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Study on selection parameter in rice genotypes

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Abstract

Eighty four genotypes (including four checks) of rice (*Oryza sativa* L.) were evaluated for performance, variability, heritability and genetic advance for yield and yield contributing character under saline-alkaline soil conditions. The best genotypes in order of merit for higher grain yield per plant were recorded as IR59418-7B-21-3(38.38g), Swarna Sub-1(32.41), NDR-359(32.64g), IR79218-63-2-3-1(30.46), Narendra dhan-2064(29.20g), Swarna (27.03g), NDRK-50002(27.61g), Pant dhan-4(27.15g), NDRK-50007(26.53g), and TR2005-041(26.31g). The high estimates of phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) were observed for panicle bearing tillers per plant, grain yield per plant, L: B ratio and moderate estimates of PCV and GCV were recorded for Biological yield per plant, plant height, harvest index kernel length, spikelet per panicle, kernel length after cooking, kernel breadth and test weight. High value of heritability in broad sense was observed for all the characters (except spikelet fertility). The highest value was obtained for panicle bearing tillers per plant, harvest index, grain yield per plant, L:B ratio, spikelet per plant, Biological yield per plant, plant height, days to 50% flowering, kernel length after cooking, panicle length, kernel birth, test weight, kernel elongation ratio and spikelet fertility. The high genetic advance in per cent of mean were recorded for the panicle bearing tillers per plant, followed by grain yield/plant, L:B ratio, Biological yield per plant, harvest index, plant height, spikelet per panicle, kernel length after cooking, kernel length, days to 50% flowering, kernel breadth, panicle length, test weight, Kernel elongation ratio and spikelet fertility while spike fertility was expressed low magnitude of genetic advance.

Keywords: rice genotypes, phenotypic coefficient, bearing tillers per plant

Introduction

Rice is the major cereal crop of the world and staple food of more than 60 percent of Indian populations. In India rice production was carried out in approximately 44.80 million hectare cultivated land with an annual production of 104.0 million tonnes. The rice requirement of the country is estimated to be around 140-160 million tonnes by 2020. Uttar Pradesh is the second largest rice producing state of the country after West Bengal. The area under rice cultivation in the state is about 5.90 million hectare of total cultivated area. The average rice productivity of the state is about 2.80 tonnes/ha which much below to the national average. The major constraints in production are soil salinity/alkalinity, micro and secondary nutrient deficiency, imbalanced fertilizer use, depleting soil health, drought and use of old variety.

Material and methods

The material of present investigation consisted of 80 rice genotypes comprising aromatic and non-aromatic rice's along with four checks viz., Sarjoo 52, Narendra 359, Pusa Basmati 1 and CSR 30. The checks, Sarjoo 52 and Narendra 359 belonged to non-aromatic group while Pusa Basmati 1 and CSR 30 were aromatic rice was evaluated at the Crop Research Farm Dileepnagar during *kharif* season 2010 of C. S. Azad University of Agriculture & Technology, Kanpur. The list of 80 germplasm is presented in Table 1. The 80 germplasm lines along with four checks were evaluated in augmented design during *Kharif*, 2010. The experimental plot was sub-divided in to 4 blocks of 24 plots each. The four checks were allocated randomly to four plots in each block, while remaining 20 plots in a block were used for accommodating the

un replicated test genotypes. The seeds were sown on 26th June, 2010 in separate plots and 30 days (26th July, 2010) old seedlings were transplanted single seedling per hill in five row plots of 1.0 m length with 20 cm inter-row and 15 cm intra-row spacing. All the recommended cultural practices were followed to raise a good crop. The fertilizers were applied @ 120 kg nitrogen, 60 kg phosphorus and 60 kg potash per hectare through urea, DAP and murate of potash, respectively. The full dose of phosphorus and potash and half dose of nitrogen were applied as basal and rest of nitrogen was applied in two split doses as top dressing at tillering and panicle initiation stage of the crop growth.

