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Potential of using leaf extract of *Annona glabra* as a novel, green source for the synthesis of silver nanoparticles

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This study aims at investigating the potential of using the leaf extract of *Annona glabra* for the green synthesis of silver nanoparticles (AgNPs) and optimization of process parameters to obtain nanoparticles with narrow size range. *A. glabra* is a very troublesome invasive species, where it grows in estuaries and stifles mangroves. Phytochemicals present in plant extracts are capable of acting as reducing and stabilizing agents during the synthesis of nanoparticles. The active ingredient responsible for the reduction of Ag⁺ ions and stabilization of silver nanoparticles varies depending on the plant extract used. Aqueous leaf extracts of *A. glabra* were prepared by heating chopped leaves (20.0 g) with water (100.0 mL) at different temperatures (60 – 100 °C) for 1 hour. AgNPs were synthesized by incubating silver nitrate (20.00 mL), as the precursor, with the plant extract, as the reducing agent. The mixture was incubated for 3 hours under slow agitation and dark conditions. Amount of plant extract (2 – 10 mL), concentration of silver nitrate (1 – 10 mM) and incubation time (0.5 - 24 hours) were changed to find the optimum conditions for the synthesis of AgNPs. Formation of silver nanoparticles were confirmed by the color change of the mixture from faint yellow to light brown and the surface plasmon resonance band around 420 nm. The size of the nanoparticles formed were measured by dynamic light scattering (DLS). The surface plasmon resonance peak maxima was detected at 417 nm for the biofabricated AgNPs using *A. glabra* leaf extract. With the increase of plant extract, size of AgNPs increased from 206 – 314 nm. Particle size increased from 183 – 224 nm with increase of silver nitrate concentration. The plant extract made at 100 °C produced the smallest nanoparticles. The size of AgNPs were polydispersed in a range of 10 – 190 nm displaying a narrower size range which falls within the general nanoscale. The optimum formulation was obtained at 100 °C extraction temperature for the leaf extract, 2 mL of plant extract, 1 mM silver nitrate and 7 hours of incubation. Leaf extract of *A. glabra* can be used for the synthesis of AgNPs and only low concentrations of leaf extract of *A. glabra* are needed to synthesize silver nanoparticles.

Keywords: Green synthesis, Silver nanoparticles, *Annona glabra*