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MARD PROJECT

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via Polonnaruwa

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EXTENSION & PRODUCTION OF HIGH VALUE CROPS YALA 1992

by

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LIST OF ACRONYMS

AE	-	Agricultural Economics
ATG&D	-	Agricultural Technology Generation and Dissemination
FSE	-	Farming Systems Extensionist
FSR	-	Farming Systems Research
FSS	-	Farm Support Services
h	-	hectare
kg	-	kilogram
MARD	-	Mahaweli Agricultural Rural Development (Project)
MEA	-	Mahaweli Economic Authority
MRTC	-	Mahaweli Regional Training Center
NCB	-	Non-calcic Brown
OC	-	Other crop
RARC/A	-	Regional Agricultural Research Center/Aralaganwila
RBE	-	Red Brown Earth
t	-	ton
USAID	-	United States Agency for International Development

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EXECUTIVE SUMMARY

Purpose of the consultancy

To assist professionals of the Mahaweli Agriculture and Rural Development in carrying out the export crop production program and develop an extension system, in cooperation with extension staff of the Mahaweli Economic Authority, to promote the production of other crops than rice in System B.

Main accomplishments

1. Coordinated and trained 29 export crop extensionists:

- a 3-week induction course
- 4 weeks of practical training
- 20 on-the-job sessions
- 1 day in-service training and
- 6 field days were organized.

2. Prepared extension materials which included:
- 5 extension handouts on crop production techniques
- 3 extension bulletins on technical information.
- 6 report and record formats for monitoring of extension activities

The extension handouts were translated into Sinhala and distributed to extensionists and participating farmers.

3. Designed and helped deliver the following farmer training programs.
- 16 extension planning meetings
- 30 classroom training sessions
- 89 demonstration days
- 15 field days
- 1, 812 participants (including 261 women)

4. Monitored and controlled deliveries of inputs and produce. Formats prepared to keep track of inputs and produce deliveries included:

- Farm record keeping
- List of inputsreceived by individual farmers
- Costs of inputs and yields

5. Coordinated
and helped deliver training for packhouse extension staff.

Results of Production Program for High Value Crops

1. Okra

In Maha 1991/92, 1 hectare (ha) of okra, variety Pusa Sawani, yielded 7,335 kilograms (kg), of which 1,328 kg was purchased by TESS for a market trial and 6,007 kg was sold on the local market.

Yala 1992 okra production was for the domestic market only. A local variety of lady's fingers was planted by 66 farmers on 7.6 ha. Yields ranged from 10 to 15 tons/ha for total production of approximately 100 tons (t).

2. Cabbage

Cabbage planted in January yielded 10 t/ha, 50 percent of which was marketable. Yield declined with later plantings.

Yala cabbage yielded 3-4 t/ha. Only 5 of 20 farmers involved in cabbage production obtained a harvest.

3. Brinjal

A total of 49 farmers were involved in the production program and planted 5.8 ha of the variety Jaffna Purple variety. Yields ranged from 5-6 t/ha. Diseases and winds are major constraints.

4. Yellow onion

A total of 82 selected farmers planted 8.6 ha of yellow onion and produced 80 t. The average yield was 10 t/ha. Higher yields were obtained on well-drained red brown earth (RBE) soils; plantings on saturated non-calcic brown (NCB) soils yielded 4-7 t/ha. The hybrid, Henry Special, gave the highest yield (19 t/ha) and bulbed well.

5. Cantaloupe

Three varieties of cantaloupe were planted by 154 farmers (including 3 commercial farmers) on 17.4 ha. Production was of excellent quality. Total production was 238.52 t, 171.58 t of which was of first quality. Rejected fruits were not recorded.

6. Butternut

Butternut grows well in System B. Yields ranged from 6-12 t/ha. In Yala 1992, 145 selected farmers planted 17.1 ha

and produced more than 100 t of butternut of world market standard.

Conclusions

The production program was successful in generating farmers' confidence in MARD's extension system and developing the interest of a large number of farmers in growing Ocs, some of them high value crops for export.

Recommendations

The following recommendations are based on two seasons of production and marketing experience in System B:

1. Continue to develop markets and promote okra production for export because of its very high potential.

2. Cabbage production during Yala in System B is not recommended.

3. Promote brinjal production in Maha if a buy back contract is available. A program for insect control must be carefully planned.

4. Continue to develop markets and promote Yala production of the yellow onion hybrid, Henry Special for export. This crop offers potential for significant profit.

5. Cantaloupe is considered a promising crop for export because of its high yield and excellent quality.

6. Continue to develop markets and conduct variety trials of cantaloupe.

7. Butternut grows well in System B. Much higher yields are expected. It should be included in the export program.

8. An intensive demonstration and field day program is necessary to help farmers adopt new technologies.

9. Extension agents should be more thoroughly trained in crop production techniques and extension methodology.

10. OC production sites must be selected carefully.

11. Promote the use of organic matter in OC production.

12. Additional extension agents would improve TESS' effectiveness in the field.

13. Strong linkages between MEA and MARD must be maintained and expanded to support MARD integrated production programs.

INTRODUCTION

The Mahaweli Agriculture and Rural Development (MARD) Project, created by the Sri Lankan Government and the United States Agency for International Development (USAID), was designed to help settler families in Mahaweli System B obtain maximum economic benefits from the investments which have been made along the left bank of the Madura Oya.

The primary goal of the project is to increase settler income through diversification into other crops (Ocs) which are more profitable than rice.

MARD is achieving this goal through implementation of an integrated development program consisting of four components: 1) Agricultural Technology Generation and Dissemination (ATG&D), 2) Water Management, 3) Farmer Organizations, and 4) Farmer Support Services, including market development and improvement of postharvest handling.

The ATG&D component has four subcomponents: 1) Farming Systems Research, 2) Horticulture Promotion, 3) Agricultural Economics, and 4) Agricultural Extension, which includes a separate unit for export crops.

The first three of the above subcomponents have identified several OCs (and combinations of OCs) which have the potential to increase settler farmers' incomes and have developed appropriate technologies for their efficient production. The responsibility of the Agricultural Extension subcomponent is to demonstrate the production of these crops and to train settler farmers in the application of developed technologies.

The MARD Project has made significant progress toward its goal, in spite of certain constraints such as high temperatures, seasonal high winds, soils with low organic matter, high water tables, and poor drainage. A substantial increase in both OC hectarage and farmers' incomes has occurred since the project's inception (Gleason. January, 1990, and March, 1992). Several high value crops for domestic and export markets have been introduced to the area. These include cantaloupe, yellow onion, okra, baby corn and potato.

MARD'S EXTENSION SYSTEM

The MEA/MARD project paper stipulated that farming system extensionists (FSEs) be hired to promote the production of OCs. During the first two years of the project

(1988-1990), 20 FSEs were recruited and worked under the supervision of ATG&D professionals and MEA extension staff. However, many of these left their posts because of security conditions and lack of support owing to the MEA's uncertainty regarding their utility. This limited ATG&D's capability to provide regular training for farmers and curtailed the use of large-scale extension techniques. For example, field days and demonstration days to promote the cultivation of OCs were below target. Consequently, from 1988 to 1991, farmers did not receive full benefit from the results of ATG&D's research and extension program.

MARD'S HIGH VALUE CROP PRODUCTION PROGRAM

Research by MARD's market development group indicated a consistently high demand for cantaloupe, okra, baby corn, and eggplant in the Middle East, Singapore, and the Maldives. This led to a concentrated effort, beginning about mid-1991, to promote the production of such crops for export and upscale domestic markets.

To preserve product quality for these markets, MEA and USAID approved construction of a packhouse. It was built through an agreement between USAID and a private company, TESS (Agro) Ltd. The MEA also authorized the establishment of commercial linkages between farmer organizations and private companies interested in the sale of fresh fruits and vegetables.

The 1992 Yala commercial production program was designed jointly by three ATG&D subcomponents, Farming Systems Research (FSR), Horticulture Promotion, and Agricultural Economics (AE). Developing markets and arranging trial shipments was the responsibility of the Farmer Support Services (FSS) component. To link the key elements involved in this production program, the project created an Export Crop Extension Unit.

Export Crop Extension Unit

This unit was created to assist MARD professionals in carrying out the export crop production program, as well as to help farmers benefit fully from the technologies and information generated by the ATG&D and FSS components.

The Export Crop Extension Unit is comprised of two short-term extension consultants, Mr. Ratnayake and myself. Our terms of reference include the following tasks:

1. Prepare an extension program for commercial production of OCs for export in 1992, including:

   a) Detailed instructions for daily activities of the extension agents

   b) Programs and schedules for farmer training

   c) Preparation of written materials (in Sinhala) for all crops in the production program

   d) Methods of tracking and monitoring the activities of extension agents, e.g. field books, farmers' records

   e) Collection and analysis of data required to estimate returns to farmers from the cultivation of each crop in the program

2. Organize and coordinate the in-service training of extension agents during the year and help deliver training to farmers.

3. Monitor and control the deliveries of inputs under the Seylan Bank credit program to participating farmers and work with extensionists to ensure the proper use of inputs.

4. Train farmers and extension agents to monitor and implement technology included in their training.

5. Track deliveries of produce to the packhouse and analyze the economic viability of a private sector extension service attached to the packhouse.

6. Train designated packhouse staff in the operation and maintenance of an efficient extension system for profitable commercial crop production, harvesting and transport.

7. Work with the MARD Extension Agronomist and MEA staff to improve extension supervision, monitoring and efficiency.

8. Prepare quarterly and seasonal reports.

Under our supervision are 29 extensionists (graduates of agricultural schools) recruited specifically for this unit. The 29 extensionists are divided into four groups. Two of these groups (13 extensionists) work under the direction of the Horticulture Promotion subcomponent, a group of 8 are

under the supervision of the FSR subcomponent, and another group of 8 work under the guidance of the AE subcomponent.

MAIN ACCOMPLISHMENTS OF THE EXPORT CROP EXTENSION UNIT

Training of Extension Agents

1. Induction Training

The newly hired extension agents had only 2 years of agricultural training and most of them had little or no experience. Therefore, a 3-week induction training session was organized in February 1992 at the Mahaweli Regional Training Centre (MRTC). Subject matter specialists were provided by the Department of Agriculture's In-Service Training Institute and the Regional Agriculture Research Centre/Aralaganwila (RARC/A).

