A study of potato cultivation in the Jaffna peninsula (maha 1967-68)

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INTRODUCTION

POTATOES have been grown in small observation plots from 1957 in the Jaffna District. From 1964 onwards these plots became bigger and ceased to be observation plots. The extent under potato cultivation rapidly increased till in Maha 1967-68 the extent was 489 acres. The conditions prevailing in this Peninsula are quite distinct with hot dry climate from March to September when temperature differences between day and night are small and warm wet climate from October to February when temperatures differences between day and night are greater. Different cultivators in previous seasons have reported different results. In order to understand the problems associated with potato cultivation (and to determine suitable solutions to the different problems) a study was carried out at the end of the Maha 1967-68 season. This study became still more important as the bookings for seed potatoes for the Maha 1968-69 were for 1,300 acres.

METHOD OF STUDY

The method adopted was by questionaire of randomly selected cultivators. It is generally accepted that cultivators do not keep records of expenses and incomes. The recording of the data was done immediately after the harvest so as to allow the minimum time to lapse and thus ensure maximum correctness of data obtained as all data are memory recorded in the minds of the cultivators. Altogether 124 farmers out of a total of about 1,200 farmers were sampled.

(*a*) *Size of holding* : The holdings under potatoes varied in extent from 1/16th acre to a maximum of 1 acre. The model holding was 1/4th acre. The average holding was 0.23 acres. Details of the distribution of holdings are given in table 1.

Table I.—Distribution of Holdings

Size of holding	*No. of farmers*	*Percentage*
1/16th acre holdings	06	4.8
1/8th acre holdings	39	31.4
1/5th acre holdings	10	8.1
1/4th acre holdings	43	34.7
1/2 acre holdings	18	14.6
3/4th acre holdings	04	3.2
1 acre holding	04	3.2
Total	124	100

Another mode occurs at 1/8th acre level. There were found to be beginners who did not want to risk too much capital on seed and fertiliser on a new crop and had ristricted the extent to 1/8th acre for the season to gain experience.

(*b*) *Variety and yield.*—During the season under study, varieties Arka, Condea, Multa, and Cosima all listed as 3 to 3½ months varieties were cultivated. However under the conditions prevailing in the District, they all matured in less than 95 days from the date of planting immaterial of the date of planting. Plantings were done from 1.11.67 to 13.1.68. Early maturity is attributable to the increasingly warm temperature that prevails in January-February and which hastened the maturity of the crop. Field observations also confirm these findings.

Though seed potatoes of the various varieties were planted over a period of 2½ months, it was difficult to sort out for each variety the various dates of planting to determine whether for each variety different planting dates would give different yield responses. The data for each variety were therefore bulked together to evaluate the yield ability of each variety. This is given in table II from which it is seen that the variety Arka has outyielded all other varieties. The poor yield of Cosima may be attributed to the fact that all fields which carried Cosima were planted in January and hence the low yields might have been due to late planting.

Table II.—Yield ability of varieties

Variety	*Total acreage under each variety*	*No. of samples*	*Total yield in cwts.*	*Average yield p/a in cwts.*	*Deviation from average plus or minus cwt.*
Arka ..	145	41	6,131	149.5	+25.9
Condea ..	285	59	6,519	110.53	—23.1
Multa ..	64	19	2,329	122.6	— 1.0
Cosima ..	30	5	346	69.3	—54.4
	524	124	15,325	123.6	

(c) *Relationship between time of planting and yield.*—In this District, as with the rest of Ceylon, the cultivator is not in a position to ascertain his best date of planting. Most of the seed potatoes have to be imported by ship from European countries at the end of their summer harvests. This procedure is fraught with delays. It is feared that late arrival of seed potatoes will result in a poor harvest or no harvest at all due to the high temperature in March-April as could be seen from table III.

Table III.—Monthly Temperature in Jaffna

Month	*Mean temperature*	*Maximum temperature*	*Minimum temperature*
January	77.8°F.	83.4°F	72.3°F
February	78.7°F	85.6°F	71.8°F
March	82.2°F	88.6°F	75.6°F
April	85.8°F	91.2°F	80.5°F
May	85.4°F	88.8°F	82.0°F
June	85.4°F	86.7°F	80.8°F
July	83.2°F	86.2°F	80.2°F
August	82.6°F	86.1°F	79.1°F
September	82.8°F	86.3°F	79.4°F
October	81.0°F	85.4°F	76.5°F
November	78.6F°	83.2°F	74.0°F
December	78.3°F	83.0°F	73.6°F

It is often stated that the potato requires an optimum temperature of around 70°F for proper tuberisation and development of tubers. In the Jaffna Peninsula, if this be so planting has to be so adjusted that before the commencement of higher temperature in February, the plants grow and cover up the soil, thus helping to ensure that tuberisation takes place before the on-set of the hot spell. The cool night temperature of around 70°F prevailing during the months of December, January and February contributes towards tuberisation and proper development of tubers. In trying to make adjustment for this factor, care should be exercised to avoid the continuous rainy period in November. Experience has shown that planting could commence during the latter part of November after the cessation of the heavy rains and could continue up to about the 25th of December. Planting after this date generally gives lower yields. During the Maha 1967-68 season, there were unusually heavy rains during the first week of December 1967 and this affected the November plantings adversely. From past experience, we do not recommend any planting in January due to the low yields obtained by such late planting. Since a portion of the seed potatoes were received late and as the cultivators were keen, January planting could not be avoided. Out of the 124 farmers sampled 19 planted in November, 89 in December and 16 in January. As the majority had planted during. December, the month of December has been sub-divided into 3 groups to compare the yields in relation to the date of planting. The results are given in the table IV.

Table IV.—Yields in relation to time of planting

Time of planting	*No. of planting*	*Yield per acre in cwt.*
November ..	.. 19	.. 76 5/7
December 1st to 10th ..	.. Nil*	.. —
December 11th to 20th ..	.. 54	.. 145 6/7
December 21st to 31st ..	.. 35	.. 119 6/7
January 1st to 13th ..	.. 16	.. 98 2/7

*No planting was done during this period due to heavy rains culminating in heavy floods on 6.12.67.

From the findings it could be duduced that January planting gives lower yields than December planting and the current recommendation of planting immediately after the heavy rain is confirmed as a justifiable recommendation.

(*d*) *Cultivation and Cultural Retails.*—To every cultivator in the District an instruction leaflet on how to cultivate potatoes indicating what operations should be done and when, almost in the patern "do it yourself" was given. It was generally observed that every cultivator without exception kept to the schedule though there were limited variations in the amount of insecticides used and the amount of fertiliser used. These could not be evaluated.

COST OF CULTIVATION AND ECONOMICS

The cultivation costs were broken up into cost of labour inputs comprising tillage, planting, after care and irrigation, harvest and sale and cost of material inputs comprising organic manure, fertilizer, seed-potatoes, agro chemicals, pump hire and land rent.

The traditional method of tillage is by the use of the mammoty. This costs much more than the tractor-drawn ploughs and implements. But the custom of mammotying the fields is considered superior by the cultivators. It was not possible to evaluate the difference between the two systems of tillage as there was not a single case where a tractor has been solely used. The average cost of tillage worked to Rs. 212 per acre (variation Rs. 480—75).

The fields were laid into ridges and furrows 2′ apart and planting was done in the furrows having incoporated fertilizers in the furrows. All these operations were included under planting which worked out at an average of Rs. 100 per acre (variation Rs. 192 to 32).

After-care included mainly weeding, earthing-up, application of insecticides and fungicides and irrigation. In this item of expenses wide variations were noted. While some did two weedings, there were others who did none. Some sprayed more often than others. Some did earthing up twice and some irrigated more often than necessary. The average cost of this item turned out to be Rs. 380 per acre (variation Rs. 768 to 120).

Harvesting is done by hand by loosening the soil with a mammoty and pulling out the plants. The tubers were cleaned in the field and bagged and weighed by the cultivator and sometimes by the purchasing agent. In some instances cultivators incurred costs in marketing by transporting the produce to selling points. The volume of the harvested tubers by itself affects the cost of harvesting and sale. The average cost for harvesting and sale worked out at Rs. 131 (variation Rs. 275 to 32).

MATERIAL INPUTS

The highest cost of material input besides seed is the cost of organic manure, without the use of which no successful highland cultivation is possible in this region. Of the 124 cultivators surveyed only 3 cultivators did not adopt any organic manuring for this crop as they had manured their previous crop. Organic manure is used in the form of cattle manure, composted household sweepings, green leaves and dried leaves. The cost is therefore very variable, depending on the material used, cattle manure being the most costly. The average cost of organic manure turned out to be Rs. 776.94 cents (variation Rs. 1,600 to 160).

Next to organic manuring it has been found that the use of fertilisers gives very good response to yields to all crops in these soils. Fertiliser use is still in it's infancy and the average cost of fertiliser worked out at Rs. 97.44 (Variation Rs. 432 to 48). It is worthy of mention that 7 cultivators did not use fertilisers but their yields were not below the average of the others. This is attributed to the fact that they used very high doses of organic manure.

At the recommended rate of planting one would require 16 cwts of 2 oz. tubers and this would cost Rs. 1,075.20 at the Departmental sale price of Rs. 67.20 per cwt. The average cost of seed potatoes turned out to be Rs. 1,129.94 (variation Rs. 1,162 to 688). This variation is due to the variation in tuber size.

