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The Effect of Differences In Etefon Concentrations On The Level of Riteness And Quality of Melon (Cucumis Melo L.)

Nugrah Fahera[1], Rismawati[1], Dodi Budirokhman[1]*

[1]Faculty of Agriculture, Gunung Jati Swadaya University, Cirebon, Indonesia

*Correspondence E-mail: dodi.budirokhman@ugj.ac.id

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ABSTRAC

Melons (Cucumis melo L.) are a high-value horticultural commodity that faces challenges in terms of irregular ripening, especially in the Cirebon area and its surroundings. This study aims to evaluate the effect of different concentrations of the growth regulator ethephon on the acceleration of ripening and melon fruit quality. The study was conducted using a completely randomized design with six levels of ethephon concentration (0, 25 ml/L, 50 ml/L, 75 ml/L, 100 ml/L, and 125 ml/L) applied to post-harvest melons, and observations were made on days 2, 4, and 6 of storage. The parameters observed included weight loss, total soluble solids, vitamin C, chlorophyll, anthocyanin, and carotenoids. Meanwhile, the organoleptic test was conducted subjectively using human senses as the primary assessment tool. The results showed that the 75 mL/L concentration provided the best effect on ripening acceleration, as indicated by increased anthocyanin, chlorophyll degradation, and softer fruit texture, as well as high panelist preference. Although the 50 mL/L concentration showed the highest taste and total soluble solids, the optimal quality characteristics were found at 75 mL/L. It is recommended to use ethephon at a concentration of 75 mL/L to accelerate ripening while maintaining optimal melon fruit quality during storage.

Keywords: Etefon, ethylene, riteness, melon

1. INTRODUCTION

Horticultural crops are one of the pillars of national food security. One of the largest horticultural crops in Indonesia is melon. Melon (Cucumis melo L.) belongs to the gourd family or Cucurbitaceae. The edible part is the fruit flesh (mesocarp), which has a soft texture and ranges in color from white to red, depending on the cultivar. This plant has two types of flowers: male and female. The fruit is of the pepo type, with the mesocarp thickening into a juicy flesh. Breeding efforts focus on developing thick, sweet, and aromatic flesh. Melons are also fruits rich in vitamins and minerals beneficial for overall health (Huda et al., 2018).

Melon plants have potential for development, as melons are fast-growing, have economic value, and offer promising prospects (Huda et al., 2018). Melons still hold high appeal for farmers, as they have stable market prices and are not yet widely cultivated. This is because melons offer numerous processing alternatives, such as melon juice, essential oil, flavored beverages, and more. Therefore, melons still present a high market potential.

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The challenge faced by farmers in growing melons, especially in the Cirebon, Indramayu, Majalengka, and Kuningan areas, is the uneven ripeness of the melons. Farmers still rely on longer harvest times so that the melons they plant reach maximum ripeness. However, if farmers continue to rely on longer harvest periods, they face the risk of crop failure caused by pest and disease infestations. However, adjusting fruit ripeness to meet demand and achieve better prices can be achieved by accelerating the ripening process using etefon (ethrel) to ensure the fruit ripens simultaneously (Bintoro, 2009) in (Ifmalinda et al., 2023).

The growth regulator commonly used to accelerate fruit ripening is from the ethylene group, namely the growth regulator ethephon. Ethephon, which contains ethylene as its active ingredient, can be used to accelerate fruit ripening so that harvesting can be done simultaneously, especially for mechanical harvesting systems (Kartika et al., 2012).

Ethylene growth regulators are gaseous and highly volatile, so ethylene is widely sold in the form of Etefon or Ethrel (Wilde, 1971) in research (Ginting et al., 2015). Etefon is the common name recognized by the American Standards Institute for 2-chloroethyl phosphonic acid (Bondad, 1976) in (Ginting et al., 2015). According to Sudjianto (2009) in (Ginting et al., 2015), Etefon is widely used by melon farmers in East Java, particularly in the Ngawi and Madiun regions. To address the issue of incomplete fruit ripening, farmers often use plant growth regulators (PGRs) such as Etefon to accelerate fruit ripening. Etefon is a compound that releases ethylene, a plant hormone involved in the fruit ripening process. Applying etefon to melons can accelerate ripening, increase sugar content, and affect fruit texture. However, different concentrations of etefon applied can produce varying effects on the final quality of melon fruit, including sweetness level, skin color, fruit texture, and vitamin content.

