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Biosynthesis and Antimicrobial activities of Silver Nanoparticles (AgNPs) by using Leaf Extracts of Tagetes erecta (Marigold) and Tridax procumbens (Tridax)

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Abstract

In recent years, biosynthesis of silver nanoparticles (AgNPs) has gained much interest from chemists and biologist. In this concern, Indian medicinal plants has yet to reveal numerous sources of cost-effective, non-hazardous, reducing and stabilizing compounds utilized in preparing AgNPs. This study investigates an efficient and sustainable route for synthesis of AgNPs from 1 mM aqueous AgNO3 using leaf extracts of two widely available plants such as Tagetes erecta (Marigold) and Tridax procumbens (Tridax) well adorned for their wide availability and medicinal property. AgNPs were prepared by the reaction of 1 mM AgNO3 and 5% of leaf extract of each kind of plant independently. The formations of the AgNPs were confirmed by the colour changes of the mixture solution and duly characterized by UV-Vis spectrophotometric analysis. Further, their antibacterial and antifungal activities were tested against two bacterial strains and one fungal strain. Finally, the AgNPs showing better antimicrobial activity was tested for their water disinfection study against three water samples collected from River, Pond and Cannel. Obtained AgNPs from the two different leaf extracts showed significantly higher antimicrobial activities against Escherichia coli & Bacillus subtilis in comparison to both AgNO3 and raw plant extracts. Results showed that both Marigold and Tridax extracts AgNPs are showing significant antimicrobial activities, whereas Marigold has little more antimicrobial activity than Tridax. The zone of bacterial inhibition by AgNPs prepared from these two leaves extracts show maximum inhibition for Gram -ve Staphylococcus aureus and Klebsiella pneumoniae as well as E. coli and A. niger. These synthesised AgNPs when applied for water disinfection, they can able to reduce more than 50% of the bacterial growth present in the water samples. In addition, the synthesised AgNPs are safe to be discharged in the environment and possibly utilized in processes of pollution remediation.

Keywords: Silver nanoparticles, Antimicrobial activity, medicinal plants, Leaf extracts

Biography:

Utkalendu Suvendusekhar Samantaray has been completed his master's in biotechnology from MITS School of biotechnology affiliated under Utkal university. He has worked on many research papers including biochemistry, anti-oxidant development, plant growth microbes, nanotechnology, etc.

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