

THE EFFECTS OF EXCESSIVE EXPOSURE TO COPPER IN BEAN PLANTS

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The present study aimed to identify changes in important physiological events related to Cu, malondialdehyde (MDA), nitric oxide (NO), chlorophyll *a* and chlorophyll *b* content in the antioxidative defense system in bean seedlings (*Phaseolus vulgaris* L. cv. Akman) after Cu treatment. The activity of superoxide dismutase (SOD), peroxidase (POD) and catalase (CAT) were determined. Cu excess was induced in *Phaseolus vulgaris* (cv. Akman) plants by soaking the roots in 100 µM CuSO₄ solution for 10 days. Cu content increased in roots, and nitric oxide levels increased remarkably in leaf tissue. Changes in enzyme activity and MDA were observed in root tissue. The highest accumulation of NO was observed in leaf tissue. The study included an assessment of the correlation between heavy metal accumulation in roots, leading to different manifestations of stress, and changes in chlorophyll level. Indications of oxidative stress response were detected by monitoring changes in the activity and content of some components of the antioxidative mechanism. Cu treatment increased the activity of superoxide dismutase, peroxidase and catalase in leaf tissue.

Key words: Superoxide dismutase (SOD), peroxidase (POD), catalase (CAT), nitric oxide (NO), malondialdehyde (MDA), copper, chlorophyll, bean (*Phaseolus vulgaris* L.).