Genotype x environment interaction and yield stability analysis of tea cultivars

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Abstract

A comprehensive understanding of Genotype X Environment interactions (G X E) and yield stability facilitate cultivar recommendation across diverse environments. The objective of the present investigation was to study G X E interaction and yield stability of tea. Fifteen TRI 4000 series tea cultivars were tested for cycle yields in a randomized complete block design with three replicates, in three agro climatic regions in Sri Lanka. A combined analysis of variance revealed significant differences between genotypes and environments where they were tested. Furthermore a substantial amount of significant G X E interaction for tea yield was detected in the tested genotypes. Five parametric stability statistics *viz* Finlay and Wilkinson regression coefficient (b), Eberhart and Russell parameters, environmental variance (S^2_i), Shukla's stability variance (σ^2_i) and Lin and Binns Superiority Index (PI) were used to study the stability of genotypes. Certain genotypes exhibited stability for some type of measures and instability for others, making it difficult to reconcile these assessments in to a unified conclusion. Hence, the level of association among the stability parameters was assessed subsequently using Spearman□s rank correltion. Cultivar mean yield was correlated significantly and positively with Superiority Index (r=0.914) whereas it was negatively correlated with environmental variance (r=0.825) indicating that these parameters could be used for simultaneous selection for yield and stability. Regression coefficient and Eberhart and Russell parameters showed positive correlation (r=0.992) indicating that any of these parameters could be used to study G X E interaction in tea. The principal components analysis was performed for the ranks of genotypes obtained from different stability parameters to assign genotypes in to groups that correspond with different stability statistics. The first two principal components (PC) accounted for 97% of the total variability enable grouping of genotypes in to four distinct classes and those groups provide useful information for identification of high yielding stable genotypes for better commercial exploitation.

Keywords: *Camellia sinensis*, L O Kuntze, G X E interaction, Stability, Yield