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Effect of Ridging Rice Crop *

by

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Synopsis: The results of an experiment conducted to study the effect of ridging on the yield of paddy are reported in this article. It has been concluded by the authors that ridging the crop by human labour increased the cost of cultivation without significantly increasing the yield.

Introduction: It is a recognised fact that heavy losses occur due to lodging of the paddy crop and depending upon the time and degree of lodging, grain yield is reduced considerably. At the Central Rice Research Institute, Cuttack (1960) the loss has been estimated to the extent of 38% when lodging occurred ten days prior to flowering and 29% when lodging occurred at the flowering stage in a lodging variety, BAM. 9 while in a non-lodging variety, A. C. 1951, the loss was 77% when lodging occurred 20 days before flowering, but the damage was reduced to 2·2% when the crop lodged 20 days after flowering. Ramiah and Mudaliar (1934) have reported the inheritance of lodging and non-lodging to be monogenic with lodging as dominant over non-lodging. Work is in progress in the Paddy Section to evolve rice varieties by combining the non-lodging character existing in certain varieties with the high yield of the local strains. However, it was observed that the lodging of the crop could be prevented to some extent by giving mechanical support to the plants by ridging, propping or earthing up the plants. At Cuttack, (1960) ridging was found to increase the yield by about 12% in the lodging variety BAM. 9 preventing the crop from lodging while in the non-lodging variety A. C. (1951) the yield was increased by 18%. Subbiah Pillai (1955) has reported that ridging the rice crop is useful in preventing lodging and it increased the yield of paddy by 8%. In this paper, the results of trials on ridging of paddy conducted at the Paddy Breeding Station, Coimbatore are reported.

Materials and Methods: This experiment with three different spacings was conducted for three years from 1954—'55. The treatments are as follows:

1. Planting in lines with spacing 6″×6″ and ridged along the rows.
2. do. 9″×4″ do.
3. do. 12″×4″ do.
4. do. 6″×6″ with non-ridging.
5. do. 9″×4″ do.
6. do. 12″×4″ do.

All the treatments received uniform manuring with 5000 lb. green leaf and 150 lb. super-phosphate per acre as basal dressing and 150 lb. ammonium sulphate as top dressing one month after planting. The paddy strain used was Co. 25 which is considered fairly non-lodging. Planting was done in lines to facilitate

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ridging and ridges were formed by removing the soil from the interspace between the rows of plants and placing it around and between the plants along the rows. First ridging was done one month after planting immediately after the application of ammonium sulphate. The ridges were thereafter rectified thrice during the crop growth at intervals of 15 days. The yield of grain and straw was recorded in addition to taking counts of ancillary characters like number of tillers per plant, height of plant, length of earhead and number of grain and chaff per earhead.

Results: In all the three years, the yield differences of grain and straw between the treatments did not attain the level of significance. However, the trend of the results showed that the ridged plots with different spacings recorded more grain and straw yields than the corresponding unridged plots. The percentage of increase in the three years ranged from 1·3 to 15·9 in the case of grain yield while it was 0·2 to 17·0 in the case of straw yield. The observation showed that the crop in the ridged plots was non-lodging compared to that in the unridged plots.

The grain yield data were analysed for 'ridging' vs. 'no-ridging', spacing and their interaction. The results of 1954—'55 showed that ridging recorded only 1·03% increased yield over no ridging and none of the main effects and interaction was significant. During 1955—'56 also there was no significant difference for the levels of spacing and no advantage was obtained by ridging either, as the yield was the same for ridged and non-ridged plots. In 1956—'57, the yield data showed that ridging was significantly superior to no-ridging and it recorded 10·04% more yield than no-ridging while there was no definite preference to a particular spacing. The results of three years are presented in Tables I (a) and (b).

The combined analysis of the yield data of all the three years showed that only 'spacing' and 'spacing' × 'ridging' were significant. The significance of this interaction however, is not much meaningful since ridging has not come off significantly. The results showed that ridged plots recorded 3·74% more yield than unridged plots. Among the three different spacings, spacing 12"×4" recorded the maximum yield followed by 9"×4" and 6"×6". From the interaction it is revealed that the ridged plots yielded 4·27%, 2·11% and 4·60% more than the corresponding unridged plots. Among the ridged plots, the plot with 12"×4" spacing recorded the highest yield followed by 9"×4" and 6"×6". The results are presented in Tables II (a), (b) and (c).

Measurements of height and number of tillers per plant were recorded before harvest while length of earhead and number of grains and chaff per earhead were recorded after harvest. The statistical analysis of the number of tillers showed that the differences were significant in all the three years. In 1954—'55, 12"×4" spacing with no-ridging recorded the maximum number of tillers per plant while during 1955—'56 and 1956—'57, ridged plot with 12"×4" spacing recorded the maximum.

