospects on cinnamon cultivation in the district.

d) **DEVELOPMENT OF CINNAMON CULTIVATION IN THE DISTRICT i.e. :**

- Improvements in agronomic aspects;
- Extension and institutional supporting services;
- Defining a policy framework for the development of the cinnamon industry in the district;
- Possibilities for the diversification of cinnamon lands and cultivation of alternative crops;
- Location of areas where cinnamon cultivation should be concentrated and on what types of farms;
- Measures necessary for improving cinnamon peeling ;
- Improvements necessary for processing of cinnamon oil.

1.2 BACKGROUND

Matara district is located in the Southern province of the island comprising of 481½ sq. miles with a population of about 676,000. It has a landscape showing gradual increase in altitude from sea level up to 3500 feet from the south to the north of the district. The Bullutota and Rakwana hill ranges which are located in the north feed the low-lands of Matara through their flow of streams. Matara is therefore bestowed with Nilwala and Polwathu Modara ganga, which add their waters to the ocean at Matara and Weligama respectively.

Matara district is located in the wet zone and receives rainfall from both North-East and South-West monsoons. More rainfall is experienced during the South-West than the North-East monsoon. The average annual rainfall in the district is between 100 to 150 inches with slightly higher rainfall in the Deniyaya and Morawaka hill ranges.

The average annual temperature is in the region of 80^oF with a slightly lower temperature in the hill country. The district falls mainly into three agro-ecological regions according to the land and water use map compiled by the Department of Agriculture. The southern part of the district falls into the agro-ecological region WD₄ which has Red-yellow Podzolic soils with soft and hard laterite and Bog and half Bog soils. The terrain of this region is usually undulating and flat. The central part of the district falls into agro-ecological region WL₂ and has Red-yellow Podzolic soils and Red-yellow Podzolic soils with strongly mottled sub soil and Low Humic Gley soils. The terrain is rolling and undulating. The northern part of the district falls into agro-ecological region WL₁ which has Red-yellow Podzolic soils and Red-yellow Podzolic soils with semi-prominent A₁ horizon with rolling and undulating terrain.

The occurrence of three main agro-ecological regions allows an array of annual and perennial crops to be grown within the district. Some of the important crops include paddy, tea, rubber, coconut, cinnamon, citronella, cloves and cardamom. Table 1.1 gives the extents of these important crops grown in Matara district.

TABLE 1.1 MAJOR CROPS AND ACREAGE IN MATARA DISTRICT

Crop	Acreage	% of total acreage
Tea	51,875	16.84
Rubber	22,685	7.36
Coconut	54,400	17.66
Paddy	52,134	16.90
Cinnamon	17,000	5.52
Protected Forests	45,000	14.60
Others	64,906	21.07
Total	308,000	99.95

Source: Statistical Handbook, Matara Kachcheri 1979.

According to this data cinnamon is cultivated in more than 5% of the total cultivable land area in Matara district.

The total national acreage under cinnamon is in the region of 40,000 of which about 17,000 or 42% is presently grown in Matara district. The following table gives the distribution of cinnamon in Matara district.

TABLE 1.2 DISTRIBUTION OF CINNAMON ACCORDING TO AGA DIVISIONS IN MATARA DISTRICT

Area (AGA'S Division)	Acreage of Cinnamon
Wellabada Pattuwa (E))	403
Wellabada Pattuwa (W)) Kadawath	1198
Gangabada Pattuwa (S))	648
Gangabada Pattuwa (N)) Sathara	2004
Morawaka Korale (W)	584

Area (AGA'S Division)	Acreage of Cinnamon
Morawaka Korale (E)	2233
Kandabada Pattuwa(W)	4197
Kandabada Pattuwa(E)	482
Weligam Korale (N)	1656
Weligam Korale (S)	1011
Weligam Korale (W)	1383

Source: Statistical Handbook, Matara Kachcheri 1979

Contribution from cinnamon to national export earnings during the last 25 years upto end of 1978 is shown in figure 1.1. The total production and price have shown an upward trend during this period (Figs. 1.2 and 1.3). Based on this data it is evident that there is potential for the future marketing of cinnamon. Since Matara district is a major contributor to the total national production, it is envisaged that benefits derived from the improvement of production and marketing of this crop will have a direct effect on the socio-economic conditions in the region.

1.3. CINNAMON

Cinnamon (*Cinnamomum zelanicum*) is indigenous to Sri Lanka. It belongs to the family Lauraceae. In its original wild form it is a large tree growing to a height of 10 - 12 metres or more, with a stem girth of 20 - 30 cm.

In cultivation the tree is coppiced, trained and maintained to form a bush of convenient height. Eight to ten stems from each point is encouraged to grow until they attain a sufficient girth (thumb size). These stems are harvested and bark is peeled for quills. The leaves are used for oil extraction by steam distillation.

Cinnamon plant requires a rainfall of 80 - 85 inches annually with a mean temperature of 80° - 85°F. They grow upto an elevation of 2,500 metres.

Cinnamon is usually propagated by seeds. The seed obtained from ripened fruits are washed and dried in the shade before planting in nurseries. The seedlings are ready for planting in the field after 6 months. They are planted at a spacing of 3' x 4' or 4' x 4' and require 3,630 and 2,722 plants per acre respectively.

Harvesting of stems usually commence when the plants are 3 - 4 years old. The total economic life span of the plant is 35 - 40 years. Cinnamon is hardy and thrives under adverse conditions of soil and moisture. However it responds well to good cultural practice and high yields could be obtained. Cinnamon is susceptible to many insect pests although they are not known to be of economic importance. Some of the common pests include cinnamon butterfly, leaf and shoot webbers and leaf gall insects. The latter is a common pest but this pest has not yet been identified. It is suspected to be as Psyllid (Hemiptera psyllidae) which sucks the leaf sap and secretes toxic saliva causing the enlargement of stone cells. The degree of damage to the leaves and consequent reduction in yield has not yet been estimated.

Among the diseases the commonest and the one which causes severe damage to the plant is reported to be grey-blight (Pestalotia cinnamoni). The other diseases are of less importance as they do not seem to cause a significant economic loss.

The harvesting season of cinnamon coincides with the rainfall distribution pattern since it appears that peeling is facilitated during the wet season. Harvesting is distributed during about 10 months of the year and usually January#February and August#September are the months during which harvesting is restricted. However, harvesting duration and timing are determined by the agronomic and economic factors. It is reported that 3 harvests can be taken during

24 months period thereby harvesting one crop every 8 months.

Stems that have turned brown and peel easily are cut leaving 1 - 2 inches at the base at harvesting. These stems are then topped and bundled and transported to sheds or "wadiyas" where the bark is peeled. Peeling is an operation which needs much skilled experience and patience. First the soft outer bark is scraped off with a fine rounded rasp and rubbed with a brass block. Then two longitudinal slits are made in the bark and the knife is worked between the bark and the wood until it is raised to a width of about $\frac{1}{2}$ ". Another slit is made in a similar manner on the opposite side of the stick and the bark is detached from the wood. The peeled bark which is in a tubular form is then carefully rolled into one another to form a packing of concentric tubes. Small pieces of the bark left after peeling are stuffed inside these tubes. These stuffed bark tubes or quills are made to a length of 42 inches.

These are then dried in the shade on coir rope. These tubes are periodically compressed by hand to retain a tubular form. These are then trimmed at the ends before they are marketed as quills.

The main product of cinnamon is the quill which comprises about 90% of the total product. These quills when sold to the dealers are sometimes bleached with sulphur smoke in order to obtain a desired colour favoured by foreign buyers. They are then sorted and repacked into 100 pound bundles and wrapped in gunny sacks. In this state they could be stored for long periods without deterioration.

There are eleven officially recognised grades defined according to the thickness of the quill and the maximum extent of discolouration.

The remaining 10% comprises of cinnamon products, chips, leaf oil and bark oil.

Chips consists of bark which is scraped rather than peeled from larger or poorly shaped sticks. Chips are either processed for export or used for bark oil production. If the chips are used for export they are reprocessed by employing the following steps: washing, sun drying, removal of extraneous matter and packing.

Bark oil is distilled from chips. A small percentage of quillings is also used for this purpose.

Leaf oil production is common only in Matara and Galle districts. Steam distillation method is employed for this purpose and there are about 60 - 65 distillation units distributed within the two districts. In addition to these products sticks left over after peeling are utilized as fire wood in cinnamon growing areas.

1.4. AIMS OF THE STUDY

The aim of the study can be summarised as follows:-

1. To assess the present status of cinnamon cultivation, processing and marketing in Matara district with a view to assist the integrated rural development programme presently implemented by the government with foreign assistance;
2. To formulate a plan to focus the attention of policy makers towards development of cinnamon cultivation in Matara district;
3. To create an interest among the district officials of the departments of Minor Export Crops, Agriculture, academic audiences and others who are associated with cinnamon cultivation and trade.

2. THE SURVEY

A survey was conducted in Matara to obtain relevant information for the preparation of this report in addition to several consultations and interviews held with people associated with growing, processing

and marketing of this crop.

2.1. PREPARATION OF QUESTIONNAIRE

The questionnaire was formulated to study the following aspects;

1. General information about the farmer and his agricultural activities with special reference to cinnamon cultivation;
2. Cultural practices and problems associated with cinnamon cultivation;
3. Informally regarding extension services and other supporting services;
4. Conditions prevailing and problems associated with processing and marketing;
5. Farmers' suggestions and opinions regarding the improvement of cinnamon cultivation.

2.2. AREA SELECTION

As mentioned, the study was carried out in Matara district. The whole area was covered through Agricultural Service Centres, namely Kekanadura, Dandeniya, Dikwella, Talalle, Mirissa, Weligama, Malimbada, Akuressa, Wilpita, Kananke, Kirinda-Puhulwella, Kamburupitiya, Medaviyangoda, Deeyandara, Ransagoda, Hakmana, Pasgoda, Urubokka and Morawaka excluding Madihagodagama and Deniyaya as the acreage under cinnamon was negligible.

2.3. SAMPLE SELECTION AND SIZE

The whole acreage under cinnamon was considered and a simple random sample of 170 farmers was taken based on highland farmers lists available at the Agrarian Service Centres. This sample represented 2.5% of the cinnamon growers in the district.

2.4. DATA COLLECTION

The interviews were conducted by graduates in agriculture and

economics who were trained by the author prior to the survey.

Personal interviews with farmers were held during the month of June. Each numerator interviewed 4 - 5 farmers per day.

2.5. PROCESSING AND TABULATION OF DATA

On completion of the survey the data was tabulated and analyzed using simple procedures and a computer programme.

2.6. SAMPLE CHARACTERS

Success or perpetuation of any farming system including cinnamon cultivation is largely determined by the manner in which resources are allocated and utilized by cultivators. Personal and situational factors also have a considerable influence and role to play. Therefore, before we proceed with the analysis, it would be helpful to outline briefly some characters such as the ownership and personal characters.

The sample of 170 farmers selected randomly was characterized by a high level of literacy. Over 75% of the farmers interviewed had a basic education above the 5th grade, and of this 41% had passed the 10th grade.

It was also evident that more than 75% of the cultivators had experience with cultivation of cinnamon for over 10 years, of whom 51% experience of over 20 years.

With regard to the size of cinnamon land holdings, the survey revealed that 64% of the total land was below $2\frac{1}{2}$ acres, with 26.5% being less than 1 acre. The ownership of land between $2\frac{1}{2}$ to 5 acres was 18% and over 5 acres was also 18%.

Of the farmers interviewed 78% owned crops other than cinnamon.

These crops included coconut, tea, rubber, paddy and other perennial and annual crops.

Nearly 40% of the farmers had off-farm income from both government and private sources.

The data on the age of the existing cinnamon plantations showed 64% less than 20 years and 36% over 20 years.

3. PRESENT STATE OF CINNAMON CULTIVATION IN THE MATARA DISTRICT.

3.1. LAND

Majority of the cinnamon holdings are small and only about 18% of the farmers own holdings over 5 acres. The following table gives the size of holding and percent distribution of ownership leased on the survey.

