

**Abstract**

World is facing challenges to produce 70% more food for the increasing population but the abiotic stresses are causing reduction in crop productivity. Human encouraged salinity and heavy metals stress are amongst these major abiotic stresses. Heavy metal contamination has become a mainstay in scientific research because of its detrimental effects on plants and animals. Salinity and Cd^{2+} in particular causes significant changes in plants like, increase in oxidative stress, decrease in enzymatic activity, lessened plant growth and its development. Therefore, silicon nanoparticles (Si-NPs) and silicon nanoparticles doped biochar (BC) were used to mitigate the effect of Na/Cd stress in soil. This experiment was designed to study the mitigating effects of BC and Si-NPs on the growth and physiology of radish grown in artificial metal spiked soil. 8 treatments were applied on the seeds of turnip namely silicon nanoparticles, silicon nanoparticles doped biochar and combine Sodium chloride and Cadmium stress and effects of these treatments were tested using different parameters. Na/Cd stress reduced plant growth and its biochemical parameters (APX, CAT, phenolics, proteins) along with chlorophyll a/b reduction however, the combined treatment of NaCl+Cd+Si-NPs+Biochar showed significant results on these biochemical parameters. Similarly, Na/Cd stress minimized the concentration of macronutrients which increases the plant nutritional value and also help in enzymes activation. While the application of Si-NPs and BC treatment showed positive impacts on concentration of macronutrients (K, Fe, Mg and Na). The sole and combined application of different treatments enhanced plant performance under non-stressed and Na/Cd stressed conditions.