



ABSTRACT

Green synthesis of silver nanoparticles (AgNPs) is a safe, cost-effective, rapid, eco-friendly and reliable process. Leaves of 8 different plants (*Azadirachta indica*, *Bombax ceiba*, *Citrus limon*, *Eucalyptus hybrid*, *Ficus caria*, *Mangifera indica*, *Psidium guajava* and *Syzygium cumini*) and juices of *Citrus limon* and *Capppsicum annum* were used for the synthesis of AgNPs. Among all the samples tested, three plants *B. ceiba* (2.738), *P. guajava* (2.803) and *S. cumini* (2.757) gave maximum absorption at 450 nm. Thus, were selected for further parametric optimization. The biosynthesis of AgNPs by *B. ceiba* was optimized when 1 mL of leaf extract (pH 5.5) was treated with 8 mM AgNO₃ in 1:9 ratio and incubated at 30°C for 24 hrs in dark. Optimum conditions for AgNPs synthesized by *P. guajava* were 2:9 ratio of extract volume (pH 5.5) to AgNO₃ (5 mM) at 30°C for 24 hrs. *S. cumini* synthesized AgNPs were obtained by treating 3 mL of extract (pH 4.5) with 9 mL of 5 mM AgNO₃ at 26°C for 24 hrs. The characterization of synthesized AgNPs was done by performing X-ray diffraction (XRD), Fourier transformed infrared spectroscopy (FTIR) and Scanning electron microscope (SEM). The crystalline nature of AgNPs was confirmed by XRD. Spherical shaped AgNPs with size ranged 66-99 nm of *B. ceiba*, 73-96 nm of *P. guajava* and 60-99 nm of *S. cumini* AgNPs were obtained by SEM. FTIR peaks for different functional groups for *B. ceiba* were recorded at 1719 cm⁻¹ (C=C), 1029 cm⁻¹ (C-O), 2857 cm⁻¹ (CH) and 3570 cm⁻¹ (O-H) and for *S. cumini* at 1476 cm⁻¹ (amide), 3546 cm⁻¹ (O-H) and 1646 cm⁻¹ (C=O). Whereas, FTIR peaks for *P. guajava* were obtained at 1464 cm⁻¹(-CH₃), 1646 cm⁻¹ (C=C) and 1742 cm⁻¹ (-COOR). In the end, anti-bacterial activity of plants mediated biosynthesized silver nanoparticles was tested against three different bacterial strains (*Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*) by disc diffusion method. It was observed that AgNPs from *B. ceiba* gave maximum resistance against *E. coli* whereas, AgNPs from *P. guajava* and *S. cumini* showed maximum resistance against *P. aeruginosa*.