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SRI LANKA COCONUT FERTILIZER STUDY

by

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Abbreviations

ASC	Agrarian Service Centers
CCB	Coconut Cultivation Board
CCC	Colombo Commercial Company
CDO	Coconut Development Officer
CFC	Ceylon Fertilizer Corporation
CMSC	Cooperative Management Service Center
CO	Cultivation Officer
CRB	Coconut Research Board
CRI	Coconut Research Institute
DRIPPL	Department of Rural Institutions and Productivity Laws
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GNP	Gross National Product
GTZ	German Agency for Technical Cooperation, Ltd.
IFDC	International Fertilizer Development Center
JEDB	Jaratha Estates Development Board
MPC	Multipurpose Cooperatives
MPCS	Multipurpose Cooperative Societies
NFA	National Fertilizer Authority
NPK	Nitrogen, phosphate, and potash mixtures
Rs	Rupees
SPC	State Plantation Corporation
USAID	United States Agency for International Development

Measurements

ft	feet
ft ²	square feet
ha	hectare
kg	kilogram
lb	pound

Note: All tons refer to metric tons.

SRI LANKA COCONUT FERTILIZER STUDY

Summary and Recommendations

The production of coconuts with its allied industries plays an important role in the economy of Sri Lanka. The coconut industry contributes 6% to the gross domestic product (GDP) and 10%-18% of the country's export earnings. In 1979 coconut products exported were valued at Rs 1.8 billion. Coconuts are grown on 28% of the land under cultivation.

Coconut production in Sri Lanka has been declining in recent years. The harvest of fresh nuts reached a peak of 2.8 billion in 1962 and 1964. The forecast is that the 1981 harvest will be slightly below the 2 billion level. This downward trend becomes alarming when examined in relation to the country's increasing population, per capita requirement of 130 nuts annually, and the country's dependence on coconuts for exports.

The Government of Sri Lanka, through the Ministry of Coconut Industries and USAID, contracted with the International Fertilizer Development Center (IFDC) to make a 2-month study during May-July 1981 and to determine what could be done to increase the consumption of fertilizer on coconut palms.

Study Objectives

The three objectives, as stipulated in the study, are:

- A. To evaluate the suitability of the fertilizer mixtures now recommended by the Coconut Research Board (CRB) and to recommend changes as deemed necessary.
- B. To review location and storage capacities of existing regional warehouses of the CCB. On the basis of the review, to recommend closing, relocating, and/or opening new warehouses to supply the 1981-86 fertilizer demand projection.
- C. To develop a plan for increasing fertilizer consumption in coconut cultivation with emphasis on the small landholder.

A discussion of each of these study objectives follows in sequence.

Suitability of Mixtures--There are six different fertilizer mixtures recommended by the Coconut Research Institute (CRI) for adult

palms and two for young palms. The difference in supplied nutrients becomes practically insignificant at the average rate of 6 lb/palm as applied by farmers.

Recommendations for the suitability of mixtures are:

1. The mixtures should be reduced to three--one for the wet zone, one for the dry zone, and one for young palms. Suggested analyses are:
 - a. Wet zone (10-6-32)--N from urea, P_2O_5 from Saphos phosphate rock, and K_2O from muriate of potash.
 - b. Dry zone (10-6-32)--N from urea, P_2O_5 from concentrated superphosphate, and K_2O from muriate of potash.
 - c. Young palms (10-10-15)--N from ammonium sulfate, P_2O_5 from concentrated superphosphate, and K_2O from muriate of potash.
2. Application rates should be made on expected yields.
3. Research should be developed at CRI to determine if one mixture could be made that will serve both the wet and dry zones. Partially acidulated phosphate rock and P_2O_5 from normal superphosphate were suggested as possibilities.
4. Research should be developed at CRI to determine the feasibility of large planters making split applications of fertilizers--a zero nitrogen, i.e., 0-10-32, for the first application followed by urea during the monsoon season.

Suitability of Coconut Cultivation Board Warehouses--The 20 CCB fertilizer warehouses were examined and rated. Several structures and locations were found. Some were good; many were poor. Many managers were not qualified to advise the farmers and were taking a negative attitude toward stocking and selling fertilizers for coconut cultivation.

Recommendations for warehouses are:

1. The CCB should maintain a 30-ton fertilizer warehouse and retail sales store at each palm nursery.
2. The CCB should draw up a 3-year plan to:
 - a. Survey the coconut-producing area and determine those areas where coconut fertilizers are not available to farmers within 6 miles.
 - b. Develop a warehouse and retail operation in the void areas.
 - c. Phase out fertilizer warehousing and retailing (except at the nurseries) within a 3-year period. Facilities can be turned over to those indicated in the master fertilizer plan to be in the fertilizer business.

Plan for Increasing Fertilizer Consumption on Coconuts--It is profitable for the farmer to apply coconut fertilizer. The cost:benefit ratio on the basis of 1981 prices is a return of approximately Rs 4 for each one invested in fertilizer. Experimental results at CRI show that unfertilized palms yield approximately 20 nuts, whereas fertilized palms can yield 70 nuts or more per palm. The following constraints to the use of coconut fertilizer were identified during the field survey:

1. Coconut fertilizer is not available at the farmer level.
2. Educational and promotional programs on coconut cultivation are inadequate.
3. Fertilizer store managers, Coconut Development Officers (CDO), and Cultivation Officers (CO) generally do not have the proper background in fertilizer technology to advise the farmer on fertilizer use.
4. Small farmers find it difficult to obtain credit for the purchase of fertilizer.
5. Cash fertilizer sales are not being made at many CCB stores, necessitating a time-consuming procedure to obtain a money order or bank draft.
6. Seasonal low prices for coconuts have an adverse effect on the consumption of coconut fertilizer and the resulting production of nuts.
7. Fragmentation of land holdings exists at each end of the scale; farmers, small and large, are reducing coconut production. Large farmers fear that the land ceiling will be reduced. Land under coconut cultivation is giving way to new roads, factories, and homes.
8. Incentives and dedication for carrying out programs designed to increase coconut fertilization are inadequate.
9. A sudden and substantial increase in the price of fertilizer produced a negative psychology toward the purchase of coconut fertilizers.
10. Dealer margins are not adequate to encourage the promotion and selling of fertilizers.

The recommended plan for increasing fertilizer consumption includes:

1. A special 17-man task force of zonal coordinators should be created within the Ministry of Coconut Industries. The highly qualified zonal coordinators will be assigned territories and have salaries based on coconut fertilizer sales. The zonal coordinator team will carry out the following programs:

- a. Coordinate the supply of coconut fertilizers to all retailers. These include multipurpose cooperatives (MPC), agrarian service centers (ASC), private dealers, coconut producer cooperatives, CCB stores, coconut estates, and coconut producers' associations.
- b. Conduct educational programs for agricultural extension personnel, retailers, and farmers. The type of educational activity includes: meetings for extension personnel, dealers, and farmers; demonstrations; lectures in rural schools; and news articles.
- c. Carry out promotional activities. The CCB will have a publicity department to promote the cultivation of coconuts. The CCB will provide films and slide sets on every aspect of coconut cultivation. Two film vehicles should be provided for touring the villages. Exhibit materials will be provided by the CCB for display at meetings. The CCB should develop a publicity department with a photography and communication section to support the special task force. Commercials and news releases will be prepared by both the CCB and the special task force. A program for selecting outstanding district coconut producers and a national champion is recommended. A program to encourage new planting of coconuts by small farmers and rural school students in grade 9 is detailed.
- d. Form coconut producers' associations. Each zonal coordinator in the special task force will select a pilot area for the purpose of organizing three coconut producer associations. There must be a need for the associations. The needs will center around credit requirements in the form of group loans, purchase of coconut fertilizers, a holding action on the sale of coconuts during periods of low prices, and member educational programs on coconut cultivation.
- e. Become a special advisory service to the Government of Sri Lanka. The zonal coordinators and team leader are in the field full time and should know the constraints to coconut production better than anyone else. The special task force can advise the Government on constraints to the use of coconut fertilizers that only the Government can solve. These would include: (1) a guaranteed minimum price for nuts based on the cost of production and (2) doubts about future land ceilings. Coconut planting is a

long-term investment. Farmers need to be assured of time to recover long-term investments, or they will convert coconut land to interplanted crops of short duration. Government policy is needed to deal with these two problems facing the coconut industry.

- f. Help coordinate coconut research. There is a wide gap between coconut research and the dissemination of findings among farmers. The zonal coordinators, through their educational activities, can help to bridge this gap. The zonal coordinators are in the field daily. They will be aware of the farmer's problems. These problems can be fed into CRI for solutions.
- g. Use whole estate to demonstrate coconut production. A limited number of the estates managed by the Government should be turned into demonstrations on "how to" produce coconuts profitably.
- h. Coordinate credit for farmers to purchase coconut fertilizers and plant palms. The bank credit programs and the CCB cultivation subsidy schemes can be popularized by the special task force at the local and national levels. The banks will be encouraged to hire an adequate staff to service farmer loan applications at all bank branches. Problems in the credit schemes at the field and national levels can be reported to the proper authorities for a quick solution. The special task force will encourage and participate in surveys to determine the effectiveness of the credit and subsidy programs with recommendations for improvement.

Benefits and Costs of the Plan--It is important to implement the entire plan. There is a synergistic effect and complementary value of each component of the plan. A time-phased schedule for each component is given.

The plan, when implemented, will increase coconut fertilizer consumption and nut production by the following amounts.

<u>Year</u>	<u>% Increase^a</u>	<u>Increase in Tonnage Over Previous Year</u>	<u>Increase in Nuts Over Previous Year (million)</u>
1982	16	7,200	64.8
1983	12	6,264	56.4
1984	9	5,261	47.3
1985	6	3,823	34.4
1986 (onward)	4	<u>2,702</u>	<u>24.3</u>
TOTAL		25,250	227.2

a. The base year 1981 (estimated) 45,000 tons of coconut fertilizer to be consumed.

During the 5-year period, this increase in nut production is enough to supply the country's need even with the 1.7% increase in population in Sri Lanka, on the basis of an annual per capita consumption of 130 nuts, and leave a surplus of 55.7 million nuts.

Using a value of Rs 1,000/1,000 nuts, the following value of the plan can be calculated.

	<u>Rs (million)</u>
Value of added nuts	227.2
Cost of fertilizer applied ^a	64.8
Cost of special task force	3.7
Cost of CCB promotional support	<u>1.6</u>
TOTAL COST	<u>70.1</u>
Net Value of Plan ^b	157.1

a. The cost of the Government fertilizer subsidy is not included in the calculation.

b. A value on allied industries, i.e., fiber, fuel, soil conservation, etc., has not been included which would be equal to the value of the fresh nuts. A cost of the extra harvest and transport of the nuts has not been included in the calculation.

The plan, when implemented, will reverse the downward trend in the fertilization of palms and increase the harvest of nuts. The plan integrates research, education, inputs, promotion, and marketing. It is recommended that the plan be implemented as scheduled.

Introduction

The production of coconuts in Sri Lanka has been declining in recent years. The harvest of nuts increased from 2.0 billion in the early 1950s to a peak production of 2.8 billion in the years 1962 and 1964 (1). Since this period, there has been a steady decline. The forecast is that the harvest of nuts will be at the 2 billion level or slightly below in 1981. This trend becomes alarming when examined in relation to the country's increasing population of 1.7%/year. The population in 1981 is estimated to be slightly over 15 million people.

There are many factors that contribute to the decline of coconut production in Sri Lanka. These factors are well defined in excellent reports listed in the references in this report. Chief factors include prolonged droughts and the 1979 cyclone, nonavailability of fertilizers, neglect of plantations, inadequate replanting, low nut prices, inadequate educational and promotional programs, and uncertainty regarding land ceilings. The lack of a sustained program to promote the use of coconut fertilizer is a key factor in the decline of coconut production.

The Government of Sri Lanka, through the Ministry of Coconut Industries and USAID, contracted with IFDC to make a study and determine what could be done to increase the consumption of coconut fertilizer and possibly halt the decline and begin an increase in coconut production.¹ The 45-day study in the country was made during May-June 1981. An extensive field survey was undertaken to verify existing data. The survey schedule is given in Appendix I. An analysis of existing data was made from which recommendations and conclusions are based. There was no attempt to create new data.

Study Objectives

Objectives of the study were:

- A. To evaluate the suitability of the fertilizer mixtures now recommended by the CRB and to recommend changes as deemed necessary.

1. IFDC is a public, nonprofit international institute incorporated in the State of Alabama, U.S.A., in 1974, with headquarters at Muscle Shoals, Alabama, U.S.A.

- B. To review location and storage capacities of existing regional warehouses of the CCB. On the basis of the review, to recommend closing, relocating, and/or opening new warehouses to supply the 1981-86 demand projection.
- C. To develop a plan for increasing fertilizer consumption in coconut cultivation with emphasis on the small landholder.

Suitability of Presently Used Fertilizers

On the basis of sources of nitrogen, there are two different fertilizer mixtures that are recommended for mature coconut trees. The CU mixtures are formulated using urea as the source of nitrogen. The CA mixtures have ammonium sulfate as the source of nitrogen (2). In each category, there are three different analyses. The first two mixtures in each category contain phosphate rock for the source of P_2O_5 . In the third mixture in each category the P_2O_5 source is concentrated superphosphate. The recommended mixtures and rates are:

<u>Urea-Based Mixture</u>	<u>Analysis</u>	<u>Rate (kg/palm/year)</u>
CU-1	10-6-31	3 (6.6 lb) ^a
CU-2	11-8-26	2 (4.4 lb)
CU-3	13-6-32	2 (4.4 lb)
<u>Ammonium Sulfate Mixtures</u>		
CA-1	8-5-24	3-3/4 (8.3 lb)
CA-2	9-6-20	2-1/2 (5.5 lb)
CA-3	10-5-23	2-3/4 (6.1 lb)

a. Conversions made in pounds to conform to field conditions.

Different mixtures are recommended for different ecological zones and soil types. Recommendations for the different areas are given in Appendix II.

At the planting of young palms, 2 lb of ground dolomitic limestone and 1 lb of Saphos (phosphate rock 27.5% P_2O_5) should be applied (3). After the palm reaches 6 months of age and until it reaches the nut-bearing stage, a CRI mixture with the analysis 9.15 N, 9.15 P_2O_5 , and 13.33 K_2O is recommended. The recommended rate is given in Appendix III.

Recommendations

- A. The number of mixtures for adult coconut palms should be reduced to two, one for the wet zone and one for the dry zone. The mixtures should be:
1. Wet Zone
 Analysis: 10-6-32
 Source of nutrients:
 N from urea
 P_2O_5 from phosphate rock (Saphos)
 K_2O from muriate of potash
 2. Dry and Semidry Zones
 Analysis: 10-6-32
 Source of nutrients:
 N from urea
 P_2O_5 from concentrated superphosphate
 K_2O from muriate of potash
- B. The mixture for young palms should be reduced to one. The mixture will serve both the wet and dry zones. Recommended mixture is:
 Analysis: 10-10-15
 Source of nutrients:
 N from ammonium sulfate
 P_2O_5 from concentrated superphosphate
 K_2O from muriate of potash
- C. CRI should develop rates of application for the two mixtures based on expected yields (management levels) and soil types.
- D. Research at CRI should be undertaken to determine the feasibility of having one mixture for adult coconut palms that will serve both the wet and dry zones. Partially acidulated phosphate rock should be considered as a source of P_2O_5 . If the coconut palm responds significantly better to normal or concentrated superphosphate than phosphate rock, a recommendation should be made that coconut fertilizers use that source of P_2O_5 .
- E. Research should be undertaken at CRI to determine the feasibility of the large coconut planters' making two separate applications (split applications) of fertilizers. The first application could consist of

a mixture of phosphate and potash, and the second application could be straight nitrogen in the form of urea.

Recommended mixture is:

1st Application: 0-10-32

2nd Application: 46-0-0 (urea)

- F. A fertilizer recommendation for toddy production should be worked out and included in the recommendations for fertilizing adult palms.
- G. A fertilizer recommendation should be worked out for king coconut palms.
- H. The CRB recommendation to correct and prevent a magnesium deficiency in coconut palms should be continued.

Discussion of Recommendations

In recommending that the number of mixtures for adult palms be reduced to two, the scientific view gave way to the practical approach. Palm trees are fertilized on an individual basis. The recommended rate ranges from 2 to 3 kg/palm for CU mixtures and 2.75 to 3.75 kg/palm for CA mixtures. The nutrient differences per palm are very small. The following calculation indicates just how small the difference can be.

A.	CU-1 (3 kg/palm)	CU-2 (2 kg/palm)	CU-3 (2 kg/palm)
	Analysis 10-6-31	Analysis 11-8-26	Analysis 13-6-32
	<u> x 3 kg</u>	<u> x 2 kg</u>	<u> x 3 kg</u>
	gives .30 kg of N	gives .22 kg N	gives .39 kg N
	.18 kg of P ₂ O ₅	.16 kg P ₂ O ₅	.18 kg P ₂ O ₅
	.93 kg of K ₂ O	.52 kg K ₂ O	.96 kg K ₂ O
B.	CA-1 (3.75 kg/palm)	CA-2 (2.5 kg/palm)	CA-3 (2.75 kg/palm)
	Analysis 8-5-24	Analysis 9-6-20	Analysis 10-5-23
	<u> x 3.75 kg</u>	<u> x 2.5 kg</u>	<u> x 2.75 kg</u>
	gives .30 kg of N	gives .22 kg N	gives .27 kg N
	.18 kg of P ₂ O ₅	.15 kg P ₂ O ₅	.13 kg P ₂ O ₅
	.90 kg of K ₂ O	.50 kg K ₂ O	.63 kg K ₂ O

In the field survey it was found that most farmers who use fertilizer apply it at the rate of 6 lb (2.73 kg)/palm. This is also the recommendation given at CCB stores and ASC. The difference in nutrients is insignificant when 6 lb/palm is used.

In 1967 Nethanael estimated that an average palm, producing 43.75 nuts yearly, removed 1.3 lb of N, 0.58 lb of P_2O_5 , and 1.9 lb of K_2O (4). The average annual yield of nuts per palm has been estimated by CRI to be 37.2 for Sri Lanka (5). The present use of CU mixtures at 6 lb/palm of fertilizer gives less nitrogen than is removed in the average yields. Potassium and phosphorus are supplied approximately at removal rates. The CA mixtures at 6 lb/palm supply less than average removal rates for N, P_2O_5 , and K_2O . If the nutrient loss by leaching is accounted for, it is suspected that the quantity of K_2O applied in 6 lb of CU and CA fertilizer mixtures is considerably less than the quantity required to maintain average yields. Potash-deficient palms are visible throughout Sri Lanka and particularly in the wet zones on lateritic gravel and sandy soils. In experiments at Veyangoda (1967-77), there was a positive response of rates of K_2O up to 4.0 lb/palm (2).

