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AGRONANOCHEMICAL FOR *GANODERMA* FUNGAL DISEASE MANAGEMENT

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Oil palm is currently the world's main vegetable oil crop due to its high productivity and long life span. However, the yearly harvest was significantly reduced, due to the basal stem rot (BSR) disease which is caused by a fungus, *Ganoderma boninense*. In 2010, the incidence of BSR disease was estimated to be about 3.7% with estimated affected areas of around 60,000 hectares. Losses due to *Ganoderma* disease is estimated to be about USD 0.5 billion. For the control of Ganoderma, integrated sanitation, biological and chemical controls were suggested. In the later, fungicides such as hexaconazole and dazomet were found effective to eradicate *Ganoderma* inoculum within infected stumps, therefore reducing the spread of Ganoderma. The chemical control can be further improved via nanotechnology platform through fungicide nanodelivery system (FUNADS), which is expected to prolonging the productive life of the infected palm, reducing the frequency of applying time by controlled release approach and to reduce the toxicity by enclosed it in biodegradable and toxic-free materials. In this work, two fungicides; hexaconazole and dazomet as the guests were encapsulated into nanomaterials as the hosts (chitosan and layered double hydroxides) for the formation of various FUNADSs using the host-guest supramolecular chemistry approach. The chemical structure of the synthesized nanofungicides was evaluated using x-ray diffraction (XRD), electron microscopy, dynamic light scattering (DLS), Fourier transform infrared spectroscopy (FTIR), and thermogravimetric (TGA/DTG) analyses. The DLS and high resolution transmission electron microscopy (HRTEM) show the FUNADs can be synthesised using various host and guest combinations, and can be turned into the nanoparticles by adjusting the synthesis parameters. *In vitro* fungicide release from the FUNADs shows a sustained release manner. Furthermore, *in vitro* anti-fungal studies of the FUNADs against *G. boninense* shows better inhibition and lower EC_{50} value compared to their counterparts, the bare fungicides.

Biography

Mohd Zobir Hussein has completed his PhD in Physical Chemistry at the University of Reading, UK and Postdoctoral studies from Pennsylvania State University, USA, University of Southampton, UK, Victoria University of Wellington, New Zealand and University of Western Australia. He has worked as Professor of Chemistry at University Putra Malaysia (UPM). He has published more than 300 papers in reputed journals and 6 patents and has been serving as a research fellow at the Institute of Advanced Technology, UPM.

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