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MARD PROJECT

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YALA 1992 ON-FARM AND SEED FARM TRIALS

DATE OF PLANTING, FERTILIZER, AND WEED CONTROL TRIALS ON VEGETABLE AND LEGUME CROPS

by

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MARD PROJECT
PIMBURATTAWA

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ACRONYMS

AS	Ammonium sulphate
ATG&D	Agricultural Technology Generation and Dissemination
C	Centigrade
CD	Cowdung
DOA	Department of Agriculture
FF	Full fertilizer rate
1/2F	Half recommended fertilizer rate
g	gram
ha	hectare
K	Potassium
kg	kilogram
l	litre
m^2	square meter
MARD	Mahaweli Agriculture and Rural Development Project
MEA	Mahaweli Economic Agency
MOP	Muriate of potash
N	Nitrogen
NCB	Non Calcic Brown
NLD	Narrow Leaf Disorder
OC	Other crop
OFT	on-farm trial
P	Phosphorus
RARC	Regional Agriculture Research Center
RBE	Redish Brown Earth
t	ton
TSP	Triple super phosphate

EXECUTIVE SUMMARY

The goal of the Mahaweli Agriculture and Rural Development (MARD) project is to increase the income of settler farmers' in Mahaweli System B through production of other crops (OCs) to supplement rice. Diversification of crop production is the responsibility of the Agricultural Technology Generation and Dissemination (ATG&D) component of MARD. The agronomy section of ATG&D tests and generates technology to develop recommendations specific for OCs in System B.

To achieve this end, the agronomy subcomponent worked in cooperation with field staff of the Mahaweli Economic Authority (MEA) in designing, executing and monitoring a program of on-farm trials (OFTs) and MEA Seed Farm demonstration plots for Yala 1992. The MEA Seed Farm trials included examples of each OFT, plus crop variety trials and assessments of new crops not appropriate for on-farm evaluation. A total of 259 OFTs and 33 Seed Farm trials were conducted to demonstrate to farmers the best available technology, as well as to improve or develop technology specifically for System B.

RESULTS OF ON-FARM AND SEED FARM TRIALS

Big, Yellow and Red-skinned Onions

A. Date of Planting

Big, yellow, and red-skinned onions respond similarly to different planting dates. Yields from plantings between May 6 and July 16 averaged 20.7 tons/hectare (t/ha), with a high 38.4 t/ha (Table 4). All of the locations were on well-drained soils, an important factor in obtaining good yields. Yields of B. onion declined with late-June to mid-July plantings in System B but yellow onion yields were maintained above 20 t/ha until July 20 (Table 14c) on the deep, rich and well-drained soils in Bakamoona.

B. Fertilizer Combinations

B. onion yields ranged from 10.9 to 27.9 t/ha on well-drained Red Brown Earth (RBE) and Non-calcic Brown (NCB) soils (Table 5). Yields were consistently higher from plots treated with cowdung plus full fertilizer at planting. Yields from full fertilizer ranked second, followed by half fertilizer + cowdung. At a price of Rs 20/kg for onion, the

average profit from 10 t/ha of cowdung + full fertilizer was Rs 408,200/ha. The addition of 10 t/ha of cowdung (at a cost of Rs 2,200) to half fertilizer generated an additional average profit of Rs 40,000/ha. The same trend occurred at the Seed Farm and with trials on yellow onion.

Onion yields were significantly higher when either the recommended rate of fertilizer was increased to 125 percent or when nitrogen (N) was increased by 25 percent.

C. Variety Trials

Yields of 4 varieties of B. onion and 2 of yellow onion ranged from 22 to 46 t/ha (Table 8), with the yellow variety, Hybrid Henry Special, out performing all other varieties by 70 percent. Hybrid Henry Special yielded consistently higher than Dessex (yellow). Yellow varieties usually out yielded Big and red-skinned varieties.

Non-Indian varieties of big, yellow and red-skinned varieties appeared susceptible to damping-off disease, resulting in higher seedling losses in nurseries and higher production costs for both seed and chemicals.

Rampur Red yielded significantly higher than Puna Red (Table 11) and about the same as Granex. A red-skinned variety, Commander, in its only test, was the highest yielder of seven varieties, followed by Rojo (Table 13). However, Commander appeared to be very susceptible to damping-off disease, which resulted in loss of nursery plants.

Red Onion

A. Date of Planting

Red onion yields averaged 16 t/ha from July 3 to August 3 plantings but only 9.70 t/ha from August 15-17 plantings.

Production costs, not including labor, were Rs 103,100/ha. At a market price of Rs 30/kg, profit from July 3 to August 3 plantings averaged Rs 474,000/ha; mid-August plantings averaged Rs 91,900/ha.

Red onion is sensitive to excessive moisture and high humidity, conditions that are conducive to the development of fungal diseases. Hence, well-drained soils are a must for red onion production.

Lasso at 5 liters/ha (l/ha) controlled weeds for about 1 month without injury to red onion at 20 demonstrations.

B. Fertilizer Combinations

The addition of cowdung (10 t/ha) to full fertilizer increased red onion yields by 25 percent.

Garlic

Application of 10 t/ha of cowdung in addition to full fertilizer increased garlic yields by 18 percent. Half the full fertilizer rate plus 10 t/ha of cowdung increased yield by 67 percent and profit by Rs 3,900/ha compared with cowdung alone.

Chilli

Acceptable chilli yields were obtained with early Yala plantings (April 7 to April 30), which permitted the crop to escape major thrip damage. Thrip infestations on plantings after May 7 could not be controlled with as many as 13 insecticide applications.

Thrip populations were higher and leaf fall and leaf aberrations more prevalent on furrow irrigated plots than on sprinkler irrigated plots. However, the mean difference in yield was significant only at the 10 percent level.

Capsicum

A. Date of Planting

Capsicum yields ranged from 4 to 11 t/ha and decreased with plantings in late June.

B. Fertilizer Combinations

A combination of 10 t/ha of cowdung and half fertilizer resulted in significantly higher yields of Capsicum than the full fertilizer treatment. At a price of Rs 20/kg for fruit, supplementing half fertilizer with 10 t/ha of cowdung (cost Rs 2,200) generated an additional Rs 22,000/ha.

Legume Crops

A. Date of Planting

Yield trends of cowpea, greengram, soybean and groundnut were similar in that highest yields occurred from March and June plantings, with lower yields from April plantings (Table 25).

Cowpea yields decreased only slightly from plantings in July (Table 26). Cowpea tolerates later planting better than the other three crops tested. Yield of groundnut planted in May was about 2 t/ha (Table 28), but decreased to 1 t/ha or less when planted in July. High groundnut yields at Bakamoona with mid-June plantings suggest that plantings dates can be extended on rich, well-drained soils.

B. Fertilizer Combinations

Yield trends were similar for cowpea and groundnut in response to cowdung applications. The application of 10 t/ha of cowdung (cost Rs 2,200) to cowpea increased profit by Rs 4,000/ha.

The addition of 10 t/ha of cowdung increased the average yield of groundnut by 347 kg/ha (Table 29). This represents an additional profit of Rs 6,475/ha, assuming a market price of Rs 25/kg and a cost of Rs 2,200/ha for cowdung.

The use of gypsum on groundnut trials at the Seed Farm increased yield by almost 29 percent (Table 32).

C. Variety Trials of Groundnut

Varieties MI-64 and MI- 74 yielded 2 t/ha, about double the averasge yields of HYQ 49 and HYQ (CG)5-47. ICGV86564 out-yielded Red Spanish by 25 percent at the Seed Farm. About the same difference occurred at Bakamooma and the yields were higher.

Cabbage

A. Date of Planting

February plantings yielded 10 t/ha and produced export quality cabbage. Later plantings were adversely affected by heat and insects, which reduced both quality and yield (Table 30). A July planting produced 38 tons/ha, for a profit of Rs 32,200/ha at a market price of Rs 11/kg.

B. Fertilizer Combinations

Cabbage yields were higher with full fertilizer than with half fertilizer + 5 t/ha cowdung (Table 31). The reverse occurred when the cowdung rate was increased to 10 t/ha.

C. Variety Trials

Variety KY Cross gave a higher yield than Exotic in terms of the number of heads formed and gross and net weight (Table 35). However, head formation of both varieties was adversely affected by high temperatures and severe insect infestations.

Carrot

The average yield of carrot during Yala was only 2 t/ha, the highest yield being 5.6 t/ha (Table 36). Seven varieties were tested, four of which produced a minimum profit of Rs 6,000/ha with costs of Rs 23,500/ha, excluding labor. Variety W 358 shows promise in System B with an average yield double that of Cape Market and a profit of Rs 60,000/ha.

Beetroot

Beetroot yields exceeded 3 t/ha from June and July plantings (Table 37) but decreased to 1.2 t/ha when planted August 8. At a price of Rs 15/kg, a yield of 3.2 t/ha grossed Rs 48,000/ha or a profit of Rs 26,500/ha if production costs did not include labor. However, yields and profits were much higher with Maha plantings from December-January, e.g. a profit of approximately Rs 275,000/ha (8).

Squash

Butternut squash yielded an average of 6.5 t/ha vs 4.3 t/ha for acorn from 18 paired trials planted between March 3 and June 28 (Table 39). Later plantings produced lower, but acceptable yields. Both crops were subject to mildew and viral infection, with acorn squash being more susceptible. Most growers were too liberal with irrigation water, resulting in less than optimum yields of both crops.

Production costs were Rs 20,000/ha, not including labor. Net income was Rs 19,200/ha for butternut and Rs 10,000/ha for acorn, assuming a market price of Rs 6/kg. At this price, a yield of 3.33 t/ha is necessary to meet production costs.

Consumers prefer the taste, shape and size of acorn over butternut squash and will likely pay a premium price for it.

Potato

Yields of four heat-resistant potato varieties were low and uneconomic. Based on an equal number of plants, Desiree out-yielded the other three varieties tested (Table 40). Potatoes do not grow well in System B during Yala or late Maha.

Tomato

Yields of 11 tomato varieties varied widely, from 0.8 to 20.6 t/ha (Table 41). Nema varieties 512 and 1401, each of which yielded more than 18 t/ha, showed tolerance to mildew and produced fruits of acceptable size. Yields of 10 t/ha or more are economic in System B.

Okra

Okra yields ranged between 8 and 2 t/ha. Yields decreased with each delay in planting between mid-August and mid-September (Table 42). Predation by leaf-eating caterpillars worsened with each delay in planting and plants were infected with virus at all planting dates.

The cost of land preparation, seed, fertilizer and pesticides totaled Rs 14,500/ha. Not including labor costs, the September 11 planting barely met production costs, the August 28 planting netted Rs 11,400/ha and the August 15 planting netted Rs 35,000/ha.

RECOMMENDATIONS

General Recommendations

General recommendations for crop production in Shri Lanka are found in the DOA's Crop Recommendations Technoguide 1990 (1). The following are suggested modifications or additions specific for System B:

1. The use of animal manure increased yields of most OCs tested in OFTs in System B. This attests to the low fertility and marginal friability of System B soils. Hence, cowdung should be used routinely in OC production. To improve the quality and increase the availability of

cowdung, animals should be coralled at night on a bed of paddy straw. With careful management, a single cow or buffalo can provide enough organic fertilizer for OC production on 1 ha of land.

2. Cover the soil surface with paddy straw at planting to: a) help control soil erosion, b) damper soil temperatures, c) reduce water loss and soil baking, d) help control weeds, and e) improve soil organic matter content.

3. Yala winds reduce crop quality and yields. Windbreaks, e.g. Gliricidia, should be planted at right angles to prevailing winds. Another option is intercropping OCs with a row of maize or pigeon pea every 50 feet.

Big, Yellow and Red-skinned Onions

1. Start onion nurseries in early April.

2. Select well-drained sites and avoid excess watering during crop development, a common practice with OC production in System B.

3. Add cowdung at a rate of 1 kg/m^2 to the fertilizer mix at transplanting.

4. Apply a recommended herbicide at planting time if a severe weed problem is expected.

5. If a developing crop is threatened by a heavy infestation of weeds, apply Lasso immediately after emerged weeds have been removed by hand.

6. Increase the DOA's recommendation for N by 25 percent as basal and top dressing at transplanting, e.g. 125 kg/ha basal and 65 kg/ha topdress.

7. Incorporate top dressing applications of N at the side of the onion row, being careful not to damage plants.

8. Procure variety Rampur from South India for commercial plantings.

9. Based on performance in System B, Hybrid Henry Special is the yellow onion of choice. Due to higher yields, profits should be comparable at a price about 30 percent lower than that for B. onion.

10. Stagger planting dates to avoid market saturation at harvest.

11. Plantings in mid-July or later often encounter rains at harvest, resulting in reduced yield and quality.

12. Continue trials with the red-skinned variety Commander, which yielded well.

Red Onion

1. Plant from October 15 to early February (avoiding heavy rains) (9) and from April to early August (10).

2. Use cowdung at a minimum rate of 1 kg/m^2 at transplanting.

3. Where labor for hand weeding is in short supply, Lasso can be used for weed control.

4. Repeat date of planting trials starting in early May.

5. Conduct additional trials to confirm yield response to chemical fertilizer mixed with cowdung.

Garlic

1. Continue garlic OFTs on homesteads or highlands with local variety Keppitipola. Use a minimum of 1 kg/m^2 of cowdung at planting, plus recommended fertilizer rates.

2. Planting dates should be from mid-June to mid-August.

3. Conduct variety trials to compare the local variety, Keppitipola, with the Indonesian variety, Kuning. The latter was superior in preliminary trials (5).

4. Conduct trials with increased fertilizer rates, at about the level recommended for B. onion.

Chilli

1. Plant chillies from November to mid-April. This permits harvest in August, before heavy thrip infestations occur.

2. If chilli plants remain healthy after harvest in February or March, an application of N will stimulate flowering and a second yield of pods.

3. Use pesticides only after there is evidence of pest damage. Do not spray for large insects as most of them are beneficial predators.

4. Do not spray until an insect problem has been identified; if the wrong insecticide is used, insect problems may increase.

5. Destroy weeds, particularly those which are faded yellow in color, because they may be infected with virus. Insects can transfer virus from diseased weeds to a crop.

6. Remove and destroy yellowish (virus-infected) chilli plants to prevent insects from spreading the virus.

7. Use the new DOA-recommended insecticides for control of thrips.

8. Conduct trials with overhead irrigation as a means of controlling thrips in Yala.

9. Train farmers and pesticide dealers in insect identification.

Capsicum

As economic yields can be obtained from November to June plantings of Capsicum, it is a useful crop for off-season cultivation in a year-round cropping system. However, later plantings require greater care because of severe thrip predation.

1. Always incorporate well-rotted cowdung at a minimum rate of 1 kg/m^2 mixed with soil when transplanting Capsicum seedlings.

2. Promote commercial production of Capsicum on well-drained soils with plantings during early Maha.

Legume Crops

1. Apply animal manure at a rate of 1 kg/m^2 along with chemical fertilizer when planting legume crops.

2. Cowpea should be planted in early Yala (April) for best results. However, because of its tolerance to various planting dates, cowpea is well adapted to rotations in a year-round cropping system. It should be planted on well-drained sites.

3. Conduct date of planting trials with groundnut at Bakamoona up to the end of June.

4. Promote groundnut as a cash crop and in crop rotations.

5. Conduct additional trials for possible improvement of quality and yield of small-seeded groundnut.

6. Increase seed of groundnut varieties MI-64, MI-74, HYQ(CG)5-47 and ICGV8654 for OFTs and demonstrations.

7. Promote production of the local Spanish variety in both Maha and Yala in System B and Bakamoona.

Cabbage

1. Cabbage can be raised with difficulty in Yala; it is slow growing and subject to insects and diseases. Promote modest commercial production, with plantings from mid-October to January.

2. Conduct date of planting trials from July to January.

3. Conduct OFTs in homesteads.

4. Apply well-rotted animal manure at a minimum rate of 1 kg/m^2 mixed with soil at transplanting of cabbage seedlings.

5. Variety KY Cross is preferable to Exotic in System B because it yields better under conditions of high temperature.

Carrot

1. For best results, confine plantings to Maha, particularly well-drained homesteads or uplands in System B.

2. Conduct date of planting trials, beginning in mid-October.

3. Conduct trials to determine the effect of supplementing the recommended fertilizer rate with 1 kg/m^2 cowdung at planting.

4. Continue variety trials to compare the performance of variety W 358 with Cape Market and other leading varieties.

Beetroot

Modest profits can be made with June-July plantings and careful management. High temperatures and severe insect pressure are major constraints during Yala; Maha plantings of beetroot give higher yields and profits.

1. Promote a modest production program with beetroot, selecting well-drained, fertile soils, and good farmers. Plant from mid-November to the end of December.

2. Conduct date of planting trials between January 15 and March 1.

3. Conduct trials on homesteads in Maha.

Acorn squash

1. Conduct additional trials during Yala, emphasizing selection of sites with good drainage and minimum use of irrigation water.

2. Apply cowdung at planting, along with chemical fertilizer.

3. Obtain available varieties of acorn squash and conduct comparative trials.

4. Conduct fertilizer trials, including higher rates of chemical fertilizer.

Potato

1. Confine potato plantings to Maha. See recommendations in Selleck et al. (8).

2. Test varieties Mondial and Spunta vs Desiree during Maha.

Tomato

1. Conduct OFTs with varieties Roma, T496, T21, Nema 512 and Nema 1401. Check with the RARC Aralaganwila for further suggestions.

Okra

1. For best results, okra should be planted in Yala from April to early August.

INTRODUCTION

The goal of MARD is to increase the income of settler farmers in System B through crop diversification. The agronomic subcomponent contributes to this goal by conducting OFTs and Seed Farm trials designed to:

a) identify crops and varieties appropriate for cropping systems in System B,

b) identify and/or develop appropriate cultural practices,

c) assist farmers to select crops, varieties and agronomic practices specific for their situation,

d) identify and alleviate constraints to increased production, and

e) demonstrate improved production technologies to agriculturalists and farmers in System B.

Information generated by these activities, in conjunction with research data from regional agricultural research centers (RARCs), particularly Aralaganwila, serve as the basis for extension recommendations for the cultivation of OCs in System B and for field days and farmer training.

Following a review of recent developments in research and results of previous OFTs, crops and technologies were selected which appear to have the greatest potential for each cropping period. Field plans to obtain information specific to OC production in System B were submitted to MEA staff for inputs. The technology thus developed serves as a basis for recommending crop rotations for extension demonstrations.

The following three projects were continued in Yala 1992 on the basis of promising results from previous OFTs and their importance to increasing farmers' incomes and developing sustainable production of OCs in System B:

a) The use of animal manure in crop production

System B soils are shallow, coarse, low in base exchange capacity and organic matter and are highly erodable. Cowdung is not used in crop production although it is often available on farms. OFTs using cowdung in production of a few OCs demonstrated increased yields, compared with chemical fertilizer alone (5,8).

