

Nanopriming Potential of Metal Nanoparticles against Internally Seed Borne Pathogen *Ustilago tritici*

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Abstract : Metal nanoparticles have the potential to revolutionize the agriculture owing to sizzling interdisciplinary nano-technological application domain. Numerous patents and products incorporating engineered nanoparticles (NPs) entered into agro-applications with the collective goal to promote proficiency as well as sustainability with lower input and generating meager waste than conventional products and approaches. Loose smut of wheat caused by *Ustilago segetum tritici* is an internally seed-borne pathogen. It is dormant in the seed unless the seed germinates and its symptoms are expressed at the reproductive stage of the plant only. Various seed treatment agents are recommended for this disease but due to the inappropriate methods of seed treatments used by farmers, each and every seed may not get treated, and the infected seeds escape the fungicidal action. The antimicrobial potential and small size of nanoparticles made them the material of choice as they could enter each seed and restrict the pathogen inside the seed due to the availability of more number of nanoparticles per unit volume of the nanoformulations. Nanoparticles of diverse nature known for their in vitro antimicrobial activity viz. ZnO, MgO, CuS and AgNPs were synthesized, surface modified and characterized by traditional methods. They were applied on infected wheat seeds which were then grown in pot conditions, and their mycelium was tracked in the shoot and leaf region of the seedlings by microscopic staining techniques. Mixed responses of inhibition of this internal mycelium were observed. The time and method of application concluded to be critical for application, which was optimised in the present work. The results implicated that there should be field trails to get final fate of these pot trails up to commercial level. The success of their field trials could be interpreted as a revolution to replace high dose organic fungicides of high residue behaviour.

Keywords : metal nanoparticles, nanopriming, seed borne pathogen, *Ustilago segetum tritici*

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