

Effects of 1-methylcyclopropene on quality of Chokanan mangoes stored at ambient

(Kesan 1-metilsiklopropina terhadap kualiti mangga Chokanan yang disimpan pada suhu ambien)

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Keywords: 1-MCP concentration, texture, ethylene, colour, shelf-life

Abstract

The effects of postharvest application of 1-methylcyclopropene (1-MCP) on fruit ripening of Chokanan mango were evaluated. Chokanan mango harvested at 11 weeks after fruit set, were exposed to five concentrations of 1-MCP (250, 500, 1000, 2000 and 4000 ppb) for 18 h at 20 °C in sealed containers. Non-treated fruits (0 ppb) were used as control. The fruits were then subjected to 100 ppm exogenous ethylene for 24 h to induce uniform ripening. All the fruits were stored for 13 days at room temperature (27 °C) for ripening and quality evaluation. The results showed that fruits exposed to 1-MCP maintained the quality during storage by delaying the changes in skin and flesh colour, retaining the fruit firmness and slowing down changes in total soluble solid and total titratable acidity contents. However, 1-MCP did not affect weight loss and ascorbic acid content of the fruits. Among the treatments, 500 ppb was the most effective concentration for extending the shelf-life of the fruits by 7 days longer than the non-treated ones without compromising their quality.

Introduction

Chokanan mango (*Mangifera indica* L. cv. Chokanan) is one of the popular fruits in Malaysia. This fruit has good external appearance with yellow skin when ripe and a very sweet taste with total soluble solids content between 14 – 16 °Brix (Zainal Abidin and Tengku Ab. Malik 1996). Because of these attributes, Chokanan mangoes are highly demanded by the local consumers. However, Chokanan mango has a short shelf-life. This is due to the high endogenous ethylene development that hastened ripening and reaches senescence within a few days under ambient temperature (Ahmad Tarmizi et al. 1996).

Under commercial practice, mangoes arrived at the market almost ready for consumption, having only a few days (2 – 3 days) left for marketing and causing high losses and problems to the sellers. To overcome these problems, it is necessary to find techniques to extend the shelf-life of Chokanan mangoes while maintaining the quality. Being a climacteric fruit, extending the shelf-life of mangoes as well as maintaining their quality are directly related to maintenance of low ethylene levels and/or blocking its adverse postharvest effects. As a hormone, ethylene binds to a receptor and the signal is transduced through a complex mechanism to trigger specific biological

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responses (Guo and Ecker 2004). Therefore, by blocking the ethylene receptor sites, it may delay ethylene-dependent responses.

One of the most potent ethylene action inhibitor is 1-methylcyclopropene (1-MCP) (Blankenship and Dole 2003). This compound is a synthetic cyclic olefin which binds to the ethylene receptor with 10 times more affinity than ethylene itself, being more active at much lower concentrations. It has no detectable odour and has not been reported to have any toxic properties (Romero et al. 2007). It has been shown to extend shelf-life and maintain quality of various fruits such as apples, pears and kiwi fruit by blocking the ethylene binding site, so ethylene is unable to bind and elicit the subsequent signals (Blankenship and Dole 2003; Watkins 2010).

Application of 1-MCP at different concentrations, durations and storage temperatures have also been shown to delay a number of quality deterioration processes in tropical fruits such as B₁₀ starfruit (Abdullah et al. 2007), 'Sekaki' papaya (Razali et al. 2007 a, b), 'Eksotika' papaya (Ali and Mamat 2010), red-fleshed pitaya (Novita et al. 2007), 'Berangan' banana (Ding and Darduri 2009) and 'Kampuchea' guava (Ding and Ong 2010). In mangoes, the positive effects of 1-MCP have been shown in several cultivars such as 'Kent', 'Rosa', 'Kensington Pride' (Jiang and Joyce 2000), 'Tainong' (Wang et al. 2009), 'Keitt' (Nghiem and Shiesh 2010), 'Dashehari' (Rupinder et al. 2007) as well as exotic cultivars such as 'Rosa', 'Jasmim' and 'Espada' (Silva et al. 2004). In Southeast Asia, application of 1-MCP on mango has been mainly studied on 'Nam Dok Mai' cultivar which exhibited positive response in delaying ripening and senescence (Rojanapattarakul and Kanlayanarat 2002; Penchaiya et al. 2006; Kramchote et al. 2008), while limited success was observed in 'Khaew Sawoey' cultivar (Piromruen et al. 2009). To the best of our knowledge, the study on the effect of 1-MCP treatment on Chokanan cultivar has not been published.

