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Evaluation of genotype environment interaction in non-transgenic soybean germplasm with differential quality

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It is necessary to develop varieties with specific characteristics that make it suitable for human consumption such as the absence of lipoxigenases and anti-nutritional factors. During breeding programs, decision making is hampered by the presence of genotype-environment interaction (GE). It has been defined as the difference between phenotypic value and the sum of the corresponding values of the genotype and environment. GE impacts in all stages of a breeding program and the way to detect and explore it is via multi-environment trials. The objective of the present work was to study GE, its nature and contribution to the variability as well as the analysis of genotypes and environments in their interaction. To achieve this, during 2013/14 and 2014/15 crop seasons we conducted performance trials of 12 soybean advanced lines with absence of lipoxigenases and anti-nutritional factors and a commercial control variety in two sites of San Luis. Combined ANOVAs were performed using mixed models to detect the presence of GE, variance components were determined using restricted maximum likelihood estimator (REML) through mixed models and interaction analysis was done using additive main effects and multiplicative interactions model (AMMI). The ANOVA detected the presence of GE in all environments combination (p -value <0.05) and the quantification of its components justified the inclusion in the analysis. Genotype 13 yield was higher in all environments and it also was stable. Meanwhile, genotype 34 present high yield in one of the evaluated sites but also high interaction and therefore low stability. The analysis of the GE allowed us to identified genotypes with differential behaviors across environments.