

Green Synthesis of Silver Nanoparticles Using *Trachyspermum Ammi* (Ajwain) Leaf extract and its Catalytic, Biological Activities

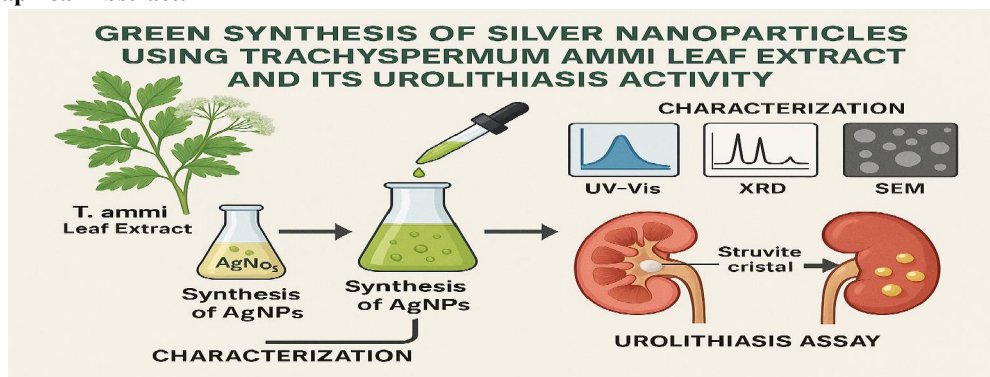
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Abstract: Nanotechnology has modernized material science, leading to the expansion of innovative solutions across multi-disciplines. The synergistic collaboration between nanoscale metals and biomolecules plays a vital role in current medicine. This study explores the microwave-assisted in situ synthesis of silver nanoparticles (AgNPs) using *Trachyspermum ammi* leaf extract and evaluates their potential applications in urolithiasis treatment, antibacterial activity, and catalysis. This study describes the eco-friendly synthesis of silver nanoparticles (AgNPs) utilizing aqueous leaf extract of *Trachyspermum ammi* (ajwain) as a reducing and stabilizing agent. A distinct brown coloration and in a UV Spectrum characteristic surface plasmon resonance (SPR) peak near 415 nm confirmed nanoparticle formation. The synthesized silver nanoparticles were analysed by XRD and SEM. The silver nanoparticles had an approximate size of 45 nm and exhibited a FCC crystalline structure. To examine their distribution on cotton fabric, a scanning electron microscope. The results indicate that the AgNP exhibits excellent antibacterial, urolithiasis & catalytic activity, making it a potential candidate for biomedical applications.

Graphical Abstract:



Keywords: AgNPs, *Trachyspermum*, Microwave, urolithiasis, catalytic, antibacterial

