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THE EFFECT OF ETHREL SOLUTION IN RIPENING PROCESS ON THE QUALITY OF PAPAYA FRUIT (*Carica papaya* L)

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Abstract
Papaya fruit is one source of vegetable protein. This fruit is often cultivated because of its considerable benefits for health. In addition to cultivating papaya plants, farmers also often ripening papaya fruit that has been harvested using ethrel solution. This study aims to describe the effect of The Addition of ethrel solution on the quality of papaya fruit. This research is an experimental study consisting of 5 treatments and 3 replications with a test model that is an organoleptic test to measure the quality of papaya fruit. Research data presented descriptively. The results showed that administration of Ethrel solution affected the quality of papaya fruit with optimal concentration in the treatment of P3 or 0.6% Ethrel per liter of water. Papaya fruit has the best color, texture, and taste in the P3 treatment when compared with the P0, P1, P2, P4, and P5 treatments. The best length of days in the ripening process is five days.
Keywords: *Ethrel Solution, Papaya Fruit, Ripening Process*

INTRODUCTION

Papaya plants are plants that are quite widely cultivated in Indonesia. The fruit and leaves are two things that are often used by people for consumption. Papaya is classified into a type of fruit that is quite popular, especially in countries with tropical climates (Ridhyanty *et al*., 2015).

Papaya fruit can be a fruit that is quite popular because this fruit has several advantages. Among them are ripe fruits that have a sweet taste and soft texture. In addition this fruit also has good physical endurance. Papaya fruit is not easily damaged or destroyed if transported on long trips, for example, outside the city (Tumembow *et al*., 2018).

At this time the prospects and potential of papaya fruit plantations are still wide open and promising for farmers as the main business that has great opportunities. This is because papaya fruit production is still lacking and demand for papaya fruit is quite high. Finally, it is needed a mass of papaya ripe massively to be distributed by wholesalers. Because the production of ripe papaya fruit is still lacking but the demand is quite high, especially at certain times such as Ramadan or the dry season, to increase the yield of ripe fruit both in quality and quantity on a large scale, papaya farmers in the *Landasan Ulin* are planting papaya using regulators growth with the trademark "Ethrel".

The known compound based on field observations named ethrel is a Growth Regulatory Substances (ZPT), which is the only hormone that consists of only one substance, namely ethene or ethylene. Ethene or ethylene is the simplest alkene compound (Ginting and Heddy, 2015). This is because, it only consists of 2

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carbon atoms, and 4 hydrogen atoms or C_2H_4. These elements are connected by double bonds (Novita *et al*., 2015).

In plants, ethylene compounds are found in gaseous form so that it is also called ethylene gas. In fruit, the decomposition process releases this gas, because this gas is produced by plants to carry out the process of *senesens* / withering. The *senesens* process is an irreversible ripening process or an initial step towards the decay process, so ethylene plays a role in fruit maturation (Ginting and Heddy, 2015). Based on this background study, a study was conducted aimed at identifying and describing the effect of The Addition Ethrel solution in the ripening process on the quality of papaya fruit *(Carica papaya* L).

MATERIALS AND METHODS

This study used an experimental method with independent variables namely the concentration of ethrel and the dependent variable determined based on the color, texture and taste of the fruit consisting of 5 treatments and 3 replications. Each treatment consisted of 3 papaya with an average weight of 2–3 kg with concentrations that can be seen in the following Table 1,

Table 1. Research Design

No.	Treatment	Concentration	Water
1.	P0	0 ml	500 ml
2.	P1	1 ml	500 ml
3.	P2	2 ml	500 ml
4.	P3	3 ml	500 ml
5.	P4	4 ml	500 ml
6.	P5	5 ml	500 ml

The study population was papaya fruit in the papaya plantation in Landasan Ulin, samples were taken at random and cultivated the fruit picked was a uniform fruit both in terms of color and texture. This research was conducted on May 26 2014 to June 15, 2014 in the papaya plantation owned by Mr. Along on Jl. Caraka Jaya, Kelurahan Landasan Ulin Utara, Liang Anggang District, Banjarbaru City.

This research was conducted in the following stages:

1. Harvest papaya fruit in the afternoon with an average weight of 2–3 kg, fruit selection and picking is done by experienced garden owners, fruit samples are taken at random with green characteristics with a little yellow line on the outer skin that indicates Papaya fruit is old and ready to be harvested.
2. Prepare papaya fruit as much as 5 treatments. Stick the label sticker as a treatment marker, place the fruit in a dry place with a cardboard base.
3. Prepare the spray tool then measure the ethrel and water solution according to the study design (see Table 1), spray the solution on each papaya fruit sample with a storage time of 5 days at room temperature (25–27ºC).
4. Observations are made every day on the color and texture while the taste / sweetness level is done on the 3rd day after the treatment. Observations using visual evaluation methods based on human judgment by using a score indicator using the organoleptic test table format

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5. The organoleptic test table format was filled by 15 panelists then gave an assessment of the color and texture criteria based on the existing score indicators, while the taste / level of sweetness assessment was carried out to determine glucose levels in papaya fruit.

