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Effect of Some Agronomic Factors on the Yield of a Few *Japonica* × *Indica* Rice Cultures

by

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Introduction: A study of response of rice plants to cultural treatments like time of planting under different fertiliser levels is for many reasons a very important problem. With the object of combining fertiliser responsiveness and stiff straw characteristic of the *japonicas*, *indica* × *japonica* hybridization projects were undertaken as early as 1952 and as a result of intensive study of a large number of *indica* × *japonica* hybrids and their derivatives in the succeeding years, a few cultures were found promising. These promising cultures were fixed up for detailed study with different dates of planting and fertiliser levels. The present studies were undertaken at Paddy Breeding Station, Coimbatore with a view to find out differential responses of a few *indica* × *japonica* rice cultures to agronomic factors namely time of planting and different levels of fertilisers as recommended by the Rice Committee of the Indian Council of Agricultural Research.

Material and Methods: Five *indica* × *japonica* rice cultures were tested against the strain ASD11 under two levels of fertiliser doses and three dates of planting in a complex manurial cum date of planting trial with the following treatments.

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Varieties (Six)

Culture 30385 ADT 12 × (Gimbozu × ADT 12)	(V1)
Culture 30491 (Norin 8 × GEB 24)	(V2)
Culture 30614 ADT 12 × (Rikku 132 × ADT 12)	(V3)
Culture 30663 (Gimbozu × ADT 12)	(V4)
Culture 30690 (Taichu 65 × ADT 12)	(V5)
ASD 11 standard	(V6)

Manurial doses (Two)

30 lb N per acre + 30 lb P ₂ O ₅ per acre	(M1)
60 lb N per acre + 40 lb P ₂ O ₅ per acre	(M2)

Dates of transplanting (Three)

Early (Early September to middle of September)	(D1)
Normal (Late September to early October)	(D2)
Late (Early October to middle of October)	(D3)

The design adopted was a split plot with four replications. Planting dates and manurial levels were kept as main plot treatments and varieties as subplot treatments. The net subplot size was 9½' × 7'. The plots received green leaf at 5,000 lb per acre uniformly as basal dose. P₂O₅ was applied as per schedule in the form of super phosphate as basal dose. N was applied in the form of ammonium sulphate one half at the time of planting and the other one month after planting. A spacing of 6" × 6" was adopted and two seedlings per hill were planted. The trial was conducted for three consecutive years from 1963-64. During 1963-64, culture 30362 was used and it was replaced by culture 30385 in the next two years. The grain and straw yields were recorded. In addition, other characters like duration of flowering, height of plant, number of ear bearing tillers per clump *etc.*, were also recorded. The grain and straw yields obtained in respect of different treatments were analysed statistically.

Results and Discussion: The mean grain yields of 2524, 2434 and 2084 kg/ha recorded under different dates of planting namely D1, D2 and D3 respectively indicated that grain yield in late planted crop was significantly less than early and normal planted crops. Similar results were also obtained by Gurchavan Singh and Jarnail, (1962 and 1963). The mean straw yield of 5714 kg/ha recorded in D1, was considerably less than those of yields of 6034 and 6125 kg/ha recorded in D2 and D3 respectively. During 1964-65 and 1965-66 the grain yields under M1 and M2 level of manuring did not differ significantly whereas in 1963-64, the grain yield of 2028 kg/ha recorded under M1 was significantly more than 1679 kg/ha recorded under M2. The overall response of the cultures to M2 level was not exhibited due to the fact that two cultures 30491 and 30690 were found affected with blast disease under M2 level. The

mean straw yield of 6272 kg/ha recorded in M2 was significantly high to that of 5644 kg/ha recorded in M1.

