

Application of *Aloe Vera* Edible Coating on Shelf Life Extension of Fresh Cut Green Mango cv. Kaew Kamin

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Abstract

The effect of *Aloe vera* gel coating at the concentration of 50, 60, 70, 80 and 90% on the quality of fresh-cut mango cv. kaew kamin on physico-chemical changes during storage at 10°C were investigated. Fresh-cut green mangoes were dipped in various concentrations of *Aloe vera* gel then placed in semi-rigid packaging stored at 10°C for 6 days. Physical and chemical changes of mango were analyzed every day. The results showed that coating with 60% of *Aloe vera* gel maintained the color changes of fresh cut green mango expressed on L*, a*, b* and Hue angle value and reduced weight loss when compared to the other treatments. The *Aloe vera* gel treatments had no effect on firmness, titratable acidity and phenolic content of fresh cut green mango during storage. Antioxidant capacity of 60% *Aloe vera* treated mango was higher than non-treated fresh cut mango. The 60% *Aloe vera* treatment had storage life for 6 days while the control had storage life for 2 days due to the off-flavor in non-treated mango.

Keywords: *Aloe Vera*, Green Mango, Quality

Introduction

Mango (*Mangifera indica* L) is a climacteric fruit which is cultivated in tropical area and it is a popular commercial tropical fruit. 'Kaew Kamin' is one of the commercial mango fruits in Thailand. Characteristic of 'Kaew Kamin' mango includes firm texture, yellow flesh and sweet and slightly sour taste, the mango fruit has been consumed at full mature and ripe stages and the demand of 'Kaew Kamin' mango fruit has increased dramatically. Nowadays, fresh cut produces become popular serving because they are fresh, nutritious, low priced, and ready-to-eat. Fresh-cut fruits process involves grading, washing, peeling, cutting and packaging, can affect the integrity of the fruits and cause biochemical changes and microbial spoilage that may result in degradation of the color, texture and flavor of fruits (Watada and Qi, 1999). The major problem of fresh cut mango cv. Kaew Kamin is short shelf life due to desiccation, darkening and microbial growth. An edible coating can be used to improve the shelf life of fresh-cut fruits by reducing quality changes and quality loss during storage (Rojas-Grau *et al.*, 2009). An edible coating can serve as a barrier to moisture migration, gas diffusion and microbial invasion to maintain the quality of fresh-cut fruits. It can be prepared from polysaccharides, proteins and lipids, added with minor components such as additives and plasticizers. *Aloe vera* gel has potential to be used as an edible coating for fresh-cut fruits as it contains various polysaccharides (Pugh *et al.*, 2001). Recently, Martinez- Romera *et al.*, (2006) reported that the usage of *Aloe vera* gel as an edible coating to extend the shelf-life and delay changes in parameters related to deterioration of quality in sweet cheery and table grapes. Thus, the aim of this study was to investigate the effects of *Aloe vera* gel to extend shelf life and improve the quality of fresh cut green mango fruit cv. Kaew Kamin.

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Material and Method

1. Plant material preparation and fresh-cut processing

Mature green mangoes cv. Kaew Kamin were purchased from Taladtai, Bangkok. The fruit were cleaned with tap water and then dipped into 100 ppm of sodium hypochlorite for 5 min. After air dried, fruit were then cut into longitudinally into 10 pieces per fruit for the experiment. Fruits were dipped into various concentration of *Aloe vera*. They were packed into semi-rigid packaging (10 cm x 16 cm x 4 cm size) and stored at 10 °C for 6 days. Quality of fresh cut mango were evaluated every day.

2. Coating material preparation and treatments

Aloe vera leaf were obtained from samutprakarn province, Thailand. After washing with tap water and dipping in 100 ppm of sodium hypochlorite for 10 min, the base and tips of the leaves along with its spikes were removed. Next, the skin was carefully separated from parenchyma to obtain *Aloe vera* flesh. The flesh was blended and then filtered through a cotton cloth sheet. The *Aloe vera* homogenates were diluted with sterilized distilled water to achieve the concentrations of 50, 60, 70, 80 and 90% (v/v).