2. Fertilizer rates in B. onion

Preliminary experiments at the Aralaganwila RARC (2) and field evidence in System B suggested that yields of B. onion might be improved with fertilizer rates higher than those recommended by the DOA. Yala 1991 trials showed that B. onion yields increased significantly when fertilizer was applied at 125 percent of the DOA recommended rate (6).

3. Garlic trials

Garlic trials involved variety testing, fertilizer treatments and dates of planting. July plantings have shown some promise (6).

METHODOLOGY

Crop Selection, Trial Type and Location

Each OFT consisted of a minimum of two plots (ranging in size from 25 to 250 m^2, depending upon the crop and circumstances), one to demonstrate DOA recommendations (if available) and an adjacent one for comparison of an anticipated improvement in technology. Data and yields were taken for each trial.

The trial plan included planting dates, fertilizer rates, weed control and variety testing for several crops (Table 1) for a target total of aat least 180 locations and 536 yield samples. Actual plots established numbered 259 OFTs (521 yield samples) plus 40 Seed Farm trials (113 yield samples), for a total of 259 trials and 634 yield samples (Table 2).

The plan for Yala 1992 OFTs was submitted to Block Research Officers (RO)s, Unit Managers and Field Assistants, who selected trials appropriate for farmers in their areas and made a commitment to supervise execution and data collection. From these inputs, the program for execution of OFTs by Block and Unit was finalized (Table 2).

The no-till/legume trial was not executed because a late paddy harvest delayed land preparation. At the request of management, greengram and soybean trials were eliminated and the trial program was expanded to include a Bakamoona unit.

Table 1. Plans for on-farm trials, Yala 1992

Crop	Type of trial	# yield samples	No. sites	Total samples
Red onion	Date of planting	3	10-20	30
	Fertilizer rates	2	10-20	20
	Cowdung/fertilizer	3	10-20	30
	Homestead	1	10	10
Legume crops	Date of planting			
Cowpea		3	10	30
Greengram		3	10	30
Groundnut		3	10	30
Soybean		3	10	30
Capsicum	Date of planting	3	10-20	30
Chilli		3	10-20	30
Big onion		3	10-20	30
Big onion	Fertilizer/cowdung	3	10-20	30
Groundnut		3	10-20	30
Big onion	Variety	6	2	12
Yellow onion		6	2	12
Greengram	No-till}			
Soybean	No-till}	5	1	5
Garlic demonstration*		5	1	5
Beetroot demonstration		6	1	6
Carrot demonstration		6	1	6
Acorn vs butternut squash		2	10	20
Total			**148-228**	**426**
	SEED FARM TRIALS			
One example of each OFT above		20		67
Legume crops	NPK trials			
Greengram		1		4
Cowpea		1		4
Soybean		1		4
Groundnut		1		4

* Local variety Keppitipola

Table 1 - Continued

Crop	Type of trial	# yield samples	No. sites	Total samples
Tomato	Variety	1		5
Big onion		1		2
Yellow onion		1		2
Potato		1		12
Garlic	Variety/date of planting	1		3
Onion	Fertility	1		3
Chilli	NLD - the effects of overhead vs furrow irrigation on thrips and mites	2		4
Total		**32**		**110**
GRAND TOTAL		**180-260**		**536**

Cropping practices followed those in the DOA Crop Recommendations Technoguide (1) unless otherwise stated. These included variety selection, land preparation, nursery techniques, fertilizer application and plant protection.

Application and yield data were collected by Unit Managers and Field Assistants at the end of the growing season and passed to the MEA/MARD agronomy staff.

Table 2. Yala 1992 OFTs: the number of trials targeted and reported

Crop/type of trial	Target	No. of sites planted	No. of sites harvested	# of plots
Red onion				
Date of planting	10-20	5	5	20
Fertilizer rates	10-20	3	3	6
Homestead sites	10	16	16	26
Cowdung/fertilizer	8	8	8	9
Cowpea				
Date of planting	10	2	2	2
Cowdung/fertilizer	0	2	2	6
Greengram	10	0	0	0
Greengram/soya- no-till	5	1	0	0
Groundnut	10	11	11	11
Cowdung/fertilizer	10-20	3	3	7
Gypsum	0	5	5	15
Variety	0	1	1	2
Soybean	10	0	0	0
Big/red-skinned onions				
Date of planting	10-20	20	20	30
Cowdung/fertilizer	10-20	23	23	75
Variety	6	22	22	48
Yellow/big onion				
Date of planting	0	33	33	72
Variety	6	7	7	28
Demonstration	0	37	37	46
Capsicum				
Date of planting	10-20	5	5	5?
Cowdung/fertilizer	0	4	4	12
Chilli				
Date of planting	10-20	8	8	8
Cowdung/fertilizer	0	4	4	12
Sprinkler vs furrow	2	3	3	6
Garlic demonstration	5	12	12	21
Beetroot demonstration	6	0	0	0
Carrot demonstration	6	0	0	0
Acorn vs b'nut squash	10	18	18	36
Butternut, planting dates	0	6	6	18
Total	**148-228**	**259**	**259**	**521**

Table 2 - Continued

Crop/type of trial	Target # sites	Target # plots	Actual # sites	Actual # plots
SEED FARM TRIALS				
One example of each OFT	20	67	7	23
Legume crops, fertility	4	16	1	5
Big onion				
Variety	1	4	3	7
Fertility	1	3	2	10
Yellow onion - variety	1	2	1	7
Garlic				
Variety/planting date	1	3	3	6
Fertility	0	0	1	4
Potato variety trial	1	12	1	16
Tomato variety trial	1	5	1	11
Cabbage, OFT	0	0	9	12
Variety	0	0	3	6
Variety/fertility	0	0	3	14
Carrot, variety	0	0	1	7
Beetroot, demonstrations	0	0	1	2
Acorn, butternut squash	0	0	2	4
Chilli, overhead vs furrow	2	4	1	2
Total	**32**	**110**	**40**	**113**
Grand total	**180-260**	**536**	**299**	**634**

Training

An attempt was made to select farmers who were competent and cooperative, who would take an interest in the program and be conscientious in attending to day to day requirements.

It was emphasized that trial plots should be situated on deep, fertile soils and on irrigable, well-drained land.

Protocols for trial execution were written for each location, translated into sinhala and distributed to MEA field staff and farmer cooperators. To collect data on trials conducted, data information forms were designed and distributed to farmers and appropriate MEA field staff.

Demonstrations and lectures were given to each group of 10 cooperating farmers, either in the field, Unit Office or at a farm residence. These were usually attended by the Unit Manager and Field Assistant of the area.

WEATHER DATA

The total precipitation recorded from January to October 1992 at the Aralaganwila RARC (209.5 mm) was only 26 percent of the average for the 8-year period 1984-1991 (Table 3a). For the period March to August 1992, precipitation was only 20 percent of the 8-year average. The lack of rain exacerbated the effect of high air and soil temperatures, already a constraint to crop growth.

Table 3a. Precipitation (mm) during Yala 1992 vs the 1984-1991 average

Month	1992	8-year mean
January	100.3	246.8
February	0	143.8
March	0	138.1
April	30.0	106.4
May	63.8	69.0
June	0	12.0
July	3.6	81.8
August	1.8	82.0
September	77.2	133.0
October	33.1	172.0
Total	309.8	1185.7

Data courtesy of Mr. A. de Silva, Research Officer, Aralaganwila RARC

Monthly mean maximum air temperatures ranged only 1°C from 35.6 to 36.6°C between March and September 1992 (Table 3b). Monthly mean minimum air temperatures averaged 6-8 °C lower. Maximum soil temperatures at a depth of 10 cm were

about the same as air temperatures until June, when soil temperatures exceeded air temperatures until September (Table 3b). During August and September, soil temperature at a depth of 5 cm was 40 °C. At a soil depth of 20 cm, temperatures varied between 1 and 3 °C between morning and evening. At a depth of 30 cm, there was very little diurnal change in temperature, but the maximum temperature increased gradually from 30.8 to 34.1 °C from March to September (Table 3b).

Table 3b. Mean maximum monthly air and soil temperatures (°C), Yala 1992

Month	Air temp.	Soil temperature at depths of			
		5 cm	10 cm	20 cm	30 cm
March	35.6	33.8	35.9	34.3	30.8
April	36.6	38.2	36.4	33.7	32.7
May	35.9	36.2	35.9	31.4	31.6
June	35.1	37.6	37.0	33.4	32.6
July	35.7	39.1	38.3	34.2	33.2
August	36.0	40.4	39.0	35.0	33.8
September	36.3	40.0	39.0	34.7	34.1

Data courtesy Mr. A. de Silva, Research Officer, Aralaganwila RARC

ON-FARM AND SEED FARM TRIALS

BIG, YELLOW AND RED-SKINNED ONIONS

Date of Planting Trials

A. Background

Onions are usually planted in late May in System B and most fields are harvested about the same time. Market prices are good for the early harvest but decline sharply as markets are flooded with the bulk of production.

B. Objective

To demonstrate the advantages of early plantings in terms of yield and quality and to determine the effect of planting date on yield in relation to year-round cropping.

C. Methodology

Trial details are given below:

Varieties: Puna Red, Rampur Red, Hybrid Henry Special

Plot size: 11 x 11 m, 5 x 5 m

Nursery seeding: March 14-May 5

Planting dates: May 6-July 30

Bulb spacing: 3 inches

Plant density: 1 plant/hill

Soil type and texture: NCB/SL; RBE/L

Cowdung treatment: 0-10 t/ha

Fertilizer rate (kg/ha):
Basal: ammonium sulphate (AS) - 125;
triple superphosphate (TSP) - 125;
muriate of potash (MOP) - 63
Top dressing: urea - 63, 4-5 weeks after planting

No. of insecticide treatments: 0-2 (Monocrotophos, Lebycid, Lorsban, Lannet)

No. of fungicide treatments: 0-6 (Topsin, Formosol, Trimiltox, Daconil, Benlate, Ridomil)

No. of weedings: 5-9, or 2-3 following Lasso treatment at transplanting

No. of irrigations: 10-13

Dates of harvest: August 4-October 10

D. Results and Discussion

Yields of B. onion varied from 16.2 to 38.4 t/ha, for an average of 20.7 t/ha when planted from May 6 to July 16 (Table 4). All trials were located on well-drained NCB or RBE soils, an important factor in obtaining good yields. The average yield from May 6-17 plantings was 22.2 t/ha,

significantly higher than the 17.6 t/ha average obtained from May 21-June 24 plantings. Yields were higher again from June 24-July 10 plantings, probably because all these sites were on well-drained RBE soils.

B. onion yields at the Seed Farm were much lower than those from OFTs. Yields in both OFT and Seed Farm trials decreased markedly with plantings from mid-July through August (Table 4).

B. onion is a highly profitable crop in System B, if it is grown where drainage is good and water is properly managed. Yields in excess of 25 t/ha have been obtained on both RBE and NCB soils. Highest yields and market prices are more likely if onion nurseries are started in early April. Good management will produce respectable yields with planting dates from May to July 10. Late July plantings result in lower yields and exposure to rains at harvest.

Production costs of these trials, not including labor, were Rs 23,600/ha, as follows:

Input	Cost Rs/ha
Land preparation	3,600
Seed	8,000
Fertilizer	4,000
Fungicides	4,000
Insecticides	500
Herbicide plus weeding	3,500
Total	**23,600**

Based on the above costs, an average yield of 20.5 t/ha and a price of Rs 15/kg resulted in a profit of Rs 283,162/ha with a range from Rs 113,000 to Rs 551,000/ha (based on range of yields).

E. Recommendations

1. Start B. onion nurseries in early April. Stagger planting dates to avoid market saturation.

2. Select only well-drained sites and avoid excess watering during crop development, a common practice in OC production in System B.

3. Onions planted in mid-July or later often encounter rains at harvest, which reduce bulb yield and quality.

Table 4. Yields of B. onion at various planting dates

Unit/ farmer	Planting date	Soil Drainage	Soil Texture	Yield t/ha
Kalukele (K)				
H. HeenBanda	May 6	Good	RBE/L	23.6
Bandasananayake	" 6	"	"	24.5
D. Kularatna	" 7	"	"	25.3
B. HerathBanda	" 9	"	"	19.8
Thispanigama (T)				
A. KudaBanda	May 12	Good	NCB/SL	19.4
N. Sarath-K	" 16	"	RBE/L	18.0
Wijaybapura (W)				
M. Ratanayake	May 17	Good	NCB/SL	27.2*
Mean[1] May 6-May 17				**22.5a**
N. PunchiBanda-T	May 21	Good	NCB/SL	18.8
N. Indranni-K	" 22	"	RBE/L	18.0
D. PunchiBaanda-K	" 24	"	RBE/L	19.2
K. Somawathis-T	" 28	"	NCB/SL	19.8
D. Jayasekera-K	" 28	"	RBE/L	16.3
R. Nandina-K	June 2	"	"	16.2
Mahadamena (M)				
M. Somadasa (D)	June 6	Good	RBE/SL	12.5**
JayaweeraBanda-K	" 9	"	"	16.5
H. Appuhamy-W	" 10	"	NCB/SL	20.0
J. Allisappu-W	" 12	"	RBE/L	10.9***
H. PunchiBanda-W	" 17	"	NCB/SL	19.8
R. Dissanayake	" 20	"	"	29.3
S. Wijepala	" 20	"	"	18.6
S. Jayaweera	" 20	"	"	17.4
H. Premaratna	" 20	"	"	15.0
J. Jayasinghe	" 21	"	"	15.1
P. Piyadasa-W	" 24	"	"	9.2
Mean[1] May 21-June 24				**17.6b**

(D) Dimbulagala

Table 4 - Continued

Table 4. Yields of B. onion at various planting dates

Unit/ farmer	Planting date	Soil Drainage	Soil Texture	Yield t/ha
Mahadamena - cont'd				
S. Jayaweera	June 25	Good	RBE/L	24.8
J. Jayasinghe	" 25	"	"	29.2
S. Wijepala	" 26	"	"	15.6
R. Dissanayake	" 26	"	"	36.8
P. Ukkubanda-W	" 29	"	"	18.2
H. Premarathne	June 30	"	"	29.6
J. Samarawathi	" 30	"	"	38.4
Nidanwela				
G. Pathirana	July 10	Good	RBE/L	25.2
Mean[1] June 25-July 10				**27.2a**
A. Gunaratna	July 12	Good	RBE/L	10.8
M. Premadadasa	" 12	"	"	18.4
Sadharmalankara	' 16	"	"	12.8
Mean[1] July 12-July 16				**14.0b**
Seed Farm	June 21	Fair	NCB/SL	5.6
" "	" 28	"	"	7.7
" "	July 24	"	"	2.4
" "	Aug 20	"	"	0.7

* Average of 3 trials
** Average of 4 locations
*** Rain at harvest
[1] Means with the same letter are not significantly different

Trials with Various Fertilizer Combinations

A. Background

Several crops have shown increased (economic) yields with the addition of cowdung to chemical fertilizer at planting (6). Data are not available on the yield response of onions to this combination.

B. Objective

To determine the effect of cowdung on yields of B. onion and yellow onion.

C. Methodology

The methodology was similar to that in the date of planting trials described above, except that chemical fertilizer and cowdung rates were different and Lasso was used for weed control.

At Mahadamena, the year-round irrigation site, a fourth fertilizer treatment was added (10 t/ha of cowdung alone). The trials were on well-drained RBE/SL soils. Although the methodology used was representative for B. and yellow onion, certain variables crept in during execution: a) two varieties, Puna Red and Rampur Red were used interchangeably, and b) a range of 3-10 days occurred between plantings at the same location.

A fertilizer trial on yellow onion was also conducted in July at Bakamoona. The methodology was similar to that reported above. Additional information is given in Annexures 1-4.

D. Results

Yields of B. onion from trials on well-drained RBE and NCB soils ranged from 10.9 to 27.9 t/ha (Table 5). The low yield was not used in the analysis because it was a result of rains at harvest. Highest yields were obtained when cowdung was added to full fertilizer (FF) at planting. The second highest yield was from FF alone, followed by half fertilizer + cowdung. Mean yields from the three treatments were significantly different from each other at the 1 percent level (Table 5).

Supplementing FF with 10 t/ha of cowdung (at a cost of Rs 2,200/h) increased profit by an average of Rs 40,000/ha, for a total average profit of Rs 408,200/ha. Half the recommended rate of fertilizer (Rs 2,500) plus cowdung generated additional profit of Rs 20,000/ha.

Yields were much lower at the Seed Farm because of inadequate soil drainage. However, the trend was consistent with OFT results, highest yields resulting from FF + cowdung at 10 t/ha and yields decreasing with lower rates of cowdung. Yields declined further with reduced increments of chemical

fertilizer. Cowdung + topdress yielded about the same as 1/2 basal + N topdress (Table 5).

Table 5. Yield (t/ha) of B. onion, variety Puna Red, with different rates of fertilizer and cowdung

Unit/ farmer	Planting date	Soil type	FF	CD 10 t/ha plus FF	CD 10 t/ha plus 1/2 F
Kalukele (K)					
H. HeenBanda	May 6	RBE/L+	23.6	25.2	22.9
Bandasananayake	" 6	"	24.5	26.4	22.8
D. Kularatna	" 7	" +	25.3	27.9	24.4
B. HerathBanda	" 9	" +	19.8	24.8	18.9
Thispanigama (T)					
A. KudaBanda	May 12	NCB/SL	19.4	24.0	17.5
N. Sarath-K	" 16	RBE/L+	18.0	22.9	17.3
N. PunchiBanda	" 21	NCB/SL	18.8	22.4	18.9
N. Indranni-K	" 22	RBE/L+	18.0	21.6	18.3
D.PunchiBanda-K	" 24	RBE/L	19.2	22.9	16.7
K. Somawathis	" 28	NCB/SL	19.8	23.6	18.2
D.Jayasekera-K	" 28	RBE/L+	16.3	21.2	14.2
R. Nandina-K	June 2	"	16.2	17.3	16.5
JayaweeraBanda-K	" 9	" +	16.5	22.9	14.2
H. Appuhamy	June 10	NCB/SL	20.0	22.9	19.5
J. Allisappu	" 12	RBE/L+*	10.9	14.2	8.1
H.PunchiBanda	" 17	NCBLSL	19.8	21.6	18.2
P. UkkuBanda	" 29	"	18.2	22.1	16.4
Mean[1]			19.6a	21.7b	18.4c

Pimburettewa	FF+CD	FF+1/2 CD	FF	1/2F +CD	1/2TD +CD	1/2B++ +TD
Seed Farm May 13	5.8	4.9	4.5	2.9	2.5	2.4
Seed Farm July 24	2.5	-	2.4	1.2	1.1(CD only)	

\+ Lasso used for weed control
* Rain at harvest
[1] Means with a different letter are significantly different
++ FF = full fertilizer; CD = cowdung 10 t/ha; B = basal; TD = topdress

Variety Rampur out-yielded Puna by an average of 7.4 t/ha. Compensation was made for this in presentation of fertilizer data. Highest yields were obtained with FF plus cowdung and the three highest yields occurred where cowdung was part of the treatment (Table 6). However, mean differences were not statistically significant because of the variability introduced with the use of two varieties in the treatments. Nevertheless, the trend of these data indicate that the use of cowdung is important in onion production (Table 6).

