

TRACTOR CULTIVATION OF PADDY FIELDS IN THE EASTERN PROVINCE

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INTRODUCTION

THE use of tractors in Agriculture had not up to last year been tried on any appreciable scale in Ceylon. A contrast is provided in other countries, particularly Western ones, by the rapid strides made in this direction. The multiplicity of tractor models and variety of ancillary equipment give a rough idea not only of the progress made but more so of the experience gained. In the United States of America in 1937 over a million and a quarter tractors were in use and the annual horsepower hours on farms for ploughing &c., were about $2\frac{1}{2}$ billion. In Canada during the period 1921-1931, the number increased from 47,000 to 105,000. In Russia, where mechanization has developed systematically, there were 380,000 tractors totalling about 6,500,000 h.p. in use in 1936. There were no tractors in use in Great Britain at the beginning of this century, but in 1931, the number rose to over 20,000. From that year up to 1934, the annual sales of tractors averaged 4,000, while in 1936 and 1937 the sales rose to 7,000 and 9,000 respectively. In the latter year there were over 48,000 tractors in use in England and Wales and this number rose to over 150,000 in 1943.

The desire for mechanical power in agriculture has not been confined to the Western countries. In Siam, the cultivation of paddy lands by tractor drawn implements has been carried out by some enterprising Chinese since 1930. Rhodesia has not been slow to appreciate the value of tractor machinery because tractors formed part of the normal farm equipment before 1929. In India trials were conducted with the Fordson Tractor at Pusa in 1919, but the use of machinery in cultivation has not been so wide-spread because of the small size of the holdings which are mainly in the hands of the peasants—conditions which are similar to those in Ceylon.

With a view, therefore, to popularizing the use of machinery—particularly in paddy cultivation—and to show how peasants could adopt this type of cultivation by organizing themselves into co-operative farmers' societies, a large scale demonstration was carried out in the Eastern Province in the *Maha* 1943-44.

An area, 203 acres in extent, of privately owned fields was taken up for this purpose late in July, 1943, on the agreement that the cultivators should pay a normal sum of Rs. 12 per acre for all operations from ploughing to

sowing. The land was thereafter to be handed back to the cultivators who would be responsible for such subsequent operations as fencing, irrigation, weeding, watching and harvesting.

NATURE OF LAND AND SOIL

This *Kandam* (about 934 acres in extent) is the oldest paddy tract in the Batticaloa District. It is reckoned to be about 700 years old, and, lying as it does on the Eastern section of the Batticaloa-Pottuvil Main road which forms an effective barrier against any flood water from the Pattipolai Aru coming in, does not benefit by any form of silting. Consequently the yields have always been very low—in fact the lowest under the Pattipolai Aru Scheme. The soil types vary from sandy to clayey.

DETAILS OF WORK DONE

As it was necessary to make the bays as large as possible in order to let the tractors have a long run and thereby save time in turning, several ridges had to be removed. This work was started in late July and was continued till September. Over 6 miles of bunds were thus demolished by manual labour. The first tractor and a second-hand disc-gang plough and disc harrow arrived in the second week of August when ploughing was started immediately. Owing, however, to the hard nature of the soil one of the discs of the old plough broke after about 3 acres had been done and ploughing was continued with the remaining 3 discs in the plough. This reduced the output by 25 per cent. and put up the cost proportionately. With the ploughing of a further 10 acres, it was found that the wear on the discs was considerable—about one inch of the diameter having worn away during the ploughing of this 10 acres. It was therefore decided that no further ploughing should be undertaken till there were a few showers of rain.

No rain fell till the 30th of September when the downpour was so heavy that work was held up for 2 days till the tractors could be put on the land. The Government manure mixture consisting of bone-meal and groundnut cake was thereafter applied at the rate of 3 cwt. per acre and the area harrowed. About 81 acres were sown dry and the rest of the area sown wet with pureline *Vellai Ilankalayan* paddy. Sowing commenced in late October and was completed by late November.

