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Executive Summary

1. AgEnt is involved in a Ramie trialling program to determine the economic and technical feasibility of growing and processing the crop in Sri Lanka. The trial planting at Avissawella, which was started in 1993, was visited by the Consultant and found that it can not answer the important economic and technical question it was intended to answer due to poor planning and execution of the project. Worst still, the records of important field activities could not be made available at the time of the consultant's visit.

2. Based on the actual visitations and review of available technical data, the following observations and conclusions were reached.

   (a) Ramie will grow best in Southwestern Sri Lanka considering the amount and distribution of rainfall. The observed rolling terrain in most of the agriculture areas can maximize the utilization of Ramie as an erosion control crop due to its extensive root system. Consequently, the soil properties, particularly low pH and nutrient status will eventually improve once the crop is adequately established.

   (b) Varieties of Ramie with high adaptation to hot humid climate like those presently grown in Davao and Cotabato of the Philippines are recommended for Sri Lanka. These varieties have high yield and very outstanding fiber properties. The Seikeiseisin series as well as the new generation of fine fibered varieties of the Institute of Plant Breeding, University of the Philippines at Los Banos should be acquired and commercially tested in Sri Lanka.

   (c) Based on the fertilizer being used now for rubber, tea and coconut, as well as the observed growth and development of the major crops in the area, and the nutrient requirements of Ramie in humid tropical environment like the Philippines, the following fertilizer rates appear appropriate:

   Establishment vertilizer rate: 60-6-6- kg/ha N, P_2O and K_20. Applied and thoroughly mixed with the soil along the rows before planting.

   Regular production fertilizer rate: 60-30-30 kg/ha N, P_20 and K_20. Applied as broadcast after each harvest and watered-in immediately.

   (d) No major insect pests and diseases were observed during the visit and none is expected to be a problem once commercial planting commences. In the humid tropics, chewing insect pests may appear, but will not cause damaging levels that will require control. Soil borne pests like nematodes will not prosper in the area on account of the chemical and physical properties of podzolic soils.

3. A specific recommendation is for the Avissawella Trial Planting to be converted into a rhizome nursery. The step by step care and maintenance procedures were deliberately enumerated together with a simple production research design.

4. In order to establish the technical and economic feasibility of Ramie Production in Sri Lanka, a Production Trial should be set-up in one or more of the following areas.

   i. Raigana Estate Farm
   ii. Etna Estate Farm
   iii. Penrith Estate Farm (Adjacent to the "Rhizome Nursery")

   If a decision to set-up more than one trial planting is made, all three areas are ideal.

5. A detailed establishment guide as well as the regular production guide with production cost estimates are included in the report. Moreover, a brief discussion on primary and secondary processing to produce the raw and degummed fibers, respectively, were made part of the report.

Introduction

AgEnt is a dynamic USAID funded private sector Agro-Enterprise Development initiative. To help Sri Lanka to grow, AgEnt assists companies and entrepreneurs with viable business and marketing plans to expand on their existing operations or start-up new ventures targeted at both domestic and export markets. Since the commencement of AgEnt programs in January 1993, it has sought to identify a range of new high value crops and processed products for Sri Lanka. As soon as the high value crop or processed product is identified, low cost/risk crop trialling and test marketing programs are undertaken with clients on a "shared" contribution basis.

A year round production system predominates Sri Lanka agriculture due to its hot and humid climate. Better still, a large part of the country, particularly the South Western section, has an evenly distributed rainfall throughout the year. This rainfall pattern can very well support the production of any crop which has a perennial growth habit but annual in agronomic uses like Ramie.

While Ramie is grown mainly for its fiber, the crop is also an excellent livestock feed (high protein tops). Moreover, it is used as an erosion control crop owing to its extensive root system that stabilize the soil particularly in hilly lands. In view of the numerous developments in spinning technology, the Ramie fiber has found additional uses in the textile industry as a pure Ramie yarn or as a blend with cotton, silk, wool and synthetic fibers. Because of its exceptionally long fibers, high luster and durability, Ramie fiber is blended with cotton and other fibers to produce high quality textile products, upholstery, elegant curtains, durable table cloths and several other accessories and interior decors. The ability of the fiber to dry quickly when wet without shrinking and stretching is unique to Ramie.

At harvest, the Ramie tops are cut and separated from the stem. At the correct harvest stage, the tops and leaves would be around 25% to 35% of total stalk fresh weight. A hectare of Ramie may therefore, produce some 3 tons of tops for feed purposes every 45 to 55 days. The Ramie top is reported to contain 15 to 25% protein and is therefore, an excellent animal feed.

The extent of root ramification of Ramie is an important attribute for the crop grown in sloping and rolling lands. As a perennial crop, Ramie is an excellent plant that can be grown in slopes to control erosion and derive economic return from its fibers and tops.

SHARED INVESTMENT PROJECT OF AGENT AND FREE LANKA MANAGEMENT COMPANY

On May 31, 1993 the AgEnt project and the Free Lanka Management Company (client) signed a cooperative "shared grant agreement" to execute a program of trial planting of Ramie. The purpose of the trial planing was to determine the feasibility of producing quality fibers of Ramie in Sri Lanka at competitive prices for the world market. It was the assumption of both parties that once production commenced, processing trials will be conducted and the processed product will be distributed to several end weavers. It was also the understanding of both parties that spinning capabilities did exist in Sri Lanka and they could be utilized in the future. At the time of the signing of agreement, it was known that some Sri Lanka garment manufactures utilized Ramie in their products which are exported into the international market.

The parties agreed that, among other, the Client would prepare with the assistance of the Sri Lankan Consultant, an end of trial summary showing yield, quality, inputs (types, quantities, costs, etc) selling price and gross/ net margins.

In a progress report of the Superintendent, Penrith Estate, Avissawella, dated 24th February 1994, he suggested that the shared venture be assessed by an expert (other than the local Consultant) to:

(a) Ascertain whether the finished product is up to require quality and market;

(b) Whether the expenditures incurred to date was commensurate with progress achieved; and;

(c) If commercially acceptable, the state of the organization as in the finished product should be determined.

It was in the light of the above circumstances that the services of the Consultant was engaged on a limited basis starting July, 1994.

METHODOLOGY

Various out of country and in country activities were undertaken by the Consultant to accomplish earlier work assignments and terms of reference.

(a) Out of country activities (Philippines, July 1994 - February 1995).

i. Visit to Ramie plantations in Davao and Cotabato (Southern Philippines) for an update of production and primary processing technologies and costs.

ii. Visit and interaction with technical personnel and arrangements for Ramie fiber processing and analyses of materials sent by AgEnt to the Philippines.

iii. Preparation of Ramie production activities and costs and sent the same to AgEnt.

iv. Received and reviewed soil and climatic data of Sri Lanka.

(b) In country activities (Sri Lanka 24th February - 8th March 1995)

i. Literature review and data analysis on file about Ramie at the AgEnt library.

ii. Consultation meetings with officers and experts of AgEnt, estate farms, textile companies, and agriculture offices.

iii. Inter-action with personnel directly involved in the trialling of Ramie and persons who had knowledge or direct work on Ramie.

iv. Visitation and survey evaluation of several estate farms as possible sites of Ramie' trial.