The recommended mixture of 10-6-32 is about as high in analysis as is possible based on the material to be used in the formulation. This is particularly true for the wet-zone mixture where phosphate rock will be used as a source of P_2O_5 . The mixture for the dry zone could be a little higher, but the same analysis was used to avoid confusion among storekeepers and farmers. Figure 1 indicates the dry- and wet-zone areas in Sri Lanka. During the survey, it was learned that if a recommended mixture for the area were not available, a substitute was refused. A substitute of the same analysis would be more likely to be accepted. It has been reported in an experiment at Pallama that concentrated superphosphate was superior to Saphos (phosphate rock) on sandy soils of the dry zone (6). On acid soils and under high moisture conditions, phosphate rock could be equal in performance to concentrated superphosphate on a tree crop like coconut.

Experiments at Veyangoda indicate that the rate of nitrogen as recommended could be reduced and the potassium increased (2). For this reason the percentage of N in the recommended mixtures has not been increased. The level of K_2O to P_2O_5 in the mixture has been maintained at a slightly greater ratio than that removed in nut yields to reflect the nutrient-supplying capacity of the soils in the coconut-producing areas.

It is recommended that the mixture for young palms be formulated using concentrated superphosphate. The mixture can be used in both the wet and dry zones interchangeably (see Appendix III). Phosphate is important

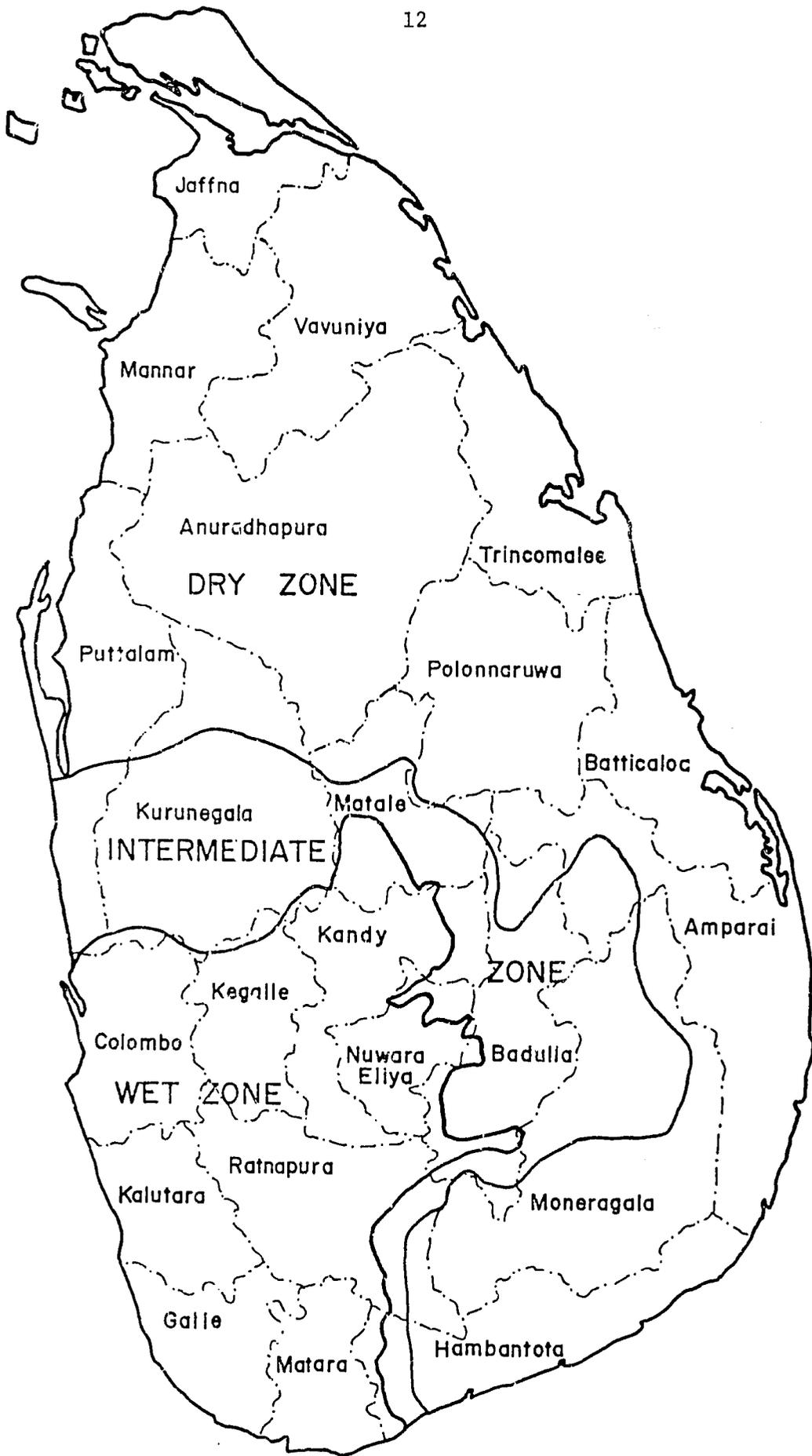


Figure 1. Dry, Intermediate, and Wet Rainfall Zones of Sri Lanka.

Source: GTZ/CFC, "Promotion of Fertilizer Distribution and Consumption."

in root development. The more water-soluble concentrated superphosphate is preferred to establish the root system for a young healthy palm. The P_2O_5 in the mixture has been raised to 10% to ensure an adequate supply.

Fertilizer recommendations on coconuts should be based on yields wanted rather than on a uniform rate. The CRI recommendations are based on soil types and ecological conditions. A factor of yields expected should also be included in the recommendation. The farmer whose expected yield is 6,000 nuts/acre requires more nutrients than the farmer aiming for 3,000. With the implementation of the master fertilizer plan, change is taking place in the fertilizer industry (7). Changing the basis of the recommendation at this time will give the storekeeper and extension officers something new to discuss with farmers. CRI should work out new recommendations and issue a new publication. An example of the new type of recommendation follows.

<u>Levels of Management</u>	<u>Expected Yields (nuts/palm)</u>	<u>Rates (lb/palm)</u>
Low	35 and fewer	5
Average	35-45	7
Good	45-55	10
Excellent	55 and up	12

Rates per palm could also reflect soil types. For example, poor, sandy, and lateritic soils could receive an extra pound or so; whereas, the more fertile soil might receive slightly less.

At present Sri Lanka is producing approximately 20,000 tons of phosphate rock annually. There is a plan to accelerate the production of phosphate rock and start the production of superphosphate. It has not been decided whether the product will be normal or concentrated superphosphate. In an interview with the State Mining and Mineral Development Corporation, it was stated that most likely normal superphosphate would be the product. Regardless of the manufacturing process and analysis, the product should be used in the coconut fertilizer.

Cost reduction is very important, and therefore indigenous fertilizer materials, as far as is practical, should be used in coconut fertilizers. Sri Lanka has urea and phosphate rock. Urea is recommended for the coconut fertilizer mixtures. Imported phosphate rock is used in the wet-zone mixtures. To be as effective agronomically as the imported phosphate rock, which is higher in available P_2O_5 , Sri Lankan phosphate rock needs to be

upgraded in available P_2O_5 . Partial acidulation is one way of upgrading the available P_2O_5 of phosphate rock. IFDC is presently carrying out experimental work to determine the effectiveness of partially acidulated phosphate rock. Results on some crops appear promising.

Palms are long-term producers that could use 20%-30% acidulated phosphate rock fertilizer. The process of partial acidulation offers two benefits:

1. The portion of the phosphate rock that reacts with sulfuric or phosphoric acid is water soluble and can be quickly available to the palm trees.
2. Compared with a completely acidulated phosphate product, there can be a saving in manufacturing cost with partial acidulation.

CRI should undertake research to determine the effectiveness of partially acidulated phosphate rock for coconut production. If the product proves to be as effective as normal or concentrated superphosphate, the coconut mixtures for adult palms can be reduced to one since P_2O_5 could be supplied from partially acidulated phosphate rock. The mixture could be used for both the dry and wet zones. Having one mixture for adult palms could reduce the amount of downtime required to change formulas at the mixing units. It will also help to eliminate confusion at the sales points that results from not having the right product when the farmers need it. Having only one mixture to inventory simplifies the warehousing operations.

Urea and phosphate materials do not mix and store well together. When these materials are mixed together, the bags become wet and unattractive and the fertilizer has poor physical properties. Storage time on such a mixture will be limited. Naho has some CU mixtures that have been in storage for 6 months and are in good condition; however, in the wet zone storage time may be limited to 3-4 months. In dry areas and better warehouses, storage time may be longer. The coconut segments of the fertilizer industry must take advantage of warehouses to meet the short demand time for applying coconut fertilizers. Urea and phosphate mixtures will become wet, be declared "disastrous material," and sold at a discount. It is happening already. Urea stores well when packaged properly. Phosphate and potash mixtures, i.e., 0-10-32, store well also. A program of research and trial should be started to determine the suitability of split applications--the first with 0-10-32 during the dry period and the second with urea after

the rains start. Both would be applied at the recommended rates. The 0-10-32 could be applied and left on the soil around the trees. It will not leach nor volatilize in the dry soil. When the rains come the urea could be applied and both fertilizer applications worked well into the soil. Urea must be worked into the soil and covered well to prevent volatilization. This type of program could be directed toward the large planters. The small farmers are not yet ready for this type of program.

The importance of magnesium for coconut production has long been recognized in Sri Lanka. The incidence of magnesium deficiency in coconut palms has been observed in most major coconut growing districts. It is widespread in the southern and western provinces, the Chilaw-Negombo area, and the Kurunegala and Matale Districts.

Remedial measures for preventing or correcting a magnesium deficiency calls for the application of ground dolomitic limestone (20% MgC); kieserite (magnesium sulfate 24% MgO), or commercial epsom salts (magnesium sulfate 16% MgO).

A coconut fertilizer containing N-P-K plus Mg could also be a good way of getting a corrective dose of magnesium on coconut palms. At this time, the most practical and economical way of applying magnesium appears to be with a straight application of either ground dolomitic limestone or kieserite as recommended in CRI Leaflet No. 43, Magnesium Deficiency in Coconut Palms (8).

To prevent a magnesium deficiency, apply dolomitic limestone once in 3 years at the following rates:

Area	Rate
High rainfall areas of the southern and western provinces	5 lb per adult and 3 lb per young palm
Lateritic gravels of the north-western and central provinces--cinnamon-sand of the Chilaw-Negombo district and light loams and sandy loam soils	3 lb per adult and young palm

To correct a magnesium deficiency when the visual symptoms begin to appear, apply kieserite at the following rates:

Area	Rate
All locations	2.5 lb per adult palm, in 6 months another 2.5 lb per palm. After 1 year another 3.0 lb per palm per year until the green healthy color is restored. For young trees, apply 1 lb per palm every 6 months until recovered.

The 50-kg size bag that is now being used for packaging coconut fertilizer is satisfactory. In the field study farmers expressed a preference for a 50-kg bag over a 25-kg bag. The reuse of the bag on the farm is important to the farmer. He thinks that the 50-kg bag is better for reuse. The home garden coconut producer needs a small bag of fertilizer. A market survey is needed to determine the best size of bag for this market. The price per bag is an important factor in determining the size since the home gardener has less money to risk on fertilization. A 10-kg bag seems to be about the right size for this market.

Since it is hygroscopic in nature, urea used in the CU mixture causes fertilizer bags to become wet. Warehouse floors become very wet, and water may accumulate on the floors. It was found that bags having a properly closed polyethylene inner liner were in better condition than those without the liner or those on which the liner was not closed correctly. The extra inner liner caused the bags and warehouse conditions to be more appealing to the customer. Coconut fertilizers that will be stored for a period of 1 month or longer should be correctly closed and packaged in bags with inner liners. Slowing the production lines down and properly closing the inner liner increase the cost of production. However, a slower process might be less costly than losing material in the warehouse or discouraging the use of fertilizer by the farmer.

Toddy production along the coast south of Colombo to Galle is big business. Farmers are leasing palms for Rs 60 each/year. On the farms surveyed where fertilizer was used, the average annual rate was 3 lb/tree during the June monsoon. Farmers stated that they never receive any information on toddy production and wondered if more nitrogen might be needed for toddy than for nut production. Farmers are uncertain if fertilizer is actually required for toddy production. Farmers in this business have money and are willing to fertilize if it can be proved that fertilization pays.

Production of king coconuts for their "milk" is a very popular and growing business within the coconut industry. Farmers in this business are also uncertain about the fertility requirements since the nut is for water content and not for eating purposes. Farmers think that fewer nutrients are required. A fertility recommendation for the king coconut should be developed and included in the recommendations for adult palms if the requirements are different from those of the other palms.

Coconut Cultivation Board fertilizer Retail Stores
and Warehouses: Considerations for Closing or Opening New Ones

In examining the 20 retail stores and warehouses that CCB presently has, all sorts of facilities were found. They range from a temporary structure with a thatched roof and no outside walls at the Polonnaruwa Coconut Nursery to a converted dwelling house at Chilaw to an excellent-type warehouse in a good location at Mundal. The CCB retail stores and warehouses by location and storage capacity are given in Table 1. Each warehouse is rated good, fair, or poor according to its ability to serve that purpose for which it was established. Factors forming the basis of the rating include size, design and construction, location, and the fertilizer demand in the area to be served.

Recommendations

- A. CCB should maintain a permanent fertilizer retail store and warehouse at all coconut palm nurseries. The capacity of the warehouse should be approximately 30 tons. Emphasis should be given to fertilizer mixtures for young palms.
- B. CCB should develop a 3-year plan to include the following:
 1. Completely survey the country to determine if there are any void areas in the coconut growing regions that are not being served by the Ceylon Fertilizer Corporation (CFC), ASC, multipurpose cooperative societies (MPCS), estates, or private dealers. A void area is one where farmers have to travel a distance greater than 6 miles to purchase fertilizers.
 2. Consider new retail stores and warehouses only where there is a market for 500 tons of coconut fertilizers within a 3-mile radius of the proposed site. If a void is found, plans should be made for establishing a temporary retail store and warehouse for 150 tons.
 3. Develop a procedure for phasing out all CCB retail stores and warehouses within a 3-year period. Stores and warehouses that are too close to a CFC warehouse, ASC, MPC, coconut producers' cooperative, or estate warehouse to ever have sufficient throughput to be economical should be phased out immediately. After the

Table 1. Coconut Cultivation Board (CCB) Warehouses in Service in 1981 by Locations, Capacities, 1980 Throughput Tonnage, and Ratings on Ability to Meet Objectives

<u>CCB Warehouses</u>	<u>Warehouse Capacity</u> - - - - - (tons)	<u>1980 Throughput</u> - - - - -	<u>Building Rating^a</u>	<u>Location</u>
Ambalangoda	40	140.5	P	G
Chilaw	50	424.4	P	G
Mundal	100	289.4	G	G
Naththandiya	60	1,136.0	F	G
Kurunegala	100	411.5	P	G
Dankottuwa	60	922.9	G	G
Bingiriya North	20	50.6	P	F
Kuliyapitiya	1,000	748.2	G	G
Veyangoda	250	638.3	P	G
Embilipitiya	30	7.8	F	P
Negombo	250	883.8	F	F
Mahayaya	100	453.5	G	F
Weeraketiya	500	119.1	G	F
Anuradhapura	50	47.1	P	G
Polonnaruwa	5	20.5	P	P
Matara	15	273.1	P	P
Weke	50	341.5	G	G
Kaliodai	20	22.7	P	G
Pallai	120	83.1	G	G
Mylambavelly	350	29.7	G	G
TOTAL	3,170	7,043.7		

a. Rating: G = good, F = fair, and P = poor. Used to indicate the ability of the warehouse to meet the objectives for which it was established.

coconut fertilizer business is established, the remaining retail stores and warehouses should be assigned to the concerns designated by the coordinated fertilizer master plan to handle fertilizers in the area.

Discussion of Recommendations

There are other groups in the business of marketing fertilizer that are better equipped than CCB to do wide-scale fertilizer marketing. CCB has another important role to perform if Sri Lanka is to halt the decline of coconut production. At some point a coordinated fertilizer master plan for Sri Lanka must be developed. Different organizations have come into the fertilizer business to bridge voids and make fertilizers available to a class of farmers otherwise not serviced. For example, the Rubber Control Department serves the rubber plantations. The Tea Smallholders Development Authority supplies fertilizer to smallholder tea growers; ASC supplies fertilizer to paddy farmers. Now the CCB is bridging a gap in setting up retail stores and warehouses to serve coconut producers.

A coordinated fertilizer master plan is needed to prevent duplication and to allow an efficient and effective fertilizer marketing system to be developed. An efficient marketing system makes fertilizers available to all categories of farmers. It appears that a coordinated fertilizer master plan for Sri Lanka is in the making. If so, it should call for marketing systems that satisfy the farmers' demands for all types of fertilizers.

Operating fertilizer retail stores and warehouses is an expensive business today in Sri Lanka. The construction and use of warehouses add to the cost of distribution. If there are warehouses with spare capacity, that capacity should be utilized before additional warehouses are established to serve an area. The addition of warehouses in a fertilizer marketing system should not be a substitute for good warehouse management. In reviewing the CCB warehouse program in conjunction with the district and retail warehousing programs of the CFC, ASC, MPC, estates, and private dealers, the following conditions were found:

- A. There are very few farming areas among the coconut-growing regions that are not served by a fertilizer distribution program of some type.

The following fertilizer warehouses at the district and retail levels are operating in Sri Lanka:²

	<u>Warehouse/ Stores</u>	<u>Storage Capacity (tons)</u>
CCB--Retail stores and warehouses	20	3,170
ASC	490	19,600
MPC--276 with branches dealing in fertilizers	3,900	45,000
Tea Commissioner	5	450
Department of Rural Institutions and Productivity Laws (DRIPPL)	22	73,390
CFC Regional Fertilizer Complex	1	15,000
CFC Division stores	85	136,085
Private dealers	<u>50</u>	<u>1,500</u>
TOTAL	4,573	294,195

The total fertilizer storage capacity is estimated to be slightly over 294,000 tons in 4,573 warehouses. There are approximately 4,461 retail stores in Sri Lanka. In addition to this capacity the Janatha Estates Development Board (JEDB) and other estates have a large fertilizer storage capacity. In 1980 the JEDB consumed 3,327 tons of coconut fertilizers. Details of fertilizer warehousing by location and organization may be referred to in the study, "Promotion of Fertilizer Distribution and Consumption." The JEDB has plans for adding retail fertilizer stores on selected estates to serve the small farmer. Wholesalers in Colombo, CFC, CCC, and JEDB have a storage space for approximately 160,000 tons of fertilizers.

- B. Fertilizer storage capacity is considerably underutilized. A satisfactory warehousing throughput for the wet zone (where both monsoons are good) would be 3.5 times storage capacity. A good throughput factor for the dry zone (where the northeast monsoon is dominant) is considered to be 2 times capacity. Using an average throughput management factor of 2.8, there is adequate warehousing capacity to handle more than 800,000 tons of fertilizer sales in Sri Lanka. This is more than enough warehouse space to satisfy the estimated requirements for the next 8 years (7).