Although the use of ethephon has been applied in the agricultural industry, further research is still needed to determine the optimal concentration that can accelerate ripening without reducing fruit quality. Therefore, this study aims to investigate the effect of varying etefon concentrations on the ripening rate and fruit quality of melons, with application conducted post-harvest to provide farmers with appropriate recommendations for effectively managing the fruit ripening process.

This study is expected to benefit melon farmers by improving the quality of their harvests and supporting more efficient and competitive melon production in the market.

2. MATERIALS AND METHODS

This study was conducted at the Laboratory of the Faculty of Agriculture, Swadaya Gunung Jati University, Cirebon. The study was carried out in June 2025. The materials used in

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this experiment included Honeydew melon fruit of the Amanda F1 variety, iodine pro analysis (PA), ascorbic acid C6H8O6 (PA), distilled water, potassium iodide (KI), acetone C3H6O (PA), and Ethrel (a plant growth regulator containing the active ingredient ethephon at 480 g/l). The equipment used in this experiment included measuring cups, a hand sprayer, label paper, a digital scale, a measuring tape, a bucket, a hand refractometer, and a hygrometer.

This study was conducted using an experimental method with a completely randomized design (CRD). The Ethephon concentration treatments were divided into three levels: K0 (0 ml/litre), K1 (25 ml/litre), K2 (50 ml/litre), K3 (75 ml/litre), K4 (100 ml/litre), and K5 (125 ml/litre). Each treatment was repeated four times, resulting in a total of 24 experimental units. Each experimental unit consisted of 2 melons, resulting in a total of 48 melons in the experimental units. Observations were conducted three times on days 2, 4, and 6 after the application of the Etefon plant growth regulator, resulting in a total of 144 experimental units.

Fruit harvesting was carried out in Ciawijapura Village, Susukan Lebak Subdistrict, Cirebon Regency. Melon harvesting was conducted at 60 days after sowing. Melons were harvested using scissors by cutting the branches and leaving the stem base on the fruit to maintain fruit quality. Harvesting was performed carefully to minimize mechanical damage to the fruit.

The melons used as samples in this study were melons with the same weight, ranging from 1,100 g to 1,400 g per fruit, with fully developed skin covered by a net-like pattern, smooth condition without mechanical damage, and free from pests and diseases. The next step is to transfer the fruit from the field to the laboratory, where the melons are arranged neatly for cooling down for one day.

This experiment began with the preparation of a solution of the growth regulator etefon using the product Ethrel. The solution was prepared in three different concentrations: control (0 ml/litre), 25 ml/litre, 50 ml/litre, 75 ml/litre, 100 ml/litre, and 125 ml/litre, each of which will be applied to the melon fruit according to the specified treatment. The application process was carried out using a direct spraying method on the skin of the melon fruit at the bottom of the fruit. Spraying was done using a hand sprayer, with a total of five hand sprayers for each concentration or treatment. The melons were placed on the floor and sprayed on the lower part of the fruit at a distance of 20 cm, with each treatment sprayed three times. Each concentration had two fruit samples. The melons were stored for 6 days in a room at a temperature of 27-30 °C.

Observations were made on days 2, 4, and 6, including weight loss, total soluble solids, vitamin C content, chlorophyll, anthocyanin, and carotenoid levels. Experimental data were

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analyzed using the F-test in a one-way analysis of variance (ANOVA). If the treatments showed a significant effect, the analysis was continued with the Duncan Multiple Range Test (DMRT) at a 5% significance level, and data analysis was performed using SPSS. Meanwhile, organoleptic testing was conducted subjectively using human senses as the primary evaluation tool.

