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Genotype x environment interaction and selection for yield and related traits in soybean

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Abstract

Fifteen genotypes of soybeans (*Glycine max* L. Merr.) were grown in three locations of Ibadan, Abeokuta and Ogbomoso during the late planting season of 2001, 2002 and 2003. Data on yield and yield traits were subjected to combined analysis of variance. There were variations in the years of production as the relative performance of the genotypes with respect to all the traits were significant under the genotype x year (Gen. x yr) effect. However, days to maturity, number of pods per plant and number of branches per plant were significant under the genotype x location (Gen. x loc.), and the third order interaction effect of Gen. x loc. x yr. Branch number per plant gave negative but significant phenotypic correlation with number of seeds per pod and weight of seeds while its correlation with seed yield was positive in Ogbomoso and Abeokuta locations. Significant genotypic correlation were observed between number of seeds per pod with seed weight and seed yield for Ibadan and Ogbomoso locations though its correlation with seed weight in Ogbomoso location was negative. The significant genotypic correlation of days to maturity with pod number and branch number ensures that these traits would be successfully selected for in yield improvement of soybean for Abeokuta and Ogbomoso locations. Number of seeds per pod and days to maturity with high heritability estimates and significant genotypic correlations can be reliably selected for when soybean improvement is targeted for Ibadan and Ogbomoso specific locations.

Keywords: *Correlation; environment; genotype; heritability; locations; traits*

Introduction

Soybean is an important oil seed and grain legume, which constitutes a major dietary protein in humid and sub-humid tropics. The rapid expansion of the economy has compelled plant breeders to apply breeding methods that would result in large turnover of high yielding varieties of this crop species. Soybean can produce reasonably well under marginal conditions of climate and soil conditions where other crops cannot. As a consequence, any improvement on the efficiency in selection and identifying genotypes suitable to different environments and or locations would have great potential in terms of supplementing the protein and oil needs of humans especially in remote environments where animal protein is expensive.

Character variability and heritability estimates determine to a large extent the rate of genetic advance

(Araujo and Coulman, 2002). The knowledge of this variation in plant improvement programme enhances successful character selection and hence effective breeding procedure. Variety selection and subsequent recommendation for release are based on data from yield and agronomic characters (Saleh *et al.* 2002; Singh, 2002). The correlations and heritability estimates of the characters reveals to a great extent the reliability in genotype selection. Genetic and phenotypic correlations arise from both linkages and environment factors that have not reached equilibrium and from pleiotropy (Simmonds, 1979) and are therefore important in crop improvement.

Seed yield of soybean was largely a function of pods per plant, seeds per pod and 100-seeds weight (Oseni, 1994) and that appropriate progress in yield improvement can be made through selection for these