Therefore, the objectives of this study were to evaluate the effect of 1-MCP on Chokanan mango and to determine the best concentration of 1-MCP required to extend the shelf-life and maintaining the quality of this cultivar.

Materials and methods

Sample preparation

Mango (*Mangifera indica* L cv. Chokanan) were harvested at 11 weeks after fruit set, from a local orchard in Kedah. The fruits were transported to the laboratory at MARDI, Serdang, Selangor. The next morning, the fruits were sorted and only those that were free from defects and of uniform maturity were chosen for the study. All the fruits were washed and dipped into 500 ppm propiconazol solution to control postharvest diseases. After air-dried, the fruits were subjected to 1-MCP treatments.

1-MCP fumigation treatment

Fruits were placed inside a lidded container together with a beaker containing a known amount of 1-MCP needed to generate the required volume of 1-MCP. In this study, six containers, each consisting of 240 mango fruits were exposed to six concentrations of 1-MCP that is, 0 (control), 250, 500, 1000, 2000 and 4000 ppb at 20 °C for 18 h. The container were immediately covered and sealed after adding 20 ml of warm water (20 °C) into the beaker to release the 1-MCP gas. After 18 h, the fruits were then exposed to 100 ppm of exogenous ethylene for another 24 h. This will ensure a uniform ripening process among the fruits.

Packaging and storage

The fruits were then packed into corrugated fibreboard boxes. A total of 20 boxes consisting of 12 fruits per box, were used for every concentration. All the fruits were stored for 12 days at room temperature (27 ± 2 °C, $65 \pm 5\%$ RH) for ripening and quality evaluation. The quality evaluations were performed five times at day 0, 3, 6, 9 and 12 days and four boxes representing

four replicates per treatment were evaluated each time. Day 12 happened to fall on a public holiday and the evaluation was done on the next day.

Skin and flesh colour determination

Skin colour of individual fruit was estimated by measuring the extent of colour changes on the following scale: 1 (green); 2 (trace of yellow); 3 (more green than yellow); 4 (50% yellow); 5 (more yellow than green); 6 (full yellow). Flesh colour was determined according to CIELAB method by using reflectance colorimeter (model CR-400, Minolta, Japan), and data were presented in terms of colour space L^* , a^* , b^* , hue angle (H°) and chroma (C^*) values. L^* is a measure of lightness, where values range from completely opaque (0) to completely transparent (100). a^* is a measure of redness (or $-a^*$ of greenness) and b^* of yellowness (or $-b^*$ of blueness) on the hue-circle. The hue angle [$H^\circ = \arctan(b^*/a^*)$] describes the relative amounts of redness and yellowness where $0^\circ/360^\circ$ is defined for red/magenta, 90° for yellow, 180° for green and 270° for blue color. Chroma [$C^* = (a^{*2} + b^{*2})^{1/2}$] gives further information on the saturation or intensity of color (McGuire 1992; Voss 1992).

Firmness determination

Firmness was measured in the equatorial position of fruit using a texture analyser (Stable Micro Systems, UK) with the 5 mm diameter stainless steel probe. The maximum value recorded by the probe while passing through the fruit to a depth of 10 mm, in Newton (N), was used as firmness of the fruit.

Total soluble solids determination

Total soluble solids of the flesh were determined from the juice of the blended fresh fruit samples using a digital refractometer (Atago Model DBX -55, Japan). Three drops of liquid sample was applied to the measuring surface of the

prism and the results displayed on the LCD panel was recorded in °Brix.

Total titratable acidity determination

Blended pulp samples (5 g) were mixed with 20 ml distilled water and were then titrated against 0.1 M NaOH up to pH 8.1 using a pH meter (Microprocessor pH meter pH 2112/HANNA, USA) as the titrametric indicator. The results were expressed as per cent citric acid according to standard methods (AOAC 1984).

Ascorbic acid determination

Ascorbic acid was determined by extracting 10 g of blended mango sample in 100 ml metaphosphoric acid (HPO_3), then filtered through whatman no 1 filter paper. A volume of 10 ml from filtered solution were determined volumetrically with the 2-6 dichlorophenol-indophenol reagent until a slightly pink colouration was observed and persisted for 15 s (Ranganna 1977). The reading of ascorbic acid content was expressed in mg/100 g fruit sample.