3. RESULTS AND DISCUSSION

Weight Loss

Stored fruit will undergo a weight reduction process. One of the quality parameters of fresh melons is their weight (Hawari, 2024). Weight reduction in melons can be caused by respiration and transpiration processes. The reduction in weight is primarily due to the dominance of transpiration processes and partially due to respiration processes during the breakdown of sugar into carbon dioxide gas (Sukasih & Setyadjit, 2016).

Fruits that have been separated from the tree will experience weight loss during storage because they have been separated from the tree (Fawaz Fauzan & Dodi Budirokhman, 2025). This also occurs because harvested fruits continue to utilize their food reserves in their metabolic processes, causing the food reserves to decrease continuously and not increase since they have been separated from the tree, thereby accelerating the fruit ripening process (Sumiasih et al., 2016). The effect of varying concentrations of Etefon on melon fruit weight loss can be seen in the following table.

Table 1. The Effect of Different Concentrations of Etefon on Weight Loss

Treatment	Initial/0	Weight Loss (%)					
		2 Day		4 Day		6 Day	
K0 (control)	1.261	1.290	ab	2,083	a	2,878	a
K1 (25 ml/L)	1.398	0,985	a	2,058	a	3,133	ab
K2 (50 ml/L)	1.370	1.555	abc	2,650	a	3,748	b
K3 (75 ml/L)	1.318	2.370	d	4,270	b	6,170	c
K4 (100 ml/L)	1.358	2.117	cd	3,963	b	5,803	c
K5 (125 ml/L)	1.354	1.835	bc	4,060	b	5,903	c

Note: Average figures accompanied by letters in the column indicate significant differences based on Duncan's test at a significance level of 5%.

Based on the results of statistical analysis, it was found that the application of Etefon on melon fruits had a significant effect on fruit weight loss. As shown in Table 1, melon fruits observed 2 days after application of each treatment exhibited significantly different effects for all treatments. Meanwhile, at the 4th and 6th days of observation, treatments K3 (75 ml/L), K4 (100

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ml/L), and K5 (125 ml/L) showed significant differences compared to K0 (control), K1 (25 ml/L), and K2 (50 ml/L). This indicates that after application, the concentration of Etefon resulted in a higher percentage of weight loss compared to the control or those not treated with Etefon. The table above shows that the higher the concentration of Etefon applied to melons, the higher the weight loss of the melons. This is due to the ongoing metabolic processes that cause the weight of the melons to continue decreasing, as well as increased transpiration and respiration in the fruit, leading to weight loss. Weight loss in melons is also influenced by ethylene, which can affect weight loss because ethylene can cause structural changes in cell walls by stimulating the activity of pectinase and cellulase enzymes, leading to cell wall softening. This softening increases cell permeability to water, accelerating water loss and increasing weight loss.

Total Dissolved solids

The high TPT content in longer storage indicates that climacteric fruits require the right storage time after harvesting. This is to ensure that the fruit is sweeter when consumed. The high TPT content after storage is caused by the accumulation of glucose resulting from the faster hydrolysis of carbohydrates compared to the transformation of glucose into energy and H_2O (Amiarsi, 2012). The sweetness of melon fruit is measured using a hand refractometer, with the unit of sweetness being °Brix. The effect of different concentrations of Etefon on the total soluble solids of melon fruit can be seen in the following table.

Table 2. Effect of Different Concentrations of Etefon on Total Soluble Solids

NO	Treatment	Brix Level (%)					
		2 Day		4 Day		6 Day	
1	K0 (Control)	9,275	a	10,000	a	9,200	a
2	K1 (25 ml/L)	9,300	a	10,050	a	10,250	b
3	K2 (50 ml/L)	10,100	a	9,700	a	10,500	b
4	K3 (75 ml/L)	9,925	a	10,650	a	9,650	ab
5	K4 (100 ml/L)	10,050	a	10,200	a	9,750	ab
6	K5 (125 ml/L)	10,050	a	11,275	a	9,050	a

Note: Average figures accompanied by letters in the column indicate significant differences based on Duncan's test at a significance level of 5%.