TABLE 3.1 SIZE OF HOLDING AND PERCENT DISTRIBUTION OF OWNERSHIP

Size of Holding	Number of Individuals owning	Percentage
Holdings		
Less than 1 ac.	45	26.5%
1 ac. - 2½ ac.	63	37.1%
2½ ac. - 5 ac.	31	18.2%
More than 5 ac.	31	18.2%

A comparison is made between the district land holding sizes with holdings containing cinnamon and other crops and cinnamon only (Figure 2.1)

It is evident that the majority of the farmers who own cinnamon and other crops have large holdings (7.5 acres) compared to the district average land holding size which is about 1.5 acres. When the size of cinnamon plantations only are considered the holding size of majority of the farmers was in the region 0.75 acre.

Of the 170 cinnamon growers considered in the sample 88% of them had land other than cinnamon which were under crops such as tea, rubber, coconut and paddy. This suggest that only a small percentage of the growers depend solely on cinnamon cultivation. To the majority of the growers in the district cinnamon cultivation is a part-time occupation. The main source of income is obtained by these farmers from other crops.

It was revealed that small holders were too poor to invest on inputs for the development of their cultivations. Whereas the cultivators who had other land and other sources of income were able to spend part of their income on the cinnamon crop and obtain higher yields.

There was a significant correlation and a positive regression coefficient value between the total land size owned by the growers and the yield of cinnamon. In other words, the greater the extent of land owned, both cinnamon and other crops the higher the yield of cinnamon obtained (Appendix 1).

Another important observation in these findings is that cinnamon is cultivated mostly on land marginal for growing other crops. This is shown in the survey where 93% of the land was steep or moderately steep with at least 60% highly eroded and denuded.

Those who own only cinnamon land comprised of 22%. Of this those who had off farm income comprised of 8% and the balance 14% had no other source of income at all. This small group consists of the most

adversely affected sector of the cinnamon growers and their income from cinnamon is also the lowest since they do not have the resources to improve the crop. (Table 2.2)

TABLE 3.2 PERCENT DISTRIBUTION OF INCOME FROM CINNAMON, OTHER CROPS AND OFF FARM SOURCES

SOURCE OF INCOME	PERCENT
Cinnamon land and other land	78%
Cinnamon land and off farm incomes	8%) Those who)
Cinnamon land only	14%) own only) 22% cinnamon land)

3.2 MANAGEMENT PRACTICES OF THE CROP

Standards of management are totally poor. The average yield of 400 lbs of quills per acre although satisfactory is not obtained in many of the cinnamon growing areas in Matara district. A greater proportion of the cinnamon land is eroded, overgrown with weeds, scattered with weak clumps or vacancies. Some cinnamon lands give the appearance of an abandoned plantation. This situation is more evident in Matara district since the well managed plantations is only 3 percent of the total acreage under cinnamon. This is reflected in the land use map of Matara district (Jinadasa). Several factors contributing to the low standard of management have been identified by earlier investigators (Moore, Upawansa). The present study also indicated the significance of most of these factors.

3.3 FERTILIZER USE

Very little or no research has been done in Sri Lanka on the response of cinnamon to fertilizer. However, a fertilizer recommendation

is available probably based on Indian experience. It is evident that fertilizer application increases the yields and improves the crop considerably. Furthermore it is observed that the regular use of fertilizer enables producers to obtain better quality crop spread over the year thereby providing more employment opportunity and income to the owner.

Out of 170 cultivators interviewed only 28 (16.4%) were found to use fertilizer and only 8 out of the 28 used the recommended fertilizer while the rest used fertilizer mixtures recommended for other crops. Statistical analysis showed, that there was no correlation between the fertilizer usage and yields obtained (Appendix 1). This is mainly due to the use of unrecommended mixtures and low quantities of fertilizer.

It was revealed that 38.8% of the farmers did not have sufficient funds to purchase the fertilizer. Even if they were able to purchase the fertilizer in one particular year they were unable to continue during the subsequent years due to the requirement of funds for other pressing needs. Furthermore the small holder has the added disadvantage of having to incur a proportionately high cost in procuring his fertilizer (Moore).

23% of the farmers were not convinced with the benefits of fertilizer application. This could be attributed to the fact that their experience in fertilizer use had shown no positive response. This is possible again since the recommended mixtures in adequate quantities have not been used.

Non-availability of fertilizer was reported by 38 percent of the farmers. Cinnamon fertilizer available if at all is not normally available in the villages of the district. The grower must travel to the city to obtain his requirement. This situation helps to discourage the small holder from using fertilizer. On the other hand, the cultivators who own large holdings are in a position to order sufficient quantities and transport by lorry.

3.4 WEED CONTROL

The findings from the survey indicate that 98% of the farmers weed their cinnamon cultivation at least once a year. This is obviously done prior to harvest and is no indication of good management. In fact, over 50% of the holdings are overgrown with weeds at any given time. Each weeding operation costs approximately Rs.200.00 per acre. The small holders however overcome this situation to some extent by using their family labour.

Chemical weed control has been attempted by only two farmers and most of the farmers felt that the use of chemicals had a detrimental effect on the quality of the bark. Furthermore, there were no recommended chemicals and application methods for this purpose. The most common practice in weed control is the use of mamoty.

It was the generally accepted belief among the farmers that weed-free cinnamon land often gives increased yields and facilitate peeling.

3.5 PESTS AND DISEASES

One significant observation was that the farmers referred to both pests and diseases of cinnamon as diseases. Often they were ignorant of the prevalence of some minor pests and diseases in their plantations. According to these farmers the occurrence of pests and diseases had no significant effect on the yield. Of the farmers interviewed 59% reported that there was some form of pest or disease and only 1.2% had attempted to control them by using common pesticides. In general there was lack of awareness and non availability of technical information.

3.6 SOIL AND MOISTURE CONSERVATION

As mentioned cinnamon is mostly grown in steep lands which are obviously susceptible to heavy erosion. Although it appears that the cinnamon growers in Matara district do not pay much attention to regular cultural practices, surprisingly 73% of them indicated that they adopt measures to prevent soil erosion by cutting drains (94.3%). Only a few farmers had bunds or bunds and drains for this purpose. However, these bunds and drains have not been maintained regularly and effectively although 64% reported that they did so.

The method of planting in the field varied among two groups of farmers. One group comprising 82% of the farmers reported that they planted along the slope and the other group comprising 18% reported that they planted across the slope. The former method undoubtedly increases soil erosion. The reasons for adopting this method by the farmers may be due to lack of their appreciation of the resulting effect of soil erosion and the convenience in carrying out weeding operations.

3.7 PRUNING AND TRAINING

Pruning and training of the cinnamon plant is essential to obtain high yields and good quality product. These practices have not been carried out regularly and effectively. 42.3% and 78.6% of farmers reported that they practice training and pruning respectively.

3.8 YIELD

The earlier investigators have reported average yields of 400 lbs per acre per year. The present survey shows a yield of about 205 lbs per acre per year. This discrepancy could be attributed to the fact that earlier surveys were carried out on large holdings unlike the present survey. Table 3.2 gives the percentage distribution of yield per acre per year.

TABLE 3.3 PERCENTAGE DISTRIBUTION OF YIELDS OBTAINED BY CINNAMON GROWERS IN MATARA DISTRICT

Yield per acre per year(lbs)	Percentage of cultivators
Less than 100	25%
100 -- 200	43%
200 -- 500	27%
500 -- 800	5%

1 Bale = 100 lbs.

The farmers felt that a satisfactory average yield of cinnamon for the district should be in the region of 400 to 500 lbs per acre per year. The survey showed that only 5% of the farmers achieved this target and 25% of the farmers obtained yields even less than 100 lbs per acre per year. These low yields are mainly due to poor management practices.

Furthermore the survey revealed that 97% of the cinnamon produced in Matara district is of a lower grade (H₂) and fetches lower prices when compared with prices for higher grades produced in other districts. This is a result of the methods employed in processing as well as effect of quality due to soil and climatic variations. For instance the Negombo cinnamon grown in cinnamon soil which are sandy in texture produce better quality bark which can be peeled easily and made into high grade quills.

The survey showed that 95% of the farmers had cinnamon as a pure stand and that they also preferred to continue this system. The land use map identified mixed crops as tea, rubber and cinnamon. These allotments were not included in the present survey since they do not strictly fall into the category of cinnamon plantations as cinnamon is an insignificant component in the mixture.

It was also observed that other crops cannot be grown in existing cinnamon cultivations since they have been planted at close spacings of 3' x 4' or 4' x 4' and that they do not provide sufficient light for the growth of other crops. Little research effort has been made so far to study the effect of growing other crops in association with cinnamon. Majority of the farmers reported that there are no suitable crops that could be grown in association with cinnamon excepting as an intercrop under coconut.

It is understood that a programme of investigations in collaboration with the Coconut Research Institute and the private sector

coconut plantations has been initiated to study this aspect of cinnamon under coconut in order to maximise land use. Field trials have already been laid out at various areas with several crop combinations and densities to study the effect of these combinations under intensive management systems on the yields of coconut and cinnamon.

3.9 REPLANTING

The Figure No. 3.2 illustrates the distribution of the crop by age in Matara district as revealed by the survey. The data suggest that about 10% of the area can be replanted immediately as the economic life span of the cinnamon is reported to be 40 years. This shows that 90% of the cultivation need not be replanted immediately but can be made viable by proper management practices. On this basis it should be noted that about 50% of the cultivation in the 20 - 40 years category will also need to be replanted in the near future. However, majority of the farmers who were interviewed felt that the economic life span of cinnamon can be over 40 years and some of the old cultivations seem to produce fairly substantial yields. Statistical analysis also showed that there was no significant correlation between age of crop and yield (appendix 1).

3.10 HARVESTING AND PEELING

Three quarter of the total labour requirement for cinnamon production is for harvesting and peeling. These two operations require skilled labour. The peelers belong to the 'Halagama caste' and there was some reluctance in the past by people belonging to other castes to engage in this work. The present survey did not show this constraint to operate. In fact in the past during the busy months the practice had been to hire peelers from Ambalangoda who also belonged to the same caste. But it was found that most of the peeling is now done by local peelers who do not necessarily belong to the 'Halagama caste'. This may also be related to the common complaint that the present day peelers are less skilled than in the

past.

The survey revealed that 93.5% of the cultivators employ hired labour or peel on share basis. Only 6.5% do their own peeling using family labour. The reason for majority of them not using family labour was due to the lack of skill and experience.

TABLE 3.4 BASIS FOR SELECTION OF PEELERS BY CULTIVATORS

Skills vs. other characters	% of cultivators
Skills	97.5%
caste and reliability	2.5%

Since peeling is not confined to a particular caste any more it is possible to expect the growers and their family members or other labourers available in the area to undertake this operation provided they have acquired the skill. Table 3.5 provides information on the availability of labour in cinnamon growing areas.

TABLE 3.5 PROBLEMS ASSOCIATED WITH AVAILABILITY OF LABOUR

Labour availability	Percent cultivators reported
Non availability of labour at the time of peeling	58
Non availability of labour within the area	5
Non availability of skilled labour in the area	15
Non availability due to other reasons	22

The tendency among the farmers has been to postpone harvesting when peelers are not available. This situation has caused considerable loss to the farmer both in terms of yield and quality of product. Although the non-availability of labour within the area reported was only 5% the important observation from this survey is that 58% reported non-availability of labour at the time of peeling. The overall picture shows that both skilled and unskilled labour is in short supply. The reason for this situation is due to the involvement of these farmers in other farming activities such as paddy cultivation where the labour requirement is greater and more timely.

During the survey the importance of providing a training programme for farmers on the aspects of peeling and processing was discussed and almost all the farmers felt that such a programme of training will help to overcome the prevailing problem of obtaining skilled labour. They also felt that if a training programme is initiated both males and females could be included although they favoured males. They also suggested that trainees should preferably be in the region of 25 years of age and that the training course should be held in the villages for a duration of about three months.