Weight loss determination

The weight loss during storage was determined by calculating the difference in weight at 3, 6, 9 and 13 days of storage and initial weight (day 0). The weight loss is expressed in percentage.

Statistical analysis

A Randomised Complete Block Design (RCBD) was used in this study using six treatments (0, 250, 500, 1000, 2000, 4000 ppb of 1-MCP) with four replications. The fruits were stored for 13 days and quality analysis was done at day 0, 3, 6, 9 and 13. All data were subjected to analysis of variance (ANOVA) and means separation was done using Least Significance Difference (LSD). Statistical analysis was conducted using SAS Software System (version 9.0).

Results and discussion

Changes in skin colour and appearance

The development of the optimum skin colour usually defines the quality of mangoes. The loss of green colour is an obvious sign of fruit ripening in many mango cultivars (Brecht and Yahia 2009). In Chokanan mangoes, the green skin turned to deep/intense yellow colour indicating full ripeness (Vásquez-Caicedo et al. 2002). It can be noted from *Figure 1* that during storage at ambient temperature, all fruits regardless of treatments ripened naturally but at a different pace. The changes in skin colour from green to yellow, during ripening process, can be interpreted as the changes in colour index value from 1 – 6 throughout the storage period (1-green and 6-full yellow). In general, such changes in mango skin colour is attributed to the decreasing chlorophyll content of the skin, concomitantly with an increase in beta carotene as ripening advanced (Ketsa et al. 1999). The fastest change in skin colour was observed in control fruits, where they turned to yellow (colour index 6) within 6 days of storage. Meanwhile, all the 1-MCP-treated fruits started to change colour after day 3 and turned yellow (index 6) at day 13, except for 250 ppb treatment which changed colour after day 1 and reached Index 6 at day 9. Based on these results, it can be seen that 1-MCP treatments at 500 – 4000 ppb

were effective to delay skin colour changes about 7 days longer than non-treated ones. However, fruits treated with 500 – 4000 ppb 1-MCP showed marked differences in external quality. At concentrations of 2000 ppb and 4000 ppb the fruits shriveled and had dull skin colour, whereas fruits treated with 500 ppb and 1000 ppb had a more superior external quality at edible ripened stage. These probably indicated that 1-MCP concentration higher than 1000 ppb would lead to over-dosage and might negatively affect the external quality of Chokanan mangoes.

The effectiveness of 1-MCP to delay ripening-associated skin yellowing was proven by most studies in mango as reported by Rojanapattarakul and Kanlayanarat (2002), Penchaiya et al. (2006), Rupinder et al. (2007), Kramchote et al. (2008), Wang et al. (2009), Nghiem and Shiesh (2010), and many more. In mango, the chlorophyll degradation in fruit skin was mediated through an increase in either or both chlorophyllase and peroxidase (Ketsa et al. 1999). The suppression of these enzyme activities by 1-MCP might explain the delay of colour changes in the treated fruits. Through numerous studies in a wide range of crop species, it was reported that 1-MCP delayed chlorophyll degradation and various types of colour changes of other fruits (Blankenship and Dole 2003).

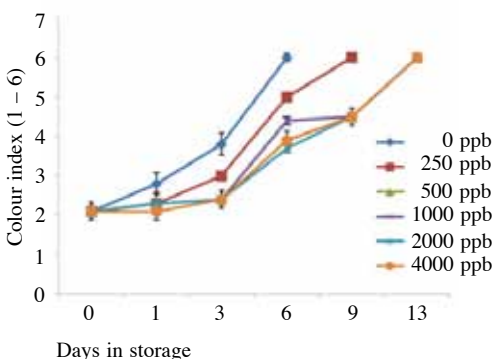


Figure 1. Effect of 1-MCP treatments on skin colour index of Chokanan mango during storage at 25 °C

Changes in flesh colour

Data on flesh colour changes recorded using CIELAB method are presented in *Figures 2 – 4*. Higher a^* and b^* values indicated more reddish and more yellowish surface colour of the flesh respectively, whereas hue angle closer to 90° indicates more yellow, with some red (Plotto et al. 2006).