2. Sources: CCB, CFC, ASC, MPC, "Promotion of Fertilizer Distribution and Consumption," and field survey.

There are several recent studies that forecast future fertilizer consumptions in Sri Lanka. The German Agency for Technical Cooperation, Ltd./Ceylon Fertilizer Corporation (GTZ/CFC) study analyzes each of these projections and also makes its own forecast. The GTZ/CFC study forecast that in 1985 about 201,640 nutrient tons will be consumed. This will consist of 92,850 tons of N, 47,350 tons of P_2O_5 , and 61,440 tons of K_2O and will be used in 430,980 tons of fertilizer products. By 1990 the consumption is forecast to increase to 105,230 tons of N, 55,400 tons of P_2O_5 , and 70,000 tons of K_2O and will be supplied in 490,950 tons of product (7). Warehouse space is used for the storing of fertilizers for several different crops. The CCB uses its warehouses almost exclusively for storing coconut fertilizers. The ASC, DR1PL, and MPC use their warehouses almost exclusively for storing fertilizers for paddy. The exact warehouse space available for storing coconut fertilizers in the coconut-producing areas can only be estimated. Table 2 shows the capacity available for storing 126,170 tons of coconut fertilizers in the coconut triangle and the southern and eastern areas growing coconuts. Fertilizer storage capacity in the 12 principal coconut-producing districts is equal to 119,800 tons or 95% of the total available storage space.

If it is assumed that one-half of the storage capacity in the ASC, MPC, and DR1PL and 100% of that of the CCB can be utilized for coconut fertilizer during the 4 months for fertilizing palms, there is space to store 64,670 tons of product. Assuming an annual throughput factor of 2.8, there is storage space to handle 181,000 tons of coconut fertilizer. Storage capacity of the private dealer is not included in this figure.

Coconut fertilizer consumption in 1980 was 56,583 tons of product. This is an increase of 10% over the 1979 figure of 51,000 tons. The peak consuming period was 1969 when about 63,000 tons of product was used. Consumption of coconut fertilizer products in tons per year is given in Appendix IV. Forecasts of product tons that will be consumed in 1985 and 1990 by districts are given in Appendix V. The three largest consuming districts in 1990 will be Kurunegala, 29,810 tons; Puttalam, 12,590 tons; and Colombo, 12,550 tons. If the plan for

Table 2. Warehouse Capacity for Storage of Coconut Fertilizers in the Coconut-Producing Area (by organizations)

<u>Organization</u>	<u>Storage Capacity</u> (tons)
CCB	3,170
ASC	19,000
MPC	39,000
DRIPL	<u>65,000</u>
TOTAL	126,170

Source: GTZ/CFC "Promotion of Fertilizer Distribution and Consumption Study," CCB, and field survey.

promoting the use of fertilizers for coconut production (below) is implemented, the 1985 forecast of 69,500 tons and the 1990 figure of 74,740 product tons can be attained. Based on the recent fertilizer demand forecast, there is adequate storage space in Sri Lanka.

- C. Warehouse construction and operations are expensive. CCB estimates that a new fertilizer warehouse today costs approximately Rs 250/ft² to construct. Using this estimate, a 50-ton warehouse of 25 ft by 12 ft would cost Rs 75,000. Land cost must also be added. If each warehouse has a manager and two laborers, the labor cost would be approximately Rs 7,000/year. Using a depreciation rate of 20 years and an opportunity cost of 17%, a 50-ton fertilizer warehouse would cost approximately Rs 23,500/year to operate. This figure does not include a factor for utilities, supplies and equipment, land cost, and fertilizer losses. Small warehouses with a low throughput are not economically feasible. Using this calculation a 50-ton warehouse with a throughput factor of two would have a cost of approximately Rs 235/ton. Warehousing adds substantially to the cost of distribution.

CCB has a very temporary role to play in selling and warehousing fertilizers. It should develop a plan to spot void areas in the coconut-growing regions where fertilizers are not available to farmers. The toddy-producing area, for example, is not covered with a distribution program. CCB should plan to get those organizations designated by the Master Plan to sell fertilizers in the area to eliminate the void. If for some reason they cannot or will not, then CCB should develop a temporary retail store and warehouse to supply the void area. CCB should popularize the coconut fertilizer in the area for a period of up to 3 years. The retail store and warehouse should be transferred to one of the designated fertilizer marketers in the area as soon as possible.

As discussed in the following plan, CCB has an important role to play in promoting coconut cultivation for increased production. One part of this plan is to have CCB provide palm seedlings to farmers from nurseries. CCB will manage the strategically located coconut nurseries. It is recommended that a retail store and a 30-ton capacity warehouse be maintained at each nursery. Fertilizer for both adult and young coconut palms will be stocked. Emphasis should be on fertilization for young seedlings.

Plan for Increasing Fertilizer Consumption on Coconuts

Research results in Sri Lanka indicate that it is profitable to fertilize coconut palms. A long-term experiment at Hnuapitiya started in 1916 and concluded in 1945 received 0.39 lb of N, 0.72 lb of P_2O_5 , and 0.55 lb of K₂O/palm/year as a complete fertilizer. This was compared with N, P, and K singly and combinations of NP, NK, and PK at constant rates applied in the complete fertilizer plot. In analyzing yield results in increments of 3 years, the complete fertilizer plot had greater yields than the nearest competitor, which was the PK plot. The PK plot yielded 55% as much as the NPK plot.

The average annual nut yield per palm was 3.3 for the N plot, 7.7 for the P plot, and 27.3 for the K plot. The NP plot yielded 23.3 nuts, NK 29.7, and PK 33.4; whereas, the complete NPK plot yielded 60.2 nuts/palm/year (9).

Experimental results at CRI confirm that yields are best with the recommended NPK coconut mixtures. Unfertilized palms can easily have yields as low as 20 nuts/palm or 1,280 nuts/acre. Properly fertilized palms can yield 70 nuts/palm or 4,480 nuts/acre. Cost of the fertilizer and labor for its application is Rs 12/palm or approximately Rs 768/acre. With coconuts selling for Rs 1,000/1,000 nuts, this fertilizer investment gives a return of Rs 3,200. This is a return of Rs 4 for each one invested. Labor for the extra harvest was not included in this calculation (9).

During the field survey for this study, several large estate owners stated that with good management they could harvest 6,000 to 6,500 nuts/acre. It does pay to fertilize and practice good husbandry--on large or small plots.

This survey revealed that if Sri Lanka is to reverse the downward trend in coconut yields, there are several problem areas that need attention. The problems are:

1. Coconut fertilizer is not available in some areas at the farmer level.
2. Educational and promotional programs on coconut cultivation at the farmer level are inadequate.
3. Fertilizer store managers, CDOs, and COs generally do not have the proper background in fertilizer technology to advise the farmer on fertilizer use.

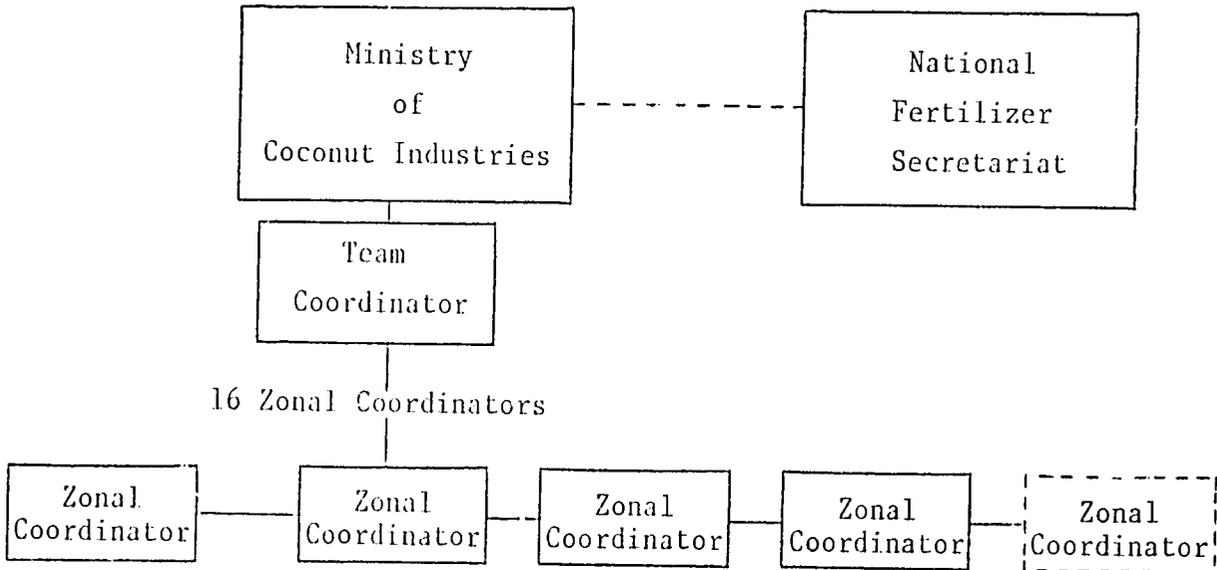
4. Small farmers having one-half acre and less find it difficult to obtain credit for the purchase of fertilizer.
5. Cash fertilizer sales are not being made at CCB stores; this necessitates a time-consuming procedure to obtain a money order or bank draft.
6. Seasonal low prices for coconuts have an adverse effect on the consumption of coconut fertilizer and the production of nuts.
7. Fragmentation of land holdings on each end of the scale--small and large farms--is reducing coconut production. Large farmers fear that the land ceiling will be reduced. Coconut land is being taken up by new roads, factories, and homes.
8. Incentives and dedication are inadequate for carrying out programs designed to increase coconut fertilization.
9. A sudden and substantial increase in the price of fertilizer has produced a negative psychology toward the purchase of coconut fertilizers.
10. Dealer margins are not adequate to encourage the selling of fertilizers.

These problems are very real and constitute a major factor in the downward trend of coconut production. Implementation of the plan prescribed by this report would begin a reversal of the decline in coconut production in Sri Lanka.

Plan

A special task force should be created within the Ministry of Coconut Industries/Coconut Development Authority for the specific purpose of coordinating the supply, conducting educational programs, carrying out promotional activities, encouraging the creation of producers' associations, and advising the Government of support programs required to increase the fertilizer consumption on coconuts.

Organizational Structure--The task force should consist of 16 zonal coordinators and a team coordinator. All will report directly to the Ministry of Coconut Industries. Activities of the task force will be coordinated with the National Fertilizer Secretariat. The organizational chart can be diagrammed as follows:

Organizational Structure

On the basis of natural boundaries, distances to be covered, intensity of coconuts grown, fertilizer consumed, and potential sales, the following division of zones is recommended.

Zonal Assignments

<u>Zones</u>	<u>Area Under Coconuts</u> - - - ('000 ha) - - -	<u>Number of Coordinators</u>
Kurunegala	156.7	2 ($\frac{1}{2}$ district each)
Colombo and Gampaha	89.1	2 ($\frac{1}{2}$ district each)
Puttalam	58.9	1
Kegalle	28.3	1
Kalutara and Ratnapura	26.6	1
Hambantota	20.9	1
Nataruwa	15.1	1
Galle	15.0	1
Jaffna and Vavuniya	14.1	1
Matale and Kandy	17.2	1
Ballicaloa	6.5	1
Anuradhapura and Mannar	6.7	1
Amparai and Moneragola	5.9	1
Polonnaruwa and Trincomalee	4.4	1
TOTAL	465.4	16

Qualifications--The task force requires senior staff members who have a minimum of a B.S. degree in agriculture, preferably with an agronomy or marketing background. Each staff member should have a minimum of 5 years' experience in agricultural development work. All staff members selected should have a track record of accomplishments and history of loyalty and dedication. They must have the ability to organize and become leaders of people of all classes. They must have a special ability to communicate with people and motivate them.

The team coordinator should possess all of these qualifications and be the most capable senior member of the group. The team coordinator should be selected first and participate in the selection of the 16 zonal coordinators whom he is to supervise.

Training--After the special task force is selected, all members will undergo an intensive 2-week training course. The curriculum will be especially designed to focus on the function to be carried out. The curriculum and the estimated time are:

<u>Subject</u>	<u>Duration</u>
Fertilizer Technology, Use, and Economics	2½ days
How to Formulate Educational Programs	½ day
How to Carry Out Dealer Meetings, Farmer Meetings, Village Campaigns, School Programs, etc.	1 day
How to Carry Out Effective Demonstrations and Field Days	1 day
Planning Coordination Activities	½ day
Organizing Farm Groups into Producer Associations and Cooperatives	2 days
Targeting Special Programs for the Small, Medium, and Large Farmers	½ day
Coordinating Transportation and Supply	1 day
Warehouse Management	1 day
Forecasting Sales	½ day
Bulletin Preparation and the Use of Visuals	½ day
Effective Communications	½ day
Reporting and Documentation	½ day
TOTAL	12 days

The team coordinator will be responsible for formulating, arranging, and conducting training for the special task force. He may seek assistance in training from several sources including IFDC, CRI, College of Agriculture, National Fertilizer Authority (NFA), and Food and Agriculture Organization of the United Nations (FAO). A plan for continuous staff development should be prepared during the first year. Expert assistance to develop this plan and carry out the first year's training should be considered.

Remuneration--The task force must be able to work across ministry lines and coordinate fertilizer supplies, educational programs, and promotional activities with all other organizations involved. All staff members must work especially closely with the ASC, NPC, government coconut estates, the Fertilizer Manufacturers and Distribution Network, and the private dealers. If the staff is to accomplish its task, it must be paid at a senior level. A minimum of grade level II is suggested for the zonal coordinators and grade I for the team coordinator.

Each task force staff member should have an incentive program. The tonnage of coconut fertilizer sold in each assigned zone (district or portion thereof) will be calculated for the years 1978, 1979, and 1980. The average of the tonnage sold in each zone for this period will form the base for calculating the incentive programs for the zonal coordinators. The average tonnage sold in the country during this period will constitute the base for the incentive program for the team leader. For each ton of coconut fertilizer sold above the base, it is recommended that the zonal coordinators receive Rs 10 and the team coordinator Rs 2.

Staff Functions

Zonal coordinators will perform the following tasks:

- A. A key function of the zonal coordinators will be to coordinate the supply of coconut fertilizer for all retailers. The field survey revealed that many fertilizer stores did not have an inventory of coconut fertilizer although the rains had started and farmers wanted to begin fertilizing their palms. Several ASC managers stated that the paddy season had started; thus, coconut fertilizer would not be stocked in their stores. Some of the CCB stores surveyed did not contain any coconut fertilizer. It was also found that several managers were taking a defeatist attitude toward stocking and selling

fertilizer because of a recent price increase of approximately 118%. (See Appendix VI for a comparison of fertilizer prices in 1980 and 1981.)

Agricultural cooperatives have a significant role to play in increasing fertilizer consumption on palm trees. At present there are 287 MPCs in Sri Lanka. The societies have 7,500 retail branches scattered all over the country; 3,900 of these handle some quantity of fertilizers. The GTZ study, "Promotion of Fertilizer Distribution and Consumption," estimates that the average sale for those branches handling fertilizer was approximately 20 tons in 1976. Most of the MPCs have a warehouse storage capacity of 50-100 tons for all basic supplies, i.e., rice, fertilizer, etc. The retail branches have small warehouses of approximately 5-10 tons capacity. The study also indicates that 90% of the rural area is within 5 km of a cooperative retail store.

The zonal coordinator, in cooperation with the MPCs, should select a number of societies and branches in the coconut-producing area and encourage them to specialize in the handling and selling of coconut fertilizer. This should be a plan to utilize existing MPCs facilities. The zonal coordinator can assist the MPCs in maintaining a supply of coconut fertilizer.

There are six coconut producers' cooperative sales societies in Sri Lanka. This is the type of cooperative that can have the greatest impact on coconut production. The coconut producers' cooperatives sell their members fertilizers and deduct the cost when purchasing the coconuts. Coconuts are purchased on a weight basis and at a higher price than can be obtained on the open market. During the field survey, it was found that the Marawila Coconut Producers' Cooperative Sales Society, Ltd., was offering its 201 members Rs 400 more per 1,000 nuts than the local market was paying. The Kammal Pattu Coconut Producers' Cooperative was offering its 172 members Rs 1,600/1,000 nuts; whereas, the local open market price was Rs 950. The existing coconut producers' cooperatives should be encouraged to continue handling fertilizers for their members.

The storage of coconut fertilizer will be more difficult now that urea is used as the source of nitrogen. The hygroscopic qualities of urea cause bags to become wet and cause a wet condition in the warehouses. Bags that become punctured or have not been properly closed will become wet rapidly. Warehouse managers will be inclined to reduce the storage time as much as possible. The field survey revealed that several ASC managers have started accumulating orders so that whole truckloads can be ordered and sold quickly and minimize the storage time. The amount of fertilizer in poor condition will increase substantially unless good warehouse management is practiced.

It will be the duty of the zonal coordinators to:

1. Encourage the fertilizer retailers to maintain a stock of coconut fertilizer during the two main periods for fertilizing coconut palms. These periods are June and July in the Maha season and October and November in the Yala season. During the other periods, the fertilizer warehouse manager will be informed of any activity or conditions that could change the fertilizing seasons so that a supply can be adjusted to meet demand.
 2. Help the retailers to forecast the demand for coconut fertilizers by time periods so that a timely supply is always available to the farmers.
 3. Advise the warehouse managers on good management and encourage the adoption of the practices.
 4. Provide feedback to the fertilizer producers on the condition of the product and any change in demand so that adjustments in the product can be considered.
- B. Educational programs are a KEY function for increasing fertilizer consumption on coconuts and thus yields in Sri Lanka. Educational programs should be targeted to three groups. The first group includes the extension officer (CDO, CO, Grama Sevaka, etc.), the second group includes the retail dealer (store manager), and the third group is made up of farmers and planters.

The extension officers contacted during the field survey did not seem to have the basic knowledge that is necessary to advise the farmer on a complete package of good cultivation practices. Many did not know the necessary basics such as the functions of nitrogen,

phosphate, and potash in plant growth; different types of fertilizer materials; nutrient deficiency signs in plants; the value of live mulch under palms; volatilization and leaching properties of fertilizers, etc. It was also found that incorrect information was being given to the farmer by both the extension officer and retailer. In several cases the survey revealed that the farmer was being told that the ammonia in CA mixtures would not leach as quickly as the nitrogen in CU mixtures. Farmers were also being advised not to purchase wet CU mixture because the nutrients were lost in the water on the floor.

It was found during the field survey that most retailers (storekeepers, warehouse managers, etc.) within the public sector are stockists. Instead of marketing, they distribute fertilizers. The reasons for this position are most likely the lack of an incentive and the little knowledge possessed regarding their product.