The training program included theory on crop production, water management and pest control. This was followed by practical field sessions. An effort was made to concentrate on extension methodology training.

The induction training session was well coordinated and training materials were well prepared. Participants indicated that the training would be very useful.

2. Practi Training

Before undertaking extension responsibilities, each extension agent received almost 4 weeks of training in the field. This training included all production operations for OCs, including nursery preparation, land selection and preparation, application of fertilizer and insecticides, transplanting, water management and harvesting.

The extension groups under the direction of the horticulture subcomponent received practical training on cantaloupe and zucchini production.

The other 16 extensionists received training on nursery management and production techniques for yellow onion, cabbage, okra and butternut.

3. On-the-Job Training

It became evident, as the growing season progressed, that additional training was necessary to overcome difficulties the extensionists faced in the field. Therefore, on-the-job training was provided on a regular basis by Mr. Ratnayake and myself. A total of 20 training

sessions were conducted on several cultural operations, including pest management, drainage and fungal diseases related to excess water. Training in extension methodology was given in an effort to upgrade the ability of the extensionists to work efficiently with farmers.

4. Coordination of In-Service-Training

A 1-day in-service training session was organized and conducted at MRTC to help extensionists upgrade their knowledge on water management and pest control in onion and cabbage production. Resource persons were three RARC/A research officers, representing the disciplines of plant pathology, entomology, and water management.

5. Additional In-Service Training Activities

Five field days were organized to observe results of on-farm research trials, water management trials, demonstrations of harvesting and handling techniques, and grading of produce at the packhouse. Another field day was organized to see results of production programs implemented by other groups.

These training sessions were important as they provided the extensionists with opportunities to exchange ideas and learn how to improve their work. For example, they learned how to improve drainage systems in farmers' fields and how to help farmers avoid deterioration of produce after harvest.

In summary, training activities organized for the extensionists from February to September 1992 included:

- a 3-week induction course
- 4 weeks of practical training
- 20 on-the-job sessions
- 6 field days

Preparation of Extension Materials

1. Production Handouts

Farmers who grow high value crops are usually exposed to high risks because of production costs. For this reason, both farmers and extension personnel should have access to the most up-to-date information on production techniques so the likelihood of costly mistakes is minimized.

Several extension handouts were prepared by ATG&D and the Export Crop Extension Unit during Yala 1992. The following handouts were written, translated into Sinhala and distributed to extension agents and participating farmers:

- Nursery preparation techniques
- Steps to follow for successful transplanting[1a] (Annex A-1)
- Yellow onion production
- Brinjal from transplanting to harvesting[a] (Annex A-2)
- Growing instructions for cantaloupe
- Cabbage production
- Okra production techniques[a] (Annex A-3)
- Snake gourd production[a] (Annex A-4)
- Butternut production[a] Annex A-5)

2. Extension Bulletins

Bulletins were prepared to upgrade the extensionists' technical knowledge. The following bulletins, which included technical information in abstract form and day to day instructions to help extensionists fulfil their responsibilities effectively, were prepared and distributed (those in this section that were written by the author are in Annex 1):

- Nursery management of yellow onion
- Pest management of OCs
- Evaluation of an extension program
- Trouble shooting field problems[a] (Annex B-1)
- Lessons learned from nursery preparation[a] (Annex B-2)
- Get the best out of your B. onion nursery
- B. onion field planting

3. Methods of Tracking and Monitoring Extension Activities

To monitor the export crop extension program, Mr. Ratnayake and I concentrated our efforts on daily supervision of the extensionists' work. In addition, we designed and distributed report forms to help them record their daily activities, problems encountered, suggestions, and accomplishments. We also prepared input record sheets and trained extensionists to make note of all inputs received and distributed to individual farmers.

Materials prepared for monitoring of extension activities were as follows:

- Field visit report[a] (Annex C-1)
- Weekly report on extension activities[a] (Annex C-2)
- Monthly report[a] (Annex C-3)

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1 All publications designated by a superscript [a] were prepared by the author of this report and are included as annexes.

- Farmer training schedules[2] [b] (Annex C-4)
- Farm visit record book
- Crop field situation[a] (Annex C-5)
- MARD training/field day/demonstration day
- Daily itinerary record sheets[b] (Annex C-6)

4. Production Planning Meetings

To promote the cultivation of crops for export, a series of 16 extension planning meetings were held at the block and unit level from March to May 1992. Participants invited included block managers, unit managers, members of farmer organizations, turnout leaders, and MEA/MARD extension staff. The participants were informed about the export production program, its targets, and what the project expected of them.

Farmer Training Programs

Farmer training programs were designed and implemented mainly by the extension consultants and field supervisors. The objective of the training programs was to introduce and demonstrate to farmers production techniques for high value crops.

The majority of System B settler farmers have had little or no experience in cultivating OCs, particularly high value OCs. It is imperative, therefore, that they be trained in production techniques for these crops. For this reason, extension efforts concentrated on farmer training, both in class and in the field.

1. In-class Training

Classroom training sessions were organized to explain the objective of the export program and provide farmers with basic information on OC production practices, including water and pest management.

2. Field Training

Method demonstrations were used intensively to show farmers how to:

a) Select land for OC cultivation
b) Prepare nurseries, including soil treatment
c) Apply fertilizer and chemicals
d) Land preparation, including drainage
e) Uproot and transplant seedlings

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[2] Publications designated with a superscript [b] were co-authored

Particular attention was given to nursery preparation, pest and disease management, drainage and production techniques for crops with domestic and export demand, e.g. cantaloupe, yellow onion, and okra.

Method demonstrations on postharvest handling, grading and storage were also organized to show farmers how to improve and preserve the quality of their produce.

3. Demonstration Days

A total of 89 demonstration days were organized during Yala 1992. Field demonstration plots were used to illustrate new crops such as cantaloupe and yellow onion, proper drainage for OCs, and the results of improved cultural practices.

4. Field days

A total of 15 field days were organized during Yala 1992. Target groups of farmers were shown the results of the export production program, including production of cantaloupe, yellow onion, okra and baby corn, as well as the packhouse operation.

5. Summary of Farmer Training Activities

Extension planning meetings: 16
Classroom training sessions: 30
Demonstration days: 89
Field days: 15
Participants: 1,812 (including 261 women)

Farmer training had a significant impact on promoting the cultivation of OCs, including high value crops.

Monitoring and Controlling Deliveries of Inputs to Farmers

The majority of farmers participating in the production program were unable to pay for the required inputs. MARD, therefore, persuaded the Seylan Bank to open a branch in System B and to issue loans for production inputs needed by such farmers. Because the bank was not fully functional at the beginning of the production season, MARD advanced money for inputs to farmer organizations. MARD also advised farmer organizations on the procedures involved in obtaining bank loans and buying inputs for distribution to participating farmers.

The inputs required were calculated by MARD professional staff on the basis of 1000 m^2, the area that most participating farmers committed to production of crops for

export. Inputs for each stage of crop development were packed under the control of MARD extension supervisors. These inputs were then delivered to farmer organizations for distribution.

To help extensionists keep track of input deliveries, the following format sheets were prepared and distributed:

a) Farm record keeping
b) List of inputs received by individual farmers
c) Cost of inputs
d) Yields

Tracking Deliveries of Produce to the Packhouse

Packhouse extension staff usually graded produce in the field or at unit offices before it was sent to the packhouse. MARD extensionists worked closely with the packhouse's two field assistants and one extension officer, as well as farmer organizations, to keep track of deliveries of produce to the packhouse. The packhouse issued a receipt for every delivery and the quantity of rejected produce was recorded before it was returned to farmers.

Net Return From the Cultivation of High Value Crop

Economic analysis to estimate returns to farmers from the cultivation of high value crops is not discussed in this report as the Agricultural Economist of MARD project has undertaken this extensive study with the information on production costs provided by AGT&D professional staff.

Training of Packhouse Extension Staff

The Export Crop Extension Unit has developed a close working relationship with packhouse staff. The packhouse extension officer was invited to participate in most planning meetings with field officers and was also involved in many of the training activities organized for extension agents and farmers. These training activities included demonstration days, field days and in-service training for extension agents.

MARD's extension supervisors also provided guidance to packhouse field sssistants to improve their knowledge of crop production techniques and proper collecting and handling of produce to reduce postharvest losses. MARD extension agents also helped the packhouse field assistants to collect information regarding contract implementation problems that farmers wanted to raise with the packhouse.

In summary, extension efforts helped the packhouse to improve the operation and maintenance of an efficient

extension system that will continue to promote the production of profitable export crops in System B.

PRODUCTION OF HIGH VALUE CROPS

Okra - Maha 1991/92, Yala 1992

In early 1992 (Maha), a group of 12 women at Nidanwela was selected to grow 1 ha of okra (variety Pusa Sawani) for market trials of the cold chain program. This activity was initiated by the AE subcomponent.

1. Production Techniques

The cultural practices recommended in the DOA Crop Recommendations Technoguide (1990) were followed for Maha production. An extension handout was used as a guide to cultural practices for Yala 1992 production.

Extension efforts concentrated on fertilizer applications and control of weeds, insects and diseases.

2. Results

Harvest of the Maha crop began in late February (55 days after planting) and extended to April 5. The average yield of about 6 t/ha was less than expected because of irregular watering. Product quality was good and exporters were satisfied.

TESS (Agro) Ltd purchased 1,328.5 kg of 3-inch pods for fresh export to Europe, for which they paid Rs 7.5/kg. Local markets absorbed 6,007 kg of the longer pods for Rs 4-6/kg.

Farmers received high net returns, despite a limited export market and a problem with water. They are enthusiastic about growing okra for export in Maha 1992/93.

Yala production was confined to supplying the domestic market. Lack of an export market and late arrival of okra seeds resulted in suspension of okra production for export. A total of 66 farmers planted 7.6 ha of lady's fingers, the preferred local type which has longer pods than Pusa Sawani and grows very well in System B.

Yala yields ranged from 10-15 t/ha with the highest marketable yield of 11.3 t/ha obtained by the Nidanwela Unit women's group. Total production from the Yala program was more than 100 t. July-August plantings resulted in better quality produce because pod borer attacks were less intense.

