

Response of *Triticum aestivum* (L.) plants grown under cadmium stress to polyamines pretreatments

Mostafa M. Rady¹, Mohamed A. Seif El-Yazal¹, Hanan A.A. Taie², Safia M.A. Ahmed¹

¹Botany Department, Faculty of Agriculture, Fayoum University, 63514 Fayoum, Egypt

²Plant Biochemistry Department, National Research Centre, 33 Bohouth Street, Dokki, , Cairo, Egypt

ABSTRACT

The role of exogenously-applied polyamines [i.e., spermine (Spm), spermidine (Spd) and putrescine (Put)] in the improvement of cadmium (Cd^{2+}) tolerance in wheat plants, and their effects on growth, yield and its components and changes in the osmoprotectant and endogenous Cd^{2+} concentrations and the contents of some nutrients in plants grown under 2.0 mM Cd^{2+} stress were assessed. The efficiency of wheat plants to tolerate Cd^{2+} stress in terms of growth and yield characteristics was noticed to varying degrees with the three applied polyamines. The reasonable growth of Cd^{2+} -stressed seedlings and consequently acceptable grain yield was correlated with the improvements in the concentrations of osmoprotectants and tissue health in terms of relative water content (RWC) and membrane stability index (MSI), and reductions in electrolyte leakage (EL) and tissue Cd^{2+} concentration. Results show that, seed soaking in 0.25 mM Spm, 0.50 mM Spd or 1.0 mM Put generated significant better growth and yield characteristics, MSI, RWC, leaf photosynthetic pigment and osmoprotectant concentrations, and nutrient contents than seed soaking with water under 2.0 mM Cd^{2+} stress. In contrast, the Cd^{2+} concentration and EL were significantly reduced. However, the Cd^{2+} -free control was the best treatment when compared to the all other stressed treatments. Seed soaking in 1.0 mM Put was the

best, generating wheat plants that most tolerant to Cd^{2+} stress than those generated from the other two polyamines. Therefore, this study recommend to use the 1.0 mM Put, as seed soaking treatment for wheat to grow well under Cd^{2+} stress.

Key words: Wheat, Cadmium, Polyamines, Osmoprotectants, Growth, Yield