

Abstract

The greenhouse whitefly, *Trialeurodes vaporariorum*, is a major pest of horticultural and ornamental plants frequently found in fields and greenhouses and usually controlled with pesticides or biological control agents. The current study examined the individual effects of the synthesized zinc oxide nanoparticles (ZnO NPs) and pathogenicity of *Beauveria bassiana* TS11 on *T. vaporariorum* adults. ZnO NPs were synthesized by precipitation method and were characterized by X-ray diffraction (XRD), fourier transform infrared (FTIR) and field emission scanning electron microscope (FESEM). The FESEM images indicated that ZnO NPs were non-compacted uniformly. XRD results confirmed the hexagonal wurtzite structure of ZnO NPs with an average size of 23.34 nm. FTIR analysis showed an intense absorption peak at a range of 434-555 cm^{-1} which was related to Zn-O bond. In bioassays, the adults greenhouse whiteflies were exposed to various concentrations (3, 5, 10, 15, and 20 mg/L) of synthesized ZnO NPs and concentrations (10^4 , 10^5 , 10^6 , 10^7 , and 10^8 spores/ml) of *B. bassiana* TS11 using spray suspension. Based on the obtained results, LC_{50} values for synthesized ZnO NPs and *B. bassiana* TS11 were 7.35 mg/L and 3.28×10^5 spores/ml, respectively. In addition, LC_{25} values of ZnO NPs and fungus isolate were 3.76 mg/L and 0.106×10^5 spores/ml, respectively. Mortality rates of ZnO NPs and *B. bassiana* TS11 at the highest concentration were obtained to be 91.6% and 88.8%, respectively. The results indicate the positive effect of synthesized ZnO NPs and *B. bassiana* TS11 on *T. vaporariorum* adults there by having the potential to be an effective control agent. The current study was conducted under laboratory conditions, therefore, after further field experiments, these control agents can be employed in integrated pest management programs.

Key words: Entomopathogenic fungus, Nanoparticle, Metal oxide, Insecticide, Bioassay



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**Evaluation of *Beauveria bassiana*
pathogenicity and toxic effect Zinc Oxid
nanoparticles against greenhouse whitefly
Trialeurodes vaporariorum
(Hom.: Aleyrodidae)**

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