



## Abstract:

Heavy metal contamination has become a mainstay in scientific research because of its detrimental effects on plants and animals. Cd 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 (SiNP's) and silicon nanoparticles doped biochar (SiNP'sBC) were used to mitigate the effect of Cd stress in soil. This experiment was designed to study the mitigating effects of SiNP'sBC and SiNP's on the growth and physiology of radish grown in artificial metal spiked soil. 8 treatments were applied on the seeds of radish namely silicon nanoparticles, silicon nanoparticles doped biochar and cadmium stress and effects of these treatments were tested using different parameters. Cd stress reduced plant growth (root and shoot) and its biochemical parameters (APX, CAT, total phenolics, total proteins) along with chlorophyll a/b reduction however, the combined treatment of Cd+SiNP's+SiNP'sBC showed significant results on these biochemical parameters. Similarly, Cd stress minimized the concentration of macronutrients like Ca and K root to shoot, which increases the plant nutritional value and also help in enzymes activation. While the application of Si NP's and SiNP'sBC treatment showed positive impacts on concentration of macronutrients (Ca, K, Mg and Na). It was observed that DTPA-extractable soil concentration of Cd decreased by the application of biochar. The sole and combined application of different treatments enhanced plant performance under non-stressed and Cd stressed conditions.