Okra grown in the Mid-country flooded the market, resulting in a price decline to Rs 2-4/kg and reduced returns to System B growers.

3. Constraints

Maha 1991/92 was the first time that settler farmers grew okra for export. Accustomed to harvesting pods for the domestic market (7-12 inches long), growers were concerned about losing money by picking small (3.5 inches long), light weight pods to meet export requirements. Constant supervision by extension agents was necessary to ensure that pods were harvested at the correct stage.

4. Conclusions and Recommendations

System B farmers grew okra for both export and domestic markets in 1992. The crop grows well in both Maha and Yala and has real potential to supply export markets when they are identified.

It should be mentioned that farmers would like to grow okra since nurseries and transplanting are not required; insect and disease control are not difficult compared with other crops.

The following recommendations are based on two seasons of production and marketing experience in System B:

a) Continue to develop markets and promote okra production for export but avoid extensive production until markets are identified and contracts are signed.

b) Seed of Pusa Sawani must be purchased in advance to ensure availability.

c) Pod borer control must be well managed to ensure quality for export.

d) Select strong and well-organized farmer organizations so that daily harvesting of produce for export is assured.

e) Harvest only in the morning to maintain freshness.

f) Handle produce gently to prevent bruising.

g) Promote testing of frozen okra.

Cabbage - Maha 1991/92, Dharmasena Farm

Reported high demand for cabbage in export markets prompted MARD to initiate production of this crop for export. Cultivation of the variety KY cross, which had yielded 10 t/ha in on-farm trials (Sellack and Dasanayake 1992), was begun at the Dharmasena Farm. This farm has been used by MARD for production for market trials.

1. Production Techniques

Production of seedlings was initiated in December 1991. Irrigation, insect and disease control were monitored as closely as possible.

2. Results

Cabbage planted in January yielded 10 t/ha, of which only 50 percent was marketable. Yield of February plantings declined to 5 t/ha. Cabbage yields were low for the following reasons:

a) Poor soil

Cabbage was planted in an area with NCB soil, which has low organic matter and water holding capacity. Part of the top soil had been displaced during land preparation.

b) Shortage of water

Irrigation water was rarely available during the day because the field was located at the tail end of a canal. The crop was usually irrigated in late evening when supervision was not available to ensure that it was done properly.

c) Insect control

Although insecticides were applied every 4 days to cabbage planted in February, Agrotis and other cabbage caterpillars such as Plutella and Hellula were not controlled. Although insecticides were changed frequently to prevent a build up of pest resistance, control was not achieved and cabbage leaves and heads were riddled with holes. Agrotis especially damaged apical meristems and interfered with normal head development.

d) High temperature

The monthly mean maximum (evening) temperature increased from 29.8° C in December to 38.0° C in May[3]. Such high temperatures resulted in stunted plants and low yields.

3. Conclusions and Recommendations

Cabbage yields from early Maha plantings (November-January) were fairly good but declined sharply with later plantings. High temperature, insects, and fungal diseases were the major constraints on late Maha cabbage production. It is difficult to produce cabbage of good quality for export in System B.

The following recommendations are made as a result of this production experience:

a) Promote early Maha planting of cabbage on well-drained RBE soils for the domestic market in which cabbage normally brings a high price.

b) Late plantings (after February) should be reconsidered, if not discouraged, since insect and disease control will be difficult and expensive.

On-farm Cabbage Production, Yala 1992

The cold chain program planned on-farm production of 20 ha of cabbage for export. A total of 500,000 vigorous seedlings were produced in nurseries on the Dharmasena Farm and on settlers' fields by five carefully selected farmers. These seedlings were intended for March-April plantings.

A selected group of 20 farmers prepared 1000 m^2 of irrigated land each for cabbage transplanting.

1. Production Techniques

Cultural recommendations described in the handout entitled "Cabbage Production" prepared by the FSR subcomponent were followed by program participants under the close supervision of extension agents.

2. Results

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[3] Courtesy of A. de Silva, Aralaganwila RARC

Low yields were attributed to:

a) High temperature

Very high temperatures in April resulted in a 30 percent mortality rate of transplanted seedlings and generally poor crop establishment. Surviving plants were stunted.

b) Insect predation

The cabbage caterpillar population built up rapidly and insecticides (Lannate and Atabron) applied every 5 days did not give effective control. Between 40 and 60 percent of developing cabbage heads were damaged.

c) Over irrigation

Extension agents were asked to supervise watering closely. However, several farmers persisted in over-irrigating their fields, which resulted in raising water tables and reducing the root zone area. Consequently, cabbage could not develop normally and was exposed to infection by diseases.

c) Diseases

Cabbage was severely attacked by a disease with symptoms similar to those of black rot (Xanthomonas campestris). These symptoms included yellowing, wilting and drying of leaves. Another disease, with symptoms resembling those of cabbage yellows (Fusarium oxysporum) also occurred. Foliage became pale yellow-green in colour shortly after planting and later leaves curled downward, turned brown and dropped off (Department of Agriculture. 1990. Crop Recommendations Technoguide)

Fungicides Brassicol and Dithane were sprayed 3-5 times to control Rhizoctonia and Fusarium. In spite of all efforts at control, 50-60 percent of the harvested heads were infected by the above diseases.

3. Conclusion and Recommendations

The serious constraints encountered in Yala cabbage production led to a suspension in June of the export program for this crop. Cabbage production during Yala in System B is not recommended.

Brinjal - Yala 1992

Brinjal, varieties Thinnavely or Jaffna Purple, have been grown during the past 2 years by commercial farmers in

System B. January-March plantings yielded an average of 7 t/ha. Brinjal harvested in April was sold at a good price (Rs 10-12/kg). A ratoon crop is possible if plants are pruned 3 months after harvest.

These factors contributed to a decision to include brinjal in the export program of Yala 1992. A total of 49 farmers planted 5.8 ha of the variety Jaffna Purple.

1. Production Techniques

Cultural recommendations detailed in an extension handout (Annex A-2) were followed.

2. Results

Yields ranged from 5 to 6 t/ha. Low yields, which discouraged many farmers from undertaking further Yala production, were due to:

a) Fungal diseases

Bacterial wilt, especially prevalent in areas with poor drainage, resulted in the death of 20-30 percent of the crop. Application of Topsin gave limited control. Better results were obtained when good irrigation techniques were used in combination with chemical control.

b) Insects

Insect predation was a major constraint. Brinjal stem and pod borer caused serious crop damage. Limited control of pod borer was obtained by applying Carbaryl. However, hand picking of wilted shoots accompanied by application of pesticides resulted in better control. Commercial farmers who did not have a good plan for insect control lost much of the harvest since most of the pods suffered from pod borer damage.

Leaf hoppers severely attacked brinjal in several areas. Two applications of Dimethoate 40 gave satisfactory control.

c) Wind

Brinjal planted in May-July was damaged by strong winds during July-August. Plant development was hampered by wind injury to leaves, branches, and young pods, and accelerated evaporation. As a result, yields were low and quality was impaired.

Yields of brinjal planted in late July and August fared much better because there was less insect and wind damage.

3. Conclusions and Recommendations

Brinjal can be grown year round in System B but the highest yields are obtained from Maha production. Insects can be managed satisfactorily by early planting. Diseases and strong winds are the major constraints to brinjal production.

The following recommendations are made for brinjal production in System B:

a) Promote Maha production for export if a buy back contract is available.

b) Plant only on well-drained areas and avoid planting in irrigated areas during Maha.

c) Insect control must be carefully planned for late Maha plantings. Chemical control should be supplemented by hand picking of wilting shoots.

d) Promotion of Yala production for export should be done cautiously. Brinjal should be grown in areas protected by wind breaks or planting should be delayed until August-September or with the onset of rains.

Yellow Onion - Yala 1992

Two yellow onion varieties, Grandprix and Henry Special, were tested in System B in Yala 1990 and 1991 by the Horticulture subcomponent. In 1990, the average yield of these two varieties was 19,860 kg/ha compared with 11,864 kg/ha for the red variety, Poona Red. Yala 1991 yields were 13,737 kg/ha for Henry Special and 7,857 kg/ha for Granprix (West and Yapa, March 1992).

The above results, in addition to reports that yellow onion is in high demand in the world market, led to a decision to include 20 ha of yellow onion in the export program of Yala 1992. For reasons discussed later in this section, only 8.6 ha were cultivated by a total of 82 farmers.

1. Production Techniques

Cultural recommendations as detailed in the extension handout prepared by the FSR subcomponent were applied by farmers under close supervision by the extensionists.

Key production issues were nursery establishment, irrigation, and control of weeds and diseases.

2. Results

A total of 80 t of yellow onion were produced by 82 farmers on 8.6 ha. Only about 20 percent of the participating farmers prepared nurseries before April 15. Many farmers delayed nursery preparation until after rice harvesting and celebration of the new year. Three farmers lost their first nurseries due to over irrigation. A nursery established at the Dharmasena Farm supplied 4,000,000 seedlings to those farmers who were unfamiliar with nursery preparation procedures and preferred to buy seedlings.

The average yield of yellow onion was 10 t/ha. Yields ranged from 19 t/ha on well-drained RBE soils to a low of 4 t/ha on saturated NCB soils. Yields of 6-10 t/ha were obtained on poorly drained soils.

The hybrid, Henry Special, gave the highest yield (19 t/ha), bulbed well and is the variety of choice.

The main diseases affecting yield were bulb rot and purple blotch. These diseases occurred on fields which were over irrigated and where standing surface water was not drained away after the irrigation. Damping off (Pythium) was controlled by Captan.

3. Discussion and Conclusion

The target of 20 ha was not reached because many farmers were reluctant to grow a new crop and rice harvest during March-April pre-empted onion nursery establishment.

Heavy rains during harvest caused spoilage in the field or during early storage and reduced significantly the quantity of marketable produce.

It was very difficult to estimate total production as many farmers refused to fill the contract they had signed with TESS for a price of Rs 12/kg. In addition, a number of farmers sold their produce to other buyers when it was not picked up by the packhouse.