3.11. PEELER'S WAGES

In the past the peelers were paid on a share basis and they usually received half the peeled cinnamon. The recent trend has been to employ labour and pay according to the number of pounds peeled. A peeler can peel about 4 - 5 pounds per day. At the present rate of pay per pound (Rs. 3.50 - 4.00) he could earn Rs. 14.00 - 20.00 per day.

The owners feel that peeling on share basis is disadvantageous to him, and causes a disincentive to increase production, since the peeler takes a disproportionate share of the output generated by the owners' investments such as on fertilizer, soil conservation, etc.,

Of the 160 farmers who reported that they employ hired labour 58% paid cash and 42% shared the harvest with the peelers on 50 percent basis. Of the category who shared the produce 91% were not satisfied with the system and 81% of the owners who paid cash were satisfied with the system.

In order to compare the difference in the income to the peeler from the two systems the following computation was carried out from the survey data:

Average yield in Matara district	- 200 lbs per acre.
Present peeling charges	- Rs.3.50 per pound.
Total income accrued to the peeler	- Rs.700.00 per acre.

On the other hand if the peeler is entitled to half the share of the harvest and cinnamon is sold at the minimum current market price of Rs.9.00 per pound his income will be in the region of Rs.900.00 per acre. Therefore it is evident that peeling on share basis is profitable to the peeler than to the owner.

4. MARKETING OF CINNAMON

4.1. CINNAMON QUILLS

Although cinnamon producers can dispose of their produce in many ways in the Matara district, the peddler-type buyer and the resident local village merchant seem to be the more common outlets. The peddler-type buyers collect small lots of quills from the smaller farmers on bicycles and sell in larger lots to district dealers. He does not engage himself in processing or grading. The local resident small dealers also handle a fairly large volume of the cinnamon produced by the small farmer in the village. These dealers in turn sell their collection to the district dealer. There is usually a price gap of about 13% between the producer and the district dealers caused by these two categories. The district dealers in turn sell the collection to shippers in Ambalangoda or

Colombo. Occasionally some district dealers also handle shipping directly. The shippers in Ambalangoda and Colombo handle bulk of the exports. In fact, only a very small quantity is sold at the auctions of the Chamber of Commerce held weekly. The small volume of cinnamon sold at the auctions is mostly being used up by the local trade.

Prior to export the dealers/shippers break open the irregular size bundles of quills brought in by collectors and growers. The quills then bleached with sulphur fumes, trimmed and graded before packing in 100 pound gunny sack covered bales. These are then stored or immediately transported to Colombo for export.

According to McConnell and Upawansa (1972) a common work rate for reprocessing cinnamon quills ranges from 250 lbs for fine grades to 500 lbs for course Hamburg grades per man day. On this basis the labour costs would work out to a maximum of 6 cents and materials and transportation costs 10 cents which constitute a total of 16 cent or 2% of the farmer's price. The table 3.6 given below shows a market margin of 25% between the producer's price and the shippers price. This margin should be reduced to the benefit of the producer since the number of transactions that a dealer could handle over a given period could be considerably high and his investment period is short. For example a dealer could purchase the produce and sell it to the shipper within a period of less than one week and he could therefore carry out several such transactions over a period of one month.

The figure No. 3.3 shows the flow of cinnamon product from farm gate to the exporter.

TABLE 3.6 PRICES AT TRANSACTIONS OF CINNAMON QUILLS

	Buying Rs. #lb.	Selling Rs. #lb.	Margin Rs. #lb.	Margin as a % of final price
Peddler	9.00	9.50	0.50	4.3%
District dealer	9.50	10.50	1.00	8.6%
Shipper	10.50	12.00	1.00	<u>12.1%</u>
Total market margin				<u>25.0%</u>

A minor product of quills is the cut quill which is handled mainly by the dealer-processor sector and these are made up to meet specific orders only and do not seem to have a great impact on the marketing of cinnamon.

The total amount of chips produced in the Matara district is negligible. The small quantities produced are sold to dealer-processors and occasionally to one or two bark oil distillers. The survey did not indicate this to be a significant product. Similarly, bark oil produced in the district is also of lesser significance at the present time.

4.2 CINNAMON LEAF OIL

The leaf oil industry in Matara has a great potential for expansion. The farmers indicated that if more distilleries are set up particularly in areas such as Hakmana, Deiyandara and Allewela they could sell their leaves to these distilleries. According to the survey findings only 17 percent of the growers sold their leaf to distilleries. There were 30 distilleries in the district that handled the leaf. It was evident that the number of distilleries were not sufficient and that most of them were not well distributed in the cinnamon growing areas and were also not functioning efficiently.

Actual figures for oil production on a per acre basis was not available. However, these figures would vary according to the state of the plantation, time of harvest and efficiency of the distillation unit. The distillers indicated that they could extract on an average 3 bottles of oil from 500 pounds of withered cinnamon leaf and that a minimum of about 1500 pounds of such leaves could be collected from an acre. Therefore it is estimated that at least 9 bottles of leaf oil could be obtained from an acre.

With regard to marketing of this product there is a district dealer network similar to that for quills consisting of a few firms which purchase from distillers in Matara district and sell to exporters in Ambalangoda and Colombo.

4.3 PEELED STICKS

Peeled sticks is an additional source of income to the cinnamon grower. After meeting the farmer's own wood fuel requirements the excess is sold in the local market for firewood. The current value varies from Rs.7.00 to 8.00 per 100 sticks. Assuming a total crop of 4 to 5 thousand sticks harvested per acre the total value from this by-product would be in the region of Rs.280.00 to Rs.350.00 per acre per year.

5. WORLD MARKET PROSPECTS FOR CINNAMON

A comprehensive account on World Market prospects for cinnamon is given by Moore in his report on the 'State and the Cinnamon Industry in Sri Lanka'. At present Sri Lanka accounts for about 60% of the world production of cinnamon. During the period 1972 to 1976 cinnamon exports have accounted for 1% of the total export earnings of Sri Lanka. Although two other countries, Seychelles and Malagasy Republic compete with Sri Lanka the quality of Sri Lanka cinnamon is superior and it fetches a higher price.

Overseas demand for Sri Lanka's cinnamon comes from very long established markets. The main market is in the Spanish speaking world, comprising of Spain and the countries of Spanish America. This group of countries account for more than half of Sri Lanka's cinnamon exports.

Although cassia is used as a substitute for Cinnamon, several characteristics differ with the two types mainly in respect of growth habit and chemical composition. Cassia is a larger tree than Cinnamon and takes a longer time to reach a harvestable stage. Cassia yields are low and harvesting frequency is longer than Cinnamon. Cassia oil differs from Cinnamon oil in that only one main type of oil is produced from the various parts of the tree which is 80 - 90% Cinnamic aldehyde (Peuthi). It is also reported that Cassia is generally adulterated with kerosine or with synthetic cinnamic aldehyde or mixture of this aldehyde and benzyl acetate. In addition to these adulterants cassia oil is also known to contain lead, as a result of action between the free cinnamon oil in the oil and the lead container in which the oil is packed. Therefore, cassia oil used in foods and pharmaceuticals preparation has to be rectified by distillation.

The world imports of cinnamon from 1960 to 1972 increased only at an average rate of 0.9% per annum whereas the rate of increase from 1973 to 1978 is 7.6% indicating that there is an upward trend in the demand. Furthermore, there had been less fluctuations in prices during this period. It could be forecasted that both with increase in world population and rise in fuel oil prices the demand for cinnamon would continue. Past experience has shown that fuel oil prices has a direct effect on the prices of synthetic products and it would eventually be economical to use natural products such as cinnamaldehyde. Furthermore, there is a consumer preference for natural products than artificial products as the latter is believed to cause cancer and other health problems.

According to Manning there was little change in the pattern of consumption during the six to seven years prior to 1970. The main market was still the United States where consumption of Cinnamon bark increased gradually with the supply mainly coming from Seychelles but this has now changed considerably due to the shift of labour from Agriculture to Industry. Consequent to this situation the price of cinnamon from Sri Lanka increased and it is expected that there will be a move towards the Sri Lanka Cinnamon in the UK and possibly in the U.S. Chinese cassia is considered to be too highly priced to be used in any significant quantities in the UK and in the U.S. Furthermore, supplies of Penang cassia and Indonesian cassia have been somewhat irregular and there had been a slight upward trend in the import of cinnamon bark. It is therefore, suggested that the cinnamon market would be able to absorb a long term 'orderly increase' in production upto about 8 - 10% of the total supply now. Although the increase in demand is small the possibility of reduced supplies of bark from Seychelles has to be borne in mind and it is felt that traditional producers such as Sri Lanka will be able to take advantage of this situation.

There is also a demand for Sri Lanka bark oil since it is considered superior to bark oil from Seychelles and India.

Bark oil contains 60 - 70% cinnamaldehyde and varying quantities of eugenol and several other compounds which gives the characteristic flavour. It is used extensively for flavouring confectionery, liquors, pharmaceuticals, soaps and dental preparations.

Cinnamon leaf oil contains about 70 - 95% eugenol and is used in the perfumery and flavouring industries. In the U.S., Seychelles oil is used as a source of eugenol in the synthesis of vanillin, while Sri Lanka oil which is considered superior is used for manufacture of perfumed soaps and in flavouring sweets and confectionary.

Cinnamon leaf oil is used in spice flavours in perfumery and as a source of eugenol. The eugenol is used for the production of vanillin or is converted to isoeugenol for use in confectionary products.

It is reported (Manning) that in the past Seychelle's oil has been in demand in the World Market. However, these users have now changed to Sri Lanka cinnamon leaf oil because of the shortage of Seychelles oil and enquiries made in the UK suggest that they are not reverting back to the purchase of Seychelle's oil. Users in the perfumery industry have shown preference for Sri Lanka oil. Manufacturers of eugenol use the cheapest sources and the tendency had been to use clove oil which contains about 82% eugenol. But in the present market situation clove oil is more expensive and cinnamon leaf oil is considered the cheapest and it is likely that the demand for the latter will increase in the future.

Cinnamon in ground form is used in cakes, breads, buns, doughnuts, and biscuits. Cinnamon quills is used as an ingredient in pickling, fruit preserve and beverages. It is also widely used in some countries to flavour porridge, tea and chocolate.

Therefore, it is evident that cinnamon has a wide range of uses and a greater opportunity for expanding the consumer market in the World Market and based on the trends of Sri Lanka's export during the last decade it is possible to predict that if cinnamon production in Matara district is doubled within the next 10 years, it would not cause consequent decrease in price in the World Market. If the export figures from 1969 and 1979 are projected for the next 10 years Sri Lanka's exports could be increased by about 3450 cwts per year. The present level of production stands around 122,000 cwts and 25% of the amount that is contributed from Matara district is about 31,000 cwts per year. Based on the projected increase in export an increment of 3450 could be added annually for the next 10 years at national level. If this amount is produced in Matara

district the total contribution would reach (31,000 + 34,500 cwts) = 65,500 cwts at the end of 10 years which is slightly above the anticipated production of 62,000 (31,000 x 2 = 62,000). This estimate is of course based on the assumption that there will be no increased production from other parts of the country. In fact, this could be expected as the good productive cinnamon land in Negombo district for instance is being taken over for industrial expansion and growing of other crops and a similar trend is being experienced in other cinnamon growing areas as well.

In the light of the above facts one has to take a rather optimistic view of the situation and continue to maintain or improve the present position in the World Market. On the other hand if cinnamon production is restricted locally it would undoubtedly help the cassia exporting countries to capture the World Market.

6. RECOMMENDATIONS FOR THE IMPROVEMENT OF CINNAMON INDUSTRY IN MATARA DISTRICT

6.1. IMPROVEMENTS IN AGRONOMIC ASPECTS

Plant Improvement

Like in other cinnamon growing areas of Sri Lanka the cinnamon plantations in Matara district consist of several clones or ecotypes. The occurrence of such genetic variation in their plantations is not recognized by the growers. In the present survey it was found that the farmers identify all cultivated cinnamon as one variety. However, some of the large farmers are aware of the occurrence of mixed varieties in a plantation.

Preliminary investigations carried out by the Minor Export Crops Department found a wide range of plant types that produce oil of different quality. The Department has already initiated a programme for selection and breeding of some promising types of cinnamon collected from various parts of the country including Matara district.