The retail sellers of coconut fertilizers are within the private sector. Baur's, the only private manufacturer in Sri Lanka, sold 20,900 tons of coconut fertilizer in 1980--37% of total sales in Sri Lanka. The private dealers are competing for the fertilizer trade by canvassing the private farmer for business, offering limited credit, and delivering. The private manufacturer and dealer need an educational program as much as the government sector needs one. The dealer is usually the last person to discuss problems with the farmer before he goes to the field. Therefore, he should be able to advise the farmer on routine production techniques.

The farmers need help with their coconut production problems. The small- and medium-sized farmers need help more than the larger planter. During the field survey, farmer groups in the scale of large (25 acres and above), medium (10-25 acres), and small (10 acres and below) were interviewed. The farmers recognize a need for technical help. Most farmers interviewed had never attended a meeting where agronomic practices and economic returns had been discussed. In each group the farmers gave priority to the fertilization of paddy over coconuts. Considerably more educational and promotional activities have been carried out on paddy. Paddy fertilization gives a quicker and slightly greater return than can be expected from coconuts. When

the farmer is shown that the fertilization of coconuts can return Rs 4 for each Rs 1 invested, he seems to be willing to fertilize. An example of the return to coconut fertilization is given in Appendix VII.

Most of the extension officers are bright and can be easily trained to carry out educational programs on coconut cultivation. It appears that most of them have never had the experience of participating in a commercial-type educational program.

As mentioned above, the zonal coordinator will have completed a 2-week refresher course. He will also have a minimum of a B.S. degree in agriculture plus 5 years' experience. He cannot, however, be an expert in all areas of coconut production. He will hold educational meetings on subjects within his specialty. When an educational function is required on a subject that the zonal coordinator does not feel comfortable in handling, a specialist for the required subjects can be recruited. CRI, college of agriculture, and other organizations can serve as key resource backups. It is recommended that the zonal coordinator be responsible for organizing and carrying out the following educational programs:

1. Extension officers--short courses on every aspect of coconut cultivation. The course will be designed especially for extension officers who advise farmers on cultivation practices. The course should be 1-2 days in duration, depending upon the need of the officers.
2. Dealers--meetings on how to sell fertilizer, including sales forecasting, canvassing farmers, inventory control, credit, delivery, and serving the customer.
3. Farmers--meetings on coconut cultivation. Emphasis will be on fertilizing, conservation practices, replanting, interplanting, credit, marketing, and economics.
4. Demonstrations--to show the effects of fertilization, conservation, interplanting, and good husbandry.
5. Lectures--to rural schools, clubs, colleges, and groups that should know about coconut cultivation.
6. News articles--on coconut cultivation in general with emphasis on replanting and fertilization. Articles should be submitted to each of the 20 newspapers in Sri Lanka on a planned schedule.

Appendix VIII lists the newspapers and circulation of each grouped by language--English, Sinhala, and Tamil.

- C. Promotional activities are a key function of the special task force. Coconut production is very important to Sri Lanka. The coconut industry contributes 4%-6% of the gross national product (GNP) and 10%-18% of the country's export revenue. In 1979 the export value of coconut products was Rs 1.8 billion (4).

The annual per capita consumption of coconuts is approximately 130. The area under cultivation has remained constant since 1930 at approximately 1.15 million acres or about 28% of the country's cultivated area. The production of fresh nuts has steadily declined and in 1980 was about 2.2 billion nuts/year (1). Some portion of the coconut palm is used in just about every ceremony in Sri Lanka; the palm is important in Sri Lanka. If the downward trend in production is to be reversed, a highly effective promotional campaign to increase production must be organized and implemented.

The Role of the Coconut Cultivation Board in Promotion

CCB, which has a publicity department, should provide the promotion support for the special task force. A list of the items used by the department is shown in Appendix IX. The department needs updating and additional staffing. Most of the items used in promotional activities, and particularly the films, need updating. Most display items are shopworn and need repainting and renovating. It is recommended that the CCB publicity department be responsible for the following promotional activities:

- A. Films on coconut cultivation and vehicles for showing the films in villages. A total of four films and two sound-equipped vehicles should be provided. The films should be in the local language. Each film vehicle should be assigned to a northern or a southern region for continuous use.
- B. Slides and tapes describing each phase of coconut cultivation. The slide set should include the practices of planting, replanting, and fertilization; signs of plant food deficiency; insect control; conservation; interplanting; harvesting; and marketing. The taped description should be in the local language. The CCB publicity department should maintain eight sets of each presentation for lending

to the special task force. The publicity department would coordinate movements of the sets to and from the zonal coordinators. Regular inspection of the slide sets would be necessary with updating as required.

- C. Exhibition materials including charts and boards carrying messages on every aspect of coconut cultivation from planting to harvest to market. Maps of nurseries, fertilizer stores, regional offices, etc., that the CCB publicity department has are good; they should be revised. Charts showing signs of nutritional disorder, especially of the primary nutrients and magnesium, should be included. The display of photographs of farmers and dealers should be included. An especially equipped vehicle with racks and hangers to transport the display equipment so that it will not be damaged on every trip should be purchased and maintained exclusively for transporting the displays for exhibition.
- D. Establishment of a section on photography and one on communications within the CCB publicity department.

The photography section would be responsible for making the slide sets and aiding the zonal coordinators with photographic requirements. The films should be prepared by a professional.

The communication section will be responsible for helping to publish a monthly newsletter covering coconut cultivation activities, articles for newspapers, and text on promotional posters, as well as spot advertisements in the cinema and on radio. The communication section will make studies to determine ways of improving and structuring effective communications at all levels within the plan for increasing the fertilization of coconut palms.

Promotion Responsibility of the Special Task Force

The special task force will request and expect support on promotional activities from the CCB publicity department. The zonal coordinators will be responsible for arranging and coordinating the promotion of coconut cultivation in their assigned territories. Promotional activities to be carried out by the zonal coordinators will include:

- A. Exhibits--Arrange for the CCB publicity department to display at major events where farmers will be in attendance in relatively large numbers. The zonal coordinator will be on hand to have discussions with farmers and dealers when the exhibit display is in use.

- B. Commercials--Provide selected rural cinema houses with spot advertisements on coconut cultivation.
- C. News Release--Work with the CCB publicity department in selecting and providing news items and commercials to local radio stations for broadcasting during peak farmer listening periods.
- D. Farmer Contests--Sponsor a contest to determine the outstanding coconut farmer in each zone and the overall national champions. The contest will last 2 years from the date of announcement. The announcement date should be just before the fertilizing period with the end of the contest 2 years later. The winner will be the one producing the highest average number of nuts with the greatest weight from five fertilized trees. The count must be in the presence of and be certified by the CO, CDO, and zonal coordinator. Rules of the contest and forms for participation will be made available at all retail stores selling coconut fertilizer. Included in the rules of the contest will be a stipulation that each qualifying participant must be a bona fide farmer working his own land and deriving the major portion of his income from the farm. Only five coconut palms can be selected and entered into the contest. A poster campaign and other means of announcing the contest will be undertaken.

A suitable prize, such as a radio, will be given to each zonal winner. The country champion and his wife will be brought to Colombo for a 2-day expense-free weekend visit. News releases and photographs will be prepared and given to the press, radio, and television. The national champion will also receive a plaque designating him national champion and signed by the President and Minister of the Coconut Industries.

- E. New Planting--Arrange special programs for the planting of young palms. One program would be for the small farmer. In cooperation with the CCB palm nurseries, a village and date for receiving the young palms can be preselected and announced. On the specified date, trucks could bring the palms and fertilizer. The seedlings could be given without cost on the condition that enough fertilizer be purchased and applied to get the palm off to a good start. A discussion on coconut cultivation should be given by the zonal coordinator to open the ceremony.

The second type of palm planting promotion program should be built around the rural schools. The zonal coordinator should select key rural schools and obtain permission to lecture to the older youths (grade 9) on coconut cultivation. Each of the students in attendance could be given two palms for planting free of cost on the condition that they would provide proper care of the palms for at least 1 year.

The palm tree is most productive when it is approximately 25-35 years of age. The palm continues to produce up to the age of 60 years but at a reduced rate. Nut production after 60 years of age is considered to be uneconomical; however, this stage can be reached earlier depending upon the care the tree receives. The FAO "Report on Overaged, Diseased and Poor-Yielding Coconut Areas in Sri Lanka" indicates that approximately 4% of the palm trees are over 60 years of age and need to be replaced. This would require 2.6 million new palms to be planted on 18,600 ha. Once the nonproductive trees have been replaced, a replanting maintenance program of 7,750 ha or 1 million trees annually is required to maintain the present palm population on 465,000 ha under the 60-year age limit.

During the 5-year plan the average increase in population at a 1.7% growth rate will be about 272,600 people that will require 130 coconuts per capita annually. This increase in population will require the production from 5,900 ha with 826,840 trees. A planting program of approximately 1.8 million trees annually is required to supply the increasing population and to replace the nonproductive trees. The special task force can give assistance in meeting the coconut planting requirements.

Formation of Coconut Producer Associations

It would not be practical to attempt to get the majority of farmers in Sri Lanka involved in the formation of a producers' association or a cooperative. During the field survey, a number of farmers stated that a producers' or growers' association could help solve some of their problems relating to a timely supply of fertilizer, credit for the purchase of fertilizer, and low nut prices during the peak harvest periods. There is a need for farmers to band together for the purpose of obtaining the essential inputs for coconut production in a number of communities. In most places surveyed, it appeared that the expertise to manage a producers' association existed among the farmers.

Zonal coordinators should have a program for helping to form coconut producer associations or cooperatives. The zonal coordinators would then carry out the following activities:

- A. Establish a pilot area to determine if the formation of coconut producers' associations can be done on a practical basis and if they will aid in the production of coconuts. A pilot area should be selected. Villages and markets should be surveyed to determine:
 1. If a need exists for a coconut producers' association.
 2. If adequate managerial expertise is present among the farmers to manage an association on a long-term basis.
 3. If there is some facility available for meetings and the temporary storage of fertilizers and coconuts.
 4. If the farmers are receptive and willing to form and participate in a coconut producers' association.

The three best locations and possibilities for success should be identified for the pilot associations.

- B. Determine the best organization and individuals to help establish the three pilot coconut producers' associations. There are several organizations in Sri Lanka that might lend assistance, including:
 1. The Ministry of Cooperatives.
 2. The Cooperative Management Service Center (CMSC).
 3. The five existing coconut producers' cooperative societies.

After determining the organization that can aid in the formation of the producers' association, one or two individuals to help at each of the three pilot associations should be chosen. Continuity in building the pilot operation is important. Farmers need to trust and identify with those helping them to form the association. The number of farm families in each association should be limited to 50, but that number can be increased at a later stage.

Organizational meetings will be held. The group should elect a president, vice-president, secretary, and treasurer. A charter with bylaws and operational procedures should be drawn up. There should be a yearly membership fee per member of Rs 5-10. A card with photograph and statement of membership in the association will be given to each member.

- C. Build the pilot coconut producer associations around the most pressing needs of the farmers in the membership. These would include:
1. Credit to purchase fertilizers and other essential crop production inputs. Small farmers find it difficult to obtain credit to purchase fertilizers in Sri Lanka. The special task force through the Ministry of Coconut Industries should work with the People's Bank, Bank of Ceylon, and the cooperative banks to develop a plan whereby the pilot coconut producers' association could obtain a group loan for purchasing fertilizers. All members would sign the note for the loan, with the promise to repay the amount borrowed individually. If a member does not pay, the other members would bring pressure for repayment. A new loan could not be obtained collectively or individually from the lending banks until the original loan has been repaid.
 2. An available supply of coconut fertilizer. Lack of a timely supply and transportation are two of the most often stated constraints to the use of fertilizers (10). An order list with the exact amount each member will purchase can be compiled. A delivery date can be agreed upon. Arrangements can be made with the supplier, i.e., NPCB, ASC, or CCB, for delivery. The members can collect their individual fertilizer orders from the truck or tractor trailer making the delivery in the village. If a truck-load is ordered, the fertilizer can come straight to the coconut producers' association site in the village, bypassing the warehouse system for a substantial saving on warehousing.
 3. The holding of coconuts during periods of low prices. In reviewing the prices farmers receive for fresh nuts by months for the past few years, it was revealed that coconut prices during the Yala harvest season and, to a lesser extent, during the Maha season drop substantially. For example, prices on local open markets during the first half of June 1981 dropped from Rs 1,200/1,000 nuts to as low as Rs 750 in some areas. See Appendix X for average market prices. Power failures in the coconut processing mills and the oversupply during the harvest season are the major reasons for this drop in price. Farmers stated that prices, historically, start to recover in July.

Farmers forecast that the nut price will come back to the Rs 1,200 level during August. Nuts can be stored for a period of 2 months without difficulty and sold for the higher price in August. With this holding action, the farmers stand to gain approximately Rs 440/1,000 nuts.

A plan can be worked out with the banks whereby the coconut producers' association can stockpile the nuts at the association site and pledge them for a loan equal to 50% of the June market price. Each member would receive an advance payment equal to 50% of the value of the total number of nuts brought in for a future sale. When the nut prices advance to a satisfactory level, the final sale can be made. The loan will be repaid at the bank. Members will receive the difference between the advance loan and the final selling price for the number of nuts each sold, less the bank interest charge for the advance loan. In years when nut prices stay above a level that is considered satisfactory, a holding program will not be undertaken.

4. An educational program on cultivation, harvesting, and marketing prices. The coconut producers' association can have regular meetings and invite speakers to lead discussions on subjects of interest to the membership. Lectures could cover the role of NPK and Mg, effective fertilization, conservation practice, inter-planting, replanting, insect and disease control, high-yielding varieties, marketing intelligence, etc. An educational program for the membership will provide one of the best bases for forming an association.

The pilot operation should determine if the establishment of coconut producers' associations is a worthwhile activity of the zonal coordinator. Some of the 48 pilot associations will fail. Some few may grow, prosper, and become cooperatives similar to the Coconut Producer Cooperative Societies at Marawila, Kamsalpattu, Dunagaha, and Nattandiya. These societies should be surveyed to determine if they would be willing to assist one of the pilot associations in becoming a full-fledged cooperative society.

Special Advisory Service

There are some constraints to increased coconut production against which the national Government must act if they are to be overcome. The special task force will be in the field on a full-time basis working with coconut producers and should be in a position to know these constraints better than anyone else in the country. If not, then a reevaluation of the technique used in selecting personnel is in order.

It is recommended that the 16 zonal coordinators and the team leader provide a special advisory service to the national Government. The advisory service will be channeled directly to the Ministry of Coconut Industries and on to the policymaking bodies in the national Government. The group will advise the Government on constraints to coconut production and make recommendations for overcoming or minimizing the effects of the constraints.

During the field survey and data collection phase of this study, groups of farmers with plantings ranging in size from small (below 10 acres), medium (10-25 acres), and large (25 acres and above) were interviewed. See Appendix XI for an example of the type of letter sent and Appendix XII for an example of the type of questions asked the farmers and their responses. Of the constraints on coconut production that require action by the national Government if they are to be overcome, two major ones were continuously presented by the farmer groups. They are:

1. The price of nuts in relation to the cost of production, and
2. Uncertainty regarding future land ceilings.

Programs for overcoming these two major constraints could be made relatively simple.

Guaranteed Minimum Price

As already discussed, the price of coconuts has a tendency to become lower during the Yala and Maha harvest. This also is the period when the rains come and fertilizers should be applied. During periods of low nut prices, farmers are inclined not to purchase and apply fertilizers. This causes a lower harvest 2 years later.

It is recommended that the special task force work out an average cost of coconut production for the major producing regions. To this cost, a return should be added that will encourage the farmers to stay in coconut

production and increase yields. This could be called a guaranteed minimum price. The Government would announce the guaranteed minimum price yearly. The guaranteed minimum price should be an index number that fluctuates with the cost of production. When the market price falls below this level, the Government would purchase nuts until the local market prices are equal to or exceed the guaranteed minimum price. The nuts can be stored at the CCB-managed estates, regional offices, and fertilizer stores. The nuts can be sold during periods of high prices which could have a stabilizing effect on the price. The coconut guaranteed minimum price program could be patterned after the paddy guaranteed pricing scheme since it seems to be effective.

During the interview with each group of farmers, the question was asked if they planned to fertilize their coconut trees in 1981. Cost:benefit ratios were not generally known among farmers in the small and medium category. The larger planters did know. The recent 118% increase in coconut fertilizer cost has naturally reduced demand. The increased fertilizer cost has narrowed the cost:benefit ratio. The large planters figure the cost:benefit ratio to be approximately 1:3, using 1981 fertilizer and labor cost and nuts at Rs 1,000/1,000. When nuts drop to Rs 750, the cost:benefit ratio drops to 1:1.8. Farmers stated they would be inclined not to fertilize with a cost:benefit ratio of 1:1.8, and only a few stated they would at a ratio of 1:3. The real incentive to fertilize and increase production among the farm groups interviewed seems to start at a cost:benefit ratio of 1:4, based on Rs 1,200/1,000 nuts, 1981 applied fertilizer cost of Rs 13/tree, and a yield of 70 nuts/tree. This suggests that the 1981 guaranteed minimum price for nuts should be established at approximately Rs 1,200/1,000 nuts to encourage farmers to fertilize. Unless there is a quick change in the cost:benefit ratio, coconut fertilizer sales will be down significantly in 1981. Nut yields will be down in 1983, reflecting the reduction in fertilizer use in 1981.

Land Ceilings

There is an underlying doubt about future land ceilings. Many large coconut planters are taking the position that they should take the quick return and not go in for underplanting of older trees, conservation, and other practices that are considered to be long term. Interplanting

with banana, pineapple, pepper, pastures, etc., is showing quick returns, and many farmers are moving in that direction. Coconut prices must keep pace with the prices of the interplanted crops. If not, more emphasis will be placed on the crops that are interplanted, and coconut production will decline.

Coconut farming requires a long-term investment for a period of 5-6 years before any return can be realized from the palm. If the Government intends to maintain its policy of a 50-acre ceiling, then farmers should be reassured of this so that they will continue to take good care of their plantations. A deliberate campaign should be undertaken by the national Government to alleviate this constraint on coconut production.

Helping to Coordinate Coconut Research

There is a wide gap between coconut research and the dissemination of research findings among the farmers. When the small- and medium-sized farmers were asked where they would go for technical help on coconut cultivation problems, the most frequent response was to the ASC and CO. Only a small percentage said to the CCB nurseries and CRI. As discussed earlier, the basic information that the COs have regarding coconut production is limited. The connecting links for disseminating research data to farmers via the COs from CRI are weak.

