



EFFECT OF LOW TEMPERATURE STORAGE ON THE RIPE-STAGE EATING PERIOD OF 'GEDONG GINCU' MANGO FRUITS

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ABSTRACT

Effect of low temperature storage on the ripe-stage eating period of 'Gedong Gincu' mango fruits was examined. Hard green mature mango fruits were stored at 8, 13°C (RH 90-95%) and room temperature (25°C). The ripe-stage eating period was examined from the combination of firmness and soluble solid content during storage period. From the firmness and soluble solid content, mango fruits stored at room temperature reached the optimum eating period during 4 to 10 days. For those mango fruits stored at 13 and 8°C, the optimum eating period was from days 14 to 18 and 32 to 33. It was found that soluble solid content of mango fruits increased during its postharvest life which the value for those stored at room temperature was greater than that of 8 and 13°C. This finding indicated that low temperature storage extended postharvest life of mango fruits cv. Gedong Gincu, however, decreased ripe-stage eating period.

Keywords: low temperature storage, 'Gedong Gincu' mango fruits, ripe-stage eating period, postharvest life, chilling injury.

INTRODUCTION

'Gedong Gincu' is the leading mango cultivar in Indonesia due to its sweet taste, medium size and beauty orange color. This mango cultivar has dimension of 10-12 cm in length and 200-250 g in weight. 'Gedong Gincu' mango fruits are generally harvested at their commercial maturity at condition of hard green mature or 95-100 days after anthesis at the maturity level of 80-85%. At this condition, the color of mango fruits is still green at upper part and a tinge of orange to red on the base of the fruit. This mango cultivar is quite unique. When it is harvested before the optimum maturity, during ripening, the orange color will not appear in the whole skin. In the market, the price of this mango is more cheaper. Harvesting at maturity level of 80-85% may result the prime quality of 'Gedong Gincu' mango fruits, however, the storage period may be limited.

After being harvested, 'Gedong Gincu' mango fruits are usually transported to the market with minor handling treatment to extend its post harvest life. During mango fruits season, it is easily found mango fruits in market or street fruit vendors. Most of fruit vendors display mango fruits in ambient temperature condition. In recent times, postharvest handling of mango fruits has obtained much attention by the government of Indonesia due to the increase in demand of high quality of mango fruits at both domestic and overseas markets. Some postharvest handling programs have been launched to increase the awareness of mango fruits supply chain actors on good postharvest handling practices. One of the programs is introduction of cold handling during marketing and distribution from the growers to the market. Mango is climacteric fruit. Ripening process of mango fruits can be delayed when they stored at low temperature at condition of hard green mature. Mango fruits, like many other tropical fruits, have a short postharvest life at room temperature (Pantastico, 1986) and are susceptible to chilling injury (Kays, 1991; Purwanto *et al.*, 2013).

Temperature control is commonly used to reduce metabolism of fruits and delay ripening (Purwanto *et al.*, 2013). However, reduced temperature can lead in some cases to abnormal ripening and decay. Effect of low temperature on the quality of mango fruits have been reported by many researchers (Aziz *et al.*, 1976; Passam, 1982; Joseph and Aworth, 1991). The critical storage temperature of mango fruits, though it depends on the cultivar, ranges from 5 to 15°C (Kane *et al.*, 1978; Zauberman *et al.*, 1988; Fuchs *et al.*, 1989).

It has been reported by many researchers that low temperature storage extends the postharvest life of mango fruits. Mango fruits stored at non-chilling temperatures, i.e. 13°C and above generally have storage life of less than 3 weeks due to ripening of the fruit (Hatton, 1990). 'Gedong Gincu' mango fruits stored under low temperature storage have short postharvest life after ripening treatment (Purwanto *et al.*, 2004). Understanding the low temperature storage behavior of 'Gedong Gincu' mango fruits will be important in order to determine the market destination and to find the optimum eating period. The objective of this study was to examine the effect of low temperature storage for hard green mature 'Gedong Gincu' mango fruit on the ripe-stage eating period.

MATERIAL AND METHOD

'Gedong Gincu' mango fruits were harvested from local farmer and collected at their commercial maturity in condition of hard green mature or 95-100 days after anthesis. After being harvested, mango fruits were transported to the Laboratory within 8 hours at ambient temperature. Mango fruits were sorted, cleaned and selected for uniformity of size and weight. The 435 sample of fruits were used in this study. Then, randomly divided into 3 groups and stored at cold chamber with temperature of 8, 13°C (RH 90-95%) and room temperature as a control (25°C). During storage period, visual observation was carried out for all samples. Storage was interrupted



when mango fruits deteriorated. Soluble solid content was determined by Refractometer (Atago PR-201). Firmness was measured by Rheometer model CR-300. All measurements were done in triplicate.

