PSII Photochemistry and Antioxidant Responses of a Chickpea Variety Exposed to Drought

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The effect of drought on the chickpea variety ILC 3279 was investigated at the vegetative stage. After 20 days from sowing, the plants subjected to drought stress for 3, 5 and 7 days imposed by withholding water were permitted to recover by rewatering for 2 days after 3, 5 and 7 days of drought. Shoot elongation, leaf production, fresh and dry biomass reduced while MDA and proline accumulation increased with extended duration of stress. The plants stressed for 3 days exhibited a rapid drop in their relative and absolute water contents. The quantum efficiency of PSII open centres in the dark-adapted and light-saturated state, excitation energy trapping of PSII and electron transport rate decreased significantly from the 5th day to the end of the drought treatments. Plants drought-stressed for 7 days brought about a marked increase in non-photochemical energy dissipation and a marked decline in photochemical quenching. After rewatering all chlorophyll *a* fluorescence characteristics except for F_M completely recovered and reached the control values. Under 5 and 7 days of drought, the anthocyanin content increased gradually while the total chlorophyll content of leaves declined compared to the controls. The total carotenoid content remained unchanged during the experiments. The antioxidant enzyme response to drought treatments was quite variable. The total SOD activity upregulated with increasing duration of stress. On the other hand, the total APX activity was significantly higher only on the 7th day while the total POD activity increased from the 5th day. Differences in the total GR activity of treated groups were not statistically significant compared to their controls throughout the treatments. The present results indicate that the chickpea variety ILC 3279 withstands severe drought with its upregulated protective mechanisms at the vegetative stage.

Key words: Chickpea, Drought, Photosynthetic and Antioxidative Response