

Genotype-by-environment interaction in thirteen coffee cultivars (*Coffea arabica* L.) in five location of Costa Rica.

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INTRODUCTION

Multilocal trials for the evaluation of genotypes, is one of the most used in agricultural research in plant breeding programs to determinate the genotype-by-environment interaction (GEI) and make recommendation of superior cultivars (Sa'diyah & Hadi, 2016). As main goal to evaluate the adaptation of potential 13 coffee cultivars (*Coffea arabica* L.) introduced in five coffee growing regions through a genotype-by-environment interaction analysis for the identification of promising materials under different agro-environmental condition of Costa Rica.

MATERIALS / METHODS

The use of the AMMI model adjust the additive main effects for genotypes and environments through an ANOVA procedure using BLUE (best unbiased linear prediction), and then applies principal component analysis (PCA) using DVS (singular value decomposition) to the remaining residuals, after setting the main effect. In addition, GGE Biplot model by Farshadfar, Mahtabi & Jowkar (2013) to interpret interaction of the environment with genotypes, since it visualizes similarities and differences between genotypes, localities and the differential response of genotypes. Graphs were created where the productive behavior of the cultivars in different harvest and stability of cultivars with respect to the average production are visualized.

CONCLUSION / PERSPECTIVES

The application of the additive main effects and multiplicative interaction (AMMI) and site regression methods (SREG) allow determining the genetic stability of a cultivar across different locations. The Genotype x Environment Biplot Interaction graphs allow identifying the trend of cultivars in possible mega-environments (there are many factors that make up the mega-environment, among them, temperature, precipitation, relative humidity, wind speed, physical and chemical aspects from the ground, among others).

RESULTS / DISCUSSION

The AMMI graphs allow us to understand the complex genotype-by-environment interaction existing in quantitative traits such as coffee production, understanding the interaction effects, improving the selection process and adding experimental efficiency by being able to form groups of, as well as of identify environments that contribute little to the interaction of GGE Biplot Interaction Graphics are highly effective in identifying genotypes in specific environments. The results demonstrate the applicability of the methods to define mega-environments, it is important to take into account the combination of subsets of environments in a larger group (mega-environments), since this allow a to better represent target population.

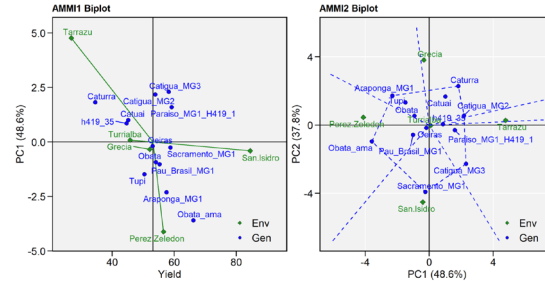


Figure 1: AMMI1 and AMMI2 graphs, five location Costa Rica.

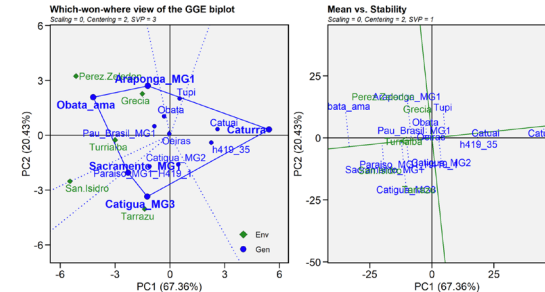


Figure 2: GGE Biplot and mean vs stability, five location Costa Rica.