Based on one season of experience with yellow onion production, the following recommendations are made:

a) Promote commercial production of the yellow onion hybrid, Henry Special, during Yala. In spite of production risks and high input costs, there is potential for significant profit.

b) Farmer training and intensive supervision by extensionists are critical to successful production.

c) Grow yellow onion only on well-drained soils.

d) May- June plantings should be promoted to have high yields and avoid losses due to rain at harvest and to enable farmers to supply the market early and, therefore, receive higher prices. (Selleck and Dasanayake. March 1992)

e) Encourage farmers to build storage facilities with local material to reduce postharvest losses and take advantage of higher off-season prices.

Cantaloupe

Cantaloupe is a newly introduced crop in the project area. The Horticulture Promotion subcomponent conducted the first variety trials in Yala 1991 (West and Yapa, March 1992). Seven varieties were included in the trial, Christmas, Palestro, Saporoso, Tasty Sweet, Mission, Fiesta, and Ole'. Tasty Sweet, Palestro, Fiesta and Mission are recommended for Yala plantings.

Like other cucurbits, cantaloupe melons grow well in System B. Yields obtained in the field are of world market standard, ranging from 12.4-36.8 t/ha.

1. Production Techniques

Three varieties, Mission, Gold Mark and Tasty Sweet were planted for the Yala 1992 export program. A total of 17.4 ha were planted by 154 farmers, including 3 commercial farmers.

Cultivation recommendations prepared by the Horticulture subcomponent were strictly applied by farmer participants.

2. Results

The export program produced 238.52 t of cantaloupe of world market standard. This quantity, 171.579 t of which was graded first quality and 66.944 t as second quality, was

purchased by TESS. Rejected fruits were not recorded and were sold to other buyers.

3. Conclusions and Recommendations

Cantaloupe grows well under the dry, hot weather conditions of System B. It is favoured by farmers because it does not require nurseries and transplanting, is easy to harvest, and net returns are high. It is considered a promising crop for export because of its high yield and excellent quality.

Recommendations are as follows:

a) Continue to conduct variety trials in order to identify the most suitable varieties.

b) Place more extension effort on regular turning of fruit and to the proper amount and timing of irrigation.

c) Cantaloupe planted in late July had more problems with pest and disease control. Control of fruit borer should be improved to reduce losses.

d) More effort should be given to market development.

Butternut

Butternut is another cucurbit that grows well in System B during Yala season. An average yield of 5,902 kg/ha in Yala 1989 whole-farm trials increased to 7836 kg/ha in Yala 1990. Net returns were sufficiently high to interest farmers and to warrant its inclusion in the export program.

1. Production Techniques

Participating farmers, with close supervision of the project's extensionists, followed the cultural practices recommended in the extension handout (Annex A-5).

2. Results

Butternut grows very well in System B, particularly on well-drained soils. A total of 145 selected farmers in 10 units planted 17.1 ha and produced more than 100 t of butternut. The quality meets the world market standard. Yields ranged from 6-12 t/ha for an average of 7.5 t/ha. This relatively low yield was due to poor quality seed, late issue of irrigation water, and leaf miner damage. These problems can be solved and much higher yields are expected.

3. Recommendations

The project should continue to develop markets for butternut, which should be included in the export program. Obtaining quality seed will be important.

GENERAL CONCLUSIONS

The MARD project promoted intensive production of high value crops for export and the upscale domestic market for the first time in Yala 1992. All components of the project participated actively in the export production program.

MARD's extension consultants and extensionists played a key role in the program by being a constant source of information and assistance on cultural practices and problems associated with the production of high value crops.

The program was successful in generating farmers' confidence in MARD's extension team and in developing the interest of a large number of farmers in growing high value OCs such as cantaloupe, yellow onion, okra, and baby corn for export. Extension agents will have no difficulty in recruiting farmers for future export programs or extension demonstrations. In short, the farmer training program has accelerated the dissemination of new crops and improved technology to System B farmers.

The export crop program confirmed that cantaloupe, okra, butternut, yellow onion, and baby corn can be grown successfully on a commercial scale in System B. However, several constraints remain. Recommendations to overcome these constraints will discussed in the following section.

GENERAL RECOMMENDATIONS

1. An intensive demonstration and field day program is necessary to convince farmers of the advantages of growing new crops and adopting new technologies.

2. It is imperative that extensionists pay careful attention to site selection in terms of soil type and drainage. Well-drained RBE soils are preferred for OC production.

3. Farmer training should stress pest and disease control and water management practices. Over-watering is a persistent problem in System B where farmers are accustomed to rice cultivation.

4. Extension agents should be more thoroughly trained in crop production techniques and extension methodology.

5. Promote the use of organic matter to improve the structure and fertility of System B soils. The export crop extension component should start a campaign to promote the collection of manure and to conserve and improve its quality by mixing it with straw mulch before incorporating it into the soil (Selleck et al, Maha 1991/92 page 67).

6. It is recommended that nitrogen-fixing trees be grown as windbreaks to protect susceptible OCs from damage by the strong winds of June, July and August in System B (Selleck et al. Maha 1991/92 page 68).

7. Farmer Support Services should increase their efforts to develop more markets for export crops.

8. More potential local buyers should be identified to promote domestic consumption.

9. Contracts should be arranged before the growing season starts to allow time for extension staff to select farmers and plan the production program (order seeds, train extension agents and farmers, and supply inputs).

10. Development of the export production program should be improved. Supporting services and farm organizations should be involved in planning the production program so they can assist in ordering seeds and inputs.

11. TESS should be careful to maintain good relations with farmers by accelerating collection of produce and processing of payments to farmers.

12. TESS should add two more extensionists to work with the project extension personnel to supervise closely the grading, weighing and registering of produce purchased.

13. When TESS works at full capacity and exports become streamlined, TESS should absorb extensionists trained by MARD to implement their private extension service.

14. It is important that the strong linkages already developed at all levels between MARD and MEA personnel involved in the production program be maintained and reinforced in order to have better coordination at all levels.

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Annex A-1

STEPS TO FOLLOW FOR SUCCESSFUL PLANTING

1. Harden off transplants.

" hardening off transplants " aims at helping young plants to be strong and able to stand full sun, heat, breezes and all other challenges during and after the transplanting .

In order to harden off transplants:

a) Don't apply fertilizer in the nurseries 7-10 days before the transplanting.

b) Stop covering the nursery 2-3 weeks after seeding and let the young plant stand the full sun.

c) Cut back on their water 5 - 7 days before uprooting the seedlings.

2. Preparation for uprooting.

Irrigate or water the nursery before uprooting in order to minimize the damage to roots.

3. How to uproot the seedlings.

a) Use the fork to loose the soils before uprooting the transplants.

b) Disturb the plant's roots as little as possible and avoid pulling seedlings when the soils of the nursery are not loose enough in order to minimize the damages to roots.

4. Care for seedlings.

a) Handle bare root transplants by their leaves, rather than by roots.

b) Keep seedlings in the shade and water them lightly avoid exposing seedlings to direct sun light.

5. Selection of seedlings for planting.

Choose the best and healthiest seedlings to plant. Watch out for tall, spindly plants. Often these plants did not receive light and will not give a good yield.

6. Planting.

a) Irrigate or water the soil before transplanting if it is dry.

b) Wherever possible plant in cool, dull conditions, preferably in the evening.

c) In very hot weather, plants benefit from being shaded. Use banana leaves, straw or newspaper to cover seedlings until they are established.

d) With leafy plants the leaves can be cut back to within a 4-5 cm after planting to reduce evaporation.

e) In most cases plant so that the lower leaves of the plants are above ground level.

f) Soil around the plant must be firmly pressed.

g) It is good practice to water and mulch plants immediately after planting.

Annex A-2

BRINJAL FROM TRANSPLANT TO HARVEST

1. Land Selection

Brinjal requires deep, well-drained sandy loam soils. Poorly drained soils should be avoided. Land previously under solanaceous crops should not be selected in order to minimize the incidence of bacterial wilt.

2. Land Preparation

One plough to a depth of 30 cm and two harrowings are necessary to enhance root growth.

Form raised beds having a width of 150 cm (for 2 rows) and a height of 20 - 30 cm.

Note : Do not make soil into a fine powdery condition. Establish drains across slopes to ensure good drainage.

Good growth and yield are obtained if planting holes are 30 x 30 x 30 cm and spaced 90 x 60 cm.

3. Fertilizer use

Apply 1 - 2 kg of cow dung per planting hole.

Apply the following formulations and rates (kg/ ha):

a) Basal : Urea - 220 kg, TSP- 380 kg; MOP - 125 kg

b) Top dressing - Apply 4 - 8 weeks after planting
Urea - 45 kg; MOP -25 kg

4. Irrigation

a) Brinjal is grown as a rainfed crop in Maha and with irrigation in Yala.

Apply irrigation water immediately upon completion of field transplanting.The water should be passed slowly along the edges of the bed until the moisture reaches the stem of the transplant. Do not flood the entire field; because this type of irrigation will cause the soil to crust and set up like cement which inhibits root development.

During dry periods, supplementary irrigation is essential. Apply irrigation water until the entire root zone is adequately wet.

b) Avoid over irrigation and water logging.

c) Apply fertilizer before irrigation.

5. Weed Control

Weed manually at 3, 6, 9, 12 weeks after planting

6. Insect control.

a) Stem and pod borer

Symptoms of attacks	:	Withdrawn and drooping shoots and fruits showing feeding holes plugged with excreta)
Non chemical control	:	Hand picking and destroying of wilted shoots and larval forms.
Chemical control	:	20 kg of carbofuran 3 % g/ha at planting time 2 kg of carbaryl 85% WSP at flowering and continuing fortnightly intervals.

b) Brinjal leaf webber - Psara bipunctalis.

Symptoms of attacks	:	Leaves are webbed together and many greenish caterpillars are seen within.
Non chemical control	:	Collecting and destruction of larvae and webbed leaves.
Chemical control	:	May not be needed.

c) Scales and Mealy bugs.

Insects suck the sap of plants and plants tend to dry up.

Chemical control	:	910 - 1920 ml of Dimethoate 40% per ha. Spray directly to the shoot and underside of leaves.

d) Mites

Symptoms of attacks	:	Early mite damage appears as brown spots on the under sides of leaves which become shiny and brown. Young leaves might be distorted and growing tips might die.
Chemical Control	:	1400 ml Dicofol 40% per ha or 3 kg sulfur 80 - 85 WP per ha. Direct spray to the underside of leaves

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ANNEX - 2 (IN SINHALESE)

වම්බටු පැල සිටුවීමේ සිට අස්වැන්න නෙලීම දක්වා පිළිවෙත්.

