FORMULATION OF SELECTIVE GREEN FUNGICIDE FROM FATTY ACIDS AND TERPENES BASED NANOEMULSION SYSTEM FOR MITIGATING ANTHRACNOSE FUNGUS COLLETOTRICHUM GLOEOSPORIOIDES

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Abstract - Green fungicides prepared from fatty acids and terpenes based nanoemulsion (HyDEN) were introduced as potential nano-coating for controlling anthracnose during fruit postharvest preservation. Anthracnose is caused by species of Colletotrichum gloeosporioides with significant damage to fruits. Fungicides have been widely used as effective treatments but have displayed several disadvantages on environment, health and safety consideration. Recently, essential oils have been used as edible coatings in protecting fruits from anthracnose but having limitations on their safety, marked organoleptic effect, and contamination issues. In this study, hydrophobic deep eutectic solvents (HDESs) prepared from fatty acids and terpenes were characterised by their physiological properties. Menthol-Thymol (MT 1:1 and MT 2:1) successfully passed the criteria and were selected for the formulation of oil in-water nanoemulsion. HyDEN (MT-N 1:1) showed a higher zeta potential value and lower mean droplets diameter than HyDEN (MT-N 2:1) and was applied for an antifungal test on C. gloeosporioides, compared with the selected antifungal agents. The HyDEN (MT-N 1:1) showed strong antifungal activity on C. gloeosporioides due to its strong mode of action, binding affinity, and rapid onset compared to HDES and Globus 5.5. This study provides replacement for the use of toxic chemicals and demonstrated the innovative and sustainable treatment in controlling anthracnose during postharvest fruit preservation.

Keywords - Anthracnose; Fatty acids; Terpenes; Nanoemulsion; Fungicide