Genetic diversity of Ethiopian durum wheat landraces differing in drought stress tolerance

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Globally drought is a serious abiotic factor challenging wheat production and quality. In Ethiopia, wheat production is fully dependent on rainfall, which is unpredictable. Therefore, drought stress tolerance is an important breeding goal in Ethiopia.

In this respect, e*x-situ* conserved Ethiopian durum wheat landraces (*Triticum turgidum var. durum,* 2n = 4x = 28) were invistigated in field trials under contrasting moisture teatments (stress and non-stress), represented by two different locations, i.e. Dera for stress and Holeta for non-stress. Furthermore, landraces were tested in growth chambers under stress (20% maximum soil water capacity (SWC) starting at flowering) and control (70% SWC) treatment. Data were analysed using R. Coefficients of correlation were calculated between drought-tolerant criteria and drought indices, as well as grain yield at stressed (Ys) and non-stressed (Yns) variants.

Analysis of variance revealed significant ($p<0.001$) difference between landraces for grain yield in the two variants in field and growth chambers, indicating a huge genotypic variation. Yns was positively correlated with all other traits except days to grain filling (DGF). The correlation between Ys and traits like spike length (SL), days to heading (DH) and days to maturity (DM) showed negative values. Those traits that revealed a positive correlation with grain yield at both stressed and non-stressed conditions may contribute to select genotypes suited for both environments. PCA1 and 2 at Holeta and Dera accounted for 49% and 67% of the variation, respectively. There was a strong and negative correlation of Ys with the drought susceptibility index (DSI) and the tolerance index (TOL), indicating that landraces with higher values are susceptible to drought and are not recommended for respective growing areas.

The positive correlations of Ys and Yns with the stress tolerance index (STI), mean productivity and others, showed that these drought indices are good indicators for yield potential and drought tolerance. According to results from field experiments, genotypes DW072, DW184, DW097-1, Top-66, Werer, Megnagna, DW188, among others can be selected as promising landraces for drought prone areas.

Overall, drought significantly reduces grain yield and other traits. In the study panel, there is a huge genetic variation

for drought tolerance that could be exploited by detecting QTL for drought stress tolerance via genome wide association studies using the 90k iSelect Chip.