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Quality of physicochemical properties, color and sensory evaluation with the treatment of maturity and storage in papaya (*Carica papaya* L.)

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Key words: Papaya, maturity level, storage time, quality.

Abstract

The physicochemical properties of papaya have changes during the maturation and storage time. Quality of papaya that includes appearance, texture, flavor, nutritional value and security is one of the factors that affect consumer tastes. The most important factor is to know the level of maturity and storage duration. Papaya is a fruit that is relatively more easily damaged compared with other fruits because it has a thin skin that is very vulnerable to the impact and injury that allows the occurrence of microorganism activity. The quality of climacteric fruits depends on the timeliness of the harvest and the length of storage. If the fruit maturity level can be predicted precisely before the harvesting process will facilitate the perpetrators of agribusiness papaya in regulating marketing objectives. Proper and appropriate maturity level and storage time can maintain fresh condition of horticultural products and prolong the shelf life so that it can be maintained its availability throughout the year. Papaya used in this study were varieties of calina harvested at 25%, 50% and 75% maturity and storage periods used were 3, 6, 9 days. This study aims to determine the level of maturity and storage duration of papaya quality, as well as the interaction of the level of maturity and storage duration of papaya quality. The results showed that papaya fruit with maturity level of green color with 50% yellow tinge gave the best quality and received by panelists because it gave water content value (90%), vitamin C (76.27 mg/100g), fruit hardness (2.77 mm/g/second), meat color of L value (123.72), organoleptic taste test (3.92) hardness (3.45), aroma (3.46), and overall acceptance (3.90). Storage for 3 days gives the best quality to the papaya fruit because it is stored longer then the shrinkage weight (123.72%), skin color of L value (124.00), the value of a (-1.98) and the value b (81.88), the meat color the value of L (120.67) , the value of a (34.34) and the value of b (56.64) will increase. While water content (91.00%), vitamin C (78.22mg/100g), hardness (3.03), total dissolved solids (11.44^{0}Brix) and sensory evaluation are aroma (3.45) will decrease further.

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Introduction

Post-harvest handling and distribution of fruits is a problem currently faced by Indonesia in the provision of fruits for both domestic and export consumption. Fruit quality issues are strongly influenced by the appearance and taste, so to get ripe fresh fruit ready to be consumed in large quantities is quite difficult to obtain given the level of aging when harvesting is not uniform.

Papaya (*Carica papaya* L.) is an important fruit at the international level, both as fresh fruit and processed products (Mitra, 1997). Papaya fruit is a fruit of high quality and nutritious table. Foyet (1972) in Samson (1980) states that papaya consists of 10% sugar, lots of vitamin A and little vitamin C. While Marte (1996) in Partners (1997) states that papaya consists of 85-90% water, 10-13 % of sugar and 0.6% of protein, vitamins A, B1, B2 and C. Quality in horticultural products is very important because it can reflect the value of the commodity. According to Muchtadi and Sugiono (1992) each fruits have different composition and are influenced by several factors, namely varieties, climatic conditions, plant maintenance, harvesting, maturity of harvested time, storage conditions (Oh *et al.*, 2018; Milanez, et.al.,2017; Nambi, *et al.*,2016; Kader, 2008). Papaya is a relatively fragile fruit compared to other fruits because it has a thin skin (Broto, 1994) so it is very susceptible to collisions and injuries that allow the occurrence of microorganism activity. This can lead to a decrease in the quality of the fruit can even cause huge losses. The easily damaged nature of this papaya fruit resulted in the shortest time interval between harvest and consumption if not treated to extend its shelf life (Candir, *et al.*, 2017;Wang et.al., 2017).