DISCUSSIONS

Ramie Trial Planting at Avissawella

The trial planting was envisioned to provide very critical answers to very important questions regarding the potential of Ramie as an industrial crop in Sri Lanka. The primary threshold objectives were:

- Market acceptability of the Sri Lanka produced fiber product; this factor in association with the total cost items was deemed critical to the continuation of the trialling activity.
- Yield/Quality possibilities under Sri Lanka.
- Production, capital, harvest/handling processing costs.
- Gross/ Net profit margins.

The February 25, 1995 inspection visit to the Avissawella Ramie Trial showed that:

(a) The best soil and climate for the production of Ramie in Sri Lanka can not be determined using the trial as a basis. No yield figures were available even while it was the only location planting in Sri Lanka at the time of the visit.

(b) A listing of suitable Ramie cultivars or selections could not be recommended from Sri Lanka based on the trial in view of the technical flaw of the layout of the trial planting. The varieties were not laid out to provide data on comparable performance.

(c) Basal and topdress fertilizer and fertilizer rates could not be determined from the trial. Mr. Gajaweera, the Consultant informed us that he lost his records a few days before the Consultants' visit. He personally recalled that he applied undetermined amounts of coir dust, sand Mg So_4,Fe So_4, $CuSo_4$ and lime to the seedbed.

(d) There appears to be no major insects and diseases of Ramie in the trial site. This was not unexpected, because the crop has very few destructive enemies and is very new in the area.

(e) No production guideline can be developed out of the information and experiences generated from the trial planting. For one thing, the trial was not properly set-up and for another, the practices impose were not correct.

RECOMMENDATIONS FOR THE AVISSAWELLA TRIAL PLANTING

(a) Make the Avissawella Ramie Trial Planting as a Nursery for one or two trial plantings.

(b) In order to produce more reproductive roots, additional care is needed as follows:

i. Cut/ ratoon the crop every 45-55 days. Cutting should be done to the ground level and never above ground level to produce uniform and dense plants after each ratooning.

ii. Spread cut stalks over the field to serve as mulch and eventually organic matter and fertilizer for the plants.

iii. Prepare a mixture of the following:

46-0-0 UREA	= 130 kg
0-60-0 Super Phospate	= 100 kg
0-0-60 Muriate of Potash	= 100 kg

iv. Apply/ broadcast the fertilizer mixture over the field at a rate of 33 grams/ m_2.

v. Water/ irrigate the field up to field capacity only after applying the fertilizer.

vi. Repeat the operation (1-5) until the other trial plantings are ready to be planted:

(c) While doing (b), it is good to get some yield data from each ratoon made. To do this, you can designate two sampling areas each for good and poor stand ($10m_2$ each area) and do the following prior to cutting/ ratooning of the whole.

i. Cut/ratoon the sample plots to the ground.

ii. Count the number of harvestable stalks (stalks measuring at least 2 feet long).

iii. Take the total fresh weight.

iv. Remove the tops and leaves and take the stalk fresh weight.

v. Dry stalks up to stable dry weight (three successive weight measurements).

vi. Record your data as follows:

Date of Harvest.....

	Good Stand		Poor stand	
	S1	S2	S3	S4
Total fresh weight				
Stalk fresh weight (kg)				
Number of stalks				
Stalk dry weight (kg)				

Based on the physical layout of the trial planting and the data gathered, it was not possible to calculate or extrapolate the quantitative and qualitative information earlier set for the project. It goes without saying that the trial planting as implemented has not and can not help determine the technical and economic feasibility of Ramie growing in Sri Lanka. In view of the failure of the trial planing to bring about very critical answers to very important questions on Ramie production and processing, the consultant was in no position to achieve the objectives set in the terms of reference using the trial planting as a basis.

POTENTIAL RAMIE GROWING AREAS IN SRI LANKA

In as much as the trial planting in Avissawella has fallen short of expectation, it became necessary to locate another trial planting site which has a good amount and even distribution of rainfall throughout the year. The southwestern part of the country is considered a wet zone (long wet season, more evenly distributed rainfall and rainy days) which is ideal for growing a year round Ramie crop. During the visitation and survey, soil textures, known pH, plant growth in the vicinity, rainfall pattern, and potential for area expansion were considered as criteria for site selection.

The location survey mission was organized and went into operation on 1-2 March, 1995. the survey team visited several estate farms in southwestern Sri Lanka for Ramie growing has been cited by earlier report (SRL/77/009: Research and experimentation of minor crops).

Based on the in site evaluation and review of available data on soil and rainfall, two sites were considered fairly suitable for Ramie production. The Raigana Estate in Ingiriya, and the Etna Estate in Kegalle. The incumbent officers of the estates made assurances that when the trialling will prove successful, there are about 30 or more hectares that could be made available for the commercial production of Ramie in the area.

Climatic Conditions

The Raigana and Etna Estates belong to the WL1 and WL2 agro ecological regions, respectively with monthly histogram of 75% rainfall probability as shown in figures 1. A bi-modal rainfall pattern with relatively low precipitation in January - February and August - September. The monthly precipitation and total annual rainfall is considered optimum for the growing of Ramie. This rainfall characteristics can easily support five harvests per year with an average yield of not less than 250 kg dry fiber per harvest.

Soil

The soil in these potential growing areas is characterized as mainly belonging to a group of Red-yellow podzolic soil with very low organic matter and a pH around 5.0. The Terrain varies from steep to moderately rolling and undulating. Panabokke (1993) wrote that a pH of 5.0 or even lower predominates the vast majority of soils in the wet zone. In the absence of more ideal soils (in terms of pH and Topography), these areas may be put to production provided that appropriate cultural practices are strictly followed including: terracing, return of decortication wast, and judicious use of inorganic fertilizers.

MANAGEMENT PRACTICES FOR RAMIE GROWING IN SRI LANKA

From the short study visits to potential Ramie growing areas, it appears that southwestern Sri Lanka is indeed the most suitable area of growing Ramie. The total amount of rainfall per year as well as the monthly distribution of precipitation is ideal for Ramie production. With this rainfall, the crop can be harvested five times in a year.

Ramie will most likely become an ideal crop for the rolling lands of southwestern Sri Lanka. The extensive root system once establish will help stabilize the soil and control erosion. Since Ramie is a perennial in growth character, the soil surface will be free from constant cultivation which is the primary cause of erosion particularly if the cultivation is done during the dry months immediately before the on-set of the rainy season.

