

Synthesis of Silver nanoparticles by Marine brown algae *Padina commersonii*, Particle Characterization and Evaluation of their Antimicrobial Potential

By-R.Ragavi

Silver nanoparticles (AgNPs) are stable and safe for treating microbial diseases. They can be sustainably synthesized using bioactive compounds from *Padina commersonii*, a brown macroalgae found in Sri Lankan coastal beaches. This eco-friendly algae acts as a reducing, stabilizing, and capping agent in the nanoparticles synthesis process

Objectives - Synthesize AgNPs using *Padina commersonii* crude extract, & characterize and evaluate their antimicrobial activities.

Methodology

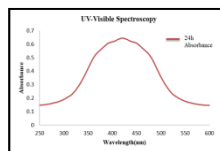


Results

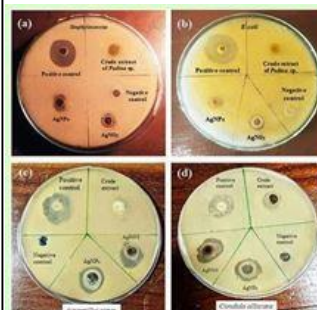
- Colour change -Pale yellow to reddish-brown within 48h

Nanoparticle Characterization:

- UV-Vis Spectroscopy (Peak at 424 nm)
- DLS -Average size: 73.19 nm
- Zeta Potential Analysis (-21.5 mV, Stable)
- SEM: Smooth, spherical nanoparticles, no aggregation.
- EDX: 20% silver content.
- XRD-Face-centered cubic structure
- FTIR & Raman- Capping agents-Proteins, phenolic compounds, and amines
Reducing agents- Polyphenolic compounds and flavonoids



Diameter values of inhibition zones in the antimicrobial assay



Inhibition zones of (a) *S. aureus* (b) *E. coli* (c) *A. niger* (d) *C. albicans*

Microbial strains	Positive Control Tetracycline (For Bacteria) Croconazole (For Fungi) (1mg/ml)	Crude extract of <i>Padina</i> sp. (1mg/ml)	AgNPs 1mg/ml	Negative Control 0.010M AgNO ₃	Negative Control DMSO
Bacteria					
<i>S. aureus</i> (mm)	19.10 ± 0.55	11.17 ± 0.29	12.77 ± 0.58	7.62 ± 0.58	0.00
<i>E. coli</i> (mm)	22.50 ± 0.87	10.50 ± 0.50	15.27 ± 0.58	8.17 ± 0.58	0.00
Fungi					
<i>A. niger</i> (mm)	23.10 ± 0.11	12.66 ± 0.10	18.10 ± 0.15	16.33 ± 0.12	0.00
<i>C. albicans</i> (mm)	19.33 ± 0.82	15.66 ± 0.10	17.43 ± 0.57	16.66 ± 0.15	0.00

AgNPs exhibited higher antibacterial & antifungal activity than the crude extract.

Conclusion -AgNPs produced through an ecofriendly green synthesis method offer a therapeutic approach to treat microbial diseases