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Antibacterial Properties of Medicinal Plants-Mediated Silver Nanoparticles

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ABSTRACT

Medicinal plants such as *Stevia rebaudiana* and *Moringa oleifera* are considered as a perspective platform for nanoparticles (NPs) synthesis since their bioactive compounds both accelerate NPs synthesis efficiency and stabilize them afterward. Nanoparticles of transition metals can be applied as a possible antimicrobial option in various areas, including medicine, biotechnology, and agriculture. Both *S. rebaudiana* and *M. oleifera* possess notable medicinal, antioxidant, and anti-inflammatory properties. In this work, the antibacterial activities of silver nanoparticles (AgNPs) synthesized using hydroponically grown *S. rebaudiana* and *M. oleifera* are compared. AgNPs synthesized using *M. oleifera* are predominantly spherical, while those synthesized using *S. rebaudiana* exhibit an irregular shape. Biosynthesized AgNPs were tested against *Escherichia coli* BW25113, *Enterococcus hirae* ATCC9790, and *Staphylococcus aureus* MDC5233. Both AgNPs suppressed the number of colony-forming units (CFU). Both AgNPs used have shown a concentration-dependent inhibitory effect on the bacterial specific growth rate. At concentration of 25 μg/mL *M. oleifera*-mediated AgNPs the specific growth rate of *E. hirae* and *S. aureus* was reduced by 45% and 30%, respectively, whereas for *S. rebaudiana*-derived AgNPs the bacterial growth decreased by 60%. Gram-negative *E. coli* has demonstrated more susceptibility to AgNPs. Thus, *S. rebaudiana* and *M. oleifera* can be used as effective platform for NPs synthesis. *S. rebaudiana*-mediated AgNPs have shown more significant antimicrobial activity compared to *M. oleifera*-derived NPs. This may be attributed to differences in the phytocompounds involved in NP synthesis, as well as to variations in the shape and size of the synthesized nanoparticles.

Keywords: silver nanoparticles, medicinal plants, green synthesis

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