Analyzing data obtained from panelists by using simple descriptive statistics to determine the effect of The Addition ethrel on the ripening process on the quality of Bangkok papaya fruit *(Carica papaya* L).

RESULT AND DISCUSSIONS

Initial observations were made to determine the condition of storage of papaya fruit before Ripening. For the color parameters are on the score indicator 2 (green with a little yellow line). For the texture parameters are on the indicator score 4 (hard). For the taste parameter is the indicator score 1 (not sweet or *sepat*).

The summary of the results from organoleptic tests on the colors of treated papaya can be seen in Table 2 below.

Table 2. Results of color observations on the day after treatment.

No.	Day After Treatment (1)	First Repetition	Second Repetition	Third Repetition
1.	P0	2	2	2
2.	P1	2	2	2
3.	P2	2	2	2
4.	P3	2	2	2
5.	P4	2	2	2
6.	P5	2	2	2
No.	Day After Treatment (2)	First Repetition	Second Repetition	Third Repetition
1.	P0	2	2	2
2.	P1	2	3	3
3.	P2	2	3	3
4.	P3	2	3	3
5.	P4	2	2	2
6.	P5	2	3	3
No.	Day After Treatment (3)	First Repetition	Second Repetition	Third Repetition
1.	P0	2	2	2
2.	P1	3	4	4
3.	P2	2	1	1
4.	P3	4	4	4
5.	P4	3	3	3
6.	P5	2	3	3
No.	Day After Treatment (4)	First Repetition	Second Repetition	Third Repetition
1.	P0	3	3	3
2.	P1	1	1	1
3.	P2	4	1	1
4.	P3	4	4	1
5.	P4	4	1	1

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No.	Day After Treatment (1)	First Repetition	Second Repetition	Third Repetition
6.	P5	3	2	2
No.	Day After Treatment (5)	First Repetition	Second Repetition	Third Repetition
1.	P0	2	2	2
2.	P1	1	1	1
3.	P2	2	1	1
4.	P3	2	2	1
5.	P4	4	1	1
6.	P5	3	2	2

Information:
DAT = Day After Treatment
Score 1 = not good / brownish yellow green, brownish yellow, moldy and foul
Score 2 = not good / green with a little yellow and perfect yellow
Score 3 = good enough / green is more than yellow
Score 4 = good / yellow more than green

In Table 2, the color observations obtained the following results:

1. DAT 1: In the table above it can be seen that there is no change in color in all treatments (score 2).
2. DAT 2: In the treatment of P1, P2, P3 and P5 there is a color change that starts to be seen from score 2 on DAT 1 to score 3.
3. DAT 3: in P0 (control) the color still does not change significantly from the previous day, in P1 with scores 2 and 1, P2 on scores 2 and 1 but there are brownish spots such as moldy, on P3 the colors look attractive (score 4) , in P4 the color of the fruit looks yellowish green (score 3), in P5 there are scores 2 and 3 with brownish spots like mold.
4. DAT 4: P0 starts to turn yellowish green (score 3), in P1 the color turns brownish yellow with white spots such as moldy, in P2 there is still a greenish yellow color (score 4 / repetition 1) and brownish yellow with mushroom spots (score 1 / 2nd repetition and score 5 / 3rd repetition), at P3 the color is still at score 4 and still looks attractive, at P4 although there is a greenish yellow color (score 4 / 1st repetition) but the color of the fruit is not attractive and brownish yellow color with fungal spots on 2nd Repetition and 3rd Repetition (score 1), on P5 the color of yellow fruit with a slight patch of fungus.
5. DAT 5: in P0 the color turns attractive yellow but it takes 5 days to obtain the color, in P1 the color turns brownish yellow but full of mushrooms, P2 the color of the fruit begins to turn brownish yellow with mold and rot, in P3 there are 2 fruit colors yellow is still interesting, but there are already brownish yellow with fungus patches, in P4 the color of the fruit is brownish yellow with a full of mushrooms, in P5 the color of the fruit is brownish yellow with fungus patches.

The summary of the results from organoleptic tests on the texture of treated papaya can be seen in Table 3 below.