Regardless of treatments, it was observed that b^* value increased with storage period, indicating an increasing degree of flesh yellowness (*Figure 2*). Control fruits showed a sharp increase in b^* for the first 3 days followed by a slight

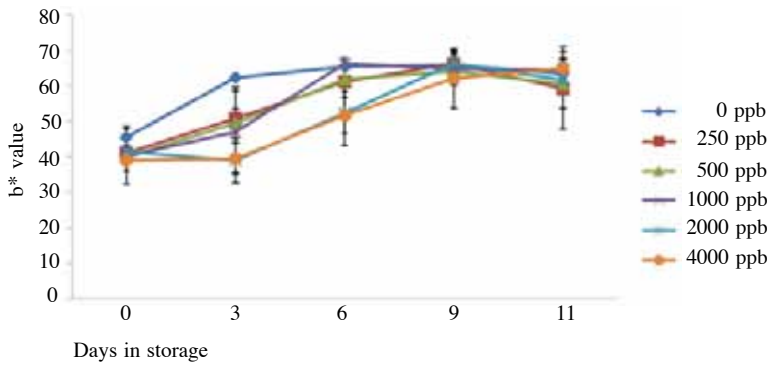


Figure 2. Effect of 1-MCP treatments on b^* values of flesh colour of Chokanan mango during storage at 25 °C

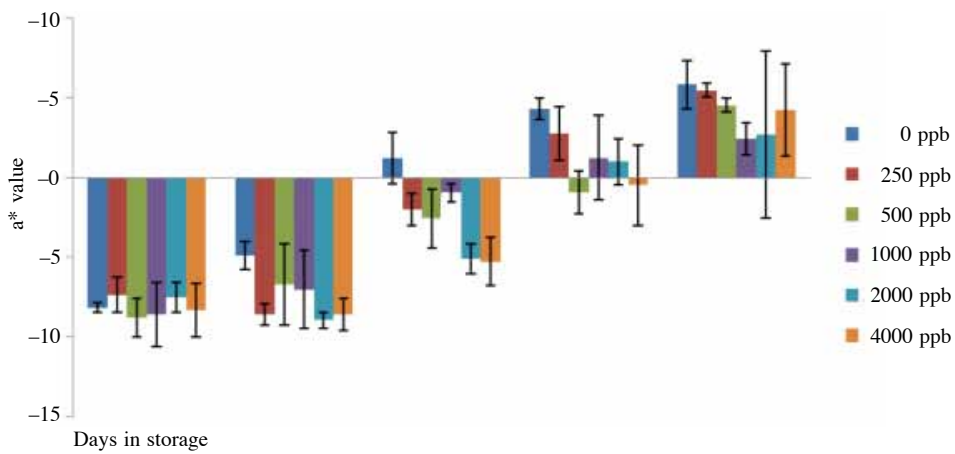


Figure 3. Effect of 1-MCP treatments on a^* value of flesh colour of Chokanan mango during storage at 25 °C

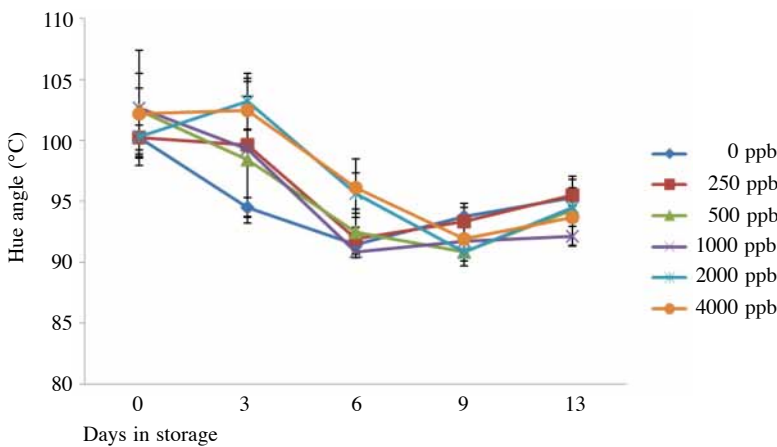


Figure 4. Effect of 1-MCP treatments on hue angle (°) of flesh colour of Chokanan mango during storage at 25 °C

inclination thereafter. The increase in b^* values were slow in 1-MCP treated fruits with a gradual increase until they reached a maximum b^* values at day 9. Of all the treatments, 2000 ppb and 4000 ppb delayed the increase in b^* value the most. Yellowing of flesh started to develop on control fruits within 6 days of storage as indicated by the shifting of $-a^*$ values towards positive values (Figure 3). Only at day 9, the shifting to positive values was observed in all the treated fruits except for 500 ppb and 4000 ppb which were still delayed.