The criteria for such a selection should include:-

- a) Plant types, which will grow vigorously into a bush with a sufficient number of straight stems producing less side branches and with a good stem girth.
- b) Wide range of adaptability to different soil and climatic conditions.
- c) High response to fertilizer application.
- d) Tolerance to low moisture and nutrient levels.
- e) Pest and disease resistance.
- f) Ability to peel easily and produce high grade quills.
- g) High percentage of oil in the bark and leaves.
- h) High quality oil from bark and leaf, mainly determined by high percentage of cinnamic aldehyde.

Planting Method

When cinnamon is established on new land or replanted the present practice is to plant 15 to 20 seeds in holes dug 1' x 1' x 1' filled with top soil at spacings of 4' x 4' or 4' x 3'. Approximately 2500 to 3500 planting holes can be prepared according to this spacing. This practice should be improved by the following methods:

- a) Size of planting hole should be slightly increased to 15" x 15" x 15" or 18" x 18" x 18" as most of the soil where cinnamon is planted is infertile and compact.
- b) These planting holes should be filled with top soil and organic or inorganic fertilizer in order to facilitate the initial establishment.
- c) Planting should commence at the beginning of the rainy season with 15 - 20 seeds or vigorously growing seedlings.
- d) Planting should be along the contour where-ever possible.
- e) Until improved varieties are released by the Department of Minor Export Crops, farmers should be encouraged to plant seeds or cuttings from selected mother plants from their own plantations. Selections should be made by trained personnel from the Department of Minor Export Crops.

- f) Effort should be made to develop and popularize the planting of vegetatively propagated material.
- g) In order to prevent soil exposure and erosion short term crops preferably legumes should be established between planting rows.

Use of Fertilizer

No proper experiments have been conducted to study the response of cinnamon to fertilizer applications. The present recommended mixtures and levels are unsatisfactory to obtain appreciable increase in yield and quality. The indications are that like other crops cinnamon too responds well to application of fertilizers. This is further supported from the yield data obtained from large holdings where fertilizer is used in addition to other management practices. Therefore, until suitable fertilizer mixtures are worked out the presently recommended mixtures should be applied at a higher rate. The present recommended rate of 3 - 5 cwts per acre for a mature plantation is highly inadequate. On this basis each clump of cinnamon will receive only about 2 oz per year. This rate is low when compared with rates of application for other crops both annual and perennial. It is the author's contention that this rate should at least be increased by 30 to 50 percent depending on the situation. On a rough estimate 6 cwts per acre is considered the requirement to have a beneficial effect on the yield.

Weeding

Cinnamon plantations are usually weeded only once a year prior to harvest. This too is done mainly to facilitate pruning and harvesting than for the benefit of the plantation itself. In some estates where management is slightly better this operation is carried out twice a year again prior to harvest.

A fertilizer application programme would not yield the best results if the plantation is not maintained weed-free. Therefore, a weeding programme should be carried out in such a manner that the plantations

are maintained in weed-free condition throughout the year. This could be achieved by manual weeding or by use of chemical weedicides such as grammoxone. The latter method has the added advantage of forming a mulch without disturbing the soil and thereby reducing soil erosion. Little or no work has yet been done on chemical weed control. There is a great potential for this method or for an integrated method of using both mechanical and chemical weed control particularly where seasonal labour is in short supply. The adaptability of any particular method would undoubtedly depend on the ultimate cost.

Cleaning and Repairing Contour Drains

Majority of the cinnamon land is undulating or steep. These lands are highly erodible and most of the existing plantations are actually thriving on the subsoil. Contour drains that were opened at the time of planting have not been cleaned or maintained on a regular basis and they do not seem to serve the purpose for which they were meant. In fact some plantations have no contour drains at all. In the rehabilitation programme it is recommended that existing contour drains should be cleaned and if necessary re-dug to a size of 18" x 18" x 18". Where contour drains are not found they should be cut at suitable intervals depending on the slope of the land.

Furthermore, depending on the slope other methods of soil conservation should be adopted such as use of bunds, terraces, etc.,

Pests and Diseases

There had been no significant work done on pests and diseases of cinnamon although this crop has been under cultivation for centuries. Amazingly enough, no serious pests or diseases are prevalent. Minor pests have been reported from time to time particularly with regard to leaf galls caused by a Psyllid (Hemiptera psyllidae). This could be brought under control by spraying a systemic insecticide or by

routine dusting with 1.3 percent B.H.C. dust one week ahead of flushing season. This application should be repeated one week later. Leaf gall damage is a common occurrence in most of the poorly managed plantations. It is therefore suggested that weeding, pruning and other methods of crop sanitation would bring this pest under control. Preliminary observations also suggest that some plants are less susceptible than others. As such, selection of resistant mother plants would also help to control this pest. Other pests that have been reported are of minor importance and could be brought under control by routine crop sanitation measures.

Occurrence of diseases such as grey blight (Pestalotia cinnamoni) has been reported from isolated locations but it is not of economic importance at the present time. Further spread should be avoided by selecting disease free planting material.

Pruning

Unproductive and excess branches should be cut back at the time of harvesting. This will avoid competition among the stems that are left behind for the next season's crop. The side branches of these green stems should be pruned to encourage better growth. The girth and height of the stems, easiness to peel, frequency of harvest and quality of peeled cinnamon depend to a great extent on the manner in which bushes are pruned and trained.

Harvesting

If a cinnamon plantation is well managed it should yield more than one crop a year. In some of the large plantations with constant use of fertilizer and other inputs it has been possible to take a harvest about every 8 months. The frequency would certainly depend on the levels of management. The following recommendations on harvesting are made:

- a) Harvesting should be carried out by skilled labour since the clumps can be damaged if they are not properly harvested.

- b) It should be done regularly and at such frequencies to avoid over exploitation and cause a severe drain on the food reserves of the plant thereby leading to poor yields during the following harvests.
- c) Harvesting should be as far as possible evenly spread throughout the year so that the peelers would have regular work and also help to avoid a decline in prices due to a seasonal glut in the market. This however, will be possible only if the rainfall is well distributed.
- d) Opportunities must be provided for the growers to learn the skills of harvest and peeling as far as possible.

6. EXTENSION AND INSTITUTIONAL SUPPORT SERVICES

Prior to the creation of the Department of Minor Export Crops in 1972, the research and extension activities on all Minor Export Crops came within the umbrella of the Department of Agriculture. Under this set-up, cinnamon and other Minor Export Crops were given a low priority as the main emphasis was focused on rice. However, with the setting up of the Minor Export Crops Department the aims and objectives have been to develop all Minor Export Crops grown in various parts of the country and to increase the foreign exchange earnings.

Presently in Matara district, a unit of this Department is available for extension activities concerning all Minor Export Crops including cinnamon. This unit is highly under-staffed and lacks transport and other facilities for field work. Their main activities with respect to cinnamon have been confined to granting subsidies and follow up work. The total component of the present staff is as follows:

- 1 District Extension Officer (MEC)
- 7 Extension Officers (MEC)

The officers of the Department of Agriculture in the district still maintain an interest in extension activities on cinnamon although not as a part of their main responsibilities.

It is therefore essential that the staff of the Minor Export Crops Department be increased with at least one Senior Officer of Assistant Director grade placed in-charge of extension activities concerning cinnamon only. The seven extension officers should also be stationed in the 7 electorates so that these officers could be responsible for promotion of all Minor Export Crops including cinnamon. At least two KVSs should be assigned to each Extension Officer and they should reside in the area. Each of KVS will be responsible for the development of about 1000 acres of cinnamon in addition to other Minor Export Crops in the area (Figure 6.1). The 7 Agricultural Extension Officers should be provided with motor cycles and the KVS with bicycles. The Assistant Director and the Agricultural Officer (Cinnamon), should be provided with two jeeps to enable them to visit the field on inspection and advisory work at regular intervals.

In addition to the Department of Agriculture, the other Government agency that should be associated with the extension activities concerned with cinnamon is the Agricultural Development Authority in the Matara District. The Officers of this department will help to strengthen the activities of the Minor Export Crops Department and Co-ordinate the extension programme with other government and private agencies. They would also arrange for the supply of planting materials, fertilizers, agro-chemicals, etc.

It is important at this stage to emphasize the need for an in-service training programme for the extension staff on various aspects of cinnamon cultivation, processing and marketing. The practice of transferring officers who have had no prior knowledge or experience to work on special crops such as cinnamon is considered highly unsatisfactory. Therefore, it is of paramount importance that these officers be trained in cinnamon cultivation and other aspects before they are sent to Matara for extension work. Such a training programme could be handled by the inservice training centres at Gannoruwa with the Assistance from other institutions such as the University, CISIR, Agrarian Services, in-Service programme of one week duration followed by another week of practical work and field trips would help to prepare the officers for an effective extension service.

This programme should be continued on an annual basis for the new recruits as well as officers already engaged in both research and extension.

7. PROJECT PROPOSALS

7.1 PROBLEM SETTING AND DESCRIPTION OF THE PROJECT

Matara district has 17,000 acres under cinnamon and contributes 40% to the total national production. Cinnamon is the most important crop among the large array of minor export crops produced in this district. This industry is a long established subsector with strong traditions in production and marketing and is predominantly a small-holder's crop. According to the survey data, 64% of the farmers own less than 2½ acre holdings. Although most of these farmers had other sources of income they were unable to invest on the improvement of the crop since their levels of income were insufficient. There is a tendency on their part to seek employment on daily wage basis or pay more attention to the growing of other crops such as rice and vegetables where quick returns could be obtained.

Cinnamon is usually grown on marginal land in Matara district, as a result yields have been poor. In order to increase the yields it is necessary to invest on inorganic fertilizer and agro-chemicals as well as increase labour inputs combined with proper management practices. Even if a small-holder has the cash to purchase fertilizer during one year he may not be able to continue application during the subsequent years. Cinnamon fertilizer is not normally available in the villages and supplies have to be obtained from distant towns. Furthermore, the smaller the quantity of fertilizer obtained greater would be the proportionate cost.

The peeler contract system is also considered a disincentive to the grower intending to develop his cinnamon plantation. Peelers are entitled to about 50% of the yield, thereby the full benefits

from extra inputs such as fertilizer, labour etc will not accrue to the owner. Even if peeling is carried out by hired labour the cost is appreciably high and reduces the farmer's income. To aggravate the situation, peelers are not available on a regular basis, since the few who have acquired the skill are either engaged in other farming activities or are in high demand during the height of the peeling season. Furthermore majority of the cinnamon growers are unable to peel their own cinnamon due to lack of skill.

The extension and other supporting services have not been sufficiently provided for this crop in the district. Main constraints are the lack of sufficient staff and transportation. The few members who are presently available in the district are entrusted with the responsibility of developing other minor export crops in addition to cinnamon.

The present subsidy scheme does not seem to have caused a significant impact on the development of this crop. The amount of subsidy given and the method of implementation need to be improved. It is felt that immediate benefits could be derived if subsidies are given for rehabilitation than for replanting. Of the total extent of cinnamon in Matara district only 5% have been well managed and a total of about 14,800 acres need to be rehabilitated.

Although the world market prices prior to 1972 have been fluctuating there is a steady increase in prices and demand during the recent years. The sudden increases in prices have encouraged the farmers in the past to over exploit their plantations at the expense of losing part of the crop during the subsequent years. This factor is not so significant when the price trend is upward as in the recent times.

Great bulk of the cinnamon products are traded through private dealers and may pass through several hands before reaching the shipper. The profit margin between the producer and the exporter is in the region of 25% of the export price. This gap could be

reduced considerably to the benefit of the producer without affecting the dealers. There is also a need for the provision of market information to the cinnamon producers since they are unaware of the current prices.

There is a general complaint at all levels that the quality of cinnamon products lack uniformity and standard. This situation also contributes to the low prices obtained by the producers particularly in Matara district where the quality of cinnamon produced is considered low when compared with other districts. This could be attributed to low standards of management of the crop at field level and the traditional methods employed in peeling where mostly H₂ grades are produced.

