

“Green Synthesis of Zinc Oxide Nanoparticles using Aloe Vera Extract as a potential Antimicrobial Agent against Bacterial Leaf Blight (BLB) Disease”

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In this study, zinc oxide nanoparticles (ZnO-NP) were successfully synthesized from aloe vera extract and zinc sulphate as zinc precursor. Structural, morphological and optical properties of the synthesized nanoparticles were characterized using UV–Vis spectrophotometer, XRD, FESEM and TEM analysis. The absorption peak from UV–visible spectroscopy was at 380 nm while the XRD pattern displays high purity ZnO-NP. FESEM and TEM analysis showed agglomerated particles with a wide size distribution range. Molecular analysis of *Xanthomonas oryzae* pv. *oryzae* (Xoo) isolates 0.0 and 1.0 were performed using polymerase chain reaction (PCR). The PCR of both isolates generated products of 230 bp similar to in silico PCR results, verifying both isolates on molecular level. Subsequently, the antimicrobial activities of ZnO-NP against Xoo isolates 0.0 and 1.0 were assessed. Xoo (10^8 cfu/ml) were grown in LB broth supplemented with various concentrations of ZnO-NP. Samples were taken at 24 hours, 48 hours and 72 hours of incubation, grown on LB agar and observed for bacterial growth. The antibacterial effect was more pronounced for isolate 0.0 than isolate 1.0. Colony forming unit values revealed the number of viable cells decreased with high concentrations of ZnO-NP whereas minimal inhibition was observed at lower ZnO-NP concentrations. Due to the antibacterial effect on high bacterial concentrations was not significant, the bacterial concentration was reduced to (10^3 cfu/ml) in the subsequent experiments. The exposure time to ZnO-NP on antimicrobial activities were also studied. It was found that at 24 hours incubation, ZnO-NP gave comparable antibacterial effects to commercial ZnO-NP and commercial non-nano ZnO-NP after exposure for 30 minutes for isolate 1.0 and 1 hour for isolate 0.0. However, the antimicrobial effects decreased after 48 hours. It was also noted that ZnO-NP provide better suppression of bacterial growth at lower bacterial concentration. These findings suggest ZnO-NP synthesized from aloe vera could be used as an antimicrobial agent in the early treatment for rice bacterial leaf blight disease.

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The above final report has not been presented at the annual “MTSF Grant Research Symposiums” as the scheduled Years 2020 & 2021 Grant Research Symposiums were cancelled due to the Covid-19 pandemic.