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Antimicrobial potential of Trichoderma-fused silver nanoparticles against pathogenic bacterial and fungal strains- Abhishek Mathur - Environmental Biotech & Engineering Co

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The genus Trichoderma and its metabolites are meant for antimicrobial activity against the microbial strain and thus it's considered to be natural antimicrobial agents. Silver is additionally referred to as an antimicrobial agent and is employed in several antimicrobials and medications. within the present investigation, the nanoparticles were prepared both of Trichoderma and Ag+ separately and further fused Trichoderma and Ag+ nanoparticles were also prepared. Trichoderma harzianum secretes secondary metabolites which act as a capping and reducer. The biosynthesized silver nanoparticles (AgNps) were characterized by UV-Vis spectroscopy and transmission microscopy (TEM). UV-Vis spectra of silver and Trichoderma nanoparticles showed absorption spectra at 450 nm and 430 nm, respectively while fused nanoparticles showed absorption spectra at 415 nm like the surface Plasmon resonance of silver nanoparticles. the dimensions and morphology of the fused nanoparticles decided by TEM, which shows the formation of spherical nanoparticles within the size range of 8-24 nm. The Trichoderma-fused silver nanoparticles were assessed against pathogenic microorganisms viz., Staphylococcus aureus, Acinetobacter baumannii, Bacillus cereus, Escherichia coli, typhoid bacillus (PTCC 1609), Pseudomonas aeruginosa, Aspergillus niger and Candida albicans . The antimicrobial effect of silver nanoparticles against the pathogenic microorganisms was varied. Yet typhoid bacillus followed by Pseudomonas aeruginosa, were more sensitive and Acinetobacter baumannii was relatively less sensitive. additionally, the antimicrobial effect of Trichoderma-fused silver nanoparticles depends not only on the property (such as formation of free radical) but also trusted their shapes and sizes.

The anamorphic fungal genus Trichoderma (Hypocreales, Ascomycota) is cosmopolitan in soils and on decaying wood and other sorts of plant organic matter. Trichoderma species were among the foremost cosmopolitan and customary fungi in nature and exist in climates starting from the tundra to the tropics. this might be due to their diverse metabolic capability and aggressively competitive nature. Rapid growth rates in culture and therefore the production of various spores(conidia) that were mostly varying reminder green characterize fungi during this genus. A growing number of teleomorphs in Hypocrea are linked to commonly occurring Trichoderma anamorphs, but most strains of Trichoderma were classified as imperfect fungi because they need not been related to a sexual state. Interestingly, Hypocrea/Trichoderma spp. were even ready to induce systemic resistance, which is characterized by the occurrence of disease control within the plant at a site distant from the situation of Hypocrea/Trichoderma. Trichoderma species are described as biological control agents against fungal and bacterial pathogens. They stimulate the production of low-molecular-weight compounds that have antimicrobial activity like e.g. phytoalexins which were normally produced by plants in response to an attack by pathogens. A large were a of interest in biocontrol is that the reduction of plant diseases caused by soil-borne and foliar plant pathogenic fungi. Roughly 70% of all the main crop diseases were caused by fungi, or the fungus-like Oomycota. Notorious examples were species belonging to the genera Rhizoctonia, Botrytis, Phytophthora, Pythium, Sclerotinia and F sarium. Most of the formulations of commercially available biocontrol products against plant pathogenic fungi contain the bacteria Pseudomonas and Bacillus or fungi belonging to the genus Hypocrea/Trichoderma. Hypocrea/Trichoderma spp. produces a good range of enzymes for degradation of homo- and hetero-polysaccharides, which were designative for his or her broad spectrum of substrate utilization and their ubiquitous occurrence in nature. Furthermore they possess a good spectrum of proteases which help them within the defense of their habitats and therefore the competition for nutrients with other microorganisms. Biological synthesis of metal nanoparticles involving the utilization of microbes is straightforward, costeffective and eco-friendly technique. These nano-particles were effective, bio-compatible and bio-degradable.