Based on the results of statistical analysis, it was found that differences in the concentration of Etefon on melon fruit resulted in significant differences in total dissolved solids. In Table 2, observations on the 2nd and 4th days after application showed no significant effect on

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each concentration. However, on the 6th day, treatments K1 (25 ml/L) and K2 (50 ml/L) showed significant differences compared to treatments K3 (75 ml/L), K4 (100 ml/L), K5 (125 ml/L), and K0 (Control). This indicates that treatments K1 (25 ml/L) and K2 (50 ml/L) had high total dissolved solids values because at these concentrations, the fruit underwent ripening supported by the application of ethephon, which has an optimal amount of ethylene to accelerate the ripening process, resulting in higher total dissolved solids values than other concentrations. In K3 (75 ml/litre), K4 (100 ml/litre), and K5 (125 ml/litre), the fruit undergoes a very rapid ripening process, causing the total dissolved solids value to increase, but it decreases again on the sixth day of observation. This decrease occurred because at these concentrations, the melons continued to undergo the ripening process, leading to faster decay compared to other concentrations.

Meanwhile, in the K0 (control) treatment, the ripening process was still slow because the melons still relied on natural ethylene, so it took a long time to ripen, resulting in low total soluble solids. and this is because in the K0 (control) treatment, after the application of the plant growth regulator Etefon, the conversion of starch into sugar still proceeds slowly, so the results do not show a significant effect (Hawari, 2024). This may also be due to the effect of ethylene on sweetness or total soluble solids, as ethylene stimulates the activity of enzymes such as amylase, invertase, and sucrase, which convert starch and disaccharides into simple sugars (glucose, fructose, and sucrose) (Xia et al., 2020). This process increases the free sugar content in the fruit tissue, enhancing the fruit's sweetness.

Vitamin C

Vitamin C is a micronutrient required for bodily metabolism. In addition, this vitamin also plays a role in maintaining and supporting the immune system (Dermawati, 2021). Based on the results of statistical analysis, there were no significant differences in Etefon concentration across all treatments. Vitamin C content in melons with different Etefon concentrations.

Table 3 Effect of Different Concentrations of Etefon on Vitamin C Content

NO	Treatment	Vitamin C (mg/100g)
1	K0 (Control)	6.18 a
2	K1 (25 ml/L)	5.06 a
3	K2 (50 ml/L)	6.44 a
4	K3 (75 ml/L)	5.07 a
5	K4 (100 ml/L)	6.53 a
6	K5 (125 ml/L)	5.84 a

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Note: Average figures accompanied by letters in the column indicate no significant difference based on Duncan's test at a significance level of 5%.

Based on the table above, it can be seen that the application of Etefon at different concentrations did not result in statistically significant differences. This indicates that the vitamin C content in melons observed up to day 6 showed no significant changes, both in the control treatment and in the various Etefon concentration treatments. This condition is likely due to the melons being in the early stages of ripening, where metabolic activity has not yet reached its peak. During this phase, the synthesis and degradation of vitamin C have not yet proceeded intensively. According to Kim & Lee (2018), vitamin C content tends to remain stable during the early stages of ripening because the activity of oxidizing enzymes such as ascorbate oxidase is still low, and the relatively acidic pH of the fruit can inhibit rapid degradation of vitamin C. However, there is a certain descriptive trend. The highest vitamin C content was recorded in treatment K4 (100 ml/L), followed by K2 (50 ml/L), and the control (K0). Meanwhile, treatments K1 (25 ml/L), K3 (75 ml/L), and K5 (125 ml/L) showed lower vitamin C content.

The application of ethephon at doses ranging from 25 to 125 ml/L has not shown a sufficiently strong effect in inducing significant physiological changes, including changes in vitamin C content. Ethephon, as an ethylene-releasing compound, requires time and an effective dose to induce increased respiration and subsequent metabolic processes, particularly during the advanced stages of ripening when respiratory activity and the degradation of bioactive components have increased. Therefore, the actual effect on vitamin C content tends to occur only after the sixth day, as the physiological ripening process progresses.