The simultaneous increase of a^* and b^* values resulted in a reduction in hue angle values throughout storage thus denoting the changes of flesh colour from greenish-white towards yellow-orange colour (Figure 4). Similar to the a^* , the hue values of control fruits significantly reduced within 3 days. The reduction was delayed in all treated fruits at different pace. In 250, 500 and 1000 ppb of 1-MCP-treated fruits, they took another 3 days to reach similar values with the control, whereas in 2000 ppb and 4000 ppb treatments, they only reached the value by day 12.

These results showed that 1-MCP treatments could delay the flesh colour changes during storage. Both 2000 ppb and 4000 ppb treatments maintained the low flesh colour index during storage. The colour was fully developed (orange yellow) at the end of storage without

noticeable differences between the treatments. Similar to the skin, flesh colour changes in Chokanan were caused by simultaneous chlorophyll degradation and carotenoid biosynthesis (Kienzle et al. 2011). The delay in flesh colour changes might be attributed to the effectiveness of 1-MCP concentrations in precluding the carotenoid biosynthesis during ripening similar to those reported in papaya (Fabi et al. 2007) and tomato (Moretti et al. 2001). The ability of the treated fruits to develop full flesh colour after the preclusion will ensure the nutritional benefits of carotenoid could be recovered at the end of storage.

Effect of 1-MCP on fruit firmness

There were significant differences in firmness between control and 1-MCP-treated fruits during storage regardless of concentrations used (Figure 5). Irrespective of storage period, fruits treated with 2000 and 4000 ppb had the highest firmness values which were approximately 70% higher than the control. It can be noted from Figure 5, the firmness of control fruits dropped drastically by the third day of storage as the fruits reached the texture of edible ripe stage. This rapid decline in firmness would imply that ethylene action had accelerated the softening of mango. The fruits continued to soften until they reached the unmarketable stage by 6 days of storage, due to senescence. For 1-MCP-

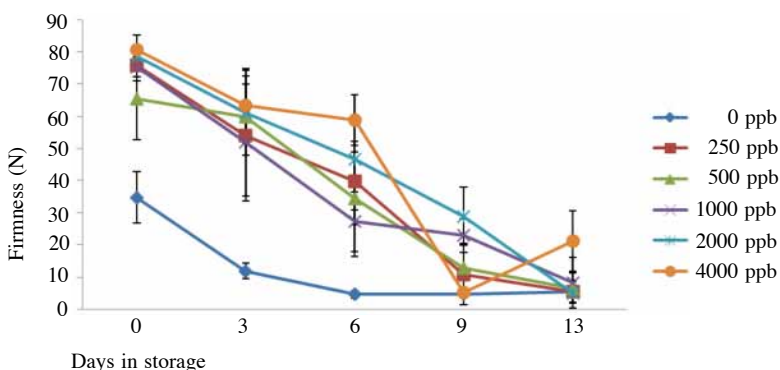


Figure 5. Effect of 1-MCP treatments on fruit firmness of Chokanan mango during storage at 25 °C

treated fruits, distinct differences in firmness were observed after 6 days of storage with 250 ppb and 4000 ppb treatments resulting in the fastest and slowest decline in firmness readings respectively. The 250 ppb treatment was considered unmarketable by day 9 of storage due to over-ripen. By the end of storage (13 days), all the fruits had almost similar firmness value (5 N) except for fruits treated with 4000 ppb 1-MCP which were still unable to reduce to firmness of edible ripen stage.

The results above showed that softening of Chokanan mango was very effectively delayed by 1-MCP, similar to several findings of other mango cultivars. Penchaiya et al. (2006) found that 'Nam Dok Mai' mangoes treated with 250 ppb 1-MCP for 24 h at 25 °C was most effective in delaying softening during storage at 20 °C. Rojanapattarakul and Kanlayanarat (2002) reported that 'Nam Dok Mai' treated with 1000 ppb for 6 h maintained the firmness during storage at 20 °C. Application of 1-MCP at 500 ppb was also relatively more effective than controlled atmosphere storage (3% O₂ + 5% CO₂) in maintaining firmness of 'Nam Dok Mai' at 13 °C (Kramchote et al. 2008).

