Advancements in Environmental Biotechnology

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CHAPTER 3

BIOCHEMICAL RESPONSE OF THE NITROGEN FIXING CYANOBACTERIUM *NOSTOCMUSCORUM* TO METALLIC NANOPARTICLES: AN APPROACH TOWARDS ENVIRONMENTAL SUSTAINABILITY

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Abstract

Indiscriminate use of nanomaterials and excessive heavy metal discharge into the environment calls for the better understanding of their toxicological effects on the ecosystem. Though these particles have various vital applications in multiple sectors, there is an increasing concern related to the potential hazards of these nanoparticles to the human health and environment. In recent years, many studies are focusing on the toxicity of different nanoparticles including silver nanoparticles. However, the exact mechanisms, as well as the toxicity contribution from its ionic and nano-form, is still very much unknown. For analyzing their toxic effects cyanobacteria is emerging as our model system.Cyanobacteria is known to accumulate heavy metals and act as a sink for many aquatic contaminants. Effect of metallic nanoparticles stress on enzymatic and non-enzymatic antioxidants is also studied as a biomarker for stress. This chapter aims to present and discuss the various applications and (eco) toxicity of silver nanoparticles to understand the use of these nanoparticles in a safe way. A significant conclusion includes the need for a risk-benefit analysis for all applications and eventually restrictions of the uses where a clear benefit cannot be demonstrated. Thus, the understanding of the responses incurred in cyanobacteria during heavy metal and metal nanoparticle stress can be very well used to evaluate their toxic responses in the environment.

Keywords: *Nanoparticle; Cyanobacteria; Biomarker; Sustainability.*