Nanopesticidal potential of silver nanocomposites synthesized from the aqueous extracts of red seaweeds

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Abstract

In this study, silver nanoparticles (AgNPs) green synthesized using the aqueous extracts of agar seaweeds (Gracilaria corticata and G. edulis) and carrageenan seaweeds (Hypnea musciformis and Spyridia hypnoides) were found effective (antibacterial activity) against Xanthomonas axonopodis pv. citri and X. oryzae pv. oryzae and antifungal activity against Ustilaginoidea virens under in vitro condition. The synthesis of AgNPs due to the reduction of Ag+ to Ag-0 observed by the colour change from pale yellow to brown was recorded between 410 nm and 430 nm. The aliphatic amine, alcohols, ether, carboxylic acids, anhydrides and cyclic peptides recorded in the AgNPs by FTIR spectra are the functional groups of protein and sulphated polysaccharides (agar and carrageenan) which involved in the reduction reaction, stability and capping of the NPs. The AgNPs of spherical shape with average size of 37 nm, 54 nm, 53 nm and 49 nm synthesized by G. corticata, G. edulis, H. musciformis and S. hypnoides respectively, were characterized. The DLS study reveals the property of agglomeration instead aggregation in a liquid medium concluding that the AgNPs synthesized using these four red seaweeds found to be a suitable source for nanopesticide formulation.