However, the softening in 'Keaw Sawoey' mangoes was delayed only by controlled atmosphere (3% O₂ and 5% CO₂), while 1-MCP treatment (500 ppb 1-MCP at 25 °C for 16 h) had comparable response as the control (Piromruen et al. 2009). In 'Kensington Pride', Hoffman et al. (2001) reported that 1-MCP could retain firmness in mango, whereas Plotto et al. (2003) reported contrasting result in which fruit firmness was lower in 1-MCP-treated fruits compared to the control. Other workers reported that 1-MCP strongly delayed softening of B10 starfruit (Abdulah et al. 2007), 'Berangan' banana (Ding and Darduri 2009), red-fleshed pitaya (Novita et al. 2007) as well as 'Sekaki' papaya (Razali et al. 2007b) during storage.

Fruit softening is associated with cell wall disassembly (Seymour and Gross

1996), and during fruit softening, pectin and hemicellulose in cell walls undergo solubilisation and depolymerisation which contribute to cell wall loosening (Fischer and Bennett 1991). These wall modifications are likely brought about by action of pectolytic enzymes during ripening such as polygalacturonase (PG), pectinesterase (PE) or galactosidase (Muda et al. 1995). The reduction of softening enzyme activities following 1-MCP treatments has been reported by several researchers. Opiyo and Ying (2010) found that 1-MCP treatment delayed the activities of both cellulase and pectinase in cherry tomato; in which the effect on cellulase appeared to be more pronounced. 1-MCP treatment also completely suppressed increases in PG activity in avocado (Jeong et al. 2002). In 'Sekaki' papaya, β -galactosidase and pectin methylesterase activity was greatly suppressed in 1-MCP-treated fruits as compared to control (Razali et al. 2007b).

Total soluble solid content

Regardless of storage period, control fruits exhibited the highest total soluble solids content (TSS) compared to those treated with 1-MCP. The tremendous increase in TSS content was observed in control fruits within 3 days of storage (*Figure 6*). The TSS content in 1-MCP-treated fruits showed a slow increase but gradually reached a value that was relatively similar to the control fruits by day 9. This showed that the ripening process of the treated fruits was delayed for the first 6 days before resuming thereafter. Of all the 1-MCP treatments, 2000 and 4000 ppb recorded the lowest TSS content. Generally, increase in TSS during fruit ripening was attributed to the increased in enzymes activities responsible for the hydrolysis of starch to soluble sugars (Biale 1960).

TSS in various fruits presented different response, either higher, reduced or unaffected by 1-MCP treatments (Blakenship and Dole 2003). Different cultivars of mango also exhibited different response.

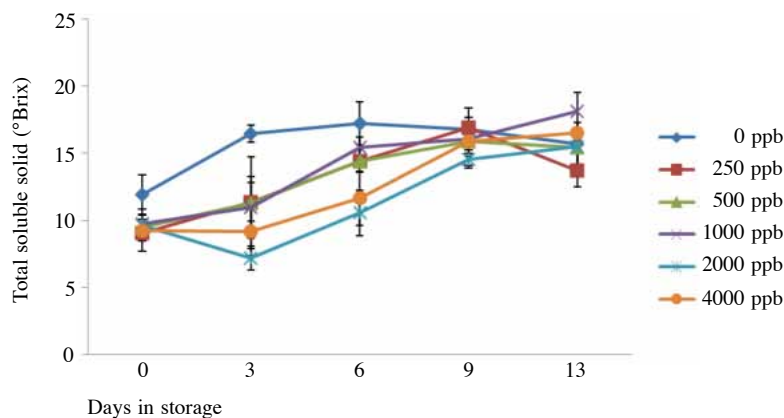


Figure 6. Effect of 1-MCP treatments on total soluble solid content of Chokanan mango during storage at 25 °C

Alves et al. (2004) who studied the effects of postharvest application of 1-MCP on ripening of ‘Tommy Atkins’ harvested at two maturity stages, found that there were no significant delay of TSS accumulation in both maturation stages. Similar results were also reported by Coccozza et al. (2004) who studied the effect of 1-MCP on ‘Tommy Atkins’ stored in MAP; and Hoffman et al. (2001) for ‘Kensington Pride’ mangoes.

