Genetic variability, character association and path analysis in rice under the humid sub-tropics of Terai zone of West Bengal

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SUMMARY

Fifty rice genotypes including four cultivars indigenous, 18 high yielding released varieties and 28 advanced breeding lines were evaluated to assess genetic variability, heritability (H^2) and genetic advance (GA). Efforts were made to unzip correlations among major agronomic characters like days to 50% flowering, plant height, number of panicles per plant, panicle length, number of filled grains per panicle, grain density, 100-grain weight and grain yield per plant. Determination of the mode of influence of individual characters on grain yield through path co-efficient was also attempted. Highly significant variations among the genotypes were observed for all the characters. Genotypic co-efficient of variability (GCV) and phenotype co-efficient of variability (PCV) for days to 50% flowering, plant height, and 100-grain weight were found to be very close to each other suggesting marginal influence of the environment in governing those characters. Moderate to high GCV with high H^2 and GA were discernible for days to 50% flowering, plant height, number of filled grains per plant, and grain yield per plant. Which indicates simple selection would be effective in genetic improvement of these characters. Plant height, panicle length, number of filled grains per panicle, grain density, and 100-grain weight bear significant association with grain yield per plant both at phenotypic and genotypic levels. Panicle length exerted maximum direct influence on grain yield per plant followed by 100-grain weight and plant height. IR 54447-B-B-B-10-2, IR 54313-106-2-3, IR 47554-3B-4-2B-1-2 and IR5996-3B-18-1 were found to be high yielding characterized with moderate number of panicles per plant and 100-seed weight.

The rice cultivars grown in the Terai zone of West Bengal is generally long duration. These varieties occupy the land for about 5-6 months which make delayed planting/sowing of next season crops, particularly potato. At the same time, these genotypes do not perform very well due to substantial variation in the microclimate and diversities in biotic and abiotic stress profiles prevailing in this zone. It demands varietal development *in situ* to evolve HYVs compatible for large-scale cultivation in North Bengal situation. It is mentionable that genetic improvement of rice grain yield through development of productive varieties bears immense importance. Selection of appropriate parents and identification of important component characters contributing substantially towards grain yield are considered to be key factors in it. The range and magnitude of phenotypic, genotypic and environmental variances and co-variances reflect the quantum of variability whereas H^2 and GA indicate exploitability of variance in individual characters. It is mentionable that importance of correlation and path analysis hardly require special emphasis in identifying major characters governing grain yield. They help in choosing

effective selection criteria, which had considerable influence grain yield and thus governs the pace of genetic improvement. Grain yield is a complex, polygenic character influenced by the environment considerably. Effective and efficient genetic modulation largely demands in depth understanding of the biological, physiological and environmental factors and the interactions thereof. Selection of superior genotypes based on *per se* yield performance may not be effective in manipulating grain yield. It is logical to select component characters for proper articulation of their influences in manifestation of maximum grain yield. Association of grain yield and its attributes thus holds great importance in selection of desirable genotypes with high yield. Knowledge on associationship among the associated characters reveals that some of them may be used as indicator of high grain yield. In reality, correlation values between yield and its component characters are equivocal due to existing relationships among the component characters. As a result direct contribution of each component character towards grain yield and the indirect effect through its association with other component character cannot be discerned entirely from correlation. Keeping all these view, the present investigation was undertaken to quantify variability in respect of a few important agronomic characters in a set of 50 rice germplasm and assessment of character association ships through correlation and path coefficient

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