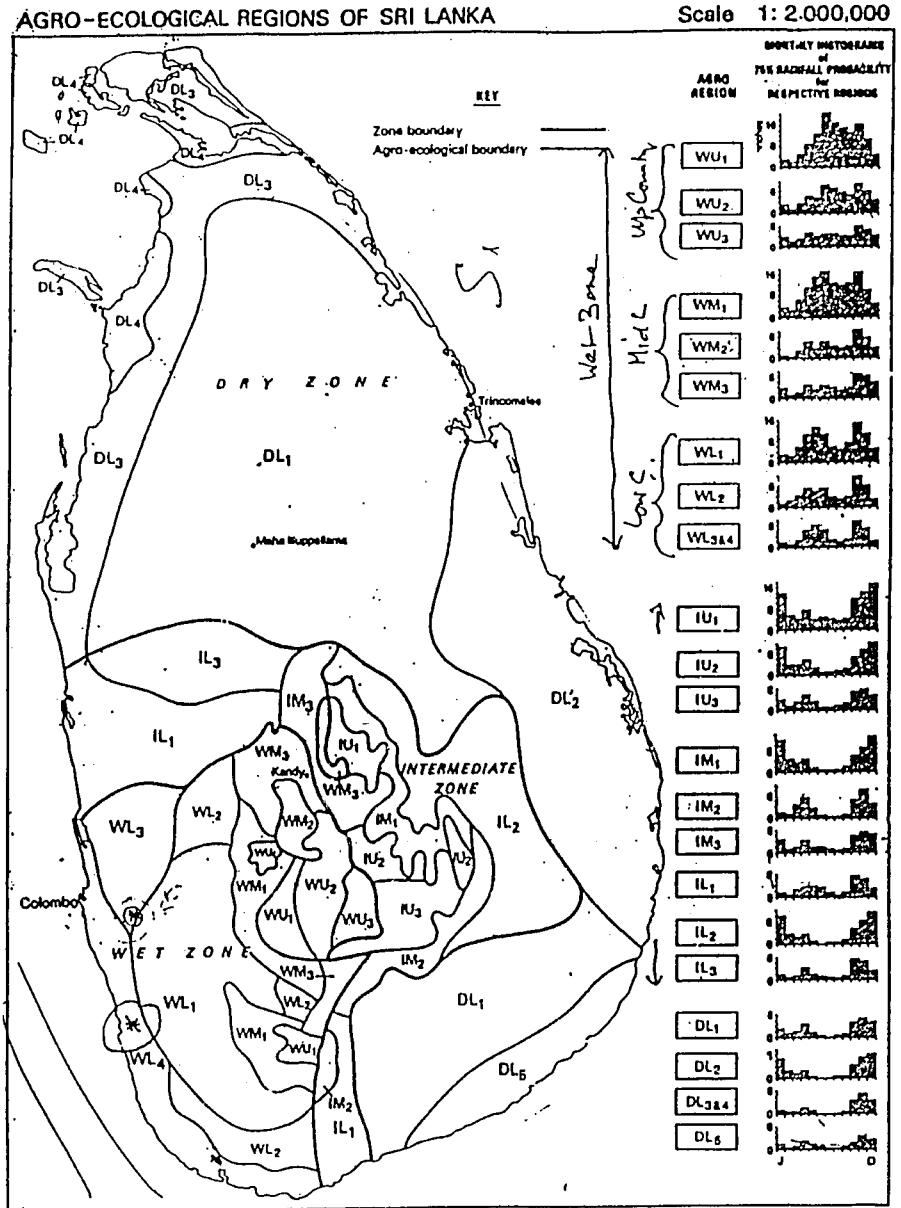
In order to ensure the stability of the plots, the area to be planted should be terraced and each terrace plot is made flat as much as possible to avoid soil movement when there is excess water. The alleys should be left uncultivated and unwatered when irrigation is available.

Considering the terrain of the potential Ramie growing areas where transport of harvests are restricted, the procurement of a portable decoticator is highly recommended. The decorticator can then be moved from one location to another in the field during harvest and the stalks are decorticated right in the field. This practice will make the return of decortication waste to the field more convenient.

PLATE 1

AGRO-ECOLOGICAL REGIONS OF SRI LANKA

Scale 1: 2,000,000



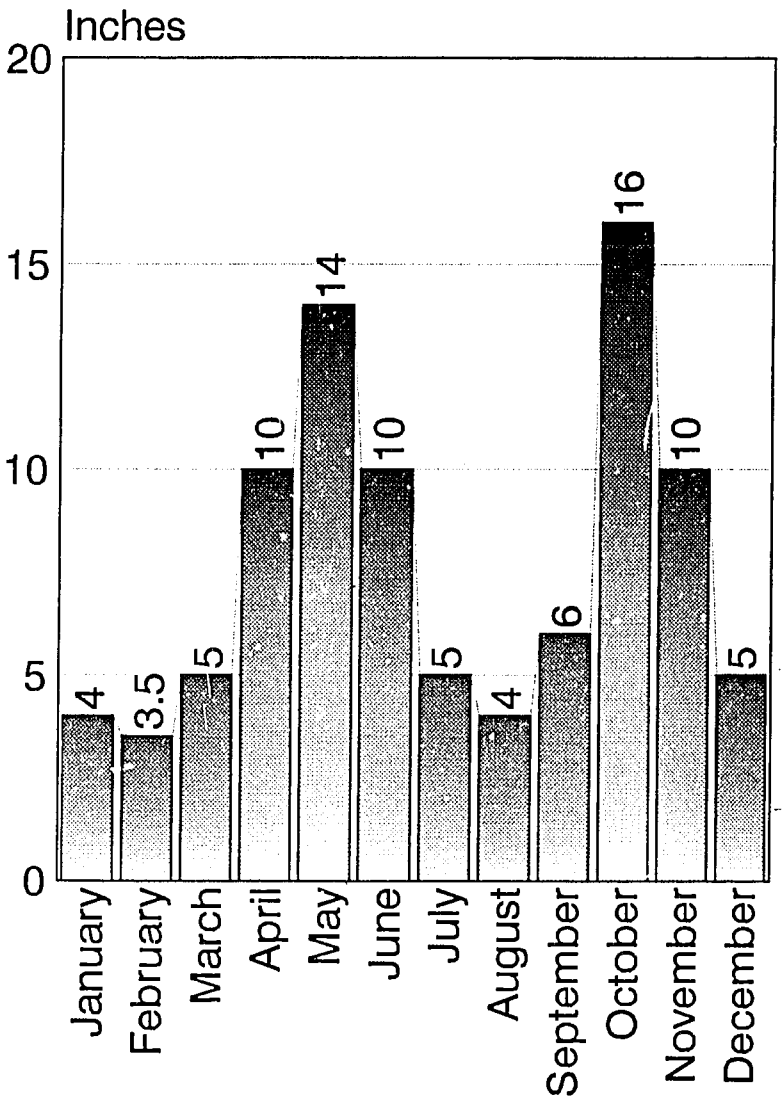
Drawn by T M K Wijesinghe – JUNE 1981

Plate 1

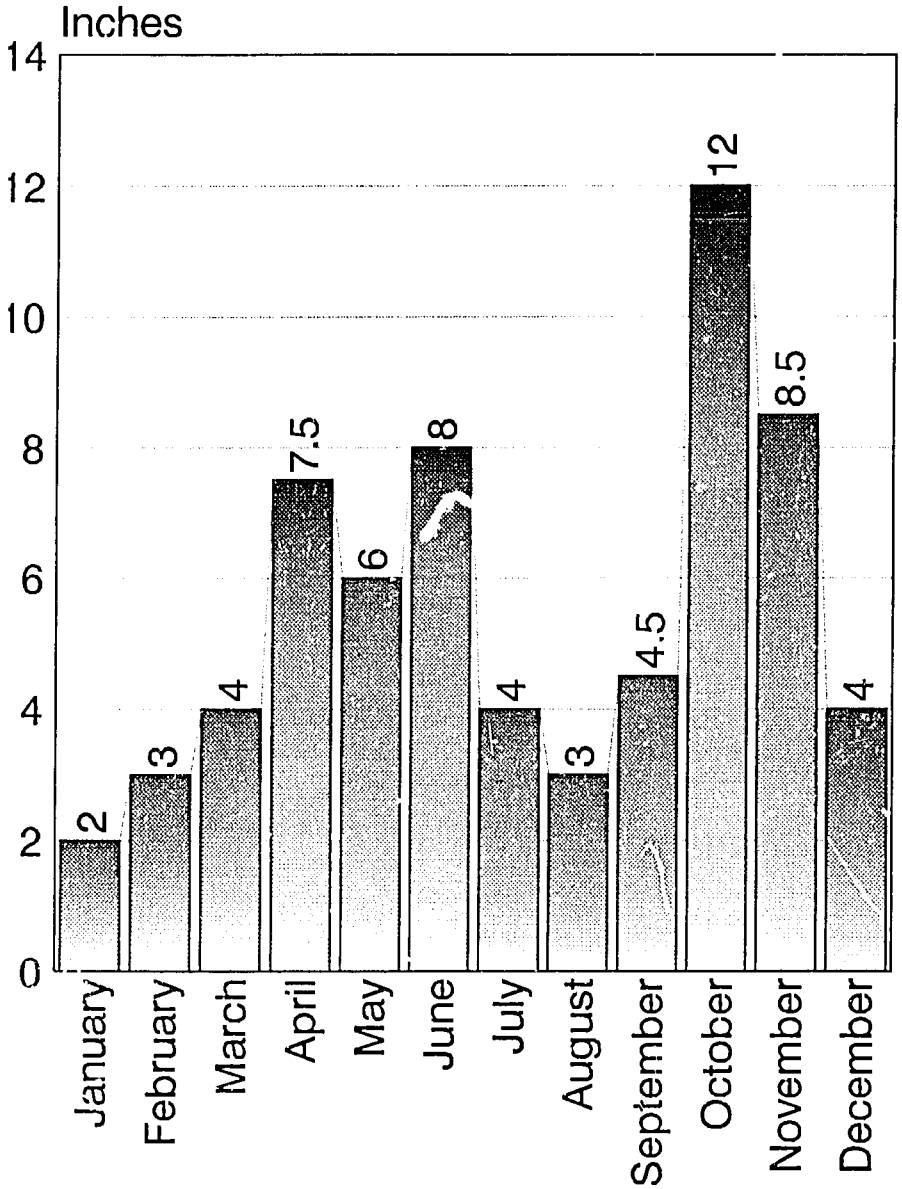
5

5a

Figure 1: The Bi-modal Rainfall Pattern of Raigana and Etna Estates



(WL1) Monthly Histogram of Rainfall at Raigana Estate



(WL2) Monthly histogram of Rainfall at Etna Estate

Nutrition

The first few years of the Ramie plantation my need amounts of inorganic fertilizer particularly N, P_2O_5 and K_2O to supply what is lacking in the soil. At pH of 5.0, much of the phosphorus in the soil is unavailable. As soon as the organic matter content of the soil is built up through the return of decortication waste, the amount of inorganic fertilizer applied should be gradually reduced to the minimum. The established fertilizer rate is about 60-60-60 Kg N, P_2O_5 and K_2O per hectare. The regular topdress fertilizer rate after each harvest is about 60-30-30 Kg N, P_2O_5, K_2O per hectare. After two years, there is an accumulation of organic matter that can slowly mineralize to supply part the nutrient needs of Ramie. By this time the nitrogen, phosphorus, potassium requirement of Ramie could be partially supplied by the organic matter of the soil, not to mention the micro-nutrients contained in organic substances.

Variety

Upon inspection, the Ramie variety being used in the trial at Avissawella is most probably one of the strains belonging to the Seikeiseisin series which is grown widely in southern Philippines. It is easy to expect varieties or strains from hot and humid countries like the Philippines to be adapted also in Sri Lanka where the climate is practically the same. Sri Lanka will benefit much if it can acquire through the National Plant Genetic Resources Laboratory, at the Institute of Plant Breeding, UP Los Banos, Laguna, varieties and strains that are high yielding and with fine fibers.

Pest/ Disease

Ramie has very few pests. In the Philippines, nematodes appear to be a major pest in the sandy soils of Cotabato. The soils in southwestern Sri Lanka will not allow nematodes to progress in view of the chemical and physical nature of yellow podzolic soils. Other chewing insects may appear from time to time particularly during the dry season when very few crops remain green. However, they can not inflict damaging effects since Ramie has the capacity to tolerate up to 50% leaf defoliation.

TRIAL PLANTING PROTOCOLS

The Consultant recommends that at least one trial planting is executed properly, following the correct steps which are enumerated in this report. If more than one trial plantings could be set-up, the area adjacent to the present trial planting at Avissawella could be utilized, as well as those available areas in the Raigana and Etna Estates.

Establishment Procedures - (One hectare trial area)

1. Construct alleys and plots across gradients. Alleys are narrow passage for workers, and plots are flattened terraces on which the Ramie crop is grown.

2. Cultivate the terrace plots and remove all plant debris.

3. One day before planting, broadcast a fertilizer mixture of 60-60-60 NPK per hectare. Incorporate into the soil very well. Make furrows at a distance of 100 cm.

4. One day before planting, prepare rhizomes of 10 cm length with at least three germination buds. Place rhizomes in wet sacks and incubate overnight.

5. Plant 5 rhizomes per linear meter along the furrows at equal distances and cover with 3 cm soil. Irrigate along the furrows if the soil is too dry for good germination.

6. Uproot growing weeds to avoid competition.

7. Ratoon to the ground every 45-55 days for two times and spread cut stalks over the field to serve as mulch.

8. Apply as broadcast, a mixture of 60-30-30 NPK per hectare every after ratooning. Water-in fertilizer if the soil is dry.

ESTABLISHMENT WORK SCHEDULE AND COST ESTIMATES

Work Schedule	Cost (One HA)
Land clearing, Terracing, Alley construction 50MD x Rs.100	5,000,-
Land preparation (plot cultivation) 40MD x Rs.100	4,000,-
Basal fertilizer application 10MD x Rs.100/-	1,000,-
Planting 30MD x Rs.100/-	3,000,-
Weeding/ Ratooning (waste cutting 2 x) 40MD x Rs.100/-	4,000,-
Topdressing (2x) 10MD x Rs.100	1,000,-
Labor Cost	18,000,-

MATERIALS

Work Schedule	Cost (One HA)
Rhizomes, 50,000 pcs. x Rs.0.20	10,000,-
Fertilizer: Basal Fertilizer NPK (14-14-14) 9 bags x Rs.600/- Topdress (2x)	5,400,-
NPK (14-14-14) 4 bags x Rs.600/- (2 x)	4,800,-
UREA (46-0-0) 1 bags x Rs.600 (2x)	1,200,-
Material Cost	21,400,-
Total establishment costs	39,400,-

REGULAR PRODUCTION CYCLE ACTIVITIES

1. Between the 45th and 55th day after the second ratooning of the establishment stage the crop is ready for harvest. Cut the stalks to the ground using a sharp bolo or scythe.

2. Pile and tie the stalks to desired sizes.

3. Decorticate and dry the ribbons (fibers) under the sun by hanging them on horizontal bamboos or wires.

4. Topdress the field using the rate 60-30-30 NPK per hectare. Water-in the broadcast fertilizer if the soil is dry.

5. Spread the decortication waste thinly over the field.

6. Bale the dried fiber into weights of 50 or 100 kg or as preferred.

Once the plantation is established, this is about 135-165 days from planting or 45-55 days after the second waste cutting/ ratooning, regular production activities immediately follows.

REGULAR WORK SCHEDULES AND COST ESTIMATES

Work Schedule	Cost (One HA)
Harvesting (cut stems to the ground) 15MD x Rs.100/-	1,500,-
Piling and Typing 6MD x Rs.100/-	600,-
Decortication and drying 15MD x Rs.100/-	1,500,-
Topdressing/ Spreading decortication wastes 10MD x Rs.100/-	1,000,-
Baling. weighing 5MD x Rs.100/-	500,-
Labor Cost	5,100,-

MATERIALS

NPK (14-14-14) 4 bags x Rs.600/-	2,400,-
UREA (46-0-0) 1 bag x Rs.600/-	600,-
Tying/Bailing materials	500.-
Materials costs	3,500,-
Total cost of one regular production cycle	8,600,-

DECORTICATING EQUIPMENT/ INFRASTRUCTURES

Decorticator

15 HP, portable, 100-150 kg, Dry Fiber/Day	- Rs. 60,000,-
Storage shed 36 m2, Concrete floor	- Rs. 40,000,-

Fixed Cost	- Rs.100,000,-

DATA TO BE GATHERED FROM THE TRIAL PLANTING

(Assumption: a decorticator will be acquired for the trial planting)

1. Actual cost of establishing the crop

   - Labor costs/ activity
   - Material costs/ items

2. Actual cost of regular production

   - Labor costs/ activity
   - Material costs/ items
   - Foxed costs (equipment/ infrastructures)

3. Sample plots - designate three areas from which technical production data could be observed and recorded ($10m_2$)

From these samples plots gather the following:

(a) Stalk height (cm, 10 sample plants)
(b) Number of stalks (from $10m_2$ area)
(c) Stalk diameter (mm, 10 sample plants)
(d) Stalk fresh weight (from $10m_2$ area) kg
(e) Stem fresh weight (minus the tops/ leaves) kgs
(f) Decorticate all stems, dry, and record dry weight (kg)

4. Decorticate all stems from the trial planting, dry and record dry weight (kg)

   - Final dry weight is recorded once a sample is weighted three times for three days and the weight remains essentially the same.

5. Record any unusual phenomena (climatic changes, occurrence of insects pests diseases etc.) during the trial period.

6. The trial period will be completed after one year of data gathering.

DEGUMMING RAMIE FIBERS

Degummed Ramie fiber is the product of a stepwise process (i.e. Batch type) involving chemical treatments like: steeping, degumming, bleaching, softening: and mechanical steps like: drying and packaging. The degumming process produces the following products namely:

1. Degummed Ramie

2. Short staple

3. Noils and wastes

4. Tops and Slivers

The degummed Ramie are fibers that are packed into bales of 125 kgs. measuring .635 cubic meters. These are directly marketed without any additional treatment.

The short staple fibers are degummed fibers cut into desired length of staple. They are marketed and used primarily for binding with Polyester, combed cotton and Rayon, and can be spun using the cotton spinning system.

The noils and wastes are the short fibers accumulated from the combing operation. They measure about 5 cm or less in length. These are used mainly as absorbent and other blended by-products.

The Ramie tops and Silvers are degummed fiber which had EEG combed and freed from impurities like neps, bark, and unopened fibers. These are used for specialty woven products.

Degummed Ramie fiber is used in a variety of products and by-products. It could be used as a pure Ramie product or is blended with other fibers to achieve or improve the quality standard of various products. Low denier or fine Ramie fibers make excellent blends with cotton, polyester, silk and wool fabrics in the textile industry.

Ramie fibers had been found to be a very good material for a wide variety of accessories and containers that require extra fiber strength, like insulators, powder bags, banknotes, curtain, upholstery and other novelty items and for the cottage industries.

While there are not international standards for degummed Ramie fibers, the international markets particularly Hongkong, Japan, Korea, Singapore and the European market have consistently been willing to pay well for fibers with the following characteristics:

Moisture content	7.8%
Residual gum	3-4%
Total Cellulose	88-91%
Denier	4-6
Tensile Strength	30 kg m/g
Fiber length	71.6-100 mm

DESCRIPTION OF THE DEGUMMING PROCESS (FIGURE 2)

The batch type technology consists of the addition of 3% Alkali and .5% antioxidant to the raw Ramie fibers which had been previously soaked for one hour in a aqueous solution consisting of .5% wetting agent at a fiber to liquor ratio of 1:10. The fibers are boiled for three hours and then washed three times, after which they are soaked in hot water two times. Bleaching follows at a fiber to liquor ratio of 1:15 with 10 grams per liter of bleaching agent at pH 9. The fibers are then boiled for 30 minutes. This is followed by hot washing and finally cold washing. The fiber is hydroextracted and dried and softened mechanically.

Before it goes through the ageing process which takes about 2-4 weeks. Cost estimates of equipment and building are listed in a separate page.

WASTE DISPOSAL SCHEME

Consistent with the objective of safeguarding the environment integrity, a waste disposal system for the degummming plant is necessary. The scheme that is outlined in figure 3 consists of effluent collection in a holding tank. Effluent treatment, precipitation, filtration, recycling or incineration, and finally release of treated water into the drainage system.

Figure 2: The Batch Type Degumming Process

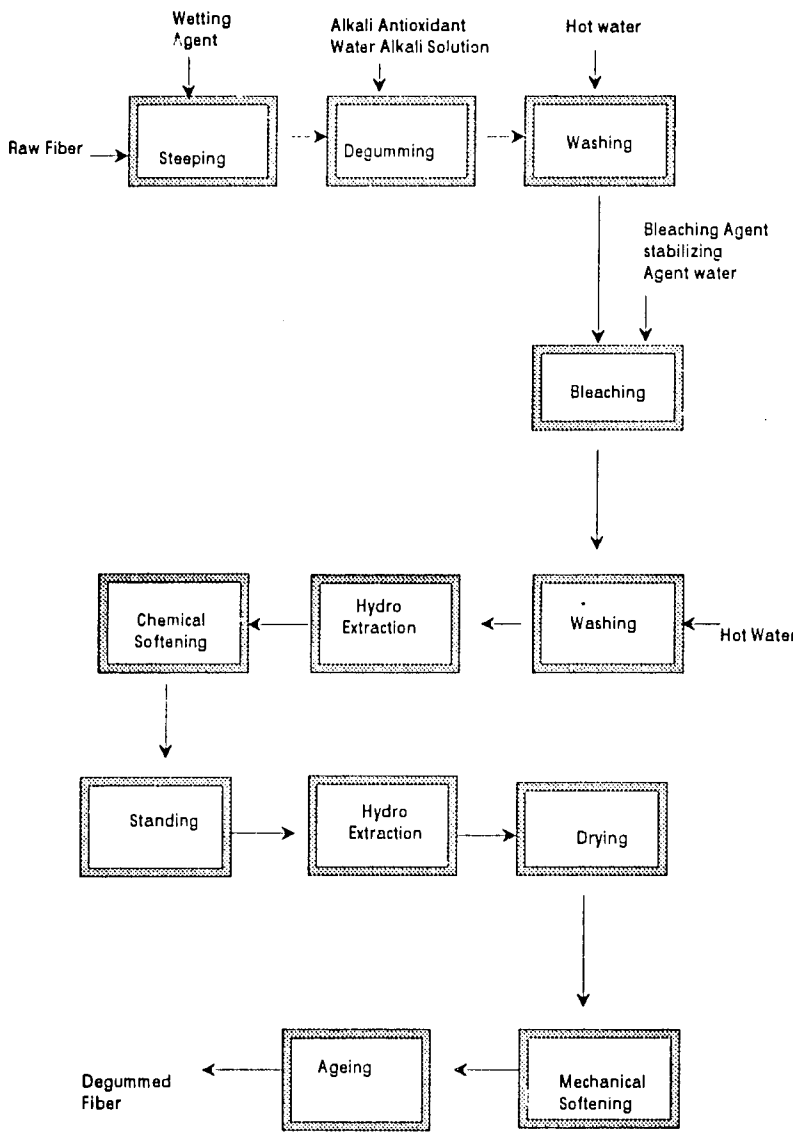
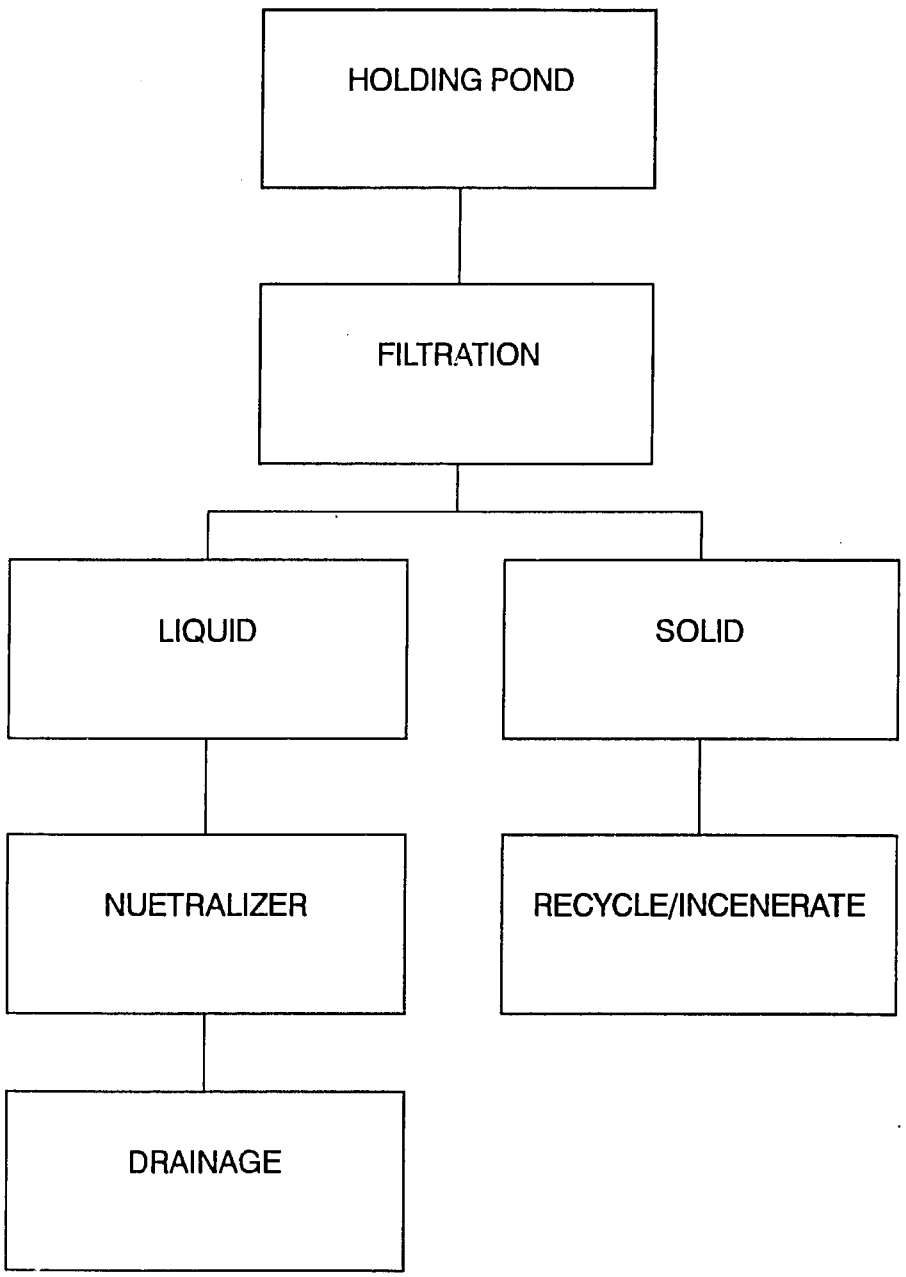


Figure 3: Waste Disposal System



COST ESTIMATES OF EQUIPMENT/ INFRASTRUCTURES FOR DEGUMMING (100 - 200 HAS CAPACITY)

Equipment (Capacity)	No of units	Unit cost Rs.	Total cost Rs.
Degumming vessels (50kg raw Fiber, 350 li)	2	250,000	500,000
Hydro Extractors (35kg Wet Fibers)	1	100,000	100,000
Chemical Softening Machine (150 kg/HR)	1	50,000	50,000
Mechanical Softener (150kg/HR)	1	250,000	250,000
Mechanical Drier (150kg/HR)	1	150,000	150,000
Overhead portable crane	1	100,000	100,000
Fiber Trailer	6	3,000	18,000
Fiber tray	15	800	12,000
Pallet Jack	1	20,000	20,000
Boiler (75 HP)	2	250,000	500,000
Water system			150,000
Mixing tank	1	50,000	50,000
Weighing machine	2	30,000	60,000
Waste water set-up			250,000
			2,210,000
Building and Furniture (1,000 M^2)			1,500,000
Total cost			3,710,000

Cost of Degumming facilities can be amortized over a period of time.

COST AND RETURN ESTIMATES OF RAMIE PRODUCTION (30 HECTARES)

Fixed costs

Cost of Establishment:

Rs.39,400/ha x 30 has.----------Rs.1,182,000,-

Decorticating Machine/ storage shed---------- 100,000,-

Degumming plant complex---------- 3,710,000,-

Total Fixed Cost Rs.4,992,000,-

Regular Production Costs (Dry Fiber)

One harvest----------Rs.8,600,-

5 Harvest/ year x 30 has---------- Rs.1,290,000,-

Degumming Costs (Degummed FIBERS)

250Kg/harvest/ha x 5 x 30 has

= 37,500 kg dry fiber

37,500 kg x Rs.12.5---------- Rs.1,758,750,-

(Cost of degumming/ kg.)

Gross Income From Dry Raw Fiber

37,500 kg dry fiber x Rs.49/ kg---------- Rs.1,837,500,-

Net income before amortization cost of decortication and storage shed

Rs.1,837,500 - Rs.1,290,000---------- Rs. 547,500,-

Gross Income From Degummed Fiber

31,125 kg degummed fiber x Rs.94/kg.---Rs.2,925,750,-

Net Income before amortization cost of

decorticating & degumming facilities ------ Rs.1,167,000,-

Rs.2,925,750 - Rs.1,1758,750

Note: The degumming plant set-up has a maximum processing capacity of 250,000 kg dry raw fiber per year.

OBSERVATIONS AND RECOMMENDATIONS

1. In terms of amount and distribution of rainfall, Southwestern Sri Lanka has the best potential for Ramie growing. The low pH problem is expected to improve after the Ramie crop is adequately established. The extensive root system of Ramie will immensely improve the chemical and biological character of the soil, control erosion, and minimize leaching of nutrients.

2. For the long term, Ramie growing should be planned and implemented beyond the requirements of the textile industry. Target industries should include all that require or can use high luster and strong fibers like interior decorations upholstery, and bags or container manufacturing industries. Ramie growing must also be integrated with livestock production to make use of the 3-5 tons per hectare of tops that is made available every 45-50 days.

