AGRARIAN RESEARCH & TRAINING INSTITUTE

PRODUCTION OF OTHER CROPS IN PADDY FIELDS IN YALA 1972

A CASE STUDY BASED ON RECORD KEEPING FARMERS IN TWO SPECIAL PROJECTS (Elahera and Dewahuwa)

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INTRODUCTION

The Five Year Plan has highlighted the pressing need to maximise the use of labour as well as reduction of food imports by the immediate development and diversification of agriculture. The need for diversification of agriculture stems from both economic as well as technical considerations. The worsening foreign exchange situation that the country experienced during the last decade has reached crisis proportions today, and consequently the necessity to produce locally as many of the basic foodstuffs, needs hardly any discussion. With the widening gap of balance of payments, there is a great urgency to increase import substitution by intensifying the production of a wide range of foodstuffs that were traditionally imported. Paddy still remains the crop with the largest potential for import substitution and this crop quite rightly has continued to receive the highest priority in every successive agricultural plan. But there are many other crops such as chillies, pulses and onions, that could have been produced locally but had received only marginal emphasis in production programmes until recently. During the period 1969-1971, the average value of the annual imports of pulses and chillies alone had amounted to Rs.91 million.

The projections given in the Five Year Plan for crops such as chillies, pulses, and onions, assume that during the initial years of the Plan period, increase in production would come from an increase in the acreage planted under rainfed conditions, mainly in chenas and home gardens. Intensification of production during the final years of the Plan is envisaged by increasing cultivation of these crops under irrigation in the existing irrigation schemes as well as in new lands that will be developed under the Udawalawe and Mahaweli Development Projects. This would mean a shift away in certain parts of the dry zone[1] during the Yala[2] season from irrigated rice monoculture to cultivation of a range of crops whose water requirements are less than that of paddy. Technically the need for diversification arises in order to maximise the use of the available land and water resources.

In addition there is also the urgent need to increase employment opportunities and bridge the present disparities in incomes particularly in rural areas where unemployment is acute. As 70 per cent

1. Dry Zone :- The drier part of the country receiving on an average less than 75 inches per year which is concentrated mainly during October-January.

2. Yala :- This season normally extends from April to August and coincides with the South West monsoon during which time the dry zone gets little or no rain.

of the unemployed are from the rural sector, labour intensive production programmes for this sector also have to receive very high priority. In this context, the agricultural sector offers considerable scope, particularly as the potential for increasing productivity in peasant holdings is substantially high. The peasant sector in Sri Lanka is still dominated by subsistence farming with paddy production in asweddumised lands as the main economic activity. The spread of new high yielding varieties of paddy has made it possible for some farmers in Irrigation Schemes to obtain additional income particularly in Maha season[1] due to higher yields. However, even in irrigated areas when water supply is restricted, as often happens during the Yala season in dry zone districts, these new varieties do not appear to perform satisfactorily[2]. Consequently, under such conditions farmers are not able to realise adequate returns from them. Thus, there is the need to introduce other high income and labour intensive field crops such as chillies, green gram, ground nut, onions etc., particularly in irrigated areas where the rice yields are marginal due to inadequate water supplies during Yala season. In addition in areas such as Elahera nearly 50 percent of irrigated lands are well drained. In such soils due to higher infiltration rate, it is not feasible to get high returns per unit of water used, by concentrating on paddy cultivation with conventional flood irrigation particularly in the Yala season when water is scarce.

It is realised that the choice of crops for diversification programmes is governed by considerations such as demand, profitability, soil characteristics, availability of water and a number of other related factors. Many of these other field crops are more labour intensive when compared with paddy, and such crops through systematic production, could provide gainful employment to more rural labour than from a rice monoculture in certain areas of the dry zone. Also with the cessation of imports, crops like chillies, pulses and onions instantly have become very high income crops, as the demand far exceeds the supply.

The envisaged shift away from irrigated rice monoculture to a system of cultivation of a whole range of "other field crops"[3] presents a complete break with tradition for the dry zone peasant,

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1. Maha:- This season normally extends from about September - October to February-March and coincides with the North-East monsoon which brings rain to the dry zone.

2. Agrarian Situation Relating to Paddy Cultivation in Five Selected Districts of Sri Lanka, Part I - Hambantota District (Section 6-2); Agrarian Research & Training Institute Colombo, 1974.

3. "Other Field Crops":- This term is used in this study to describe that range of crops which have hitherto been referred as "subsidiary food crops". One field crop cannot be termed subsidiary to another except under special circumstances and the habit of thinking of paddy as a dominant crop and others of subsidiary importance is no longer tenable.

except, perhaps for farmers in the Jaffna and Vavuniya Districts. The successful adoption of diversified farming on a wider scale would primarily depend on the efficient use of factors of production that are both economically profitable and technically feasible in a given environment. This is a challenge that both the extension personnel as well as farmers involved in the implementation of these programmes would have to face.

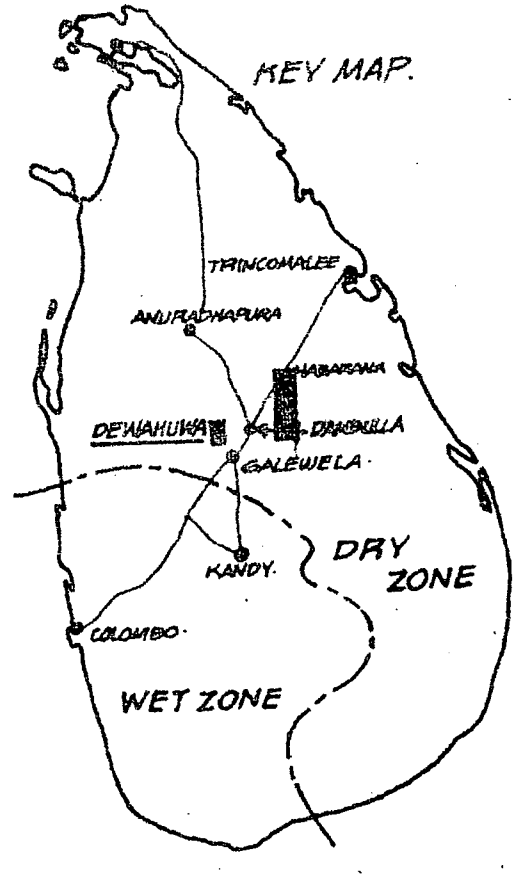
THE SETTING

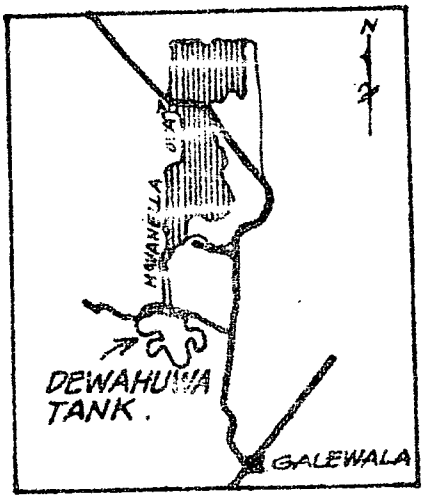
The Elahera Colonization Scheme[1] located in the Polonnaruwa District along the Naula-Giritale Road, covers about 6,000 acres of irrigated land. Unlike many of the other Colonization Schemes in the dry zone, there is no storage reservoir to supply water to this project. The source of irrigation water is a diversion canal (Yoda Ela), that carries water from the Kaluganga to the Minneriya reservoir. Consequently the availability of irrigation water for this project is dependent on the rainfall in the catchment area of the river. Generally, the availability of water in this project is satisfactory during the Maha season with the onset of the North-East monsoon rains, but the flow of water in the canal decreases gradually and reaches a minimum in Yala season by August.

Individual allotments consist of five acres of paddy and three acres homesteads. Approximately half the irrigated area is categorised in the poorly-drained land-class and the rest as well-drained. The cropping pattern prior to 1967 was a monoculture with rice. Almost the entire extent of paddy land is cultivated in Maha, but due to problems of water supply normally less than half the extent is grown with crops during Yala season, and consequently the cropping intensity in this project area is less than1.5. In order to rationalise the use of irrigation water, only half the families in one particular area are permitted to cultivate paddy in any given Yala season, so that generally, a family is able to cultivate three crops in two years. Sowing of Maha paddy crops often extend as far as January and consequently Yala cultivation too gets delayed and crops remain in the field till September. Since August-September is a period of minimum water flow in the Yoda Ela, failure of paddy crops in Yala season due to water shortages is rather a common feature in this project. In view of the relatively low agricultural production and cropping intensity in irrigated lands, this Colonization Scheme had been selected in 1967 as a "Special Project" for intensive development.

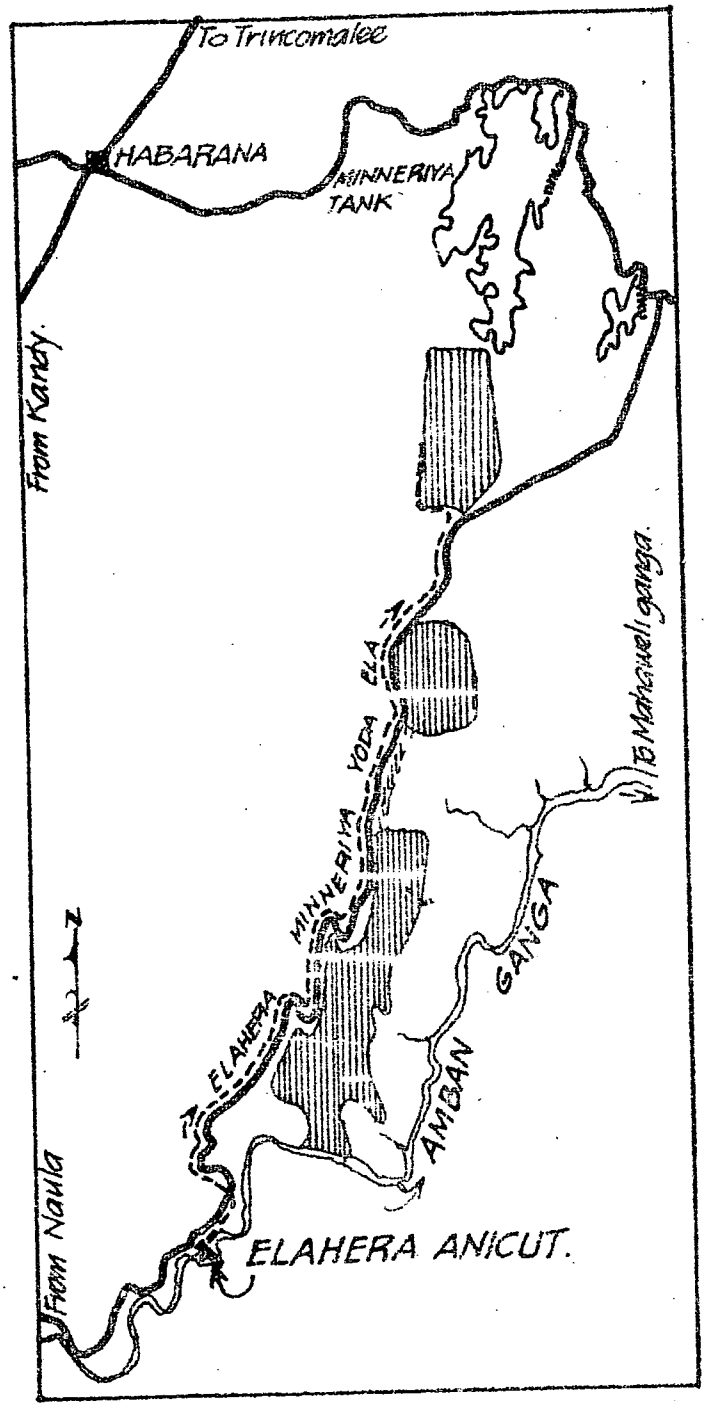
At Elahera, extension efforts have been directed towards inducing farmers to sow their Maha paddy crops early with the onset of the North-East monsoon rains, so as to facilitate the sowing of Yala crops in time and complete the harvesting by August, (before the water level in the Yoda Ela reaches a minimum). The main objective of this approach appears to be to gradually increase the cropping intensity to 2, so as to ensure that every family gets an opportunity of growing two crops every year. *The strategy followed to achieve this objective is to increase progressively the cultiva-*

1. Colonization Scheme: Government sponsored settlement on land brought under cultivation with irrigation mainly in the dry zone. For further details refer "Pioneer Peasant Colonization in Ceylon" by B.H. Farmer, Oxford University Press,1957





DEWAHUWA SCHEME
SCALE: 1" = 4 MILES.