The right level of maturity in the harvested papaya determines in marketing to obtain good quality papaya fruit. Papaya fruit harvested at maturity level (mature green) will produce ripe fruit with a quality that is not optimum. While for papaya fruit harvested at the level of yellow maturity (quarter ripe) will result in short period of marketing. Papaya fruit that is climacteric potential to be stored in a long period of time maturity mature green (mature green) is still green but old. The quality of climacteric fruits is highly dependent on the timeliness of the harvest and the way it is stored (Bertone *et al.*, 2012; Pan, *et al.*, 2017). After harvest pods to remain durable, the metabolic process should be kept as low as possible. Some controlled external factors to maintain product durability, so that durable freshness is moisture, storage temperature and certain gas content in storage space (CO_2 and O_2). Storage is required to maintain the quality and freshness of the fruit until it reaches the consumer in good condition, but it also aims to extend the shelf life in order to be consumed in the future with good quality (Horvitz, *et al.*, 2017; Bianchi *et al.*, 2018;Wu *et al.*, 2017; Pan *et al.*, 2017).

Sensory evaluation are a means of testing using the human senses as the primary means of measuring the reception power of the product (Wieczynska *et al.*, 2016). Sensory evaluation has an important role in the application of quality and can give an indication of decay, deterioration of quality and other damage from the product. The purpose of organoleptic test is directly related to the taste.

Therefore, the purpose of this study was to determine the quality of physicochemical properties,colorand sensory evaluation with the treatment of maturity and storage time in papaya (*Carica papaya* L.)

Materials and methods

Papaya used in this study were papaya varieties Calina, with three levels of maturity. Three Levels of maturity is a green papaya fruit blossom yellow 25% as many as 9 pieces, green color with 50% yellow tinge of 9 pieces and green papaya fruit with 75% yellow tinge as much as 9 pieces obtained from the area of direct harvesting of papaya gardens in GampongLampermai, Aceh Besar District. Other materials used in this research are newsprint, plastic bag, cardboard box, water, alcohol, aquades, filter paper, starch 1% and iodine 1 N.

The materials used in this research are analytical scales, stationery, refractometer, blender, pipette, erlenmeyer, knife, insulation, scissors, digital camera and triplot.

This study used Randomized Block Design (RAK) 3x3 factorial pattern with 3 replications with 2 factors studied, namely maturity level (K) with 3 levels, namely: K_1 = green fruit with 25% yellow tinge, K_2 = green fruit with 50% yellow tinge, and K_3 = green color with 75% yellow tinge. Factor II is the storage period (L) with 3 levels ie L_1 = 3 days storage period, L_2 = 6 days storage period, and L_3 = 9 days storage time. So that there is a combination of 9 treatments and each treatment combination has 3 replications, each replication consists of 1 unit, then 27 units of units obtained in the experiment.

Parameter analysis

Water content (Apriyantono et al., 1989)

The clean empty bowl is dried with a drying oven at 105ºC for 15 minutes and cooled in a desiccator for 15 minutes, then weigh and weigh. A total of 5 g of sample is included in a weighed cup and then dried in an oven at 105ºC for 5 hours or until it is constant. The cup containing the sample was transferred to the desiccator, cooled for 15 minutes, then weighed with an analytical scale and weighed. The water content is calculated based on the weight loss ie the initial weight difference with the final weight.

$$\text{Moisture content} = \frac{BB - BA}{BB} \times 100\,\%$$

Information: Start Weight = wet weight, Weight End = dry weight

Total dissolved size (Brix)

Total dissolved solids measurements were made by fruit extraction and dripping of juice on Refractometer lenses. Total soluble solids by looking at the numbers listed on the tool scale by the units of Brix.

Fruit Hardness (mm/g/sec)

The fruit hardness is measured using Penetrometer in mm/g/sec. Measurement of violence done on papaya fruit that has not been peeled. Penetrometer needle stabbed at three places that is tip, middle, and base of fruit third data obtained then taken average.