The large coconut planters go directly to CRI for help on technical problems. In a meeting with 24 large planters at St. Xavier's College, Marawila, all present had gone directly to CRI with problems of some nature within the last 12 months. A somewhat similar situation was found in the other groups surveyed. CRI cannot handle all the large planters on an individual basis. They need some way of multiplying their efforts. The educational meetings that the zonal coordinators will be conducting can provide a means of reaching more farmers. If special education meetings are required to reach the large planter in group meetings, they can be arranged by the zonal coordinator. The educational meetings on coconut cultivation for the MPC, ASC, and CCB stores will reach the medium- and small-scale farmers. CRI can provide backup support for the zonal coordinators' educational meetings and close the gap between research and extension. Educational meetings can be devised to reach all categories of coconut producers.

The zonal coordinators can provide feedback to the scientist at CRI for site-specific research. The zonal coordinators will be working at the field level throughout the coconut-growing area. They will learn of specific problems--poor nutrition, insects, diseases, etc.--that are reducing coconut yields. These problems can be fed back to CRI for an answer or so that research can be undertaken to solve the problem.

Whole Estate Demonstrations

The coconut estates operated by the Government should be made into model estates of how to manage the land for high economical yields. Many of the coconut estates surveyed were well managed. The estates at Bopitiya and Marawila and the replanted estates near Valaichenai in the east apparently fall into this category. Several other estates seem to be in a less than desirable state of production. A study of 85 coconut estates in Puttalam, Kurunegala, and Colombo districts during a 3-year period, 1975-77, revealed that "estates managed by the Government sector showed a higher decline in the per acre annual yields, as compared with the private-sector estates" (10). Government estates should be examples of what to do. If all estates cannot be managed satisfactorily, one in each area could be made into a demonstration of how to manage an estate for best yields.

Coconut Fertilizer Credit

The People's Bank and the Bank of Ceylon, in cooperation with the CCB and Central Bank and with the concurrence of the Ministry of Coconut Industries and the Ministry of Plan Implementation, have a major responsibility in making credit available to farmers for the purchase of coconut fertilizer. Details of the Coconut Fertilizer Credit Scheme can be obtained from Appendix XIII.

The credit scheme was announced and commenced in January 1979. Implementation of the credit scheme was not made in time to make many loans in the 1979 Yala and Maha seasons. From the beginning of the program to June 1981, the People's Bank had made 2,238 loans totaling Rs 8.264 million. The Bank of Ceylon, during that same period, had made 2,445 loans totaling Rs 9.215 million. The Central Bank sanctioned Rs 50 million for the Coconut Fertilizer Credit Scheme. Of this total, only Rs 17.479 million has been loaned. Both banks reported that the demand for fertilizer loans was down.

Both banks also suggested that the CCB should create a demand for more loans by promoting the program at the farmer level. The banks do not have an adequate field staff to make coconut fertilizer loans. During the field survey, only the Galle District Bank of Ceylon seemed to have an adequate staff of field officers to make fertilizer loans. This bank had 20 field officers to cover 16 branches for coconut and paddy loans. The bank reported the farmer application forms have not been received from CCB.

During the field survey portion of this study, it was found that farmers generally were not previously aware of the fertilizer credit scheme. When they were told of the scheme, conditions, and repayment period of up to 5 years with a 2-year grace period and also a favorable interest rate of 9½%, farmers expressed considerable interest. It appears that if farmers are instructed on the returns from applying coconut fertilizer, they will want to take advantage of needed credit to purchase fertilizers.

Bank credit is slow. Farmers generally, and small- to medium-scale farmers in particular, feel unwelcome at banks. During an interview with a group of medium-scale farmers at Gampaha, it was revealed that 35 farmers who had made credit applications at the bank had waited 6 months and still had not received a reply to their bank credit application.

The CCB has a Coconut Cultivation Subsidy Scheme that covers six different types of programs. These are (1) rehabilitation, (2) underplanting and replanting, (3) new planting, (4) assistance to land allottees of 1 acre and less, (5) pasture/fodder, and (6) perennial crops. Details of the CCB subsidy scheme may be found in Appendix XIII on credit instruments. Subsidies payable under these six schemes are outright gifts to coconut growers and are not repayable. The costs of materials, i.e., fertilizers, seedlings, etc., are deducted from the grant. For example, the amount of the grant for the new planting scheme is Rs 2,750/acre and payable in five installments--Rs 1,250 after weeding, fertilizing, and planting and Rs 375 thereafter in four equal payments after fertilizing and weeding.

The new planting scheme is popular with the farmers in areas where they have been told about the credit schemes. In the Hambantota district it was found that many of the ASC personnel did not know about the CCB credit schemes. At Matara, since the beginning of the subsidy scheme in April 1980, 578 applications (permits) have been approved. In 1981, 79 new planting applications have been approved. A survey was made of 89 farmers

who signed up and received the first installment on the new planting scheme. Of this total, only 36 applied for the second installment. A survey was made of 17 farmers who did not continue the program. Sixteen farmers gave nonavailability of seedlings and fertilizers as the reason for not continuing the scheme. The time required to apply and receive the credit grant is long and, thus, discouraging to farmers. Many farmers reported a 3-4 month waiting period for their grant clearance. The CDOs spend almost 100% of their time in the subsidy scheme. They must receive the application for the subsidy scheme from the farmer. He must then inspect the farmer's field and operations for creditability. The CDO approves the farmer's application and then leaves it with the CCB regional manager for final approval. If the farmer's application is approved, he will be notified, and the operation can commence.

At the farmer level, the CCB is known as a credit organization. The CCB does not have a program for popularizing planting, fertilization, and care of coconut palms. The field survey in the southern coconut region--Galle, Hambantota, Weeraketiya, Ambalangoda, and Matara--revealed that very little is being done to encourage the farmer to increase coconut (or toddy) production. It appears that new plantings of palms could be made in these districts and particularly the northern and inland portions.

Coordinating Credit

The special task force has an important role to play in coordinating coconut credit programs. The special task force through the team leader will perform the following functions:

- A. Encourage the People's Bank and Bank of Ceylon to hire an adequate staff of field officers to take prompt action on farmer applications for coconut fertilizer loans. One field officer is required to handle each branch. In some situations field officers may be able to handle more than one branch.
- B. Coordinate the credit requirements with bank and CCB officials. If Rs 50 million is not adequate to cover the demand for coconut fertilizer, a request for additional funding can be made. If the funding provided by CCB is not adequate to cover their coconut cultivation subsidy scheme demand, a request for additional funds should be made.

- C. Coordinate the necessary announcements of credit schemes to the general farming population. Newspapers, radio, posters, and meetings should be utilized to let the farmers know of available programs. Necessary forms for making credit applications should be made available to all district and branch banks. The credit and subsidy programs must be made known to all banks, MPC, ASC, CCB stores, nurseries, and other organizations involved in agricultural development programs.
- D. Encourage surveys to determine the effectiveness of the credit and subsidy programs. Recommend adjustment as required to have a more effective program.

Zonal coordinators will perform the following functions:

1. Ensure that credit and subsidy programs are known at the administrative and farmer levels within their zones. Deficiencies in the programs should be fed back to the special task force team leader so that corrective measures can be taken.
2. Work within the farming population to expedite approval of loans and grants. The zonal coordinator can advise the farmers on how to make application, whom to see, and conditions necessary for approval. The banks and CCB will approve the loans and subsidy programs, but the zonal coordinator through group farmer meetings can help the farmer to avail himself of this vital crop production input.
3. Coordinate the flow of fertilizer, seedlings, and credit. The zonal coordinator will see that these three are available to farmers at the required time.

Benefits of Plan

The plan when implemented will have a positive effect on the demand for coconut fertilizer. Without a change in the program and efficiency with which the programs are carried out, annual coconut fertilizer consumption may level off at about 48,000-50,000 tons of product which is considerably below the 1980 level of 56,583 tons of product or 20,000 tons of nutrients consumed. A new approach is needed if coconut production is to regain the position it once held in the Sri Lanka economy.

The GTZ/CFC report, "Promotion of Fertilizer Distribution and Consumption," forecasts that nitrogen consumption will increase by about 1.6%, P_2O_5 by about 2.6%, and K_2O by about 1.5%/year on coconuts until 1985. From 1985 to 1990 the report indicated nitrogen consumption would increase only slightly at 1.2% annually, P_2O_5 would remain virtually constant, and K_2O would increase at approximately 1.5% annually. See Appendix XIV for the forecast made in this study. Appendix XV shows the fertilizer materials and nutrients used for coconuts from 1961 to 1980. Using these forecasts the fertilizer consumption in 1981 should be approximately 57,600 tons of product or 20,360 nutrient tons, up 1.8% from that consumed in 1980. Coconut fertilizers represent 13% of the total tons of products used in Sri Lanka in 1980. Total tonnage used in 1980 was 439,000. Appendix XVI shows the tonnage used by products and nutrients for 1961-80.

The field survey for this study revealed that coconut fertilizer consumption in 1981 will be substantially below the tonnage forecast for 1981 and below the 1980 tonnage of 56,513 tons. The forecast for 1981 indicates that coconut fertilizer consumption will be down by approximately 20% to about 45,000 tons of product or 16,000 nutrient tons. This prediction was based on a survey of fertilizer stores and forecasts made by the managers on 1981 fertilizer sales. This projection also takes into account that coconut fertilizer sales at the Maho regional fertilizer warehouse are down by about 34% for the first 5 months of 1981. It also takes into consideration that the nutrient content of the coconut fertilizer will remain about constant. A shift to higher analysis has already taken place. There is very little room in the mixture using existing raw materials (phosphate rock and muriate of potash) to increase the analysis.

A positive jolt to the coconut fertilizer distribution system could cause an upturn in purchases during the last half of 1981. The two primary months for fertilizing coconut palms--October and November--are yet to come. See Appendix XVII for the 1976 monthly issue of Coconut Fertilizer from Colombo. Appendix XVIII shows a comparison of coconut fertilizer sales by the wholesalers for the first 5 months of 1979, 1980, and 1981. Fertilizer sales for the first 5 months of 1981 as compared with those for the same period in 1980 are down by 12%.

The biggest constraint to coconut fertilization during the first half of 1981 appears to be the 118% average increase in fertilizer prices

announced in February. A gradual price increase possibly would have caused less resistance to purchasing fertilizers by farmers. At present there is considerable resistance to purchasing coconut fertilizers, and the attitude of fertilizer store managers interviewed is to discourage farmers from buying coconut fertilizer because of its higher price.

Another factor that was causing fertilizer sales to be down in May and June this year was the low open market price of coconuts. During this period many major coconut markets were reporting prices below Rs 1,000/1,000 nuts. On the basis of 1981 prices this appears to be the price level where farmers consider a further decline would make fertilization unprofitable.

If the plan for increasing coconut fertilization is implemented immediately, there can be some positive results by the time the Maha monsoon arrives. Prices of coconuts can be guaranteed, and attitudes of farmers and fertilizer store managers can be made more receptive to coconut fertilization. Credit programs can be explained to the farmers and those engaged in the coconut fertilizer marketing system. A supply of coconut fertilizer can be made available in all fertilizer stores throughout the coconut-producing regions. There is still time to have some impact on consumption in the last half of 1981; however, the real impact will occur in 1982. If the plan is implemented it will contribute a growth factor to consumption of 16%, the first year; 12%, the second year; 9%, the third year; 6%, the fourth year; and level off at about 4% thereafter. This projection is based on experiences in similar programs in other countries and the contribution that each component in the plan can contribute to the total. Contributing factors assigned to each component by years are:

Plan Components	% Contribution by Years				
	1982	1983	1984	1985	1986
Coordination of supply	8	10	11	12	12
Educational programs	2	5	8	10	11
Promotional activities	3	7	9	11	12
Advisory service	1	2	3	3	4
Coordinating credit	2	4	6	7	8
TOTAL	(16)16	(12)28	(9)37	(6)43	(4)47

The figure in parentheses () is the projected increase in consumption that the plan can contribute yearly if implemented as a complete unit. If only portions of the plan are implemented and the constraints to be removed by other portions of the plan remain, the projection cannot be attained. The growth in consumption contributed by this plan will be to the extent of the first limiting constraint. It is projected that by 1986 fertilizer consumption on coconuts will amount to approximately 70,250 tons of product or 25,300 nutrient tons.

This is an increase of 25,250 tons over the base year 1981 when an estimated 45,000 tons of product will be consumed. Using this base figure the effects of the plan by years can be calculated:

<u>Year</u>	<u>Fertilizer, % Increase^a</u>	<u>Increase in Fertilizer Tonnage Over Previous Year</u>	<u>Increase in Nuts Over Previous Year (million)</u>
1982	16	7,200	64.8
1983	12	6,264	56.4
1984	9	5,261	47.3
1985	6	3,823	34.4
1986 (onwards)	4	<u>2,702</u>	<u>24.3</u>
TOTAL		25,250	227.2

a. During the base year 1981 (estimated) 45,000 tons of coconut fertilizer to be consumed.

It is impossible to predict an exact net effect of the plan. Only an indication can be forecast. Given a situation where 6 lb of coconut fertilizer increases nut yields conservatively from 20 to 45 or an increase of 25 nuts/tree, each ton of applied coconut fertilizer could possibly give an increase of 9,000 nuts. The additional 25,250 tons of coconut fertilizer consumed as a result of the plan being implemented would produce 227 million coconuts. During the 5-year period, this increase in nut production is enough to supply the country's need even with the 1.7% increase in population in Sri Lanka, on the basis of an annual per capita consumption of 130 nuts, and leave a surplus of 55.7 million nuts.

Cost of Special Task Force

The following cost for the special task force has been estimated:

<u>Item</u>	<u>Annual Cost (Rs)</u>
Team coordinator (1 x 2,300 x 12)	27,600
Zonal coordinator (16 x 2,000 x 12)	384,000
Motorcycles (16 x 550 x 1 x 12)	105,600
Lodging per diem (16 x 8 x 35 x 12)	53,760
Demonstrations (fertilizer)	4,000
Equipment and materials (16 x 100 x 12)	19,200
Refreshments for meetings (16 x 200 x 12)	38,400
Team leader travel (jeep, depreciation [5 years] and expenses)	35,200
Miscellaneous, 10%	<u>66,766</u>
	734,536

The following cost for the CCB promotional support activities has been estimated.

<u>Equipment</u>	<u>Total Cost</u> ----- (Rs) -----	<u>Cost/Year^a</u> -----
24 slide sets @ 4,500	108,000	36,000
16 slide projectors @ 12,000	192,000	38,400
16 screens @ 3,000	48,000	9,600
8 35-mm cameras @ 8,000	64,000	12,800
1 set of photo development and processing equipment	50,000	10,000
2 movie vans @ 200,000	400,000	80,000
64 demonstration boards @ 450	28,800	5,760
12 film materials @ 75 x 16		14,400
16 flip charts, paper and pencils @ 300		4,800
Miscellaneous, 18.5%		39,175
<u>Salaries</u>		
2 van drivers--salary and benefits @ 15,000		30,000
1 photographer @ 15,000		15,000
1 publicity writer @ 10,000		<u>10,000</u>
TOTAL COST/YEAR		305,935

a. Equipment depreciated on a 5-year basis.

Net Value of Plan When Implemented

Using the estimated annual increase in nut yields that can be contributed to the plan less the 1981 cost of 6 lb of coconut fertilizer applied per palm, the cost of the special task force, and the CCB support cost, a net value of the plan for a 5-year period can be estimated.

	<u>Rs (Million)</u>
Value of added coconuts @ Rs 1,000/1,000 nuts	227.2
Cost of fertilizer applied: ^a	
Fertilizer, Rs 6; labor, Rs 1 (adds 25 nuts)	64.8
Cost of special task force	3.7
Cost of CCB promotional support	<u>1.6</u>
TOTAL COST	<u>70.1</u>
Net value of the plan	157.1

a. The cost of the Government fertilizer subsidy is not included in the calculation.

The net value of the 5-year plan at 1981 cost is estimated to be Rs 157.1 million. Added harvesting labor, transport, storage cost, government subsidy cost, and inflation rates have not been included in the estimated 5-year value of the plan. The increase in nut production has a direct influence on the production of husks. Husks are used in a moisture-conserving practice under the coconut palms. They are also used in the production of fiber goods. Husks were selling for Rs 70/1,000 during June 1981. The contribution of the husk to the fiber industry would have a value approximately equal to the value of the fresh nuts at 1981 prices. The value of husks is not included in the value of the plan.

Time Phasing

It is important to implement the entire plan. There is a synergistic effect and complementary value of each component of the plan. Each zonal coordinator in developing a plan of work must decide where to allocate program activities for the greatest return. Appendix XIX gives some points to consider in developing a plan of work. Notice that private dealers in 1980 sold 10,355 tons, and large planters purchased 19,750 tons of coconut fertilizers. These two areas should receive an early program priority. It is impossible to implement every phase of the plan at once. A time-phased plan of action should be followed in developing the entire plan. The following phase is recommended.

A Time-Phased Action Schedule for Implementing the Plan

<u>Month</u>	<u>Action to be Taken</u>
1981 August/September (first 2 months)	Preparation of plan. The team receives a plan and reviews it. The team obtains an agreement with Ministry of Coconut Industries and National Fertilizer Secretariat to implement the plan. They adopt a procedure for implementing it.
October (3rd month)	Minister of Coconut Industries appoints a staff selection committee of which he is chairman. Committee selects and appoints the special task force team leader. Team leader becomes a member of the committee. A job description for the team leader is prepared by the Ministry.
November/December (4th and 5th month)	The 16 zonal coordinators are interviewed, selected, and appointed. A 1-week orientation training course is drafted by the team leader. Job descriptions are prepared for each zonal coordinator.
1982 January (6th month)	Team leader conducts an orientation course, discusses job description, and assigns each zonal coordinator. Targets for 1982 are established. A plan for personnel development is started.
February/March (7th and 8th month)	Field activities commence. <u>Zonal coordinators</u> survey territories; establish order of priorities, i.e., coordination of supply, appointment of new dealers, and construction or retirement of warehouses; activate MPCS, ASC, and private dealers;

(continued)

A Time-Phased Action Schedule for Implementing the Plan (continued)

<u>Month</u>	<u>Action to be Taken</u>
	coordinate credit, etc. See Appendix XIX for procedures for establishing priorities. <u>Team leader</u> works with CCB to activate promotion support programs. A 2-week training program for coordinators is finalized.
April (9th month)	A Plan of Action for 1982 is completed by each zonal coordinator and submitted to team leader. Team leader completes a plan of action for special task force and submits it to the Ministry of Coconut Industries. Start the execution of programs in the plan of action.
May (10th month)	Staff members attend a 2-week course on fertilizer marketing designed especially for those with functions similar to those of zonal coordinators. CCB starts a National Awareness Program on the importance of coconuts to Sri Lanka. Zonal coordinators start dealer meetings and coordination of farmer credit programs.
June (11th month)	Programs started are continued. Farmer educational meetings are started. Team leader advises the government on how to prevent low prices for coconuts.
July (12th month)	Programs started are continued. Plans are made for a maximum of three demonstrations dealing with fertilizer rates and management levels.
August (13th month)	Programs started are continued. CCB film tracks are obtained for village shows.

