

Synthesis and Antifungal Evaluation of Silver Sulfide Decorated Chitosan Nanoparticles

*Garima Sethi, Anjali Sidhu¹ and Anju Bala²

¹Department of Chemistry, Punjab Agricultural University, Ludhiana

²Department of Plant Breeding and Genetics, Punjab Agricultural University, Ludhiana

E-mail: *garima.sethi267@gmail.com

Abstract—Nanoparticles have great potential in the fields of biomedicine, building materials, environmental protection, antibacterial and antifungal agents. Silver sulfide nanoparticles (Ag_2S NPs) have been synthesized for their applications in various fields including photoconductors, photovoltaic cells, solar selective coatings and infrared detectors, but have less reporting as bio-compatible material or in in vitro or in vivo applications. Silver sulfide has been hypothesized as less toxic form in nature as metal nanoparticles of soft nature get their ultimate fate by sulfidation as their natural pathway of detoxification. In this study we synthesized silver sulfide nanoforms by approaching sonochemical method. Various sulfide ion sources and silver nitrate were used as initial components for the synthesis of silver sulfide nanoparticles (Ag_2S NPs). All the synthesized samples were tested for their preliminary in vitro antifungal activity against *Ustilago hordei*, *Fusarium moniliform* and *Bipolaris oryzae* and Ag_2S NPs synthesized from sodium sulfide showed better antifungal potential in comparison to commercially used standard fungicides. This Ag_2S NP sample was further coated with chitosan to get silver sulfide decorated chitosan nanoparticles to evaluate the potential of this conjugate in comparison to silver nanoparticles (Ag NPs).

Keywords: Silver sulfide, nanoform, sonochemical irradiation, pathogenic fungi, chitosan.