Results and Discussion

Physical changes of fresh cut mango cv. Kaew Kamin coated with various concentration of *Aloe vera* gel was evaluated. The results showed that weight loss of all treatments of fresh cut mango was increased during storage. Weight loss of 60% *Aloe vera* coated fruit was significantly lower than other treatments following by 50% *Aloe vera* treatment ($P < 0.05$) (Fig.1A). Fresh-cut mango is prone to weight loss due to the removal of skin that exposes the fruit's internal tissues *Aloe vera* gel has been reported to have hygroscopic properties, which results in the formation of a water barrier between the sample and the environment that prevents the transfer of water (Serrano *et al.*, 2006). Firmness of all treatments was increased during storage until day 4 then it was gradually decreased till the end of storage. It was not significant different among treatments (Fig. 1B). The result showed that the 50 and 60% *Aloe vera* maintained the L^* , a^* , b^* and Huge value of fresh cut green mango when compared to control samples after 10 d of storage ($P < 0.05$) (Fig. 2). Coating of fresh-cut fruit with *Aloe vera* gel causes the creation of modified atmosphere conditions that help to delay color changes (Ergun and Satici, 2012).

The 60% *Aloe vera* had storage life for 6 days while the other *Aloe vera* treatments and control had storage life for 4 and 2 days, respectively. The antioxidant capacity of control was lower than that of the 60% *Aloe vera* coating at two day after storage (Figure 3). This can cause the deterioration and short shelf life of fresh cut mango in control. *Aloe vera* gel was used to maintain physical quality including surface browning prevention of minimally processed cantaloupe (Yulianingsih *et al.*, 2013), kiwifruit (Benitez *et al.*, 2013). In apple slices, *Aloe vera* gel was used to prevent surface browning (Chauhan *et al.*, 2011; Song *et al.*, 2013). Because edible coatings are commonly used to improve fresh cut fruit appearance and conservation. Coatings act as moisture and gas semi-permeable barriers during storage, prevent deterioration and preserve the quality of fruit. Chemical changes including antioxidant capacity and phenolic content of 60% *Aloe vera* coated fruit was analyzed. Results revealed that antioxidant capacity of 60% *Aloe vera* coated fruit and non-coated fruit were slightly increased during storage (Fig. 3A). Phenolic content of 60% *Aloe vera* coated fruit and control remained constantly during storage for 6 days. However, the antioxidant capacity and phenolic content had no significant different in of all treatment (Fig. 3B). *Aloe vera* treated mango had storage life for 6 days while as the non-treated mango had storage life for 2 days (Fig. 4).

Conclusion

The 60% of *Aloe vera* gel maintained the physical quality and induced antioxidant capacity of fresh cut green mango cv. kaew kamin. The *Aloe vera* gel treatments had no effect on firmness and phenolic content of

fresh cut green mango during storage. *Aloe vera* treated mango had storage life for 6 days while as the non-treated mango had storage life for 2 days.

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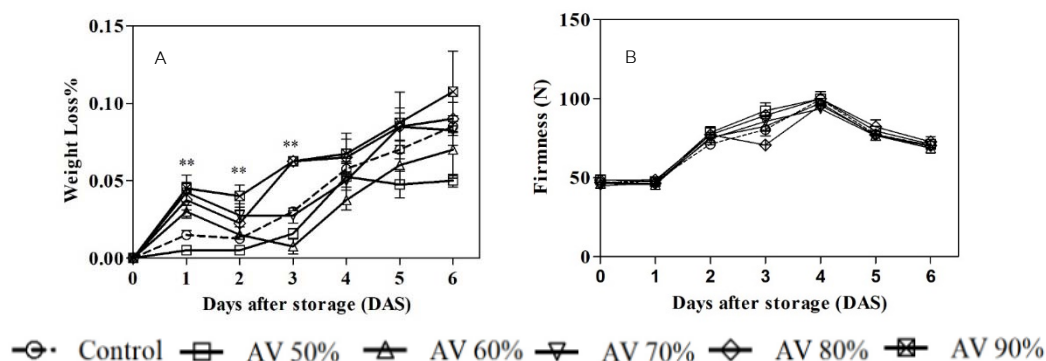


Figure 1 Weight loss (A) and Firmness (B) of Fresh cut mature mango cv. Kaew Kamin coated with 0 50 60 70 80 and 90% *Aloe vera* packed into semi-rigid packaging with lid and storage at 10°C for 6 days.

