Biogenesis and Optimisation of Silver Nanoparticles by the Endophytic Fungus Cladosporium sphaerospermum

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Abstract:

The present study is dealing with an ecofriendly and green biological route for extracellular biosynthesis of silver nanoparticles (AgNPs) using the endophytic fungus Cladosporium sphaerospermum F16 (KU199685). The biosynthesised AgNPs were characterised using ultraviolet-visible spectroscopy (UV-vis), transmission electron microscopy (TEM), dynamic light scattering (DLS), energy-dispersive X-ray analysis (EDX) and X-ray diffraction (XRD). The results showed the formation of stable, well-dispersed and spherical crystalline AgNPs with an average size 15.1 ± 1.0 nm and zeta potential of about −41.2 ± 0.5 mV. Optimisation of AgNPs synthesis prepared under different reaction conditions such as: pH, temperature, silver nitrate concentration and time of synthesis reaction to increase the AgNPs production. Meanwhile, the optimum conditions for maximum AgNPs production were pH (7), silver nitrate (5 mM) and incubation time (5-7 days). Interestingly, the fungal exo-metabolites were found to reduce silver ions into AgNPs within 10 min after heating the reaction mixture (50-70 °C) as indicated by the developed reddish brown color compared to 30 min under room temperature.

Keywords:

Silver nanoparticles, biosynthesis, optimisation, Cladosporium sphaerospermum.

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