RESULT AND DISCUSSIONS

Visual observation

Mango fruits stored at room temperature remained in good condition for up to 10 days. The color of mango fruits skin became orange at 6 days and the brown spot was found at 10 days observation. The emergence of brown spot was thought to be due to physiological deterioration. For mango fruits stored at 13°C, the orange color was observed at storage period of 16 days. For mango fruits stored at 8°C, the major green color was remained until 30 days. However, brown spot was found at days 34. This phenomenon showed that for mango fruits stored at 8°C, the temperature in which mango fruits experienced chilling injury, mango fruits were failure to ripen normally. From the visual appearance, it was difficult to judge the ripe-stage eating period, however, it was observed that this ripe-stage eating period was shorter than that mango fruits stored at higher temperature. This finding was supported by the previous work for 'Gedong Gincu' mango fruits stored at room temperature, 8 and 13°C, after ripening treatment, postharvest life of mango fruits stored at ambient temperature room was longer than that at 8 and 13°C (Purwanto *et al.*, 2004).

Firmness

Firmness decreased during the postharvest storage of mango fruits (Figure-1). The speed of losing firmness was higher at condition of room temperature storage. For mango fruits stored at 4 days, firmness became less than 1N, and relatively constant until the storage period of 10 days. This indicated that mango fruits have already ripened. For those mango fruits stored at 13°C, the same value of firmness was achieved at storage period of 14 days. This showed that mango fruits were able to consume and physiologically those mango fruits were on the optimum maturity after 14 days. For those mango fruits stored at 8°C, there were slightly changes relatively in firmness until storage period of 30 days. The extremely change in firmness was observed after 30 days storage.

Soluble solid content

Soluble solid content of mango fruits increased during its postharvest life which the value for mango fruits stored at room temperature was greater than that of 8 and 13°C (Figure-2). The increase in soluble solid content indicated the degradation of starches to sugars during the maturation (Khader, 1992). For mango fruits stored at room temperature, the maximum soluble solid content was achieved at storage period of 4 days. The same period for mango fruits reached the optimum firmness. This phenomenon indicated that at days 4 up to 10, mango fruits reached the optimum maturity.

For those mango fruits stored at 13°C, the maximum value of soluble solid content occurred at 16 to

20 days. Data of firmness showed that days 14 to 18 has the similar value as days 4 to 10 for mango fruits stored at room temperature. After reaching the maximum value, soluble solid content decreasing with time. The decrease in soluble solid content was because of the death of cells due to senescence of fruits (Acosta *et al.*, 2000). For mango fruits stored at 8°C, soluble solid content has increasing tendency with the value was lower than that mango fruits stored at 13°C and room temperature.

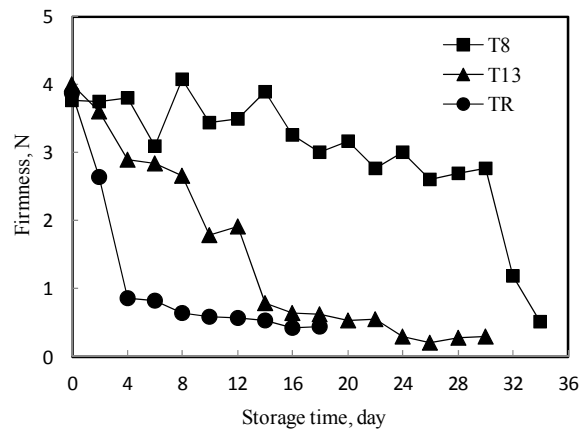


Figure-1. Change in firmness of 'Gedong Gincu' mango fruits during storage period.

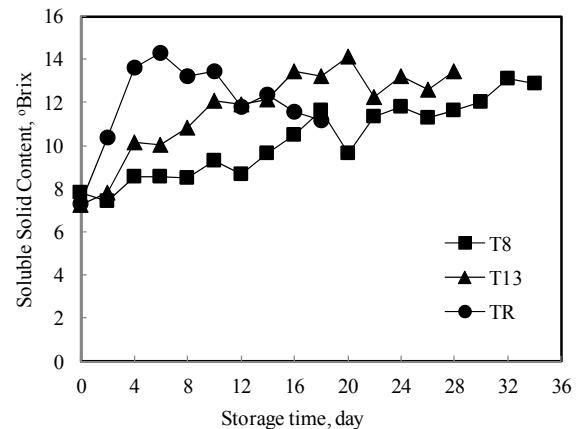


Figure-2. Change in soluble solid content of 'Gedong Gincu' mango fruits during storage period.

For mango fruits stored at 8°C, within 2 days, the firmness decreased dramatically to the same value as ripe-stage eating period for mango fruits stored at room temperature. The similar phenomenon occurred for the soluble solid content which reached the maximum value within 2 days. This finding indicates that ripe-stage eating period for mango fruits stored at 8°C was very short from days 32 to 33. The value of soluble solid content was also lower than that mango fruits stored at higher temperature. This indicates that mango fruits might experienced chilling injury.



CONCLUSIONS

Low temperature storage decreased the ripe-stage eating period of 'Gedong Gincu' mango fruits. Mango fruits stored at room temperature showed in good condition for 4 up to 10 days. The same value was achieved at days 14 to 18 for 13°C and days 32 to 33 for 8°C. The shortest ripe-stage eating period and lowest soluble solid content were found for mango fruits stored at 8°C.

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