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Table 3. Results of texture observations on the day after treatment

No.	Day After Treatment (1)	First Repetition	Second Repetition	Third Repetition
1.	P0	4	4	4
2.	P1	4	4	4
3.	P2	4	4	4
4.	P3	4	4	4
5.	P4	4	4	4
6.	P5	4	4	4
No.	Day After Treatment (2)	First Repetition	Second Repetition	Third Repetition
1.	P0	4	4	4
2.	P1	4	3	3
3.	P2	4	2	4
4.	P3	4	4	4
5.	P4	4	3	4
6.	P5	4	1	3
No.	Day After Treatment (3)	First Repetition	Second Repetition	Third Repetition
1.	P0	4	4	4
2.	P1	3	2	2
3.	P2	4	3	3
4.	P3	4	4	3
5.	P4	4	2	3
6.	P5	4	3	3
No.	Day After Treatment (4)	First Repetition	Second Repetition	Third Repetition
1.	P0	4	4	4
2.	P1	3	1	2
3.	P2	4	1	3
4.	P3	4	4	3
5.	P4	3	1	1
6.	P5	4	3	3
No.	Day After Treatment (5)	First Repetition	Second Repetition	Third Repetition
1.	P0	4	3	4
2.	P1	1	1	1
3.	P2	4	1	3
4.	P3	4	4	1
5.	P4	3	1	1
6.	P5	4	3	3

Information:
DAT = Day After Treatment
Score 1 = not good / soft
Score 2 = not good / soft enough
Score 3 = good enough / a bit hard
Score 4 = good / hard

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In Table 3, texture observations the following results are obtained:

1. DAT 1: It can be seen that there is no change in texture in all treatments (hard).
2. DAT 2: There is no change in texture at P0 and P3 (hard) and slight changes in P1, P2, P4 and P5 (slightly hard).
3. DAT 3: at P0 there is no change in the fruit texture (hard), in P1 the fruit texture becomes rather hard and somewhat soft, in P2 the fruit texture is still hard and somewhat hard, in P3 the fruit texture is still in a hard and somewhat hard, in P4 the fruit texture is hard, somewhat hard and somewhat soft, and in P5 the fruit texture is still hard and somewhat hard.
4. DAT 4: in P0 the fruit texture is still hard, in P1 the fruit texture becomes rather hard, soft and somewhat soft but looks brown spots so it can be said to be in a state of decay and withered, in P2 the fruit texture is hard, soft and rather hard, at P3 fruit texture is still the same as hsp 2, in P4 the fruit texture is in a soft / rotten state but the color is not yet perfect yellow, in P5 the fruit texture is still hard and rather hard the same as DAT 3.
5. DAT 5: in P0 the texture remains hard and somewhat soft, in P1 the fruit texture becomes very soft and rotten, in P2 the fruit texture is hard, very soft or rotten, and rather hard but has moldy because of taste, in P3 there are 2 treatments are still good and 1 fruit is very soft or rotten, the texture of the fruit in P4 is getting softer due to overripe and moldy, in P5 the fruit texture does not experience significant changes as in DAT 3 and 4.

The summary of the results from organoleptic tests on the flavor of treated papaya can be seen in Table 4 below.

Table 4. Results of the flavor of papaya fruit on the day 3 after treatment.

No.	Day 3 after treatment	Observation Results One	Observation Results Two	Observation Results Three
1.	P0	2	1	1
2.	P1	2	1	2
3.	P2	2	1	3
4.	P3	3	4	4
5.	P4	2	3	4
6.	P5	2	3	2

Information:
DAT = Day After Treatment
Score 1 = not sweet / sweet
Score 2 = less sweet
Score 3 = sweet
Score 4 = sweeter

In Table 4 shows that in the 3rd Hsp, P0 (control) and P1 papaya fruit taste is still sweet and not sweet enough, in P2 there is a slight increase but the taste is still less sweet, in P3 shows a sweet and sweeter taste than P0 treatment and P1, the fruit taste is still less sweet than P3, and in P5 the fruit taste is also less sweet than P3 and P4. Based on the results of research that has been described, it could be seen that the Ethrel solution has an effect on the ripening process of papaya fruit. The effect is seen from the change in color, texture, and taste of papaya fruit. This

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is in line with research conducted by Novita, Sugianti, and Asropi (2015) who have applied it to red guava fruit (*Psidium guajava* L.). This research is also in line with research conducted by Ginting, Sitawati, and Heddy (2015) who have applied it to melons (*Cucumis melo* L.).

CONCLUSIONS & RECOMMENDATIONS

Based on research and discussion it can be concluded that the ethrel solution affects the quality of papaya fruit. The optimal use of ethrel concentration to produce papaya fruit with good quality is in the treatment of P3 or 0.6% ethrel / litre of water. The use of 0.6% ethrel in papaya made the color, texture and taste change prominently compared to P0 (control or no treatment), P1, P2, P4 and P5.

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