Table 6. Yields (t/ha) of B. and yellow onions with different rates of fertilizer plus cowdung

Unit/ farmer	Planting date	(Full) FF	CD 10 t/ha+ FF	1/2 F	CD 10 t/ha
Mahadamina, Puna					
R. Dissanayake	6/20-30	29.3	17.9	30.7	22.6
S. Wijepala	6/20-24	19.6	23.2	21.0	13.5
J. Jayasinghe	6/21-24	15.4	19.7	19.7	19.6
P. Piyadasa	6/24-30	9.2	32.1	16.9	15.1
S. Jayaweera	6/20-25	24.8	15.5	14.2	23.9
H. Premarathna	6/20-25	15.0	20.0	21.8	19.8
Mean		18.9	21.4	20.7	19.1
Bakamoona: Madudamana, Hybrid Henry Special					
Jayaratna	7/8-9	24.7	39.7	29.9	
M. Palis	7/10	19.8	26.3	22.5	
A. Baron	7/9-10	23.8	26.1	21.8	
Sagath	7/16	24.5	28.2	25.3	
Aberatne	7/18	20.8	23.2	20.5	
S. Samapala	7/19-20	19.7	20.3	18.3	
Mean[1]		22.2a	27.3b	23.1a	

[1] Means with a different letter are significantly different from each other

Yield of yellow onions planted in July at Bakamoona was significantly higher with a treatment of FF + 10 t/ha of cowdung than with either of the other two treatments, FF or 10 t/ha cowdung + half fertilizer. Yield from all treatments exceeded 22 t/ha (Table 6). Yields were equivalent from FF and half fertilizer + cowdung, suggesting that at present prices, it would be more advantageous to use 10 t/ha cowdung than the half rate of fertilizer.

Treatment with Lasso provided about 1 month of weed control without crop injury, permitting easier weed management. At four commercial locations in the Kalukele Unit, heavy weed infestations jeoparized onion crops. Crops were saved and good yields obtained by hiring extra labor for hand weeding, and applying Lasso immediately after. It would appear that hand weeding plus Lasso applied to established onions but pre-emergence to weeds is a practical solution to severe weed problems.

E. Recommendations

1. Apply cowdung at a rate of 1 kg/m^2 mixed with fertilizer at transplanting.

2. Apply a recommended herbicide at planting if a severe weed problem is expected.

3. If an onion crop is threatened by a dense weed population, Lasso can be used immediately after hand removal of emerged weeds.

Rates of Nitrogen (N), Phosphorus (P) and Potassium (K) on B. onion

A. Background

Significant increases in B. onion yields occurred when recommended fertilizer rates were increased by 25 percent in Yala 1991 OFTs (6).

B. Objective

To determine the fertilizer element responsible for increased yield of B. onion.

C. Methodology

Trials were conducted in Dimbulagala and at the MEA Seed Farm. The methodology was similar to that described above, except cowdung was omitted and full fertilizer rates were used as the control. The fertilizer combinations tested were as follows:

a) FF + 25 percent each of N, P and K
b) FF + 25 percent N
c) FF + 25 percent P
d) FF + 25 percent K

D. Results

Yields at Dimbulagala varied from 11.2 to 16.3 t/ha, the N supplement being the most beneficial (Table 7). There was no significant difference in yield between full fertilizer and FF + 25 percent P, but yields from the addition of 25 percent K and 25 percent each of N, P and K together were significantly higher than from full fertilizer alone. The highest onion yield was obtained from the FF + 25 percent N treatment, but it was not signficantly different from that obtained with FF+ 25 percent each of N, P and K together. A similar trend occurred at the Seed Farm (Table 7), but the mean differences were not significant due to variability and because one replicate was omitted from the trial. Yields from MEA Seed Farm trials were also low because of over watering and poor drainage.

Table 7. Yield (t/ha) of B. onion with different rates of fertilizer components

Unit/ farmer	Planting date	(Full) FF	FF+ 25%	FF+ 25% N	FF+ 25% P	FF+ 25% K
Dimbulagala						
M. Somadasa	June 5	13.6	16.4	17.2	13.6	14.4
" "	" 5	12.4	15.6	15.6	12.4	14.8
" "	" 5	12.4	13.2	17.6	10.4	13.6
" "	" 5	11.6	13.6	14.8	8.4	14.2
Mean[1]		**12.5a**	**14.6b**	**16.3c**	**11.2a**	**14.2b**
Seed Farm	June 17	1.0	2.0	5.0	2.0	4.0
" "	" 17	0.8	0.8	2.2	0.8	1.6
" "	" 17	2.0	1.2	1.2	1.2	1.2
Mean[1]		**1.3a**	**1.3a**	**2.8a**	**1.3a**	**2.3a**

[1] Means with different letters are significantly different at the 1% level

E. Recommendations

1. Increase basal and topdress N by 25 percent over DOA recommendations, e.g. N - 125 kg/ha basal and 65 kg/ha topdress at transplanting of B. onion.

2. Incorporate N topdress applications at the side of the onion row, being careful not to damage plants.

Variety Evaluation of B. and Yellow Onions

A. Background

B. onion varieties, Puna, Pusa and Bombay are the traditional varieties grown in System B. There have been occasional problems with poor quality seed. Another B. onion variety, Rampur Red, has been imported for seed from south India by the private sector.

Preliminary trials indicated that yellow onion yielded better than B. onion (3, 12) and therefore offers potential for higher profit. However, yellow onion is not yet a popular item in local markets.

B. Objective

To assess the relative performance of B. and yellow onion varieties.

C. Methodology

Seven varieties of B. onion and two of yellow onion were assessed for their performance at different planting dates.

Trial details are given below:

Varieties: B. onion - Puna Red, Pusa Red, Bombay Red, Rampur Red, Hybrid Granex, Rojo, Commander
Yellow onion - Hybrid Henry Special, Hybrid Dessex

Planting dates: May 17-August 20

Bulb spacing: 3 inches

Plant density: 1 plant/hill

Soil type and texture: NCB/SL, RBE/L

Cowdung treatment: None or 10 kg/ha

Fertilizer rate (kg/ha):
Basal: AS - 125, TSP - 125, MOP - 63
Top dressing: urea - 63, 4 to 5 weeks after planting

No. of insecticide treatments: 0-3 (Monocrotophos, Lorsban, Lebycid)

No. of fungicide treatments: 1-11 (Topsin, Homai, Ridomil, Parmosol)

No. of weedings: 3 following Lasso treatment at transplanting

No. of irrigations: 10, or every 5-6 days

Further information is provided in Annexures 5-7.

The trials were conducted in the Wijaybapura and Mahadamena Units on well-drained RBE/L soil and at the Seed Farm. All trials at Mahadamena were treated with Lasso for weed control. Other aspects of methodology are the same as those described for Date of Planting trials above.

D. Results

Onion yields from the Wijaybapura location were high, ranging from 22 to 46 t/ha (Table 8); the average yield of the yellow Hybrid Henry Special was 70 percent higher than that of all other varieties. Hybrid Henry Special sold for Rs 20/kg at the cooperative and B. onion varieties brought Rs 25/kg in the local market.

Table 8. Yields of four B. and two yellow onion varieties

Unit/ farmer	Variety	Planting date	Soil type	Yield kg/ha
Wijaybapura				
M. Ratanayake	Puna Red	May 17	NCB/SL	28.0
" "	Pusa Red	" 17	"	24.8
" "	Bombay Red	" 17	"	28.8
" "	Granex	" 17	"	22.0
" "	Henry Special	" 17	"	46.2
" "	Dessex	" 17	"	32.8

The average yield of Rampur Red was significantly higher (1% level) than that of Puna Red (Table 9).

Granex, a red-skinned onion was the highest yielder of Bombay, Rojo and Granex (statistically significant at the 1.5% level) (Table 10). Yields of Rojo and Bombay were not statistically different.

Table 9. Yield (t/ha) of two varieties of B. onion

Unit/farmer	Planting date	Rampur Red	Puna Red
Mahadamena			
J. Jayasinghe	June 21	19.7	10.7
H. Premarathne	" 20	20.5	13.5
S. Jayawardene	" 21	23.3	14.2
H. Premarathne	" 22	21.8	15.2
J. Jayasinghe	June 27	19.6	12.3
S. Wijepala	" 20	15.8	15.0
R. Dissanayake	" 20	22.6	10.5
J. Jayasinghe	" 21	15.1	-
S. Wijepala	" 20	-	11.2
R. Dissanayake	" 20		21.9
S. Jayawardene	" 20	24.8	-
S. Wijepala	" 21	24.0	-
E. Piyadasa	" 25	-	9.5
Mean[1]		**20.8a**	**13.4b**

[1] Mean difference (7.4 t/ha) significant at the 1% level

Table 10. Yields (t/ha) of 3 varieties of B. onion

Unit/ farmer	Planting date	Bombay Red	Granex Red	Rojo Red
Mahadamena				
S. Jayaweera	June 25	25.6	35.2	23.2
J. Jayasinha	" 25	29.2	39.6	23.2
S. Wijepala	" 26	15.6	25.2	18.0
R. Dissanayake	" 26	36.8	44.0	31.6
H. Premarathne	" 30	29.6	22.8	27.2
J. Samarawathi	" 30	38.4	26.8	18.4
Mean		**25.3**	**32.3**	**23.6**
Seed Farm	June 21	5.6	10.0	-
Nidanwela				
G. Pathirana	July 10	25.2	28.0	30.8
A. Gunaratna	" 12	10.8	18.0	11.2
M. Premadasa	" 12	18.4	21.2	16.4
Sadharmalankara	" 16	12.8	14.4	14.0
Mean		**16.8**	**20.4**	**18.1**
Mean[1] Mahadamena + Nidanwela		**21.9a**	**27.5b**	**21.4a**

[1] Different letters indicate significant differences at the 1.5% level

In a variety trial at Bakamoona (Mahaweli System G), yellow-skinned varieties Dessex and Hybrid Henry Special at 25 t/ha, out-yielded red-skinned varieties Granex and Puna (significant at the 3% level). Granex yielded 9 t/ha more than Puna Red, a difference that was highly significant. Yields of Granex, Dessex and Hybrid Henry Special planted in July at Bakamoona were not significantly different because comparisons were made between different sites (Table 11). In a demonstration at the Seed Farm, red-skinned variety Commander, in its only test, was the highest yielder of seven varieties, followed by Rojo. However, Commander appeared very susceptible to damping-off disease which resulted in loss of most of the plants in the nursery. Yields were very low with plantings from mid- to late August (Table 11).

Table 11. Yields (t/ha) of B. and yellow onion varieties

Unit/ farmer	Planting date	Red		Yellow	
		Puna	Granex	Dessex	Henry
Bakamoona- System G					
KiriBanda	July 7	17.1	25.0	25.7	25.4
Dharmasena	July 8	14.0	24.2	25.5	25.4
Arachchiappi	July 8-9	16.3	24.0	26.2	25.1
Jayasinghhe	" "	16.5	25.4	26.1	24.9
Hemapala	July 10	14.2	25.4	26.2	26.8
Nimal	July 12	15.0	24.9	25.7	25.3
Wijeratne	July 12-13	13.8	22.4	23.9	23.0
Ratnapala	July 14-15	13.8	20.2	22.4	23.7
Gunawardene	July 16	14.8	24.0	25.3	22.2
Chandaratna	" 16	12.7	21.5	23.9	25.0
Manika	July 16-17	12.7	24.0	24.5	24.9
Gunasena	July 18	9.8	19.3	21.6	21.2
Soma	July 20	11.2	19.9	21.2	22.5
Nawaratna	July 22	11.7	19.9	22.4	22.2
Jayampathe	July 25	13.5	17.4	23.3	22.2
Mean[1]		15.3a	24.2b	25.4c	25.2c

[1] Mean with different letter is significantly different from other means at the 3% level

Table 11. Continued

Unit/ farmer	Planting date	Red		Yellow	
		Puna	Granex	Dessex	Henry
Bakamoona					
	July 28	-	8.5	-	4.1
	" 28	-	7.8	-	-
	July 29	-	6.8	8.6	-
	July 30	-	-	7.6	5.2
	" 30	-	-	7.7	-
	July 31	-	5.5	-	-
	Aug 2	-	-	-	6.7
	Aug 3	-	4.2	5.1	5.3
	" 3	-	-	5.5	-
	Aug 6	-	-	-	4.5
Mean[1]			6.6a	6.9a	5.2a

	Comm.	Rojo	B'bay				
Seed Farm							
June 28	13.6	12.6	7.7	8.0	8.1	6.7	9.5
Aug 8	-	2.7	-	-	-	-	3.8
" 15	-	-	-	-	0.9	1.0	-
" 20	-	-	0.7	-	-	-	-

[1] Mean differences not statistically significant

Commercial plantings of Hybrid Henry Special yielded an average of 10 t/ha, significantly higher (1% level) than the hybrid Dessex (Table 12). In another series of commerial trials, Hybrid Henry Special maintained the 10 t/ha level, while Dessex yields were very low (Table 13). However, at two OFT locations (Ihalawewa), there was little difference in yield between the two varieties (Table 13).

Table 12. Marketed commercial yields of yellow onion varieties, Dessex and Hybrid Henry Special

Unit/ farmer	Planting date	Soil type	Yield t/ha
Bogaswewa- var. Dessex			
W.M. MuthuBanda	June 5	NCB/SL	6.4
J. KaluBanda	" 5	"	3.6
R. TikiriBanda	" 5	"	5.5
D.M. MuthuBanda	" 6	"	3.6
D.G. Muthubanda	June 6	NCB/SL	0.6
R. LokuBunda	" 7	"	6.8
G. SamatakoonBunda	" 7	"	4.7
Y. Abeyrathna	" 10	"	11.0
Mean			5.3[1]
Bogaswewa - Hybrid Henry Special			
R. Rathanayake	June 7	NCB/SL	9.3
D. TikiriBanda	" 7	"	7.1
W. Podimahaththaya	" 7	"	8.4
R. DayarathnaBanda	" 7	RBE/SL	13.0
G. Appuhamy	" 7	"	9.3
H. RanasinghaBanda	" 7	"	15.8
A. Pinhamy	" 7	RBE/L	8.1
Mean			10.1[2]

[1] Mean difference from [2] significant at the 1% level

E. Recommendations

1. Hybrid Henry Special, the highest yielder, is recommended for yellow onion production in System B.

2. Procure big onion variety Rampur from South India for commercial production.

3. Continue trials with Commander, a red-skinned variety.

Table 13. Yields (t/ha) of two yellow onion varieties and one B. onion variety on commercial farms

Unit	Planting date	Soil texture	Henry Special	Dessex	Puna Red
Dawagama	June 30	L	30.0	-	-
Dawagama	July 1	L	17.3	-	-
"	" 1	L	14.3	-	-
"	July 3	SL	15.0	-	-
"	" 3	Cl	15.0	-	-
"	July 5	L	6.3	-	3.8
Aluthwewa	July 18	SL	8.0	-	-
"	July 20	SL	6.0	2.0	-
"	" 20	-	9.9	1.0	-
"	" 20	-	2.0	-	-
"	July 22	SL	12.5	1.0	-
"	July 25	-	16.7	1.0	-
"	" 25	-	13.3	-	-
Dawagama	" 25	L	9.2	-	-
Aluthwewa	July 27	SL	3.1	-	-
"	" 27	SL	10.0	3.1	-
"	July 28	-	6.3	-	-
"	July 30	SL	4.0	-	1.7
"	" 30	SL	-	0.5	-
"	" 30	-	5.0	-	-
Mean[1]			10.7a	1.4b	2.8
Ihalawewa- on farm trials					
E. Bodhisena	July 10	-	12.0	18.0	-
M. Upasena	July 11	-	25.0	20.0	-

[1] Means with different letters are significantly different at the 1% level

YELLOW AND RED-SKINNED (INTRODUCED) BIG ONION VARIETIES

Date of Planting Trials

A. Background

Yellow onions have not been evaluated at various planting dates and red-skinned varieties, which are popular for export, have not been grown in Shri Lanka.

B. Objective

To evaluate the performance and quality of yellow and red-skinned varieties of big onions at various planting dates.

C. Methodology

The methodoloy is as described under the section on variety testing. For further information see Annexures 8 and 9.

D. Results

Big onions, including red-skinned onions, and yellow onions respond similarly to planting dates. Yields from May and June plantings in System B averaged over 20 t/ha but decreased with July plantings (Tables 14a, b). However, yields in Bakamoona, where the soil is deep, rich and well drained, were maintained above 20 t/ha until July 20 (Table 14c). Onion yields decreased significantly with later plantings. The lower yields were due in part to harvesting before maturity to avoid heavy rains which adversely affect keeping quality.

Table 14a. Yields of 1 red-skinned big onion variety and 2 yellow onion varieties

Unit/ farmer	Variety	Planting date	Soil type	Yield t/ha
Wijaybapura				
M. Ratanayake	Hybrid Granex	May 17	NCB-SL	22.0
" "	" Henry Sp.	" 17	"	46.2
" "	" Dessex	" 17	"	32.8
Mean				**33.7**

Table 14b. Yields (t/ha) of two red-skinned onion varieties at various planting dates

Unit/ farmer	Planting date	Granex Red	Rojo Red
Mahadamena			
S. Jayaweera	June 25	35.2	23.2
J. Jayasinha	" 25	39.6	23.2
S. Wijepala	June 26	25.2	18.0
R. Dissanayake	" 26	44.0	31.6
H. Premarathne	June 30	22.8	27.2
J. Samarawathi	" 30	26.8	18.4
Mean[1]		32.3	23.6
Nidanwela			
G. Pathirana	July 10	28.0	30.8
A. Gunaratna	July 12	18.0	11.2
M. Premadasa	" 12	21.2	16.4
Sadharmalankara	July 16	14.4	14.0
Mean[1]		20.4	18.1

[1] Means with different letters are significantly different

E. Discussion

Big onion varieties Commander and Rampur (South India) yielded from 7.4 to 9 t/ha more than the Bombay/Puna complex and Rojo. A 7 t/ha yield at Rs 20/kg generates an additional profit of Rs 140,000/ha. Yields of Granex were superior to those of Rojo. Considering the higher price of seed and the additional care and fungicides required, production costs for Rojo and Granex are about Rs 10,000/ha more than for Rampur. Further, the Cooperative Wholesale Establishment presently refuses to purchase Rojo and Granex, because of assumed inferior keeping quality.

