

STABILITY ANALYSIS BY RANKS AND SIMULTANEOUS ESTIMATION OF YIELD AND YIELD STABILITY IN BREAD WHEAT

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ABSTRACT

Genotype x environment (GE) interactions, in particular leading to different rankings of the genotypes in variable environments, are a major challenge to plant breeders. Numerous methods of characterizing stability of genotypes across environments are available. The objectives of this investigation were to study non-parametric measures of stability based on the ranks of genotypes in different environments and simultaneous evaluation of yield and yield stability by means of Hühn's $S_i^{(1)}$, $S_i^{(2)}$, $S_i^{(3)}$, $S_i^{(6)}$, Jensen's $H_i^{(5)}$ statistics and two indices. The indices were derived from the sum of the two ranks; \bar{X}_i rank + W_i^2 rank, and \bar{r}_i + $S_i^{(2)}$ rank, respectively. The data used in estimating these statistics were obtained from the Official Winter Bread Wheat Registration Trials with 15 genotypes tested at 13 environments (year-location combinations). The $S_i^{(1)}$ and $S_i^{(2)}$ statistics selected higher yielding genotypes. The $S_i^{(3)}$ and $S_i^{(6)}$ statistics, however, appeared to give more weight to stability than did $S_i^{(1)}$ and $S_i^{(2)}$. Rank correlation coefficients indicated that low $S_i^{(3)}$, $S_i^{(6)}$, and W_i^2 were generally associated with low yield. Jensen's $H_i^{(5)}$ statistic and Index 2 (sum of mean rank (\bar{r}_i) and $S_i^{(2)}$ rank) showed a high degree of association with yield. Repeatability of stability statistics were studied by measuring rank correlations between high-yield and low-yield environments. The repeatability of Index 2 between high-yield and low-yield environments was relatively high and significant. Repeatability of the other statistics between the two groups of environments was negligible.