ELAHERA SCHEME
SCALE: 1" = 4 MILES.

PADDY AREA

ROADS

LOCATION OF STUDY AREAS

tion of well-drained lands, with other field crops and confine paddy only to poorly drained lands during the Yala season. The progress ofcultivation of other field crops as well as paddy during Yala is indicated below:-

Year	Other Field Crops (acres)	Paddy (acres)	Total Extent culti-vated (acres)	Total Extent of irri-gated land (acres)Approx:
1968	65	2,605	2,670	6,000
1969	208	2,574	2,782	6,000
1970	188	3,048	3,236	6,000
1971	509	2,087	3,496	6,000
1972	723	3,348	4,071	6,000

The Colonization Scheme at Dewahuwa is located on the southern fringe of Anuradhapura District bordering the administrative District of Matale. The Galewala-Kalawewa main road passes through this scheme. With the restoration of the Dewahuwa tank in 1950 this settlement scheme came into operation. The total extent of the Colonization Scheme is 2,337 acres of paddy land and 1,412 acres of highland. Similar to Elahera, individual allotments consist of five acres of paddy and three acre homesteads.

Generally paddy cultivation is confined only to the Maha season and hardly any cultivation work is undertaken during Yala primarily due to shortage of irrigation water. The cropping intensity in this project is one. Since 1950, two attempts made to cultivate paddy during Yals season, in about 1/3 of the total *asweddumised*[1] extent had proved to be a failure. However, the use of a section of the paddy area during Yala for production of other field crops that need relatively less water is technically feasible. This Colonization Scheme too had been brought under the Special Project Programme in 1970, with the active collaboration of the Japanese Government.

At *Polonnaruwa* normally there is sufficient water for Yala cultivation, but there are isolated areas in and around Giritale and Kaudulla which experience water difficulties during Yala season. Consequently the Department of Agriculture has initiated pilot programmes to induce farmers to grow other field crops particularly in well-drained paddy fields that are located on the upper sides of theirrigation channels using lift irrigation.

1. Asweddumised extent:- It is the total physical extent of land cultivable with paddy each season.

THE STUDY - OBJECTIVES, SCOPE & METHOD

Intensive cultivation of field crops such as chillies and onions has been traditionally confined to areas with relatively less rainfall in Northern Province, principally - the Jaffna Peninsular and parts of Vavuniya. In the said Districts these crops are normally cultivated very successfully, on well-drained soils under irrigation and have become the mainstay of a large majority of farmers for decades, particularly in the Jaffna Peninsular.However crops such as green gram and groundnut, have not received sufficient attention until their imports were banned in 1971. Consequently the production of these field crops in other areas of the Dry Zone, particularly in paddy fields using restricted water supplies available during Yala season is a complete departure from the established pattern of their production.

In 1968, the Department of Agriculture in collaboration with the Land Commissioner's Department initiated a pilot project at Elahera to introduce other field crops in paddy fields in the Yala season and since then commendable progress had been made in extending this approach to a number of other Special Projects in the Dry Zone. However, up to now the cultivation of these field crops on a systematic basis on asweddumised land alongside paddy has not been evaluated in economic terms. A major handicap for initiating economic farm planning is the paucity of information on relevant input-output as well as cost-return data. In order to evolve viable systems of farming the extension personnel need information on economic variables pertaining to a wider range of crop alternatives that are technically suitable for different environments.

As a preliminary step to collecting desired economic data the Production Economics Unit of the Agrarian Research and Training Institute, in association with the extension division of the Department of Agriculture undertook a case study of the cost of production of a few crops earmarked for development during the 1972 Yala season in the Special Projects of Elahera and Dewahuwa and around Polonnaruwa. In this study emphasis is given to the Elahera project where over 700 acres were planted with other field crops in paddy fields during this season, and the aim of the study is to obtain information on economic variables such as labour usage, material inputs and variations in yields under different production patterns in paddy fields.

Objectives

1. To collect basic input-output data on field crop production in paddy fields in locations where rice yields are marginal during Yala due to scarcity of irrigation water.

2. To evaluate the relative profitability of production of a range of field crops such as chillies, green gram, ground nut and onions, as an alternative to paddy in Special Project areas where irrigation water is restricted for paddy production during Yala season.

3. To provide economic data to extension staff for preparation of farm plans and budgets in Colonization Schemes earmarked for intensification of crop diversification programmes.

4. To provide training and experience to extension officers in Special Project areas in farm record keeping work.

Methodology

This is a case study in respect of 45 farmers who cultivated field crops in paddy fields at Elahera, Dewahuwa and Polonnaruwa during Yala 1972 season. A farm record book prepared by the Production Economics Unit was used by Agricultural Instructors for recording the required information. In the absence of a record book, it is necessary to rely on the ability of farmers to recall details of field operations, labour used and expenses incurred throughout a growing season and it is difficult to ascertain accurately the desired information from them as the "recall" lapse among farmers is high. Thus a supervised farm record keeping programme was conducted to collect detailed information. In view of the detailed nature of record keeping involved and also as the Agricultural Instructors participating in this programme had to attend to record keeping work in addition to their normal duties, a smaller number of farmers in each project was selected on the following basis:

1. *Willingness of farmers to co-operate on a project of this nature by providing relevant economic information on production of each of the field crops right through the season (5 to 6 months) to extension staff on their visits to the selected farms.*

2. *Ability of the Agricultural Instructors to contact the co-operating farmers frequently without allowing their normal work to suffer. In this study, each of the record keeping farmers has been contacted by the extension officer of the area at least 2-3 times a week throughout the cultivation season to obtain relevant information for entering the record books regularly.*

In all three locations training classes were conducted on farm record keeping work for the benefit of the agricultural extension staff who were called upon to handle these programmes. At these classes the procedure with regard to costing of various input items were explained in detail. In order to get the relevant

entries recorded as accurately as possivle, this work was entrusted only to the Agricultural Instructors. During the growing season, the writers visited these project areas periodically and supervised the progress of record keeping work undertaken by the extension staff. On these visits discussions were held both with the extension staff as well as some of the farmers who co-operated in this study and necessary guidance was given.

Limitations of the Study

As stated earlier, this is a case study primarily confined to two Special Projects where each of the crops grown by co-operating farmers is studied in detail: in addition six farmers outside the Elahera project but located near Polonnaruwa have also been included as they desired to co-operate in this study. *In view of the small size of the sample and the restrictions placed on the initial selection of farmers, it is not proposed to draw general conclusions from the data obtained from these records, with regard to the profitability of production of other field crops in the Dry Zone. The information presented here is primarily intended to serve as guidelines for extension officers involved in drawing up crop diversification programmes, preparation of farm budgets and farm plans in the said Special Project areas. Besides, the information contained herein could also be useful to them in their advisory work, particularly to illustrate the possibilities of increasing family farm earnings.*

Extent covered by the Study

At Elahera, of the 6,000 acres of asweddumised paddy land, 4,071 acres have been cultivated with paddy and 723 acres under other field crops during Yala 1972 season. The 22 farmers in respect of whom records were kept have grown 39 acres of other field crops and 38 acres under paddy during this season. The average extent cultivated by record keeping farmers amounts to 1.8 acres under other field crops and 2.15 acres under paddy. Production records were maintained during this season only in respect of other field crops and not for paddy.

At Dewahuwa there was no Yala cultivation of paddy at all. In view of the repairs and maintenance work undertaken on the main irrigation channel it was not possible for the farmers at Dewahuwa to obtain even the limited water that was available in the tank for cultivation of even other field crops, during this season. Consequently, only 99 acres have been cultivated under other field crops in this Project with lift irrigation from drainage channels and seepage water. The 17 farmers who participated in this study have cultivated 37 acres giving an average of 2.2 acres per farmer.

At Polonnaruwa, data was not available on the extents cultivated under other field crops in paddy fields in Yala 1972. In fact, very limited cultivation of field crops is undertaken in Polonnaruwa during Yala as most paddy lands have an assured supply of water for

paddy cultivation. The six farmers from Polonnaruwa who participated in this study have cultivated eleven acres under field crops in paddy fields. The details in respect of records maintained in each location are given below:

Location	Total extent under field crops in paddy fields (acres)	Number of record keeping farmers	Extent in respect which records were kept (acres)	Average extent per record keeping farmers (acres)
Elahera	723	22	39	1.76
%	(100)	-	(5)	-
Dewahuwa	99	17	37	2.20
%	(100)	-	(38)	-
Polonnaruwa	n.a.	6	11	1.85
%	-	-	-	-

Particulars of Record Books maintained by Extension Officers

Location	Chillies	Green Gram	Ground -nut	Red Onions	Bombay Onions	Total
Elahera	8	4	6	3	1	22
Dewahuwa	-	14	2	1	-	17
Polonnaruwa	4	-	-	-	2	6
Total	12	18	8	4	3	45

Costing Procedure

In costing the various items, the following procedure was adopted:

I. Labour

(a) Hired - the actual hiring charges incurred by the farmers have been used in compiling cost of hired labour. Besides the cost of food and drink supplied to such labour was estimated in consultation with record keeping farmers and added on to the actual money payments.

(b) Family - in costing family labour, the principle of opportunity cost was not used. In fact the opportunity cost of family labour in rural areas in Sri Lanka is almost zero. The family labour used has been costed using the same wage rates paid to hired workers by the farmers concerned. However, the value of the food consumed by family labour has not been accounted in costing, as expenses on food is incurred by family labour whether such labour is engaged in cultivation or not.

II. Buffaloes

In the case of buffaloes hired, the actual payment made in hiring buffaloes has been used in computing costs. In instances where the farmers' own buffaloes have been used, the local rate for hiring buffaloes has been used in costing.

III. Tractors

In instances where tractors were hired, the actual payments made have been used in costing. Where the farmer's own tractor was used, the local hiring charges have been used in arriving at costs of services provided by the tractor.