3. An accurate technical and economic evaluation of Ramie production and fiber processing can only be done with locally generated experiences and information. A step by step procedure for a deliberate and purposive trialling of Ramie growing has been outlined and incorporated in the report.

4. As a guide to the implementation of a one hectare Ramie production trial, cost estimates were made for the various scheduled activities and materials needed. During the actual conduct of the trial, the cost of operations and materials should be recorded properly as they occur.

5. In order to insure the success of the trialling projects, the equipment and infrastructures should be procured and constructed, respectively.

   - One unit of portable decorticating machine should be procured as soon as possible. This decorticating machine is mounted in a trailer and can be moved to designated places with ease when needed. The cost and specifications are contained in the report.

   - A pilot degumming plant which can process the harvest from 100-200 hectares of Ramie is detailed in the report. Also presented is a waste disposal scheme of effluents coming from the degumming plant.

   The specifications and cost estimates for the various equipment, machineries, and infrastructures will need updating once a final decision is made to go ahead and procure as well as construct the needed facilities.

6. The objective of detailing a program for a two pronged approach in Ramie Production (textile and other high value Ramie products and by-products) is very important before commercial the farms are established. This can be taken up under another consultancy assignment as this will require detailed studies on: agronomic practices and production schedules, processing requirements and schedules as well as manufacturing.

7. The task of overseeing the Ramie trialling and consequently the industry, require a certain degree of knowledge of Ramie growing and processing. These knowledge of familiarization may be acquired through the conduct of short term seminar and on the job training by a competent trainer and/or a short term study visit to existing plantations and processing plants abroad. China and the Philippines should be able to accommodate any planned study visit if properly coordinated.

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5. Petruszka, M, 1979. Report: Consultancy on growing and processing of Ramie. SRL/77/00g Research and experimentation in minor export crops. FAO.

6. Pcarrd. 1988, The Philippines Recommends for Ramie production, FIDA, USM, Phil.

PERSONS CONSULTED ABOUT THE PROJECT

1. Dr. C.R. Panabokke
   Senior Associate, IIMI

2. Major M.R.C. Peiris
   Director, FLMC

3. Mr. H.D.S. GAJAWEERA
   Consultant, Avissawella Ramie Project

4. Mr. Richard Hurelbrink
   Chief of Party, AgEnt

5. Mr. Phillip Mowbray
   Production Advisor, AgEnt

6. Mr. S.H. Charles
   Production Advisor, AgEnt

7. Mr. Gamini Kumarage
   Agri-Business Advisor

8. Mr. Tony Dalgleish
   Marketing Advisor, AgEnt

9. Mr. Ranjit Tennekoon
   Director, Textile Training & Services Institute

10. Mr. Gamini Weerasekera
    Superintendent, Raigma Estate

11. Mr. Ransar Siriwardena
    Superintendent

12. Mr. S.B. de Silva
    Superintendent, Pitakande Estate

13. Mr. D. Jayasuriya
    Superintendent, Walahanduwa Estate

TERMS OF REFERENCE

1. Determine the best soil and climate for the production of Ramie and what geographic regions of Sri Lanka are best suited for its production.

2. Provide the project with a list of the most suitable cultivars/ selections for Sri Lanka including those currently being trialed.

3. Basal fertilizer requirements including fertilizer types and rates.

4. Top dress fertilizer applications, including fertilizer types and rates.

5. Pest and disease identification and control measures.

6. Provide the project with a detailed production guideline with current cost estimates. The guide should include specifically site selection, planting methodology including production costs with labor, harvesting costs, yield and selling price.

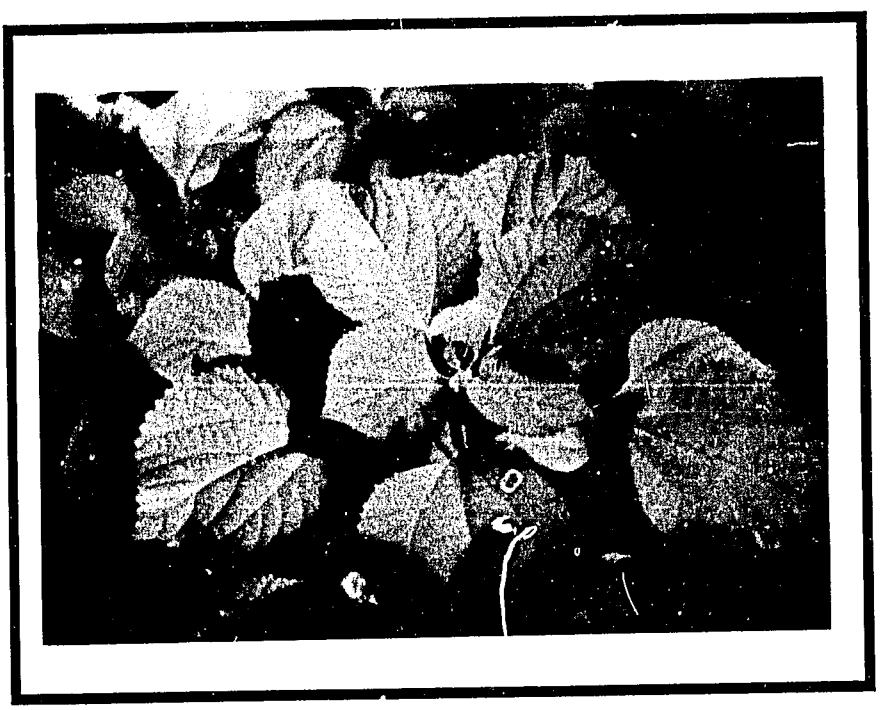
7. Provide the project with a detailed set of specifications for the processing charges through raw processed and degumed Ramie.