Production of cinnamon leaf and bark oil has a great potential for expansion. The present level of production could be increased if adequate facilities are available for oil extraction. Most of existing distills do not operate efficiently and need to be remodelled and reconditioned. There is also a dearth of distills for both bark and leaf oil extraction in some areas.

7.2. OBJECTIVES

The project is proposed with a view to provide adequate information on all aspect of cinnamon production and marketing in Matara district for the planning and implementation of the district development integrated programme.

The main objective of the proposed project is to develop the cinnamon industry in Matara district with a view to increase the present level of production and generate employment in rural sector. It is envisaged that an increase in the present level of production will have a direct impact on the socio-economic standards of the people in Matara district.

7.3 PROJECT DETAILS

According to the survey on the land use of the Matara district (Jinadasa), the land under cinnamon cultivation has been categorized into two main groups; as well managed and poorly managed. The total area under these two groups constitute 9430 acres although the estimated total acreage under cinnamon in the district is about 17,000. The other category that has cinnamon in mixed cultivations includes the small holdings. These small holdings constitute a complex area with small allotments containing tea, rubber, and cinnamon. This area is mainly confined to the northern part of the district. It is assumed that the balance 7,500 acres under cinnamon is within these small allotments. Therefore the immediate development plans should be focused on the poorly managed cinnamon cultivation in the district. Based on the findings of the survey, approximately 90% of the extent can be rehabilitated and only the balance 10% need to be replanted.

It is recommended that the extent under cinnamon cultivation in Matara district should not be increased. If such an attempt is made it will have to be done at the expense of other crops. The cost benefit ratio also indicates that it would be unwise to grow cinnamon on land suitable for other crops. As stated earlier the land presently under cinnamon is unsuitable for other types of farming enterprises and since a significant percentage of the rural population is already engaged in the cultivation, processing and marketing of this crop, an effort to maximise the utilization of such land is considered a feasible approach. Confining to the existing extent with a programme to replant and rehabilitate the industry would certainly help to increase production and increase the income of those associated with the crop.

Replanting

The present subsidy scheme for replanting should be continued with certain modifications. The subsidy should be increased to Rs.3,000/-

per acre. This figure is arrived at on the basis of cash flow indicated in Table A.1. The total expenditure in establishment of an acre of cinnamon for the first three years is Rs.4,525#-. Of this amount it is estimated that about Rs.1,000#- will be realised from the sale of quills, leaves and sticks at the end of the third year. Therefore the balance cost will be around Rs.3,500#- and a total subsidy of Rs.3,000#- is recommended. Under the present scheme the initial instalment is smaller than the final instalment. This method is considered to be unsatisfactory as the major part of the expenses are increased during the first year. Therefore, the first year instalment should be about 2/3 of the subsidy (Rs2,000#-). The instalments during the second and third year could be equally distributed. By this method it is envisaged that small farmers who do not have sufficient resources for the initial expenses will be benefitted. The first year instalment could be further split so that the funds are released as and when different operations are completed. Closer supervision of the field staff will be necessary in order to implement in this manner.

Cost benefit analysis details are given in appendix II.

The total cost of this scheme will be as follows:

1,700 acres at the rate of Rs.3,000#=-	Rs.5,100,000#=-
Less amount received under the present subsidy return	Rs.4,250,000#=-
Project cost	<u>850,000#=-</u>

Rehabilitation

At present there is no subsidy scheme for rehabilitation of cinnamon land. Of the total area of 17,000 acres under cinnamon in Matara district only 506 acres are well managed. Leaving out this extent and 1,700 acres that require replanting, the balance 14,800 acres need to be rehabilitated. This rehabilitation programme could commence immediately according to the following scheme;

The land should be categorized into three groups according to their level of production, age and condition of the land.

Yield of Quills (3 years average)

Group I Less than 100 lbs.

Group II 100 - 200 lbs.

Group III 200 - 300 lbs.

Yield of Quills (3 years average) Subsidy
Recommended

		<u>1st year</u>	<u>2nd year</u>
Group I	Less than 100 lbs.	Rs.1,250.00	750.00
Group II	100 - 200 lbs.	Rs.1,000.00	500.00
Group III	200 - 300 lbs.	Rs. 750.00	250.00

Similar to the scheme recommended for replanting the subsidies should be given immediately after the work has been completed. It may therefore be necessary to split the annual subsidy into two or three instalments. The cost of such a scheme works out on an average basis (1,500/- per acre) for 14,800 acres to around 21,000,000. Since this is a large investment the programme could be phased out to five years starting with group I and II.

The cost-benefit analysis for replanting with subsidy and without subsidy is given in Appendix III.

Cinnamon Peeling

The importance of a programme for training peelers was discussed at length in Section 3.10. It is recommended that initially such a training programme should provide training for about 200 trainees per annum and this should continue for at least three years, in view of the anticipated increase of yields from replanting and rehabilitation programmes. The training programme could be organized in the district by the agricultural extension staff. It is proposed that Extension Officers should select experienced peelers from their areas. Each of these peelers should be assigned with five to six trainees for a period of about three months. The duration of training will depend on the trainer as well as the trainees and it may be necessary to extend the period.

Provision should be made to pay an incentive allowance to both the trainer and the trainee. In addition to this allowance, both should benefit from the extra earnings derived by peeling during the period of training. The amount entitled by the trainee could be worked out on a percentage basis (such as 25% to the trainee and 75% to the trainer). The cost of such a training programme phased out for three years would involve the following expenditure:

Allowance payable to 40 trainers each of Rs.50/- per day for 5 days	= Rs.10,000.00
Allowance payable to 200 trainees each of Rs.5/- per day trainee for 90 days each	= Rs.90,000.00
Other organizational costs	= Rs.10,000.00
Total	= Rs.110,000.00
Total cost for three years	= Rs.330,000.00

Improvements necessary for processing of cinnamon oil

As stated earlier most of the leaf oil distillation units in the district need to be reconditioned and improved in order to prevent unnecessary loss of oil due to inefficient extraction. The owners of these distilleries are ignorant of the fact that a good portion of the oil is left behind in the oil residue. Furthermore there is an acute shortage of distilleries in the district and it is necessary to increase the number of distilleries immediately by three and during the next three years by another 6 to 7. An advisory service from the Industrial Development Board or the CISIR should inspect these existing distilleries from time to time and give necessary technical advise to improve the efficiency of these units.

The subsidy of Rs.15,000/- for the setting up of a distillery is highly inadequate. The total cost of installing such a unit is around Rs.50,000/-. Therefore it is recommended that a subsidy of Rs.25,000 be granted. As a further incentive to the investor the Department of Minor Export Crops should arrange for long term bank loan for the balance Rs.25,000/-.

With regard to bark oil distillation there are only two units in the district. Here too the number of units is inadequate at the present time. Initially it would be advisable to set up at least one in each electorate. This means that an additional five units are required immediately. The cost of such a unit varies from Rs.15,000 to 20,000 and a subsidy should be provided to assist the distillers. The amount recommended is Rs.10,000#- per unit.

However it should be mentioned that the operation of these distilleries to full capacity depend on the availability of cinnamon chips and this varies with the prices of cinnamon quills. When the prices of cinnamon is high the local supply of chips for oil extraction is low. The approximate cost of subsidising the leaf oil and bark oil distilleries is as follows:

5 new leaf oil distilleries at 10,000 each	= Rs. 50,000.00
30 existing distilleries-improvement cost at 10,000 each	= Rs. 300,000.00
5 new bark oil distilleries at 10,000 each	= Rs. <u>50,000.00</u>
Total cost	= Rs. <u>400,000.00</u>

Another 75,000 will be granted under the existing subsidy scheme at 15,000 per unit.

In view of the total income derived from leaf and bark oil an investment of Rs.400,000#- is considered feasible and worthwhile.

Marketing

Marketing has been one of the biggest constraints in the cinnamon industry. The existing structure of marketing is found to be unsatisfactory from the growers point of view since there is a significant gap in the prices obtained between grower and the shipper. There is also the possibility of price fluctuations which may have detrimental effect on the product if they are not minimized as far as possible. Moore in his report has suggested holding 'buffer stocks' at national level; such a manipulation would certainly help to overcome this problem to some degree.

However at district level this will not be possible.

The main recommendation for the improvement of marketing cinnamon in Matara district is to organize the existing marketing structure in such a way that the private dealers both small and large do not control the prices due to lack of competition. It is therefore very essential that some Government agencies should move into the rural areas and establish centres for purchase of cinnamon products. Since cinnamon is a minor product compared to tea, rubber and coconut such a scheme would encounter certain difficulties in operating the centres. In order to overcome this difficulty it is recommended that purchasing centres for all minor export crops should be set up in rural areas. The inclusion of other minor export crops would make a centre more viable. These commodity purchase centres should be located in the main areas of district where cinnamon and other minor export crops are grown. These centres in turn should have a district centre similar to the private sector organization where reprocessing, repacking and regrading will be done before they are exported by the Government agencies or through expected private firms. The government agencies that should be consulted for the establishment of such a net work should include the Department of Commodity Purchase, Marketing Federation and Co-operative establishments.

In addition to the establishment of the commodity purchase centres, the farmer should be kept well informed of the current market prices of cinnamon. These should be published in the news papers and given over the radio like for other important crops.

Fertilizer

As stated earlier, the significant constraints to the development of the Cinnamon Industry in the Matara district are lack of information on the use of fertilizer and the difficulty of obtaining adequate supplies at the proper time. It is also necessary to carry out a sound research programme by the Department of Minor Export Crops, Universities and other Agencies on the use of fertilizer. These investigations should primarily include response of Cinnamon to N.P.K.

and other elements both macro and micro. Various combinations of different levels and different locations, if tested out, would provide the basic information to develop a suitable mixture. Following these investigations, it would be necessary to study the method, time and depth of application. However, the available information suggests that use of fertilizer would increase yields and is profitable (Appendix IV).

The urgent need at the present time is to provide a suitable organisation to assist the cinnamon growers to obtain their fertilizer requirements. This would be achieved only if fertilizer is made freely available to the farmers through co-operatives or through commodity purchase centres that would be set up for purchase of cinnamon. It is recommended that the extension staff should provide estimates of fertilizer required based on approximate acreages in their respective areas to the co-operatives or to the commodity purchase centres.

7.4. LOCATION AND TARGET GROUPS.

This project should be implemented in all parts of the district where cinnamon is grown. Extents which need to be rehabilitated and replanted in each electorate are given in the following table:

Electorate	Acreage to be replanted	Acreage to be rehabilitated
Kamburupitiya	345	3026
Hakmana	460	4070
Devinuwara	120	1010
Matara	170	1460
Deniyaya	159	1370
Weligama	220	1910
Akuressa	<u>226</u>	<u>1954</u>
Total	<u>1700</u>	<u>14,800</u>

This programme should be phased out over a period of 5 years.

Rehabilitation should initially commence on land yielding less than 100 lbs of quills#acre#year and should be continued until the category that produces 200 to 300 lbs#acre#year is completed during the 5 years. The extent under each category recommended for rehabilitation are given below:

Yield#acre#year -----	Acreage recommended for rehabilitation -----
Less than 100 lbs of quills	2500
100 to 200 "	7300
200 to 300 "	<u>5000</u>
Total	<u>14,800</u>

Replanting also should commence with rehabilitation on 1700 acres that is over 40 years. During the first year 200 acres should be replanted followed by 500 acres each in the next three years. It is necessary that both replanting and rehabilitation should commence with the minimum acreages since the infra-structure for handling a large extent is not available at the present time. With the increase in production from rehabilitation and replanting it is envisaged that there will be an increased flow of cinnamon leaves and chips for oil extraction. Therefore facilities to handle such increase should also be provided during the project period. The following table gives the suggested areas for installation of new distilleries:

Location -----	No of new distilleries	
	<u>Leaf oil</u>	<u>Bark oil</u>
Deniyaya	1 (1981)	
Kamburupitiya	1 (1982)	1 (1983)
Weligama	1 (1983)	1 (1984)
Akuressa	1 (1983)	1 (1984)
Matara		1 (1981)
Hakmana	1 (1984)	1 (1982)

The 30 existing leaf oil distilleries should be remodelled and reconditioned at the rate of 10 each year for three years. The selection priority for this purpose should be based on the advice of a technical team from the CISIR.