Color Changes

Inside chloroplasts, there is not only chlorophyll, which is the substance that causes the green color of leaves. Chloroplasts also contain other color pigments, namely carotenoids, phycocyanin, phycoerythrin, and fucoxanthin. Each of these pigments has a different color, and each leaf has one dominant type of chloroplast. Leaves contain chlorophyll, which is why they are green. The following is the effect of applying Etefon on melon fruit.

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Table 4 Effect of Different Concentrations of Etefon on Chlorophyll a and b Levels

NO	Treatment	Chlorophyll a and b (mg/g)			
		2 Day		6 Day	
1	K0 (Control)	0,892	a	1,1663	c
2	K1 (25 ml/L)	0,939	a	0,7610	bc
3	K2 (50 ml/L)	0,912	a	0,8235	c
4	K3 (75 ml/L)	0,729	a	0,3365	ab
5	K4 (100 ml/L)	0,867	a	0,3250	ab
6	K5 (125 ml/L)	0,769	a	0,2868	a

Note: Average figures accompanied by letters in the column indicate significant differences based on Duncan's test at a significance level of 5%.

Based on the table above, it can be seen that Etefon at different concentrations has a significant effect on the chlorophyll content of melon fruit skin. In Table 4, in the observation 2 days after application, all treatment concentrations did not have a statistically significant effect. However, at the 6-day observation period after application, the concentrations K3 (75 ml/L) and K4 (100 ml/L) differed significantly from the control (K0), K1 (25 ml/L), K2 (50 ml/L), and K5 (125 ml/L) treatments. This indicates that, based on the research results, there was a significant decrease in chlorophyll content 6 days after application, particularly in treatments with high ethephon concentrations. This decrease in chlorophyll content suggests that ethephon plays a role in accelerating chlorophyll degradation as concentration increases. This statement is supported by the mechanism of action of ethephon as an ethylene precursor compound. After application, ethephon releases ethylene gas within the fruit tissue, which then induces the activity of chlorophyll-degrading enzymes such as chlorophyllase, Mg-dechelatase, and pheophytinase. These enzymes play a crucial role in the chlorophyll degradation process during fruit ripening, which is visually evident by the color change of the skin from green to yellowish-green or yellow.

In line with the statement by Hendgen et al. (2021), which states that ethephon treatment causes premature chlorophyll degradation in leaves from the fifth day after treatment, the chlorophyll index in grape leaves treated with ethephon was significantly lower than in control leaves. The chlorophyll index of ethephon-treated leaves continued to decline over 14 days until premature leaf fall on September 26. The chlorophyll index of control leaves began to decline due to leaf senescence, which occurred approximately three weeks later than in ethephon-treated leaves. The rate of degradation and duration of the color change process were comparable between ethephon-treated leaves and those undergoing natural senescence.

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Anthocyanins are natural compounds that accumulate in vacuoles and are responsible for the red, blue, and purple colors in fruits, vegetables, flowers, and other plants. These compounds are also often found in leaves, stems, seeds, and other tissues. Generally, pigments derived from pelargonidin and cyanidin produce red and purple colors in sequence, while delphinidin pigments exhibit purple or blue colors.

Table 5. Effect of Different Concentrations of Etefon on Anthocyanin Content

NO	Treatment	Anthocyanin (mg/g)			
		2 Day		6 Day	
1	K0 (Control)	0,04075	a	0,01850	a
2	K1 (25 ml/L)	0,06475	a	0,01800	a
3	K2 (50 ml/L)	0,07250	a	0,02700	ab
4	K3 (75 ml/L)	0,08300	a	0,04650	b
5	K4 (100 ml/L)	0,04725	a	0,02775	ab
6	K5 (125 ml/L)	0,04725	a	0,02375	a

Note: Average figures accompanied by letters in the column indicate significant differences based on Duncan's test at a significance level of 5%.