1. සුදුසු බිමක් තෝරා ගැනීම

වම්බටු සඳහා ඔසා ජලාපවහනයක් ඇති වැලි සහිත ලෝම ගැඹුරු පසක් අවශ්‍යවේ. ජලය හොඳින් බැස නොයන පස් ඇති ස්ථාන තෝරා නොගත යුතුය. හිටුවැරීමේ රෝගය අඩුකර ගැනීම සඳහා කලින් සොලනෙයි කුලයට අයත් භෝග, (බටු, හත්තාලි, මිරිස් වැනි) නොවැවූ බිමක් තෝරා ගැනීම සුදුසුවේ.

2. බිම සකස් කර ගැනීම

* හොඳින් මුල් වැඩීම සඳහා සෙ.මී. 30 ක් (අඟල් 12) පමණ ගැඹුරට එක් වරක් සී සෑමෙන් පසු දෙවරක් හැරෝ කර ගැනීම යෝග්‍යවේ.

* සෙ.මී. 150 ක් (අඩි 5) පලල්වූත් සෙ.මී. 20-30 ක් පමණ (8" - 12") උස්වූත් පාත්ති (පේලි දෙකක් සිටුවීම සඳහා) සකස් කර ගන්න.

සැලැතිය යුතුයි - පය දුවිලි තරමට සිහින් වන ආකාරයට සකස් කිරීම නුසුදුසුය.

ජලය බැස යාම සඳහා කානු දමා ගත යුතුය.

ගස් හොඳින් වැඩීම සඳහාත් හොඳ අස්වැන්නක් ලබාගැනීම සඳහාත් පැල සිටුවන වලවල් සෙ.මී. 30x30x30 (අඟල් 12x12x12) ප්‍රමාණයට සකස් කර ගන්න.

3. පොහොර භාවිතය

එක්වලකට ගොම කිලෝ 1-2 ක් පමණ යොදන්න.

මූලික පොහොර

(අ) පහත සඳහන් ප්‍රමාණය යොදන්න.

යූරියා	හෙ/කි.ග්‍රෑම්	220
සුපර් පොස්ෆේට්	හෙ/කි.ග්‍රෑම්	380
පොටෑෂ් (MOP)	හෙ/කි.ග්‍රෑම්	125

(ආ) මතුපිට පොහොර

සිටුවා සති 4 න් සහ සති 8 න්
යූරියා හෙ/කි.ග්‍රෑම් 45 ක් හා
පොටෑෂ් (MOP) හෙ/කි.ග්‍රෑම් 25 බැගින් යොදන්න.

4. ජලය සැපයීම

(අ) මහා කන්නයට වැසි ජලයෙන්ද යල කන්නයට වාරි ජලයෙන්ද බටු වගාව කරනු ලැබේ.

පැල සිටවූ වගාම ජලය හරවන්න. ජලය හැරවීමෙදී පාත්ති කානුවල ජලය ගලා යාමට සලස්වා පාත්තියට ජලය උරාගත් පසු කඩා හරින්න. එසේ නොමැතිව පාත්ති ඇසි යන ආකාරයට ජලය නොබඳින්න. එසේ කලහොත් පාත්ති මඩවී පසුව පස තදවීමෙන් ගසේ මුල් ඇදීමට බාධා පමුණුවයි. වියලි කාලගුණයක් පවතින අවස්ථාවලදී ගස්වල මුල් ප්‍රදේශය හොඳින් තෙමී යන පරිදි වැඩි වාර ගණනක් ජලය හැරවිය යුතුය.

(ආ) අවශ්‍ය ප්‍රමාණයට වඩා ජලය හැරවීම නොකල යුතු අතර වතුර පාත්තිවල රැඳී තිබීමට ඉඩ නොතබන්න.

5. <u>වල් මර්දනය</u>

සිටුවා සති 3, 6, 9, 12 දින් අතින් වල් උදුරා දමන්න.

6. <u>කෘමි මර්දනය</u>

(අ) බටු දළු සහ ගෙඩි විදින පණුවා

හානියේ ලක්ෂණ - දළු මැලවී පැන්නට පෙරලී නිඩිමත් ගෙඩි හිල්කොට එම හිල් වලින් පනුවන්ගේ මල පහ පිට කිරීම.

කෘමිනාශක නොයොදා - මැලවුනු දළු කඩා ඉවත් කිරීමත් පනු පිලවී ඉවත් කිරීමක් කරන්න.

කෘමිනාශක භාවිතය - පැල සිටුවන අවස්ථාවේදී කාබොෆියුරාන් හෙක්ටයාරයකට කි.ග්‍රෑම් 20 බැගින් යෙදීම.

හෙක්ටයාරයකට කි.ග්‍රෑම් 2 බැගින් කාබරිල් 85% wsp මල් හටගන්නා විටත් ඉන්පසු සති දෙකකට වරක් යෙදීම.

(ආ) බටු කොල හකුලන පනුවා

රෝග ලක්ෂණ - බටු කොල එකට හකුලුවා එහි ඇතුලේ කොලපාට දළඹුවන් වැඩේ.

කෘමිනාශක නොයොදා - හැකුලුනු කොල පනුවන් - පිලවුන් සමගම කඩා විනාශ කිරීම.

කෘමිනාශක යෙදීම අවශ්‍ය නොවෙනු ඇත.

(ඇ) කොරපොතු සහ පිටි සහිත මකුණන් - මෙම කෘමීන් විසින් පැලවල යුෂ උරා බීමෙන් පැල සහ ගස් වියලී යයි.

කෘමිනාශක භාවිතයෙන් මර්දනය කිරීම - ඩයිමෙතොස්වි (dimethoate 40%) මිලි ලීටර් 910 - 1820 අතර ප්‍රමාණයක් හෙක්ටයාරයකට යෙදිය යුතුය. මෙම කෘමිනාශක තෙලීන්ම ගසේ හදවත් කොලවල යටි පැත්තටත් විදින සේ ඉසිය යුතුය.

(ඈ) ඔයිටාවන් (ගුල්ලන්)

හානියේ ලක්ෂණ

පලමු අවස්ථාවේදී මෙම හානිය නිසා කොලවල යටි පැත්තේ දුඹුරු පැහැති ලප හට ගෙන ක්‍රමයෙන් එම ලප දුඹුරු පාටින් දිලිසීමට පටන් ගනී. ලපවී කොල සහ දළු වකුටු වී මිය යෑමට පටන් ගනී.

කෘමිනාශක භාවිතයෙන් - ඩයිකොෆෝල් (dicofol 40%) හෙක්ටයාරයකට මිලි ලීටර් 1400 බැගින් හෝ සල්ෆර් (sulfur 80-85% wp) හෝ තෙලීන්ම කොලවල යටි පැත්තට ඉසින්න.

Annex A-3

OKRA PRODUCTION

1. Soil

Best yields are obtained on well - drained soils. Water logging should be avoided.

2. Land Preparation

a) Plough to a depth of 15 - 30 cm and rotate.

b) Make planting holes 30 x 30 x 30 cm and add organic manure (cowdung) in the hole, if cowdung is available.

3. Seed Rate

4 - 5 kg/ha.

4. Time of Planting

Okra is generally planted from late September to early October in Maha and from March to June in Yala. Avoid planting during heavy rains.

5. Planting and Spacing

a) Spacing : 90 x 60 cm.

b) Soak seeds for 24 hours before sowing to enhance germination and to remove unfilled seeds.

c) Dibble 3 - 4 seeds per hole at the depth of 1 - 2 cm. Thin to 2 plants/hill 12 days after seedling. Fill vacancies 1 week after sowing.

6. Fertilizer Use

a) As basal, apply the following formulations and rates (kg /ha)

Urea - 150 ; TSP- 200 ; MOP - 75 .

Note : Irrigate well before applying basal but not immediately after application of fertilizer.

b) For Top Dressing - Apply 4 weeks after planting : Incorporate into soil on each side.
Urea - 150 ; MOP - 75

7. Irrigation

Water daily until germination is complete then water every 3 - 4 days.

8. Weed Control

Weeding should be done 2 - 4 weeks after emergence. Weeding should coincide with fertilizer application.

9. Pest and Disease Control

a) Insects : Shoot and fruit bores, red bodied bugs and leaf weber are main pest problems apply insecticide if the damage is serious.

Insecticide : Carbaryl 85% WSP is the insecticide recommended for the control of these insects.

Dosage : 1.1 kg/ha.

b) Diseases :

Powdery Mildew (Erysiphe Cicharacearum)

Symptoms : Scattered white patches appear on the upper surface of leaves. Heavily attached leaves dry up and drop off.

Control : Crop rotation.

Use carbendazine.

Yellow Vein Mosaic :

Symptoms: Clearing of leaf margins followed by vein chlorosis. Younger leaves develop yellow veins. Surrounded by dark and light green patches fruits are small, distorted and chlorotic

Control : Remove infected plants

Plant disease - free seed.

Adhere to the recommended time of planting.

Delay in planting can increase incidence of the disease.

10. Harvesting

Harvest tender pods: Harvest pods every other day to maintain good quality. Use a sharp knife to remove pods from the plant, thus avoiding pulling or breaking, which can damage the plant.

Annex A3

Okra Production
ඔත්රා (බණ්ඩක්කා)

1. <u>පස</u> මනා ජලවහණයක් ඇති බිම්වල වගා කිරීමෙන් වැඩි අස්වැන්නක් ලැබිය හැකිය. එබැවින්, පසෙහි ජලය රැඳී නිබීම වැළැක්විය යුතුය.

2. <u>බිම සකස් කිරීම</u>

   අ. සෙ.මී. 15 - 30 න් (අඟල් 6-12) හැඹුරට පස පෙරලා කැට පොඩි කර පස සිහින්ව පිළියල කර ගත යුතුය.

   ආ. බීජ සිටුවීම සඳහා සෙ.මී. 30x30x30 (අඟල් 12x12x12) ප්‍රමාණයට වලවල් කපා තාබනික පොහොර (හොඳ පොහොර) සපයා ගත හැකි නම් යොදන්න.

