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Investigating the impact of hydrophobic deep eutectic oil-in-water nanoemulsion on cell membrane degradation and inhibition of c. Gloeosporioides in postharvest technology

Abstract

This study examines the effects of a hydrophobic deep eutectic oil-in-water nanoemulsion (HyDEN) on the cell membrane degradation and inhibition of Colletotrichum gloeosporioides. By analyzing post-treatment cell membrane morphology, we gain insights into the efficacy and mechanisms of action of antifungal agents. Significant changes such as disruption, collapse, wrinkling, and lysis were observed in the external morphology of C. gloeosporioides treated with HyDEN. When comparing control and treatment groups, HyDEN demonstrated more pronounced disruption and greater mycelial growth inhibition than Globus 5.5. HyDEN also effectively inhibited spore germination compared to Globus 5.5. Tests on intracellular ion leakage showed that HyDEN caused higher conductivity, indicating significant membrane disruption. Additionally, HyDEN led to a greater release of soluble sugars due to membrane damage compared to Globus 5.5. These findings suggest that HyDEN is a promising antifungal strategy, effectively disrupting cell wall and membrane functionality, and inhibiting fungal growth.

Keywords

Cellular leakage; Colletotrichum gloeosporioides; Globus 5.5; Hydrophobic deep eutectic nanoemulsion