Based on the table above, it shows that the application of Etefon at different concentrations significantly affects the anthocyanin content of melon fruit skin. In Table 5, it is observed that two days after application, all treatment concentrations did not have a statistically significant effect. However, at the 6-day observation point after treatment application, treatment K3 (75 mL/L) showed a significant difference compared to treatment K0 (Control), K1 (25 mL/L), K2 (50 mL/L), K4 (100 mL/L), and K5 (125 mL/L). This indicates that a concentration of 75 mL/L is the most effective dose for enhancing anthocyanin synthesis. Lower concentrations (25–50 mL/L) did not elicit a maximal response, while higher concentrations (100–125 mL/L) may have caused saturation effects, resulting in outcomes no higher than the optimal dose. These results support the existence of an optimal dose at 75 mL/L to achieve maximum anthocyanin synthesis. Observations of anthocyanin content in melon fruit peel showed that the application of Etefon at the observed concentration two days after application did not significantly affect the dynamics of anthocyanin pigment levels during ripening. This indicates that in the early stages of storage, the anthocyanin content was not significantly affected by the concentration of ethephon. This is reasonable because anthocyanins are pigments that typically accumulate during the ripening process and are influenced by the length of time the plant responds to ethylene. This initial increase is also likely caused by mild physiological stress due to ethephon treatment, which triggers anthocyanin synthesis as a plant defense response to external conditions.

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Carotenoids absorb light at wavelengths of 400-550 nm. Carotenoids can form naturally in plants such as fruits and vegetables, and are also found in algae and aquatic organisms. In general, it can be said that all photosynthetic organisms (including algae, plants, and cyanobacteria) and some non-photosynthetic bacteria and fungi can produce carotenoids during their metabolic processes.

The presence of carotenoids in plants is generally known from the colors found in the plants, such as orange or red, but not only orange or red plants contain carotenoids; dark green plants also contain carotenoids. In green-leaved plants, the presence of carotenoids is more related to their function in the photosynthesis process, where carotenoids are found within chloroplasts. The presence of carotenoids in green plants does not contribute to the color of the carotenoids themselves. This may be due to the carotenoid color being masked by the high concentration of chlorophyll in green plants.

Table 6. Effect of Different Concentrations of Etefon on Carotenoid Levels

NO	Treatment	Carotenoid (mg/g)			
		2 Day		6 Day	
1	K0 (Kontrol)	0,23450	a	0,28800	c
2	K1 (25 ml/L)	0,30325	a	0,21850	abc
3	K2 (50 ml/L)	0,24050	a	0,26075	bc
4	K3 (75 ml/L)	0,32050	a	0,17225	ab
5	K4 (100 ml/L)	0,30650	a	0,13975	a
6	K5 (125 ml/L)	0,23125	a	0,13075	a

Note: Average figures accompanied by letters in the column indicate significant differences based on Duncan's test at a significance level of 5%.

Based on the table above, it shows that the application of Etefon at different concentrations significantly affects the carotenoid content of melon fruit skin. In Table 6, it is observed that two days after application, all treatment concentrations did not have a statistically significant effect. However, at the 6-day observation point after treatment application, treatment K0 (Control) showed a significant difference compared to treatments K4 (100 ml/L) and K5 (125 ml/L), but no significant difference compared to treatments K1 (25 ml/L), K2 (50 ml/L), and K3 (75 ml/L). This indicates that before the etefon treatment showed its full physiological effect, carotenoid formation had not yet been significantly affected.

This decrease indicates that ethephon, as a precursor of ethylene, accelerates ripening and stimulates the activity of carotenoid-degrading enzymes such as carotenoid cleavage dioxygenase (CCD), which breaks down carotenoid compounds into apocarotenoid derivatives. This is

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supported by research findings (Hu et al., 2018) reporting that etefon application on orange peel causes a decrease in β-carotene and lutein due to increased activity of carotenoid-degrading enzymes.

Thus, the application of the plant growth regulator ethephon affects the carotenoid content of melon peel, particularly at high concentrations that accelerate pigment degradation. This is important to note because carotenoids play a role in fruit visual quality and serve as indicators of nutritional value and ripeness.

Organoleptic Test

The observation of these melons was conducted using organoleptic testing on the variables of color, taste, and texture. Organoleptic testing is a method used to test the quality of a material or product using the human senses. In this case, the aspects tested were color, taste, and texture. The testing was conducted by 10 researchers with the following criteria: minimum age of 20 years or older, both male and female, and not currently suffering from the flu or any impairments in taste or vision. The evaluation of color, taste, and texture of the melon fruit was based on the scoring system.