Vitamin C (mg/100g) (Apriyantono et al., 1989)

Samples taken as much as 100 g and crushed by using blender until obtained juice.Considering juice of 30 g, put into 100 ml poultice flask, Then filtered by using filter paper to separate the filtrate, and take 25 ml filtrate with pipette and put into Erlenmeyer 125 ml and Add 2 ml of 1% millet soluble. Then titrated with 0.1 N standard iodine. Vitamin C content can be calculated as follows:

$$\text{Vitamin C (mg/100g)} = \frac{V \times 0{,}88 \times P \times 100}{S\ (g)}$$

Information :V = ml of lod solution 0.1 N, P = Dilution, S = Sample weight

0.88 = mg ascorbic acid for 1 ml of 0.1 N lod solution

2.3.5. Papaya Color(Hutabarat, 2008).

Color measurements are determined on the basis of digital data with red, green, and blue light intensity (Red Green Blue = RGB) taken with the Casio type Exilim camera. The RGB value of papaya is then converted to the values of L, a, and b, by the equation:

$X = 0.607R + 0.174G + 0.201B$

$Y = 0.299R + 0.587G + 0.114B$

$Z = 0.066G + 1.117B$

The conversion equation used to determine L, a, b is as follows:

$$L = 25\left[\frac{100Y}{Y_0}\right]^{\frac{1}{3}} - 16$$

$$a = 500\left[\left(\frac{X}{X_0}\right)^{\frac{1}{3}} - \left(\frac{Y}{Y_0}\right)^{\frac{1}{3}}\right]$$

$$b = 200\left[\left(\frac{Y}{Y_0}\right)^{\frac{1}{3}} - \left(\frac{Z}{Z_0}\right)^{\frac{1}{3}}\right]$$

Dengan nilai X_0 = 98,071; Y_0 = 100; Z_0 118,225

With value XO = 98,071; YO = 100; ZO 118.225

With the conversion equation, the value of L denotes the brightness [L = 100 (white) and L = 0 (black)], the value a denotes the red if it is positive, the color is gray if it is 0, and the green color is negative. While the value of b shows the yellow when the value is positive, the color gray when it is 0, and blue when it is negative.

Sensory evaluation (Soekarto, 1981)

Implementation of organoleptic test using the human senses as the main tool to assess the quality of papaya fruit. Sensory evaluation with descriptive analysis method is done to know the level of consumer acceptance to a product. The number of panelists required in this test is as many as 30 semi-trained panelists from Agro technology Study Program Faculty of Agriculture, Syiah Kuala University.

Preparation of papaya fruit for Sensory evaluation that is, cutting papaya fruit, papaya fruit washing by using clean water, papaya fruit given code according to each treatment, papaya fruit transferred plastic plate to do organoleptic test.

Attributes of organoleptic assessment performed on papaya fruit are texture, color, aroma, flavor, and overall acceptance of papaya fruit. In this test panelists are expected to fill out the questionnaire provided.

Results and discussion

Physicochemical properties of papaya

Differences in fruit maturity level at harvest resulted in differences in the quality of papaya fruit as shown in table 1, table 2, and table 3. The higher the maturity level the higher the weight loss value, the total soluble solid, the skin color of the L value, the skin color of the value a, skin color b value, meat color of L value, meat color of a value, and color of b value, but decrease in water content, hardness of papaya fruit, vitamin C, organoleptic test of color, flavor, aroma, hardness, and whole. The higher the storage time the higher the weight loss value, the L skin color, the skin color of the value a, the color of the L value, the color of the meat the value of a, and the color of the meat value b. there is also a decrease in the value of water content, kekrasan papaya fruit, PTT, vitamin C, skin color b value, organoleptic color test, taste, aroma, violence, and overall. (Table 1).

Table 1. Physicochemical properties of papaya.

Maturity (%)	*Moisture Content*	*Hardness Value*	*PTT*	*Vitamin C*
25	88.88	2.77^{c}	10.67	74.31
50	90.64	2.40^{b}	10.67	76.27
75	88.74	1.71^{a}	10.89	69.91
Storage (day)				
3	88.03	3.03^{c}	11.44^{a}	78.22
6	91	2.07^{b}	10.67^{ab}	72.84
9	89.23	1.78^{a}	10.11^{b}	69.42

Description: The number followed by the same letter in the same column is not significant at the 5% level (BNJ 0.05).

