

The effect of silicon nanoparticles on the seed germination and growth of Moso bamboo (*Phyllostachys pubescens*) under cadmium stress.

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Abstract

Cadmium (Cd) as one non-essential element is known to be one of the most toxic metals in the environment, which can influence on seeds and limit plant growth and germination. For this purpose In the current study, the impact of silicon nanoparticles on germination characters and key growth parameters were investigated in moso bamboo seedling under cadmium. Thus Seeds were germinated in the concentration of 100µm Cd alone and as well in a combination of two levels of SiO₂NPs (100 and 200 µm) in compare with control treatments. Which have conducted in Petri dishes under laboratory conditions in three replications. To evaluate the effect of Nanoparticles on cadmium, germination characterize including germination percentage(GP), germination rate(GR), germination Index(GI), Mean Germination Time(MGT), and growth parameters such as length of shoot and root as well plant biomass such as shoot and root dry weight and vigor indexes were measured. The results indicated that Si NPs significantly improved, relative to the control, germination characterizes (GP, GR, and GI) under Cd toxicity. Although lead to enhancing mean Germination Time (MGT). In another hand, the results indicated that plant growth indexes and plant biomass and vigor index of Moso bamboo improved under a combination of 100 µm Cd with Silicon nanoparticles. We concluded that SiO₂NPs could ameliorate cadmium toxic in seed germination, which this enhancement in germination parameters led to improving seedling growth in Moso bamboo under Cd toxicity. In another hand, we suggest that 200µmol SiO₂NPs has the most impact on seed germination and plant growth of Moso bamboo under 100 µm cadmium stress. Thus, the use of Si NPs may help in controlling Cd in the stage of seed germination and seedling growth in Moso bamboo (*Phyllostachys pubescens*)

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Speaker Publications:

1. "Heavy Metal Stress and Some Mechanisms of Plant Defense Response"; The Scientific World Journal./ 2008 / Volume 2015, 756120,2015.
2. "Impact of Nutritional and Environmental Factors on Inflammation, Oxidative Stress, and the Microbiome View this Special Issue"; BioMed Research International / Volume 2018, 8492898
3. "Growth Responses and Photosynthetic Indices of Bamboo Plant (*Indocalamus latifolius*) under Heavy Metal Stress"; The Scientific World Journal, Volume 2018, 1219364
4. "The role of salicylic acid and gibberellin signaling in plant responses to abiotic stress with an emphasis on heavy metals", Plant Signaling & Behavior, Volume 15, 2020 - Issue 7, 1777372

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Biography: