Original Articles.

The Transplanting of Paddy.

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TO what extent the Ceylon cultivator will practise the transplanting of paddy depends *inter alia* on the following factors:—

(1) The supply of labour
(2) The increased financial return.

With the conclusion of experiments laid down during Maha 1926-27 a considerable amount of data is now available to show the nature of the increase of yield due to transplanting. The extra cost of transplanting will be determined during Maha 1927-28; but as various enquiries have been received about the increased yield due to transplanting it has been thought advisable to publish the results up to date. The results refer to six months Maha paddies. The effect of transplanting short-aged Yala paddies is now being determined. Summers (1921) first studied the tillering of certain Ceylon rices and the effect of different methods of planting on tillering power and yield.

Experiments with different methods of planting paddy were started at Anuradhapura in Maha, 1921-22, and the results of those experiments together with more elaborate ones in Maha, 1922-23, have already been published by Iliffe (1924). The different methods of planting used in the latter experiments were broadcasting, broadcasting and thinning, transplanting and sowing individual seeds 6 in. apart. The 1926-27 experiment differs from the previous ones in that larger plots were used; seeds were planted or sown at the same time (except that the transplanted seeds were sown a little earlier as transplanting lengthens the age of a paddy) and the method of planting individual seeds was not included as it was considered of less immediate practical importance than the other three.

Long narrow 1/100 acre plots were used and put down in the following manner:—

(a) Transplanted
(a) Broadcasted
(b) Transplanted
(b) Broadcasted and thinned
(c) Transplanted, etc., etc.

That is, considering the transplanted plots as the controls, each different treatment had a control plot next to it. The broadcasted plots were sown at the rate of 70 lb. (about 1½ bushels) of seed per acre (considerably less than the local rate) and the transplanted plots at the rate of one bushel per acre. Transplanting took place 30 days after sowing the nursery. All plots were weeded; and during the weeding the plants in every alternate broadcasted plot were thinned to about 6 in. apart. The hills in the transplanted plots were about 6 in. apart with two to four plants per hill as would be the case in a cultivator's field.

Tables I. and II. show the results.

Table I.

Broadcasting and Transplanting Experiment.

Yield of Grain in lbs. per 1/100 acre Plot.

Block No.	Treatment		
	Transplanted	Broadcasted	Broadcasted and thinned
1 a	48·00	25·50	
1 b	47·00		35·50
1 c	48·00	30·00	
1 d	47·50		33·00
1 e	42·00	29·50	
1 f	38·75		31·00
1 g	39·25	35·00	
2 h	43·50		34·50
2 i	44·00	32·00	
2 j	43·50		36·50
2 k	36·00	32·00	
2 l	40·25		32·00
2 m	42·00	29·50	
2 n	40·50		37·50
3 o	39·75	35·00	
3 p	32·50		25·25
3 q	30·25	27·75	
3 r	34·50		24·75
3 s	36·00	30·25	
3 t	33·00		23·50
Total	806·25	306·50	313·50
Average	40·31	30·65	31·35

Table II.

Treatment	Yield in lbs	Yield as percentage of broadcasted yield		
		1926-27	1921-22	1922-23
Transplanted	4031	131	130	132
Broadcasted and thinned	3135	102	—	98
Broadcasted	3065	100	100	100

Discussion of the results.—The increase of yield of grain due to transplanting is definite; the increase is 31 per cent. over the broadcasted plot and is in such close agreement with the results of previous experiments that there can be no doubt as to the significance of the increase. The mean difference of the ten pairs of plots (transplanted and broadcasted) is 9·7 lb. with a standard error of 2·07 lb. The value of t^* is 4·6 and with $n=9$ only, one value in 100 will exceed 3·250 by chance. This, however, is hardly a valid estimate of the error of the experiment as the position of the plots in each pair was not "randomized" (see Fisher, 1926). The small increase in the thinned plots is not significant. It would show, however, that the seed rate of the broadcasted plots was ample although it was only a little more than half the amount usually sown by the cultivator. (But it must not be overlooked that cultivators' seed contains dirt and empty grains through faulty winnowing.) Again there is close agreement with the previous result in 1922-23. With a seed rate of 3 bushels an acre thinning would probably have produced a significant difference. The results show that with a proper seed rate thinning is not necessary. There is no doubt that with long-aged paddies transplanting will materially increase the yield of grain; 20 per cent. would be a fair estimate of the increase.

Financial Returns.—As mentioned above, costs have not yet been determined but it is possible to calculate the credit side of the account. Gains are made under two heads, first, by the increased yield and secondly, by the saving of seed. If we take the increased yield as being no more than 20 per cent., in a 60 bushel crop the increase would be 12 bushels, worth Rs. 30 at Rs. 2·50 a bushel. The saving of seed is at least 1½ bushels, *i.e.*, Rs 3·75 making a total of Rs. 33·75 out of which to meet the extra cost of transplanting. There is a very appreciable saving of seed by transplanting; experiments in Burma (Lord, 1924 and Clark, 1925) have shown that a seed rate of 25 lb. an

* See Fisher, R. A.—*Statistical Methods for Research Workers.* p. 137.

acre is as effective as a seed rate of 75 lb. per acre. Even if we allow 45 lb. (one bushel) per acre there is still a saving of seed of from one and a half to two bushels per acre.

A rough estimate of the extra cost of transplanting per acre is as follows:—

Extra cost of nursery (nursery is planted up after plants pulled with little additional preparation) say ...	Rs.	3·00
Pulling seedlings, 7 men days @ 75 cts.	,,	5·25
Transplanting, 15 women days @ 35 cts.	,,	5·25
Total ...	Rs.	13·50*

There would thus appear to be a profit of at least Rs. 15 per acre by transplanting paddy instead of by broadcasting. The adoption of transplanting by the cultivator depends not alone on the financial return but also on the supply of labour for transplanting; and it may be a long time before the women of a village are prepared or are trained to supply the necessary labour.

Other Advantages of Transplanting.—When paddy is transplanted the cultivator has more time available for the thorough preparation of his fields, that is, he has the time during which seedlings are in nursery, about thirty days. The water necessary for this preparation is frequently more easily obtained during this time. Thorough preliminary preparation of the fields reduces the number of weeds and hence lowers the cost of weeding the crop. The photographs show two buffalo or bullock drawn implements, the Burmese Harrow and the Leveller, which are effective on the heavier types of soil in reducing the cost of preparation and in preparing a better seed bed. These implements are successfully used at the Experiment Stations at Anuradhapura and Peradeniya.

Finally, transplanted paddy does not lodge so badly as the more thickly sown broadcasted paddy and this is probably one of the reasons for the increased yield.

Literature Cited.

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ILIFFE, R. O.—Trials with different methods of planting paddy. *Year-book, Dept. of Agriculture,* Ceylon, 1924, p. 24. *et seq.*

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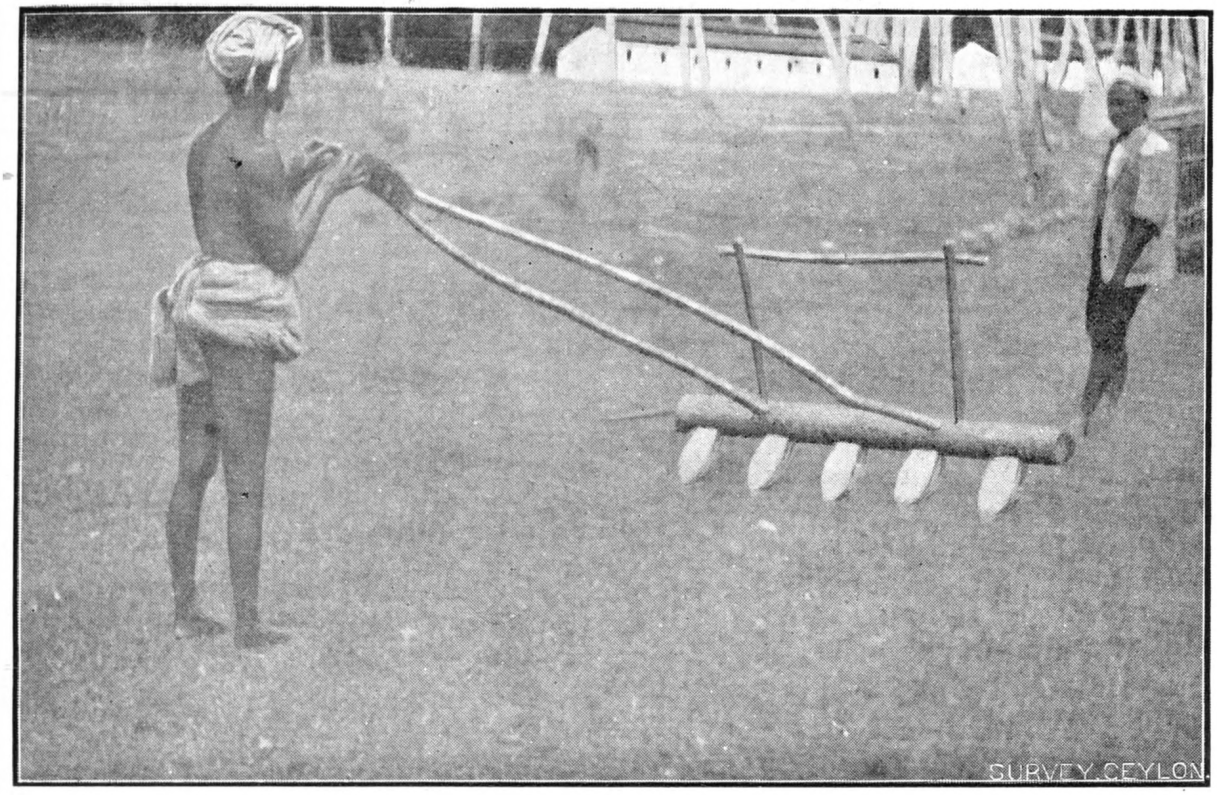
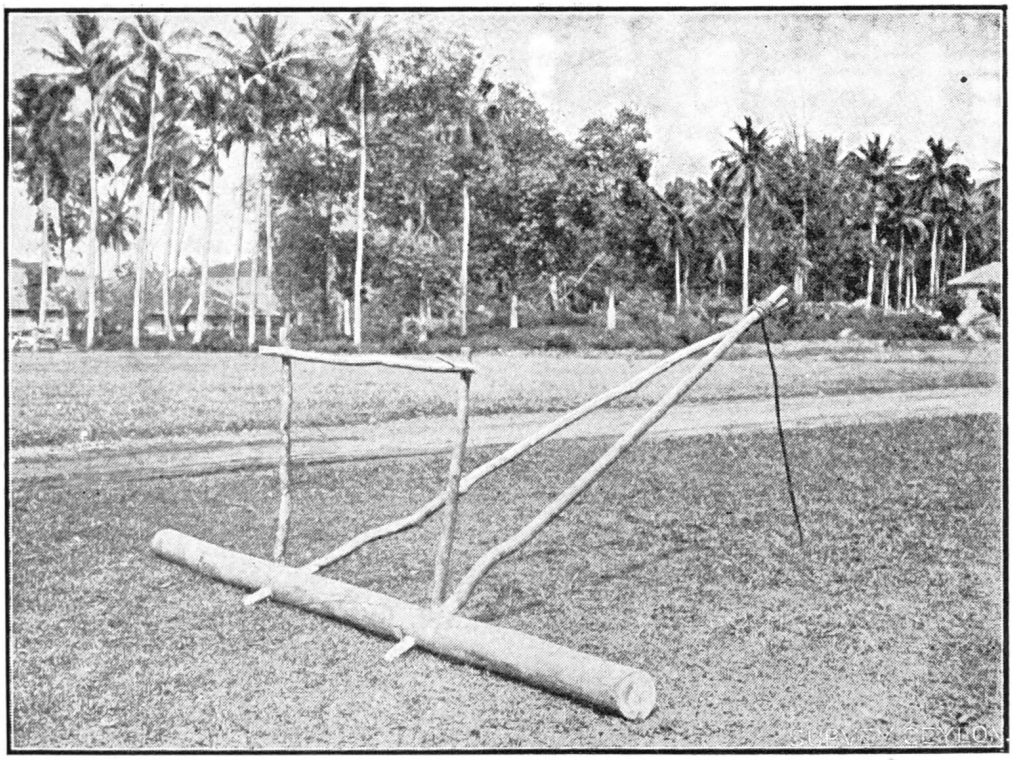
SUMMERS, F.—The tillering of Ceylon rices. *Tropical Agriculturist,* Feb., 1921.

* Allowing for the increased cost of labour this figure is higher than, but agrees fairly closely with, the figures for the cost of transplanting given in the *Tropical Agriculturist* for Sept. 1919 (p. 155, *et seq.*) and October 1920 (p. 202).



The Burmese Harrow.



The Leveller.