The average value of water content of the three treatments of maturity and storage period has a moisture value above 85%. This is in accordance with the statement of Kalie (2000) the water content of papaya fruit is 86.7%. The same thing stated by Santoso and Purwoko (1995) most fruits and vegetables contain more than 80% moisture content and Wiills *et al.* (1986) get the water content of papaya fruit as much as 89.3%. Based on the water content of the papaya on the maturity level of green color with 50% yellow tinge with water content that tends to be higher is suspected to be more juicy compared to other maturity levels.

Papaya over a 6-day storage period has the greatest water content, and continues to decline with increasing storage duration. Evaporation of water that occurs during the storage process can lead to shrinkage of weight, in addition to water loss in papaya fruit can cause fruit damage and decrease the quality of papaya fruit. According to Kader (2002) transpiration can cause water loss, lower weight, and decrease the appearance of fruit. The transpiration process is strongly influenced by external factors such as temperature, storage duration, and environmental moisture during storage. During the storage of papaya fruit is at a temperature of 25 °C to 29 °C, so the process of transpiration or process of water loss from fruit to the environment takes place more quickly.

Table 2. Skin color L value, skin color a value, skin color value b.

Maturity (%)	*L*	*a*	*b*
25	120.96a	-14.5	80.91
50	123.70ab	-6.29	81.35
75	123.72b	3.61c	81.56
Storage (day)			
3	120.68a	-8.03	77.61
6	123.71b	-7.17	84.34
9	124.00b	-1.98	81.88

Description: The number followed by the same letter in the same column is not significant at the 5% level (BNJ 0.05).

In the treatment of maturity level and length of storage value of fruit hardness tend to decrease, this indicates that the fruit more soft. This is in accordance with Billy *et al.*, (2008) statement that the process of maturation in papaya fruit is seen by the decrease of hardness on the fruit which is the effect of the maturation process due to the process of degradation of pectin into protopectin causing the pressure of cell wall turgor decrease and cause fruit become soft during the maturation process.

Table 3. Meat color value l, meat color value a, color meat value b.

Maturity (%)	L	a	b
25	119.24	31.33	49.29a
50	120.06	32.59	54.21ab
75	120.56	33.58	63.51b
Storage (day)			
3	119.57	29.05	53.49
6	119.61	34.12	56.34
9	120.67	34.34	56.64

Description: The number followed by the same letter in the same column is not significant at the 5% level (BNJ 0.05).

The process of decreasing the hardness of the papaya fruit during storage is rapid, this is due to the storage temperature using the room temperature. So that the metabolic process takes place quickly during the storage process and decreasing the hardness of papaya fruit during storage allegedly due to loss of turgor pressure, starch reshuffling to sugar and cell wall degradation. According to Mushtadi (1992) the change in turgor is caused by the composition of the cell wall changed and the change affects the firmness of the fruit and which will soften when it is ripe.

The higher the maturity levels the PTT content increases. This is consistent with the statement Sjaifullah (1997) Total dissolved solids is a reflection of sweetness, which also indicates the degree of aging and maturity, in which the sugar content increases with the aging process. During storage, the highest

PTT content is in 3 days storage with an average value of 11.44 ^{0}Brix, then begins to decline after 6 days of storage with an average value of 10.67 ^{0}Brix and continuous continuous decline up to 9 days storage time with a value of 10.11 ^{0}Brix allegedly the fruit began to break due to overgrown mushrooms around the base of the papaya fruit. This is in accordance with the statement of Tirkey *et al.* (2014) the decrease in the total amount of dissolved solids caused by the degradation of sugars to acid when the fruits begin to decay and decay.

Table 4. Sensory evaluation on color, taste, flavor, hardness and overall acceptance.

