

Antifungal efficacy of zinc oxide nanoparticles against *ganoderma boninense*- in vitro

ABSTRACT

Malaysia's oil palm industry faces a severe crop disease infection called basal stem rot (BSR) caused by a white-rot fungus called *Ganoderma boninense* (GB). Numerous methods have been taken to manage the disease, but there are no satisfactory control measures for the disease to date. Therefore, this study was conducted to investigate the antifungal efficacy of zinc oxide nanoparticles (ZnO NPs) against GB. The in-vitro antifungal activities of ZnO NPs were expressed in inhibition of GB mycelia growth in potato dextrose agar (PDA) incorporated with different concentrations of ZnO NPs (2, 4, 6, 10, 20 mg/mL). All of the concentration of ZnO NPs does not show a total inhibition growth of GB, in which the highest concentration (20 mg/mL) can only reach 79% of inhibition rate. However, all concentrations' inhibition rate exceeds 50%, which showed a significant antifungal capacity on mycelial growth of GB. The amount of ergosterol content was done by HPLC analysis resulted in the amount of ergosterol decreasing as the concentration of ZnO NPs increases. To further evaluate the treatment's efficacy, it is undergone SEM screening to examine the morphology changes of GB hyphae. The results show a lower density of the fungal mat, a malformation, and the strand of hyphae is shriveled compared to the control.