The yellow onion varieties were the highest yielders in comparative trials, and about equivalent to the red-skinned Granex, which yielded 8-10 t/ha more than the traditional big onion varieties grown in System B. However, the local market is not well developed for yellow onion and the CWE refuses to purchase them.

Table 14c. Yields of yellow and red-skinned onions at various planting dates

Unit/ farmer	Planting Date	Granex Red	Dessex yellow	Henry yellow
Bakamoona, System G				
KiriBanda	July 7	25.0	25.7	25.4
Arachchiappi	" 8-9	24.0	26.2	25.1
Jayasinghhe	" 8-9	25.4	26.1	24.9
Dharmasena	" 8	24.2	25.5	25.4
Hemapala	" 10	25.4	26.2	26.8
Nimal	" 12	24.9	25.1	25.3
Ratnapala	" 15	20.2	22.4	23.7
Mean[1]		**24.2b**	**25.4c**	**25.2c**
Bakamoona, System G				
Sagath	July 16	-	-	24.5
Aberatne	" 18	-	-	20.8
S. Samapala	" 20	-	-	19.7
	July 28	8.5	-	4.1
	" "	7.8	-	-
	" 29	6.8	8.6	-
	" 30	-	7.6	5.2
	" 30	-	7.7	-
	" 31	5.5	-	-
	August 2	-	-	6.7
	" 3	4.2	5.1	5.3
	" 3	-	5.5	-
	" 6	-	-	4.5
Mean: July 28 -Aug 6		**6.6d**	**6.9d**	**5.2d**

[1] Means with different letters are significantly different from other means at the 1% level

F. Recommendations

1. The good performance of B. onion variety Rampur Red imported from south India warrants extensive evaluation in commercial production. It would appear to be superior to Puna Red, the traditional variety grown in System B.

2. Hybrid Henry Special and Dessex yielded about the same in trials, but in commercial fields Dessex was not a good performer. Hence, Hybrid Henry Special is the yellow onion of choice and, due to higher yields, profits should be comparable at a price about 30 percent lower than that of B. onion.

3. Continue yield trials with the red-skinned variety Commander.

RED ONION

Date of Planting Trials

A. Background

Previous trials have shown that red onion can be grown from November to early February in System B (9) if rainy periods are avoided, and again from March to July (10).

B. Objective

To determine primary and secondary planting dates acceptable for red onion production in System B.

C. Methodology

Date of planting trials were conducted on seven farms in cooperation with MARD's Water Management sub-component trials on year-round irrigation. Trial details are indicated below.

Location: Mahadamena, Bimpakuna

Planting dates: June 9-August 17

Transplant dip: Benlate for 30 minutes

Soil type: RBE/SL, NCB/SL

Drainage: Good

Fertilizer rates (kg/ha):
Basal: AS - 100, TSP - 100, MOP - 50
Topdress: urea - 50, MOP - 25, 6 weeks after transplanting

Irrigation schedule: every 5 days

No. of fungicide treatments: 0-5

No. of insecticide tresatments: 0

Herbicide rates: Lasso at 5 l/ha

Harvest dates: Aug 10-Oct 27

For further information see Annexure 10.

D. Results and Discussion

Red onion yields averaged about 16 t/ha from July 7 to August 3 plantings, varying from 11.5 to 22.9 t/ha (Table 15). The average yield of plantings from August 15-17 declined to 9.7 t/ha, a difference that was significant at the 1 percent level. Yields from June plantings were lower, but variable and not significantly different than those from other dates of planting. Disease problems were purple blotch and powdery mildew.

Production costs, not including labor, were Rs 103,100/ha as indicated below. At a price of Rs 30/kg, profit from July 3 to August 3 plantings averaged Rs 474,000/ha; from mid-August plantings, Rs 91,900.

Production costs (Rs/ha) of red onion

Land preparation	3,600
Seed	90,000
Fertilizer	3,000
Chemicals	6,500
Total	**103,100**

Red onion is sensitive to excessive moisture and high humidity, conditions that are conducive to development of fungal diseases. Hence, well-drained soils are a must for red onion production.

Lasso at 5 l/ha controlled weeds for about 1 month without injury to red onion at 20 demonstrations.

Table 15. Yield (t/ha) of red onion at different planting dates

Unit/farmer	July 7-14	July 31-Aug 3	Aug 15-17
Mahadamena			
R. Diassanayake	20.4	15.6	6.5
S. Wijepala	13.7	11.5	7.9
J. Jayasinghe	16.4	16.1	10.4
P. Piyadasa	14.6	16.9	12.2
S. Jayaweera	13.9	16.4	11.3
Mean[1]	**15.8a**	**15.6a**	**9.7b**

Thispanegama	Planting date	S type+	Drainage	Yield
J. UkkuBanda	June 11	NCB/SL	Good	4.8
J. KinBanda	" 17	"	"	5.6
Ihalwewa				
K. PunchiBanda	June 30	RBE	Good	19.2
S. RamBanda	July 7	"	"	13.0
N. Piyathilake	" 21	NCB	Poor	6.8
Bimpakuna				
H. Indrapala	July 12	NCB	Poor	19.0
Mean[1]				**11.4ab**

\+ S = soil type
[1] Mean with a different letter is significantly different from the others at the 1% level

E. Recommendations

1. Plant from October 15 to early February (avoiding heavy rains) (9) and from April to early August (10).

2. Conduct date of planting trials starting in early May.

3. Where labor for hand weeding is in short supply, Lasso can be used for weed control.

Fertilizer Combinations

A. Background

Several OFCs have shown a positive yield response to the addition of animal manure to chemical fertilizers (6). Data are not available for red onion, but an economic response to applications of cowdung at planting is expected.

B. Objective

To determine whether the addition of cowdung to chemical fertilizer will increase profits for red onion growers in System B.

C. Results and Discussion

The addition of cowdung to fertilizer increased yields by 25 percent (Table 16) but the difference was not statistically significant. This was probably due to a limited number of participating farmers (replicates) and because rates from different farms were compared.

Table 16. Yield (t/ha) of red onion, variety Jaffna, with different rates of fertilizer and cowdung

Unit/ farmer	Planting date	Soil type	FF	CD* + FF	CD* alone
Thispanegama					
W. Ariyasinghe	June 9	NCB/SL	-	-	6.4
J. UkkuBanda	June 11	NCB/SL	4.8	-	-
M. Gunasekera	" 14	"	-	-	7.6
N. Dayananda	June 15	NCB/SL	-	6.8	-
M. Somadeva	" 15	"	8.0	-	-
J. KiriBanda	" 17	"	5.6	-	-
S.A. Priyantha	" 17	"	-	-	6.4
M. TissaKumara	" 18	"	-	7.2	-
P. Ariyaratna	" 21	"	-	8.8	-
Mean[1]			6.1a	7.6a	6.8a

* Cowdung at 1 t/ha (1 kg/m^2)

[1] Means were not statistically different

D. Recommendations

1. Use cowdung at a minimum rate of 1 kg/m^2 at transplanting.

2. Conduct further trials to confirm yield response to the addition of cowdung to chemical fertilizer.

Increased Rates of Chemical Fertilizer

A. Background

Yala 1991 trials showed that B. onion yields in System B were increased significantly by application of 125 percent of the recommended fertilizer rate (6). It was thought that red onion might respond similarly to higher rates of fertilizer.

B. Objective

To determine if increased fertilizer rates would increase red onion yields.

C. Methodology

Red onion, variety Jaffna, was planted on well-drained RBE and NCB soils using two fertilizer rates: a) the recommended rate, and b) 125 percent of the recommended rate. Cowdung was not applied. Other aspects of the trial are as described under the Date of Planting section above.

D. Results and Discussion

Red onion yielded in excess of 12 t/ha but yields were not increased by higher rates of fertilizer.

Table 17. Yield (t/ha) of red onion with full fertilizer rate and 125 percent of full rate

Unit/ farmer	Planting date	Soil type	Soil drainage	Full rate	FF+ 25%
Ihalwewa					
K. PunchiBanda	June 30	RBE	Good	19.2	17.2
S. RamBanda	July 7	"	"	13.0	14.0
N. Piyathilake	" 21	NCB	Poor	6.8	6.0
Mean[1]				13.0a	12.4a

[1] Means not statistically different

GARLIC

Variety and Date of Planting Trials

A. Background

The local small-cormed garlic variety, Keppitipola, has been grown successfully in the up-country highlands, where approximately 40 varieties from about a dozen countries (4) have been tested. Only Indonesian varieties performed as well or better than Keppitipola. In System B, none of the varieties tested produced corms except in a July 1991 planting, which yielded 3 t/ha (5) for a profit of Rs 54,000/ha. Plantings from August to January at the MEA Seed Farm did not produce economic yields (5,7).

B. Objectives

1. To identify date(s) of planting when at least one garlic variety can be successfully grown in System B.

2. To assist the testing program at the Bandarawela RARC by providing samples of introduced varieties.

3. To develop the methodology for successful commercial production of garlic in System B.

C. Methodology

A local garlic variety, Keppitipola, was obtained from the Badulla District. Three varieties were imported from Indonesia, including L. Hijau, which performed acceptably in earlier trials at the Seed Farm. Two varieties were imported from the Philippines, Dolicos White and Batangas White, both described as lowland types. Samples of the imported varieties were also sent to the Bandarewela RARC for evaluation.

Garlic varieties were planted in 25 m^2 beds at the Seed Farm and in OFTs as a continuation of trials initiated in July 1991. The beds were covered with mulch immediately after planting.

Details of the planting date trials are indicated below:

Varieties: Keppitipola (local), Batangas, L. Hijau, Dolicos White

Planting dates: Feb 21-Aug 2

Plant spacing: 8 x 5 in

No. of insecticide treatments: None

No. of fungicide treatments: 2-6 (Benlate, Trimiltox, Topsin, Captan, Ridomil, Daconil, Pomarsol)

No. of waterings: 3-8

No. of weedings: 1-4

Fertilizer applied (kg/ha):
Basal: AS - 50, TSP - 50, and MOP - 100
Top dressing: urea - 50, 4 and 8 weeks after planting, without and with cowdung at 10 t/ha

D. Results

The highest garlic yield (4.4 t/ha) was obtained with a July planting of variety Hijau (Table 18), but bulbs were not top quality. Similar results were obtained in July 1991 trials. At a cost of Rs 38,400/ha for seed and inputs and a selling price of Rs 45/kg, a yield of 855 kg/ha is required to meet production costs (not including labor). A yield of 3.5 t/ha generated a profit of Rs 119,200/ha. August to mid-June plantings resulted in lower yields, and on occasion there was no yield due to die-back from heat and mildew.

Best results were obtained when 10 t/ha of cowdung was mixed with fertilizer and applied basally at planting.

Fertilizer Combinations

A. Background

Several OCs have shown a positive yield response to the addition of manure to chemical fertilizers (6). Data are not available for garlic, but an economic response is expected.

B. Objective

To determine whether the addition of cowdung to chemical fertilizer would increase yields of garlic variety Hijau in System B.

Table 18. Yields (kg/ha) of three garlic varieties planted at various dates

Unit/ farmer	Planting date	Local	Hijau	Batangas
Wijaybapura				
T. Tenakoon	Feb 21	0*	-	-
Seed Farm**	Apr 7	100	100	100
Seed Farm**	" 12			0#
R. Somasiri	" 17	0	-	-
A. Kasturi	May 20	0	-	-
HeenBanda	June 6	633+	-	-
Seed Farm**	" 11	160	110	120
Karunaratne	" 26	1567+	733+	-
Ihalalewewa				
S. RamBanda	June 28	1400+	800+	-
Binpakuna				
H.Indrapala	July 11	693+	3456+	-
Thispanegama				
U. Bandulakumara	July 11	0	0++	-
H. UkkuBanda	" 13	0	0++	-
E. Wijemarike	" 12	0	0++	-
A. Wijeratna	" 13	0	0++	-
J. Jayasinghe	" 27	3600	4400	2400
Seed Farm**	Aug 2	440	-	-
" "	Sept 6	-	80	240

* Mildew
** Pimburattewa
\# Variety Dolicos White (Philippines)
\+ Highland
++ Rain at harvest

C. Results and Discussion

All yields were low, inadequate drainage being one of the main constraints. However, addition of 10 t/ha of cowdung to the full fertilizer rate increased garlic yield by 18

percent. However, because of low yield levels, increased profit was only Rs 1,400/ha. The addition of half the recommended rate of fertilizer to cowdung increased yields by 67 percent and profit by Rs 3,900/ha (Table 19).

The application of at least 10 t/ha of cowdung at planting is an important component of garlic production technology. Garlic production could be profitable for highland farmers on well-drained small plots.

Table 19. Yield (kg/ha) of garlic variety Hijau with different rates of fertilizer and cowdung*

Unit/ farmer	Planting date	Soil type	FF	CD+ FF	CD+ 1/2 F	CD
Seed Farm	Aug 2	NCB/SL	440	520	300	180

* FF = full fertilizer rate; CD = cowdung at 10 kg/ha; 1/2 F= half recommended fertilizer rate

D. Recommendations

1. Plant garlic from mid-June to mid-August.

2. Continue OFTs on homesteads and highlands with local variety Keppitipola, using a minimum of 1 kg/ha cowdung at planting plus recommended rates of fertilizers.

3. Conduct variety trials with local variety Keppitipola and Indonesian variety Kuning. The latter was superior in preliminary trials (5).

4. Conduct trials with increased fertilizer rates, using the level recommended for B. onion.

CHILLI

Date of Planting Trials

A. Background

Although chilli is traditionally grown in Yala, it has been difficult to cultivate, particularly during the last two years. This was due to a leaf aberration diagnosed as a combination of narrow leaf disorder (NLD) and leafcurl complex. Observations indicate that this problem is associated with thrip infestations.

B. Objective

To determine if chilli can be grown successfully during Yala with earlier plantings.

C. Methodology

Variety MI-2 was established in nurseries prior to planting in 121 m^2 field plots. Other trial details were as follows:

Plant spacing: 60 x 45 cm

Plant density: 2 plants/hill

Dates of transplanting: April 7-June 15

Soils: RBE and NCB/SL to L, good drainage

Cowdung treatment: 10 t/ha at planting

Fertilizer (kg/ha):
Basal: urea - 100, TSP - 100, MOP - 50
Top dressing: AS - 14 at 28, 49 and 70 days after planting; MOP - 50 at 28 days after planting

No. of irrigations: 7-12

No. of insecticide applications: 3-7 (Monocrotophos, Metasystox, Lebycid, Actalic)

No of fungicide applications: 3-6 (Parmosol, Antracol, Topsin)

No. of weedings: 7-9 (Lasso-5)

Harvest dates: June 6-Oct 2

D. Results

Chilli yields were acceptable with early Yala plantings from April 7 to April 30 (Table 20), which escaped major thrip damage. Lower yields after May 7 were caused by thrip infestations which could not be controlled, even with as many as 13 insecticide applications, including Lebycid, noted for its efficacy on thrips.

After harvest of Maha plantings, an application of N and irrigation water to ratoon chilli in 1990 resulted in economic yields (11). This result was confirmed by growers in System B with November 1991 plantings.

Table 20. Chilli yields from different planting dates

Unit/ farmer	Planting date	Soil type	Yield[1] (t/ha)	Remarks
Thispanagama				
M. Ariyadasa	April 7	NCB	1.4	Thrips mid-Aug
A. Seniwiratne	" 9	RBE	1.5	" "
W. Ariyadasa	" 11	NCB	1.2	" "
P. Bodhituṁga	" 20	"	1.2	" "
R. Amitha	" 20	RBE	1.1	" "
M. Ariyadasa	" 30	NCB	1.3	" "
D. Seniwiratne	" 30	RBE	1.0	" "
D. Ranbanda	May 7	"	0.7	" "
D. Jayasekera	May 12	"	0.6	" "
K. Hendrickappu	May 15	NCB	1.3	Thrips mid-Aug
K.P. Fernanado	" 30	"	1.1	" "
L. Ratanayake	June 15	"	0.6	" "

[1] Mean yield differences on NCB and RBE soils were not statistically significant

E. Recommendations

1. Complete Yala chilli plantings by the end of April to minimize thrip damage.

2. Chilli plantings can continue on from October to April. If chilli plants are healthy in February or March, after yields are taken, an application of N will stimulate flowering and a second yield of fruit.

Fertilizer Combinations

A. Backgound

Significantly higher chilli yields and profits were obtained when cowdung was added to chemical fertilizer (5,6). This may be of significance in improving chilli tolerance to stress, such as NLD or thrip attacks.

B. Objective

To determine whether yields of mid- to late April plantings of chilli could be maintained by adding cowdung to applications of commercial fertilizer.

C. Methodology

The methodology was similar to that described under Date of Planting trials above, except the following fertilizer treatments were also included: a) full fertilizer + 10 t/ha cowdung, and b) half fertilizer rate + 10 t/ha cowdung.

D. Results

The addition of cowdung gave yields from 5 to 25 percent more (Table 21) but the results from treatment differences were not statistically significant. However, yield levels from this trial (0.5-2.2 t/ha) confirm that April plantings will produce acceptable chilli yields because major growth occurred before the peak of the thrip infestation.

Irrigation: furrow vs sprinkler

A. Background

Thrip damage to chilli in System B is serious during Yala but is a minor problem during Maha. The distribution of rainfall during Maha may be a significant factor in the restriction of thrip populations (11). While Maha precipitation is usually sufficient to grow a crop, extensive irrigation is required during Yala.

Table 21. Yield (kg/ha) of chilli with different rates of fertilizer and cowdung*

Unit/ farmer	Planting date	Soil type	FF	CD+ FF	CD+ 1/2 FF	Remarks
Kalukele						
Y. RamBanda	April 20	RBE/L	0.7	0.6	0.9	Thrips
H. Abeythilake	" 20	"	0.6	0.5	0.7	"
Thispanigama						
C. Dharmasena	" 28	NCB/SL	2.2	2.0	2.2	
K. Dharmaratna	" 25	"	0.9	1.1	1.2	Thrips
Mean[1]			1.1a	1.05a	1.25a	

* 1 kg/m^2

[1] Means with similar letters are not significantly different

B. Objective

To determine whether sprinkler irrigation (vs furrow) will deter thrip development during Yala.

C. Methodology

Chilli seedlings were transplanted on adjacent plots ranging from 25 m^2 to 121 m^2 in size. One treatment at each location was furrow irrigated and the other watered as needed with a sprinkling can. Other operations are similar to those described above under Date of Planting trials.

D. Results

Yields were higher from plots that were watered by sprinkler than from those that were furrow irrigated, but the mean difference was significant at only the 10 percent level (Table 22). However, thrip populations were higher and leaf fall and leaf aberrations more prevalent on furrow-irrigated plots.

