

## **BIOSYNTHESIS AND CHARACTERIZATION OF SILVER NANOPARTICLES USING *OCIMUM TENUIFLORUM* (TULSI) LEAF EXTRACT AND THEIR ANTIFUNGAL ACTIVITY AGAINST CROP PATHOGENS**

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### **ABSTRACT**

*Nanotechnology has emerged as a promising field for developing sustainable solutions in agriculture and medicine. Among nanomaterials, silver nanoparticles (AgNPs) have gained considerable attention due to their antimicrobial and antifungal properties. In this study, silver nanoparticles were biosynthesized using *Ocimum tenuiflorum* (Tulsi) leaf extract through an eco-friendly green synthesis approach. The plant extract acts as a natural reducing and stabilizing agent, converting silver ions ( $Ag^+$ ) from silver nitrate ( $AgNO_3$ ) into stable AgNPs. The synthesis was confirmed by a visible color change from pale yellow to reddish-brown due to surface plasmon resonance. The nanoparticles were characterized using techniques such as UV-Visible spectroscopy, X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), and transmission electron microscopy (TEM). The antifungal activity of the synthesized AgNPs was evaluated against selected crop pathogens including *Fusarium oxysporum*, *Alternaria solani*, and *Rhizoctonia solani*. The results revealed that Tulsi-mediated AgNPs significantly inhibited fungal growth, demonstrating their potential as an eco-friendly alternative to chemical fungicides in agriculture.*

**KEYWORDS:** *Green Synthesis; Silver Nanoparticles; *Ocimum Tenuiflorum*; Tulsi; Antifungal Activity; Crop Pathogens; Nanotechnology; Plant-Mediated Synthesis etc.*

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