

## Green Synthesis of Silver Nanoparticles using Silk-banana-peel Extract and their Antimicrobial Activity

VL Abeyrathne<sup>1#</sup>, UDNAE Nanayakkara<sup>1</sup>, KNMIN Kumarasinghe<sup>1</sup>,  
MMA Banu<sup>1</sup>, AY Thanushanth<sup>1</sup>, DNAW Samarakoon<sup>1</sup>, and MMK Peiris<sup>2</sup>

<sup>1</sup>KAATSU International University, Battaramulla, Sri Lanka

<sup>2</sup>Faculty of Allied Health Sciences Sciences, General Sir John Kotelawala Defence University,  
Ratmalana, Sri Lanka

#venuabeyarathne@gmail.com

### Abstract

The peels of bananas act as an ideal reducing and stabilizing agent due to the presence of secondary metabolites and biopolymers. The green synthesis of silver nanoparticles (AgNPs) using common agriculture waste biomass is a cost-effective, non-toxic and environmentally friendly approach. The aim of this study was to investigate the in-vitro antimicrobial activity of the biosynthesized AgNPs from Silk-banana (Kolikuttu) peel. Aqueous extract of banana peel was obtained by wet maceration. AgNPs were synthesized by adding 1mM AgNO<sub>3</sub> into fresh banana peel extract (BPE) while stirring at 60°C and characterized by Scanning Electron Microscopy (SEM) and UV-Visible Spectroscopy. BPE mediated conversion of silver ions into AgNPs was observed within 30 minutes as indicated by the appearance of reddish-brown colour in the solution. The UV-Visible spectrum of AgNPs revealed a characteristic Surface Plasmon Resonance (SPR) peak at 480 nm and SEM showed spherical-shaped nanoparticles. The antimicrobial activity of AgNPs was investigated using the well-diffusion method on *Pseudomonas aeruginosa* (ATCC 27853) and *Staphylococcus aureus* (ATCC 25923) at 37°C in duplicates. Results were observed after incubating for 24 hours. Vancomycin (0.1 mg/ml) and gentamicin (0.1 mg/ml) were used as positive controls. Green synthesized AgNPs displayed in-vitro antimicrobial activity against *P. aeruginosa*, (12.0 mm ± 2) and *S. aureus* (8.5 mm ± 0.5). BPE itself did not show any antimicrobial activity. AgNPs having antimicrobial properties against *Pseudomonas aeruginosa* and *Staphylococcus aureus* can be synthesized successfully using agricultural waste such as silk banana peel. Further studies are required to utilize these novel AgNPs as a potential antimicrobial agent.

**Keywords:** *Banana peel extract, Silver nanoparticles, Antimicrobial activity*