

Physiological Response and Antioxidant Enzyme Activity of New Durum Wheat Varieties under Heat Stress

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Abstract

Heat stress is one of the most important environmental factors causing serious problems to durum wheat production in arid and semi-arid regions. Different biochemical and physiological parameters were determined in the leaves of new durum wheat varieties (*Triticum durum* Desf.) under heat shock stress (40°C) at the 3rd–4th leaf stage to select tolerant genotypes: antioxidant enzyme activities; ascorbate peroxidase (APX), catalase (CAT), guaiacol peroxidase (GPX), malondialdehyde (MDA) content, total chlorophyll, chlorophyll (a) and (b) content, photochemical efficiency ($F_vF_m^{-1}$) and cell membrane stability (CMS). This is the first time that this study has been carried out to test these varieties for their heat stress tolerance using antioxidant enzymes. Results show that heat stress has a significant impact on the most of the measured parameters, increasing levels of (MDA) content and enzyme activity up to 81.41% for catalase (CAT) compared to the control and decreasing the chlorophyll content and photochemical efficiency ($F_vF_m^{-1}$), reaches 40% for chlorophyll (a). The lowest level of MDA was registered in the genotype Boutaleb with $1.170 \pm 0.23 \mu\text{mol g}^{-1} \text{FM}$, whereas the highest level in catalase activity was observed in Boutaleb and Mansourah (0.011 ± 0.001) and (0.009 ± 0.002) $\mu\text{mol min}^{-1} \text{mg}^{-1}$ respectively, in comparison with the control and with the other genotypes, and the lowest level was determined in Hoggar with (0.002 ± 0.001) $\mu\text{mol min}^{-1} \text{mg}^{-1}$. The new variety Boutaleb (G5) performs better than other genotypes, and it will serve as a source of new heat-tolerant wheat lines.

Keywords:

heat stress, *Triticum durum* Desf., enzyme activity, catalase, new lines