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Impact of soil drought stress on photochemical efficiency of photosystem II and antioxidant enzyme activities of Phaseolus vulgaris cultivars

Rabiye TERZİ, Aykut SAĞLAM, Nihal KUTLU, Hatice NAR, Asım KADIOĞLU
Karadeniz Technical University, Department of Biology, Faculty of Arts and Sciences, 61080 Trabzon -
TURKEY

 [Keywords](#)
[Authors](#)



bot@tubitak.gov.tr

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Abstract: Common bean (*Phaseolus vulgaris* L.) cultivars (cvs) (Göynük 98, Karacaşehir 90, Şehirali 90, ES 855, and Yunus 90) were subjected to drought stress in order to assess the levels of drought tolerance through the analysis of growth parameters, leaf water potential (ψ_{leaf}), stomatal conductance (g_s), chlorophyll (chl) content, and lipid peroxidation. Significant differences were recorded among cultivars in most traits. Yunus 90 was identified as the most tolerant, and Karacaşehir 90 was the most sensitive. Furthermore, the changes in antioxidant enzyme activities, H_2O_2 content, and Photosystem II were investigated under drought stress, where Antioxidant enzyme activities increased while H_2O_2 contents decreased. In Yunus 90, increases in catalase (CAT) and ascorbate peroxidase (APX) activities were higher than those of the other cvs. Increase in GPX activity was higher in Karacaşehir 90 compared to Yunus 90. Drought stress reduced quantum yield of PS II photochemistry (ϕ_{PSII}) and photochemical quenching (qP) in all cultivars. The reduction was more pronounced in Karacaşehir 90. These results showed that different common bean cvs had different photochemical efficiencies and used different antioxidant enzymes in order to scavenge reactive oxygen species.

Key words: Ascorbate peroxidase, catalase, chlorophyll fluorescence kinetics, drought tolerance, *Phaseolus vulgaris*

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