Evaluation of soybean lines and environmental stratification using the AMMI, GGE biplot, and factor analysis methods

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ABSTRACT. In the final phases of new soybean cultivar development, lines are cultivated in several locations across multiple seasons with the intention of identifying and selecting superior genotypes for quantitative traits. In this context, this study aimed to study the genotype-by-environment interaction for the trait grain yield (kg/ha), and to evaluate the adaptability and stability of early-cycle soybean genotypes using the additive main effects and multiplicative interaction (AMMI) analysis,

genotype main effects and genotype x environment interaction (GGE) biplot, and factor analysis methods. Additionally, the efficiency of these methods was compared. The experiments were carried out in five cities in the State of Mato Grosso: Alto Taquari, Lucas do Rio Verde, Sinop, Querência, and Rondonópolis, in the 2011/2012 and 2012/2013 seasons. Twenty-seven early-cycle soybean genotypes were evaluated, consisting of 22 lines developed by Universidade Federal de Uberlândia (UFU) soybean breeding program, and five controls: UFUS Carajás, MSOY 6101, MSOY 7211, UFUS Guarani, and Riqueza. Significant and complex genotype-by-environment interactions were observed. The AMMI model presented greater efficiency by retaining most of the variation in the first two main components (61.46%), followed by the GGE biplot model (57.90%), and factor analysis (54.12%). Environmental clustering among the methodologies was similar, and was composed of one environmental group from one location but from different seasons. Genotype G5 presented an elevated grain yield, and high adaptability and stability as determined by the AMMI, factor analysis, and GGE biplot methodologies.

Key words: *Glycine max*.; Genotype selections; Multivariate techniques; Grain yield