(continued)

A Time-Phased Action Schedule for Implementing the Plan (continued)

<u>Month</u>	<u>Action to be Taken</u>
September (14th month)	Programs started are continued. One article on coconuts is prepared for newspaper in each territory. Coordination of supply is vital at this stage--appointments of new dealer and selection of warehouses should be completed by September 30.
October (15th month)	Programs started are continued. Replanting programs with school or village are carried out. Plans are made for one cooperative producers' association.
November (16th month)	Programs started are continued. One cooperative producers' association is developed.
December (17th month)	Programs started are continued. An annual progress report is prepared by each zonal coordinator. Team leader consolidates progress reports and submits one for entire special task force to Ministry of Coconut Industries for evaluation. New targets are set for 1983. The plan for personnel development is completed.

In conclusion, coconut production in Sri Lanka is important to the economy. It contributes 6% to the GDP and 10%-18% of the country's export earnings. In 1979 the value of all coconut products exported from Sri Lanka was Rs 1.81 billion. Coconuts are grown on 28% of the land under cultivation. The coconut industry employs approximately 2.48% of the total work force (4). In traveling throughout the coconut-producing regions and observing the drinks, foods, ornamentals, and manufactured goods produced from the palm, the author received the impression that the coconut is as basic as paddy to the Sri Lankan society.

The downward trend in coconut production needs to be reversed. The plan for increasing the use of fertilizer on palms brings together an integrated effort to remove constraints to fertilizer use. The plan integrates research, education, inputs, promotion, and marketing. Together, these components will produce a much greater impact than if they functioned alone. Personnel development throughout the recommended plan is essential to its success. If implemented, the plan will increase the use of coconut fertilizer. During the 5-year plan period a net gain of approximately Rs 157 million can be realized from fresh coconut production alone. It is recommended that the plan be implemented as scheduled.

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Appendices

Appendix I. Itinerary for the Sri Lanka Coconut Fertilizer Study

<u>Date</u>	<u>Place of Visit</u>
22-05-81	Visit to fertilizer stores and seedling nurseries at Polonnaruwa.
23-05-81	Visit to Mylambaueeli fertilizer stores, nursery, and East Coast Rehabilitation Project. Discussion with the regional manager and the project director on rehabilitation project and the fertilizer promotion work in the area.
25-05-81	Visit to fertilizer stores at Dankottuwa, Nattandiya, Chilaw, and Mundal.
26-05-81	Visit to Mahayaya Estate and Mahayaya fertilizer stores. Inspection of replanting and underplanting work done in Mahayaya Estate and fertilizer application in the field. Visit to Kurunegala Integrated Development Project Office. Discussion with the Assistant Project Director on the fertilizer warehousing program under the project.
27-05-81	Visit to CRI, discussion with the officials of the Soils and Chemistry Departments on the soil types in Sri Lanka and fertilizer technology.
28-05-81	Visit to CRB. Discussion with the Director, CRB, on technological aspects of coconut fertilizer.
29-05-81	Visit to Gampaha Regional Office and Ganemulla ASC for a farmers' meeting. Farmers having 1-10 holdings were interviewed in order to ascertain information on fertilizer usage and subsidy work.
30-05-81	Visit to JEDB estate at Gampaha.
01-06-81	Discussion with the Deputy General Manager, JEDB on fertilizer distribution and sales work done by JEDB. Discussion with the Competent Authority, CCC, on their sales and distribution network.

(Continued)

Appendix I. Itinerary for the Sri Lanka Coconut Fertilizer Study (Continued)

<u>Date</u>	<u>Place of Visit</u>
02-06-81	Discussion with the Commissioner of the Cooperative Development in Sri Lanka with regard to the distribution and sales of fertilizer by the MPC and the agricultural producers' cooperatives. Discussion with the Commissioner of the ASC on the warehousing and distribution of coconut fertilizer by the ASC.
03-06-81	Visit to Maho Region Fertilizer Mixing Complex. Inspection of the blending unit and warehouse facilities and discussion with the officers with regard to the marketing system.
04-06-81	Discussion with the Chairman, CFC, Sri Lanka and visit to blending complex of the CCC at Hunupitiya.
05-06-81	Visit to ASC at Mirigama and Walpita. Discussion with ASC division officers of Mirigama on the prospect of fertilizer promotion in that region. Interview with the cultivation officers with regard to the extension work and the sales promotion on fertilizer.
06-06-81	Visit to State Plantation Corporation Estate in Gampaha.
08-06-81	Discussion with the Director, National Fertilizer Secretariat.
09-06-81	Discussion with the Deputy General Manager (Credit) at the People's Bank on fertilizer credit system. Discussion with the Deputy General Manager (Agriculture Credit) of Bank of Ceylon and his officers on the progress made on the Coconut Fertilizer Bank Credit Scheme and the impact it has had on the use of fertilizer.
10-06-81	Visit to Balangoda and Ratnapura smallholders' plantation. Discussion with the Government Agent, Ratnapura, on the prospect of fertilizer promotion in the Sabaragamuwa Province.
11-06-81	Visit to the CRB and further discussions with the officers with regard to the reduction of fertilizer mixture now in use. Visit to Regional Office, Madampe.

(Continued)

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Appendix I. Itinerary for the Sri Lanka Coconut Fertilizer Study (Continued)

<u>Date</u>	<u>Place of Visit</u>
12-06-81	Visit to ASC, Kuliypitiya, for an interview with farmers whose holdings were approximately 10-25 acres.
13-06-81	Visit to JEDEB estate in Kurunegala. Attended Progress Review Meeting at the Ministry of Coconut Industries.
16-06-81	Interview with planters who own approximately 25 acres and above (mostly 50 acres and above). Discussion with this group on the effects of the fertilizer subsidy on consumption, cost:benefit ratio, fertilizer on the basis of soil type, fertilization on expected yield basis, constraints to fertilizer supply and distribution and related areas.
17-06-81	Visit to National Livestock Development Board at Madampitiya.
18-06-81	Visit to Ambalangoda fertilizer stores and Matara fertilizer stores. Discussion with the Project Director, Matara Integrated Development Project on the proposed fertilizer promotion in Matara District.
19-06-81	Visit to ASC at Ambalantota and discussion with the divisional officer on the prospects of fertilizer distribution and promotion among the farmers whose allotments are approximately $\frac{1}{2}$ acre and less. Visit to Weerakatiya Seedling Nursery and district fertilizer stores at Weerakatiya.
20-06-81	Visit to JEDEB estate at Gampaha.
22-06-81	Discussions with A. Baur & Co. and National Fertilizer Secretariat to verify sales tonnages and marketing programs. Visit to Agrarian Training and Research Institute to assess training facilities.
23-06-81	Discussions with USAID Mission, Coconut Ministry, CCB, and Mining and Minerals Corporation.

(Continued)

Appendix I. Itinerary for the Sri Lanka Coconut Fertilizer Study (Continued)

<u>Date</u>	<u>Place of Visit</u>
24-06-81	Visit to the new urea factory at Sapugaskande.
25-06-81	Visit to the CRI for further discussions on research programs.
26-06-81	Discussions with officials of National Fertilizer Secretariat and CCB.
27-06-81	Visit to Palugaswewa Estate managed by the JEDB to discuss their fertilizer marketing programs.
28-06-81	Free
29-06-81	Preparation for the review meeting on June 30. Reviewed the study findings with the American Ambassador and USAID officials.
30-06-81	Review of study recommendations with the Ministry of Coconut Industries.
01-07-81)	
02-07-81)	Drafting of report and final discussions with the
03-06-81)	of the Ministry of Coconut Industries, CCB, and CRI.
04-06-81)	
05-07-81	Departure

Appendix II. Fertilizer Mixture Recommendation According to Soil Type and Climate

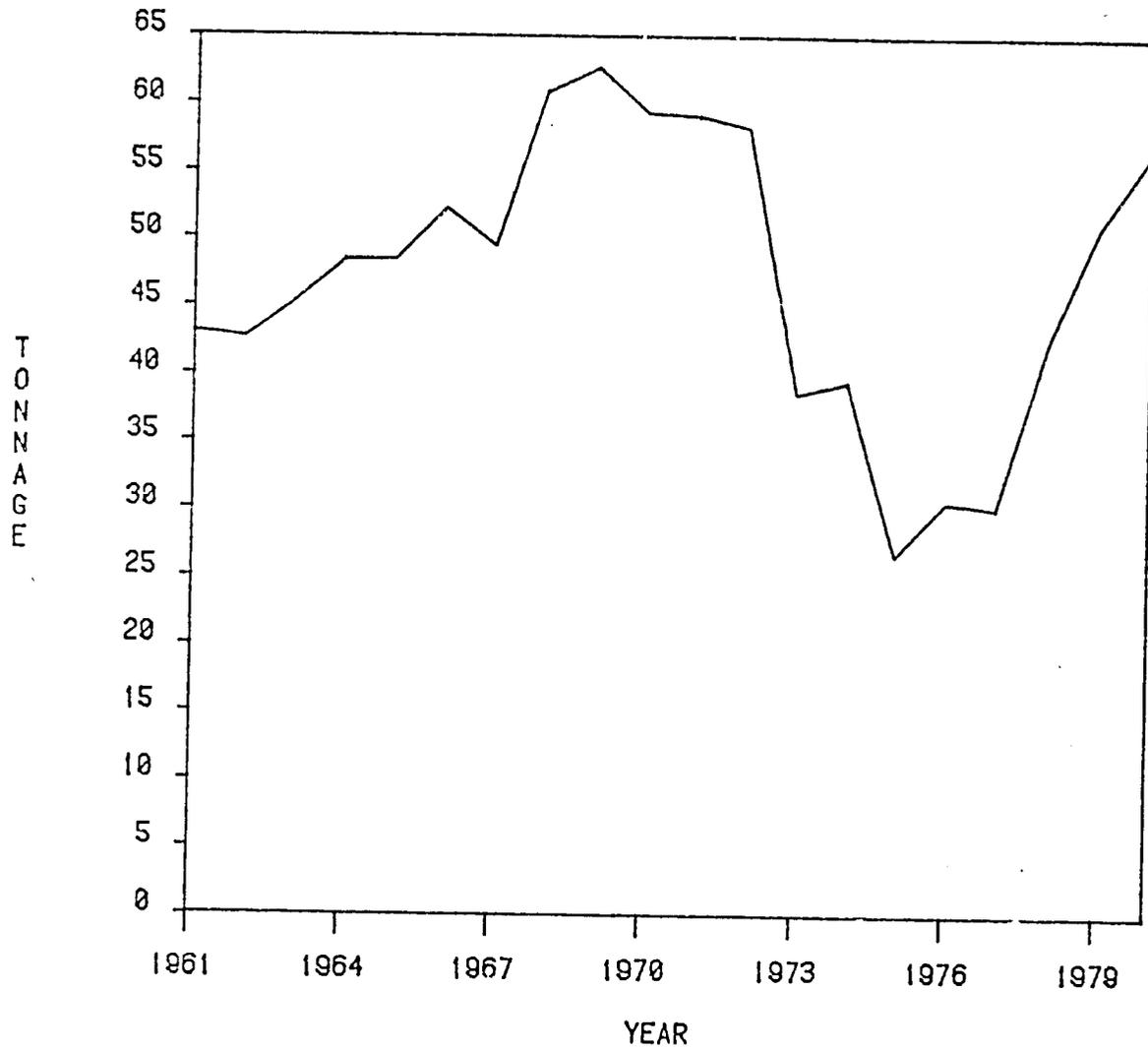
<u>Soil Type and Climate</u>		<u>Mixture</u>
1.	<p>a. Lateritic loams and lateritic gravels (borain or cabook soils) of the wet zone (districts of Colombo, Kalutara, Galle, Matura, Kandy, Matale South, Ratnapura, Kegalle)</p> <p>b. Lateritic loams and lateritic gravels of the intermediate rainfall zone in the districts of Chilaw, Puttalam, and Kurunegala</p> <p>c. Cinnamon sands of Chilaw and Negombo districts, coastal marine sands and lagoon sandy deposits of Chilaw and Negombo districts, and the sandy soils of the Southern coastal belts</p>	CU-1 or CA-1
2.	<p>a. Deep reddish-brown loams, sandy loams, and clay of the districts of Chilaw, Puttalam, Kurunegala, Hambantota, Mannar, Anuradhapura, Vavuniya, Muliativu, Dambulla, and Melsiripura in the intermediate and dry zones</p> <p>b. Limestone-derived, chocolate-brown, loamy soils of Matale, Dambulla, and Jaffna districts</p> <p>c. Deep alluvial loams in valleys and flood plains of rivers and estuarine and lagoon clay soils</p>	CU-2 or CA-2
3.	Coastal marine sands and lagoon sandy deposits of Puttalam, Batticaloa, Mannar, and Jaffna districts	CU-3 or CA-3

Appendix III. Fertilizer Required for Young Palms

<u>Time After Transplanting</u>	<u>Fertilizer Per Palm (lb)</u>	
	<u>New Clearings</u>	<u>Second Plantations and New Plantations on Sandy Soils</u>
6 months	$\frac{1}{2}$	$1\frac{1}{2}$
1 year	$\frac{1}{2}$	$1\frac{1}{2}$
$1\frac{1}{2}$ years	1	$1\frac{1}{2}$
2 years	1	$1\frac{1}{2}$
$2\frac{1}{2}$ years	$1\frac{1}{2}$	2
3 years	$1\frac{1}{2}$	2
$3\frac{1}{2}$ years	2	$2\frac{1}{2}$
4 years	2	$2\frac{1}{2}$
$4\frac{1}{2}$ years and beyond, until bearing, at 6 monthly intervals	$2\frac{1}{2}$	3

Source: Coconut Research Institute, Leaflet No. 8.

Appendix IV. Coconut Fertilizer Consumption Tonnage From 1961 Through 1980
('000 product tons)



Source: Central Bank report from 1961 to 1979 and National Fertilizer Secretariat.

Appendix V. Estimated Fertilizer Product Ton Requirements for Coconut Per District for 1985 and 1990^a

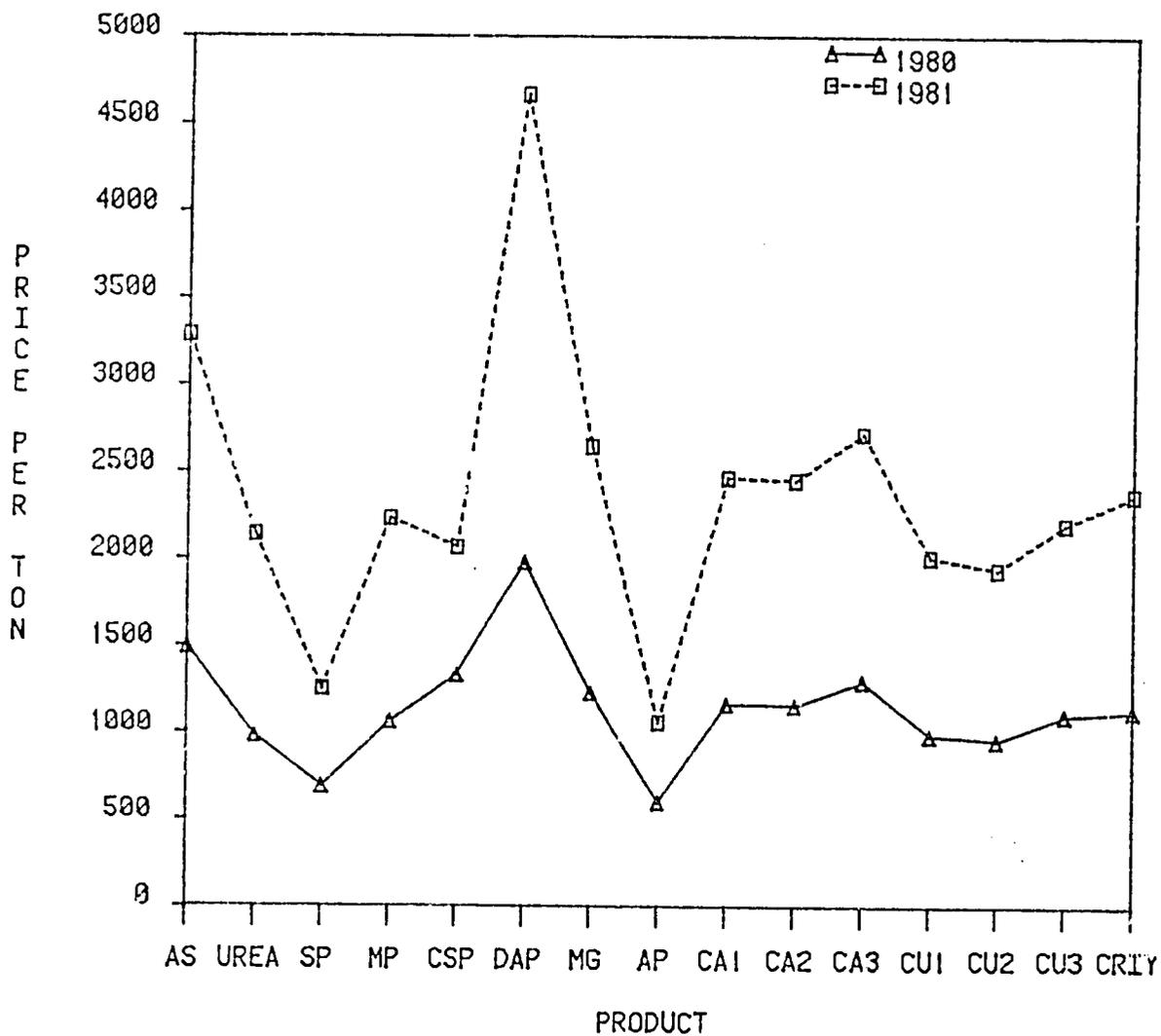
<u>District</u>	<u>1985</u>	<u>1990</u>
Colombo (and Gampaha) ^b	11,680	12,550
Kalutara	1,140	1,290
Galle	1,290	1,460
Nataru	1,290	1,480
Ratnapura	720	870
Kegalle	3,470	4,200
Kandy	1,050	1,160
Matale	1,140	1,240
Kurunegala	28,140	29,810
Puttalam	12,140	12,590
Jaffna	2,140	2,240
Vavuniya	210	220
Mannar	170	180
Anuradhapura	400	500
Pelonnaruwa	200	250
Trincomalee	540	550
Batticaloa	1,280	1,310
Amparai	600	610
Moneragala	190	230
Kambancota	<u>1,710</u>	<u>2,000</u>
TOTAL	69,500	74,740

a. Urea, phosphate rock, and muriate of potash only; very small requirements of concentrated superphosphate have been computed as phosphate rock.

b. Colombo district now divided into Colombo and Gampaha districts.

Source: GTZ/CFC, "Promotion of Fertilizer Distribution and Consumption," Annex 1, Tables 20 and 21.

