

Response of wheat growth and productivity to exogenous polyamines under lead stress

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

Polyamines [i.e., spermine (Spm), spermidine (Spd) and putrescine (Put)] antagonistic effects on stress imposed by 2.0 mM lead (Pb^{2+}) on growth, yield and its components and changes in the osmoprotectant and endogenous Pb^{2+} concentrations, the contents of some nutrients and tissue health in wheat plants were evaluated. Under the three applied polyamines (PAs) applications, the efficiency of wheat plants to tolerate Pb^{2+} stress in terms of growth and yield characteristics was noticed to varying degrees. The enhancements in osmoprotectant concentrations and plant health [in terms of relative water content (RWC) and membrane stability index (MSI)], and reductions in electrolyte leakage (EL) and plant Pb^{2+} concentration were correlated with the reasonable growth of Pb^{2+} -stressed plants and their grain yield. Results point out that, better growth and yield characteristics, MSI, RWC, leaf photosynthetic pigment and osmoprotectant concentrations, and nutrient contents were obtained with seed soaking in 0.25 mM Spm, 0.50 mM Spd or 1.0 mM Put than those generated with seed soaking in water under 2.0 mM Pb^{2+} stress. In contrast, EL and the concentration of endogenous Pb^{2+} were significantly reduced. However, the Pb^{2+} -free control was positively exceeded the all stressed treatments. Among all tested PAs, Put at the level of 1.0 mM showed the best

results, therefore, it is recommended, as seed soaking, for wheat to grow well under Pb²⁺ stress.

Key words: *Triticum aestivum*, Lead, Polyamines, Osmoprotectants, Growth, Yield

es. 3(10), 1121–1126.