Result and Discussion

Mean performance of genotypes

The data of mean performance of 84 genotypes (including four checks) for sixteen characters in rice is presented in table 1. Out of 84 germplasm (including four checks) collections evaluate the highest mean performance for grain yield per plant along with mean performance for some of the component traits was exhibited by IRS59418-7B-2-1-3, followed by Swarna sub-1, NDR 359, IR 79218-63-2-3-1, Narendra-2064, Swarna, NDRK 50002, Pant Dhan-4, NDRK-50007 and TR 2005-041. The above mentioned genotypes may be used as donor parents in hybridization programme for developing high yielding varieties of respective groups. The most desirable genotypes improving characters other than grain yield per plant were Nagina-22 and Narendra dhan-118 for early days to 50% flowering, PS-1460 for short stature, Swarna for panicle bearing tillers/plant, NDRK 50012 for panicle length, Pant Dhan-4 for spikelet per panicles, pokkali, NDRK-5033, and Dubraj for spikelet fertility. Similarly, most desirable lines for remaining characters were FL-478 for 1000- grain weight, NDRK 50002 for biological yield per plant, IR 59418-7B-21-B for harvest index; WAS 197-B-6-3-12 for kernel length, Narendra-1 and NDRK 5026 for kernel breadth, WAS 169-B-4-2-9 for L:B ratio.

Coefficient of variability

The data on mean value, range, coefficient of variation, heritability and genetic advance for the characters studies are presented in table 2. The high estimates of genotypic coefficient of variation (GCV) were observed for panicle bearing tillers per plant (31.43%), grain yield per plant (26.18), L:B ratio (24.19%) and moderate estimates of PCV and GCV were recorded for Biological yield per plant (19.01%), plant height (17.68%), harvest index (17.84%), kernel length after cooking (15.21%), kernel length (14.22%), and kernel breadth (12.05%), ; while low GCV were exhibited by panicle length (9.16%), and spikelet fertility (5.44%). The magnitude of PCV was found higher than the GCV for all the characters.

Heritability and genetic advance

The estimation of heritability in broad sense and genetic advance in per cent of mean were estimated and laid out in Table- 2. High value of heritability in broad sense was observed for all the characters (except spikelet fertility). (categorized according to Robinson 1966, High => 60%, Medium = 30 – 60 and low <30%). The highest value was obtained for panicle bearing tillers per plant (99.20%), harvest index (98.80%), grain yield per plant (98.60%), L:B ratio (96.70%), spikelet per plant (96.40%), Biological yield per plant (95.30%), plant height (94.30%), days to 50% flowering

(91.50%, kernel length after cooking (91.30%), panicle length (84.50%), kernel breadth (79.70%), test weight (72.50%), kernel elongation ratio (60%). Similar result were reported by Kumar *et al* (2001) [7], Roy *et al* (2001) [12], Khedikar *et al* (2003), Shukla *et al* (2004) [14]. The low value was obtained in spikelet fertility (56.80%). Genetic advance in per cent of mean for the studied characters were observed from high to low magnitude as per criterion Adopted by Johnson *et al.*, 1955 high = > 30, medium = 10 – 30 and low <10. The high genetic advance in per cent of mean were recorded for the panicle bearing tillers per plant (64.48%) followed by grain yield/plant (53.54%), L:B ratio (49.01%), Biological yield per plant (38.41%), harvest index (36.53%), plant height (35.36%), spikelet per panicle (30.76%), kernel length after cooking (29.94%), kernel length (26.84%), days to 50% flowering (24.28%), kernel breadth (22.16%), panicle length (17.35%), test weight (17.11%), Kernel elongation ratio (12.42%). Same result were reported by Nayak *et al* (2002) [9], Singh *et al* (1997) [15], Panwar *et al* (2007) [10], Yadav and Kumar (2012) [18]. While spike fertility was expressed low magnitude of genetic advance.

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