Total titratable acidity content

Regardless of storage period, the control fruits had lower total titratable acidity (TTA) values than treated fruits. Concomitant with TSS, the difference in TTA values between control and treated fruits were noticeable after 3 days storage, after which the acidity was sharply depleted by day 8 (Figure 7). Meanwhile a slow decreasing trend was observed in all treated fruits, in which 4000 ppb treatments recorded the highest retention of acidity. The TTA in treated fruits started to decline towards the end of storage. By the end of storage, all the treated fruits reached similarity in TTA values with the control, except for 500 and 4000 ppb which still retained higher acidity values. Generally, the decrease in acidity was due initially to the high rate of loss of citric acid (Medlicott and Thompson 1985), the predominant acid in mangoes (Lizada 1993) which could

be attributed to its conversion into sugars and further utilisation in metabolic process (Rathore et al. 2007). Therefore, the delay in acidity loss was probably due to a reduction in metabolic process following 1-MCP treatment.

In previous studies, the effect of 1-MCP on TTA was not consistent with some crops being affected and others were not (Blakenship and Dole 2003). The TTA values closely corresponded with the pH values. There was significant difference in pH values between control fruits and all the treated ones (Table 1), where the latter regardless of concentrations had lower pH values indicating more acidic fruits. Minimal changes in pH might also be related to a slower rate of respiration and metabolic activities (Jitareerat et al. 2007).

TSS/TTA ratio

The delay in losses in soluble solid and acidity resulted in significantly lower TSS/TTA ratio in 1-MCP-treated fruits as compared to control. As noted in Table 1, the differences in TSS/TTA ratio were not significant among the treated fruits, except for 250 ppb and 4000 ppb. The TSS/TTA ratio is often better related to palatability of the fruits than to either TSS or TTA level alone (Wills et al. 1982). Generally, the increase in TSS without an increase in TTA

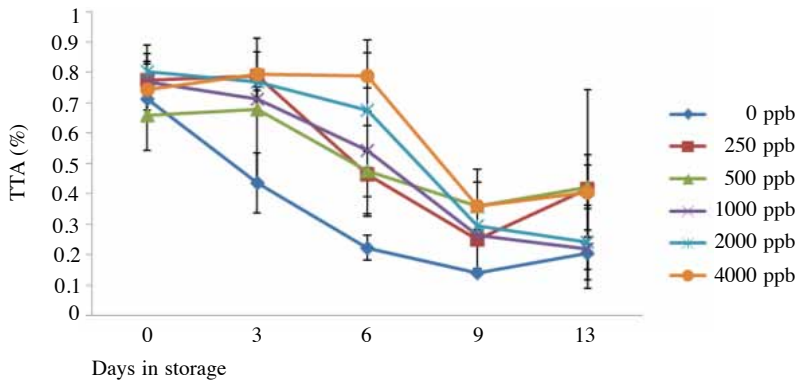


Figure 7. Effect of 1-MCP treatments on total titratable acidity content of Chokanan mango during storage at 25 °C

Table 1. pH, TSS/TTA ratio, ascorbic acid content and weight loss of Chokanan mango subjected to 1-MCP treatments during storage at 25 °C

	pH	TSS/TTA ratio	Vit C (mg/100 g)	Weight loss (%)
1-MCP treatments				
0 ppb	4.36a	67.10a	18.02a	6.79a
250 ppb	4.02b	43.57b	18.35a	6.59a
500 ppb	3.86b	30.45cb	16.49a	6.15a
1000 ppb	4.05b	42.76cb	17.39a	4.57a
2000 ppb	3.88b	33.06cb	17.54a	7.92a
4000 ppb	3.82b	25.94c	17.02a	14.74a
Storage duration (day)				
0	3.42C	13.47C	24.14A	0.00B
3	3.60C	18.42C	19.47B	2.25B
6	3.93B	34.36B	17.14B	13.84A
9	4.43A	69.08A	12.07D	9.14BA
13	4.62A	67.08A	14.52C	13.74A

Means followed by different small letters are significantly different ($p < 0.05$) between 1-MCP treatments and means followed by different capital letters are significantly different ($p < 0.05$) between storage duration

resulted in an increase in the TSS/TTA ratio and led to the fruit tasting sweeter. However, lower TSS/TTA ratio in 1-MCP-treated fruits reported here did not indicate that they had inferior eating qualities. By comparing the ratio specifically at edible-ripe stage for both control and treated fruits which were at day 6 and 13 respectively, it was evident that there was no marked difference among the fruits in terms of the TSS/TTA ratio. This

suggests that 1-MCP could attain the eating quality of fruits at the right stage.

