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Panicle Studies in *Indica* and *Japonica* Rice Varieties

by

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Introduction: The formation of earhead marks the shift from vegetative to reproductive phase and the stored food materials is apportioned between its constituents namely number of grains, number of chaff, grain weight and panicle length. Study of these characters in rice crop helps the breeders in the evolution of strains having high yield potential. Ramiah (1937) has stated that the number of grains found in an earhead is a varietal character and the arrangements of spikelets also vary between varieties. Tin U (1936) observed variation in panicle characters within a variety and grain weight in the same panicle. Ramiah and Parthasarathy (1933) have found that the lower portions of the earheads bear a high proportion of empty grains. Richharia *et al* (1963) emphasised the importance of panicle length and density of grains in the selection of high yielding varieties. Hence a study of earhead

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character with respect to its length, number of grains and chaff present and their weight in rice is important as these characters contribute to high yield in a strain.

Materials and Methods: Ten rice varieties, two belonging to *japonica* group and eight to *indica* group were selected for the trial. The varieties included in the *japonica* group were Gimbozu and Rikku 132 and in the *indica* group were CO 29, ADT 20, CO 32, CO 30, CO 14, ADT 25, CH 42 and CH 62. They belonged to different maturity groups. They were grown in homogenous plots in size 1.2 m × 6.0 m in singles adopting 15 cm × 15 cm spacing during 1965 *Kharif* season. The transplanted field received 5614 kg of green leaf and 168 kg of superphosphate per hectare as basal dose. Ammonium sulphate at 168 kg/ha was applied in two equal doses, one half applied at the time of planting and the other half top dressed one month after planting. Ten plants in each variety were fixed at random 20 days after flowering. One panicle in each plant was earmarked and removed on the 35th day of flower initiation to assure uniform maturity. All the panicles were dried uniformly for 3 days of 8 hours each under the sun. The earhead length was then measured and then divided equally into three portions namely top, middle and bottom as suggested by Tin U (1936). The number of grains and chaff present in each portion of the panicle in all the varieties were recorded. The grain weight in each portion was also recorded separately. The data thus collected were subjected to statistical analysis. Correlation studies between earlength and other characters were also carried out.

Results and Discussion: The results obtained with respect to grain weight, grain and chaff number in each portion of the varieties are discussed.

Grain weight: The mean grain weight recorded in bottom (T1), middle (T2) and top (T3) portions in each variety are furnished in Table.

The grain weight in each portion was analysed statistically. Highly significant differences existed in grain yields in the three different portions of the panicles in rice. The grain weight in the middle portion (T2) was significantly higher than in the other portions in all the *indicas* except CO 30. In *japonicas* however there was no difference in grain weight in the top and middle portions of the panicle indicating thereby that grain weight in the panicles was more uniformly distributed in the *japonicas* than in the *indicas*. It was also observed that the yield per panicle was significantly less in *japonicas* than in *indicas* confirming the observations made by Palaniswamy and Purushothaman (1964).

Grain number: The grain number in each portion was analysed statistically after transforming the data into log transformation. The mean grain number observed in each portion is furnished in Table.

