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Effect of Nanoparticles on Germination and Seedling Tolerance Traits of Armenian Genotypes of Wheat (*Triticum Aestivum* L.) Under Salinity Stress

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ABSTRACT

Salinity is a major abiotic stress limiting wheat (*Triticum aestivum* L.) seed germination and productivity in arid and semi-arid regions, including some agricultural zones of Armenia. Using nanoparticles (NPs) offers a promising solution to increase plant resistance to salt stress. The aim of the study is to investigate the effect of zinc oxide nanoparticles and silicon dioxide nanoparticles (50 mg/L) on the germination of Armenian wheat genotypes (Vars, Rima) under different level of salt stress and to evaluate their early growth and physiological responses. For the assessment of wheat genotype salt tolerance, we have used the following indices: *germination rate* (GR), *germination energy* (GE) and *germination stress indices*, *seedling vigor index* (SVI), *mean daily germination* (MDG), *mean germination time* (MGT). Stress tolerance was assessed with indices such as *Promptness Index* (PI), *Root Length Stress Tolerance Index* (RLSI), *Germination Stress Tolerance Index* (GSTI), *Physiological Index of Plant Height* (PHSI), *Shoot Fresh Weight Stress Tolerance Index* (RFSI), *Root Dry Weight Stress Tolerance Index* (RDSI), *Shoot Dry Weight Stress Tolerance Index* (SDSI), *Germination Reduction* (GR), *Shoot Length Reduction* (SLR), *Root Length Reduction* (RLR) and *Stress Susceptibility Index* (SSI). Various physiological traits of plants such as shoot and root lengths, fresh and dry biomass, and biochemical traits like concentrations of sodium, chloride and potassium ions were also analyzed to evaluate the influence of zinc oxide nanoparticles and silicon dioxide NPs under different levels of salinity. The findings suggest that NPs have a positive impact on seed germination and on salt tolerance in wheat seedling. According to these results the use of NPs can mitigate salinity stress and support wheat growth in saline soils.

Keywords: salt stress, Armenian genotypes of wheat, zinc oxide NPs, silicon dioxide NPs, seed germination, salt tolerance

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