Appendix VI. 1980 and 1981 Fertilizer Prices^a (Rs)



Source: The Colombo Commercial Company, Ltd. (fertilizers).

Appendix VII. An Example of the Rate of Return to Fertilization on Coconuts^a

No Fertilizer Example

Average yield of nuts per tree when not fertilized	17
Gross return with nuts @ Rs 1,200/1,000	20.40

Fertilized Example

Average yield of nuts per tree when fertilized with 10 lb/palm	65
Gross return with nuts @ Rs 1,200/1,000	78.00
Cost of fertilizer @ Rs 2,000/ton; labor, RS 1/palm; and freight, Rs 30/ton	11.15
Gross return with nuts @ Rs 12,200/1,000	66.85

Comparison

Gross return from fertilized palms	Rs 66.85
Gross return from unfertilized palms	- Rs 20.40
Net gain fertilized over unfertilized	Rs 46.45
Return of:	Rs 4.1 for each Rs 1 invested

a. Extra labor used for the harvest and marketing of additional nuts was not included in the calculation.

Appendix VIII. Newspaper and Circulation^a

<u>English</u>	<u>Circulation</u>
Ceylon Daily News	51,000
Ceylon Daily Mirror	31,136
Sun	56,225
Ob. Mag. Edition	74,475 (weekly)
Sunday Times	45,173 (weekly)
Weekend	63,250 (weekly)
<u>Sinhala</u>	
Dinamina	123,181
Lankadipa	63,363
Davasa	113,000
Janatha	58,810
Sri Lankakipa	98,115 (weekly)
Silumina	283,797 (weekly)
Riviresa	282,000 (weekly)
<u>Tamil</u>	
Thinakaran	13,243
Virakesari	26,000
Dinapathy	41,000
Elanadu	9,119
Thinakaran Weekly	19,237
Virakesari Weekly	30,000
Chintamani Weekly	50,000

Readership: 5 readers per copy

a. Recommended in view of a high percentage of literacy (over 85%).

Source: National Fertilizer Secretariat, Ministry of Plan Implementation Fertilizer Promotion Programme, Colombo, 1980.

Appendix IX. Items Available at the CCB Publicity Department for Use in Promoting Coconut Cultivation

1. Films
 - a. Surathura
 - b. Kapruka
2. Slides--Showing the steps involved from laying of nurseries to planting of seedlings, as well as those connected with treatments for pests and diseases.
3. Posters
 - a. Two posters published by Ministry of Coconut Industries.
 - b. A notice used by the CDO to convene publicity meetings.
4. Publicity boards (drawings) showing.
 - a. Technical advice.
 - b. New planting/under planting.
 - c. New planting.
 - d. Intercrops (coffee/cocoa/pepper).
 - e. Charts showing the progress of credit subsidy programs and fertilizer usage.
5. Maps of Sri Lanka indicating locations of:
 - a. Nurseries.
 - b. Fertilizer stores.
 - c. Regional offices.
6. Models showing:
 - a. New Planting.
 - b. Under planting.
 - c. Cultural practices, i.e., soil conservation, drains, husk burying, mulching, etc.
7. Photographs
 - a. Showing all aspects of cultivation.
 - b. Pests and diseases.

Appendix X. Local Market Prices of Fresh Nuts
 (Average wholesale price) (Rs/'000 nuts)

<u>Month</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
January	650-700	769	1,115	1,380
February	600-650	850	1,085	1,470
March	575-650	850	1,045	1,540
April	575-650	850	1,145	1,444 ^a
May	600-650	850	1,175	1,200 ^a
June	550-625	675-825	1,065	850 ^a
July	600-650	700-850	1,250	
August	625-675	725-850	1,281	
September	625-675	750-850	1,325	
October	625-675	760-865	1,325	
November	625-675	850-1,150	1,325	
December	625-675	850-1,150	1,325	
Average	575-700	748-871	1,205	

a. Estimated triangle prices during May and June 1981.

Source: Marketing Division, Colombo Development Authority.

Appendix XI. Sample of a Letter Sent Out to All Classes of Farmers
Inviting Them to Meetings to Discuss Constraints on
Fertilizer Use

Ref. No. F/5/1

Coconut Cultivation Board,
Colombo 1.
1981-06-

Dear Mr.

VISIT OF MR. L. B. WILLIAMS, FERTILIZER EXPERT

Mr. L. B. Williams of the International Fertilizer Development Centre is now in Sri Lanka on an assignment as a Consultant to the Ministry of Coconut Industries and the Coconut Cultivation Board to examine the coconut fertilizer usage and formulate a plan to increase the fertilizer usage and thereby to increase the yield in coconut plantations.

He has had discussions with the coconut cultivators at various levels and he is now interested in meeting the most experienced planters. It is his desire to meet you and have a discussion with regard to fertilizer usage and related inputs, etc. He also wishes to share your wide knowledge in this industry and to have a frank discussion in general. With this purpose in view I have arranged a Planter's Meeting on 16th June, 1981, at 9:30 a.m. at St. Xavier's College, Marawila.

I shall be thankful if you could please attend this meeting.

Yours sincerely,

(R.I. Fernandopulle),
Chairman,
COCONUT CULTIVATION BOARD.

GDS/09.

Appendix XII. Example of Farmer Interview Meetings Used to Learn Constraints to the Use of Coconut Fertilizer

Location: Kolupitiya, about 60 miles north of Colombo.

Date: June 1981

Farmer representation: Fourteen farmers attended. The size of farm holdings are as follows:

- 2 farmers owned more than 15 acres.
- 6 farmers owned 10-15 acres.
- 2 farmers owned 7-8 acres
- 2 farmers owned 5-6 acres
- 1 farmer owned 4 acres
- 1 farmer owned 3 acres

Questions and answers follow:

Fertilizer Practices

Of the 14, 11 had fertilized their trees in 1980, and only 5 had plans to use fertilizer on their coconut palms this year.

- Q. Why do you (five) plan to fertilize?
- A. To get a higher yield.
- Q. How many nuts do you get per tree, not fertilized?
- A. About 20. (All in agreement.)
- Q. How many nuts if you do fertilize?
- A. (Farmer discussion.) 40-50.
- Q. Do you understand the fertilizer response period is 2 years from flowering to mature nuts?
- A. General assent.
- Q. How much does it cost to fertilize coconut trees?
- A. Rs 1/tree--Fertilizer, Rs 1/lb at 6 lbs/tree for a total cost of Rs 7.
- Q. You get a net gain in coconuts from a fertilized tree of Rs 25. That is to say, for each rupee invested, you get Rs 3.5 returned. You already knew that? Then why are only five of you planning to fertilize?
- A. No rain. No money. Even if it had rained, no money.

Appendix XII. Example of Farmer Interview Meetings Used to Learn Constraints to the Use of Coconut Fertilizer (continued)

- Q. There is subsidy money for fertilizer for coconut palms at the banks. Why didn't you borrow the money?
- A. Farmers don't like to go into banks. They don't treat farmers nicely. They ask a lot of questions. Some of our friends have made application for a loan, but they never heard anything from it.
- Q. How many of you grow paddy?
- A. All (of them).
- Q. How many fertilized the paddy?
- A. (General laughter.) All.
- Q. How much paddy do you get per acre, fertilized and unfertilized?
- A. 10 bu without. 35 with, or 25 bu, net gain. We get Rs 50-55/bu.
- Q. Or about Rs 1,375 for 25 bu. How much is the extra cost for fertilizing paddy?
- A. Rs 400 plus labor. With labor, about Rs 475.
- Q. Then on paddy you get about Rs 2.90 for each rupee invested in fertilizer. That's even a little less than the return on palms based on 1981 prices.
- A. There's a 4-month turn on the money on paddy. It takes 24 months on coconuts. That's more interest money.
- Q. But the rate of interest on the loan is less for coconuts.
- A. The rate of interest on paddy fertilizer at the bank is 14% or Rs 19 for 4 months/acre, compared to Rs 1.14/tree for 24 months at 9½% for coconut fertilizers.

Fertilizer Packaging

Of the 14 farmers, 7 preferred fertilizer in bags of 25 kg. One preferred the 50-kg bag. Others pointed out that a 10-kg bag can be taken on the bus. The price of labor in handling the fertilizer is by the bag; therefore, the cost of application from the smaller bag is more.

Appendix XII. Example of Farmer Interview Meetings Used to Learn Constraints to the Use of Coconut Fertilizer (continued)

Pricing of Nuts

- Q. How does the price of nuts influence your use of fertilizer?
- A. Nuts that are harvested in May, June, and July usually bring about Rs 800-900/1,000). In August, September, and October the prices start up and get up to Rs 1,000-1,200. December and January prices go up to about Rs 1,400.
- Q. Coconuts don't spoil. Why don't you hold them until prices go up?
- A. Can't. We have to have the money.

Farmer Knowledge About Fertilizer Use

- Q. Do you see that palm out there (through the window), the one with yellow around the edges of the fronds. What does it need?
- A. No response.
- Q. It needs nitrogen. Notice the brown discoloration starting on the tip of the leaves and progressing up the main midribs. Nitrogen is for green. Phosphate is for root growth. Why do you need potash?
- A. Must be for nuts. Palms respond to potassium with larger, heavier nuts.
- Q. If you needed information on a new practice or chemical, where would you go for it?
- A. Here, to the ASC.

Farmers' Views of the Problem

- Q. If the President (of Sri Lanka) asked you to write a report on ways of increasing the fertilization of coconuts in Sri Lanka, what main thing would you include?

Appendix XII. Example of Farmer Interview Meetings Used to Learn Constraints to the Use of Coconut Fertilizer (continued)

A. There are so many organizations, but they need to be coordinated. Credit, supply, and extension could all be in one place. Coconut fertilizer is never in stock.

Q. How can we get you to use fertilizer on your coconut palms?

A. Do something about pricing.

(The following day, one of the farmers who holds more than 15 acres, came into Colombo to seek out the visiting IFDC team member and continue the discussion. He mentioned, among other topics, the increasing growth of government bureaucracy and the long distance he must travel to obtain fertilizer. A long discussion was held on the possibility of forming coconut producers' associations for collective educational programs, purchasing of inputs, and marketing.)

Appendix XIII

Examples of Notices and Forms Used in Obtaining
Credit for the Purchase of Coconut Fertilizers

BANK OF CEYLON OFFERS CREDIT FACILITIES FOR COCONUT LAND OWNERS/ LESSEES OF 1/2 TO 50 ACRES

* **SPECIAL COCONUT FERTILIZER CREDIT SCHEME.**

✠ **BRIDGING FINANCE FOR PERMIT HOLDERS OF THE COCONUT CULTIVATION BOARD TO COMMENCE DEVELOPMENT WORK TILL SUBSIDIES ARE PAID.**

FERTILIZER CREDIT SCHEME

1. For purchase of fertilizer
2. Repayment Period
5 Years with a grace period of 2 years, if loan is for two consecutive annual fertilizer applications.
4 years with a grace period of two years for loans granted for one year fertilizer application
During grace period only interest to be paid.
3. Repayment commences from the beginning of 3rd year to be paid in equal quarterly instalments.
4. Interest at $9\frac{1}{2}\%$ per annum.

BRIDGING FINANCE SCHEME

For New Planting, Replanting, Under-planting, Rehabilitation & Soil Conservation.

Repayment by remittance of subsidy by the Coconut Cultivation Board direct to the Bank.

Interest at 14% per annum.

For details please contact your closest Branch Manager
or the Credit Manager, (Agriculture) Central Office,
York Street, Colombo 1.
Telephone : 29932 or 28521



BANK OF CEYLON

අක්කර 1/2 සිට 50 දක්වා වූ පොල් ඉඩම් හිමියන් සහ බදු හිමියන්ට ලංකා බැංකුවෙන් ණය පහසුකම්

දී විදේශ පොල් පොහොර ණය ගෝඡනා ක්‍රමය

දී පොල් වගා මණ්ඩලයෙන් සහනාධාර මුදාහරිනහොත් බලපත්‍ර හිමියන්ට සංවර්ධන කටයුතු සඳහා අනුදා ණය හැප්වේ.

පොහොර ණය ගෝඡනා ක්‍රමය

1. පොහොර විලඳි ගැනීම සඳහා
2. ආපසු ගෙවීමේ කාලය
අවුරුදු 5 ණය ලබාගන්නේ අවුරුදු දෙකක් තුළ පදිමාබලයක් පොහොර ගෙවීම නම්, අවුරුදු දෙකක අනුග්‍රහ කාලයක් අයත්වේ.
අවුරුදු 4 ණය ලබාගන්නේ අවුරුදු දෙකක් තුළ එක් වගාවක් පොහොර දැමීමේ නම්, අවුරුදු දෙකක අනුග්‍රහ කාලයක් අයත් වේ.
අනුග්‍රහ කාලය තුළ වගාව: පුත්තේ පොළිය පමණකි.
3. පොළිය වසරකට 9%.
4. නොවන වසර පුළුල් ආපසු ගෙවීමේ ආරම්භ වන අතර සහන පත්‍රයෙහික මාසික වලින් ගෙවිය යුතුවේ.

අනුදා ණය ක්‍රමය

1. අලුත් වගාවන්, නැවත වගා කිරීම, යටි වගාව පුනරුත්ථාපන හා පස සංරක්ෂණ කටයුතු.
2. පොල් වගා මණ්ඩලයෙන් සහනාධාර ගෙවීම බැංකුවට ප්‍රේෂණය කරනු ලැබේ.
3. පොළිය වසරකට 14%

එැබි විස්තර සඳහා ලගම ලංකා බැංකු ශාඛාවේ කළමනාකරුවෙහි හෝ සහන සඳහන් අයගෙන් විචසන්න.

ණය කළමනාකරු (කාමිකර් හ)



ලංකා බැංකුව

විද්‍යම කාර්යාලය,
සෝරිස් විදිය,
කොළඹ 1.

දුරකථනය - 20932 28521

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Manager,

.....Bank

.....Branch.

APPLICATION FOR LOAN
PURCHASE OF COCONUT FERTILIZER

1. Particulars of Applicant

1.1. : Name in Full : Mr./Mrs./Miss.....

1.2. : Home Address :

1.3. : Age :Married or Single:.....

Citizenship :

1.4. : Name of Wife / Husband :

1.5. : Applicant's occupation :

1.6. : Applicant's Income :

(a) From employment (Annual) - Rs.

(b) From Agriculture (-do-) - Rs.

(c) From Other Sources(-do-) - Rs.

Gross Annual Income - Rs.

1.7. : Particulars of Bank Accounts :

	<u>Name of Account</u>	<u>A/c. No.</u>	<u>Bank</u>	<u>Branch</u>
(a)
(b)
(c)

1.8. : Particulars of Loans obtained from Banks and other Institutions :

	<u>Name of Bank/ Institute</u>	<u>Total Amount obtained</u>	<u>Date of Loan</u>	<u>Present unpaid Balance</u>
(a)
(b)
(c)
(d)

2. Particulars of Coconut Lands for which the loan is applied:

	<u>Name of Land</u>	<u>Extent Acres</u>	<u>No. of Coconut Pains</u>	<u>Name of Village</u>	<u>G. S. Division</u>	<u>D.R.O. Division</u>	<u>District</u>
1.
2.
3.
4.
5.

2. 2: Nature of ownership: Sole owner/Co-owner/Lease holder/Authorised Agent (delete words not applicable)

2. 3: <u>Name of owners</u>	<u>Age</u>	<u>Address</u>
1.
2.
3.
4.

2. 4: If the applicant is the Lease holder or the Authorised Agent of the owner give owner's Name and Address:
.....
.....

2. 5: Documentary proof of ownership: (give deed numbers etc.)

3. Particulars of Coconut Fertilizer Loan:

3. 1: Amount of Loan Required: Rs.....

3. 2: Security Offered:.....

3. 3: Names and Address of Guarantors:.....
.....
.....

3. 4: Quantity of Fertilizer Required under the Loan: Tons:
Cwts:

3. 5: Name and Address of the Fertilizer dealer from whom Fertilizer will be purchased:
.....
.....

(A pro - forma Invoice obtained from the dealer should be annexed to this application

4. Declaration:

- 1, I/we hereby certify that the particulars given by me/us in this application are true and correct,
- 2, Please make arrangements to release the loan to the Fertilizer Dealers stated under 3, 5, above from where I/We wish to purchase the Fertilizer,
3.
.....
.....

Date:.....

Signature/s of Applicant/s

Certificate of Ownership

I hereby certify that the above named applicant is the legal owner/lease holder of the Coconut Land named.....of extent.....

Ac.....R.....P.....situated at.....

District.....DRO's division.

Grama Sevaka / Cult vation officer.

AGA/Divisional Officer.....

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COCONUT FERTILIZER CREDIT SCHEME
GUARANTORS STATEMENT

.....
Bank,

Coconut Fertilizer Loan requested by

Mr/Mrs/Miss.....

I have to inform you that I agree to act as guarantor in connection with a Loan/of Rs.....
(in words).....requested by the above-named applicant
and I deliver to you the following statement with a full knowledge of the liability to be assumed by
me and knowing that you will rely on the truth of the following particulars in considering extending
credit to the applicant.

1. Name in Full:.....

2. Address:.....
.....

3. Date of Birth:.....

4. Single or Married:.....

5. Occupation:.....

6. Annual Income:.....

State sources of income, attach documents } :.....
to prove that the ration book was }
surrendered. }
.....
.....

7 Citizenship Identity Card No:.....

8. Landed property owned by Guarantor:

Address	Extent and description	Purchase Price	Estimated value	Mortgage if any

9. If you are a customer of this bank, give following details.

- a) Name of the Branch:.....
- b) Current Account No:.....
- c) Particulars of Fixed Deposits, If any:.....
.....
- d) Savings Account No:.....
- e) Investment Savings Account No:.....

10. If a customer of any other bank, give following details:

Name of the Bank	Branch	Current Account No.	Savings Account No.

11. Existing debts owed by me:

Name of Lender	Original amount	Amount now due	Security given

12. Existing Debts guaranteed by me:

Name of Borrower	Name of Lender	Original amount	Amount due now

Affirm that each of the Statements given above is true and correct.

Date:.....

.....

Signature:

4/20/2004/2-D

COCONUT CULTIVATION BOARD

SUBSIDIES FOR COCONUT CULTIVATION

The Coconut Cultivation Board grants cash subsidies under several subsidy schemes, details of which are given below, to assist coconut growers to improve and develop their coconut lands. Technical advice and guidance is also provided to coconut growers through its field advisory staff.

The subsidies payable under these Schemes are outright grants to coconut growers and are NOT REPAYABLE. Subsidies are not paid for planting king coconuts. The items of work specified under the subsidy schemes should be satisfactorily completed on the approved land to qualify for the payment of the subsidies.

1. Rehabilitation Subsidy Scheme:

Coconut lands of half (1/2) an acre or more in extent with a minimum density of 15 palms above one year of age in each half an acre will be eligible to receive subsidies for the following items of work.