E. Discussion

During Yala 1991 and Yala 1992, chilli losses from thrip damage were more severe than those from NLD. In general, neither problem was serious during Maha. It is likely that

rains during Maha, along with cooler air temperatures (compared with Yala), help to control thrips. Overhead irrigation (compared with furrow irrigation) appears to restrict and delay thrip development during Yala.

Table 22. Yield (kg/ha) of chilli variety MI-2 with furrow vs sprinkler irrigation

Unit/ farmer	Plot size	Planting date	Yield	
			Furrow	Sprinkler
Pimburettewa				
Seed Farm	25 m^2	May 5	124	272
Wijayabapura				
SuduBanda	121 m^2	June 13	107	173
Somasiri	121 m^2	" 23	16.5	29

There is an over-use of insecticides in chilli, partly because those recommended are insufficiently effective and partly because there is confusion at the farm level between thrip damage and chilli leafcurl. Leafcurl is caused by insect-borne viruses, which are controlled by different insecticides than are mites and thrips. The fact that thrips are rarely visible to the naked eye creates another problem for farmers. As a result, there is a tendency to use preventive sprays which exacerbate the problem because they kill thrip predators. IPM trials have shown that 5 sprayings during Yala resulted in higher yields than 9 sprayings (10). Available evidence indicates that chilli requires few if any insecticide treatments during Maha in System B.

DOA trials have identified insecticides which are more effective against thrips than those currently recommended. These should be available in Yala 1993.

NLD is likely associated with limited chilli root development and inadequate nutrient levels. This deduction is supported by the following observations in System B:

a) NLD appears to be more prevalent on NCB (lower in base exchange capacity) than RBE soils

b) NLD is nearly always associated with the following:

i) high water table
ii) poor drainag
iii) compact soils
iv) coarse, infertile soils

These factors either limit the soil nutrient supply directly, or restrict root development, thus indirectly limiting the supply of nutrients. The fact that NLD can be reduced or reversed by the addition of N fertilizer, cowdung or straw, or a rain shower, lends credence to this view and rules out plant disease as a cause. NLD has rarely been reported in Maha, probably because chilli cultivation was not common during Maha. However, I observed NLD in chilli in December 1992 on gravelly RBE soils with a high water table.

F. Recommendations

1. Plant chillies from November to mid-April. This permits harvest before heavy thrip infestations develop in August.

2. Use pesticides only after chilli damage is evident and the pest has been identified. Do not spray to kill large insects because most of these are beneficial insect predators.

3. Destroy weeds in the area, particularly those which are a faded yellow in color, as they are usually infected with virus. Insects can infect chilli plants from diseased weeds.

4. Pull up and destroy yellowish chilli plants to prevent spreading of the virus infection by insects.

5. Avoid using insecticides in Maha. Zero to two applications should be sufficient for the season.

6. Use the insecticide to be recommended by the DOA for thrip infestations.

7. Conduct trials with overhead irrigation for thrip control in Yala.

8. Train farmers and pesticide dealers to differentiate between 'good' and 'bad' insects.

CAPSICUM

Date of Planting

A. Background

Capsicum grows well during Yala in System B (6) but thrips are a major problem. It is likely that economic yields of Capsicum can be obtained also during Maha and in off-seasons.

B. Objective

To determine if early Maha plantings of Capsicum on well-drained sites will produce economic yields.

C. Methodology

Capsicum variety Hungarian Yellow Wax was planted on well-drained raised beds in early Yala. Trial details are presented below:

Plant spacing: 15 X 30 cm

Plant density: 2 plants/hill

Dates of transplanting: March 19-June 25

Cowdung treatment: 10 t/ha at planting

Fertilizer (kg/ha):
Basal: urea - 220, TSP - 380, MOP - 125
Top dressing: urea - 45, MOP - 25 at 28 days after planting

No. of irrigations: 4-5 day intervals (maximum 10)

No. of insecticide applications: 2-3 (Lorsban, Actalic, Lebycid, Monocrotophos)

No. of fungicide applications: 2-3 (Kumulus, Pomorsol, Topsin, Antrocol)

Harvest dates: May 12-October 7

No. of picks: 4

Field data are reported in Annexures 12 and 13.

D. Results

Capsicum yields from April 21 to June 2 plantings at the Dimbulagala locations ranged from 4 to 5.4 t/ha, decreasing with later plantings. The low yields at the Seed Farm showed the same trend. At four other locations, yields were maintained at 10 t/ha or more from April 29 to June 23 (Table 23).

Table 23. Capsicum yields from different planting dates

Unit/ farmer	Planting date	Soil texture	Soil drainage	Yield (kg/ha)
Seed Farm	March 19	NCB	Poor-fair	1,238
	April 20	"	"	1,468
	June 25	"	"	620
Dimbulagala				
H. Ariyadasa	April 21	RBE	Good	5,369
M. Somaweera	" 29	"	"	4,295
P. Bodhitunga	May 15	"	"	4,626
W. Ariyasingha	June 1	"	"	4,295
K. KiriBanda	" 2	"	"	3,956
Sevanapitya				
P.J.Ranaweera	April 29	RBE	Good	11,000
Thispanagama				
W. Saranelis	May 5	RBE	Good	10,700
A. UkkuBanda	June 2	"	"	12,600
Senapura				
K.P. Somadasa	June 23	RBE	Good	10,200

E. Recommendations

As economic Capsicum yields can be obtained with plantings from November to June, this crop is useful for off-season production in year-round cropping systems. However, special care must be taken with later plantings because of severe thrip pressure.

Fertilizer Combinations

A. Backgound

Significantly higher chilli yields and profits were obtained when application of chemical fertilizer was supplemented by cowdung (5,6). Preliminary trials indicated that Capsicum yields would also benefit from cowdung applications (8).

B. Objective

To determine whether Capsicum profits would be increased by supplementing commercial fertilizer with cowdung.

C. Methodology

The methodology was the same as that described above for Date of Planting trials. The trial was conducted on well-drained RBE soils.

D. Results

Capsicum yields from cowdung alone at 10 t/ha were not significantly different than those from the full fertilizer rate (Table 24). However, the combination of 10 t/ha cowdung + half the recommended rate of fertilizer resulted in significantly higher yields than the other treatments. At a price of Rs 20/kg, an input cost of Rs 2,200 for cowdung to supplement half the recommended rate of fertilizer generated an additional profit of Rs 22,000/ha.

E. Recommendation

1. Apply cowdung at a minimum rate of 1 kg/m^2 by mixing it with soil before transplanting Capsicum seedlings.

LEGUME CROPS

Date of Planting

A. Background

The yield of legume crops is generally best with early plantings (6,7), but further information is needed to determine their place in year-round cropping systems.

Table 24. Yield (t/ha) of Capsicum variety, Hungarian Yellow Wax, with different fertilizer rates and cowdung at 10 t/ha

Unit/ farmer	Planting date	Full fert.	CD + 1/2 F	CD alone
Sevanapitya				
P.J. Ranaweera	April 29	11.0	12.1	10.0
Thispanagama				
W. Saranelis	May 5	10.7	12.1	9.7
A. UkkuBanda	June 2	12.6	10.8	10.2
Senapura				
K.P. Somadasa	June 23	10.2	12.6	12.0
Mean[1]		11.1a	11.9b	10.7a

[1] There is a significant difference between means with different letters

B. Objective

To determine the response of soybean, greengram, cowpea and groundnut to various planting dates.

C. Methodology

DOA recommendations were followed except where otherwise noted. The trials were conducted at the MEA Seed Farm on moderately drained NCB soils. Crop varieties used in the trials were: soybean - Bosier; cowpea - Bombay; greengram - MI-5; groundnut - Spanish (local).

D. Results

The highest yields of four legume crops were obtained with March and June plantings, while lower yields occurred from April plantings (difference significant at the 1 percent level) (Table 25). The factor responsible for the April yield depression was not identified but it is likely due to higher soil temperatures, which at a depth of 5 cm averaged higher in April than in March or May (Table 3b).

Table 25. Legume crop yields (kg/ha) from different planting dates

Crop	March 23	April 20	June 16
Cowpea	1,180	855	980
Soybean	945	580	1,025
Greengram	960	543	820
Groundnut	370	248	289
Mean[1]	**864a**	**557b**	**779a**

[1] Means with different letters are significantly different from each other

COWPEA

Date of Planting Trials

A. Objective

To determine the yield response of cowpea (variety Bombay) to various planting dates.

B. Methodology

DOA recommendations were followed except where otherwise stated. Details of the trials are as follows:

Plot size: 11 x 11 m

Planting dates: July 24-30

Plant spacing: 30 x 8 cm

Plant density: 2 plants/hill

Fertilizer (kg/ha):
Basal: urea - 35, TSP - 140, MOP - 75
Top dressing: urea - 30 at flowering

No. of irrigations: 4-5 day intervals (maximum 11)

No. of insecticide treatments: 2-3 (Dimethoate, Lannate, Carbaril, Lebycid)

Harvested area: 10 x 10 m

C. Results

Yields were highest with March to June plantings, decreasing somewhat with plantings in July (Table 26). Cowpea, however, tolerates later plantings better than greengram, soybean and groundnut.

The cost of production, excluding labor, totalled Rs 8,000/ha as follows: land preparation - Rs 3,600, seed - Rs 1,400, fertilizer - Rs 1,000. At a yield of 1 t/ha and a price of Rs 20/kg, profit was Rs 12,000/ha. A yield of 400 kg/ha was required to meet expenses.

Table 26. Cowpea yields from different planting dates

Unit/ farmer	Planting date	Soil texture	Soil drainage	Yield (kg/ha)
MEA Seed Farm	March 23	NCB	Fair	1,180
	April 20	"	"	855
	June 16	"	"	980
Ihalawewa				
S. Dayaratne	July 24	RBE	Good	479
H. Padimanike	July 30	NCB	Poor	578

D. Recommendations

For best results, cowpea should be planted in early Yala. However, because of its tolerance to various planting dates, cowpea is well adapted to rotations in a year-round cropping system.

Fertilizer Combinations

A. Background

OFTs with several crops have shown an economic response to the use of animal manure along with chemical fertilizer at planting. Preliminary data indicate that animal fertilizer would also improve yields of legume crops, including cowpea (8).

B. Objective

To confirm yield response of cowpea to the application of animal manure at planting.

C. Methodology

Cowpea, variety Bombay, was planted in two OFTs with three combinations of cowdung and fertilizer. Details of the trial are included under Date of Planting trials above.

D. Results

Cowpea site replications were insufficient for statistical analysis. Since yield trends in response to cowdung applications were similar for cowpea and groundnut, two groundnut locations were included in the analysis. Increases in yield from the addition of cowdung were statistically significant. In cowpea, the addition of cowdung at a cost of Rs 2,200/ha generated an additional profit of Rs 4,000/ha minimum. In preliminary trials, 10 t/ha of cowdung alone increased yields more than the full fertilizer treatment (Table 27).

Table 27. Yield (t/ha) of cowpea, variety Bombay, with different rates of fertilizer and 10 t/ha of cowdung

Unit/ farmer	Planting date	Soil type	Soil drainage	FF	FF+ CD	CD alone
Ihalawewa						
S. Dayaratne	July 24	RBE	Good	479	826	907
H. Padimanike	" 30	NCB	Poor	578	644	743
Mean				**529**	**735**	**825**
Nidanwela (groundnut)						
A. Dissanayake	July 18	NCB	Poor	696	885	0*
A. Ratanayake	July 20	RBE	Good	997	1244	1190
Mean[1]				**688a**	**900b**	**947b**

* Insects

[1] The mean value designated 'a' was significantly lower than that designated 'b'

E. Recommendation

1. Apply a minimum of 1 kg/m^2 of cowdung at planting whether commercial fertilizer is used or not.

GROUNDNUT

Date of Planting Trials

A. Background

Groundnut yield is best with early plantings,[1] but yield data from various dates of planting are needed to determine the place of groundnut in year-round cropping systems.

B. Objective

To determine the response of groundnut to various planting dates.

C. Methodology

DOA recommendations were followed except where otherwise stated. Trial details are provided below:

Variety: Red Spanish (local)

Plot size: 121 m^2

Plant spacing: 45 X 15 cm

Plant density: 1 plant/hill

Planting dates: May 12-July 20

Fertilizer (kg/ha):
Basal: urea - 20, TSP - 75, MOP - 40
Top dressing: not applied (Pimburettewa); urea - 30 at onset of flowering

No. of insecticide applications: 2-4 (Monocrotophos, Lebycid, Lannate)

No. of fungicide applications: 0-3 (Antrocol, Peronoz, Benlate, Trimiltox)

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[1] Weerasinghe, K. Research Officer, RARC Aralaganwila. Seminar, October, 1992.

No. of weedings: 7 (4 when Lasso was used)

No. of irrigations: 5-8

Harvest dates: September 20-October 26

See Annexure 15 for additional information.

D. Results

Groundnut yields were good, with May plantings averaging about 2 t/ha. Yields from July plantings were 1 t/ha or less and the mean difference was significant at the 8% level. Groundnut yields were much lower at the Seed Farm than on OFTs (Table 28), attributed to problems in water management. High yields at Bakamoona with mid-June plantings suggest that later plantings may be possible on rich, well drained soils.

Table 28. Groundnut yields from various planting dates

Unit/ farmer	Planting date	Soil Texture	Soil Drainage	Yield t/ha
Pimburettewa				
Seed Farm	March 23	NCB	Fair	370
	April 20	"	"	248
	May 19	NCB	"	1,077
	May 24	"	"	620
	June 1	NCB	"	467
	June 16	"	"	289
A. Kaskiri	May 10		Good	3,000
Thispanagama				
R. Dharmasena	May 12	NCB	Good	2,808
W. Samapala	" 12	"	"	1,982
R. HendrickAppu	" 12	"	"	1,652
W. Somaweera	" 12	"	Poor	1,156
H. MuthuBanda	" 12	"	Good	1,652
Backamoona	June 17			5,227*
Nidanwela				
A. Dissanayake	July 18	NCB	Poor	696
A. Ratanayake	" 20	RBE	Good	997

* Fresh weight

E. Recommendations

1. Emphasize March-April plantings of groundnut.

2. Conduct date of planting trials up to the end of June at Bakamoona.

Fertilizer Combinations

A. Background

Several OCs have shown an economic response to the addition of animal manure to chemical fertilizer at planting. Preliminary data indicate that animal fertilizer would also improve yields of legume crops (8).

Information from ICRISAT[2] indicated that groundnut, particularly confectionary types, require applications of gypsum fertilizer to ensure full seed development.

B. Objectives

1. To confirm whether legume crops benefit directly from the application of animal manure to soils at planting.

2. To determine whether the application of gypsum improves quality or yield of groundnut.

C. Methodology

A trial to demonstrate the effect of various fertilizer nutrient levels was established at the MEA Seed Farm on May 24. The methodology was the same as for Date of Planting trials above, except that the following treatments were added:

a) full N + K
b) full N only
c) full N + P
d) no fertilizer

[2] S.L. Dwivedi. Personal communication.

D. Results

Difficulty in locating a supply of gypsum delayed application until groundnut was in the late flowering stage. Although the yield was about 0.2 t/ha higher with FF + gypsum than with FF alone, the difference was not statistically significant. However, the addition of 10 t/ha of cowdung to FF increased the average yield of groundnut by 347 kg/ha, a difference significant at the 1% level (Table 29). At a selling price of Rs 25/kg for groundnut, cowdung added to fertilizer at a cost of Rs 2,200/ha, resulted in an additional profit of Rs 6,475/ha.

Table 29. Yield (t/ha) of groundnut with different rates of fertilizer, cowdung and gypsum

Unit/ farmer	Planting date	Soil drainage	FF	FF + CD 10 t/ha	FF + gypsum
Tispanagama					
R. Dharmasena	May 12	Good	2,808	3,056	2,726
W. Samapala	" 12	"	1,982	2,148	2,354
R. HendrickAppu	" 12	"	1,652	2,313	2,395
W. Somaweera	" 12	Poor	1,156	1,652	991
H. MuthuBanda	" 12	"	1,652	1,817	1,983
Mean[1]			1,850a	2,197b	2,090a

[1] Means with the same letter are not significantly different

An analysis was made of combined data from groundnut and cowpea trials because trends were similar (Table 30). Yields from treatments in which cowdung was used were significantly higher than from FF alone but yields from FF + cowdung and 1/2F + cowdung were not significantly different (Table 30). Low yields from cowdung treatments at the Kaskiri farm were due to severe pod damage by insects (data were not used in the statistical analysis). This was attributed to the introduction of insects with the manure. It can be concluded however, that yields of cowpea and groundnut are increased by the use of animal manure.

In the chemical fertilizer trial at the Seed Farm, the highest yield (620 hg/ha) was obtained with FF followed by the 'no fertilizer treatment' (Table 31). If cowdung is not added, full fertilizer rates should be applied.

Table 30. Yield (t/ha) of groundnut and cowpea with different rates of fertilizer and cowdung

Unit/ farmer	Planting date	Soil type	Soil drainage	FF	FF + CD 10 t/ha	CD + 1/2 F
Pimburettewa (groundnut)						
A. Kaskiri	May 10	NCB	Good	3,000	600*	-
Nidanwela (groundnut)						
A. Ratanayake	July 20	RBE	Good	997	1,244	1,190
A. Dissanayake	July 18	NCB	Poor	696	885	insect damage
Ihalawewa (cowpea)						
S. Dayaratne	July 24	RBE	Good	479	826	907
H. Padimanike	" 30	NCB	Poor	578	644	743
Mean[1]				688a	900b	947b

* Data not used in the analysis due to pod damage by insects
[1] Means with the same letter are not significantly different

Table 31. Yield of groundnut with different rates of chemical fertilizer at the Seed Farm

Treatment	Yield (kg/ha)
Full fertilizer (NPK)	620
Full N + K	223
Full N only	112
Full N + P	235
No fertilizer	347

E. Recommendations

1. Use animal manure at a rate of 1 kg/m^2 mixed with chemical fertilizer at time of planting.

2. Conduct additional trials for possible improvement of quality and yield of small-seeded groundnut.

Variety Trials

A. Background

Large-seeded, confectionary varieties of groundnut yielded well in preliminary trials at the Aralaganwila RARC (2). This crop, if successfully grown, is expected to have good market potential in Sri Lanka.

B. Objective

To evaluate the performance of 3 local varieties and 3 new groundnut varieties provided by ICRISAT.

C. Methodology

Trials were conducted at the Seed Farm and Bakamoona. Methodology is described under groundnut Date of Planting trials. Plot sizes and varieties tested were as follows:

Backamoona - 570 m^2, ICGV86564 (ICRISAT), Red Spanish (local)
Seed Farm - 65-75 m^2, MI-64, MI-74, Red Spanish, HYQ-49, HYQ-(CG)5-47 (ICRISAT)

D. Results

Varieties MI-64 and MI-74 yielded 2 t/ha, about double the yields of HYQ-49 and HYQ(CG)5-47. ICGV86564 out-yielded Red Spanish by 25 percent at the Seed Farm. About the same yield difference occurred at Bakamooma but yields of fresh pods were about 10 times higher (Table 32).

Table 32. Yields (kg/ha) of six groundnut varieties

Location	Planting date	Local varieties			ICRISAT		
		MI-64	MI-74	Red Span.	HYQ-49	HYQ 5-47	ICGV 86564
Seed Farm	May 19	1991	2133	-	1077	1738	-
	June 1	-	-	467	-	-	561
Bakamoona	June 17-19	-	-	5227	-	-	6139

E. Recommendation

1. Increase seed of varieties MI-64, MI-74, HYQ5-47 and ICGV8654 for OFTs and demonstrations.

CABBAGE

Date of Planting

A. Background

Recommendations from Maha Illuppallama RARC indicated that with careful management cabbage can be grown throughout the year (1). Although some farmers in System B reported moderate success with Yala 1991 plantings, data showed cabbage yields to be low in Yala (6), as well as in December-January (8). This crop would be particularly useful for year-round cropping systems in System B.

B. Objective

To determine the response of cabbage yields to planting dates in Yala and in late Maha.

C. Methodology

Following production of transplants in the nursery, cabbage variety KY cross (and Exotic) were established on raised beds on OFTs and at the Seed Farm to study date of planting, fertilizer combinations and variety performance. Details of the trials are listed below:

Plot size: 11 x 11 m; 5 x 5 m

Plant spacing: 50 x 40 cm

Plant density: 1 plant/hill

Dates of transplanting: February 15-July 16

Cowdung: 10 t/ha

Fertilizer (kg/ha): Full rate
- Basal: Urea - 200, TSP - 300, MOP - 150
- Top dressing: urea - 250, 4 to 5 weeks after planting
- Full rate + cowdung (5 t/ha)
- Full rate + cowdung (10 t/ha)
- Half rate + cowdung (5 t/ha)

Irrigations: 11-12

No. of insecticide treatments: 6-9 (Lebycid, Lorsban, Tamoran, Atabron, Lorsban, Atabron, Lebycid)

No. of fungicide treatments: 2-3 (Benlate, Dythane Zineb, Mancozeb, Dithane)

No. of weedings: 3-4

Further information is provided in Annexure 16.

D. Results

February plantings yielded 10 t/ha and produced export quality cabbage. Later plantings were affected by high temperatures and severe insect predation, which adversely affected quality and yield (Table 33).

A July planting produced 38 t/ha of marketable cabbage which sold for 11/kg, giving as profit of Rs 322,000 on a per hectare basis. It should be noted that the plot was only 17 m_2 and was isolated from other cabbage plots. Insects were a problem, but were controlled with six applications of insecticides.

At a price of Rs 7/kg, a yield of at least 3.5 t/ha is required to meet production expenses, excluding labor.

E. Recommendations

1. Plant cabbage in Maha. Cabbage can be raised with difficulty in Yala, but it is slow growing and subject to insects and diseases.

2. Conduct date of planting trials from July to January.

Fertilizer Trials

A. Background

In preliminary trials, yields of cabbage fertilized with cowdung were higher than with chemical fertilizer alone and a combination of chemical fertilizer + cowdung resulted in the highest yield (8). Further data are required to verify these results.

Table 33. Yield of cabbage from various planting dates

Unit/ farmer	Planting date	Soil Dr'age	Soil Texture	Yield t/ha	Remarks
Ellewewa					
Dharmasena Farm	Feb 15	Good	RBE/SL	10.0	Insects-m+
" Farm	March 15	"	"	5.0	" -s
Pimburettewa (P)					
Seed Farm	April 4	Mod.	MCB/SL	10.0	Insects-s
K. Gunaratne	" 4	-	-	3.5	" -s
Aralaganwila (A)					
K. TikiriBanda	April 19	-	L	1.5	Insects-s
Aluthoya					
P. Jayasinghe	April 19	Good	SL	1.3	Insects-s
Seed Farm - P	April 28	Mod.	MCB/SL	6.0	Insects-s
Seed Farm	May 7	"	"	8.4*	" "
M. LokuBanda-A	" 16	Good	L	1.0	" "
Seed Farm-P	May 17	"	"	10.5	" "
Thilakeratne	" 17	-	LS	2.8	" "
Bimpakuna					
H. Indrapala	July 16	Good	MCB/SL	38.2	Insects-m

* Variety Exotic; no heads; yield represents whole plant
\+ m = moderate, s = severe

B. Objective

To compare cabbage yields at different rates of cowdung in relation to chemical fertilizer rates.

C. Results

Cabbage insects were not well controlled, even with 9 applications of 5 different insecticides. As a result, heads did not form. Soil and air temperatures (exceeding 35° C) were too high for optimum growth.

Yields were higher with FF than with half fertilizer + 5 t/ha cowdung (Table 34). Doubling the amount of cowdung with

the half fertilizer increased yields over full fertilizer alone. This confirms earlier data, which showed that yields are improved with the application of cowdung at planting.

Table 34. Gross and (net) yield (t/ha) of cabbage variety KY Cross with various rates of fertilizer and cowdung

Unit/ farmer	Planting date	Full fertilizer	CD 5t/ha+ half fert	Cd 10t/ha+ half fert
Seed Farm	April 4	22.4 (10.0)	20.6 (8.3)	- (-)
Seed Farm*	April 28	15.0 (6.0)	14.0 (5.6)	18.5 (7.4)
Seed Farm	May 17	31.8 (10.5)	15.1 (3.5)	- -

* Variety Exotic, with CD rates double those listed above Gross represents the weight of the whole head; net, the weight of marketable leaves

D. Recommendation

1. Apply well-rotted animal manure at a minimum rate of 1 kg/m^2 minimum, mixed with soil at transplanting cabbage seedlings.

Cabbage Variety Trial

A. Background

High soil and air temperatures, along with severe insect predation, are constraints to cabbage production in Yala.

B. Objective

To identify the most heat and insect resistant varieties for use in Yala.

C. Results

Plant growth and head development were limited by soil and air temperatures exceeding 35° C and severe insect infestations. Yields of variety KY Cross were higher than those of Exotic in terms of number of heads formed and gross and net weight (Table 35). However, Exotic produced larger

heads than KY Cross, averaging more than 2 kg in weight. In some cases, Exotic did not form heads, probably as a result of high temperatures.

Table 35. Yields of cabbage varieties KY Cross and Exotic

Variety	Planting	Heads/plot		Yield (kg/ha)	
		No.	Wt (kg)	Gross	Net
KY Cross	April 17	150	0.53	16.1	8.4
Exotic	April 17	24	2.39	11.5	1.2
" "	May 7	0	0	8.4	-

D. Recommendation

1. Variety KY Cross is preferable to Exotic in System B because of better yields under conditions of high temperature.

CARROT

A. Background

Carrot yields were highest with plantings during November-December, particularly on homesteads (8). Cape Market is the popular variety in System B.

B. Objective

To assess the adaptability and performance of six carrot varieties in comparison with Cape Market during Yaha.

C. Methodology

Seven carrot varieties were direct seeded on raised beds at the Seed Farm (irrigated lowland). Trial details were as follows:

Varieties: Cape Market, W 347, W 353, W 358, W346, W 348 and W349

Dates of seeding: March 23, April 7

Plot size: 25 m^2

Soil type and drainage: RBE/SL - fair

Fertilizer (kg/ha)
Basal: urea - 250, TSP - 300, MOP - 125
Top dressing: 250 urea, 125 MOP at 4 and 6 weeks after planting

Irrigations: 6

Insecticide treatments: 0

Fungicide treatments: 4 (Benlate, Trimiltox, Dithane)

Dates of harvest: W 347, W 353 - August 17
W 358, W 346 - August 27
W 348, W 349, Cape Market - Sept 4

D. Results

Carrots did not grow well during Yala 1991. The average yield was only 2 t/ha, the highest yield being 5.6 t/ha (Table 36). At a selling price of Rs 15/kg, a minimum profit of Rs 6,000/ha was reaslized from 4 of the 7 varieties tested; production costs were Rs 23,500/ha not including labor. This compares with profits of Rs 50,000-255,000/ha from December plantings on homesteads (8). Compared with other varieties in this trial, W 358 shows promise in System B with an average net yield double that of the standard Cape Market, and a profit of Rs 60,000/ha.

Table 36. Yields (kg/ha) of carrot varieties

Variety	Gross weight	Net weight
W 347	120	40
W 353	280	160
W 358	11,200	5,600
W 346	4,800	2,800
W 348	4,400	2,400
W 349	3,600	2,000
Cape Market	3,400	2,000

E. Recommendations

1. For best results, confine plantings to Maha, particularly on well-drained homesteads or uplands in System B.

2. Conduct date of planting trials commencing in mid-October.

3. Conduct trials to determine the effect of supplementing recommended fertilizer rates with 1 kg/m^2 cowdung at planting.

4. Continue variety trials to compare the performance of W 358 with Cape Market and other leading varieties.

BEETROOT

A. Background

Beetroot performed well during Maha plantings from early December to mid-January, yielding from 18 to 21 t/ha (8). June plantings also showed promise (7).

B. Objective

To determine if beetroot can be profitably grown during Yala in System B.

C. Methodology

Seedlings of beetroot variety Crimson Globe were transplanted on raised beds in NCB soils at the MEA Seed Farm. Details of the trial are listed below:

Plot size: 11 x 11 m

Plant spacing: 30 x 30 cm

Plant density: 1 plant/hill

Dates of seeding: June 19, July 9

Cowdung treatment: 10 kg/ha

Fertilizer (kg/ha):
Basal: urea - 200, TSP - 300, MOP - 125
Top dressing: urea - 250, 4 to 5 weeks after planting

No. of irrigations: 7-8

No. of insecticide treatments: 4-5 (Lebycid, Lorsban, Monocrotophos)

No. of fungicide treatments: 1 (Pomersol forte)

Harvest date: 3 months after planting

D. Results

Beetroot yields exceeded 3 t/ha from June and July plantings (Table 37), but decreased to 1.2 t/ha when planted August 8. At a price of Rs 15/kg, a yield of 3.2 t/ha grossed Rs 48,000/ha. The cost of production, not including labor, was Rs 21,500/ha, leaving a profit of Rs 26,500/ha. However, yields and profits were much higher with December-January plantings, e.g. a profit of about Rs 275,000/ha (8).

Table 37. Beetroot yields (t/ha) from three planting dates at the Seed Farm

Soil type	Soil drainage	June 16	July 9	Aug 8
NCB	Fair	3.6	3.2	1.2

E. Recommendation

1. Modest profits can be made with careful management of Yala plantings in June-July. However, Maha plantings of beetroot result in higher yields and profits. High temperatures and severe insect pressure are major constraints during Yala.

BUTTERNUT SQUASH

A. Background

Butternut squash is a popular vegetable in the local market and has export potential. However, most farmers in System B plant butternut at the same time. As a result, a brief harvest period results in market saturation and a serious erosion of prices.

B. Objective

To determine various planting dates at which butternut can be grown.

C. Methodology

Butternut squash was planted on 121 m^2 plots at the year-round irrigation and cultivation site, in cooperation with MARD's water management sub-component. Application details are provided below:

Planting dates: May 23-September 5

Soil type: NCB/SL, RBE/SL

Drainage: Poor-good

Fertilizer rate (kg/ha):
Basal: AS - 220, TSP - 380, MOP - 225
Topdress: urea - 45, MOP - 25, 3 and 6 weeks after transplanting

Irrigation schedule: every 5 days

No. of fungicide treatments: 1-4 (Daconil, Formasol, Ridomil, Antracol)

No. of insecticide treatments: 0-2 (Lannate, Lebycid, Monocrotophos

Harvest dates: August 25-October 11

Field data are presented in Annexure 17.

D. Results

Average yield from different planting dates ranged from 5.1 t/ha to 8.2 t/ha and plot yields ranged from 1.2 to 11.6 t/ha. Yields of June plantings were higher than later plantings but the difference was not statistically significant (Table 38). The major problems were mosiac virus, powdery mildew, soft rot and leaf miner.

Production costs were Rs 20,000/ha not including labour. At a price of Rs 6/kg, the average net income was Rs 19,199/ha. At these levels, a yield of 3,333 kg/ha is necessary to break even.

Production cost (Rs/ha) of butternut squash

Land preparation	3,600
Seed	2,200
Fertilizer	9,650
Chemicals	4,550
Total	20,000

Table 38. Yield of butternut squash at different planting dates

Unit/ farmer	Yield (t/ha)		
	June 24-29	July 7-14	July 23-28
Mahadamena			
J. Jayasingha	1.7	1.4	1.2
R. Dissanayake	6.8	11.1	5.5
S. Wijepala	7.6	6.2	9.2
P. Piyadasa	11.6	3.7	5.5
S. Jayaweera	13.2	6.9	9.7
J. Samerawathi	8.1	1.3	6.5
Mean[1]	8.2a	5.1a	6.3a

[1] Mean difference of the highest yield from other yields was significant only at the 12% level

BUTTERNUT VS ACORN SQUASH

A. Background

Round-fruited acorn squash is a popular product in international markets. Following the success of butternut squash production in System B, acorn squash was introduced for preliminary plantings. Maha plantings were not successful (8), due to severe infection of mildew and virus.

B. Objective

To determine whether acorn squash can be grown in System B and to compare performance with the well-established butternut squash.

C. Methodology

Squash was planted on various sized plots up to 121 m^2. Irrigation was every 5 days and the plots were weeded once or twice, as needed. Insecticide applications ranged from 1-2 and fungicides 0-2. Other methodology is described under the previous section on butternut.

Field data are provided in Annexures 18, 19 and 20.

D. Results

Butternut squash yielded an average of 5.6 t/ha vs 3.5 t/ha for acorn (a difference significant at the 1% level) from 18 paired trials planted between March 3 and June 28 (Table 39). A similar trend in yield occurred at the Seed Farm, where the latest date of planting was September 5. There was no particular yield trend in response to planting date. Both crops were subject to mildew and virus infection. Acorn squash was more susceptible, which probably accounted for lower yields. Most growers over-irrigated, resulting in less than optimum yields of both crops.

The market price for acorn squash increased from 5/kg to Rs 7.5/kg (equivalent to butternut) as consumers became familiar with the product. Later on, when butternut was plentiful and acorn squash was scarce, acorn prices increased to Rs 12-20/kg. However, at a price of Rs 6 Rs/kg, acorn squash at an average yield of 4 t/ha provided a profit of only Rs 10,000/ha if labor was not included in production costs.

Consumers prefer the taste, texture, shape and size of acorn over butternut squash and are inclined, therefore, to pay a premium price for it. After market promotion, the average market price will likely be at least Rs 12/kg. However, an improvement in acorn squash yield is necessary before it can be relied upon as a consistent, profitable crop for System B.

E. Recommendations

1. Conduct additional date of planting trials with acorn squash during Yala, emphasizing good drainage sites and minimum use of irrigation water.

2. Always use cowdung at planting along with chemical fertilizer.

3. Obtain available varieties of acorn squash and conduct comparative trials.

4. Conduct fertilizer trials, including higher rates of chemical fertilizer.

Table 39. Yields of butternut and acorn squash

Unit/ farmer	Planting date	Yield t/ha Butternut	Yield t/ha Acorn
Pimburettewa			
Seed Farm	March 3	7.1	6.4
	Sept 5	7.3	5.4
	June 28	3.8	0.5
Mean of Seed Farm[1]		**6.1a**	**4.1b**
Thispenagama (T)			
R. Somasiri-P	May 23	8.7	3.3
H. Muthbanda	June 1	5.3	2.3
W. Ariyasingha	" 1	3.5	3.0
K. Upulbandara	" 1	2.7	2.3
W. Somadeva	" 3	5.3	4.3
N. DingiriBanda	" 5	8.7	7.2
W. PunchiBanda	" 5	3.0	1.0
H. Appuhamy	" 10	7.8	3.7
HeenBanda-P	" 15	5.3	1.6
A. Kudabandara	" 15	6.8	3.5
P. UkkuBanda	" 16	4.8	2.3
H. Somadeva	" 17	5.3	4.3
K. Fernando	" 18	3.8	2.7
W. Saranelis	" 20	5.2	4.0
K. HenrichAppu	" 20	3.0	2.3
SudaBanda-P	" 23	10.0	8.3
Nidanwela			
G. Witharana	July 5	6.0	7.0
R. PunchiBanda	" 6*	10.0	5.0
Mean		**6.5a**	**4.3b**

[1] Means are significantly different at the 1% level
* Planted on ridges

POTATO

Variety/Date of Planting

A. Background

Maha 1990/91 plantings of potato in System B were successful (8). The outstanding heat resistance in some potato germplasm justified trials in early Yala in System B. Consequently, four of the world's best heat-resistant potato varieties were imported and tested during Yala of 1991. The samples arrived late and could not be planted until June. Nevertheless, two of the varieties produced tubers of acceptable size and quality, but yields were not economic. It was decided that the results warranted repeated trials at earlier planting dates.

B. Objective

To identify a potato variety that is economic in System B with plantings in late Maha/early Yala.

C. Methodology

A variety trial was conducted at the MEA Seed Farm and a date of planting trial was carried out with variety Desiree at three locations in the Sevanapitya Unit.

Varieties: Desiree, Mondial, Spunta, Pentland Del

Plot size: 5 x 3 m

Replicates: 4

Planting dates: February 24-March 15, 1992

Plant spacing: DOA recommendations based on tuber size:

Tuber diameter (mm)	Spacing (cm)
15-27	15
29-35	25
36-45	45
46-55	60

Plant density: 1 plant/hill

Cowdung treatment: 10 t/ha at planting

Fertilizer (kg/ha):
Basal: AS - 250, TSP - 50, MOP - 75
Top dressing: AS - 250, MOP - 75 at earthing up

No. of irrigations: 1-6

No. of insecticide applications: 5 (Lorsban, Lebycid)

No. of fungicide applications: 5 (Antrocol, Topsin, Mancozeb)

No. of weedings: 3

D. Results

Heavy rains after planting and inadequate drainage resulted in poor germination and emergence (16-41 percent). As a result, performance was determined from ~~of~~ individual plants in each plot. Seed tubers of Desiree were small and based on DOA recomendations, a larger number of tubers were planted/plot. All yields were low and uneconomic, but based on an equal number of plants per plot, Desiree out-yielded the other varieties (Table 40). The majority of the plants died without producing tubers.

At the two OFT locations, planted in March, seed pieces rotted in the ground and failed to produce a crop. Seed Farm trials and OFTs during two Yala seasons failed to produce econonomic yields of potatoes.