TABLE I (a)

Summary of results for ridging vs no-ridging (grain yield)

Treatments	1954—'55			1955—'56			1956—'57		
	Acre yield in lb.	Percentage on no ridging	Percentage on general mean	Acre yield in pounds	Percentage on no ridging	Percentage on general mean	Acre yield in pounds	Percentage on no ridging	Percentage on general mean
Ridging	3711	101·03	100·51	2775	100·0	100·0	3530	110·04	104·78
No ridging	3673	100·00	99·49	2775	100·0	100·0	3208	100·00	95·22
General mean	3692	100·52	100·00	2775	100·0	100·0	3369	105·02	100·00
Standard error	71·55	1·95	1 94	60·10	2·17	2·17	86·04	2·68	2·55
'F' test	Not satisfied			Not satisfied			Satisfied		
Critical difference	...	...	...	...	...	...	253·0	7·88	7·51
Conclusion	Nil			Nil			Ridging>No ridging		

TABLE I (b)

Summary of results for spacing (Grain yield)

Treatments	1954—'55		1955—'56		1956—'57	
	Acre yield in pounds	Percentage on general mean	Acre yield in pounds	Percentage on general mean	Acre yield in pounds	Percentage on general mean
6″ × 6″	3741	101·33	2680	96·58	3269	97·33
9″ × 4″	3706	100·38	2748	99·03	3429	101·78
12″ × 4″	3629	98·07	2897	104·39	3409	101·19
General mean	3692	100 00	2775	100·0	3369	100·0
Standard error	87·68	2·38	58·48	2·65	104·3	3·10
'F' test	Not satisfied		Not satisfied		Not satisfied	

TABLE II (a)

Summary of results of combined analysis for ridging vs No-ridging (1954—'55, 1955—'56 and 1956—'57)

Particulars	Ridging	No ridging	General mean	Standard error	'F' test
Acre yield in pounds ...	3339	3219	3279	40·17	Not satisfied
Percentage on no-ridging ...	103·74	100·0	101·86	1·25	
Percentage on general mean ...	101·83	98·17	100·00	1·23	

TABLE II (b

Summary of results for spacing

Particulars	6″ × 6″	9″ × 4″	12″ × 4″	General mean	Standard error	'F' test	Critical difference (P=0·05)
Acre yield in pounds	3230	3291	3312	3279	49·21	Satisfied	143·2
Percentage on general mean	98·50	100·45	101·00	100·0	1·50	Satisfied	4·37

Conclusion: 12″ × 4″ > 9″ × 4″ > 6″ × 6″.

TABLE II (c)

Summary of results for interaction

Particulars	6″×6″	9″×4″	12″× 4″	6″×6″	9″×4″	12″× 4″	General mean	Standard error	'F' test	Critical difference (p=0·05)
	(Ridging)			(No-ridging)						
Acre yield in pounds	3300	3329	3387	3160	3260	3236	3279	69·50	Satisfied	202·7
Percentage on general mean	100·64	101·53	103·29	96·37	99·42	98·69	100·0	2·12	do.	6·18

Conclusion: $\overline{3\ 2\ 1\ 5\ 6\ 4}$

The differences in the height of plants among the different treatments were significant only during 1956—'57 and ridged plots with 12″ × 4″ had the tallest plants followed by the corresponding unridged plot.

The length of earhead, number of grains and chaff per earhead were recorded only in 1956—'57. The statistical analysis of these characters showed no significant differences between the different treatments. However, the trend showed that the earheads from the ridged plots were longer than those from the corresponding unridged plots. The number of grains per earhead also was more in the ridged plots than the unridged plots. Among the ridged plots, the plot with 12″ × 4″ spacing produced the longest earheads with the maximum number of grains per earhead. The number of chaffy grain per earhead was the lowest in the ridged plot with 12″ × 4″ spacing than in the corresponding unridged plot. These findings reveal that the factors such as number of tillers per plant, length of earhead and number of grains per earhead have contributed to the increase in grain yield in the ridged plots.

The economics have shown that the cost of ridging by human labour works out to Rs. 50/- per acre while the saving in weeding charges is Rs. 15/- and therefore, the net extra expenditure in ridging the crop works out to Rs. 35/- per acre. This does not compensate the small increase in yield obtained from the ridged plots. However, the ridging if carried out with a suitable mechanical device, the cost of ridging should be very small.

Discussion: As indicated already the results of the experiment reveal that there is no significant advantage in ridging considering the main effects except that the lodging of the crop was prevented. Among the spacings adopted 12" × 4" indicates definite superiority over 6" × 6" and 9" × 4", evidently due to the plants in that treatment having larger feeding area than in the other two spacings. Although much emphasis could not be placed between differences amongst interaction means due to the non-significance of ridging effects, there seems to be a definite advantage in ridging with 12" × 4" spacing. The operation of ridging has slightly increased the height and number of tillers of the plants as well as length of earheads and number of grains per earhead.

Summary: The experiment conducted to find out the effect of ridging on the yield of rice crop revealed that though ridged plots yielded more grain than the corresponding unridged plots, the difference was not statistically significant. Though the interaction between 'spacing' × 'ridging' was significant, much importance could not be given to the differences amongst interaction means as the ridging effects were not significant. But ridging with 12" × 4" spacing had a definite advantage over others. Other ancillary attributes such as height and number of productive tillers per plant, length of earheads and number of grains per earhead also showed slight increases in most cases. However, the results showed that the ridging has only slight effect on the yield though it prevented lodging. It was also observed that ridging the crop by human labour increases the cost of cultivation without much increase in yield.

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