Organoleptic Color

Color is the first impression that appears and is assessed by the panelists. Color is the first organoleptic parameter in presentation. Color is the first impression because it uses the sense of sight. An attractive color will entice the panelists or consumers to taste the product (Arziyah et al., 2022). The color observation standards for melons are: (1) Green, (2) Greenish-white, (3) White, (4) Yellowish-white.

Table 7. Color scores for each treatment using the organoleptic test scoring system

No	Variable	Treatment	Average
1	Color	K0 (control)	1,9
2		K1 (25 ml/litre)	1,9
3		K2 (50 ml/litre)	2,5
4		K3 (75 ml/litre)	3,0
5		K4 (100 ml/litre)	2,8
6		K5 (125 ml/litre)	3,2

The table above shows that out of 10 panelists, the preferred fruit color was melon at concentrations of 125 ml/litre of water, 100 ml/litre of water, and 75 ml/litre of water. At these concentrations, the melon flesh is white, as white melon flesh indicates that the fruit is ripe. This is because climacteric fruits can undergo color changes during the ripening process. The initial color of melon flesh is green, and as the ripening process progresses, the flesh color changes to white or

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white-yellowish. This color change in the fruit flesh occurs due to pigment breakdown as the respiratory process in the fruit progresses, particularly in melons treated with high doses of Etefon. This is supported by research by Haruna & Mudaffar (2024), which found that the use of Etefon causes the green color in the fruit flesh to change more quickly to a yellowish-white color, due to the breakdown of chlorophyll and the formation of carotenoids. This color change also indicates that the fruit has reached maturity.

Organoleptic Taste

Taste is the main factor influencing the quality of melons. Taste is also a consumer preference in consuming melons. Taste in this organoleptic test refers to the sweetness level of melons. Researchers were asked to taste the melons. The taste of ripe melons changes from bland to sweet (Ifmalinda et al., 2023). The following table shows the results of the organoleptic taste test on melons. The taste observation standards for melons are: (1) Not sweet, (2) Slightly sweet, (3) Sweet, (4) Very sweet.

Table 8. Taste scores for each treatment using the organoleptic test scoring system

No	Variable	Treatment	Average
1	Taste	K0 (control)	1,1
2		K1 (25 ml/litre)	2,2
3		K2 (50 ml/litre)	2,5
4		K3 (75 ml/litre)	1,9
5		K4 (100 ml/litre)	1,8
6		K5 (125 ml/litre)	1,9

The table above shows that out of 10 panelists, the preferred taste of melon fruit was melon with a concentration of 50 ml/litre, with an average score of 2.5, followed by melon with a concentration of 25 ml/litre of water, with an average score of 2.2. These values indicate that melon fruit has a sweet to moderately sweet taste. As for the evaluation of melons not treated with Etefon or the control group, they were not sweet because in the control group (K0), the melons were still unripe. Therefore, the process of starch conversion into sugar was still proceeding slowly (Hawari, 2024). At concentrations of 75 ml/litre, 100 ml/litre, and 125 ml/litre of water, the average values were 1.8 to 1.9, which were lower than those at 50 ml/litre and 25 ml/litre. This occurs because although ethephon or ethylene is effective in accelerating ripening, if applied at excessive concentrations, it can have negative effects on fruit quality, such as reduced texture, sweetness, and flavor. Ethephon application can also increase respiration rate and water uptake by the fruit, resulting in a decreased sugar-to-fluid ratio, thereby reducing sugar concentration.

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Organoleptik Texture

In organoleptic testing, the texture of melons refers to the physical perception felt when the fruit is touched, bitten, and chewed. This assessment includes aspects such as softness, crispness, and the juiciness of the fruit flesh. To determine this, testers are asked to feel the texture of the melon using their sense of touch and taste. The texture observation standards are as follows: medium texture, soft fruit flesh, and full ripeness level: (1) Hard, (2) Slightly hard, (3) Soft, (4) Very soft. The following table shows the results of the organoleptic texture test.

