

## Research Article

# Biomimetic Synthesis of Silver Nanoparticles Using Endosymbiotic Bacterium Inhabiting *Euphorbia hirta* L. and Their Bactericidal Potential

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The present investigation aims to evaluate biomimetic synthesis of silver nanoparticles using endophytic bacterium EH 419 inhabiting *Euphorbia hirta* L. The synthesized nanoparticles were initially confirmed with change in color from the reaction mixture to brown indicating the synthesis of nanoparticles. Further confirmation was achieved with the characteristic absorption peak at 440 nm using UV-Visible spectroscopy. The synthesized silver nanoparticles were subjected to biophysical characterization using hyphenated techniques. The possible role of biomolecules in mediating the synthesis was depicted with FTIR analysis. Further crystalline nature of synthesized nanoparticles was confirmed using X-ray diffraction (XRD) with prominent diffraction peaks at  $2\theta$  which can be indexed to the (111), (200), (220), and (311) reflections of face centered cubic structure (*fcc*) of metallic silver. Transmission electron microscopy (TEM) revealed morphological characteristics of synthesized silver nanoparticles to be polydisperse in nature with size ranging from 10 to 60 nm and different morphological characteristics such as spherical, oval, hexagonal, and cubic shapes. Further silver nanoparticles exhibited bactericidal activity against panel of significant pathogenic bacteria among which *Pseudomonas aeruginosa* was most sensitive compared to other pathogens. To the best of our knowledge, present study forms first report of bacterial endophyte inhabiting *Euphorbia hirta* L. in mediating synthesizing silver nanoparticles.

## 1. Introduction

A substantial increase in microbial infection owing to rapid expansion of drug resistant microbial pathogens is rudimentary due to inadequate discoveries in the field of antimicrobial agents [1–3]. Scientific literatures have highlighted the severity of drug resistant pathogens which has created alarming situation across the globe leading to the need for novel antimicrobial agents. Hence, scientific communities are

designing rational strategies in developing potent antimicrobial agents [4, 5]. In recent decades, protruding scientific interest illuminates new scientific domain nanotechnology which has demonstrated perpetual copious research in all fields of science that has influenced all forms of lives [6–8]. Interestingly, use of nanoparticles is reported to aid microbial infection by acting efficiently as antimicrobial agents [9]. Evaluation of nanoparticles as antimicrobial agents can form one of the potential alternative strategies towards combating