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INDIVIDUAL RANKING METHOD OF SIMULTANEOUS SELECTION IN RAINFED RICE (*ORYZA SATIVA* L.)

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ABSTRACT

The study revealed that 100-grain weight can be successfully utilized to identify higher yielding genotypes during early generation selection in rainfed rice. Simultaneous selection for grains/panicle, 100-grain weight and grain yield/plant can lead to identification of high yielding genotypes in F_2 generation.

Key words: Individual ranking, yield components, rice.

In plant breeding programmes normally modifications are desired in several traits in a particular genotype. The theory of selection indices as proposed [1–3] for making simultaneous selection on the basis of several traits is seldom used in plant breeding experiments, especially in segregating populations where large number of genotypes are to be handled. Therefore, an attempt has been made in the present experiment to develop an alternate procedure for multitrait selection in F_2 generation utilizing directly character means of four yield contributing traits in all possible combinations. Each character was given equal economic weight.

MATERIALS AND METHODS

The F_2 populations involving four parents suitable for rainfed situation, namely, Whitegora x Whitebagari and KR 5-142 x FH 207 were grown in 16-row plots of 8 m length at the spacing of 20 x 15 cm between and within the rows, respectively. Single seedlings per hill were transplanted from 27-day-old nursery. Observations were recorded on all the plants for panicle bearing tillers/plant (X_1), grains/panicle (X_2), 100-grain weight (X_3), and grain yield/plant (X_4). All the individual plants were then ranked for each character to make selection on the basis of single characters as well as their all possible combinations (Table

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1). For selection on the basis of single characters, higher mean values were considered while for selection based on two or more components simultaneously, superior average rankings were considered for different characters under selection in a particular selection criterion at 10% selection intensity. These selected materials were, thus, grown in F_3 generation in randomized complete block design with two replications. The plot size for each entry in each replication was 2 x 0.60 m. Data recorded on ten random plants were subjected to statistical analysis. The expected and realized selection responses were computed [4] to compare different selection criteria.

RESULTS AND DISCUSSION

The significant treatment variance for all the four characters indicated the presence of a wide range of variation in the selected materials.

Different selection criteria, their expected and realized genetic advance in each criterion are presented in Table 1.

The results of the present investigation show that selection based on 100-grain weight was as efficient as multiple characters. The study also suggested that there was no concurrence between the predicted and realized selection responses. The values of predicted responses were generally higher than the realized ones with few exceptions in both crosses.

A perusal of data (Table 1) revealed that among single characters used for selection, 100-grain weight was the most reliable criterion suitable for rainfed situation. The significance of grain size has also been emphasized in wheat improvement [5]. Among the selection criteria based on multiple

Table 1. Selection criteria, expected and realized genetic advance in yield in two rice crosses

Selection criterion	White Gora x White Bagari		KR 5-142 x FH 207	
	expected GA	realized response	expected GA	realized response
X_1	21.7	0.2	34.2	-2.8
X_2	22.7	17.3	27.3	22.7
X_3	57.8	31.0	18.3	30.5
X_4	29.7	17.8	32.6	26.1
X_1X_2	36.5	23.6	7.8	11.8
X_1X_4	26.8	23.3	33.9	19.0
X_1X_3	38.5	11.3	65.8	0.2
X_2X_3	25.4	15.3	36.9	5.8
X_2X_4	20.4	23.5	31.0	19.5
X_3X_4	22.1	21.3	32.0	21.1
$X_1X_2X_3$	28.6	6.8	29.0	12.3
$X_1X_2X_4$	27.8	23.2	32.3	21.0
$X_1X_3X_4$	38.1	29.7	31.0	28.8
$X_2X_3X_4$	19.0	32.5	26.6	29.1
$X_1X_2X_3X_4$	44.5	25.0	29.6	24.1
Unselection	47.5	7.9	40.1	-6.2

X_1—productive tillers/plant; X_2—grains/panicle; X_3—100-grain wt., and X_4—yield/plant.

characters, the realized responses for grain yield were highest in the populations developed on the basis of simultaneous selection for grains/panicle, 100-grain weight, and grain yield/plant in both crosses. In these cases, they even crossed the limit of predicted genetic advances. A fairly good in yield response was also realized in the population developed from simultaneous selection combining panicle bearing tillers/plant, 100-grain weight and grain yield/plant in both crosses. It was evident that selection based on panicle bearing tillers/plant alone did not contribute to the yield responses realised, but in combinations with other characters it gave better response (Table 1). This indicates the usefulness of multitrait selection over selection for yield based on single characters. Moderate values of realized responses were obtained when all the four characters were considered simultaneously. It can also be seen that the predicted response was highest in the unselected population which may be due because of higher amount of variability in this material. However, the lowest magnitude of the realized response in this population confirms the significance of selection criteria.

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