IV. Materials Used

In the case of materials used such as seed, fertilizer and agro-chemicals the purchase price has been used.

V. Land Rent

Land rent has not been included in the cost computation as not a single record keeping farmer has paid any rent to the Government. Since all the farmers are from Colonization Schemes, the question of payment of rent to landlords does not arise.

VI. Irrigation

The cost of hiring irrigation pumps has been indicated separately. The labour costs for irrigation have been pooled with other labour expenses.

VII. Fencing and Miscellaneous Costs

This includes costs of items used for fencing as well as fuel for irrigation pumps where supplied, and gunny bags for storing and transport of produce.

VIII. Transport

The cost of transport of inputs to the farms as well as produce from the farms has been included in the computation.

Acknowledgements

We gratefully acknowledge the assistance given us by the Project Managers of Elahera and Dewahuwa, the District Agricultural Extension Officer, Polonnaruwa and the Agricultural Instructors in the study areas who participated in this programme.

Our special thanks go to the Director of Agriculture, Dr. E. Abeyratne and Mr. A.G. Kularatne, Agricultural Officer, who took a personal interest and helped us in numerous ways to conduct this study.

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I. Production, Costs & Returns of Individual Crops

1. CHILLIES

Production records were maintained in respect of 12 farmers, 8 of whom are from the Elahera Special Project and 4 from Polonnaruwa. The farmers at Elahera had raised their crops in ordinary paddy lands with gravity irrigation, whilst those at Polonnaruwa had cultivated on well drained paddy lands and three of them had used lift irrigation. The average acreages grown under chillies and the yields obtained are given in Table I-1.

Table 1-1 Extents cultivated and yields obtained - 1972 Yala

	No. of Record Keeping farms	Average acreage under chillies per farm	Average output per farm 1/ (cwt)	Average output per acre 1/ (cwt)
Elahera	8	0.69	4.94	7.16
Polonnaruwa	4	0.69	8.59	12.45

1/ Weight of dried chillies produced

The extents cultivated by record keeping farmers ranged from 0.25 to 1.25 acres and it is a mere coincidence that the average acreage per farm in both locations had worked out at 0.69 acres. The average production per acre at the two locations shows a marked difference. Polonnaruwa farmers have recorded 74 percent higher yields per acre compared to those at Elahera. This yield variation is partly due to the reason that the farmers in Polonnaruwa have grown chillies on well drained paddy lands with lift irrigation, whereas those at Elahera have raised their crops in ordinary paddy fields with gravity irrigation. As chillie is a very sensitive crop to excessive soil moisture conditions the crops raised at Elahera with gravity irrigation have suffered due to excessive soil moisture during the growing season.

Data pertaining to utilization of labour is given in Table 1-2. It is seen that at Polonnaruwa, with intensive labour use, which amounts to 48 more man-days per farm, compared to Elahera, the farmers have been able to produce 3.5 cwt more of dried chillies per farm of 0.69 acres. Polonnaruwa farmers also have used a very high percentage of hired labour in comparison with those at Elahera, the relevant figures being 61 and 30 percent of the total labour utilized per farm at the two locations (Table 1-2).

Table 1-2 Utilization of Labour, Buffaloes, and Tractors per farm, Yala 1972

	Area per farm	Man days of labour used			Tractor days per farm	Buffalo days per farm	Output in cwts per farm[3/]
		Hired	Family	Total[1/]			
Elahera	0.69	37.3	84.8	122.1	0.6	-	4.94
%		(30.6)	(69.4)	(100.0)			
Polonnaruwa[2/]	0.69	104.4	65.9	170.3	1.3	0.3	8.59
%		(61.3)	(38.7)	(100.0)			

[1/] Excludes the number of days worked by both tractor and buffalo drivers

[2/] At Polonnaruwa, three of the farmers have used only tractors for land preparation whilst one had used both tractor and buffaloes

[3/] Weight in dried chillies

Table 1-3 Operationwise labour utilization per acre

	Elahera		Polonnaruwa	
	Days	%	Days	%
1. Land preparation	12.5	7.01	46.2	18.57
2. Nursery	8.6	4.82	15.1	6.07
3. Planting	12.0	6.73	12.1	4.86
4. Irrigation	18.7	10.49	46.3	18.61
5. After care: weed control, pest control and fertilizer applications	68.0	38.14	49.2	19.77
6. Harvesting	48.4	27.15	56.9	22.88
7. Processing	10.1	5.66	22.5	9.04
8. Transport	-	-	0.5	0.20
Total	178.3	100.0	248.8	100.0

Table 1-3 indicates the intensity of labour use per acre in different field operations at the two locations. Polonnaruwa farmers have used almost four times as much labour for land preparation as those at Elahera. Due to better land preparation at Polonnaruwa relatively less labour has been used by these farmers on subsequent weeding operations. Another major difference in labour use is seen in respect of irrigation. Since lift irrigation has been adopted at Polonnaruwa, 46 labour days have been utilised per acre for irrigation alone, compared to only 19 days used at Elahera where gravity irrigation has been practiced. The higher yields recorded in Polonnaruwa have also necessitated the use of more labour for harvesting and processing of chillies. Polonnaruwa

farmers have used a total of 70 more labour units and also have been able to obtain 5.2 cwts of dried chillies more per acre compared to those at Elahera. Data pertaining to the two locations given in Tables 1-1 and 1-3 point out that with intensive labour use particularly in well drained paddy lands, substantially higher yields could be obtained from this crop. Generally the performance of these record keeping farmers compare favourably with the data given in the crop budgets of the Department of Agriculture. These crop budgets drawn up for irrigated chillies estimate an output of 10 cwts of dried chillies per acre with a labour input of 220 mandays.

Cost of Production

Production costs classified on the basis of inputs used are given in Table 1-4.

Table 1-4 Cost of Production per Farm and per Acre

		Elahera		Polonnaruwa	
		Per Farm	Per Acre	Per Farm	Per Acre
Number of farms		8		4	
Area grown in acres		0.69	-	0.69	-
Output in cwts		4.94	7.16	8.59	12.45
1.Labour a)Hired[1/]	Rs.	232.50	336.96	628.88	911.42
	(%)	(28.9)		(50.6)	
b)Family	Rs.	339.50	492.03	337.25	488.77
	(%)	(42.1)		(27.3)	
Total labour	Rs.	572.00	828.99	966.13	1,400.19
	(%)	(71.0)		(77.9)	
2.Seed	Rs.	15.38	22.29	23.38	33.88
	(%)	(1.9)	-	(1.9)	-
3.Tractors	Rs.	52.69	76.36	75.00	108.70
	(%)	(6.5)	-	(6.0)	-
4.Buffaloes	Rs.	-	-	2.50	3.62
	(%)	-	-	(0.2)	-
5.Irrigation pumps	Rs.	-	-	8.50	12.32
	(%)	-	-	(0.7)	-
6.Fertiliser	Rs.	107.75	156.16	74.86	108.49
	(%)	(13.4)	-	(6.0)	-
7.Agro-chemicals	Rs.	52.27	75.75	68.84	99.77
	(%)	(6.5)	-	(5.5)	-
8.Transport and Miscellaneous	Rs.	5.56	8.06	22.80	33.04
	(%)	(0.7)	-	(1.8)	-
Total Cost	Rs.	805.65	1,167.61	1,242.01	1,800.01
	(%)	(100.0)		(100.0)	
Cost per cwt	Rs.	163.07		144.58	
Cost per lb	Rs.	1.46		1.29	

[1/] Includes the cost of food supplied to hired labourers which amounted to Rs.78.50 at Elahera and Rs.199.25 at Polonnaruwa respectively.

Cost data recorded at the two locations show a considerable variation. In Polonnaruwa due primarily to intensive labour use, cultivation costs per acre are higher than in Elahera by Rs.633.00 of which Rs.571.00 is the cost of labour. Break-up of costs on the basis of inputs used, indicates that the labour costs form the largest single item of production expensesranging from 71 to 78 per cent in Elahera and Polonnaruwa respectively. Costs of other material inputs such as fertilizer and agro-chemicals amounts to 20 percent at Elahera and only 11 percent at Polonnaruwa. Farmers at Polonnaruwa have used considerably less fertilizer.

Cost of Production of a cwt of dried chillies was calculated from the cost of production per acre and is given in Table 1-4. It is seen that production cost of a cwt of dried chillies has been somewhat higher at Elahera, in spite of the comparatively low production expenses per acre reported in this project. This is mainly due to relatively lower yields recorded at Elahera.

Costs and Returns

Costs as well as Returns reported by record keeping farmers are given below:

Table 1-5 Costs and Returns

	Area under chillies per farm acres	Average output per farm cwts	Total Value of output Rs. (A)*	Total Cost Rs. (B)	Profit per farm Rs. (C)	Profit per acre Rs.
Elahera	0.69	4.94	4,313.28	805.65	3,507.63	5,083.52
Polonnaruwa	0.69	8.59	7,934.93	1,242.11	6,692.82	9,699.89

Note(a) Profit Margin per farm = (A) - (B) = C

(b)*Price per cwt

Elahera Rs. 873.78
Polonnaruwa Rs. 923.74

Profits realised by farmers in Polonnaruwa exceed those earned at Elahera by as much as Rs.4,616.00 per acre. This very wide variation in the profit margin is mainly due to differences in yields obtained at the two locations. As indicated earlier, Polonnaruwa farmers have had the advantage of cultivating chillies on well drained paddy lands with lift irrigation. Besides these farmers have utilised labour more intensively for cultivation purposes. These two factors have made it possible for them to produce substantially higher yields compared to those obtained at Elahera. Thus despite the higher production costs incurred, farmers in Polonnaruwa have recorded substantially higher profit margins per acre.

Net profits per farm were also calculated in respect of record keeping farmers and are presented below:

Table 1-6 Net Profits per Farm

	Elahera	Polonnaruwa
Average size of farm in acres	0.69	0.69
Output per farm in cwts	4.94	8.59
%	(100.0)	(100.0)
Amount sold in cwts	4.31	6.92
%	(87.1)	(80.6)
Home consumption in cwts	0.63	1.67
%	(12.8)	(19.4)
Farm price per cwt	873.78	923.74
Farm price per lb	7.80	8.25
Total sales per farm	3,765.99	6,392.25
Total cost per farm	805.65	1,242.01
Net profits per farm[1/]	2,960.34	5,150.24
Net profits per acre	4,290.39	7,464.12

Note[1/] Net profits=Total sales - Total cost

In Polonnaruwa net profits per farm are Rs.2,189.00 higher than at Elahera. These farmers have obtained not only higher yields but also have sold their produce at higher prices. (Table 1-6). Due to higher yields obtained at Polonnaruwa cost of production per cwt had been Rs.18.50 less than at Elahera (Table 1-4). Besides these farmers have been able to sell their produce at Rs.50.00 more per cwt compared to those at Elahera (Table 1-6). These price differences realised for dried chillies along with the lower production costs (Table 1-4) have made it possible for Polonnaruwa farmers to earn substantially higher net profits per acre as shown in Table 1-6.

[1/] Net profits indicated here are the returns to land, capital and management. Since capital investment is almost nil, net profits consist mainly of returns to land and operator's management.