Ascorbic acid content

1-MCP treatments did not affect ascorbic acid content as there was no significant difference between control and treated fruit (Table 1). This was not in agreement with Cocozza et al. (2004) who found that higher ascorbic acid was recorded in

1-MCP-treated ‘Tommy Atkins’ mangoes compared to control, which was due to a larger accumulation of glucose through the reduction of respiration rate by 1-MCP, thus favoring vitamin C synthesis. Interestingly, Islas-Osuna et al. (2010) reported that 1-MCP did not delay ripening and softening in ‘Kent’ mangoes, but the main effect was in reducing the loss of ascorbic acid during storage.

Weight loss percentage

Similar to ascorbic acid, 1-MCP treatments also did not affect the weight loss of Chokanan mangoes (*Table 1*) although it significantly delayed several other metabolic processes. This was in line with the finding on ‘Nahm-Dawg-Mai-Sri-Tong’ mangoes by Chaiprasart and Hansawasdi (2009) who indicated that treatment with 1-MCP in different exposure concentrations and time has no effect on weight loss.

Conclusion

Generally 1-MCP treatment was effective in delaying the ripening and senescence processes of Chokanan mangoes during storage at ambient temperature, as indicated by the slower changes in skin and flesh colour, firmness, TSS and TTA contents. However, there was no significant effect of 1-MCP on weight loss and ascorbic acid content which showed that both parameters were not dependent on ethylene autocatalytic. The 1-MCP action on Chokanan mango presented consistent concentration-dependent response, where the higher concentration generally resulted in greater delay of ripening and senescence processes. Although 2000 ppb and 4000 ppb were better in ripening and senescence inhibition, both treatments resulted in inferior appearance by the end of storage. On the other hand, treatments at 500 ppb and 1000 ppb were found to be effective in delaying ripening and senescence without compromising the overall fruit quality. As both treatments presented similar response to the fruits, 500 ppb is the

recommended 1-MCP concentration since it is more economical, compared to the higher dosage. Treating Chokanan mangoes with 1-MCP at 500 ppb concentration could extend the shelf-life 7 days longer than non-treated fruits at ambient temperature while maintaining fruit quality. Thus, this findings provide greater potentials for more research works especially with treatments extended under lower temperature storage.

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Abstrak

Kesan aplikasi lepas tuai 1-metilsiklopropina (1-MCP) terhadap pemasakan buah mangga Chokanan telah dinilai. Mangga Chokanan yang dituai 11 minggu selepas pembentukan buah, didedahkan kepada rawatan 1-MCP pada lima kepekatan (250, 500, 1000, 2000 dan 4000 bpj) selama 18 jam pada suhu 20 °C di dalam bekas bertutup kedap. Buah tanpa rawatan (0 bpj) digunakan sebagai kawalan. Buah kemudian didedahkan kepada gas etilena pada kepekatan 100 bpj selama 24 jam bagi menggalakkan pemasakan seragam. Kesemua buah disimpan pada suhu bilik (27 °C) sehingga 13 hari bagi tujuan pemasakan dan penilaian kualiti. Keputusan menunjukkan bahawa mangga yang diberikan rawatan 1-MCP berjaya mengekalkan kualiti semasa simpanan dengan memperlahankan perubahan warna kulit dan isinya, mengekalkan kepejal buah serta memperlahankan kandungan jumlah pepejal terlarut dan asid tertitrat. Walau bagaimanapun, 1-MCP tidak memberi kesan signifikan terhadap kehilangan berat serta kandungan asid askorbik dalam mangga. Antara kepekatan 1-MCP yang diuji, 500 bpj didapati paling berkesan dalam memanjangkan hayat simpanan buah selama 7 hari lebih lama berbanding dengan buah yang tidak dirawat dengan 1-MCP, tanpa menjejaskan kualitinya.