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Synthesis and Characterization of Organic and Inorganic Nanoconjugates as Effective Antifungal Agent against Phytopathogenic Fungi

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Abstract—*The antifungal potential of ZnO, MgO, AgNPs and their conjugates with 1,2,4-triazoles analogues were evaluated against phytopathogenic fungi (Fusarium moniliform, Fusarium fujikuroi, Drechslera oryzae) of rice. The nanoparticles were synthesized by the methods reported in the literature. Series of 5,6-disubstituted-1,2,4-triazolopyrimidines and1,2,4-trizaolosulfonamide were synthesized using Microwave Oriented Reaction Enhancement methodology. On the basis of antifungal evaluation, most potent 1,2,4-triazoles analogues(TS4, PM5 and PM9) were further conjugated with various nanoparticles. All the synthesized and conjugated analogues were characterized by Transmission Electron Microscopy (TEM), UV-Visible Spectroscopy (UV-Vis) and Dynamic light scattering (DLS). All the compounds were evaluated for its fungicidal potential by poisoned food technique.The data were recorded in terms of percentage radial growth inhibition (at different test concentrations) from which ED_{50} values were calculated using polo software programme. Among the nanoparticles, Ag came out to be as better than ZnO and MgO against all phytopathogenic fungi. Maximum inhibition was observed against Fusarium moniliform. Ag-PM5 nanoconjugates showed excellent antifungal potential followed by the MgO-PM5 and ZnO-PM5 with ED_{50} of 7, 11 and 15 ppm. The conjugation revealed improvement in their antifungal potential in comparison to test compounds as well as nanoparticles alone.However due to toxicity of Ag and ZnO, it was concluded that the use of MgO nanoconjugates as antifungal agent can pave the way for safe food and environment.*

Keywords*: Antifungal activity, Fusarium moniliform, Microscopy, Nanoparticles.*