E. Recomendations

1. Test varieties Mondial and Spunta vs Desiree during Maha.

2. Confine commercial potato plantings to the period early October to late January.

TOMATO

A. Background

Some of the tomato varieties tested at the Girandurakotte RARC yielded in excess of 10 t/ha (2). Favorable results were obtained at the Aralaganwila RARC (2) and two varieties yielded from 8 to 10 t/ha in Maha Seed Farm trials (7).

Table 40. Performance of four potato varieties

Parameter	Variety			
	Mondial	Spunta	Desiree	P. Del
Total ememergence 3/20	147	140	525	127
% emergence 3/20	41	24	16	31
% emergence 5/10	26	26	14	39
% rotten seed pieces 3/20	48	51	82	69
Shoots/plant 3/20	3.8	4.3	4.6	3.8
No. plants harvested 6/17	32	27	59	37
% " harvested 6/17	21	19	11	29
Tubers/plant	0.4	0.27	0.39	0.03
Tuber weight (gm/plant)	3.3	4.4	5.1	0
Yield kg/ha	42.	48.	120.*	0

* Based on 30 plants, yield = 61 kg/ha_

B. Objective

To identify tomato varieties that produce good yields in System B during Yala.

C. Methodology

Nursery seedlings of 11 tomato varieties were transplanted in demonstration plots (due to limited quantities of seed available) at the Seed Farm. Details of the demonstration are indicated below:

Variety	No. of plants	Plot size (m^2)
Spectrum 599	45	3.0
Hybrid 882	48	3.0
Nema 512	17	1.1
Nema 1401	33	2.0
Nema 1435	5	0.34
Sausalito	29	1.7
Hypeel 696	32	1.8
Noreal 4	96	6.1
Peto 95-43	72	4.0
Peto 98	32	1.8
Peto 111	60	3.3

Plot size: 0.34- 6.1m^2

Date of planting: April 22

Plant spacing: 80 x 50 cm

Plant density: 1 plant/hill)

Soil type and drainage: NCB/SL, fair-poor

Cowdung treatment: 10 t/ha at planting

Fertilizer (kg/ha):
Basal - urea 220; TSP 275; MOP 125
Topdressing - urea 125 at 6 weeks after planting

No. of irrigations: 9

No. of insecticide applications: 0

No. of fungicide applications: 5 (Topsin, Dithane, Antrocol, Trimiltox)

No. of weedings: 2

Dates of harvest: July 4-22

No. of picks: 3

D. Results

Tomato yields varied widely, from 0.8 to 20.6 t/ha (Table 41). Both Nema varieties, 512 and 1401, yielded more than 18 t/ha and merit additional assessment. Although evaluation data were less detailed than planned, certain observations were made. Varieties hybrid 882, Nema 512 and Nema 1401 were more resistant to mildew than the others. Fruit size of these three varieties was acceptable and larger than the others. Fruits of Nema 512 were oblong, others were round. Yields of 10 t/ha or more are economic in System B.

E. Recommendation

1. Conduct OFTs with varieties Roma, T496, T21, Nema 512 and Nema 1401. Check with the RARC Aralaganwila for their suggestions.

Table 41. Yields (t/ha) of 11 tomato varieties in demonstration plots at the Seed Farm

Variety	Yield
Spectrum 599	0.58
Hybrid 882	4.20
Nema 512	18.00
Nema 1401	20.60
Nema 1435	1.30
Sausalito	0.60
Hypeel 696	4.70
Noreal 4	1.70
Peto 95-43	0.80
Peto 98	1.20
Peto 111	0.80

OKRA

A. Background

Okra was successfully grown in System B for market during Yala 1991 (10). Depending upon its adaptability to different planting dates, it may be useful to fit export market windows and in cropping rotations.

B. Objective

To compare okra yields at three planting dates.

C. Methodology

Location: J.D. Jayasinghe, Mahadamene Unit

Variety: MI-7

Plot size: $125m^2$

Planting dates: Aug 15, Aug 27, Sept 11

Plant spacing: 30 x 30 cm

Plant density: 1 plant/hill)

Soil type: RBE/L

Drainage: Good

Fertilizer (kg/ha):
Basal: urea - 150, TSP - 200, MOP - 75
Top dressing: urea - 150 at 4 weeks after planting

No. of insecticide applications: 3 (Monocrotophos)

No. of fungicide applications: 0

No. of weedings: 2

Dates of harvest: July 4-22

No. of picks: 6-13

D. Results

Yields ranged between 8 and 2 t/ha, decreasing with each delay in planting as follows: August 15 - 8.3 t/ha, August 28 - 4.9 t/ha, and September 11 - 2.1 t/ha. This was associated with predation by leaf-eating caterpillars which increased as the season progressed. Plants were infected with virus at all planting dates.

The cost of land preparation, seed, fertilizer and pesticides totaled Rs 14,500/ha. Not counting labor, the September 11 planting barely met production costs, the August 28 planting date netted Rs 11,400/ha and the August 15 planting date netted Rs 35,000/ha.

E. Recommendation

1. Plant okra in Yala from April to early August for best results. The period from late August to September should be classified as 'possible but difficult to grow' in the Crop Planting Time Table (9).

REFERENCES

1. Department of Agriculture. 1990. Crop Recommendations Technoguide. Peradeniya, Sri Lanka. 311 pp.

2. _____. 1990. Yala Research Results. Regional Agriculture Research Centre, Aralaganwila. 213 pp.

3. Hittle, C.N. and S.T.W. Kirinde. 1990. Yala 1989 agronomic performance from 41 farms, Mahaweli, System B. Mahaweli Agriculture and Rural Development Project. 57 pp.

4. Selleck, G.W. 1990. Annual Report, Diversified Agricultural Research Project. Peradeniya, Sri Lanka. 154 pp.

5. Selleck, G.W., P.M.M.B. Abeyratne and D.M.S.B. Dasanayake. 1992. Yala 1991 Seed Farm trials. MARD/MDS report. Pimburettewa, Sri Lanka. 37 pp.

6. Selleck, G.W. and D.M.S.B. Dasanayake. 1992. Yala 1991 on-farm trials. MARD/MDS report. Pimburettewa, Sri Lanka. 47 pp.

7. _____. 1992. Maha 1991/92 Seed Farm trials: legumes, grain crops, bulb crops, chilli, Capsicum and vegetables. MARD/MDS report. Pimburettewa, Sri Lanka. 40 pp.

8. Selleck, G.W., D.M.S.B. Dasanayake, M. de Silva and S. Ganigame. 1992. Maha 1991/92 On-farm trials. MARD/MDS report. Pimburettewa, Sri Lanka. 105 pp.

9. Selleck, G.W. and J.E. Gleason. 1992. Crop rotations for year-round production in System B. MARD/MDS report. Pimburettewa, Sri Lanka. 12 pp.

10. Selleck, G.W., D.M.S.B. Dasanayake, M. de Silva and S. Ganigame. In MARD/MDS Quarterly report, July - September, 1992. Pimburettewa, Sri Lanka. pp: 9-11.

11. Selleck, G.W. 1991. Observations of chilli NLD disease in System B. during Yala, 1991. MARD/MDS report. Pimburettewa, Sri Lanka. 2 pp.

12. West, M. 1992. Seed farm adaptability trials, No. II: Maha 1990/91; Yala, 1991; Maha 1991/92. MARD/MDS report. Pimburettewa, Sri Lanka. 25 pp.

APPENDICES

Annexure 1

BIG ONION FERTILIZER TRIAL

BLOCK : ELLEWEWA **VARIETY : POONA RED**

UNIT : KALUKALE **PLOT SIZE : 11 X 11 M**

FARMER	PLANTING	SOIL		INSECTICIDES	FUNGICIDES	IRRIGATIONS	YIELD KG/PLOT		
		TYPE	DRAINAGE				FF	FF + CD	CD + 1/2 F
H.M. Heenbanda FC 36/3	06.05.92	RBE, CL	V. Good	1, Monocrotophos	1, Topcin	12	287	307	279
D.R.N. Jayarathne FC 20.2	28.05.92	RBE, CL	V. Good	1, Monocrotophos	1, Parmosol Topcin	11	198	258	173
D.M. Kularatne FC 40/70	07.05.92	RBE, CL	V. Good	2, Monocrotophos	2, Parmosol Antracol	12	308	339	297
B.H.H. Herath Banda FC 38/01	09.05.92	RBE, CL	V. Good	1, Monocrotophos	2, Parmosol Topcin	11	241	302	231
N.H.G. Indraini FC 20/01	22.05.92	RBE, CL	V. Good	0	1, Topcin	12	219	263	222
N.H.G. Sarath FC 20/08	16.05.92	RBE, CL	V. Good	0	0	12	211	278	219
N.B. Bandaranayaka FC 36/01	06.05.92	RBE, CL	V. Good	0	0	12	278	321	298
D.R. Punchibanda FC 36/2	24.05.92	RBE, CL	V. Good	1, Monocrotophos	2, Parmosol Topcin	12	233	278	203
R.G. Nandana FC 38/8	02.05.92	RBE, CL	V. Good	2, Monocrotophos	4, Parmosol Topcin	13	197	211	201
Y.M. Jayaweerabanda FC 36/7	09.06.92	RBE, CL	V. Good	1, Monocrotophos	3, Topcin Parmosol	11	201	278	173
J.R. Alwisappu FC 20/2	12.06.92	RBE, CL	V. Good	0	2, Parmosol Topcin	10	133	173	98

* FF = Full Fertilizer, FF + CD = Full Fertilizer + Cowdung 10 t/ha, CD + 1/2 F = Cowdung 10 t/ha + Half Fertilizer Rate

Annexure 2

BIG ONION FERTILIZER TRIAL

BLOCK : ELLEWEWA **VARIETY : POONA RED**

UNIT : THISPANEGAMA **PLOT SIZE : 11 X 11 M**

FARMER	PLANTING	SOIL		INSECTICIDES	FUNGICIDES	IRRIGATIONS	YIELD KG/PLOT *		
		TYPE	DRAINAGE				FF	FF + CD	CD + 1/2 F
A. Kuda Banda, FC/204	12.05.92	NCB, SL	Good	0	2, Parmosol Topcin	10	236	291	212
N.M. Punchi Banda FC/211	21.05.92	NCB, SL	Good	1, Monocrotophos	2, Parmosol Topcin	10	229	273	231
K.A. Somawathi FC/200	28.05.92	NCB, SL	Good	0	3, Antracol Parmosol Topcin	11	242	287	221
H.M. Appuhamy FC/200	10.06.92	NCB, SL	Good	0	2, Parmosol Topcin	12	243	278	237
H.G. Punchirala FC/214	17.06.92	NCB, SL	Good	2, Monocrotophos	6, Parmosol Topcin Antracol	10	241	263	221
P.G. Ukkubanda FC/190	29.06.92	NCB, SL	Good	0	6, Parmosol Topcin	10	221	269	199

* FF = Full Fertilizer, FF + CD = Full Fertilizer + Cowdung 10 t/ha, CD + 1/2 F = Cowdung 10 t/ha + Half Fertilizer Rate

Annexure 3

BIG ONION FERTILIZER TRIAL : YEAR AROUND IRRIGATION

SOILS : RBE UNIT : MADUDAMANA **DRAINAGE : GOOD**

PLOT SIZE : 11 X 11 M

FAMER	PLANTING DATE	NO. HERBICIDES	NO. FUNGICIDES	NO. INSECTICIDES	HARVESTING DATE	TREATMENTS													
						FULL FERTILIZER				HALF FERTILIZER & COWDUNG 10 t/h				FULL FERTILIZER & COWDUNG				COWDUNG			
						VARIETY	PLANTING DATE	AREA m	YIELD KG/PLOT	VARIETY	PLANTING DATE	AREA M	YIELD KG/PLOT	VARIETY	PLANTING DATE	AREA M	YIELD KG/PLOT	VARIETY	PLANTING DATE	AREA M	YIELD KG/PLOT
H.M.P. Dissanayaka	20.06.92 to 30.06.92	1. Lasso	Trimilton Parmosol Daconil	1. Lannate 1. Monocrotophos	14.09.92 to 28.09.92	Punna	20.06.92	121	267	Bampur	21.06.92	121	374	Puna	27.06.92	121	374	Puna	30.06.92	121	274
S.P. Wijepala	20.06.92 to 24.06.92	1. Lasso	- do -	0	01.09.92 to 25.09.92	Punna	20.06.92	121	136	Bampur	21.06.92	121	255	Puna	24.06.92	121	192	Bampur	24.06.92	121	164
J.D. Jayasingha	21.06.92 to 24.06.92	1. Lasso	Daconil	0	20.09.92 to 04.10.92	Bampur	21.06.92	121	184	Bampur Puna	24.06.92 "	61 61	120 64	Puna	20.06.92	121	150	Bampur	24.06.92	121	239
P.D. Piyadasa	24.06.92 to 30.06.92	1. Lasso	1. Trimilton 1. Parmosol 1. Ridomil 1. Daconil 1. Topsin	1. Monocrotophos 1. Lannate	19.09.92 to 04.10.92	Bampur	24.06.92	121	112	Puna	24.06.92	121	115	Bampur	27.06.92	121	390	Bampur	30.06.92	121	184
Sarath Jayaweera	20.06.92 to 25.06.92	1. Lasso	1. Trimilton 1. Parmosol	1. Lannate 1. Monocrotophos	21.09.92 to 07.10.92	Bampur	20.06.92	121	302	Bampur Puna	21.06.92 "	61 60	142 85	Puna	24.06.92	121	98	Bampur	25.06.92	121	296
H.A. Premarathna	20.06.92 to 25.26.92	1. Lasso	1. Trimilton 1. Daconil	1. Leybicide 1. Lannate 1. Monocrotophos	08.09.92 to 25.09.92	Bampur	20.06.92	121	182	Bampur Puna	21.06.92 "	46 75	92 101	Bampur Puna	22.06.92 "	46 75	98 116	Bampur	25.06.92	121	240

Annexure 4

YELLOW ONION FERTILIZER TRIAL

BLOCK : BAKAMUNA UNIT : MADUDAMANA VARIETY : HENRY SPECIAL

SOIL TYPE : CLAY LOAM (RBE/LHG) PLOT SIZE : 11 x 11 m

FARMER	PLANTING DATE	INSECTICIDES	FUNGICIDES	WEEDINGS	HARVEST DATE	YIELD KG/PLOT			REMARKS
						FULL FERTILIZER	COWDUNG + FULL FERTILIZER	CD + 1/2 F	
Jayaratna	08 07 92 to 09 07 92	1. Lorsban	1. Trimiltox 3. Topcin 2. Ridomil 1. Copper sandoz 4. Parmosol	03	06 10 92	299	481	362	Purple bloch, Bulb rot, Mildew Onion Trips.
M G. Palis	10 07 92	1. Lorsban 1. Lebycid	2. Trimiltox 2. Topcin 2. Ridomil 3. Copper sandoz	03	06 10 92	240	319	272	Onion Thrips, Caterpillars, Midew, Bulb rot
A G Baron	09.07 92	1. Lorsban	2. Trimiltox 2. Parmosol 2. Topcin 2. Dithene 1. Ridomil 1. Manzate 3. Copper sandoz	03	06 10 92	288	316	264	Bulbrot Mildew Purple Blotch, Onion Thrips
Jayath	16.07.92	1. Sumicidim 1. Lorsban	2. Topcin 1. Trimiltox 2. Ridomil 1. Mancerzeb 2. Homai 1 Copper Sandoz	03	06 10.92	297	342	306	Onion Thrips, Purple Blotch, Bulb rot, Mildew
S.A. Somapala	19.07.92 to 20 07.92	1. Lorsban	1. Trimiltox 2. Topcin 1. Parmosol 2. Ridomil 1. Copper Sandoz	03	06 10.92	239	246	221	Onion Thrips, Purple Blotch, Bulb rot, Mildew.
Abeyratne	18.07.92	1. Lorsban 1. Sumicidin	1. Trimiltox 2. Parmosol 2. Topcin 2. Ridomil 2. Manzate 1. Copper Sandoz	03	08 09.92	252	281	248	Onion Thrips, Purple Blotch, Bulb rot, Mildew.

