ABSTRACT

The synthesis of noble metal nanoparticles is an expanding research area due to the potential applications for the development of novel technologies. We report intra and extracellular synthesis from the selected plants *Cassia auriculata*, *Cassia fistula*, *Cassia occidentalis*, *Cassia sophera* and *Cassia tora* belongs to Family: *Ceasalpiniaceae*. *Cassia auriculata* was selected for rapid and convenient method to reductively prepare gold and silver nanoparticles from various concentrations of chloroauric chloride and silver nitrate respectively. Aqueous leaf extract from the plant (*Cassia auriculata*) were used as reducing agent for the synthesis of noble metals nanoparticles. Increased concentration of leaf extract was found to decrease the size of AgNPs and increased particle size in AuNPs. Rapid biosynthesis of AuNPs and AgNPs obtained under microwave within seconds and by photo irradiation within minutes. Biosynthesized AuNPs and AgNPs were characterized and confirmed by UV-Vis spectroscopy, X-ray diffraction (XRD), Infra-red spectroscopy (FT-IR), Transmission electron microscopy (TEM). The phytochemical analysis revealed phenols, flavonoids, tannins, cardiac glycosides and saponins. Two low molecular weight proteins of 15kD and 42kD bound with AuNPs and AgNPs were identified by SDS-PAGE. Preparation of bio-nanocomposites includes immobilization of AuNPs and AgNPs on biopolymer film where leaf extract has been used as reducing agent, further films were characterized by UV-Vis, FT-IR, TEM and Thermo gravimetric analysis (TGA). The Gold and Silver bio-nanocomposites exhibited antibacterial activity against *E. coli* and *B. subtilis*. Applications of biosynthesized noble metals nanoparticles studied were antimicrobial assay, cytotoxicity and genotoxicity on cancer cell lines and seed germination and
seedling growth in *Pennisetum glaucum*. The AgNPs showed considerable antimicrobial activity against *Escherichia coli*, *Bacillus subtilis*, *Aspergillus niger* and *Aspergillus flavus*. Fungi were most susceptible to silver nanoparticles followed by bacteria. Anticancer activity and genotoxicity of synthesized AuNPs and AgNPs were analyzed against A549, LNCap-FGC, MDA-MB human carcinoma cells lines, least concentration of AgNPs were more toxic and AuNPs reveals dose dependent response. Gold nanoparticles have enhanced the seed germination and seedlings growth in *Pennisetum glaucum*, whereas silver nanoparticles enhanced the germination and decreased the seedling growth.