

Abstract

In order to evaluate the effects of water stress on grain yield, its components and some morphophysiological, phenological and biochemical traits of grain Sorghum genotypes (*Sorghum bicolor L.*), a field experiment using a split plot design was carried out in the research station of the Southern Khorassan Agriculture and natural resources research and education center in 2014-2015. The main plots include 3 water stress treatments (normal irrigation as control, halting irrigation at the stage of terminal leaf emergence and halting irrigation at the stage of 50% flowering. The sub-plots include 10 genotypes of sorghum (KGS29, MGS2, Sepideh, KGFS27, MGS5, KGFS5, KGFS17, KGFS13 and KGFS30) in 3 replications. Results showed that water stress significantly decreased grain yield and its components (1000 seed weight, number of seed per panicle). Genotypes were statistically significant differences about all traits that indicate high variability among them. The water stresses increased canopy temperature and Radiation Use Efficiency while stomatal conductance, chlorophyll index (SPAD) and Stay-green of genotypes were decreased and the maximum efficiency of photosystem II of photosynthesis remained un-changed between the treatments. Regarding the biochemical characteristics, the impact of drought in the vegetative and reproductive growth stages was different, as drought reduced the content of chlorophyll and carotenoid and increased the content of soluble sugar and free proline. Comparison of interaction between genotype and stress about free prolin concentration of leaves indicated that genotype KGFS17 in medium drought stress, had highest level and genotype MGS5 and MGS2 in normal irrigation commonly had the lowest prolin content of leaves respectively. In drought stress condition, Sugar percentage of stem (Brix), plant height, canopy temperature, prolin content and number of dry leaves at maturity stage (Stay-green) had the highest portion in determining of the diversity of genotypes in this study. In general, physiological traits could be used as good indicators in water stress investigations and provide more comprehensive information as compared with morphological traits.

Keywords: Irrigation cut off, Generative growth, Free prolin, yield, Sorghum



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Title

**Investigation of morphophysiological difference of yield and
growth in grain sorghum genotypes at drought stress
conditions in different development and growth stages**

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