Maturity (%)	*Color*	*Taste*	*Flavor*	*Hardness*	*overall acceptance*
25	3.54c	3.65b	3.38	3.10b	3.84
50	3.44b	3.92b	3.46	3.45c	3.9
75	2.65a	3.17a	3.24	2.35a	3.64
Storage (day)					
3	3.19	3.75b	3.45	3.11b	3.93
6	3.3	3.77b	3.33	3.19b	3.74
9	3.14	3.22a	3.3	2.60a	3.71

Description: The number followed by the same letter in the same column is not significant at the 5% level (BNJ 0.05).

On the maturity level of green fruit with 50% yellow tinge there is an increase in vitamin C. This is in accordance with the statement of Bron and Jacomino (2006) vitamin C in papaya increased 20 to 30% during the cooking process and does not depend on the level of papaya maturity at harvest. The same is stated by Workneh *et al.*, (2012) during the ripening process of papaya fruit an increase in total acidity, which is believed to be associated with an increase in free galactic acid. At the maturity level of the green color with 75% yellow tinge there is a decrease in vitamin C levels allegedly because the fruit through cooking. According to Arriola *et al.* (1980) the content of papaya acids will continue to increase during cooking and will decrease when the fruit of papaya through cooking (over ripe).

Fig. 1. Three levels of papaya maturity.

In long storage indicates that the longer the papaya fruit is stored then the decreased levels of vitamin C it. Decrease in vitamin C can be characterized by increasing the level of damage that occurs due to the growth of mushrooms in papaya fruit so that the occurrence of decay. This is consistent with the assertion of Bari *et al*., (2006) The content of vitamin C in the early maturity level increases and then decreases in the fruits stored until close to decay. Decrease in vitamin C is very close to the vitamin C properties that are vulnerable to oxidation. According to Winarno (2002) ascorbic acid is very easily oxidized rapidly into L-diketogulonat acid that does not have the activity of vitamin C anymore. (Table 2) The level of brightness is one indication that the fruit can be more accepted by consumers and have a better selling point when in an optimal state. The increasing brightness is due to the effect of storage temperature. The higher the storage temperature makes the skin tone becomes brighter.

Fig. 2. Appearance of Papaya Outer Skin.

This is in accordance with the statement Iswari (2002) temperature is one factor that can affect the activity of chlorophylase enzymes in the process of degradation kolorofil then chlorofi dissolved into purine or chlorine that is colorless. With the loss of chlorophyll it appears carotenoids and xantofil that play a role that causes the appearance of yellow in ripe fruit.

From the above explanation can be concluded that the higher level of maturity and the longer the storage then the value of a (red) on the skin of papaya fruit continues to increase continuously. A (red) value with a negative value indicates a green fruit.The change of green color to yellow on the skin of fruit occurs due to the ongoing ripening process. This fruit-color change occurs as a result of chlorophyll decay and the synthesis of carotenoid-carotenoid formation of carotenoids results in yellowing of the skin of the fruit (Pantastico 1986).

Color has a meaning and an important role in food commodities, namely to increase the attractiveness of appearance, identification and quality attributes (Handayani, 1999). Yellow color changes will be faster with storage at room temperature because the activity of cells in the fruit more quickly in remodel anthocyanin content. According to kays (1991) discoloration of the fruit during the maturation process generally involves the loss of chlorophyll and other pigment synthesis such as carotenoids and anthocyanins.

