Genotype by environment interaction and yield stability of soybean genotypes

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Abstrak

Soybean breeding program in Indonesia has been actively involved in improving the genetic yield potential to meet the needs of farmers in different parts of the country. The study aimed to determine the presence of soybean production mega-environments and to evaluate the yield performance and stability of 12 soybean genotypes. Soybean yield performances were evaluated in eight production centers in Indonesia during 2013 growing season. The experiment in each location was arranged in a randomized complete block design with four replications. Parameters observed included grain yield and yield components. The yield data were analyzed using GGE biplot and the yield components data were analyzed using analysis of variance. The results showed that the yield performances of soybean genotypes were highly influenced by genotype-environment interaction (GEI) effects. The yield components were significantly affected by GEI except per plant branch number. The partitioning of the G + GE sum of squares showed that PC1 and PC2 were significant components which accounted for 57.41% and 18.55% of G + GE sum of squares, respectively. Based on the GGE visual assessment, agro-ecology for soybean production in Indonesia was divided into at least three mega-environments. Genotypes 8 and 2 were the best yielding genotypes in the most discriminating environment, but adapted to specific environment, thus highly recommended for that specific location. Genotypes 9 and 10 were stable and had relatively high yield performances across environments. Those genotypes would be recommended to be proposed as new soybean varieties.