

Title Controlling postharvest anthracnose of banana using novel edible composite coatings by stimulating defence related enzymes

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Abstract

Anthracnose, a postharvest disease is the most destructive malady of tropical fruits and vegetables. Chitosan is reported to have antifungal effects against several fungi. However, in this study the potential of chitosan combined with gum arabic as an edible coating was exploited. During *in vitro* studies chitosan plus gum arabic significantly reduced mycelial growth and spore germination of *Colletotrichum musae*, a causal organism of anthracnose in banana. A complete inhibition of radial mycelial growth and spore germination was not found in all chitosan plus gum arabic treatments. The results of *in vivo* experiments also revealed the effectiveness of chitosan plus gum arabic on banana and significantly reduced disease incidence. A concentration of 1.0% chitosan plus 10% gum arabic gave optimal control of anthracnose whereby no disease symptoms were observed even after 33 days of storage ($13 \pm 1^\circ\text{C}$; $70 \pm 5\%$ relative humidity). Chitosan plus gum arabic treatments maintained significantly higher enzyme activities of total phenolics, polyphenol oxidase (PPO), peroxidase (POD), and phenylalanine ammonia lyase (PAL) compared to the untreated control. The results suggest a direct fungistatic effect of chitosan plus gum arabic against *C. musae*, and also the stimulation of biochemical defence responses in banana fruit. It can be concluded that there is a high potential for the use of chitosan plus gum arabic as an alternative to chemical fungicides to control *C. musae* in banana.