Effectiveness of drought tolerance indices to identify tolerant genotypes in bread wheat (Triticum aestivum L.)

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Abstract:

In order to assess efficiency of drought tolerance indices, 50 bread wheat genotypes were evaluated under three environments: normal (clay fertile soil, E1), 100% (E2), and 50% (E3) field water capacity in sandy calcareous soil. A total of 14 drought tolerance indices including grain yield/plant, grain yield/spike, 1000-kernel weight, spike length, no. of tillers, plant height, flowering time, stomata frequency, stomata width, stomata length, drought susceptibility index (DSI), stress tolerance index (STI), yield stability index (YSI), and harmonic mean (HM) were estimated. A moderate to high broad-sense heritability was obtained for 1000-kernel weight (0.47), spike length (0.38), plant height (0.54), flowering time (0.73), stomata frequency (0.59), and stomata length (0.54). Grain yield/plant was strongly positively correlated with grain yield/spike, no. of tillers, plant height, flowering time, stomata length, STI, YSI, and HM, while negatively correlated with stomata frequency and DSI in E2 and E3, respectively. Thus, highly heritable traits strongly correlated with grain yield under stress conditions especially stomata frequency and length could be used as reliable indices for selecting high-yielding genotypes tolerant to drought stress. Cluster analysis based on morpho-physiological traits suggested the group 3 genotypes in E2 as the most tolerant genotypes to be used for developing improved varieties.

Keywords:

bread wheat, cluster analysis, correlation, drought tolerance, selection indices

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