   ඇ. උස් වූ පාත්ති හෝ වැටි පිළියෙල කර ගන්න.

3. <u>බීජ ප්‍රමාණය</u>: හෙක්ටයාර් එකකට බීජ කිලෝග්‍රෑම් 4.5 කි.

4. <u>සිටුවීමේ කාලය</u> : සාමාන්‍යයෙන් ඔත්රා (බණ්ඩක්කා) සිටවනු ලබන්නේ මහ කන්නයේ සැප්තැම්බර් පසු කාලයේ සිට ඔක්තෝම්බර් මුල් කාලය දක්වාත් යල් කන්නයේ මාර්තු සිට ජූනි දක්වාත් කාලය තුළදීය. කොසේ වෙතත් මහ වැසි කාලය මග හරවා සිටුවිය යුතුය.

5. <u>බීජ සිටුවීම හා පරතරය</u>:

   අ. පේළි අතර සෙ.මී. 90 න් (අඩි 3ක් පමණ) ද පේළියක පැල අතර සෙ.මී. 60 න් (අඩි 2ක් පමණ) ද විය යුතුය.

   ආ. පැලවීම පරාපු කරවීම පිණිසත් බොල් බීජ ඉවත් කිරීම පිණිසත් පැය 24 ක පමණ කාලයක් මෘදුකරණය කිරීමට පෙර බීජ පොඟවා ගන්න.

   ඇ. එක් වලක බීජ 3-4 න් සෙ.මී. 1-2 පමණ (අඟල් 1/2-3/4 න් පමණ) හැඹුරට මෘදුකරණය කරන්න.

   බීජ සිටුවා සතියකින් පමණ පාලු සිටවන්න. දින 12 කට පමණ පසු එක් වලක පැල දෙකක් ඉතිරි කර සෙසු පැල ගලවා දමන්න.

6. <u>පොහොර යෙදීම</u>

   මූලික පොහොර : පහත දැක්වෙන පොහොර මිශ්‍රණය හා ප්‍රමාණයන්ට අනුව යොදන්න.

   යූරියා හෙ./කි. 150 බැගින්
   පොටෑෂ් (MOP) හෙ.කි. 75 බැගින්

<u>සැලකිය යුතුය</u>: මූලික පොහොර යෙදීමට ප්‍රථමයෙන් පාත්ති හොඳින් නෙමන්න. පොහොර යෙදූ වහාම ජලය සැපයීම නොකල යුතුය.

<u>මතුපිට පොහොර යෙදීම</u>
සිටුවා සති 4 තින් පමණ පසු පහත සඳහන් පොහොර ප්‍රමාණයන් පේළි අතරේ දමා පස සමඟ හොඳින් මිශ්‍ර කරන්න.

   යූරියා හෙ.කි. 150 බැගින්
   පොටෑෂ් (MOP) හෙ.කි. 75 බැගින්

7. <u>ජලය සැපයීම</u> : සියළුම බීජ පැළවෙන තුරු දිනපතාම ජලය සපයන්න. ඉන්පසු දින 3-4 තුට වරක් ජලය සපයන්න.

8. <u>වල්පැල මර්ධනය</u>: පැළ වී සති 2-4 කින් වල්පැල ගලවා දමන්න. වල්පැල පැලවීමෙන් පොහොර දැමීමත් එක විටම පාළු සිදුකල යුතුය.

9. <u>පලිබෝධ හා රෝග මර්ධනය</u>:

1. <u>කරල් ගුල්ලා</u>:
රතු මතුණෙන් සහ කොල හකුලන දළඹුවන් ප්‍රධාන කෘමිවෙස්, රෝග තත්ත්වය වැඩි වන්නේ නම් කෘමි නාශකයක් භාවිත කරන්න.

කාබරිල් 85% (carbaryl 85% WOP) නිර්දේශිත කෘමිනාශකයයි.

ප්‍රමාණය හෙ/කි. 1.1.

2. <u>පිළිපුස් රෝගය</u>

අ. රෝග ලක්ෂණ - කොලය මතුපිට සුදු පැහැති පැල්ලම් තැනින් තැන දිස්වේ. මෙම පැල්ලම් වැඩි සුර ඇති වූ විට කොලය වියලී හැලී යයි.

ආ. මර්ධනය සඳහා බෝග මාරුවෙන් මාරුවට සිටුවන්න.

කාබෙන්ඩසිසිම් (Carbendiazine) යොදන්න.

3. <u>කහ පැහැති විවිතු පතු රෝගය</u>

<u>රෝග ලක්ෂණ</u>
කොල කෙලවර වර්ණය අඩුවී කොළ කාරවී ලා කොල පැහැයට හැරෙයි. ලපවී කොල වල කහ පැහැති කාරවී මතුවී එවා වටේ කද සහ ලා කොල පැහැති පැල්ලම් ඇති වේ.

කරල් කුඩා වී වන්වී ලා කොල පැහැයක් ගනී.

<u>මර්ධනය සඳහා</u>:

රෝගය වැලදී ඇති පැළ උදුරා දමන්න නිරෝගී බීජ තෝරා ගන්න

ප්‍රමාදවී වගා කිරීමෙන් රෝගය වැඩිවීමට හේතුවන නිසා වගා කිරීමේ නිර්දේශිත කාලසීමාවන් අනුගමනය කරන්න.

10. <u>අස්වනු නෙලීම</u>

ලපවී අවස්ථාවේදී කරල් කපා ගන්න හොඳ තත්ත්වයේ කරල් ලබා ගැනීම සඳහා දිනක් හැර දිනක කරල් කපා දමන්න.

කරල් ගසෙන් ඇදීමෙන් හෝ කරකවා නොකඩා තටුවෙන් කපා ගැනීම සඳහා මුවහත් පිහියක් පාවිච්චි කරන්න.

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Annex A-4

SNAKE GOURD

Snake gourd can be grown throughout the year in system B. But best time of sowing is from April to August.

1. **Soils** : Best yields are obtained on well-drained soils, rich in humus.

2. **Land preparation** : Plough to a depth of 20 - 30 cm and rotate to a fine tilth.

3. **Varieties**

   a) TA : Fruit very long, cylindrical, ashy white mottles with discontinuous green steaks.

   b) MI short : Fruit - short and cylindrical, very light green with ashy white mottles.

   c) Thinnavely : Fruit - Long cylindrical, ashy white mottles with continuous white steaks.

4. **Seed Rate** : 4 kg/ha

5. **Planting** :

   a) Prepare planting holes 30 x 30 x 30 cm.

   b) Mix 3 kg of cowdung/planting hole with soil and heap it to about 10 cm above ground level.

   c) Distribute 3 seeds/hole, well spaced to a depth of 2-3 cm. Soaking seeds overnight before sowing promotes early germinations and requires less water in the planting hole.

   d) Thin to 2 seedlings/hill 2 weeks after emergence.

   e) Seedlings can also be raised in polythene bags and transplanted in the field, Thus avoiding adverse effects caused by unfavourable weather conditions.

6. **Training and Pruning**

a) Three weeks after germination, Train vines on a strong horizontal trellis about 2 m high.

b) Prune all developing laterals below the trellis level.

7. **Fertilizer Use :**

a) Basal - apply the following formulations and rates

Urea	-	220 kg/ha
TSP	-	380 kg/ha
MOP	-	125 kg/ha

b) Top dressing - apply 4 weeks after planting

Urea	-	90 kg/ha
MOP	-	50 kg/ha

8. **Irrigation**

a) Maintain soil moisture but do not over irrigate. Excess moisture is detrimental to the root system.

b) Mulching during dry months is important to conserve soil moisture.

9. **Weed Control**

Good weed control is important for satisfactory growth. Hand weeding in rows should be done as soon as seedlings appear.

ANNEX - 5 (IN SINHALESE)

බිටානා වගා කිරීම.

මෙරට වව්වන්කා වලට නැකම් තියන මෙම බෝගය යල සහ මහ කන්න දෙකෙහිදීම වගා කළ හැකිය. මෙම වගාව සඳහා හියුමස් සහිත පසක් තෝරා ගත යුතුය.

බීජ පසක් කිරීම.

පොළොව 20 - 30 cm (අඟල් 8 - 12) පමණ ගැඹුරට සී සෑමෙන් පසු පස් තැට සිහින් වන වලස මොදින් හැරෝ කර ගත යුතුය.

30 X 30 X 30 cm (අඟල් 12 X 12 X 12) ප්‍රමාණයට වලවල් සකස් කොට එම වලවල් වලට ගොම පොහොර කිලෝ 5 පහ බැගින් පමණද ඊටම රසායනික පොහොරද යොදා (ප්‍රමාණය පසුව දක්වා ඇත.) 10 cm ක් (අඟල් 4) පමණ පස් මුදුන් කරන්න.

බීජ අවශ්‍යතාවය.

එක් හෙක්ටයාරයක් සඳහා බීජ කිලෝග්‍රෑම් එකක් පමණ අවශ්‍ය වේ.

මොදින් පැල වන බීජ දෙකක් බැගින්ද පැලවීම පැලවූ බීජ තුන බැගින්ද වලවල්වල සිටුවා පැලවුණු පසු වලක පැල දෙකක් ඉතිරි වන සේ ඉතිරි පැල ගලවා දමන්න.

සිටුවීමේ පරතරය.

පේළි අතර 100 cm (අඟල් 40) හා පේළියක පැල අතර 50 cm (අඟල් 20)

පොහොර යෙදීම

මූලික :- යූරියා - කි.ග./හෙ. 220, සුපර්ෆොස්ෆේට් (TSP) - කි.ග./හෙ. 380 සහ පොටෑෂ් (MOP) - කි.ග./හෙ. 125
බෝගය සිටුවා සති 4 දින් පසු යූරියා කි.ග./හෙ. 45 ක් සහ පොටෑෂ් කි.ග./හෙ. 25 යොදන්න.

ජලය සැපයීම

(අ) ජලය හැරවීම සඳහාත් බැස්සවීම සඳහාත් පැල සිටවූ වලවල් වලට 25cm (අඟල් 10) පමණ දුරින් තොගැඹුරු කාණු කැපිය යුතුය.

(ආ) බීජ පැලවන තෙක් දිනපතා ජලය සැපයීමත් ඉන්පසු දින 7 කට වරක් ජලය සැපයීමත් සෑහේ.