As mentioned earlier, the agreement was that the land should be handed back to the cultivators after sowing was completed. But the cultivators did not adhere to their part of the agreement. They did not fence the area in time. Neither did they attend to irrigation. The results were that (a) there was very severe damage by stray cattle and (b) the young plants commenced to yellow due to lack of water. Weed growth also became very profuse as a result of the failure to irrigate at the right time. At this stage, in spite of the severe setback the young seedlings had received, the land was taken over again and all operations carried out by the Department. By mid-January all the plants had completely recovered and the growth was excellent. At flowering time in February, however, there were unusual and exceptionally heavy rains; a total of over 27 inches was recorded as against an average of only 3.1 inches for over 30 years. This resulted in a very high proportion of chaff.

Harvesting was done on a strictly randomized principle. A total of 38 one-eighth acre plots was harvested and threshed and the results analysed. The yield figures are given in Table I.

RESULTS

Total area cultivated in tract	801 $\frac{3}{4}$ acres
Area tractor worked	203 ..
Area cultivated by village methods	598 $\frac{1}{4}$..
Average yield per acre of tractor worked area	44.15 bushels
Average yield per acre in remaining area	16.7 ..

The above results show a very substantial increase in the tractor worked area. The yield is well over 2 $\frac{1}{2}$ times that obtained in the rest of the area. The average yield obtained in *Maha* 1942-43 from this tract was 18.7 bushels per acre. The lower average obtained in *Maha* 1943-44 is entirely due to the adverse weather conditions experienced during flowering. The extent of the damage caused by the unusually heavy rains can be gauged from the fact that in the plot from which the highest yield of 108 bushels per acre of unwinnowed paddy was recorded, no less than 43 bushels constituted unfilled grains. In a normal year chaff is usually less than ten per cent. of the crop. This year, however, chaff amounted to 29.41 per cent. of the crop harvested from the tractor worked area. The actual yield of unwinnowed paddy from this area was 62.53 bushels per acre. Making an allowance of 10 per cent. chaff in a normal year it will be seen that 19.4 per cent. of the chaff should have yielded grain. This would have amounted to over 40 per cent. of grain. Thus the yield should have been over 59 bushels per acre in the tractor worked area after making an allowance of 5 per cent. for the few bunds left.

CONCLUSIONS

The results which show an increase of a little over 25 bushels per acre after making the allowance referred to above indicate beyond doubt the vast possibilities for paddy cultivation in Ceylon. Basing the calculation on the accepted cycle of good and bad years in Agriculture and on the fact that this year of trial was the worst of the cycle, it would be safe to assume that the average annual production over the period of the cycle could be not less than 75 bushels per acre. This figure does not provide for the fact that with the continued use of tractors, soil conditions would improve. Apart from the substantial increase in yield that will result from the use of machinery because thorough tillage is possible—and at the right time—two very great advantages that should be taken into consideration are (a) a considerable saving in labour and (b) a very much more economical use of irrigation water which saving should be available for cultivating extra land. Another important factor is the effect tractor cultivation has on costs of production. In the Eastern Province where buffaloes are used, the average cost from mudding to sowing was Rs. 30 as against Rs. 13.75 per acre for tractor working from ploughing to sowing. It should be noted that this amount which includes depreciation on machinery, transport, cost of fuel, lubricants &c., at market rates, for tractor working the area is relatively high, because after

the breaking of the ridges, the fields were not level and had therefore to be worked several times with the meagre ancillary equipment available in order to bring them into a state which would permit of irrigation in large bays. Hence at least half the amount should be really regarded as capital expenditure and the working cost of the same area in subsequent seasons would be proportionately less.

If tractor cultivation is to be adopted on a large scale, it should of necessity be on co-operative lines, and co-operative farmers' societies should be formed in each tract. One lamentable feature in these tracts is the absence of permanent fences. This should receive first consideration from the societies, because, it is only then that rotational cultivation in paddy fields will be possible. With the large increase in yield that will be obtained by intensive cultivation, all improvements such as fencing, levelling, grading, drainage, planting of *Gliricidia* along the bunds, &c., could be done on a share basis. Even if a very low yield of 45 bushels per acre is obtained, there is yet a considerable margin of profit to effect the necessary improvements during the first two or three years itself on the following basis :—

Part liquidation of capital expenditure	..	..	10 bushels
Working expenditure including depreciation	..	..	15 ..
Permanent improvement	..	..	5 ..
Members' share	..	..	15 ..

