Performance of African eggplant (Solanum aethiopicum) entries across environments, and hints for selection environment in northern Tanzania

Dinssa F.F¹., P. Hanson², M. Matovolwa¹, R. Mallogo¹, M. S. Mushi¹, O. Mbwambo¹ and G. P. Munuo¹

¹World Vegetable Center, Eastern and Southern Africa ²World Vegetable Center, Cotonou, Benin

Abstract

African eggplant (Solanum spp.) is a widely used fruit and leafy vegetable in Africa. The crop grows in various agro-ecological zones and most farmers grow unimproved local cultivars. In general, African eggplant breeding is in early stages although farmer interest in improved cultivars is growing. Information on Genotype (G) x Environment (E) interaction would help guide breeders in cultivar development strategies, and whether the emphasis should be placed on specific and/or wide adaptation. The objective of this study was to determine the extent of G, E, and G x E interaction (GEI), and identify major production environments for breeding programs. A total of 21 African eggplant entries were evaluated for fruit yield and horticultural traits in two locations in 2017, and five locations in 2018 targeting two agro-ecologies in northern Tanzania. Trial locations ranged in altitude from 866 masl in the Kilimanjaro region to 1235 masl in Arusha region. Location and year were considered as independent environments so entries were evaluated in seven environments. Entries were arranged in a randomized block design with three replications. Highly significant differences among entries were found for fruit yield and other traits in each environment. G, E, and GEI effects were highly significant in an Additive Main Effect and Multiplicative Interaction (AMMI) analysis. Environment explained about 34% of the sum of squares of treatments (G+E+GEI) while G and GEI accounted for 14 and 52%, respectively. The AMMI analysis partitioned the GEI sum of squares into three significant Interaction Principal Component Axis (IPCA). The G and GEI (GGE) biplot analysis clustered the seven environments into two mega-environments. The results of the study and its implication on African eggplant selection strategy will be discussed.

Keywords: AMMI analysis, genotype x environment interaction, GGE biplot, mega-environment, stability