(ඇ) පාන්නි වලට ජලය උරා ගන්නා ප්‍රමාණයට ජලය සැපයිය යුතු අතර වැල් වැසී යන ආකාරයට ජලය නොසැපයීමට වග බලා ගත යුතුය.

වල් කර්ෂනය.

අතින් වල් උදුරා දමා බීජ පැලවී සති 3ක් පමණ ඉක්ම ගිය පසු පිදුරු වසුනක් දැමීම යෝග්‍ය වේ.

රෝග මර්ධනය

1. වවුනි මිල්ඩිව් - යටි පුස් රෝගය.

රෝග ලක්ෂණ:- කොළවල තහ පැහැති දිගැති පුල්ලි මතු වේ. කොළ දුඹුරු පාට වී හැකිලෙයි. අළු හා සුදු පැහැති ඩිජාතු ජාල කොළවල යටි පැත්තේ දිස්වේ.

මර්ධනය සඳහා:- පාත්ති අවට ඇති ලදු කැලෑ පැලෑවි ආදිය කපාදමා පිරිසිදුව තබන්න. නිර්දේශ කර ඇති දිලීර නාශකයක් පාවිච්චි කරන්න.

2. පවුඩරි මිල්ඩිව් - පිටි පුස් රෝගය.

ලක්ෂණ.:- කොළ තහ පාට වීම, සුදු පැහැති ඩිජාතු ජාල, කොළය දෙපැත්තෙන්ම පෙනෙන්නට ඇත.

මර්ධනය:- පාත්ති අවට ඇති ලදු කැලෑ පැලෑවි ආදිය කපා දමා පිරිසිදුව තබන්න. නිර්දේශ කර ඇති දිලීර නාශකයක් පාවිච්චි කරන්න.

3. මෘදු කුණුවීම

රෝග ලක්ෂණ :- පසට ආසන්නව වැලේ දණ්ඩ සහ ගැටවල දියර වැනි කුණුවීමක් දැකිය හැකිය.

මර්ධනය :- අධික තෙතමනය වලක්වන්න. පස බුරුල් කොට වාතාශ්‍රය ලැබීමට සලස්වන්න. පසට හා වැලට නිර්දේශිත දිලීර නාශකයක් යොදන්න.

4. විවිතු වයිරස් රෝගය.

රෝග ලක්ෂණ.:- කොළ පාට හා කහ පාට මිශ්‍ර ලප කොළවල ඇතිවේ. කොළ හැකිලී රැලි වැටේ.

මර්ධණය :- රෝගය වැලදී ඇති වැල් ගලවා විනාශ කරන්න. රෝග වාහකයින් කෘමි නාශක මගින් විනාශ කරන්න.

අස්වනු නෙලීම.

ගෙඩි වල පිටි වැනි පටලයක් සෑදුනු විට නෙලාගත යුතුය. මල් පිපී දින 20 කින් ගෙඩි කඩා ගත හැක.

අස්වැන්න.

හෙක්ටයාරයකට කිලෝග්‍රෑම් 15,000 - 25,000 අතර.

ගබඩා කිරීම

ගෙඩි මාසයක් පමණ කල් තබා ගත හැකිය.

Annex B-1

GUIDELINES FOR IDENTIFICATION OF COMMON CROP PROBLEMS

The abnormalities of crop growth are found every day on the fields. As extensionists, we need to distinguish normal from abnormal growth when we are on the fields with farmers.

Some abnormalities like wilting or leaf burning can have different causes.

In order to identify accurately the crop problems; the extension worker has to:

a) watch closely the trouble signs such as wilting, stunting, leaf rolling, leaf browning, bruising, abnormal colour, spots on leaves, or signs of insects feeding.

b) examine thoroughly the affected plants, including: leaves (both sides), the root system, the inside of the stem to see if the roots develop normally or rot.

c) obtain information from farmer concerning the type of insecticide, herbicide applied and dose used; since the application of an overdose of fertilizer, herbicide or pesticide might create the abnormal problem.

d) see whether the problem occurs uniformly on the entire field or only in spots, since some problem such as poor drainage, nematodes do not affect the entire field at one time.

APPEARANCE SYMPTOMS AND PROBABLE CAUSES

1. Wilting

Detective work :

- Using the shovel to pull up a few plants and examine the root system.
- Checking stem for borers.
- Check the soil moisture and water table

Probable causes:

- Lack of moisture due to drought
- Diseases: bacterial or fungal wilts caused by poor drainage (discolouration of vascular tissues and stem rots).
- High temperature combined with dry and windy conditions.

2. Leaf rolling or curling

Detective work:
- Look for insects on the crop leaves
- Using pocket magnifying glass to facilitate identification of insects.

Probable causes:
- Sucking insects feeding on stem or leaves
- Lacking moisture .
- Virus (curled and wrinkled leaves).
- Calcium deficiency.

3. Leaf burning or browning

Detective work:
- Asking farmers about crop management practices.
- Examining crop leaves

Probable causes:
- Drought
- Fertilizer burn
- Insecticide overdose
- Herbicide damage

4. Leaves show feeding holes.

Detective work :
- Examine the leaves both sides; using the magnifying glass to identify small insects, look for insect hiding in the soils

Probable causes:
- Caterpillars (soiled with excreta)
- Beetles
- Snails

5. Spots on leaves

Probable causes:
- Sucking insects
- Spilling of fertilizer
- Leafspots (cercospora : brown spots on yellowing leaves)

6. Leaf drying

Probable causes:
- Leafhoppers, or Aphids sucking the leaves.

7. Silvery tunnels in the upper-surface of leaves

Probable causes : - Leaf miner

8. Upward curling of leaves with rolled edges

Probable causes : - Thrips

9. **Downward curling leaves :**

Probable causes : - Mites

10. **Leaf mottling , malformation**

Probable causes : - Virus

11. **Yellowing , stunting**

Probable causes :
- Nutrient deficiency
- Root rot, stem rot
- Poor drainage
- Excessive acidity

12. **Overnight defoliation**

Probable causes : - Leaf cutter ants

13. **Young seedlings collapse at ground level**

Probable causes :
- Damping-off and seedling blight
- Heat girdling of stem (Cow peas, green gram.

14. **Poor germination**

Detective work : - Dig up seeds or look for seeds in the soils to determine the causes

Probable causes:
- Planting too deep, too shallow
- Lack of moisture, seeds were washed away due to heavy rain or irrigation
- Bird, rodents, fertilizer burn, soil crusting .

Annex B-2

LESSONS LEARNED FROM NURSERY PREPARATION

During April-May 1992, about fifteen extension agents and their supervisors were involved in preparing several nurseries for cabbage, brinjal and onion (big and yellow onion). Four cabbage nurseries were in good shape, but one failed. Some brinjal nurseries did have problem due to low germination rate. As regards yellow onion nurseries, about 10 farmers have partly failed. It is time for us to draw some conclusions on factors affecting the success or failure of nurseries activities.

Below are the main factors contributing to the failure of a nursery:

1. Watering Problem

One cabbage nursery failed because water was not fully available. For watering, the farmer used the water from a well and did not water enough and as a result the germination rate was very low and young seedlings died due to lack of humidity in the seed bed.

On the contrary two yellow onion nurseries were over irrigated and farmers did not dry out water after irrigation; consequently, young seedlings were severely infected by Damping off and died.

2. Exposure to Direct Sunlight

Farmers removed straw 4 - 5 days after germination; but yellow onion young seedlings were not covered after the straw was removed due to the late arrival of polythene; consequently all seedlings of five beds dried up. So it is very important to cover young seedlings from 10 am to 3 pm during the first 10 days after the straw is removed.

It should be noted that the covering must be done in such a way that the seed beds have a good aeration.

3. Lack of Good Care

The supports of the polythene shade collapsed; the seedlings were wrapped by the polythene under sunlight consequently seedling were dried up by the heat.

Some farmers used strong dosages of fungicides and insecticides which resulted in damaging 40- 60% of seedlings.

4. Lack of Supervision from Extension Agents

Two nurseries were not done correctly. Recommendations were not followed and as a result, seedlings did not develop well as expected. Extension agents in charge of these nurseries did not pay regular visits to the fields.

II. Procurement of Good Seedlings

Good seedlings are obtained from nurseries laid on sandy loam in well drained areas. In sandy loam, seedlings' roots are likely to be less damaged when being lifted for transplanting.

Healthy seedlings were produced in the nurseries where seeds were sown moderately thin.

Good seedlings were also obtained from nurseries free from weeds and where watering had been done regularly.

More seedlings were obtained from nurseries treated with fungicide after straw was removed.

It is really not necessary to select a fertile soil to install a nursery but it is better to transplant a seedling from a poor soil to rich soil.

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Annex C-1

FIELD VISIT REPORT

1. Carried out by : ..... Date :.....

   Accompanied by : .....

2. Nurseries or crops fields visited and locations:-

3. Names of farmers contacted :-

4. Observations and remarks on the situation of each field visited:

5. Farmers' reactions :

6. Recommended actions to be taken by :

7. Other suggestions :-

.....
Signature

CC:

Annex C-2

WEEKLY REPORT ON EXTENSION ACTIVITIES

Period from .....to 1992

Submitted by .....Extension Assistant

I. **General information**

a) Number of extension agents :.....
b) Name of the supervisor :.....

II. **Implementation progress**

1. Main accomplishments in the week (Such as land selection, land preparation, nursery preparation, transplanting, weeding, spraying etc.. indicate the surface area in hectares).

2. Crop situation (the development of crops, insects, diseases and actions taken....)

3. Extension activities

a) Farmer training activities (extension meetings, in class training sessions, number of training session organized, locations, number of participants, topics discussed)

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b) Demonstration days and field days (Number organized, dates, locations, number of participants: men, women, observations .)

c) Other extension activities

III. Problems encountered and suggestions

IV. Self evaluation of the group

V. Conclusion

Annex C-3

MONTHLY PROGRESS REPORT

From 25/.. to 25/.. 1992

A. General Information

1. Name of the extension agent :

2. Name of the direct Supervisor :

3. Location (name of the unit) :

4. Crops :

B. Implentation Progress

1. Summary :

Crop	Target for 92 (ha)	Done to previous Months (ha)	Planned this Month (ha)	Done this Month (ha)	Remained (ha)

2. Main accomplishments :
(Nursery and land selection, land preparation, transplant, weeding, spraying... indicate the surface area in hectares)

3. Crop situation: (the development of the crops, insect diseases and actions taken..)

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C: **Other Extension activities**

1. Extension planning meeting (No. organized, No. of participants (women and men)

2. Training of farmers: (No. of training sessions organized dates, locations, No. of participanting farmers, topics discussed.