Insecticides and fungicides had to be used to protect the crop from pests and diseases. Here it was found that all cultivators had used some form of agrochemicals. The average cost of these chemicals worked out at Rs. 117.33 (variation Rs. 340.20 to 35).

The crop has to be irrigated every 4th to 5th day unless water has been provided by rainfall. For irrigation a water pump is necessary and the prevailing pump hire rates have been included in the data sheets even when the cultivator owned his pump. The pump hire rates however vary from village to village depending on the availability of pumps. The depth of the well and the frequency of irrigation. The average cost of hire of water pump turned out to be Rs. 253.87 (variation Rs. 480 to 120).

Land rent varies from village to village and is also affected by location and accessibility and type of soil and the average worked out to be Rs. 155.04 (variation Rs. 400 to 60).

It could be seen from table VI that the model sale price was Rs. 51 to 55 at which price range the largest number of cultivators had sold their produce and this is also the lowest price that had been obtained. This is due to the fact that majority of the cultivators (75 out of 124 cultivators sampled) had sold between 1.3.68 and 20.3.68. After this period there was a steady rise in the price to Rs. 70 by 20.4.68. If the cultivators had stored their produce for a period of 3 to 4 weeks, it would have been possible for them to obtain at least Rs. 10 more for each cwt. they sold, even after making allowances for loss of weight due to storage which would have been in the region of about 10 per cent for that period.

SUMMARY

The average cost of cultivation of potatoes during Maha 1967-68 in Jaffna was Rs. 3,353.56. The average yield was 123.6 cwts. The lowest selling price recorded in the survey was Rs. 51 per cwt. Hence the profit on the average yield at the lowest selling price with average cost of cultivation was :—

	Rs.	*c.*
123.6 × Rs. 51	6,303	60
Minus cost of cultivation	3,353	56
Net profit	2,950	04

Potato being a three months crop the profit of Rs. 2,950 in four months (allowing one month for preparatory tillage) is very high and it is not possible to obtain such high profits with any other three months crop. In the case of cultivators who obtained yields higher than the average and those who sold at prices higher than the lowest selling price of Rs. 51 the proft could be in the region of 3,500 per acre or more. However it has to be mentioned that successful potato cropping requires high inputs, especially of materials and hence the risk by incompetent cropping is high.

Potato being a new crop, the majority of the farmers adopted the recommended techniques in a systematic manner and this resulted in successful crops and high returns.

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The average cost of cultivation works out to be Rs. 3,353.56 cts. (variation Rs. 6,579.20 to Rs. 1,370.00). Details are given in table V.

Table V.—Cost of production and profit account

Labour inputs	*Average* Rs c.	*Maximum* Rs. c.	*Minimum* Rs. c.
Tillage	212 0	480 0	75 0
Planting	100 0	192 0	32 0
After care and irrigation	380 0	768 0	120 0
Harvest and sale	131 0	275 0	32 0
Material inputs			
Organic manure	776 94	1,600 0	160 0
Fertilisers	97 44	432 0	48 0
Seed Potatoes	1,129 94	1,612 0	688 0
Agro-chemicals	117 33	340 20	35 0
Pump hire	253 87	480 0	120 0
Land rent	155 04	400 0	60 0
	3,353 56	6,579 20	1,370 0

Average Yield	123·6 cwt.	
Sale value at the modal price of Rs. 55 per cwt	6,789 0	
Gain per acre	3,444 44	(at average cost).

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Table VI—Sale Pattern of Harvested Potatoes

Time of Sale	*Sale Price Obtained by Cultivators*										*Total No. of Cultivators*
	Rs. 51–55	*Rs.* 56–60	*Rs.* 61–65	*Rs.* 66–70	*Rs.* 71–75	*Rs.* 76–80	*Rs.* 81–85	*Rs.* 86–90	*Rs.* 91–96	*Rs.* 96–100	
25. 1.68 to 31. 1.68	—	—	—	—	—	—	—	—	1	2	3
1. 2.68 to 10. 2.68	—	—	—	6	1	—	1	1	—	—	9
11. 2.68 to 20. 2.68	—	1	—	3	—	2	—	—	—	—	6
21. 2.69 to 29. 2.68	—	—	2	2	—	—	—	—	—	—	4
1. 3.68 to 10. 3.68	23	1	1	—	—	—	—	—	—	—	25
11. 3.68 to 20. 3.68	32	12	2	4	—	—	—	—	—	—	50
21. 3.68 to 31. 3.68	5	13	2	—	—	—	—	—	—	—	20
1. 4.68 to 10. 4.68	—	3	3	—	—	—	—	—	—	—	6
11. 4.68 to 20. 4.68	—	—	—	1	—	—	—	—	—	—	1
	60	30	10	16	1	2	1	1	1	2	124