Abstract

Several methods were used to evaluate phenotypic stability in 20 tea (*Camellia sinensis*) genotypes, many of which are cultivated widely in East Africa. The genotypes were evaluated for annual yields at two sites over a six year period. Data obtained were used to compare methods of analysis of G × E interactions and yield stability in tea. A standard multi-factor analysis of variance test revealed that all first order interactions (genotypes × sites; genotypes × years; sites × years) as well as second order interactions (sites × genotype × years) were significant. Regression analysis was used to assess genotype response to environments. Regression coefficients (b_i) obtained ranged from 0.78 to 1.25. Deviations from regression (S^2d) were significant ($p < 0.05$) from 0.0 for all the test genotypes. Analysis for sensitivity to environment change (SE^2_i) revealed that the test genotypes differed in their level of sensitivity. The hierarchical cluster analysis method was used to assemble the test genotypes into groups with similar regression coefficients (b_i) and mean yield, which proved useful for the identification of high yielding genotypes for breeding purposes as well as for commercial exploitation. Rank correlation between yield and some stability parameters were significant. Mean yield was significantly correlated to b_i ($r = 0.80^{***}$) and SE^2_i(0.74^{***}) which is an indication that selection for increased yield in tea would change yield stability by increasing b_i and SE^2_i leading to development of genotypes that are specifically adapted to environments with optimal growing conditions. Genotypes differed in response to years and sites. As stand age increased, genotype yields generally increased though annual yield fluctuations were more pronounced in some genotypes than others. This response was not consistent across the sites for all genotypes indicating the need to test clones at multiple sites over longer periods of time.