Planting dates and manurial levels: The grain and straw yields recorded are furnished in Table 1 below:

TABLE 1. *Grain and Straw Yields under Different Dates and Manurial Levels ((kg/ha)*

Year	GRAIN						STRAW						C.D. (P=0.05)	
	MANURIAL LEVELS						MANURIAL LEVELS							
	M1		M2		C.D. (P=0.05)		M1		M2		C.D. (P=0.05)			
	D1	D2	D3	D1	D2	D3		D1	D2	D3	D1	D2	D3	
1963-64	2623	2608	1976	2599	1962	1473	72.48	5245	5376	5633	5848	5568	5656	NS
1964-65	3075	3211	2695	3272	3363	2655	49.84	4759	5272	5703	5299	5373	6546	469.51
1965-66	2881	2677	2676	2639	2723	2492	NS	5901	6584	6217	7232	7935	6994	456.29
Mean	2860	2832	2449	2837	2693	2213		5302	5777	5851	6126	6292	6399	

** Significant at 1% level

NS: Not significant

In 1963-64, the grain yield obtained under M1 at early and normal plantings was on par with grain yield obtained under M2 at early planting. Late planted crop under M1 gave significantly higher yield than M2 in 1963-64 and they were found to be on par in 1964-65. It indicated that for improving yield under late planted conditions, heavy fertiliser doses should be applied. Similar results have been reported by Sahu and Lanka (1966). With respect to straw yield, late and normal planted crops with high fertiliser doses gave significantly higher yields.

Varieties: The grain yields recorded by the cultures and standard are furnished in Table 2 below:

TABLE 2. *Grain yields of the different varieties (kg/ha)*

Year	Cultures						C. D. (P=0.05)	Conclusion
	V1	V2	V3	V4	V5	V6		
1963-64	2064	1274	2027	2020	1656	1992	224.63**	V1 V3 V4 V6 V5 V2
1964-65	2430	2351	2334	2386	2399	3304	172.34**	V6 V1 V5 V4 V2 V3
1965-66	2420	2357	2539	2625	2457	3623	118.07**	V6 V4 V3 V5 V1 V2
Mean	2305	1994	2300	2344	2171	2973		

** Significant at 1% level

The standard ASD 11 (V6) out yielded all other cultures in 1964-65 and on par with three others in 1963-64. The cultures differed among themselves at 1% level in their yielding capacity in all the three years. In straw yield also, V6 gave significantly higher yield than other cultures in all the three years.

Dates of planting × varieties: Significant interaction between dates of planting and varieties was obtained in all the three years.

All the varieties responded differently under different dates of planting in different years. *Chakravarthi et al* (1936) also obtained significant differences in yield in rice among different dates of planting. Thus optimum time of planting for a variety has to be assessed for increased rice production. The presence of significant interaction at 1% level between different varieties and dates of sowing in respect of straw yields was also observed.

Varieties and fertilizer levels: The interaction between these two factors was found to be present during 1965-66 only in respect of grain and during 1963-64 and 1965-66 in respect of straw.

There was no significant difference on the yield among the two fertiliser doses in respect of grain in the varieties studied. But the varieties recorded significantly different yields under M1 and M2 indicating thereby the existence of different yielding potentials in the different rice varieties under different levels of manuring. The standard ASD11 recorded significantly higher yields in M1 and M2 followed by 30614 which again gave significantly higher yield than other cultures.

Date of planting × manurial levels × varieties: The second order interaction between these three factors was not exhibited in all the three years both in respect of grain and straw.

Other characters: The other characters like flowering duration of cultures, plant height and number of ear bearing tillers produced under different manurial levels and dates of planting were also studied. All cultures were found to be taller in M2 over M1. There were no differences in flowering duration amongst the different levels of manuring. Except in ASD11, there were no difference in height between early and normal plantings. Late planting retarded the growth of the cultures 30385, 30491, 30663, 30690 and ASD11. Early and late planting did not influence the flowering duration of the cultures whereas the normal planting induced the crop to flower earlier.

Summary and Conclusions: Differential response of a few promising *Indica × Japonica* rice cultures to different dates of planting and different levels of manuring was studied for three years. The following conclusions were arrived at.

Early and normal plantings were found to be good. Planting rice seedlings beyond early October was found to reduce the yield significantly. Normal and late planted crop gave more straw than early planted crop. There was no significant increase in grain yield between the two manurial doses. As regards straw, significant increase in high fertiliser level was observed. Interaction between planting time and fertiliser levels was observed. Heavy fertiliser doses are essential to late planted crop in order to get more yield. The *indica* \times *japonica* rice cultures differed significantly in their yield capacity. None of the cultures out yielded the standard, ASD 11 in grain as well as straw production. The higher order of interaction between date of planting, manurial levels and varieties was absent in grain as well as straw production.

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