TABLE

Portion Varieties	Weight of grain in each portion in different varieties				C.D. P: 0.05	Conclu- sion	Grain number in each portion in different varieties				Chaff number in each portion in different varieties					
	T1	T2	T3	SE			T1	T2	T3	Sig. or not	Conclu- sion	T1	T2	T3	Sig. or not	Conclu- sion
CO 29	0.2240	1.1328	0.7204	0.0629	0.1868**	T2T1T3	10.8	47.3	31.1	**	T2T3T1	7.6	4.3	1.0	**	T1T2T3
ADT 20	0.1374	0.6956	0.5297	0.0319	0.0948**	T2T1T3	8.8	44.5	32.7	**	T2T3T1	3.5	5.2	3.1	NS	—
CO 32	0.2288	1.3585	1.0695	0.0554	0.1646**	T2T3T1	13.8	71.1	56.4	**	T2T3T1	12.8	18.3	6.9	**	T2T1T3
CO 30	0.1198	0.9540	0.9944	0.0667	0.1981**	T3T2T1	6.8	52.8	55.1	**	T3T2T1	6.6	23.1	8.1	**	T2T3T1
CO 14	0.2362	1.1946	0.6930	0.0305	0.0916**	T2T3T1	16.2	63.7	35.7	**	T2T3T1	12.0	15.9	4.4	**	T2T1T3
ADT 25	0.3843	1.5386	0.9588	0.0391	0.1160**	T2T3T1	26.7	90.0	56.2	**	T2T3T1	8.2	12.4	6.3	**	T2T1T3
CH 42	0.1347	0.8539	0.7293	0.0455	0.1300**	T2T3T1	5.8	33.4	30.2	**	T2T3T1	4.4	7.6	4.7	NS	—
CH 62	0.1849	0.9307	0.7837	0.0400	0.1187**	T2T3T1	8.1	39.2	31.9	**	T2T3T1	5.1	12.9	4.0	**	T2T1T3
Gimbozu	0.1143	0.4395	0.5099	0.0283	0.0840**	T3T2T1	5.0	15.0	15.6	**	T2T3T1	11.9	25.1	10.8	**	T2T3T1
Rikku 132	0.1573	0.4119	0.4172	0.0260	0.0772**	T3T2T1	5.3	18.0	17.5	**	T2T3T1	0.6	1.7	1.6	NS	—

** Significant at 1% level. NS: Not significant.

The difference between grain number in the three different portions of the panicles in rice was significant at 1% level corroborating the findings of Tin U (1936). The grain number in the middle and top portions was same in ADT 20, CO 32, CO 30, CH 42 and CH 62 and the grain number in the middle portion was significantly more than the top portions as in the case of grain weight, in CO 29, CO 14 and ADT 25. In *japonicas* no difference in grain number in the top and middle portions of the panicle was observed indicating thereby the presence of uniformity in grain packing. It was also observed that the grain number in the *japonicas* on T1, T2 and T3 portions of the panicles was significantly less than the grain number in T1, T2 and T3 portions in the *indicas* respectively. The above findings lead us to conclude that *japonicas* belong to "panicle number" type of rice varieties and *indicas* to "panicle weight" of rice varieties according to the classification made by Baba in 1956 as quoted by Tanaka *et al* (1964). The reason for higher yields in *japonicas* might be due to the fact that they produce more number of panicles.

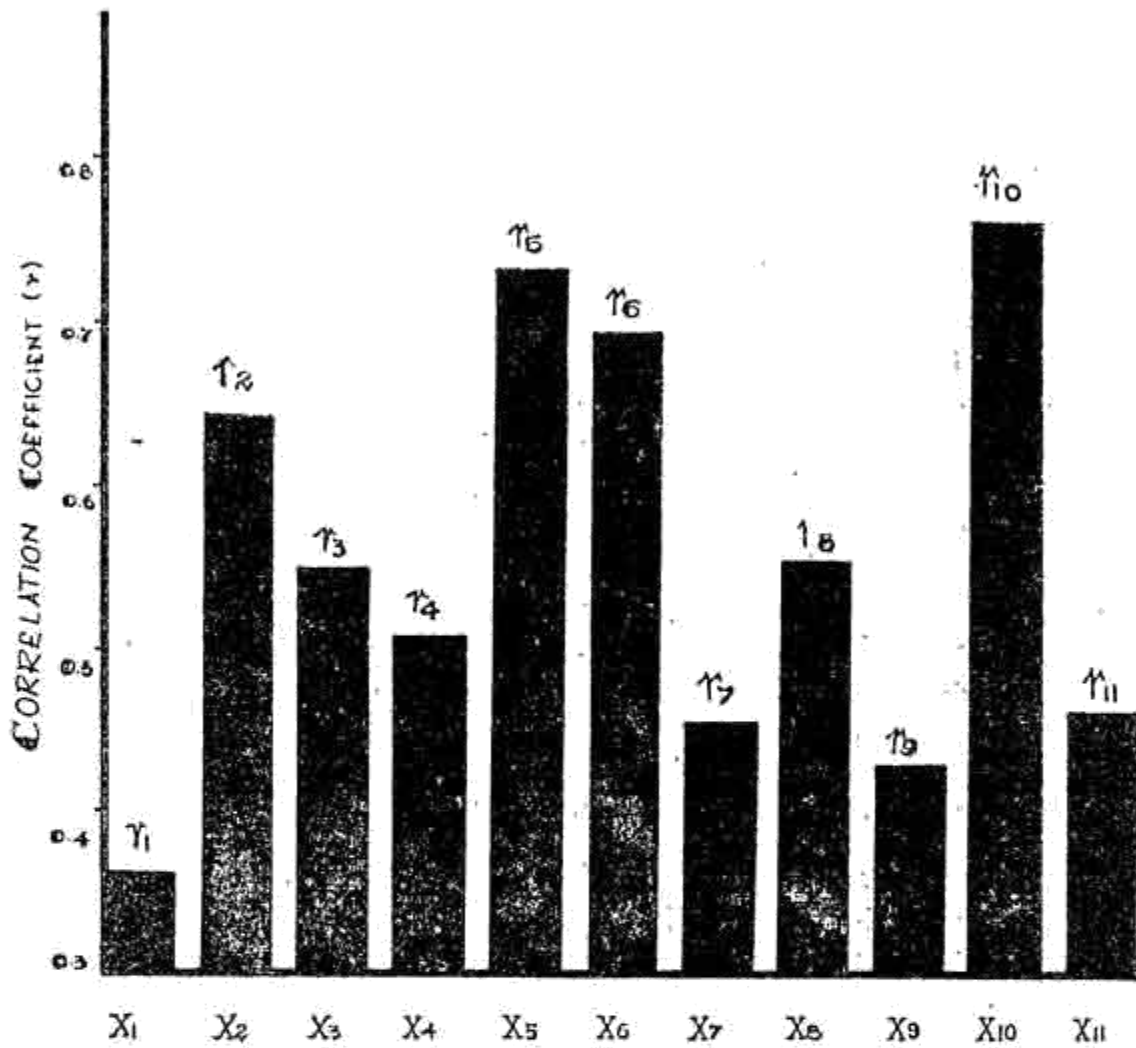
Chaff number: The data on chaff number were analysed as in the case of grain number. The mean chaff number recorded in each portion in the varieties is given in Table.

