

**ACUTE TOXICITY EVALUATION OF CHEMICALLY SYNTHESIZED AND  
TRICHODERMA LONGIBRACHIATUM MEDIATED SILVER NANOPARTICLES IN  
AQUATIC CRUSTACEAN DAPHNIA MAGNA**

**W.G.T.N. Gunawardana<sup>1</sup>, S.A.D.S. Perera<sup>2</sup>, L.D. Amarasinghe<sup>2</sup> and S.R. Wickramarachchi<sup>1\*</sup>**

<sup>1</sup>Department of Chemistry, University of Kelaniya, Dalugama, Sri Lanka

<sup>2</sup>Department of Zoology and Environmental Management, University of Kelaniya, Dalugama, Sri Lanka

\*suranga@kln.ac.lk

Silver nanoparticles (AgNPs) are used in many applications in various fields, including biolabeling, sensors, filters, and antibacterial agents due to their specific physico-chemical and biological properties. As a result, AgNPs are released into the environment, and ultimately their transformation products, such as nanoparticulate of Ag<sub>2</sub>S, accumulate in wastewater treatment plants; thus, their toxicity and impacts on the environment are of growing concern. The purpose of this study is to evaluate the acute toxicity of chemically synthesized AgNPs (C-AgNPs), and green synthesized AgNPs using *T. longibrachiatum* biomass (TI-AgNPs) in the aquatic crustacean *Daphnia magna*. Synthesized AgNPs were characterized by ultraviolet-visible spectroscopy (UV-VIS), Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM). The colour change from pale yellow to dark brown of the solution indicated the formation of AgNPs initially. The surface Plasmon Resonance (SPR) band in the range of 415 - 400 nm in the UV-VIS confirmed the formation of TI-AgNPs and C-AgNPs. TEM and SEM images confirmed that TI-AgNPs and C-AgNPs were spherical. Aged less than 24 h (neonates) of *D. magna* were subjected to acute toxicity assay in a range of concentrations of TI-AgNPs and C-AgNPs (2.00 -10.00 mg l<sup>-1</sup>). The percentage immobility of the daphnids was dose-dependent. The EC<sub>50</sub> value of C-AgNPs was 4.01 ± 0.07 mg l<sup>-1</sup>, whereas TI-AgNPs was 5.33 ± 0.05 mg l<sup>-1</sup> for *D. magna* at 48 h exposure. Hence, TI-AgNPs exerted lesser toxic effects on *D. magna*. The presence of biomolecules as capping agents on AgNPs may reduce their toxicity towards *D. magna*.

**Keywords:** Acute toxicity, *Daphnia magna*, Green synthesis, Silver nanoparticles, *Trichoderma longibrachiatum*