The peeler training programme should commence in 1981 and should train 200 peelers annually for a period of three years. These trainees should be selected from the 7 electorates on the basis of the extent under cinnamon in each electorate. The following scheme is suggested:

Location	No of trainees		
	1st year (1981)	2nd year (1982)	3rd year (1983)
Kamburupitiya	45	45	45
Hakmana	55	55	55
Devinuwara	20	10	20
Matara	15	15	15
Weligama	25	25	25
Akuressa	25	25	25
Deniyaya	15	15	15
Total	200	200	200

In order to handle the marketing of cinnamon products and provide better prices for the produce 15 commodity purchase centres should be established in areas covered by the 15 agrarian services centres indicated below. It is suggested that these centres should be established in 1981.

Locations for commodity purchase centres

Kamburupitiya	Weligama	Urubokka
Meda-uyangoda	Kekenadura	Pasgoda
Wilpita	Kirinda-puhulwella	Hakmana
Kananke	Akuressa	Ransagoda
Malimbada	Deiyandara	Dandeniya

Improvement of extension services will be a pre-requisite for the implementation of a development programme for cinnamon in Matara district. Therefore the extension services of the Department of Minor Export Crops should be strengthened in 1981 by the provision of additional staff as suggested below:

- 1 Assistant Director (Minor Export Crops)
- 2 Agricultural Officer (Cinnamon)
- 7 Krushi Viyapathi Sevakas' (KVSs)

7.5. SUMMARY OF PROJECT COSTS AND BENEFITS

WITHOUT PROJECT - COSTS

Labour (including weeding, peeling, pruning etc)	@ Rs.	1120#-
Per ac. (Rs.15#- SMD) for 17,000 acres	Rs.	19,040,000
Fertilizer 400 lbs#ac. for 2,000 acs. =#90 lbs	Rs.	720,000
Replanting subsidy (5% of total extent) 850		
acres @ Rs.2,500#- per acre	Rs.	2,125,000
Extension services		550,000
Marketing costs	Rs.	<u>7,650,000</u>
Total	Rs.	<u><u>29,585,000</u></u>

WITHOUT PROJECT - RETURNS

Yield 200 lb ac./year for 17,000 ac. @ Rs.15/- per lb of quills	Rs.51,000,000
Leaf sale for oil extraction from 10% of total extent at Rs.200/- per ac.	Rs. 340,000
Sticks used from 10% of total extent at Rs.150/- per ac.	Rs. 318,750
Oil extraction from 10% extent to distilling owners at Rs.250/- per ac.	Rs. <u>425,000</u>
Total	Rs. <u><u>52,083,750</u></u>
Total returns	Rs.52,083,750
Total cost	Rs. <u>29,585,000</u>
Benefits	Rs. <u><u>22,498,750</u></u>

SUMMARY OF PROJECT COSTS
(in Rupees)

ITEMS	1981		1982		1983		1984		1985		1986	
	IRDP	MECD	IRDP	MECD	IRDP	MECD	IRDP	MECD	IRDP	MECD	IRDP	MECD
Rehabilitation												
1st instalment	3145000	-	3650000	-	3650000	-	1875000	-	1875000	-	-	-
2nd instalment	-	-	1875000	-	1825000	-	1825000	-	625000	-	625000	-
Peeler training 200 trainers/year	110000	-	110000	-	110000	-	-	-	-	-	-	-
Improvement of extension services												
Asst. Director (MECD)	18000	-	18600	-	18200	-	19800	-	20400	-	21000	-
AO (Cinnamon)	12000	-	12360	-	12720	-	13080	-	13440	-	131800	-
RVS	550400	-	51660	-	52920	-	54180	-	55440	-	56700	-
35% subsistence and other allowances	28180	-	28917	-	29694	-	30471	-	31248	-	32025	-
Replanting												
1st instalment	4000000	-	1000000	-	1000000	-	1000000	-	-	-	-	-
2nd instalment	1000000	1000000	250000	250000	250000	250000	250000	250000	250000	250000	-	-
Vehicles 2 Jeeps	150000	-	-	-	-	-	-	-	-	-	-	-
7 Motor cycles	105000	-	-	-	-	-	-	-	-	-	-	-
Insurance Fuel and maintenance	60000	-	60000	-	60000	-	60000	-	60000	-	60000	-
2 Drivers	12000	-	12480	-	12960	-	13440	-	13920	-	14400	-
Marketing Rent for 15 CPCC	9000	-	9000	-	9000	-	9000	-	9000	-	9000	-

Continued....

ITEMS	1981		1982		1983		1984		1985		
	IRDP	MECD	IRDP	MECD	IRDP	MECD	IRDP	MECD	IRDP	MECD	
Leaf oil											
distilleries new	10000	15000	10000	15000	20000	30000	10000	15000	-	-	-
Remodelling	10000	-	10000	-	10000	-	-	-	-	-	-
Bark oil											
distilleries new	10000	-	10000	-	20000	-	10000	-	-	-	-
Miscellaneous costs	50000	-	50000	-	50000	-	50000	-	50000	-	50000
Total	3869540	515000	6098017	1265000	6221494	1280000	4219971	1265000	3003448	250000	1510225

Notes:

- IRDP - Integrated Rural Development Project
- MECD - Minor Export Crops Department
- CPCC - Commodity Purchase Centres.

WITH PROJECT - RETURNS

(in Rupees)

ITEMS	1981	1982	1983	1984	1985
Yield	250 x 17000 x 15	300 x 17000 x 15	350 x 17000 x 15	400 x 17000 x 15	400 x 17000 x 15
Rupees	63750000	76500000	89250000	102000000	102000000
Leaf	100 x 8500 Ac.	150 x 17000	200 x 17000	250 x 17000	300 x 17000
Rupees	850000	850000	3400000	4250000	5100000
Sticks	100 x 8500 Ac.	150 x 17000	250 x 17000	300 x 17000	300 x 17000
Rupees	850000	2550000	4250000	5100000	5100000
Oil producer benefits Rupees	2550000	5100000	5100000	5950000	6800000
Total Rupees	68000000	85000000	102000000	117300000	119300000

The above calculations are based on current price and expected increased yields over the five year period

	1981	1982	1983	1984	1985
Yield per acre lbs	250	300	350	400	400
Leaf Rupees	100	150	200	250	300
Sticks Rupees	100	150	250	300	300

PROJECT BENEFITS

	1981	1982	1983	1984	1985	1986
Total returns	Rs. 68000000	85000000	102000000	117300000	119300000	119300000
Total costs	Rs. 4384540	73363017	75501494	5484971	3253448	1510225
Benefits	Rs. 63615460	11636983	26498506	111815029	116046552	117789775

5
13 Cost Benefit Ratios

Total cost per year Rs. 44,871,282

Discounted cost per year Rs. 53,843,539

Total returns per year Rs. 96,895,384

Discounted total returns
per year Rs. 116,164,460

(Discount rate 20%)

Cost benefit ratio with project 1.6

APPENDIX I CORRELATION STUDY BETWEEN INPUT AND YIELD

<u>Variables</u>	<u>Correlation Xvs.Y</u>
Fertilizer used / Ac	0.06828
Experience in cultivation (yrs)	0.00659
Cinnamon acreage owned (Ac)	0.03673
Age of crop cinnamon (yrs)	0.00799
Labour used in cultivations (smd)	0.09473
Total land holdings (Ac)	0.14859

APPENDIX II COST-BENEFIT ANALYSIS
OF REPLANTING

The following section presents the results of financial analysis for the proposed replanting of old cinnamon land in Matara district on the following assumptions.

- a) The capital and labour are not limiting
- b) The land is suitable for cinnamon only
- c) The infra-structure is available
- d) Technical information is available

1. Costs

- a) Establishment cost up to 3 years
- b) Maintenance cost - After 3 years it is assumed constant throughout the life span of the crop. The establishment and maintenance costs are given in the following table.

2. INPUTS/COSTS OF REPLANTING/MAINTAINING ONE ACRE OF CINNAMON IN
MATARA DISTRICT

<u>Replanting</u>	1st year		2nd year		3rd year		4th year	
	Labour Units	Rs.	Labour Units	Rs.	Labour Units	Rs.	Labour Units	Rs.
Uprooting/Cleaning	40	600	-	-	-	-	-	-
Soil conservation	20	300	4	60	6	90	6	90
Fencing/lining peg holes	20	300	2	30	4	60	4	60
Preparation of holes & planting	50	750	-	-	-	-	-	-
Application of fertilizer	4	60	4	60	8	120	10	150
Filing vacancies	3	45	3	45	3	45	2	30
Weeding twice	30	450	20	300	20	300	15	225
Pruning/Training			3	45	4	60	6	90
Harvesting/peeling							350#-	1
<u>Materials</u>								
Fertilizer Rs.0.90 a Kg.		90#-		90#-		180#-		
Cost of planting materials		70#-						
Tools and other misce- llaneous supplies		25#-						
Total expenditure		2696#-		630#-		1205#-		2

The input cost items for establishing and maintaining cinnamon are based on the following:

1. An anticipated labour wage rate of Rs.15.00 per unit.
2. A hundred kilograms of fertilizer at Rs.90.00.
3. The labour input based on recommendations and the survey.
4. Amount of fertilizer used based on available recommendations and other information.
5. Weeding twice a year every year.
6. Cost of peeling at Rs.3.50 per pound.
7. The discount rate on capital as 20%.
8. No opportunity cost is involved on land since the land could be used only for cinnamon and no other crop.

3. Returns

a) Yield

1. A reasonable yield of 400 lbs per acre per year is assumed since the inputs have been increased over the prevailing management conditions. This assumption is considered fair as the per acre yield with good management has previously been reported as high as 600 lbs.
2. Harvest could be obtained from the 4th year after planting with a minor harvest in the 3rd year.
3. The life span of the crop is 40 years.

b) Price

1. A pound of cinnamon quill at the farm gate at Rs. 9.00 which is actually a modest estimate as the recent World Market shows an upward trend.
2. Income from leaves and peeled sticks at Rs.300.00 per acre.

4. COST-BENEFIT RATIO WITHOUT SUBSIDIES

The ratio was found to be 0.79 and from a financial point of view it is not viable. However, since a significant proportion of the rural population in Matara district is associated with the growing, processing and marketing of this crop it cannot be considered purely from a financial angle. It should be mentioned that only fertilizers and agro-chemicals which form a very small amount of the total input for the production of this crop are imported. On the other hand the amount of foreign exchange earnings from this crop has a great impact on the socio-economic conditions of the people in Matara district. In addition the cinnamon industry in Matara district helps to provide employment to a large proportion of the farming population. In view of these facts it is recommended that the cinnamon industry in Matara district should be sustained and developed with the continuation and expansion of the existing subsidy scheme. The cost benefit analysis including the prevailing rate of subsidy (Rs.2500/-per acre) and a recommended full subsidy to cover the total establishment cost of Rs.3000/- was computed and arrived at the following ratios:

	<u>Cost -benefit ratio</u>
Rs.2500/- subsidy	1.03
Rs.3000/- subsidy	1.77

Although the Rs.2500/- subsidy is sufficient to more or less break-even the cost and benefit, a slightly higher subsidy is recommended in order to encourage the farmers to sustain the industry by making it more attractive.

In order to increase the scope of this evaluation a sensitivity analysis was done by manipulating the labour wages and price of cinnamon as follows:

LABOUR WAGES

COST-BENEFIT RATIO

Increase 10%	1.63
Increase 20%	1.51

PRICE OF CINNAMON

Increase 10%	1.93
Increase 20%	2.13

LABOUR WAGES AND PRICES

Price decrease 10%)	1.46
Labour wages increase 10%)	

Therefore the above ratios suggest that changes in labour wages of prices do not substantially affect the previous conclusion.

