Indian Journal of Agricultural Sciences **87** (5): 618–23, May 2017/Article

Effect of chitosan coating on postharvest diseases and fruit quality of mango *(Mangifera indica)*

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Received: 14 June 2016; Accepted: 25 October 2016

ABSTRACT

The objective of this work was to study the effect of postharvest chitosan coating on fruit quality and shelf life of mango (*Mangifera indica* L.) during storage at ambient condition. Physiologically mature freshly harvested mango fruits (cv. Langra) were treated with chitosan solutions (0%, 0.5%, 0.75% or 1.0%) containing 0.5% acetic acid for 1 min and stored at ambient condition (25 ± 2°C, 85 ± 5% RH). Treatment with 1.0% and 0.75% chitosan significantly reduced weight loss and disease incidence of fruit compared to control. These treatments also maintained higher ascorbic acid, total phenolics content and total antioxidant activity than other treatments.However, development of peel colour and total carotenoids content in the fruit pulp was suppressed by chitosan 1.0% treated fruits. Treatment of mango with chitosan also delayed increase in the total soluble solids and decrease in titratable acidity compared to control. No significant differences were recorded between chitosan 0.75% and 1.0% treated fruits except for peel colour development and total carotenoids content. These results indicated that 0.75% chitosan coating could preserve fruit quality, reduce disease incidence and extend shelf life of mango up to 12 days during storage at ambient condition.

Key words: Chitosan, Coating, Decay, Mango, Postharvest

Mango (*Mangifera indica* L.) is one of the most important tropical fruit of the world, known for its attractive colour, exotic flavour, delicious taste and rich nutritional properties. Owing to climacteric in mature mangoes ripen rapidly after harvest, showing respiration and ethylene evolution peaks on 3rd or 4th day of harvest at ambient temperature (Narayana *et al*. 1996). The fruit is highly perishable in nature having shelf life of only 4 – 8 days at ambient condition (Carrillo *et al*. 2000). Such a short postharvest life seriously limits the long distance commercial transport of this fruit (Gomer-Lim 1997). Moreover, mango fruits are also highly sensitive to postharvest decay which causes massive loss during transit or storage. The major postharvest diseases occur in mango are anthracnose (caused by *Colletotrichum gloeosporioides*) and stem-end rot (caused by *Lasiodiplodia theobromae*) which remain as latent infection at the time of harvest. Susceptibility of mango to the attack by these pathogens increases during storage owing to a series of ripening associated changes and environmental condition favouring establishment and colonisation of these pathogens (Eckert *et al*. 1996). Low temperature storage is a common postharvest technique to delay ripening, senescence and minimize spoilage. But, the problem with mango is its high chilling sensitivity while stored at low temperature (Barman and Asrey 2014). Generally, control of these postharvest diseases is achieved by combination of thermal and fungicide prochloraz treatment. However, owing to adverse effects of synthetic fungicides on human health and environment (Zeng *et al*. 2006) and also reports for development of pathogen resistance over synthetic fungicides (Cavelier *et al*. 1994) make a strong desire to explore new alternatives to reduce postharvest diseases and extend its shelf = life.

Chitosan is a high molecular weight cationic polysaccharide derived from deacetylation of chitin obtained from exoskeleton of crustacean shells such as shrimps, crabs and krills (Sandford and Hutchings 1987, Sandford 1989). Due to its excellent film-forming and barrier properties, biodegradable nature and antimicrobial property, chitosan has attracted attention as a potential food preservative in improving storability of several fruits (Arvanitoyannis *et al*. 1998, El-Ghaouth *et al*. 1991, Zhang and Quantick 1997, Jiang and Li 2001, Li and Yu 2001). United States Food and Drug Administration (USFDA) have also approved application of chitosan as a potential food additive (Hirano

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