



Studies on papaya anthracnose and storage life extension of papaya using chitosan

**A thesis submitted for the Degree of
Doctor of Philosophy**

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542176

July 2007

ABSTRACT

Antifungal activity of chitosan extracted from head and shell waste of locally available prawn was tested against the anthracnose disease causing organism, *Colletotrichum gloeosporioides* of papaya variety Rathna. One percent chitosan was selected - from the range of 0.1 to 3 % concentrations tested - as an effective concentration to inhibit germination and radial mycelial growth of the fungus via a series of *in vitro* and *in vivo* experiments. Incidence and severity of the disease was significantly reduced to 30 % while maintaining the overall quality when Rathna papaya was subjected to 1 % chitosan dip treatment prior to storage at 13.5° C and 95 % relative humidity (RH) for 2 weeks. Chitosan forms a semi permeable coating around the fruit and thereby reduce the rate of respiration and increase the carbon dioxide (CO₂) concentration in the internal cavity of the fruit without affecting the organoleptic properties of the fruit. The film forming ability of chitosan was clearly evident from scanning electron microscopic (SEM) photographs. Chitinase and β , 1-3, glucanase activities significantly increased with chitosan treatment suggesting stimulation of production of pathogenesis - related (PR) proteins. Overall quality of chitosan treated papaya was significantly (*p < 0.05) higher compared to other recommended postharvest treatments such as waxing, hot water and salicylic acid dip treatments.

Antifungal activity of 1 % chitosan solution increased when exposed to gamma-radiation of 5 k Gy at a dose rate of 5 k Gy / hr. Incidence and severity of anthracnose in papaya var. Rathna was further reduced to 20 % after 2 weeks at low temperature storage with irradiation treatment. This treatment extended the storage life of Rathna var. papaya for up to 3 weeks at 13.5° C with 70 % marketable quality fruit. In Red Lady var. when non irradiated chitosan was less effective, incidence and severity of the disease reduced to 30 % with irradiated chitosan.

Two isolates of *C. gloeosporioides* were obtained from commercially grown papaya varieties (Rathna and Red Lady) in Sri Lanka. Pathogenicity and morphological variations, cross inoculation studies using fresh papaya, and genomic investigation by genomic RFLP (Restriction Fragment Length Polymorphism) followed by southern hybridization suggest that the two isolates are two different strains of *C. gloeosporioides*.