Assessment of agro-morphologic performance, genetic parameters and clustering pattern of newly developed blast resistant rice lines tested in four environments

ABSTRACT

Multi-environmental yield trial is very vital in assessing newly developed rice lines for its adaptability and stability across environments especially prior to release of the newly developed variety for commercial cultivation. The growth performance and phenotypic variability of these genotypes are the combination of environment, genotype and genotype by environment (G×E) interaction factors. Thus, evaluation creates an opportunity for effective selection of superior genotypes. The objectives of this study were to evaluate the newly developed blast resistant rice lines in varied environmental conditions, precisely measure the response of the advanced lines in multiple environments and classify the genotypes into groups that could serve as varieties for commercial cultivation. Genetic materials included 18 improved blast resistant rice lines and the recipient parent MR219. The total of 19 newly developed genotypes was evaluated under four varied environments in Peninsular Malaysia. The experiments were carried out using randomized complete block design (RCBD) with three replications at each environment. Data were collected on the vegetative, yield and yield component traits. Descriptive statistics (mean performance) and analysis of variance were conducted using SAS Software version 9.4. Genotypic and phenotypic coefficients, phenotypic variance component, heritability and genetic advance were also determined. Analysis of variance revealed that all traits were significantly different for genotypes except days to maturity, number of filled grains and total number of grains. Meanwhile, all the traits differed significantly for genotype × environment (G×E) except number of tillers per hill and number of panicles per hill. Low heritability (<30%) was found for all the traits. Similarly, low genetic advance was also observed for all the traits except for number of tillers per hill and number of panicles per hill. yield per hectare had significant and positive correlation with most evaluated traits except for days to flowering, days to maturity, plant height and number of unfilled grains. Cluster analysis classified the 19 evaluated genotypes into six groups. Therefore, the six clusters/groups of genotypes were recommended as varieties for commercial cultivation in Malaysia and other rice growing regions.

Keyword: Rice genotypes; Blast resistant genotype; Genotypic coefficient of variation (GCV); Phenotypic coefficient of variation (PCV); Heritability values