It is seen from table that the chaff number was less in the top portion than in middle and bottom portions of the panicles.

Correlation studies: The relationship between panicle length and other characters like grain weight, grain number and number of chaff in each portion of the panicle in all the varieties taken together was studied by finding their correlation coefficients. Correlation studies revealed that the panicle length was significantly correlated with all other characters under study (*vide graph*). The number of grains per panicle in the middle portion was significantly correlated with the panicle length in the *indicas* as well as in *japonicas* but similar results were not obtained in case of panicle length and grain weight indicating that their relationship was of a varietal trait.

Conclusion: The following conclusions were drawn from the study: (1) The grain weight in the three portions of the panicles in the rice differed significantly. The contribution of the grain weight in the middle portion towards yield was more than the grain weight in other portions in the *indicas*, (2) The differences in grain weight in the different parts of the panicles were not markedly seen in the *japonicas*. (3) Number of grains was more in the *indica* varieties than the *japonica* varieties. The *indicas* may therefore be classified under "Panicle weight" type and *Japonicas* as "Panicle number" type. (4) The study on the distribution of chaff in the panicle indicated that middle portion contained more chaff and top portion less. (5) Correlation studies between panicle

Simple Correlation Coefficients
Between Ear Length and Other Characters



r ₁	Ear length and weight of grain in Bottom portion	(X ₁)
r ₂	" " " Middle portion	(X ₂)
r ₃	" " " Top portion	(X ₃)
r ₄	" number of grains in Bottom portion	(X ₄)
r ₅	" " " Middle portion	(X ₅)
r ₆	" " " Top portion	(X ₆)
r ₇	" " chaff in Bottom portion	(X ₇)
r ₈	" " " Middle portion	(X ₈)
r ₉	" " " Top portion	(X ₉)
r ₁₀	" total number of grains	(X ₁₀)
r ₁₁	" total number of chaff	(X ₁₁)

length and other characters revealed the presence of significant correlation between them. Grain number in the middle portion and panicle length were significantly correlated with each other both in *indicas* and *japonicas*. Hence more weightage should be given to the middle portion of the panicle in plant selection and estimation of crop yield. The precise density of panicle could be obtained by taking unit area samples from the middle portion.

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