2. GREEN GRAM

Eighteen records were maintained in respect of green gram cultivated at Elahera and Dewahuwa Special Projects. At Elahera, cultivation was done on ordinary paddy fields with gravity irrigation, but in Dewahuwa as irrigation water was not available for Yala cultivation, a group of farmers has grown a number of crops such as green gram, groundnut and onions on paddy lands in a compact block of about 25 acres with water lifted from a drainage channel. The average acreage grown under green gram and the yields obtained are given in Table 2-1.

Table 2-1 Extents cultivated and yields obtained - Yala 1972

	No. of record keeping farmers	Average acreage grown per farm	Average output per farm (cwts)	Average output per acre (cwts)
Elahera	4	0.56	3.28	5.86
Dewahuwa	14	1.68	7.84	4.67

The extents cultivated by record keeping farmers have ranged from 0.25 to 4.00 acres. The yields recorded are relatively low, as irrigated crops normally are capable of yields around 1,000 pounds per acre under reasonably good levels of management. Dewahuwa crops have suffered particularly due to severe drought conditions experienced during the growing season.

Labour Use

Table 2-2 Utilization of Labour, Buffaloes, and Tractors per farm - Yala 1972

	Area in acres per farm	Man days of labour used			Tractor days per farm	Output in cwts per farm
		Hired	Family	Total		
Elahera	0.56	35.1 (59.9)	23.5 (40.1)	58.6 (100.0)	1.0	3.28
Dewahuwa	1.68	102.2 (51.7)	95.4 (48.3)	197.6 (100.0)	1.0	7.84

Operationwise labour utilization for cultivation of green gram was also tabulated from the records, and are presented in Table 2-3.

Table 2-3 Operationwise labour utilization per acre

	Elahera		Dewahuwa	
	Days	%	Days	%
1. Land preparation	12.7	12.46	17.1	14.36
2. Planting	13.9	13.64	13.3	11.17
3. Irrigation	9.3	9.13	16.5	13.85
4. After care - weed control, pest control and fertilizer applications	15.0	14.72	23.8	19.98
5. Harvesting of pods	45.8	44.95	36.9	30.98
6. Processing	5.2	5.10	11.5	9.66
7. Transport	-	-	-	-
Total	101.9	100.00	119.1	100.00

The total number of man-days utilised for production shows very little variation at the two locations. Harvesting of pods has consumed a substantial proportion of the total labour utilised. The labour used for this operation alone has ranged from 31 to 45 percent at the two locations. The Department of Agriculture Crop Budgets estimate the labour requirements for this crop as 47 man days when land preparation is undertaken with mechanical power and weed control is done with chemicals. However, farmers involved in this study have used tractors only for first ploughing and all the other field preparation work as well as weed control operations have been done with manual labour. Consequently the number of man days used per acre by the record keeping farmers for production of green gram far exceeds the estimates of the Department of Agriculture.

Cost of Production

Production costs classified on the basis of inputs used are given in Table 2-4. This data shows that the difference in production costs per acre at the two locations is relatively small, the relevant figure being Rs.70.00. At Dewahuwa costs per acre have been higher due primarily to extra costs incurred in fencing, lift irrigation, fertilizer and chemicals. On the basis of inputs used, labour constitutes the most important item in the cost structure. Expenses on labour have ranged from 66 to 76 percent at Dewahuwa and Elahera respectively. The total cost of cultivation reported at both locations compares well with the estimates of the Department of Agriculture which ranges from Rs.634.00 to Rs.714.00. However, it has to be pointed out that these record keeping farmers have used relatively more labour and less material inputs such as fertilizer and agro-chemicals, in comparison with the estimates of the Department of Agriculture.

Table 2-4 Cost of Production per Farm and per Acre

		Elahera		Dewahuwa	
		Per Farm	Per Acre	Per Farm	Per Acre
No. of farms		4		14	
Area grown in acres		0.56	-	1.68	-
Output in cwts		3.28	5.86	7.84	4.67
1.Labour a)Hired[1/]	Rs.	206.13	368.09	457.41	272.26
	(%)	(53.3)	-	(35.7)	-
b)Family	Rs.	88.75	158.48	386.50	230.06
	(%)	(22.9)	-	(30.2)	-
Total labour	Rs.	294.88	526.57	843.91	502.32
	(%)	(76.2)	-	(65.9)	-
2.Seed	Rs.	42.5	75.89	68.44	40.74
	(%)	(11.0)	-	(5.4)	-
3.Tractors	Rs.	43.44	77.57	105.80	62.98
	(%)	(11.2)	-	(8.3)	-
4.Irrigation pumps	Rs.	-	-	27.32	16.26
	(%)	-	-	(2.1)	-
5.Fertilizer	Rs.	4.25	7.59	88.40	52.62
	(%)	(1.1)	-	(6.9)	-
6.Agro-chemicals	Rs.	2.06	3.68	28.18	16.77
	(%)	(0.5)	-	(2.2)	-
7.Fencing and miscellaneous	Rs.	-	-	117.80	70.12
	(%)	-	-	(9.2)	-
Total cost	Rs.	387.13	691.30	1,279.85	761.81
	(%)	(100.0)	-	(100.0)	-
Cost per cwt	Rs.	118.03	-	163.25	-
Cost per lb	Rs.	1.05	-	1.46	-

[1/] Includes the cost of food supplied to hired labourers

Production costs per cwt of green gram are also given in Table 2-4. Costs of production per cwt have varied from Rs.118.00 at Elahera to Rs.163.00 at Dewahuwa. Higher cost of production at Dewahuwa is due to both higher production expenses incurred and also lower yields obtained per acre in this project.

Costs and Returns

Costs and Returns from green gram cultivation are given in Table 2-5. The data shows that profits earned by record keeping farmers at Dewahuwa are Rs.280.00 less per acre compared to the profits earned by those at Elahera, which was due primarily to lower yields recorded as well as higher cultivation costs incurred per acre at Dewahuwa. Net profits per farm at each of the locations was calculated from the data recorded.

Table 2-5 Costs and Returns

	Area under green gram per farm acres	Average output per farm cwts	Total Value of output Rs. (A)*	Total Cost Rs. (B)	Profit per farm Rs. (C)	Profit per acre Rs.
Elahera	0.56	3.28	726.86	387.13	339.73	606.66
Dewahuwa	1.63	7.84	1,811.76	1,279.85	531.91	326.33

Note(a) Profit Margin per farm = (A) - (B) = C

(b)*Price per cwt

Elahera Rs. 221.00
Dewahuwa Rs. 236.00

Table 2-6 Net Profits per Farm

	Elahera	Dewahuwa
Average size of farm in acres	0.56	1.68
Output per farm in cwts	3.28	7.84
%	(100.0)	(100.0)
Amount sold in cwts	2.92	6.88
%	(89.0)	(87.8)
Home consumption in cwts	0.36	0.96
%	(11.0)	(12.2)
Farm price per cwt	220.98	236.27
Farm price per lb	1.97	2.11
Total sales per farm	645.25	1,625.52
Total cost per farm	387.13	1,279.85
Net profit per farm 1/	258.12	345.67
Net profits per acre 1/	460.92	205.76

Net profits at Elahera had worked out to Rs.460.00 compared to only Rs.205.00 per acre at Dewahuwa.

1/ Net profits indicated here are the returns to land, capital, and management. Since capital investment is almost nil, net profit consists mainly of returns to land and operator's management.

3. GROUNDNUT

In respect of groundnuts, eight production records were maintained, of which six were at Elahera, where cultivation was done in paddy fields with gravity irrigation. The two records at Dewahuwa refer to crops raised with lift irrigation. The average acreage grown and the yields obtained are given in Table 3-1.

Table 3-1 Extents cultivated and yields obtained - Yala 1972

	No. of record keeping farmers	Average acreage grown per farm	Average output per farm (cwts)	Average output per acre (cwts)
Elahera	6	1.71	18.24	10.67
Dewahuwa	2	1.00	8.63	8.63

The extents cultivated by these farmers have ranged from 1.00 to 3.00 acres. The yields recorded are comparatively low, as new varieties of ground nuts are capable of giving yields in the range of 25 - 30 cwts per acre, when grown under irrigation.

Land Use

Table 3-2 Utilization of Labour, Buffaloes, and Tractors per farm - Yala 1972

	Area in acres per farm	Man days of labour used			Tractor days per farm	Output in cwts per farm
		Hired	Family	Total		
Elahera	1.71	87.2	59.4	146.6	1.5	18.24
%		(59.5)	(40.5)	(100.0)		
Dewahuwa	1.00	120.3	54.6	174.9	0.5	8.63
%		(68.8)	(31.2)	(100.0)		

Table 3-3 shows a wide variation in the total number of man days used per acre at the two locations, the relevant figures being 86 at Elahera and 175 at Dewahuwa. The higher intensity of labour use at Dewahuwa is due primarily to the fact that the record keeping farmers have depended exclusively on manual labour for land preparation, making of ridges, and earthing up of plants. In contrast farmers at Elahera have performed some of these operations with machinery. In addition, for lifting water from channels as well as for weeding, extra manual labour has been utilised at Dewahuwa. Erection of protective fences is another extra item of work that the farmers at Dewahuwa had undertaken.

Table 3-3 Operationwise labour utilization per acre

	Elahera Days	Elahera %	Dewahuwa Days	Dewahuwa %
1. Land preparation	9.3	10.75	31.2	17.79
2. Planting	13.3	15.37	17.1	9.75
3. Irrigation	5.2	6.03	22.5	12.83
4. Aftercare, fencing top dressing, weed control, and earthing up of plants	10.5	12.14	43.1	24.57
5. Harvesting	17.5	20.23	27.8	15.85
6. Processing	29.5	34.10	31.7	18.07
7. Transport	1.2	1.38	2.0	1.14
Total	86.8	100.0	175.4	100.0

Table 3-4 Cost of Production per Farm and per Acre

		Elahera Per Farm	Elahera Per Acre	Dewahuwa Per Farm
No. of farms		6		2
Area grown in acres		1.71		1.00
Output in cwts		18.24	10.67	11.51
1.Labour a)Hired	Rs.	513.29	300.17	600.75
	(%)	(42.88)		(53.0)
b)Family	Rs.	223.71	130.82	234.00
	(%)	(18.69)		(20.6)
Total labour	Rs.	737.00	430.99	834.75
	(%)	(61.57)		(73.6)
2.Seed	Rs.	254.00	148.54	112.00
	(%)	(21.22)		(9.9)
3.Tractors	Rs.	132.50	77.49	45.00
	(%)	(11.07)		(4.0)
4.Irrigation pumps	Rs.	-	-	18.25
	(%)	-	-	(1.6)
5.Fertilizer	Rs.	23.92	13.99	29.85
	(%)	(2.00)		(2.6)
6.Agro-chemicals	Rs.	-	-	20.85
	(%)	(-)	-	(1.8)
7.Harvesting, transport, miscellaneous(fencing field, etc)	Rs.	49.50	29.95	73.85
	(%)	(4.14)		(6.5)
Total cost	Rs.	1,196.92	699.95	1,134.55
	(%)	(100.0)		(100.0)
Cost per cwt	Rs.		65.60	131.47
Cost per lb			0.59	1.17

Costs of production at the two locations show a wide difference. Production costs at Dewahuwa exceeds those incurred at Elahera by Rs.434.00 per acre. This wide variation in costs is due mainly to the considerably higher number of man days used at Dewahuwa, the main reasons for which were indicated earlier. Expenses on labour have ranged from 61 at Elahera to 73 per cent of total costs at Dewahuwa.