		<u>Per Chain</u>	<u>Per Meter</u>
(A) Establishment of drains for the conservation of soil and moisture	(On hard gravel soil) (On sandy soil) (On other soil types)	Rs. 30/- 19/- 25/-	Rs. 1/50 -/95 1.25
(B) Drainage drains	...	13/-	-/65
(C) Filling vacancies	...	Rs. 3.25 per vacancy filled.	
(D) Removal of palms in excess of 64 to the acre	...	Rs. 20/- per palm removed.	
(E) Planting coconuts in place of dud palms	...	Rs. 20/- per plant.	

2. Underplanting Replanting Subsidy Scheme:

Coconut lands of half (1/2) an acre or more in extent with a minimum density of 15 palms (in each 1/2 acre) with palms over 60 years of age and an annual yield of less than 1,000 nuts per acre per year will qualify for this subsidy. A subsidy of Rs. 2,250/- per acre in five instalments is granted for replanting or underplanting.

3. New Planting Subsidy Scheme:

New lands of 1/2 an acre or more in extent, and suitable for coconut cultivation are eligible to receive this subsidy. A subsidy of Rs. 2,750/- per acre is paid in five annual instalments.

4. The Scheme of Assistance to Land Allottees of 1 Acre or Less in Extent:

Private land holdings of 1 acre or less in extent or Crown land allotments of 1 acre or less in extent qualify for this subsidy, provided at least 10 seedlings can be planted according to the recommended spacing on the allotment. Subsidy of Rs. 28/- per seedling is paid in 4 instalments.

The maximum number of plants for the planting of which this subsidy is available, is 64 per acre.

Coconut Seedlings:

Subsidy permit-holders from this Board can obtain selected coconut seedlings from the following nurseries at Rs 2/- per seedling ex-nursery.

The cost of the seedlings should be sent to the relevant Regional Office or to the undersigned with an application for seedlings, in cash, by money order or by Bank draft drawn in favour of the General Manager, Coconut Cultivation Board, Colombo. Cheques will not be accepted.

<u>Nursery</u>	<u>Location</u>	<u>Nursery</u>	<u>Location</u>	<u>Nursery</u>	<u>Location</u>
1. Ratnapuram	Panrendawa	9. Palkelele	Kundasale	17. Ratmalwatte	Wariyapola
2. Walpata	Walpata	10. Talawewa	Vijithapura	18. Diyadorawatte	Kuliyapitiya
3. Ibbagamawa	Tharayaya	11. Kilinochchi	Kilinochchi	19. Polonnaruwa	Newtown, Polonnaruwa
4. Hestipola	Hestipola	12. Mylambaveli	Chenkaladi	20. Uhana	Ampara
5. Wilpetha	Battimoya	13. Alampil	Mollariya	21. Kaliodeiwatte	Kaliodei
6. Koggala	Hiraduwawa	14. Handanangala	Ethiliewa	22. Embilipitiya	Embilipitiya
7. Framingolle	Hiraduwawa	15. Attavilla	Puttalam	23. Welipitiya Watte	Nannapurawa, Bibila
8. Kirimetiya	Lunuwila	16. Weke	Kirindiwela		

5. Pasture Fodder Subsidy Scheme

Coconut lands of 1/2 an acre or more in extent situated in areas with an evenly distributed rainfall of over 60" per year in the administrative districts of Colombo, Gampaha, Kalutara, Galle, Matara, Kegalle, Kandy, Matale, Badulla, Puttalam, Kurunegala and Ratnapuram are eligible to apply for this subsidy. A subsidy of Rs. 300/- is paid in two annual instalments of Rs. 125/- and Rs. 175/-.

6. Subsidy Scheme for Perennial Crops:

Coconut lands of 1/2 an acre or more in extent with a minimum of 30 coconut palms (of 20 to 45 years in age) to the acre situated in areas with rainfall of at least 70" per annum in the districts mentioned below are eligible for the subsidy.

P.T.O.

Districts

Coffee	...	Colombo, Gampaha, Kurunegala, Kandy, Kegalle, Matale, Galle, Matara, Kalutara, Ratnapura, Puttalam.
Cocoa	...	Kurunegala, Kandy, Kegalle, Matale, Galle, Kalutara, Badulla
Pepper	...	Colombo, Gampaha, Kurunegala, Kandy, Kegalle, Matale, Galle, Kalutara, Matara, Ratnapura, Badulla, Puttalam.

Subsidies are paid as follows:-

Coffee	...	305	Plants per acre	Rs. 1,375/-	in 3 annual instalments.
Cocoa	...	250	- do -	Rs. 500/-	in 4 - do -
Pepper	...	300	- do -	Rs. 1,875/-	in 3 - do -

7. A lessee of a land is also eligible to apply, provided the lease continues for at least 10 years from the date of making the application.
8. Application forms and other particulars regarding the subsidy schemes, supply of seedlings addresses of the local Field Extension Officers (Coconut Development Officers) etc. can be obtained from the undersigned or from the Board's Regional Offices, the addresses of which are given below.
9. Application forms (in duplicate) should be sent by Registered Post to the Relevant Office as given below.

<u>Address</u>	<u>Relevant Districts</u>
1. No. 22, Gajaba Mawatha, Gampaha	... Gampaha, Ratnapura, Kegalle.
2. No. 133 Main Street, Ambalaneloda	... Galle, Kalutara.
3. No. 43, Wigoda Road, Kurunegala	... Kandy, Matale, Nuwara-Eliya and a part of Kurunegala District (Polpahawela, Wariyapola, Ibbagamuwa, Maho, Nikaweratiya, Galgamuwa, Kurunegala, Dambadeni, Hathapathuwa West, Mawathagama, Polpithiyagama, Ridigama & Girihawa A. G. A.'s Divisions).
4. "Abeyratne Walawwe", Old Town Madampe	... Puttalam.
5. No. 50, Wilfred Gunasekera Mawatha, Fort, Matara	... Matara, Hambantota.
6. No. 20, Pannala Road, Kuliyaipitiya	... A part of Kurunegala District (Kuliyaipitiya, Bingiriya, Pannala, Hettipola and Robeigane A. G. A.'s Divisions)
7. No. 25, Bharathi Lane, Batticaloa	... Batticaloa.
8. Coconut Cultivation Board Sub-Regional Office MPCS Building, Amparai.	... Amparai
9. Coconut Cultivation Board Sub-Regional Office New Town, Polonnaruwa.	... Polonnaruwa.
10. No. 50/74, Stage II, Anuradhapura	... Anuradhapura, Mannar, Jaffna, Trincomalee, Vavuniya, Mulathivu.
11. Coconut Cultivation Board Sub-Regional Office C.O. District Minister's Office, Monaragala.	... Monaragala, Badulla.
12. Coconut Cultivation Board Head Office P. O. Box 1383, Y. M. B. A. Building, Colombo 1.	... Colombo.

P. O. Box 1388, Colombo 1.
Telephone: 21351, 21382, 26071

General Manager,
COCONUT CULTIVATION BOARD

Colonial P.W. Colombo 12.

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Appendix XIV. Projected Levels of Fertilizer Nutrient Requirements for 1980, 1985, and 1990 and Actual Consumption, 1961-76, for Coconuts ('000 tons)

	Average Use	Consumption	Projections		
	<u>1961-74</u>	<u>1976</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>
Nitrogen (N)	4.3	3.0	6.0	6.5	6.9
P ₂ O ₅	3.5	1.8	5.2	5.9	6.0
K ₂ O	7.9	5.5	20.7	22.3	24.0

Source: GTZ/CFC, "Promotion of Fertilizer Distribution and Consumption," Main Report, p. 70.

Appendix XV. Use of Fertilizer Products and Nutrients for Coconut in Sri Lanka, 1961-80 ('000 tons)

Year	Products							Nutrients			
	AS	Urea	PR	Apatite	NP	Others	Total	N	P ₂ O ₅	K ₂ O	Total
1961	15.47	-	12.03	-	12.90	2.59	42.99	3.3	3.3	7.7	14.3
1962	15.33	-	11.92	-	12.77	2.56	42.58	3.2	3.3	7.7	14.2
1963	16.30	-	12.67	-	13.58	2.72	45.27	3.4	3.5	8.2	15.1
1964	17.23	-	13.40	-	14.86	2.87	48.36	3.6	3.7	8.9	16.2
1965	16.20	-	16.02	-	16.07	0.13	48.42	3.4	4.4	8.1	15.9
1966	17.40	-	17.39	-	17.39	-	52.18	3.7	4.8	8.7	17.2
1967	16.46	-	16.46	-	16.46	-	49.38	3.5	4.5	8.2	16.2
1968	31.33	-	15.67	-	15.67	-	62.67	6.6	4.3	9.4	20.3
1969	29.63	-	14.82	-	14.81	-	59.26	6.2	4.1	8.9	19.2
1970	31.89	-	15.94	-	15.94	-	63.77	6.7	4.4	9.6	20.7
1971	29.10	-	14.55	-	14.55	-	58.20	6.1	4.0	8.7	18.8
1972	24.10	-	9.64	-	14.46	-	48.20	5.1	2.7	8.7	16.5
1973	19.30	-	9.65	-	9.65	-	38.60	4.1	2.7	5.8	12.6
1974	19.72	-	7.92	-	11.86	0.03	39.53	4.1	2.2	7.1	13.4
1975	13.30	-	5.33	-	7.99	0.01	26.63	2.8	1.5	4.8	9.1
1976	13.87	0.16	6.10	-	9.13	1.23	30.69	3.0	1.8	5.5	10.3
1977	12.82	5.39	5.48	-	4.52	0.95	29.10	5.2	1.6	1.7	8.5
1978	18.23	7.66	7.79	-	7.51	1.36	42.55	7.4	2.2	4.5	14.1
1979	14.30	4.62	10.55	0.74	10.71	2.20	49.59	5.2	5.2	6.4	16.8
1980	9.82	8.44	14.28	1.72	19.99	1.52	55.77	5.9	4.5	12.0	22.5

Source: CFC, National Fertilizer Secretariat.

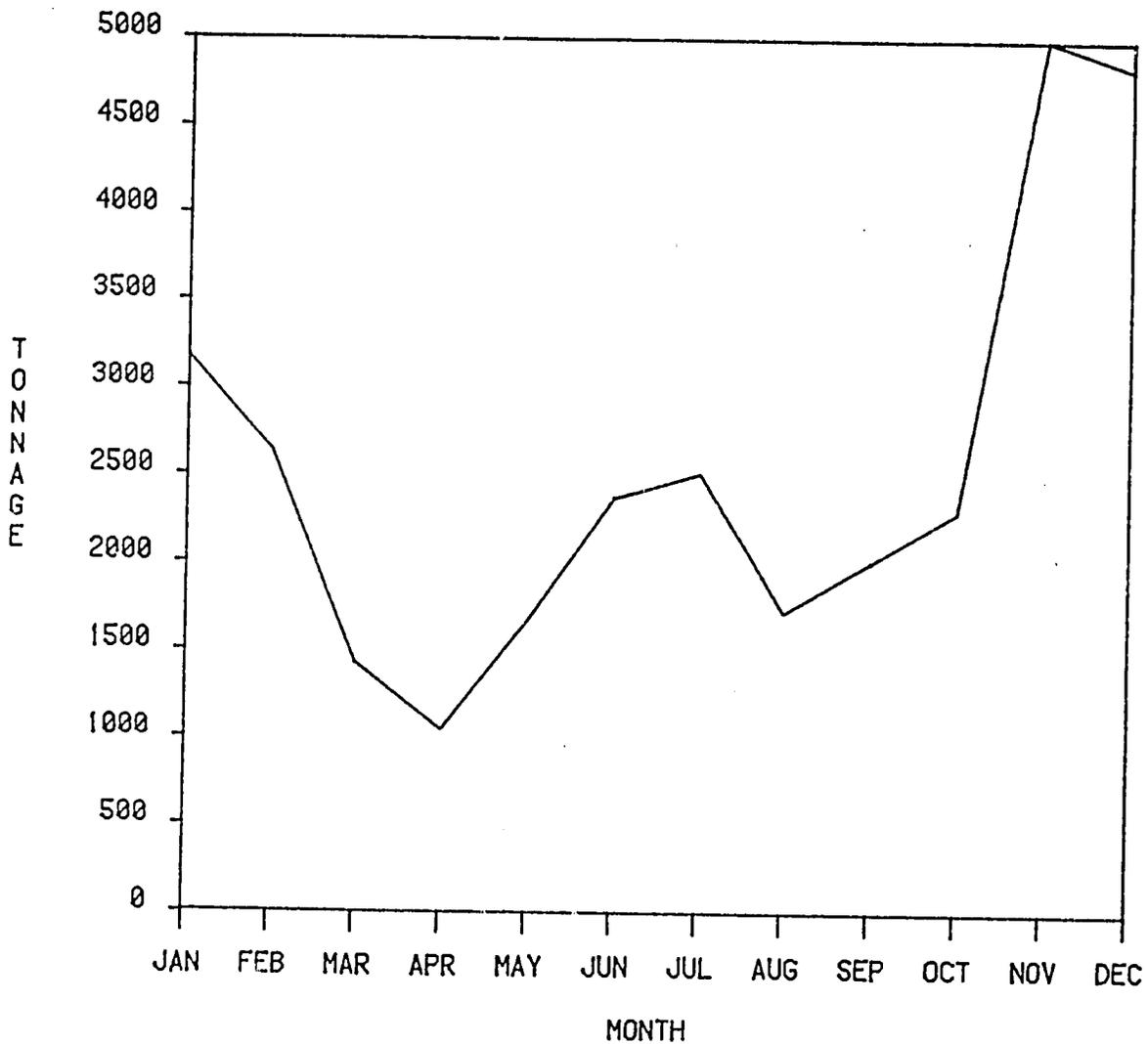
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Appendix XVI. Use of Fertilizer Products and Nutrients for All Crops in Sri Lanka, 1961-80 ('000 tons)

Year	Products									Nutrients			
	AS	Urea	PR	TSP	MP	NPK	Apatite	Others	Total	N	P ₂ O ₅	K ₂ O	Total
1961	145.97	0.26	59.76	-	46.95	-	-	25.03	277.97	30.8	16.5	27.8	75.1
1962	160.16	0.67	59.06	-	47.67	-	-	23.82	291.38	34.0	16.3	28.2	78.5
1963	171.37	0.87	61.46	-	51.22	-	-	25.65	310.57	36.3	16.9	30.3	83.5
1964	189.37	3.13	65.33	-	55.44	-	-	26.20	339.47	41.2	17.9	32.6	91.7
1965	175.64	2.57	61.89	-	55.12	-	-	20.69	315.91	38.1	17.3	31.1	86.5
1966	169.10	12.95	62.14	-	57.50	-	-	27.64	329.33	41.6	17.1	32.1	90.8
1967	161.29	16.65	65.97	-	59.28	-	-	32.83	336.02	41.8	18.7	33.3	93.8
1968	178.98	32.16	58.61	4.66	55.84	9.99	-	22.71	362.95	52.9	19.7	34.3	106.9
1969	149.54	36.84	55.02	6.80	55.14	10.79	-	23.30	337.43	48.0	19.8	33.8	101.6
1970	145.60	42.82	54.66	8.66	53.72	12.89	-	16.08	334.43	51.0	20.7	33.4	105.1
1971	136.93	59.56	50.83	11.84	53.40	14.05	-	15.17	341.78	57.0	21.1	34.2	112.3
1972	106.59	60.91	36.93	10.43	47.57	16.63	-	15.26	294.32	51.2	17.5	31.2	99.9
1973	117.04	68.20	39.69	19.61	48.19	17.65	-	14.41	324.79	56.8	22.7	31.6	111.1
1974	118.14	58.55	29.99	7.17	46.13	24.95	-	9.62	294.55	55.3	15.3	31.3	101.9
1975	82.89	43.68	27.04	0.98	31.53	17.44	-	6.89	210.45	40.1	10.8	21.5	72.4
1976	91.42	68.34	33.05	7.69	44.74	10.78	-	8.16	264.18	52.3	14.5	28.5	95.3
1977	80.28	103.60	30.69	20.40	35.78	19.35	-	7.00	297.51	65.4	22.4	23.8	111.6
1978	110.33	123.92	42.31	24.44	47.06	21.58	-	10.38	380.02	80.9	28.7	30.8	140.4
1979	104.75	115.98	39.50	9.01	50.04	34.87	7.97	10.25	372.37	77.2	26.1	34.3	137.6
1980	97.51	150.25	37.75	26.19	67.11	40.24	9.2	11.38	439.58	92.3	33.3	50.3	175.8

Source: CFC, National Fertilizer Secretariat.

Appendix XVII. The Monthly Issue of Coconut Fertilizer From Colombo Warehouse in 1976



Source: GTZ/CFC, "Promotion of Fertilizer Distribution and Consumption," Annex 5, Table 6.

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Appendix XVIII. Comparison of Coconut Fertilizer Sales From the Manufacturer (Wholesaler) for the 5 Months in 1979, 1980, and 1981 (Rs)

<u>Month</u>	<u>Year</u>		
	<u>1979</u>	<u>1980</u>	<u>1981</u>
January ^a	2,300	2,355	3,382
February	800	776	568
March	600	1,140	761
April	2,800	2,871	2,215
May	<u>4,400</u>	<u>4,500</u>	<u>3,301</u>
5 MONTHS TOTAL	10,900	11,642	10,227 ^b

a. January sales are higher than normal because dealers were stocking for the anticipated price increase.

b. Total sales in 1981 are down by 13% over 1980.

Appendix XIX. Points to Consider in Establishing Orders of Priorities in Workplans^a

	Sales by Organizations in 1980, Rs									
	Private Dealers	MPCS	ASC	CCB	Other Government Agencies	National Livestock Board	SPC ^b	JEDB	Large Planters	Total
CFC sales from Colombo	1,102	1,024	1,259	-	318	-	-	-	998	4,701
CFC sales from District St.	9	18	5	-	12	-	-	-	4	48
CFC sales from Maho	2,716	1,904	4,795	-	1,133	516	-	-	-	11,064
CCC	337	181	-	8,428 ^c	880	-	556	-	4,028	14,410
JEDB	967	630	209	-	-	-	-	3,556	89	5,451
Baur	5,224	945	-	-	-	-	109	-	14,631	20,909
TOTAL	10,355	4,702	6,268	8,428 ^c	2,343	516	665	3,556	19,750	56,583

a. Work with the organization selling the greatest quantity of coconut fertilizer first. Gradually shift programs to the organization that has the highest potential for coconut sales.

b. State Plantation Corporation.

c. 1,385 tons of CCB sales directly to producer cooperatives and ASC.

Note: An order of program activities based on constraints to coconut fertilization are: (1) coordination of supply, (2) dealer education, (3) credit programs, (4) promotional activities, (5) table price of coconuts, (6) farmer education, (7) new planting and replanting, and (8) institutional bargaining (producer associations).

Source: National Fertilizer Secretariat.