APPENDICES

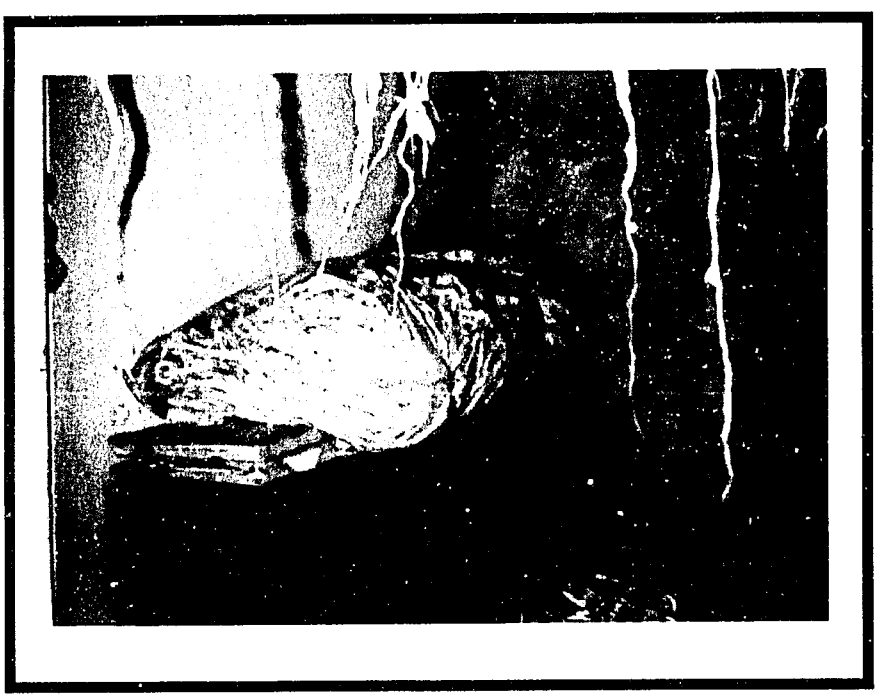
LAND PREPARATION

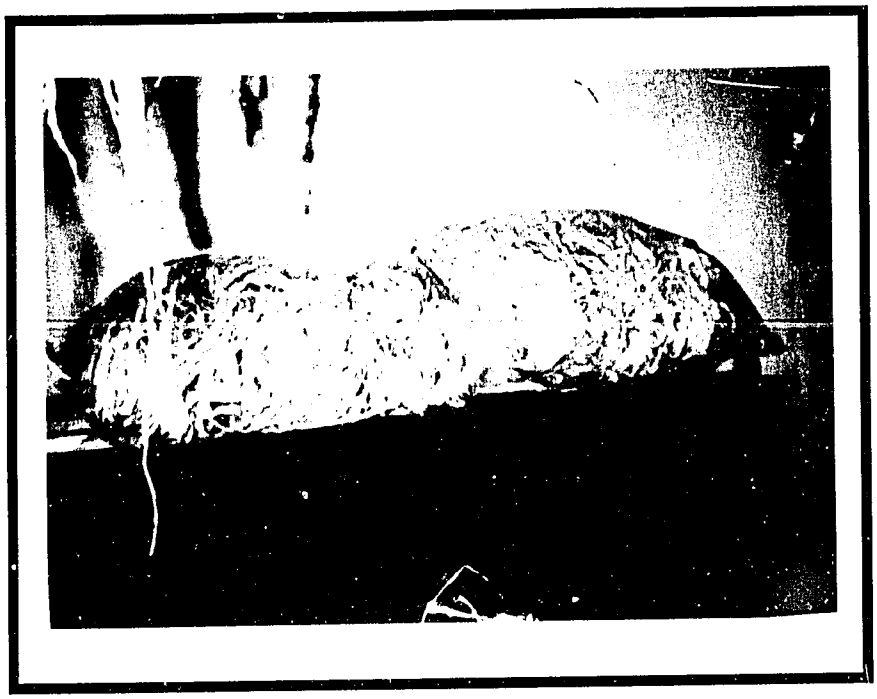
CROP ESTABLISHMENT

ESTABLISHED RAMIE



DECORTICATED RAMIE FIBRE





RAMIE COSTS PER HECTARE (Rs)

CROP ESTABLISHMENT

1. Labor		
	Land clearing, 50 MD at Rs 100.00 per day	5,000.00
	Tillage, 40 MD at Rs 100.00 per day	4,000.00
	Basal fertilizer application, 10 MD at Rs 100.00 per day	1,000.00
	Planting, MD 30 at Rs 100.00 per day	3,000.00
	Weeding/Ratooning (2 waste cuttings), 40 MD at Rs 100.00 per day	4,000.00
	Topdressing 2x, 10 MD at Rs 100.00 per day	1,000.00
	Labor Sub-total	18,000.00
2.	**Materials**	
	Rhizomes 50,000 pieces at Rs .20 each	10,000.00
	Fertilizer	
	Basal	
	NPK (14-14-14) 9 bags at Rs 600.00 ea	5,400.00
	Topdress	
	Urea (46-0-0) 1 bag at Rs 600.00 x 2 applications	1,200.00
	Materials Sub-total	16,600.00
3.	**Total Establishment Costs**	**34,600.00***
A.	**Amortized Crop Establishment Costs***	**2,306.67**
B.	**Normal Production Costs Per Harvest Cycle** (50-50 days)** (5 harvests per year)	**43,000.00**
C.	**Decortication equipment/infrastructure***	**6,700.00**
Ca.	**Over-head (15% of the above costs)**	**7801.00**
Cb.	**TOTAL COSTS**	**59,807.67**
Cc.	**ANNUAL REVENUE(1250 kg per year, with a value of (Rs) 49 per kg.)**	**61,250.00**
Cd.	**NET PROFIT/(LOSS)**	**1442.33**
Ce.	**UNIT COST OF PRODUCTION/KG**	**47.85**

D.	**Deguming Equipment, Waste Treatment/ Buildings*** **1250 kg per ha x Rs 12.50/ kg**	**15,625.00**
E.	**Over-head (15% of the above costs)**	**10,144.65**
F.	**TOTAL COSTS**	**77,775.65**
G.	**ANNUAL REVENUE** **1,037 kg at Rs 94/kg (degummed)**	**97,478.00**
H.	**NET PROFIT/(LOSS)**	**19,702.35**
I.	**UNIT COST OF PRODUCTION/KG**	**75.00**

The net margin per kg is **(Rs)19.00**, using a degummed selling price of (Rs) 94.00 per kg.

* These costs are amortized for 15 years
** Includes harvest labor for the cycle

RAMIE COSTS PER HECTARE (Rs)

CROP ESTABLISHMENT

1. Labor		
	Land clearing, 50 MD at Rs 100.00 per day	5,000.00
	Tillage, 40 MD at Rs 100.00 per day	4,000.00
	Basal fertilizer application, 10 MD at Rs 100.00 per day	1,000.00
	Planting, MD 30 at Rs 100.00 per day	3,000.00
	Weeding/Ratooning (2 waste cuttings), 40 MD at Rs 100.00 per day	4,000.00
	Topdressing 2x, 10 MD at Rs 100.00 per day	1,000.00
	Labor Sub-total	18,000.00
2.	**Materials**	
	Rhizomes 50,000 pieces at Rs .20 each	10,000.00
	Fertilizer	
	Basal	
	NPK (14-14-14) 9 bags at Rs 600.00 ea	5,400.00
	Topdress	
	Urea (46-0-0) 1 bag at Rs 600.00 x 2 applications	1,200.00
	Materials Sub-total	16,600.00
3.	**Total Establishment Costs**	**34,600.00***
A.	**Amortized Crop Establishment Costs***	**1,730.00**
B.	**Normal Production Costs Per Harvest Cycle** (50-50 days)** (5 harvests per year)	**43,000.00**
C.	**Decortication equipment/infrastructure***	**5,000.00**
Ca.	**Over-head (15% of the above costs)**	**7,459.00**
Cb.	**TOTAL COSTS**	**57,189.00**
Cc.	**ANNUAL REVENUE(1250 kg per year, with a value of (Rs) 49 per kg.)**	**61,250.00**
Cd.	**NET PROFIT/(LOSS)**	**4061.00**
Ce.	**UNIT COST OF PRODUCTION/KG**	**45.75**

D.	**Deguming Equipment, Waste Treatment/ Buildings*** **1250 kg per ha x Rs 12.50/ kg**	**15,625.00**
E.	**Over-head (15% of the above costs)**	**9803.75**
F.	**TOTAL COSTS**	**75,158.75**
G.	**ANNUAL REVENUE** **1,037 kg at Rs 94/kg (degummed)**	**97,478.00**
H.	**NET PROFIT/(LOSS)**	**22,319.75**
I.	**UNIT COST OF PRODUCTION/KG**	**72.48**

The net margin per kg is **(Rs)21.52**, using a degummed selling price of (Rs) 94.00 per kg.

* These costs are amortized for 20 years

** Includes harvest labor for the cycle