The production costs per acre recorded at Elahera comes very close to the estimated cost of Rs.682.00 given in the crop budgets of the Department of Agriculture. However at Dewahuwa production costs are considerably higher as explained earlier. In comparing costs it is also relevant to point out that the estimates of the Department of Agriculture have been drawn up on the basis that land preparation is undertaken with tractors, whereas most of the record keeping farmers have used manual labour for field preparation.

Costs and Returns

Costs and Returns from groundnut cultivation as reported by record keeping farmers are indicated below:

Table 3-5 Costs and Returns

	Area under groundnut per farm acres	Average output per farm cwts	Total Value of output Rs. (A)*	Total Cost Rs. (B)	Profit per farm Rs. (C)	Profit per acre Rs.
Elahera	1.71	18.24	1,517.84	1,196.92	320.92	187.67
Dewahuwa	1.00	8.63	1,388.00	1,134.55	253.45	253.45

Note(a) Profit Margin per farm = (A) - (B) = C

(b)*Price per cwt

Elahera Rs. 83.00
Dewahuwa Rs. 124.00

Net profits per farm as well as per acre were calculated from the records maintained.

Table 3-6 Net Profits per Farm

	Elahera	Dewahuwa
Output per farm in cwts	18.24	8.63
%	(100.0)	(100.0)
Amount sold in cwts	18.08	7.88
%	(99.2)	(91.3)
Home consumption in cwts	0.16	0.75
%	(0.8)	(8.7)
Farm price per cwt	83.25	164.97
Farm prices per lb	0.74	1.47
Total sales per farm	1,505.25	1,300.00
Total cost per farm	1,196.92	1,134.55
Net profits per farm1/	308.33	165.45

Net profits[1/] per acre based on this data amounted to Rs.180.00 at Elahera and Rs.165.00 at Dewahuwa. The net profits earned by these farmers are very low, due primarily to poor yields harvested, and very high production expenses recorded particularly at Dewahuwa.

1/ Net profit indicated here is the return to land, capital and management. Since capital investment is almost nil, net profit consists mainly of returns to land and operator's management.

4. RED ONIONS

Four records were maintained in respect of red onions at Elahera and Dewahuwa. Cultivation at Elahera is in paddy fields with gravity irrigation, whereas at Dewahuwa production refers to crops grown with lift irrigation. The average acreage grown and the yields obtained are given in Table 4-1.

Table 4-1 Extents cultivated and yields obtained - Yala 1972

	No. of record keeping farmers	Average acreage grown per farm	Average output per farm (cwts)	Average output per acre (cwts)
Elahera	3	0.14	7.63	54.50
Dewahuwa	1	0.50	16.50	33.00

The extents cultivated by individual farmers under this crop are comparatively small, as the initial investment on seed materials is very high. Besides, these farmers are also not very familiar in growing this crop in paddy fields. The yields recorded are relatively poor particularly at Dewahuwa, as the crops have suffered due to severe drought and pest damage. Absence of application of any organic manures, could also have contributed to lower yields.

Labour Use

Table 4-2 Utilization of Labour, Buffaloes, and Tractors per farm - Yala 1972

	Area in acres per farm	Man days of labour used			Tractor days per farm	Buffalo days per farm
		Hired	Family	Total		
Elahera	0.14	32.1	11.1	43.2	0.1	0.5
%		(74.3)	(25.7)	(100.0)		
Dewahuwa	0.50	117.7	37.5	155.2	0.5	-
%		(75.8)	(24.2)	(100.0)		

Table 4-3 Operationwise labour utilization per acre

	Elahera		Dewahuwa	
	Days	%	Days	%
1. Land preparation	60.9	19.7	54.0	17.4
2. Preparation of planting beds	56.5	18.3	56.0	18.0
3. Irrigation	27.2	8.8	28.0	9.0
4. After care - Weed control and fertilizer applications etc.	84.8	27.5	80.0	25.8
5. Harvesting	45.6	14.8	53.4	17.2
6. Processing	33.7	10.9	39.0	12.6
7. Transport	-	-	-	-
Total	308.7	100.0	310.4	100.0

The data in Table 4-3 indicates high intensity of labour use at both locations. These farmers have relied mainly on manual labour for land preparation, laying of planting beds and weeding.

Cost of Production

Production costs as reported by the record keeping farmers are given in Table 4-4.

Cost of production per acre at the two locations shows some variation. At Elahera, costs are Rs.537.00 higher per acre compared to Dewahuwa. Unlike the other field crops discussed earlier, in the case of red onions cost of seed forms an appreciable proportion of the total production costs per acre. It is significant to point out that seed material alone has accounted for about 40% of the total costs recorded. Still labour constitutes the largest single item of production expenses. Though the number of man days used per acre at both locations is almost equal (Table 4-3)the total costs incurred on labour show considerable variation (Table 4-4). This is primarily due to differences in wage rates at Elahera, where the onion growers have paid higher wages, about Rs.1.25 more per man day. Cost of purchased inputs such as fertilizer and agro-chemicals had amounted only to about 5 per cent of the total costs. Production costs of a hundredweight of onions produced at Dewahuwa were relatively higher, mainly due to very low yields obtained at this location.

Table 4-4 Cost of Production per Farm and per Acre

		Elahera		Dewahuwa	
		Per Farm	Per Acre	Per Farm	Per Acre
No. of farms		3		1	
Area grown in acres		0.14		0.50	
Output in cwts		7.63	54.5	16.50	33.00
1.Labour a)Hired	Rs.	221.58	1,582.70	501.50	1,003.00
	(%)	(42.7)		(31.7)	
b)Family	Rs.	55.16	394.00	173.00	346.00
	(%)	(10.6)		(10.9)	
Total labour	Rs.	276.74	1,976.70	674.50	1,349.00
2.Seed	Rs.	214.53	1,532.36	606.00	1,212.00
	(%)	(41.4)		(38.3)	
3.Tractors	Rs.	3.87	27.64	41.25	82.50
	(%)	(0.8)		(2.6)	
4.Buffaloes	Rs.	3.33	23.79	-	-
	(%)	(0.6)	-	-	-
5.Irrigation pumps	Rs.	-	-	22.50	45.00
	(%)			(1.4)	-
6.Fertilizer	Rs.	18.97	135.50	93.85	187.70
	(%)	(3.7)	-	(5.9)	
7.Agro-chemicals	Rs.	-	-	4.25	8.50
	(%)	-	-	(0.3)	
8.Transport and Miscellaneous	Rs.	1.00	7.12	140.65	281.30
	(%)	(0.2)		(8.9)	
Total cost	Rs.	518.44	3,703.11	1,583.00	3,166.00
	(%)	(100.0)		(100.0)	
Cost per cwt	Rs.	67.95		95.94	
Cost per lb	Rs.	0.61		0.86	

Costs and Returns

Costs and returns per farm as well as per acre are given below:

Table 4-5 Costs and Returns

	Area under onions per per farm acres	Average output per farm cwts	Total Value of output Rs. (A)*	Total Cost Rs. (B)	Profit per farm Rs. (C)	Profit per acre Rs.
Elahera	0.14	7.63	738.40	518.44	219.96	1,571.18
Dewahuwa	0.50	16.50	1,650.00	1,583.00	112.00	224.00

Note(a) Profit Margin per farm = (A) - (B) = C

(b)*Price per cwt

Elahera Rs. 97.00
Dewahuwa Rs. 100.00

At Elahera record keeping farmers have obtained only a profit of Rs.220.00 per farm, whilst at Dewahuwa the single farmer for whom production records were kept had realised only Rs.112.00 per farm.

Table 4-6 Net Profits per Farm

	Elahera	Dewahuwa
Output per farm in cwts	7.63	16.50
%	(100.0)	(100.0)
Amount sold in cwts	6.35	16.00
%	(83.2)	(97.0)
Home consumption in cwts	1.28	0.50
%	(16.8)	(3.0)
Farm price per cwt	97.12	100.0
Farm price per lb	0.87	0.89
Total sales per farm	616.73	1,600.00
Total cost per farm	518.44	1,583.00
Net profits per farm1/	98.29	62.00

Net profits per acre based on above data amounted to Rs.702.00 at Elahera and Rs.124.00 at Dewahuwa. Net profits earned by these farmers particularly at Dewahuwa are very low. As pointed out earlier this is primarily due to low yields recorded as the onion crops have suffered both from drought and pests particularly at Dewahuwa. In addition the prices received by these growers at the farm level are relatively low as the harvesting of these crops coincided with the peak production season in Northern Province.

1/ Net profit indicated here is the return to land, capital and management. Since capital investment is almost nil, net profits consist mainly of returns to land and operator's management.

5. BOMBAY ONIONS

Bombay onion is relatively a new crop for farmers in this area and its cultivation in paddy fields was altogether a new experience to them. Only 3 production records were available in respect of this crop. The extents grown and the yields obtained are given in Table 5-1.

Table 5-1 Extents cultivated and yields obtained - Yala 1972

	No. of record keeping farmers	Average acreage grown per farm	Average output per farm (cwts)	Average putput per acre (cwts)
Elahera	1	0.50	26.68	53.36
Polonnaruwa	2	0.38	24.25	63.81

Yields recorded are relatively low, which could be due to lack of application of organic manures such as cattle manure, and chemical fertilizers.

Table 5-2 Utilization of Labour, Buffaloes, and Tractors per farm - Yala 1972

	Area in acres per farm	Man days of labour used Hired	Family	Total	Tractor days per farm	Buffalo days per farm
Elahera	0.50	19.0 (17.0)	92.5 (83.0)	111.5 (100.0)	-	2.0
Polonnaruwa	0.38	56.5 (66.5)	28.4 (33.5)	84.9 (100.0)	0.5	1.3

Table 5-3 Operationwise labour utilization per acre

	Elahera Days	%	Polonnaruwa Days	%
1. Land preparation	34.0	14.9	34.0	15.2
2. Nursery	23.0	10.1	24.0	10.7
3. Preparation of planting beds & transplanting	44.0	19.3	32.2	14.3
4. Irrigation	60.0	26.4	34.9	15.6
5. Top dressing & weed control	34.0	14.9	65.8	29.3
6. Harvesting	20.0	8.9	17.8	7.9
7. Processing	12.5	5.5	14.2	6.3
8. Transport	-	-	1.5	0.7
Total	227.5	100.0	224.4	100.0

In Bombay onion cultivation seedlings raised in nurseries have been used for transplanting whereas in the case of red onions, bulbs have been planted. Consequently less labour has been used for cultivation of this crop, compared to red onions.