APPENDIX III COST-BENEFIT ANALYSIS REHABILITATION

1. Costs

The assumptions for the financial analysis were considered the same as reported for replanting. The following table gives the inputs/costs:

Table A.1. INPUTS AND COSTS OF REHABILITATING CINNAMON IN MATARA DISTRICT

Operations	labour units
------------	--------------

Weeding twice	20
Fertilizer	8
Filling vacancies/uprooting weak and uneconomic plants	12
Pruning/training/pest control	6
Soil conservation	10
Fencing and miscellaneous	6
	<u>62</u>

Materials

Fertilizer at the rate of Rs.0.90/kg.	Rs. 270.00
Implements, tools, etc.	50.00
Cost of planting material	<u>30.00</u>
Total expenditure	Rs. <u>1280.00</u>

The input cost items are based as for replanting.

2. Returns

a) Yield

1. A yield of 400 lbs/acre or approximately 200 lbs more than the current yield could be expected
2. Increased harvest could be obtained from the 2nd year

onwards after rehabilitation.

3. The inability period of the investment is 20 years.
- b) The price for cinnamon quills at Rs.9.00/lb and income from leaves and sticks at Rs.300.00 per acre.

3. COST-BENEFIT RATIO

The cost-benefit ratio for rehabilitation was found to be 1.67 which is much higher than that for replanting. Since then a large extent needs to be rehabilitated and the total cost for rehabilitating an acre is about 50% of the cost of replanting, it is feasible to embark on a rehabilitating programme immediately if funds are limiting for a replanting programme. If a subsidy is given for a rehabilitation programme the cost-benefit ratio would further improve as shown below.

	<u>Cost-benefit ratio</u>
Without subsidy	1.67
With subsidy	1.90

Similar to other crops the main inputs used in cinnamon production are land, labour and chemical fertilizer. It is expected that there should be a significant correlation between yield and these inputs. On the contrary, such correlations were not evident from the survey data obtained from Matara. This could be attributed to the fact that farmers did not use sufficient amounts of inputs to show a significant effect. It was revealed that majority of the farmers who used fertilizer did not apply the recommended mixtures at the proper time in sufficient quantities in order to obtain a positive response. Similarly labour inputs also showed no significant correlation since the labour was not employed in sufficient numbers at proper times. Therefore, a production function cannot be established based on the Matara survey data.

However, a marginal profitability analysis was carried out to further justify the investment on fertilizer and labour inputs using the simplest form of production function derived by Moore from his survey on cinnamon at Batapola.

The functions are as follows:

Pure Stands: $Y = 100.78787 + 0.26003 X_1 + 0.10045 X_2$
 $R_2 = 0.294$ $n = 24$ plots

Mixed Stands: $Y = 59.07190 + 0.15803 X_1 + 0.08987 X_2$
 Y = Quill yield in pounds per acre
 X_1 = Fertilizer application in pounds per acre
 X_2 = Labour inputs hours per acre

Assumptions

- a) A pound of quill at farmgate Rs.9.00
 - b) A pound of quill in the international market Rs.15.00
- Subsidized fertilizer at 0.41 cents per pound
 Unsubsidized fertilizer at 0.82 cents per pound

c) Labour units (8 hrs.) Rs.15.00

Cost of labour (1 hour) Rs.1.80

The regression equation on pure-stands indicates the regression coefficient of 0.26003 pound of quills for addition of a pound of fertilizer.

Therefore, marginal cost on fertilizer = 1 lb. x 41 cents = 41 cents
marginal returns : = 0.26003 lbs. x Rs.9.00
= Rs.2.34

Assuming that the owner pays Rs.3.50 for peeling a pound of quill his share of returns on an additional pound of fertilizer will be 62%. Hence, the net gains to the owner by adding a pound of fertilizer will be Rs.1.45 and the cost-benefit ratio is 3.5. This shows that each additional rupee invested on fertilizer will accrue a benefit of Rs.3.50. On this basis if we consider the benefits at national level the ratio is even better maintaining at 4.75.

If the fertilizer prices increase by 100 percent the ratio would still be satisfactory since it is 2.38. The additional income that would be realized from the increased production of cinnamon leaf oil and sticks resulting from fertilizer application has not been taken into consideration. Therefore, the overall benefits to the industry and the nation would be of a greater magnitude.

The other input that was considered for analysis was labour. Using the equation for mixed stands (Moore) a cost-benefit ratio of only 0.4 was derived on the following basis.

Marginal cost - 1 x 1.87 Marginal return - 0.09 x 9.00 = .81

Similarly low marginal returns for labour input has been observed in other crops such as tea. The important consideration in this aspect is that although the returns are low, there is employment opportunities created particularly for the family labour where alternate employment opportunities are lacking.

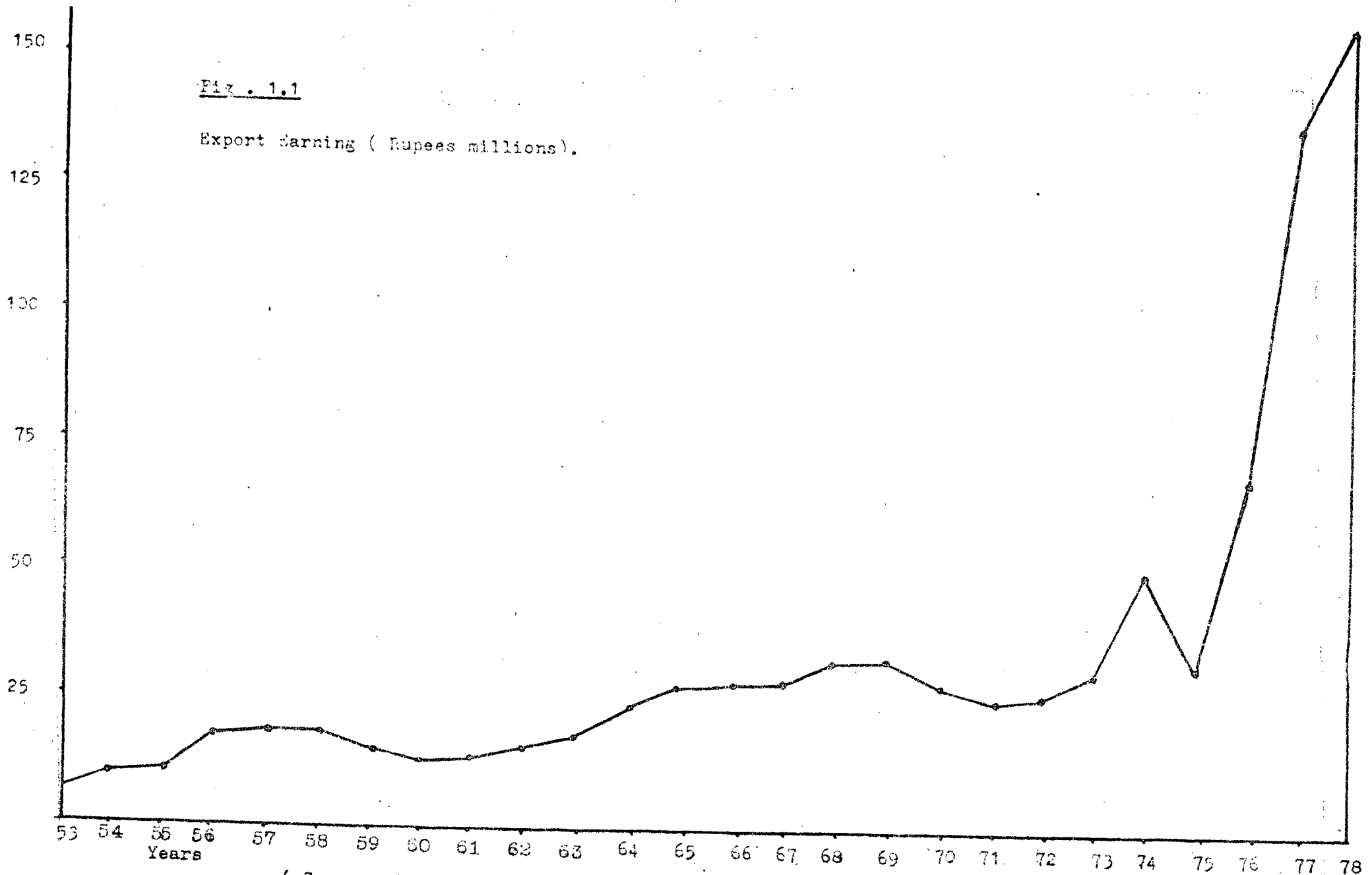
REFERENCES

1. D.J.McConnell and C.K. Upawansa (1972). The spice industries of Sri Lanka - Cinnamon Farm Management Report No.2.
2. M.P.Moore (1978). The State and the Cinnamon Industry in Sri Lanka. (ARTI Occasional Publication No.15).
3. Noreen Coorey (1971). Ceylon spices in the International spice Market. (CISIR Publication).
4. Statistical Branch Matara (Kachcheri). Statistical Bulletin Matara District (1979)
5. Maxwell de Silva (1978). Cardamom Development in Knuckles Region
6. J.Price Gittinger (1972). Economic Analysis of Agric. Projects. The Johns Hopkins University Press.
7. S.Dimantha ('?) Land Suitability Evaluation of the Matara District. (ARTI Publication).
8. Department of Minor Export Crops. Cinnamon Cultivation and Processing.
9. Frederic Rosengarten, Jr. (1973). The Book of spices. Pyramid Communication Inc. (U.S.A)
10. C.D.Jinadasa (1980). A Report - The Present Cord Use of the Matara District
11. Integrated Development Programme. Matara District.
12. Manning C.E.F. The Market of Cinnamon and Cassia and their essential oils. Tropical Products Institute Report(G 44) February, 1970.
13. UNCTAD GATT Spices a survey of the World Market Vol. 1 & II. 1977.

Personal Communications Professor Jogarathnam, Dr.S.Pinnaduwege,
Dr.K.V.A.Bavappa U.N. Expert.

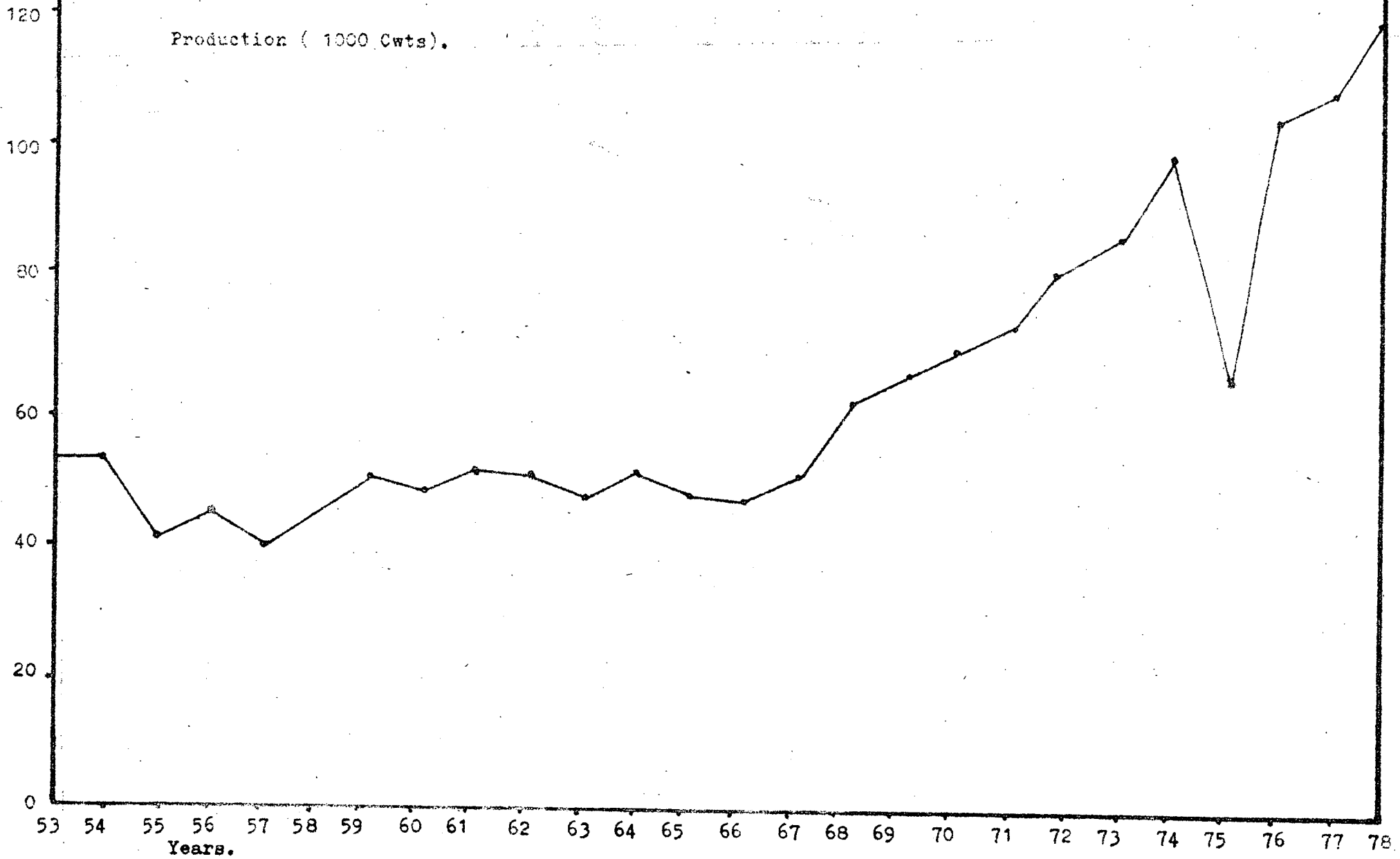
Mr.W.Sinnathamby, Forbes & Walkers.