3. Demonstration days: (No. demonstration days organized, dates, locations, No. of participants : men, women; observations..)

4. Field days: (No. organized, dates locations, No. of participants..)

5. Observations and recommendations:

6. Conclusion:

TRAINING SESSIONS PROGRAMMED FOR YELLOW ONION PRODUCTION IN YALA 1992

MONTH & DATE	VENUE	TYPE OF TRAINING PARTICIPANTS	CATEGORY OF PARTICIPANTS	NO. OF PARTICIPANTS	PERIOD OF TRAINING	NAMES OF RESOURCE PERSONS
04.08.92	Damminna	Demonstration day	Potential Export Crop Growers	25	08 – 11	Rath, Tissa, Gamini.
05.08.92	Bandanagala	"	"	"	"	Asanga, Buwaneka.
10.08.92	Pimburattewa	"	"	"	"	Shanta, Tissa.
10.08.92	Kandegama	"	"	"	"	Bandula, Manjula.
11.08.92	Aluthoya	"	"	"	"	Bandula, Dharmasinghe.
12.08.92	Nidanwala	"	"	"	"	Buwaneka.
15.08.92	Divuldamana	"	"	"	"	Tissa, Rajakaruna.
15.08.92	Nidanwala	Okra Quality Control	"	"	"	Bidara, Padmina.
16.08.92	Ihala Ellewewa	"	"	"	"	Buwaneka, Nyas.
24.08.92	Ellewewa	Bitter Gourd	"	"	"	Buwaneka. Nandasena.

TRAINING SESSIONS PROGRAMMED FOR YALA 1992

MONTH & DATE	VENUE	TYPE OF TRAINING PARTICIPANTS	CATEGORY OF PARTICIPANTS	NO. OF PARTICIPANTS	PERIOD OF TRAINING	NAMES OF RESOURCE PERSONS
16.05.92	Kudawewa	Brinjal Production	Participating Farmers	06	09 – 10	Dinatissa, Samarasinghe.
17.05.92	Bandanagala	Butternut Production	"	15	09 – 11	Dinatissa, Asanga.
21.05.92	Kudawewa	Brinjal Production	Extension Agents & Far	"	05 – 06	Minh, Rath, Bandula.
03.06.92	Nidanwala	Okra Production	Participating Farmers	20	10 – 11	Bidara, Padmini.
04.06.92	Ellewewa	Bitter Gourd Production	"	05	02 – 03	Dinatissa, Buwaneka.
09.06.92	Bandanagala	Butternut Production	"	20	03 – 05	Buwaneka, Asanga.
10.06.92	Bogaswewa	Yellow Onion Production	"	15	10 – 12	Minh, Dinatissa, Buwaneka.
20.06.92	Bogaswewa	Weed Control for Yellow Onion	"	15	03 – 05	Dinatissa, Buwaneka, Janaka.

TRAINING SESSIONS PROGRAMMED FOR YELLOW ONION PRODUCTION IN YALA 1992

MONTH & DATE	VENUE	TYPE OF TRAINING	CATEGORY OF PARTICIPANTS	NO. OF PARTICIPANTS	PERIOD OF TRAINING	NAMES OF RESOURCE PERSONS
30.05.92	Aralaganwila	Yellow Onion Production	Participating Farmers	30	3 – 5 pm	Minh, Bandula, Vijekoon.
02.06.92	Damminna	"	"	25	"	Rath, Tissa, Dharmasinghe.
02.06.92	Aluthwewa	"	"	30	"	Minh, Bandula, Jayasooriya.
03.06.92	Devagama	"	"	15	"	Rath, Jayarathna.
04.06.92	Kandegama	"	"	15	"	Bandula, Manjula.
04.06.92	Pimburattew	"	"	30	"	Bandula, Shanta.
04.06.92	Damminna	"	"	10	"	Rath, Tissa, Gamini.
05.06.92	Ihalawewa	"	"	35	"	Minh, Bandula, Rajakaruna.
06.06.92	Divuldamana	"	"	35	"	Minh, Bandula, Rajakaruna.
08.06.92	Nidanwala	"	"	10	"	Bandula, Rajakaruna.

FIELD DAYS PROGRAMMED DURING YALA 1992

MONTH & DATE	VENUE	TYPE OF TRAINING	CATEGORY OF PARTICIPANTS	NO OF PARTICIPANTS	PERIOD OF TRAINING	NAMES OF RESOURCE PERSONS
22.08.92	Pimburattewa	Field days	Potential export crop growers	20	1 day	Shanta, Bandula.
22.08.92	Aralaganwila	"	"	25	"	Tissa, Vijekoon.
25.08.92	Devagama	"	"	25	"	Bandula, Jayarathne.
22.08.92	Aluthoya	"	"	25	"	Dharmasingine, Tissa.
27.08 92	Aluthwewa	"	"	20	"	Bandula, Jayasooriya
28.08.92	Ihalawewa	"	"	25	"	Buwaneka, Nyas.
29.08.92	Kudawewa	"	"	25	"	Buwaneka, Samarasinghe.

FIELD DAYS PROGRAMMED DURING YALA 1992

MONTH & DATE	VENUE	TYPE OF TRAINING	CATEGORY OF PARTICIPANTS	NO. OF PARTICIPANTS	PERIOD OF TRAINING	NAMES OF RESOURCE PERSON
04.08.92	Nidanwala	Field Days	Potential export crop growers	20	1 day	Rath, Minh, Yapa.
06.08.92	Kandegama & Damminna	Field Days	Potential export crop growers	20	1 day	Minh, Bandula.
08.08.92	Divuldamana & Ihalawewa	Field Days	Potential export crop growers	20	1 day	Dinatissa, Buweneka.
11.08.92	Bogaswewa	Field Days	Potential export crop growers	20	1 day	Rath, Tissa.
13.08.92	Bandanagala	Field Days	Potential export crop growers	20	1 day	Dinatissa,
15.08.92	Kalukele	Field Days	Potential export crop growers	20	1 day	Rath, Nayeem.
21.08.92	Maguldamana	Field Days	Potential export crop growers	20	1 day	Minh, Nayeem.

IN-SERVICE TRAINING SESSIONS PROGRAMMED FOR YALA 1992

MONTH & DATE	VENUE	TYPE OF TRAINING	CATEGORY OF PARTICIPANTS	NO. OF PARTICIPANTS	PERIOD OF TRAINING	NAMES OF RESOURCE PERSONS
20.07.92	Drainage Trial Site	In-Service Training	Extensionists	17	02 – 06	Rath, Minh, Nimal.
28.07.92	"	"	"	"	"	Rath, Yapa, Nimal.
27.07.92	Packhouse	Quality Control of Butternut & Cantaloupe	"	"	08 – 12	Jackie, Rath, Minh.
04.08.92	Field and Packhouse	"	"	"	"	Rath, Minh.
20.09.92	Fields	Yellow Onion Quality Control	"	"	"	Bill, Rath, Minh.

TRAINING SESSIONS PROGRAMMED FOR YALA 1992

MONTH & DATE	VENUE	TYPE OF TRAINING PARTICIPANTS	CATEGORY OF PARTICIPANTS	NO. OF PARTICIPANTS	PERIOD OF TRAINING	NAMES OF RESOURCE PERSONS
01.06.92	Kudawewa	Brinjal Production	Participating Farmers	17	03 – 05	Minh, Buwaneka, Samarasinghe.
03.06.92	Nidanwala	"	"	"	10 – 12	Buwaneka, Bidara, Padmini.
03.06.92	Nidanwala	Butternut Production	"	"	"	Minh, Buwaneka, Bidara, Padmini.
05.06.92	Bandanagala	"	"	30	03 – 05	Buwaneka, Dinatissa, Somawasa.
09.06.92	Nidanwala	Snake Gourd Production	"	10	09 – 12	Rath, Buwaneka, Bidara, Padmini.
04.06.92	Dammina	"	"	10	"	Rath, Tissa, Gamini.
05.06.92	Ihalawewa	"	"	35	"	Minh, Bandula, Rajakaruna.
06.06.92	Divuldamana	"	"	35	"	Minh, Bandula, Rajakaruna.
08.06.92	Nidanwala	"	"	10	"	Bandula, Rajakaruna.

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TRAINING SESSIONS PROGRAMMED FOR BUTTERNUT PRODUCTION IN YALA 1992

MONTH & DATE	VENUE	TYPE OF TRAINING PROGRAMME	CATEGORY OF PARTICIPANTS	NO. OF PARTICIPANTS	PERIOD OF TRAINING	NAMES OF RESOURCE PERSONS
20.05.92	Damminna	Butternut Production	Participating Farmers	15	09 – 11	Bandula, Rajakaruna
30.05.92	Aluthoya	"	"	24	10 – 12	Bandula, Dharmasinghe.
29.05.92	Pimburattewa	"	"	10	03 – 05	Bandula, Shanta.
01.06.92	Kandegama	"	"	06	10 – 12	Minh, Bandula, Manjula.
01.06.92	Divuldamana	"	"	20	03 – 05	Bandula, Gamini.

Annex C-5

CROP FIELD SITUATION

Crop : ..... Date : .....

Location FC : ..... Unit.....

Name of Farmer : .....

Surface Area : .....

Drainage Situation :

Well drained : Yes ..... No .....
Excess water : Yes ..... No .....

Soil Texture : .....

Disease problem : .....
.....
Insect problem : .....
.....
Actions suggested :.....
.....
.....
Date : .....

Results: Good ..... Bad .....

Other Observations and Recommendations :

Name and signature of reporter .....

DAILY ITINARARY RECORD

NAME OF EXTENSIONIST................ UNIT.............. FROM .... TO............

DAY & DATE	LOCATIONS		DISTANCE	NO. OF FARMERS MET	DESCRIPTION OF WORK DONE	REMARKS
	DEPARTURE FROM	ARRIVE AT				