Table 9. Texture scores for each treatment using the organoleptic test scoring system

No	Variable	Treatment	Average
1	Texture	K0 (control)	1,4
2		K1 (25 ml/litre)	2,4
3		K2 (50 ml/litre)	2,6
4		K3 (75 ml/litre)	3,1
5		K4 (100 ml/litre)	3,2
6		K5 (125 ml/litre)	3,4

The table above shows that out of 10 panelists, the preferred texture of melon fruit was observed at concentrations of 75 ml/liter, 100 ml/liter, and 125 ml/liter of water, because melons treated with Etefon at these concentrations have a texture that falls into the soft category. Melons of good quality, particularly the Amanda Tavi F1 variety, have a soft or tender texture. This is supported by the texture of honeydew melons, particularly the Amanda Tavi F1 variety, which has a soft texture with varying flesh colors (Daniel, 2017). This may also be due to the role of ethylene in stimulating the activity of pectinase and cellulase enzymes, which cause cell wall softening. Therefore, the application of ethephon on melons at a certain concentration causes accelerated fruit softening and a decrease in crude fiber content.

Meanwhile, at concentrations of 25 ml/liter, 50 ml/liter, and control, the values fell into the hard and somewhat hard categories. This was because the fruit softening process was slow, as the softening process of melons depends on the amount of ethylene content. (Zheng et al., 1994) added that the genetic expression of polygalacturonase PG, one of the enzymes involved in cell wall degradation that causes fruit softening, is an enzyme that is not dependent on ethylene. Melons are non-climacteric fruits, meaning that the application of ethylene or ripening agents only affects chlorophyll degradation and color changes in the fruit (Kader, 1999).

Organoleptic Preference

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In this test, panelists were asked to provide personal responses regarding attributes such as color, taste, and texture of melons with descriptive assessments. The preference observation standards were: (1) Strong dislike, (2) Dislike, (3) Like, (4) Strong like.

Table 10. Preference scores for each treatment using organoleptic test scoring

No	Variabel	Treatment	Average
1	Preference	K0 (control)	1,9
2		K1 (25 ml/litre)	2,7
3		K2 (50 ml/litre)	3,3
4		K3 (75 ml/litre)	3,0
5		K4 (100 ml/litre)	2,7
6		K5 (125 ml/litre)	2,5

The table above shows that out of 10 panelists, the panelists' organoleptic assessment or conclusion preferred melons with concentrations of 50 ml/L and 75 ml/L with scores of 3.0 to 3.3, which falls into the “like” category. This indicates that the 50 ml/L and 75 ml/L treatments have a balanced combination of fruit color, taste, and texture. The lowest preference rating was obtained in the treatment with a concentration of 0 ml/L or the control. This is because the melon fruit, as seen from its green color, unsweet taste, and hard texture, indicates that the melon has not yet reached maturity.

4. CONCLUSION

Based on the results of the study conducted, the effect of different concentrations of Etefon on the ripeness and quality of melon fruit (Cucumis melo L.) can be summarized as follows:

The research results indicate that the application of Etefon at various concentrations has a significant effect on several quality and ripeness parameters of melon fruit, including weight loss, total soluble solids (TSS), color change, chlorophyll degradation, anthocyanin and carotenoid content, and fruit texture. Some parameters, such as vitamin C, did not show statistically significant differences, but descriptively still showed a consistent pattern consistent with the effects of Etefon. Organoleptic tests also indicated that Etefon treatment influenced panelists' evaluations of color, taste, texture, and overall preference for melon fruit.

The 75 ml/L treatment yielded the best results for several key parameters, such as fruit texture (softest and most preferred by panelists), chlorophyll degradation, anthocyanin, and carotenoid levels (most effective in inducing skin color changes). Although the TPT value and organoleptic taste were highest at 50 ml/L, the overall combination of fruit quality attributes (color, texture,

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preference level, and physiological ripeness) made the 75 ml/L concentration the optimal treatment for accelerating ripening while maintaining the overall quality of the melon fruit.

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