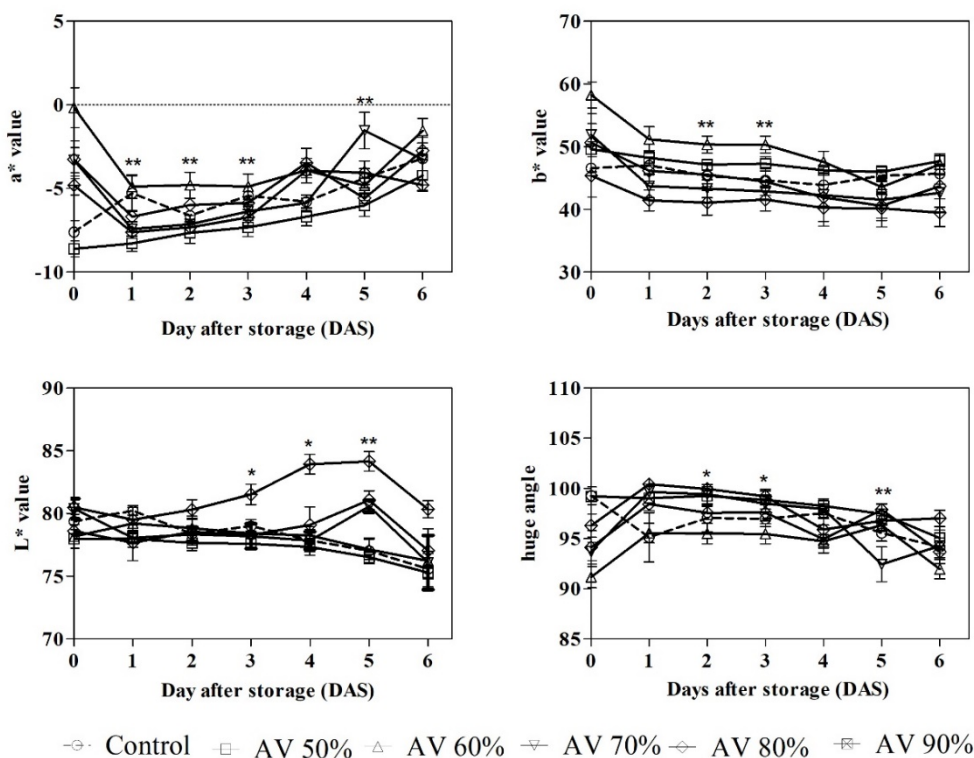


Figure 2. Color changes expressed as a* b* L* Hue angle of fresh cut mango cv. Kaew kamin coated with 0 50 60 70 80 and 90% *Aloe vera* packed into semi-rigid packaging with lid and storage at 10°C for 6 days.

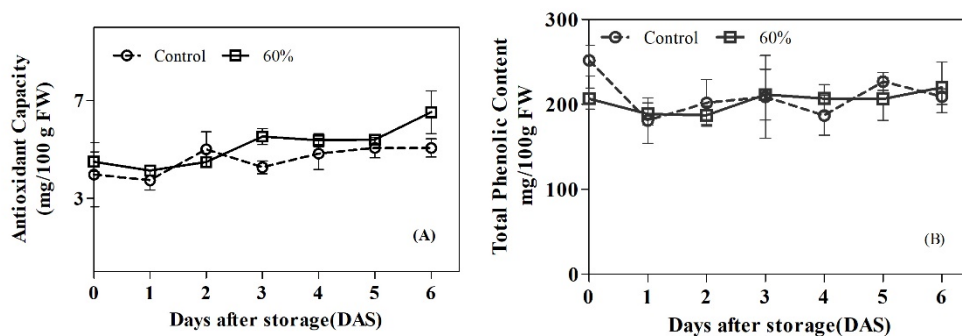


Figure 3. Antioxidant capacity (A) and total phenolic content (B) of fresh cut mango cv. Kaew kamin coated with 60% *Aloe vera* and non-coated fruit (control) packed into semi-rigid packaging with lid and storage at 10°C for 6 days.

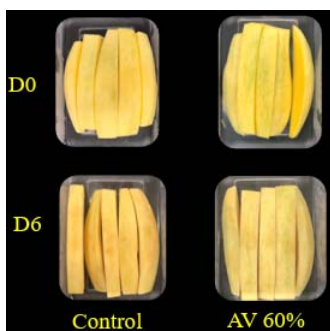


Figure 4. Appearance of fresh cut mango cv. Kaew Kamin coated and non-coated with 60% *Aloe vera* gel then packed into semi-rigid packaging with lid and storage at 10°C for 6 days.