Table 5-4 Cost of Production per Farm and per Acre

		Elahera		Polonnaruwa	
		Per Farm	Per Acre	Per Farm	Per Acre
No. of farms		1	-	2	-
Area grown in acres		0.5	-	0.38	-
Output in cwts		26.68	53.36	24.25	63.81
1.Labour a)Hired	Rs.	100.00	200.00	316.87	833.68
	(%)	(18.6)		(55.2)	
b)Family	Rs.	335.50	671.00	116.00	305.20
	(%)	(62.2)		(20.2)	
Total labour	Rs.	435.50	871.00	432.87	1,138.88
	(%)	(80.8)		(75.4)	
2.Seed	Rs.	28.80	57.60	28.80	75.77
	(%)	(5.3)		(5.0)	
3.Tractors	Rs.	-	-	31.25	82.22
	(%)	(-)	-	(5.4)	
4.Buffaloes	Rs.	30.00	60.00	12.25	32.23
	(%)	(5.6)	-	(2.2)	
5.Irrigation pumps	Rs.	-	-	17.0	44.73
	(%)	(-)	-	(3.0)	
6.Fertilizer	Rs.	25.00	50.00	23.95	63.01
	(%)	(4.6)		(4.2)	
7.Agro-chemicals	Rs.	19.75	39.50	4.50	11.84
	(%)	(3.7)		(0.7)	
8.Transport and Miscellaneous	Rs.	-	-	23.55	61.96
	(%)	(-)	-	(4.2)	
Total cost	Rs.	539.05	1,078.10	574.17	1,510.64
	(%)	(100.0)		(100.00)	
Cost per cwt	Rs.	20.00		23.68	
Cost per lb	Rs.	0.18		0.21	

At both locations, labour costs alone have accounted for over 75 per cent of the total cost recorded. Production costs in this instance have been comparatively less than the costs incurred in red onion cultivation. This has been mainly due to very low costs incurred on seed material. As pointed out earlier in the case of this crop, seedlings had been raised in nurseries and as a result the cost of seed used has been negligible, whereas in the case of red onions, the cost of bulbs alone used for planting has amounted to over Rs.1,200.00 per acre. Costs incurred on purchased inputs such as fertilizer and agro-chemicals have been relatively low.

Cost of production per cwt has ranged from Rs.20.00 to Rs.23.00 at the two locations.

Costs and Returns

Costs and returns per acre and per farm are given below:

Table 5-5 Costs and Returns

	Area under Bombay onions per farm acres	Average output per farm cwts	Total Value of output Rs. (A)*	Total Cost Rs. (B)	Profit per farm Rs. (C)	Profit per acre Rs.
Elahera	0.50	26.68	3,780.15	539.05	3,241.10	6,482.20
Polonnaruwa	0.38	24.25	3,320.76	574.17	2,746.59	7,227.56

Note(a) Profit Margin per farm = (A) - (B) = C

(b)*Price per cwt

Elahera	Rs.	140.00
Polonnaruwa	Rs.	134.00

It is seen that the record keeping farmers have obtained very substantial profits. Following the ban on imports the market price of this commodity has risen sharply. Since this crop could be grown successfully in the dry zone only during a restricted period, the current demand far exceeds the supply.

Table 5-6 Net Profits per Farm

	Elahera	Polonnaruwa
Area grown in acres	0.50	0.38
Output in cwt	26.68	24.25
%	(100.0)	(100.0)
Amount sold in cwt	26.32	23.75
%	(98.7)	(7.9)
Home consumption in cwt	0.36	0.50
%	(1.3)	(2.1)
Farm price per cwt	141.70	136.92
Farm price per lb	1.27	1.20
Total sales per farm	3,729.75	3,251.75
Total cost per farm	539.05	574.17
Net profits[1/]	3,190.70	2,677.58

1/ Net profits indicated here are the returns to land, capital and management. Since capital investment is almost nil, net profits consist mainly of returns to land and operator's management.

Net profits calculated on the data in Table 5-6 indicate Bombay onions as a very profitable crop. The relevant figures at the two locations are Rs.6,381.00 and Rs.7,046.00 respectively. These growers have received relatively higher prices for their produce. In addition the cultivation costs incurred per acre have been considerably low. Due to these two reasons it has been possible for these farmers to obtain very high net profits per acre despite the relatively low yields harvested.

II. Alternative Use of Well Drained Paddy Lands in Yala Season in the Dry Zone

A Comparative Analysis

Field crops such as chillies, pulses, and onions, grown under traditional rainfed conditions provide only a small surplus to the farmer, whilst these very same crops under irrigation, give substantially higher yields and their production even in small holdings becomes very profitable. As pointed out earlier, it is only in Jaffna and parts of Vavuniya, that systematic production of these crops have been successfully undertaken so far with lift irrigation mainly from wells. In other parts of the dry zone, stored water has been used almost exclusively for paddy production. Since paddy has received special patronage for decades, most of the farmers in the dry zone have had little opportunity to develop the required skills for successful production of other field crops under irrigation. According to agronomists, field crop production in paddy fields under irrigation involves special skills. *In fact, for most of these traditional paddy farmers, the very process of learning the new technology of other field crop production under irrigation particularly in paddy fields has been largely one of trial and error. Thus the performance of these farmers who co-operated in this study is evaluated with this background in mind.*

From a farm management point of view, the primary objective of introducing other field crops to well drained paddy lands in Yala, is not only to make the best use of land and water resources available in the selected project areas, but also to provide increased employment and incomes to individual farm families. *Field crops compete with paddy for the same land in these areas, but due to shortage of water for paddy during Yala, other crops that need relatively less water have to find a place in the cropping systems if some of the above objectives are to be achieved.*

Water Use

The very concept of other field crop production in paddy fields has been originally formulated as the availability of water for paddy production in Yala is a major constraint in the two special project areas covered by this study. Paddy is generally grown under submerged conditions. Besides farmers resort to the wasteful practice of continuous flooding of fields primarily to control weeds and consequently the quantity of water used is far in excess of actual crop requirements. In any event, paddy requires more water than any other crop. Since quantitative data on water usage either at Elahera or Dewahuwa is not available, relevant information obtained from the Dry Zone Agricultural Research Station, Maha Illupalama is used in this discussion.

Table 6-1 Total Water Requirements of Other Field Crops

Crop	Crop duration	Total Irrigation requirement
	Days	Ac. Ins.
Chillies	150	48.0
Onions	90	26.0
Green gram	85	28.0
Ground nut	105	27.6

Generally the average gross irrigation requirement for a Yala paddy crop is around 61 inches. A comparison of gross water requirements of other field crops (Table 6-1) with that of paddy shows that a given quantity of water could mature a larger extent of other field crops than paddy. *The above data shows that with the water required to mature an acre of paddy in Yala, it is possible to bring at least two acres under any of the pulse crops or onions.* It is also seen that of the field crops grown, only chillies have a relatively high water requirement, as this is a long term crop, i.e. 5 months. *At Elahera in well drained fields due to the high permeability of soils, the gross irrigation requirement for paddy is likely to be even higher than the figure indicated above. Consequently returns per unit of water used on irrigated paddy in Yala season are expected to be considerably lower when compared with the water utilised for other field crops. The possibility of bringing larger extents of other field crops with a given quantity of water could help to increase the cropping intensity in these settlement schemes from the limited water available in Yala season. Thus the intensification of production of other field crops in paddy fields should enable the authorities to permit more farm families at Elahera to undertake cultivation of field crops during the Yala season with the available water.* Presently only half the families at Elahera in one particular area are permitted to cultivate in any given season, and there is hardly any Yala cultivation at Dewahuwa.

Use of Labour

The average number of man days used for cultivation of other field crops in paddy fields as reported by record keeping farmers is summarised below:

Table 6-2 Number of Man days used by Record Keeping Farmers per Acre

Crop	Elahera	Dewahuwa	Polonnaruwa
Chillies	178	-	248
Green gram	102	120	-
Ground nut	87	175	-
Red onions	308	310	-
Bombay onions	227	-	224

For a realistic comparison of labour use for production of other field crops with that of paddy relevant data on paddy grown either at Elahera or Dewahuwa Colonization Schemes is not available. However, during the same season production records maintained in respect of paddy in the Polonnaruwa district in which Elahera Scheme is located show that 68 man days have been used for cultivation of an acre of paddy[1/]. Figures in Table 6-2 indicate that the total number of man days used per acre for production of other field crops is substantially higher than the amount of labour generally used for paddy. The number of man days used by these farmers (Table 6-2) is somewhat higher than the estimates of man days given in the crop budgets of the Department of Agriculture, particularly in respect of green gram and ground nuts. High intensity of labour use reported by record keeping farmers is due to a number of reasons.

Records maintained indicate that the majority of these farmers have undertaken not only the initial tillage of land, but also preparation of planting beds and ridges as well as weed control mostly with manual labour using hand tools. Besides, most of the crops under discussion are sensitive to excess soil moisture conditions. Thus it has been necessary for the farmers to prepare rather elaborate ridges and beds for planting in order to protect these crops from being exposed to excessive soil moisture conditions particularly under gravity irrigation. Crops such as chillies and green gram when grown under irrigation continue to flower for a longer duration and consequently the harvesting period too gets prolonged, necessitating an increase in the number of pickings of mature pods. In the case of ground nuts, removal of pods from the roots requires a high proportion of manual labour.

The ready availability of cheap casual labour during Yala season in these colonization schemes is another reason that has induced the record keeping farmers to use labour rather liberally. In both these areas during Yala season local labour does not have sufficient employment opportunities particularly as the acreage under paddy is very restricted due to scarcity of irrigation water. Consequently casual labour is available at relatively very low wage rates during the Yala season. Cost data collected shows that the daily wage rate paid for hired labour has averaged only Rs.4.00 per man and Rs.3.00 per woman at both locations. These wage rates are comparatively low when compared to wages that normally prevail in these settlement projects during the Maha season.

As the family farm earnings are influenced by the amount of hired labour used in the production of crops, a summary of the pattern of labour used in the farms covered by this study is presented in Table 6-3.

1/ Cost of Production of Paddy - Yala 1972 by K. Izumi and A.S. Ranatunga

Table 6-3 Ratio of Hired and Family Labour to Total Labour in the Farms covered by this Study

Crop	Hired Labour % of total labour	Family Labour % of total labour	Total
Chillies	43	57	100
Green gram	52	48	100
Ground nut	62	38	100
Red onions	74	26	100
Bombay onions	43	57	100

It is seen that the ratio of hired labour used in red onion cultivation is highest and has amounted to 74 per cent of the total labour used. In the case of crops such as chillies and Bombay onions, the relevant figure is 43 per cent. Heavy dependence on hired labour by these record keeping farmers tends to reduce their family farm earnings. However, from a broader aspect of providing employment opportunities, diversification of cropping programmes in paddy fields in Yala in these areas offers considerable promise, as during the Yala season a high percentage of farmers in these colonization schemes are either under-employed or un-employed due to shortage of irrigation water for paddy.

It is realised that with the use of manual labour and hand tools the extents that an average farm family is able to manage successfully under these crops is relatively small. This tendency is seen even among record keeping farmers, most of whom have grown these crops in small extents. Technically, the production of field crops using mostly manual labour and hand tools in small plots is by no means less efficient. In Sri Lanka with a shortage of foreign exchange for import of machinery, high rate of unemployment and with limited irrigable lands available, use of manual labour and hand tools is thought to be a realistic approach for expansion of production of these crops under the existing socio-economic conditions. It is likely that these crops could be produced with relatively less labour provided machinery and weedicides are used extensively. However, such techniques widely adopted in developed countries where land/man ratio is very high and the cost of capital is relatively less than the cost of labour are not so desirable both from the point of view of providing employment as well as in the use of scarce foreign exchange.