Meetings and personal communications A.D.A., A.O. & D.E.O. Matara.



(Source- Customs returns Journal 1953 - '69 , Central Bank report 1969 - '78)

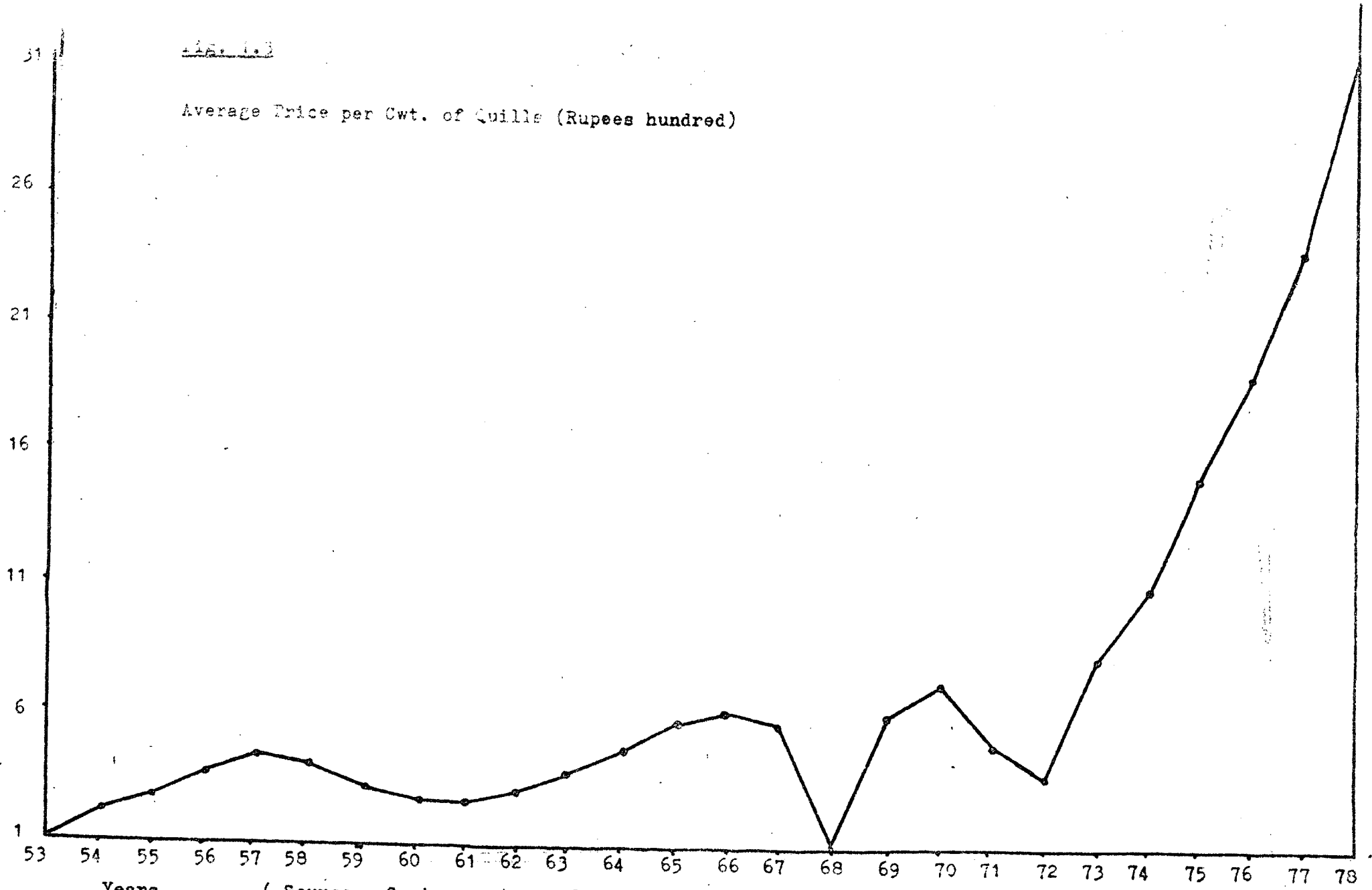
Fig. 1.2



(Source - Customs returns Journal 1953 - '69, Central Bank Report 1969 - '78)

Fig. 1.3

Average Price per Cwt. of Quills (Rupees hundred)

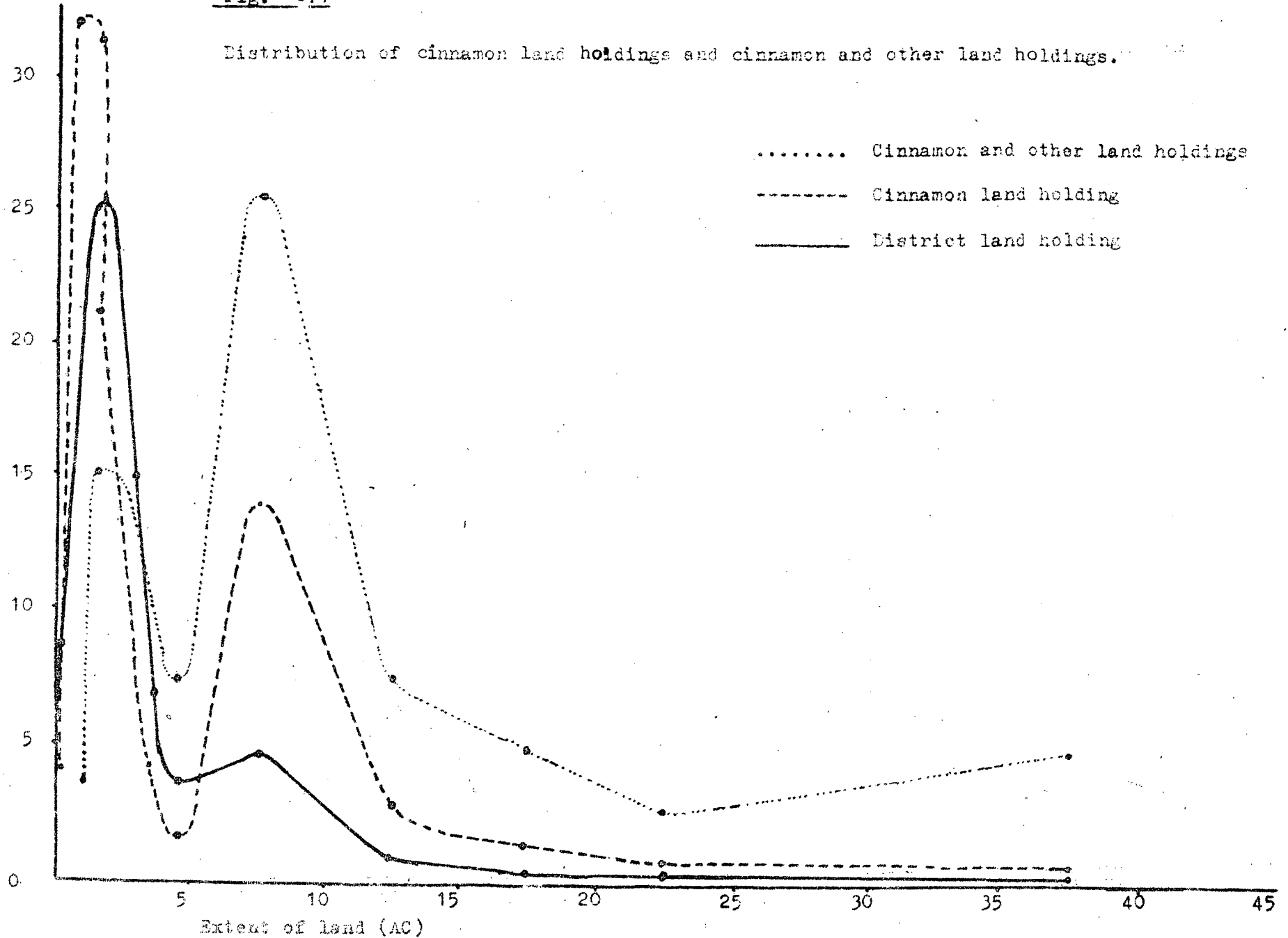


Years

(Source - Customs returns Journal 1953 - 1969 - Central Bank Report - 1969 - 1978.)

Fig. 3.1

Distribution of cinnamon land holdings and cinnamon and other land holdings.



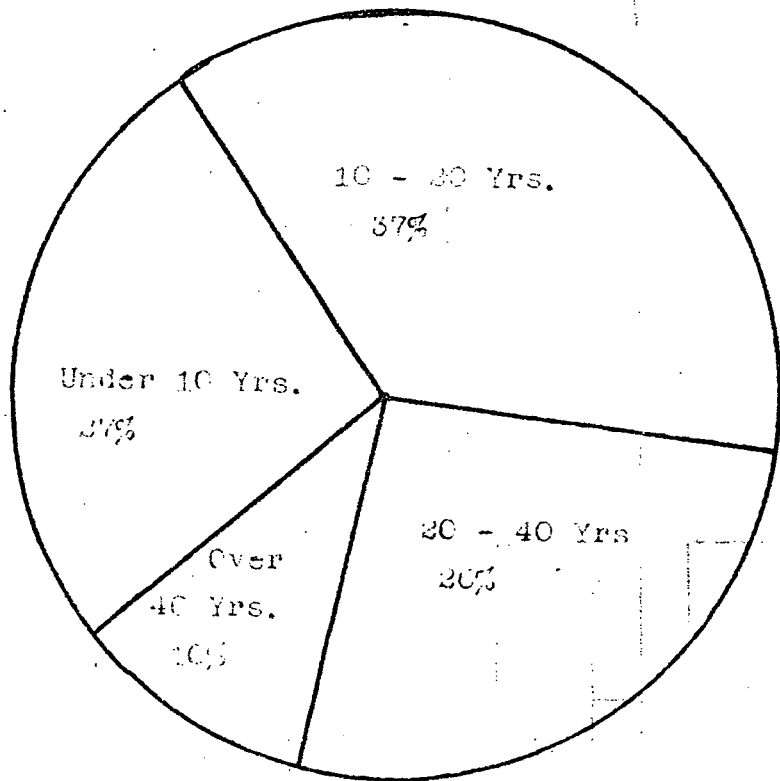


FIGURE : 2.2

DISTRIBUTION OF CINNAMON PLANTATIONS BY AGE.

FIG. 2.2. DISTRIBUTION OF CINNAMON PLANTATIONS BY AGE.

FIG. 3.3 DIAGRAM SHOWING FLOW OF CINNAMON PRODUCTS

