

Silver Nanoparticles Synthesized in Plant Extract Against Acute Hepatopancreatic Necrosis of Shrimp: Estimated By Multiple Models

Authors : Luz del Carmen Rubí Félix Peña, Jose Adan Felix-Ortiz, Ely Sara Lopez-Alvarez, Wenceslao Valenzuela-Quiñonez

Abstract : On a global scale, Mexico is the sixth largest producer of farmed white shrimp (*Penaeus vannamei*). The activity suffered significant economic losses due to acute hepatopancreatic necrosis (AHPND) caused by a strain of *Vibrio parahaemolyticus*. For control, the first option is the application of antibiotics in food, causing changes in the environment and bacterial communities, which has produced greater virulence and resistance of pathogenic bacteria. An alternative treatment is silver nanoparticles (AgNPs) generated by green synthesis, which have shown an antibacterial capacity by destroying the cell membrane or denaturing the cell. However, the doses at which these are effective are still unknown. The aim is to calculate the minimum inhibitory concentration (MIC) using the Gompertz, Richard, and Logistic model of biosynthesized AgNPs against a strain of *V. parahaemolyticus*. Through the testing of different formulations of AgNPs synthesized from *Euphorbia prostrata* (Ep) extracts against *V. parahaemolyticus* causing AHPND in white shrimp. Aqueous and ethanol extracts were obtained, and the concentration of phenols and flavonoids was quantified. In the antibiograms, AgNPs were formulated in ethanol extracts of Ep (20 and 30%). The inhibition halo at well dilution test were 18 ± 1.7 and 17.67 ± 2.1 mm against *V. parahaemolyticus*. A broth microdilution was performed with the inhibitory agents (aqueous and ethanolic extracts and AgNPs) and 20 μ L of the inoculum of *V. parahaemolyticus*. The MIC for AgNPs was 6.2-9.3 μ g/mL and for ethanol extract of 49-73 mg/mL. The Akaike index (AIC) was used to choose the Gompertz model for ethanol extracts of Ep as the best data descriptor (AIC=204.8, 10%; 45.5, 20%, and 204.8, 30%). The Richards model was at AgNPs ethanol extract with AIC=-9.3 (10%), -17.5 (20 and 30%). The MIC calculated for EP extracts with the modified Gompertz model were 20 mg/mL (10% and 20% extract) and 40 mg/mL at 30%, while Richard was winner for AgNPs-synthesized it was 5 μ g/mL (10% and 20%) and 8 μ g/mL (30%). The solver tool Excel was used for the calculations of the models and inhibition curves against *V. parahaemolyticus*.

Keywords : green synthesis, euphorbia prostata, phenols, flavonoids, bactericide

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