Expenses

The breakdown of the expenses incurred on major inputs used in the production of different crops at each of the locations is summarised below:

Table 6-4 Cost of Cultivation per Acre classified on the basis of Major Inputs Used

Crop		Labour	Machinery & Equipment	Purchased* Inputs	Seed	Miscel-laneous	Total
Chillies							
Elahera	Rs.	829.00	76.00	232.00	22.00	8.00	1,167.00
	%	71	7	20	2	-	100
Polon-naruwa	Rs.	1,400.00	125.00	209.00	33.00	33.00	1,800.00
	%	78	7	11	2	2	100
Green gram							
Elahera	Rs.	527.00	78.00	11.00	75.00	-	691.00
	%	77	11	1	11	-	100
Dewahuwa	Rs.	502.00	79.00	69.00	41.00	70.00	761.00
	%	67	10	9	5	9	100
Grownd nut							
Elahera	Rs.	431.00	77.00	14.00	149.00	29.00	700.00
	%	62	11	2	21	4	100
Dewahuwa	Rs.	835.00	63.00	51.00	112.00	74.00	1,135.00
	%	73	6	4	10	7	100
Red Onions							
Elahera	Rs.	1,977.00	51.00	136.00	1,532.00	7.00	3,703.00
	%	54	1	4	41	-	100
Dewahuwa	Rs.	1,348.00	128.00	196.00	1,212.00	281.00	3,165.00
	%	43	4	6	38	9	100
Bombay Onions							
Elahera	Rs.	871.00	60.00	89.00	58.00	-	1,078.00
	%	82	5	8	5		100
Polon-naruwa	Rs.	1,139.00	159.00	75.00	75.00	62.00	1,510.00
	%	75	11	5	5	4	100

* Purchased Inputs: Includes mainly cost of fertilizer and agro-chemicals used.

The data in Table 6-4 shows that highest production expenses have been recorded in respect of red onions. The costs have exceeded Rs.3,000.00 per acre at both locations. Chillies as well as Bombay onions show expenses of over Rs.1,000.00 per acre. During the same season, according to production records of paddy maintained in the Polonnaruwa district, the cost of cultivation of paddy per acre was Rs.733.00[1/]. Comparison of cultivation costs of each of these field crops with that of paddy, indicates that except for green gram and ground nut, the other crops need considerably higher cash outlays. Very high cash outlays required for production of these crops naturally restrict the area that an average farmer could successfully cultivate.

A breakdown of total expenses recorded on the basis of important inputs used indicates that cost of labour is the most important item in the production expenses of the crops under discussion. Generally, the cost of labour has ranged from 62 to 82 per cent of the total cost of production of different crops, the only exception being red onions where cost of labour has amounted to 43 per cent of the total costs. *Though the cost of labour when expressed as a ratio of total cost of production shows this input as the most costly item, the total sum shown as expenses on labour does not altogether constitute a real expenditure to the individual farmer, as an imputed value for his family labour has already been included under this item.* It was shown earlier in Table 6-3 that the ratio of family labour to total labour used tends to vary markedly in the production of different crops. In the case of crops such as chillies, green gram and Bombay onions, approximately 50 per cent of labour used has been provided by the farm families, while in the case of red onions, the relevant figure has been only 26 per cent. *Consequently the actual expenditure in terms of cash outlays on labour utilised for production of different crops is considerably less than the figures given in Table 6-4.*

Expenses incurred on purchased inputs such as fertilizer and agro-chemicals have been extremely low except in the case of chillies. Low level of application of required inputs would undoubtedly have affected the productivity of many of the crops such as green gram, ground nut, red onions and Bombay onions. It is also of interest to point out that in red onion production about 40 per cent of total costs have been incurred for purchase of seed onions. In the case of other crops cost of seed has ranged only from about 2 to 10 per cent of the total costs. Heavy cash outlays required for purchase of seed onions which in this instance have amounted to Rs.1,200.00 per acre would compel peasant farmers to restrict the area under this crop. Majority of the colonists in these settlement projects could neither afford nor would be willing to incur a cash outlay of such magnitude for purchase of seed of a newly introduced crop. Thus the relatively small extents grown under red onions by record keeping farmers is understandable.

[1/] K. Izumi and A.S. Ranatunga op. cit. p.4

Returns

The gross value of output in respect of different crops calculated from record books is summarised below:

Table 6-5 Calculated Value of Output per Acre

Crop	Elahera	Dewahuwa	Polonnaruwa
	Rs.	Rs.	Rs.
Chillies	6,261	-	11,500
Green gram	1,298	1,078	-
Ground nut	887	1,388	-
Red onions	3,703	3,165	-
Bombay onions	7,560	-	8,738

It is seen that the gross returns realised per acre by these farmers show considerable variation in respect of different crops. Besides, in the case of both chillies and ground nut, the gross returns earned show substantial variations at the two locations. Variations in returns are primarily due to differences in yields as well as prices received by the individual growers. The reasons for variations in yields at different locations were indicated briefly in the earlier discussion on individual crops. *Generally it is of interest to point out an important aspect that has emerged from the data assembled in that the farmers who grew these crops on well drained lands particularly with lift irrigation, have been able to obtain substantially higher yields per acre. This trend is very clear particularly in the case of chillies grown at Polonnaruwa.* With gravity irrigation practiced at Elahera many of the farmers appear to have over irrigated their field crops more or less in the same manner as they are accustomed to irrigate their paddy. Consequently crops such as chillies, green gram, and ground nut have suffered a set back due to excessive soil moisture conditions. Excess soil moisture has had a depressing effect on yield. Crops grown at Dewahuwa under lift irrigation have suffered towards the tail end of the season due to shortage of water. In the case of onions low yields recorded are partly due to absence of application of any organic manures. Low crop yields have eventually resulted in lower gross returns per acre.

Another important aspect that has had a direct bearing on gross returns is the prices realised by the record keeping farmers for the various commodities produced. Average prices received at the farm level for various crops produced at the different locations are indicated in Table 6-7.

Table 6-6 Average Prices realised per Pound of Produce at Farm Level

Crop	Elahera	Dewahuwa	Polonnaruwa
	Rs.	Rs.	Rs.
Chillies	7.80	-	8.25
Green gram	1.97	2.11	-
Ground nut	.74	1.47	-
Red onions	.84	.89	-
Bombay onions	1.25	-	1.20

In examining the prices realised by the farmers, it is relevant to point out that of the above commodities with the exception of red onions were imported until recently. Due to the banning of imports in 1971/72, the supply of these commodities in the country has fallen far short of the actual consumer needs. This situation has generally helped the farmers to sell harvested crops at relatively higher prices and also realise higher gross returns particularly in the case of chillies and Bombay onions. However, it is relevant to point out that the prices received at the farm level (Table 6-7) are 40 to 50 per cent less than the retail prices that prevailed in the open market at the time in Colombo except in the case of red onions[1]. This disparity in prices received by the growers is partly due to the reason that institutional arrangements for purchase of produce from growers in the producing areas were inadequate at the time[2]. Besides as these settlement schemes are relatively inaccessible due to poor road communications, transport of produce, out of these areas to nearby markets has also been a problem to these growers. In the case of red onions, prices realised are not high, as harvesting of this crop (July - August) coincided with the peak onion production period in the Jaffna District. Relatively lower prices received for red onions coupled with lower yields obtained have resulted in lower returns per acre from this crop. The variation in value of output realised from ground nut at Elahera and Dewahuwa is primarily due to price differentials which have amounted to Rs.0.73 per pound. At Dewahuwa despite lower yields recorded, farmers have been able to realise over Rs.500.00 more per acre from ground nut due to higher prices received by them.

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[1] Since this study is mainly confined to collection of data pertaining to costs and prices realised at the producer level, marketing margins mentioned are only rough estimates mainly based on discussions held with Agriculture Extension officers in the study areas.

[2] With improvement in institutional arrangements for marketing of farm products, the marketing margins of non perishable commodities such as dried chillies are unlikely to exceed 1/3 of the retail price.

Since labour and land constitute the most important factors of production, returns to these factors were also computed (Table 6-8). This data indicates that the two high income crops, namely chillies and Bombay onions have also provided the highest returns to labour and land. In the case of chillies the returns have amounted to as much as Rs.33.00 and Rs.45.00 per man day at Elahera and Polonnaruwa respectively. On the other hand in the case of red onions even with a gross income of over Rs.3,000.00 per acre returns per man day have been considerably lower. As pointed out earlier in the discussion onion producers have recorded not only low yields, but also have received lower prices. Besides these growers have incurred very high cash expenses on planting material which has amounted to 40 per cent of the production costs. These factors together have been responsible for low returns per man day from this labour intensive crop. With regard to green gram and ground nut, yields harvested have been considerably low, and despite the satisfactory prices received by the growers, gross returns per acre as well as returns per man day have been low.

While conceding the fact that the systematic use of more inputs such as fertilizer, organic manures and insecticides would have given higher returns to labour and land, it is of interest to point out that even with relatively lower cash expenses incurred on purchased inputs, these farmers have been able to realise high returns for their labour and land. Except for red onions, the production costs of other field crops excluding labour have been less than Rs.400.00 per acre. Based on these production expenses, returns realised per man day obtained particularly from chillies and Bombay onions are extremely high. These two crops appear to be very profitable from the point of view of individual growers. Generally the returns per man day as well as cash inputs utilised for production of crops (Table 6-7) could serve as a useful index to extension staff in deciding crop combinations for alternative use of paddy lands during Yala season in these settlement projects. However, the relative profitabilities of these crops are likely to fluctuate markedly depending on the supply position.

The foregoing discussion points out that the productivity of labour and land utilised for production of other field crops in the study areas has been very high. The returns to labour and land per man day (Table 6-8) are substantially higher than the actual wage rates paid. This tendency is most striking in the case of both chillies and Bombay onions. In such circumstances, a very relevant aspect that needs clarification is to ascertain whether the high returns per man day realised are due to higher productivity of labour or land. It is common knowledge that the available supply of labour for production of these crops during Yala season is very high (extremely elastic) as the cultivation of paddy in these project areas is very restricted during Yala season due to shortage of irrigation water. Thus it is very likely that the marginal productivity of labour engaged in the production of these field crops during Yala season has been very low. Even if it is assumed that the wage rate paid to hired labour is equivalent to the marginal

Table 6-7 Returns to Labour and Land (Rupees per acre)

	Chillies		Green gram		Ground nut		Red Onions		Bombay Onions	
	Ela-hera	Polon-naruwa	Ela-hera	Dewa-huwa	Ela-hera	Dewa-huwa	Ela-hera	Dewa-huwa	Ela-hera	Polon-naruwa
A. Gross value of output per Acre	6261	11500	1297	1078	887	1388	5274	3300	7560	8738
B. Production Costs excluding labour costs	338	399	164	259	268	299	1726	1817	207	371
C. Returns to land and labour A - B	5923	11101	1133	819	619	1089	3548	1483	7353	8367
D. No. of man days used per Acre	178	248	102	100	87	175	309	310	227	224
E. Returns to labour and land per man day	33	45	11	8	7	6	11	5	32	37

Note 1. Returns to land and labour (A - B) = C

Note 2. Returns per man day $\frac{C}{D} = E$

productivity of labour, it is clear that a very substantial proportion of the returns has in fact come from the land as indicated in Table 6-8.