BIG ONION VARIETY TRIAL

Annexure 5

BLOCK : DAMMINNA **UNIT : NIDANWALA** **PLOT SIZE : 5 X 5 M**

SOILS RBE, WELL DRAINED, BED - PLANTED

FARMER/LOT NO	VARIETY	PLANTING DATE	FUNGICIDE	INSECTICIDE	DATE OF HARVEST	YIELD KG/PLOT	
						GROSS	MARKETABLE
Gunapala Pathirana FC 43 - 8	Hybrid Red Granex	10.07.92	Trimiltox Parmorsol Topcin	Lebycid	05.10.92	106	70
	Rojo	10.07.92	Trimiltox Parmorsol Topcin	Lebycid	05.10.92	112	77
	Bombay Red	10.07.92	Trimiltox Parmorsol Topcin	Lebycid	05.10.92	103	63
A.M.Gunaratna FC 43 - 5	Hybrid Red Granex	12.07.92	Trimiltox Parmorsol Topcin	Lebycid Lorsban	06.10.92	50	45
	Rojo	12.07.92	Trimiltox Parmorsol Topcin	Lebycid Lorsban	06.10.92	28	20
	Bombay Red	11.07.92	Trimiltox Parmorsol Topcin	Lebycid Lorsban	06.10.92	27	17
Sadhdharmalankara FC 43 - 2	Hybrid Red Granex	16.07.92	Trimiltox Topcin	-	26.10.92	41	36
	Rojo	16.07.92	Trimiltox Topcin	-	26.10.92	43	35
	Bombay Red	16.07.92	Trimiltox Topcin	-	26.10.92	39	32
M.G.Premadasa FC 43 - 2	Hybrid Red Granex	12.07.92	Trimiltox Parmorsol Topcin	-	03.10.92	53	50
	Rojo	12.07.92	Trimiltox Parmorsol Topcin	Lebycid	03.10.92	41	35
	Bombay Red	12.07.92	Trimiltox Topcin	Lebycid	03.10.92	54	46

Annexure - 6

BIG ONION VARIETY TRIAL, YEAR AROUND IRRIGATION & CULTIVATION

BLOCK : ELLEWEWA UNIT : MAHADAMANE PLOT SIZE : 5 x 5 m

FARMER	DATE OF PLANTING	NO. HERBICIDES	NO. FUNGICIDES	NO. INSECTICIDES	YIELD KG/PLOT			HARVEST DATE	REMARKS
					GRANEX	BOMBAY	ROJO RED		
H.A. Premarathne	30.06.92	1, Lasso	1, Parmosol 1, Trimiltox	0	57	74	68	09.09.92 to 25.09.92	Purple Blotch
Sarath Jayaweera	25.06.92	– do –	1, Trimiltox 1, Daconil	0	88	64	58	09.09.92 to 01.10.92	– do –
S.P. Wijepala	26.06.92	– do –	1, Trimiltox 1, Daconil	0	63	39	45	25.09.92	– do –
J.G. Samarawathi	30.06.92	0	1, Parmosol 1, Daconil	1, Monocrotophos	67	96	46	18.09.92 to 25.09.92	Purple Blotch Leaf eating Caterpillar
R.M.P. Dissanayaka	26.06.92	1, Lasso	– do –	– do –	110	92	79	16.09.92 to 28.09.92	– do –
J.D. Jayasinghe	25.06.92	1, Lasso	1, Parmosol	0	99	73	58	15.09.92 to 21.09.92	Purple Blotch

YELLOW ONION, VARIETY TRIAL

Annexure 7

BLOCK : DAMMINNA **UNIT : IHALAWEWA** **PLOT SIZE : 5 X 5 M**

SOILS : RBE

FARMER/LOT NO	PLANTING DATE	FUNGICIDE	INSECTICIDE	DATE OF HARVEST	YIELD kg/ha			
					DESSEX		HENRY SPECIAL	
					GROSS	MARKETABLE	GROSS	MARKETABLE
E.G. Bodhisena FC/15 - 163	11.07.92	Trimiltox Topcin	Dimithoate	28.10.92	26.0	18.0	22.5	12.0
M.G. Upasena FC/18 - 190	10.07.92	Trimiltox Topcin	-	20.10.92	32.0	20.0	33.0	25.0

Annexure - 8

DATE OF PLANTING TRIAL - B.ONION, GRANEX RED

BLOCK : BAKAMUNA
SOIL TYPE : CLAY LOAM (RBE/LHG)

UNIT : MADUDAMANA

FARMER		PLANTING DATE	INSECTICIDES	FUNGICIDES	WEEDINGS	HARVESTING	YIELD KG/PLOT	REMARKS
Kiribanda	Date 1	July 09	2, Lebycid Lorsban	11, Trimiltox Dithane Topcin Homai Parmosol Ridomil	04	Oct. 04	303	
	Date 2	July 30	1, Lorsban	07, - do -	02	Oct. 08	103	Early harvest due to rain.
Arachiappu	Date 1	July 11	2, Lebycid Lorsban	11, - do -	02	Oct. 04	291	
	Date 2	July 31	1, Lorsban	06, - do -	04	Oct. 08	94	- do -
Jayasinghe	Date 1	July 11	2, Lebycid Lorsban	11, - do -	04	Sep. 23 - Oct. 04	308	
	Date 2	August 01	1, Lorsban	06, - do -	02	Oct. 08	82	- do -
Dharmasena	Date 1	July 10	2, Sumicidin Lorsban	10, - do -	04	Oct. 05	309 *	
	Date 2	August 01	1, Lorsban	06, - do -	02	Oct. 08	104 *	- do -
Hemapala	Date 1	July 12	2, Sumicidin Lorsban	10, - do -	03	Oct. 05	317 *	
	Date 2	August 02	1, Lorsban	06, - do -	02	Oct. 08	92 *	- do -
Nimal	Date 1	July 14	2, Sumicidin Lorsban	10, - do -	03	Oct. 05	311 *	
	Date 2	August 02	1, Lorsban	06, - do -	02	Oct. 08	93 *	- do -

Annexure 9

FARMER		PLANTING DATE	INSECTICIDES	FUNGICIDES	WEEDINGS	HARVESTING	YIELD KG/PLOT	REMARKS
Ratnapala	Date 1	July 14	2, Sumicidin Lorsban	08, – do –	03	Oct. 06	287 @	
	Date 2	August 05	1, Lorsban	05, – do –	02	Oct. 08	81 @	– do –
Wijeratna	Date 1	July 13	1, Lorsban	08, – do –	03	Oct. 06	271	
	Date 2	August 02	1, Lorsban	05, – do –	02	Oct. 06	67	– do –
Gunewardana	Date 1	July 16	2, Sumicidin Lorsban	09, – do –	03	Oct. 06	306 *	
	Date 2	August 02	1, Lorsban	05, – do –	02	Oct. 06	62 *	– do –
Manika	Date 1	July 16	2, Sumicidin Lorsban	08, – do –	03	Oct. 06	296 *	
	Date 2	August 06	1, Lorsban	05, – do –	02	Oct. 06	67 *	– do –
Chandraratna	Date 1	July 16	1, Lorsban	09, – do –	03	Oct. 06	261	
	Date 2	August 06	1, – do –	05, – do –	02	Oct. 06	51	– do –
Soma	Date 1	July 20	1, – do –	08, – do –	03	Oct. 06	272 *	
	Date 2	August 03	1, – do –	05, – do –	02	Oct. 06	63 *	– do –
Gunasena	Date 1	July 18	1, – do –	09, – do –	03	Oct. 06	257 *	
	Date 2	August 01	1, – do –	06, – do –	02	Oct. 06	50 *	– do –
Nawaratna	Date 1	July 22	1, – do –	07, – do –	03	Oct. 06	269 *	
	Date 2	August 06	1, – do –	05, – do –	02	Oct. 06	54 *	– do –
Jayampathi	Date 1	July 25	0	06, – do –	03	Oct. 10	269 *	
	Date 2	August 05	0	05, – do –	02	Oct. 10	64 *	– do –

* Dessex Yellow @ Henry Yellow

RED ONION FERTILIZER TRIAL, YALA 1992

Annexure 10

BLOCK : DIMBULAGALA
UNIT : THISPANEGAMA

PLOT SIZE : 5 X 5 M
SOIL TYPE : RBE

FARMER & LOT NO.	PLANTING DATA	PESTICIDES	HARVEST DATA	YIELD KG/PLOT		
				FF + CD	FULL FERTILIZER	COWDUNG
N.G. Dayananda FC 01/05	15.06.92	0	17.08.92	17	-	-
J.M. Kiribanda FC 02/10	17.06.92	0	17.08.92	-	14	-
S.A. Anurapriyantha FC 2/5	17.06.92	0	19.08.92	-	-	16
M.M.T. Kumara FC 2/10	18.06.92	0	19.08.92	18	-	-
J.M. Ukkubanda 194	11.06.92	0	14.08.92	-	12	-
W.G. Ariyasinhe FC 45/10	09.06.92	0	10.08.92	-	-	16
P.G. Ariyaratna FC 4/05	21.06.92	0	22.08.92	22	-	-
M.G. Gunasekara FC 4/2	14.06.92	0	15.08.92	-	-	19
M. Somadeva FC 53/15	15.06.92	0	17.08.92	-	20	

* FF + CD = Full Fertilizer + Cowdung 10 t/ha.

FERTILIZER TRIAL CHILLI

Annexure 11

BLOCK : ELLEWAWA, DIMBULAGALA
UNIT : KALUKELE, THISPANEGAMA

PLOT SIZE : 11 X 11 M
COWDUNG : 10 t/ha

FARMER	PLANTING DATE	SOIL		INSECTICIDES	FUNGICIDES	IRRIGATION	WEEDINGS	HARVEST DATE	YIELD KG/PLOT*		
		TYPE	DRAINAGE						CD + 1/2 F	CD + FF	FF
Rambanda FC/35/02	20.04.92	RBE – CL	Very Good	4, Monocrotophos 4, Lebycid	2, Parmosol 2, Antracol	12	05	27.06.92 to 02.09.92	11	07	09
Ariyathilaka FC/35/01	20.04.92	RBE – CL	Very Good	3, Monocrotophos 5, Lebycid 2, Metasystox	2, Parmosol 2, Antracol	11	05	22.06.92 to 07.09.92	13	09.5	10.5
Dharmasena FC/251	28.04.92	NCB – Sandy Loam	Good	4, Monocrotophos 2, Lebycid 4, Actalic	2, Parmosol 2, Antracol 2, Topcin	11	08	02.07.92 to 02.10.92	33	29.5	32
Dharmaratna FC/241	25.04.92	NCB – Sandy Loam	Good	3, Monocrotophos 3, Lebycid 4, Metasystox	2, Parmosol 2, Antracol 2, Topcin	12	07	29.06.92 to 28.08.92	20.5	17.5	16.5

* CD = Cowdung
FF = Normal Fertilizer rate

Annexure 12

DATE OF PLANTING TRIAL CAPSICUM

BLOCK : DIMBULAGALA **UNIT : THISPANEGAMA** **PLOT SIZE : 11 X 11 M**

NAME OF THE FARMER	DATE OF PLANTING	INSECTICIDES	FUNGICIDES	HARVESTING DATE	YIELD kg/plot
M.G. Ariyadasa 54/08	21.04.92	2, Monocrotophos 2, Lebycid	3, Parmosol	24.06.92 to 02.09.92	65
M.M. Somaweera 52/03	29.04.92	3, Monocrotophos 3, Lebycid	2, Topcin 2, Antrocol	03.07.92 to 21.09.92	52
P.A. Bodhitung 54/09	15.05.92	3, Monocrotophos 3, Lebycid	2, Topcin 2, Parmosol	02.07.92 to 15.09.92	56
W.G. Ariyatunga 54/10	01.06.92	3, Monocrotophos 3, Lebycid	3, Topcin 3, Parmosol	25.07.92 to 02.10.92	52
K.A. Kiribanda 54/4	02.06.92	3, Monocrotophos 2, Lebycid	3, Topcin 3, Parmosol	22.07.92 to 07.10.92	48

Annexure 13

FERTILIZER TRIAL – CAPSICUM

VARIETY : HUNGARIAN YELLOW WAX

PLOT SIZE : 11 X 11 M

FARMER/UNIT	PLANTING DATE	SOIL		INSECTICIDES	FUNGICIDES	HARVEST DATE	YIELD KG/PLOT*		
		TYPE	DRAINAGE				COWDUNG	CD + FF	FULL FERTILIZER
Jastin Ranaweera Sevanapitiya	29.04.92	RBE	V. Good	1. Monocrotophos 2, Lebycid	2, Topcin	17.06.92	121	146	133
W.G. Saraneiis 58/8 Tispanegama	06.05.92	NCB	Good	3, Monocrotophos 2, Actalic	2, Topcin 2, Antracol	24.06.92	117	146	129
A.M. Ukkubanda Sevanapitiya	02.06.92	RBE	V. Good	3, Monocrotophos 3, Lebycid 1, Lorsban	2, Topcin 2, Antracol	16.07.92	113	131	123
K.G. Piyasiri Senapura	23.06.92	NCB	V. Good	3, Monocrotophos 3, Lebycid	2, Topcin 2, Antracol	02.08.92	123	153	146

* CD : Cowdung 10 t/ha
1/2 F : Half Fertilizer Rate
FF : Full Fertilizer

Annexure 14

COWPEA FERTILIZER TRIAL

BLOCK : DAMMINNA **UNIT : IHALAWEWA** **PLOT SIZE : 11 X 11 M**

FARMER/LOT NO	PLANTING DATE	INSECTICIDE	SOIL		YIELD kg/ha		
			TYPE	DRAINAGE	FULL FERTILIZER	COWDUNG 10 t/ha	FF + CD
S.Dayaratna FC 63 – 738	24.07.92	Dimethoate Lannate	RBE	Good	5.8	11.0	10.0
H.M.Podimanike FC 12 – 147	30.07.92	Lannate Carboril	NCB	Poor	7.0	9.0	7.8

Annexure 15

GROUNDNUT FERTILIZER TRIAL YALA 1992

(HALF RECOMMENDED RATE + COWDUNG VS FULL RATE OF CHEMICAL FERTILIZER)

UNIT : PIMBURETTEWA

FARMER	PLOT SIZE	DATE OF PLANTING	INSECTICIDE TREATMENT	NO. OF IRRIGATIONS	WEEDINGS	YIELD KG	
						FULL RATE	HALF RATE
Asoka Kasluri	100 sqm divided into two plots	10.05.92	1, Lebycid	04	01	15	03

Annexure – 16

CABBAGE, DATE OF PLANTING

PLOT SIZE : 100 X 10 M

IRRIGATION : 1 WEEK

UNIT/FARMER	DATE OF PLANTING	SOIL		NO. OF INSECTICIDES	NO. OF FUNGICIDES	NO. OF WEEDINGS	HARVEST DATE	YIELD	
		DRAINAGE	TEXTURE					KG/PLOT	T/HA
Pimburettewa K.H.B. Gunaratne	15.04.92	–	–	1 – Tamaron	1 – Parmosol	–	07.07.92	350	3.5
Aralaganwila K.A. Tikiribanda	19.04.92	–	10 am	4 – Carbofuron Selecron Tamaron Atabron	–	1	08.07.92	150	1.5
Aluthoya P.G. Jayasinghe	20.04.92	Good	Sandy 10 am	3 – Atabron Tamaron Carbofuron	1 – Ridomil	1	07.07.92	125	1.25
Kandegama K.D. Gunadasa	28.04.92	Good	10 am	2 – Atabron Tamaron	1 – Ridomil	1	01.07.92	125	1.25
Aralaganwila M.N. Lokubanda	16.05.92	Good	10 am	2 – Selecron Atabron	–	1	05.08.92	100	1.5
Aluthoya Thilakeratne	17.05.92	–	10 am Sandy	3 – Atabron Tamaron Carbofuron	1 – Ridomil	–	20.08.92	284	2.8

Annexure 17

BUTTERNUT DATE OF PLANTING TRIALS, YEAR ROUND IRRIGATION & CULTIVATION

BLOCK : ELLEWEWA UNIT : MAHADAMANE PLOT SIZE : 11 x 11 m

FARMER	FUNGICIDES	INSECTICIDES	YIELD KG/PLOT			HARVEST DATE	REMARKS
			DATE 1	DATE 2	DATE 3		
J.D. Jayasinghe	1, Daconil 1, Parmosol	1, Lannate	26.06.92 21	09.07.92 19	27.07.92 14	25.08.92 to 22.09.92	Mosaic virus, Soft rot, Leaf miner damage
R.H.P. Dissanayaka	1, Daconil 1, Ridomil 1, Parmosol	1, Lannate 1, Lebycid	27.06.92 83	12.07.92 134	28.07.92 67	28.08.92 to 05.10.92	– do –
S.P. Wijepala	1, Daconil 1, Peronox 1, Parmosol	1, Lannate	24.06.92 92	10.07.92 75	27.07.92 111	28.08.92 to 04.10.92	Soft rot, Powdary Mildew Leaf miner damage
P.D. Piyadasa	1, Parmosol 1, Deconil 1, Peronox	1, Lannate 1, Lebycid	29.06.92 141	14.07.92 45	26.07.92 66	23.08.92 to 11.10.92	– do –
Sarath Jayaweera	1, Trimiltox 1, Daconil 1, Peronox 1, Parmosol	1, Lannate 1, Lebycid	24.06.92 160	08.07.92 83.5	23.07.92 117	19.08.92 to 10.10.92	– do –
J.G. Samarawathi	1, Daconil 1, Peronox	1, Lannate 1, Lebycid	24.06.92 98	08.07.92 16	24.07.92 79	18.08.92 to 10.10.92	– do –

BUTTERNUT/ACORN SQUASH TRIAL

Annexure 18

BLOCK : DIMBULAGALA **UNIT : THISPANEGAMA** **PLOT SIZE : 60 sqm**

FARMER LOT NO.	DATE OF PLANTING	INSECTICIDES	FUNGICIDES	HARVEST DATE	YIELD KG/PLOT	
					BUTTERNUT	ACORN
Muthu Banda 209	01.06.92	2, Monocrotophos	2, Parmosol Antracol	17.07.92 to 02.09.92	32	14
N.M. Dingiribanda 51/2	05.06.92	2, Monocrotophos	2, Antracol	22.07.92 to 12.09.92	52	43
A. Kudabanda 204	15.06.92	2, Monocrotophos	2, Antracol	30.07.92 to 18.09.92	41	21
W.G. Saranelis 52/8	20.06.92	2, Monocrotophos	2, Parmosol Antracol	15.08.92 to 30.08.92	31	24
K.G. Hendricappu 54/7	20.06.92	2, Monocrotophos	1, Antracol	10.08.92 to 02.10.92	18	14
W.G. Ariyasinghe 54/10	01.06.92	2, Monocrotophos	2, Antracol	18.07.92 to 05.09.92	21	18

FARMER LOT NO.	DATE OF PLANTING	INSECTICIDES	FUNGICIDES	HARVEST DATE	YIELD KG/PLOT	
					BUTTERNUT	ACORN
W.G. Punchibanda 50/3	05.06.92	2, Monocrotophos	2, Antracol	20.07.92 to 05.09.92	18	06
H.M. Appuhamy 49/10	10.06.92	2, Monocrotophos	2, Antracol	28.07.92 to 21.09.92	47	22
Piasena Fanando 54/13	18.06.92	2, Monocrotophos	2, Antracol	02.08.92 to 20.09.92	23	16
Upul Bandara 53A/01	01.06.92	2, Monocrotophos	2, Antracol	16.07.92 to 05.09.92	16	14
H.A. Somadeva 52/7	17.06.92	2, Monocrotophos	2, Antracol	02.08.92 to 20.09.92	32	26
P.G. Ukkubanda 51A/01	16.06.92	2, Monocrotophos	2, Antracol	30.07.92 to 16.09.92	29	14
W. Somadeva 53A/5	03.06.92	2, Monocrotophos	2, Antracol	22.07.92 to 05.09.92	34	22

Annexure - 19

BUTTER NUT VS ACORN SQUASH

BLOCK : DAMMINNA **UNIT : NIDANWALA** **PLOT SIZE : 11 X 11 M**

FARMER/LOT NO	PLANTING DATE	SOIL		FUNGICIDE	INSECTICIDE	YIELD KG/PLOT		REMARKS
		TYPE	DRAINAGE			BUTTERNUT	ACORN	
G. Witharana FC 43 - 7	05.07.92	RBE	Good	Trimiltox Daconil	Selicron Carboril	72	85	Flat beds
R. Punchi Banda FC 19 - 765	06.07.92	NCB	Good	Trimiltox Daconil	Selicron Carboril	130	60	Ridges

Annexure – 20

BUTTERNUT/ACORN SQUASH DEMONSTRATION TRIALS – YALA 1992

BLOCK : WIJAYABA UNIT : PIMBURETTEWA

FARMER	PLOT SIZE		DATE OF PLANTING	INSECTICIDE TREATMENT	FUNGICIDE TREATMENT	NO. OF IRRIGATIONS	WEEDINGS	YIELD KG	
	B/N sqm	A/C sqm						BUTTERNUT	ACORN
R.A. Somasiri	75	75	23.05.92	2, Lebycid	Dythane Daconil	Every 5 days	02	65	25
Sudubanda	80	80	23.05.92	1, Lebycid	Nil	Every 7 days	01	80	66
Heenbanda	75	75	15.05.92	1, Lebycid	Nil	Every 5 days	01	40	12

* B/N = Butternut
A/C = Acorn