All colonization schemes should also be worked on co-operative lines. Here, it is possible to introduce such smaller machinery as garden tractors, if the schemes are not large enough to warrant expenditure on large 30–40 h.p. tractors. These garden tractors are capable of ploughing about 2 acres of land a day.

If mechanized farming is introduced the question arises what should be done with the large herds of buffaloes now used for mudding. It must be mentioned that no scheme of rotation could be complete without the introduction of mixed farming. The responsibility for the care and maintenance of neat cattle and buffaloes should rest with the farmers' societies. Each society should appoint herdsmen whose duty would be to feed and provide water for the animals, drive them to pasture grounds during the day and back to the stockade at night. The droppings can be collected and turned into compost. Eventually a clean milk supply can be organized. Grading on systematic lines by the use of stud animals can also be effected best through these societies.

It will be seen that there is a very strong case for the immediate introduction on a large scale of tractor machinery for agricultural operations on organized lines. If this is done it would be possible to make the Island self-supporting in the matter of foodstuffs within a comparatively short period.

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TABLE 1—YIELD OF PADDY IN TRACTOR WORKED AREA

Plot No.	Yield $\frac{1}{8}$ acre plots				Yield per acre			
	Unwinnowed		Winnowed		Unwinnowed		Winnowed	
	paddy Bushels		paddy Bushels		paddy Bushels		paddy Bushels	
1	..	12.13	..	8.40	..	97.0	..	67.13
2	..	7.75	..	6.33	..	62.0	..	50.67
3	..	6.00	..	4.67	..	48.0	..	37.33
4	..	8.13	..	6.38	..	65.0	..	51.0
5	..	3.5	..	2.73	..	28.0	..	21.83
6	..	4.0	..	3.05	..	32.0	..	24.42
7	..	4.5	..	3.13	..	36.0	..	25.0
8	..	4.5	..	3.63	..	36.0	..	29.0
9	..	7.25	..	5.23	..	58.0	..	41.83
10	..	7.0	..	5.08	..	56.0	..	40.67
11	..	10.0	..	6.65	..	80.0	..	53.17
12	..	—	..	8.21	..	—	..	65.67
13	..	9.0	..	6.56	..	72.0	..	52.5
14	..	7.0	..	5.25	..	56.0	..	42.0
15	..	6.5	..	5.0	..	52.0	..	40.0
16	..	—	..	7.17	..	—	..	57.33
17	..	—	..	6.85	..	—	..	54.83
18	..	—	..	4.04	..	—	..	32.33
19	..	—	..	6.69	..	—	..	53.5
20	..	—	..	7.06	..	—	..	56.5
21	..	—	..	5.33	..	—	..	42.67
22	..	—	..	5.77	..	—	..	46.17
23	..	—	..	5.54	..	—	..	44.33
24	..	—	..	5.85	..	—	..	46.83
25	..	—	..	6.52	..	—	..	52.17
26	..	8.75	..	5.46	..	70.0	..	43.67
27	..	7.5	..	4.83	..	60.0	..	38.67
28	..	10.0	..	5.29	..	80.0	..	42.33
29	..	—	..	4.56	..	—	..	36.5
30	..	8.25	..	5.71	..	66.0	..	45.67
31	..	6.75	..	4.58	..	54.0	..	36.67
32	..	13.5	..	8.13	..	108.0	..	65.0
33	..	—	..	4.5	..	—	..	36.0
34	..	8.5	..	5.5	..	68.0	..	44.0
35	..	10.08	..	5.75	..	80.67	..	46.0
36	..	8.5	..	5.75	..	68.0	..	46.0
37	..	—	..	3.23	..	—	..	25.83
38	..	8.5	..	5.35	..	68.0	..	42.83