Table 6-8 Productivity of Land and Labour

Crop	Returns to land and labour per day (average for all locations)	Wage rate paid per man day (average for all locations)	Returns to land per day
	Rs.	Rs.	Rs.
Chillies	39.00	4.00	35.00
Green gram	9.50	4.00	5.50
Ground nut	6.50	4.00	2.50
Red onions	8.00	4.00	4.00
Bombay onions	34.50	4.00	29.50

The figures in Table 6-9 show that in the case of farmers who grew chillies and Bombay onions, the marginal productivity of land per day is about eight times when compared with that of labour. The marginal productivity of land per day has been less than that of labour, only in respect of ground nut.

Thus, in the formulation of programmes for intensification of other field crop production in dry zone settlements during Yala, it is desirable to bear in mind not only the question of providing increased employment opportunities but also to devise ways to raise wage rates of agricultural labour. If both these objectives are not achieved, the high returns from the production of these crops would go solely to a very exclusive group of land owners/allottees who happen to occupy these well drained irrigable lands in settlement projects more due to fortuitous circumstances. Extension of the cultivation of these crops to other areas including highlands that are technically suitable for their production could result in a better income distribution among a much wider group of farmers as well as agricultural labourers.

Family Farm Earnings

A summary of the profit margins as well as family farm earnings computed per acre in respect of the crops grown at different locations are given in Table 6-9.

Table 6-9 Profit Margin and Family Farm Earnings per Acre (Rupees)

	Chillies		Green gram		Ground nut		Red onions		Bombay Onions	
	Ela-hera	Polon-naruwa	Ela-hera	Dewa-huwa	Ela-hera	Dewa-huwa	Ela-hera	Dewa-huwa	Ela-hera	Polon-naruwa
A. Gross value of output per Acre	6261	11500	1277	1078	887	1388	5274	3300	7560	8738
B. Total cost of cultivation	1167	1800	691	761	699	1134	3704	3165	1078	1510
C. Profit Margin	5094	9700	586	317	188	254	1570	134	6482	7228
D. Imputed value of family labour	492	488	158	230	130	234	394	346	671	305
E. Family farm earnings	5586	9212	744	547	318	488	1964	480	7153	7533

Note 1. Profit Margin per acre (A - B) = C

2. Family farm earnings (C - D) = E

As was seen in the earlier discussions, chillies and Bombay onions have given the highest profit margins (Table 6-9). In the case of red onions, farmers at Elahera have realised a profit margin of Rs.1,500.00 against a mere Rs.134.00 per acre at Dewahuwa where this crop has suffered due to adverse weather conditions and pest damage. Both green gram and ground nut have provided a relatively smaller profit margin which has been less than Rs.500.00 per acre except at Elahera.

In view of the keen interest shown by the extension staff of the Department of Agriculture who co-operated in this study, to get an idea of labour productivity in terms of "Family Labour Earnings", a discussion on this aspect was included. In order to estimate the Family Labour Earnings from the crops grown, firstly it is necessary to deduct land rent payable in the areas concerned. Since this study

was confined to Colonization Schemes and as there were no tenant-cultivators among the record keeping farmers, the question of deciding on an appropriate land rent posed certain difficulties[1]. Consequently, an assumption was made with regard to land rent, based on the pattern of rent payable for paddy lands at these locations but outside the Colonization Schemes. The most common system of land rent payment in paddy in dry zone areas is 25 per cent of the harvested crop and assuming an average yield of 50 bushels of paddy per acre during Yala season in these areas, the amount of hypothetical rent amounts to Rs.225.00 per acre when paddy is priced at Rs.18.00 per bushel.

Using the above hypothetical land rent and deducting same from Family Farm Earnings in Table 6-9, Family Labour Earnings per acre from each of the crops are given in Table 6-10.

Table 6-10 Family Labour Earnings per Acre (Rupees)

	Chillies		Green gram		Ground nut		Red onions		Bombay Onions	
	Ela-hera	Polon-naruwa	Ela-hera	Dewa-huwa	Ela-hera	Dewa-huwa	Ela-hera	Dewa-huwa	Ela-hera	Polon-naruwa
A. Family farm earnings per acre	5586	9212	744	547	318	488	1964	481	7153	7533
B. Imputed value of land rent per acre	225	225	225	225	225	225	225	225	225	225
Family labour earnings (A - B)	5361	8987	519	322	93	263	1739	256	6928	7308

It is realised that the performance of these record keeping farmers is not so spectacular if comparisons are made with the profits

[1] Annual payment due to Government from the colonists in these settlements is only Rs.20.00 per acre. Since this form of land tax is quite different from the land rent used in economic discussions, this tax was not used to impute the land rent in the study areas in estimating Family Labour Earnings.

generally earned from similar crops by farmers in the Jaffna and Vavuniya districts, particularly those in youth settlement projects. Farmers in the Northern Province not only possess the expertise due to their long experience with the production of these crops, but also have a comparative advantage in their production due to easy availability of underground water and suitable soil conditions. However, in view of the recent ban on imports of these commodities, it is no longer possible for the country to depend solely on the traditional areas in Northern Province and the chenas in other parts of the dry zone to produce the total domestic requirements. Thus the extension of production of field crops to well drained paddy lands where paddy yields are marginal becomes necessary in order to meet the growing demand for these commodities.

In view of the fact that only small extents were cultivated under different crops by individual record keeping farmers and that the total number of farmers involved in this study was small, it is not proposed to draw general conclusions on the profitability of production of these crops based on the profits computed from the records maintained. However, the data assembled could prove useful to extension staff in deciding combinations of crops that would give high profits subject to other constraints on the use of resources to farm families.

SUMMARY

Inadequate supply of irrigation water is a major constraint to successful production of paddy d ing Yala season in a greater part of the dry zone. In settlement schemes such as Elahera and Dewahuwa, the extents under this crop during Yala season are very limited due to difficulties of obtaining sufficient irrigation water. At Elahera, normally only half the families in one particular area are permitted to cultivate paddy in any given Yala season so that generally a family is able to cultivate only three crops in two years. The cropping intensity in this project is less than 1.5. At Dewahuwa, generally, there is no cultivation of paddy during Yala season. Consequently a substantial portion of paddy land as well as labour in these projects remain idle during Yala seasons. In order to make fuller use of land with the limited irrigation water available in settlement schemes, the Department of Agriculture initiated a pilot project at Elahera in 1968, to grow in paddy lands other field crops that require relatively less water than paddy.

However, the cultivation of these field crops on a systematic basis in paddy fields has not been evaluated in economic terms. As a preliminary step to collect relevant economic data, a case study in respect of 45 farmers who cultivated crops such as chillies, green gram, ground nut and onions in paddy fields at Elahera, Dewahuwa, and Polonnaruwa, during 1972 Yala season was undertaken with the active participation of the extension division of the Department of Agriculture. A farm record book prepared by the Production Economics Unit was used by the Agricultural Extension staff for collection of the required information.

Since the crops involved in this study require a relatively high input of capital labour and expertise, and as the farmers who participated in this programme have mostly depended on manual labour and hand tools for cultivation, the extents grown under these crops by individual farmers have been relatively small. Generally the average extents cultivated at the different locations by them have ranged from .25 to about 1.75 acres except in the case of red onions. According to data collected, the labour utilised for production of these field crops in paddy fields has generally exceeded 100 man days per acre.

Production costs per acre are highest with red onions which have exceeded Rs.3,000.00 per acre. In the case of chillies and Bombay onions the cultivation costs have ranged from Rs.1,000.00 to Rs.1,800.00 per acre at the two locations. Production of green gram and ground nut incurred relatively less expenses ranging from Rs.600.00 to Rs.1,000.00 per acre. A breakdown of the total production expenses recorded for different crops on the basis of inputs used shows that labour is the most important item as far as produc-

tion costs are concerned. The total expenses recorded in respect of labour have ranged from 62 - 82 per cent for different crops, the only exception being red onions, where the labour costs have been relatively less. The ratio of family labour to total labour used per acre has ranged from 40 - 60 per cent for crops other than red onions. The amount of hired labour used in red onion cultivation has been as high as 74 per cent of the total labour input. Expenses incurred on purchased inputs such as fertilizer and agro-chemicals have been extremely low except in the case of chillies. In the case of red onions, cost of seed alone has amounted to over Rs.1,200.00 per acre, which is about 40 per cent of the total cost of cultivation.

The gross returns realised per acre show considerable variation in respect of different crops. The returns also have varied substantially at different locations particularly in the case of chillies and ground nut. Variations in returns are primarily due to differences in yield as well as prices realised by individual growers. Farmers who have grown these field crops on better drained lands with lift irrigation at Polonnaruwa have obtained substantially higher yields particularly in the case of chillies. With gravity irrigation at Elahera, the crops have suffered some set back due to excessive soil moisture, and consequently have recorded lower yields. Crops at Dewahuwa have been severaly affected due to shortage of water. Both chillies and Bombay onions have recorded a gross output valued over Rs.6,000.00 per acre whereas in the case of red onions the total income realised has been only around Rs.3,000.00 per acre. Green gram and ground nut have given substantially lower returns ranging from Rs.800.00 to Rs.1,300.00 per acre. Since land and labour constitute the most important inputs, returns to these factors of production were computed and it is seen that both chillies and Bombay onions have given returns ranging from Rs.39.00 to Rs.34.50 per man day. In the case of the other three crops, the returns per man day have ranged from Rs.5.00 to Rs.11.00.

Profit margins as well as family farm earnings computed for different locations indicate that both chillies and Bombay onions have given profits ranging from Rs.5,000.00 to as much as Rs.9,000.00 per acre. Red onions at Elahera have given a profit of Rs.1,570.00 against a mere Rs.134.00 per acre at Dewahuwa where this crop has suffered due to shortage of water and pest damage. Both green gram and ground nut have provided relatively smaller profit margins which are less than Rs.500.00 per acre except at Elahera. Family farm earnings realised from different crops show a similar pattern as the profit margins indicated earlier.

An attempt was made to estimate the 'family labour earnings' from family farm earnings as such figures are of interest to extension workers. For this purpose, a hypothetical land rent based on the prevailing system of rent payment in paddy cultivation was used. However, as the imputation of land rent based on the pattern of rent payment in paddy cultivation is arbitrary, the family labour earnings calculated are not considered a very satisfactory measure of earnings.

It is realised that the progress of these record keeping farmers is not so spectacular when compared with the profits earned from similar crops by farmers in the Northern Province who not only possess the expertise due to their long association with these crops, but also have a comparative advantage due to easy availability of underground water and suitable soil conditions for these crops. *In fact, most of these traditional paddy farmers who co-operated in this programme, have only just begun the process of learning the new technology of other field crop production under irrigation. Thus their performance is being evaluated with this background in mind.*

In view of the relatively small extents cultivated by individual record keeping farmers, it is not intended to draw general conclusions with regard to profitability of production of these crops in paddy fields in Yala. However, the data assembled would prove useful to extension staff in deciding combinations of crops that would give the highest profits subject to other constraints on the use of resources available to farmers.

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