Title	Chitosan loaded nano-emulsions and their efficacy to control anthracnose of dragon fruit plants
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Abstract

The filamentous plant pathogen *Colletotrichum gloeosporioides* is responsible for anthracnose on a large scale in tropical regions. This pathogen attacks fiuits after harvest as well as stems, branches and floral buds, thus causing a significant decline in yield. Synthetic fungicides are commonly used to control plant diseases, however, the increased concerns about environmental risk due to xenobiotics, the selection of pathogen strains resistant to chemicals and the cost of traditional pesticide treatments have prompted studies on alternative strategies in crop protection. The induction of a systemic, long lasting and broad-spectrum resistance with natural or synthetic compounds represents one of the most promising approaches to control diseases. Chitosan, a polycationic biopolymer derived from waste material from crabs and shrimps in the food industry, has great potential to inhibit fungal growth. Chitosan prepared as a nano-emulsion, in which the average size of the droplets is 1000 nm, has been tested as an alternative to the use of the conventional form of chitosan against anthracnose. The *in vitro* antifungal activity of five droplet sizes of nanoemulsions of chitosan (200, 400, 600, 800 and 1000nm) were investigated against anthracnose caused by *Colletotrichum gloeosporioides* isolated from dragon fiuit plants. Droplets of 600 nm size were more effective in controlling conidial germination (91.5%), dry weight of mycelium (0.62 g) and sporulation (87.5%) at 1.0% chitosan concentration. The results suggest that instead of applying chitosan in the conventional form, chitosan in the form of nano-emulsions could be more effective as a biofungicide for controlling anthracnose of dragon fiuit plants.