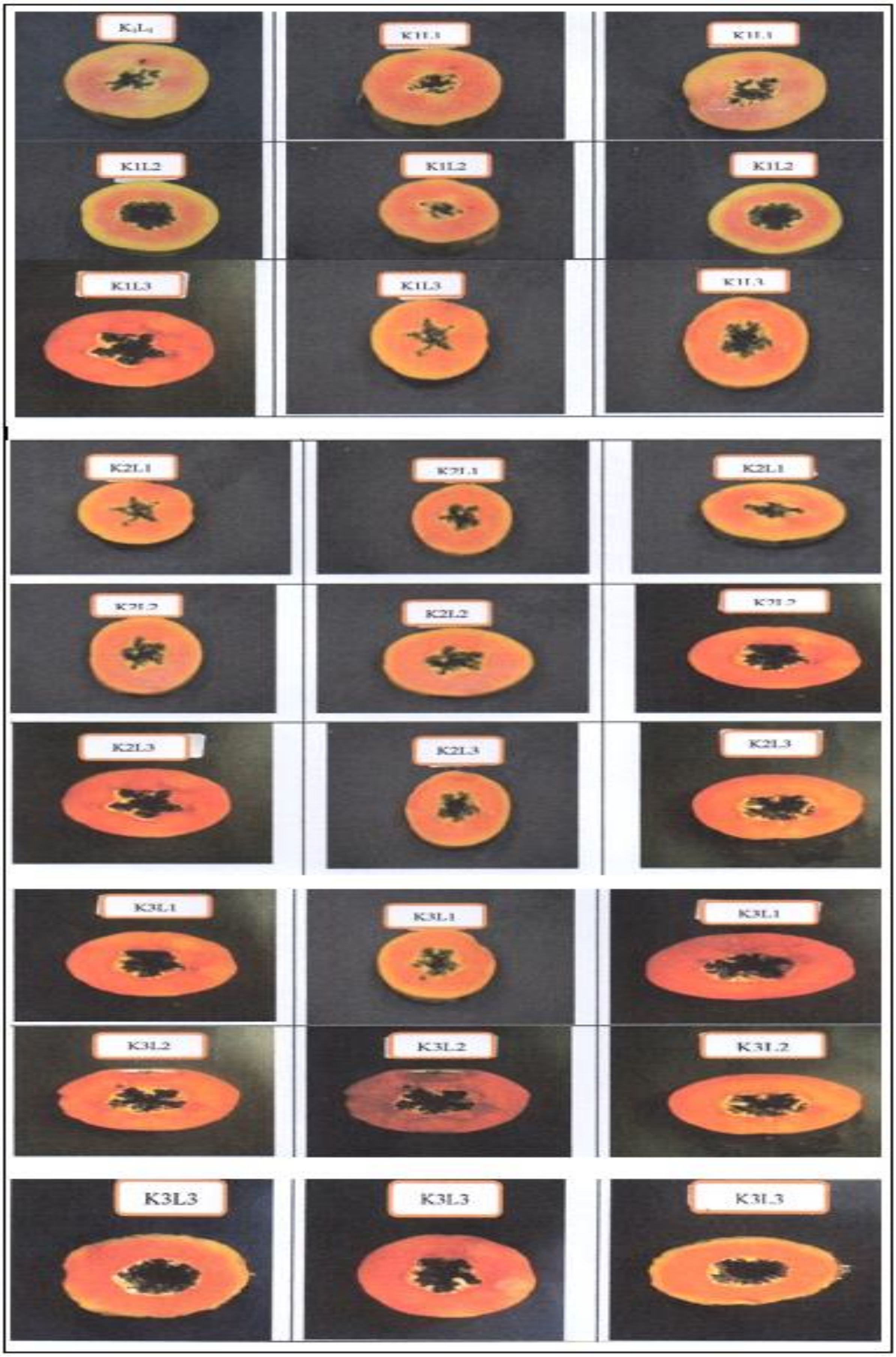

Fig. 3. Papaya meat color on three levels of maturity and storage duration.

The change in value b after storage initially increments then looks down. This is allegedly due to the fungus that grows on the surface of the skin of papaya fruit that inhibits yellowing of papaya skin. (Table 3).

From the above explanation can be concluded that the higher the level of maturity and the longer the storage then the value of L (brightness) in the flesh of papaya fruit is increasing. The increasing brightness is due to the effect of storage temperature. The higher the storage temperature causes the color of the meat to become brighter. This skin color change indicates the fruit is ripe and ready for consumption.

The level of brightness is one indication that the fruit can be more accepted by consumers and have a higher selling value when in an optimal state. This is in accordance with the statement of Santoso and Purwoko (1995) change of color that is a clear change occurs in many fruits and often serve as the main criteria for consumers to determine whether the fruit is ripe or still mengkal.

The higher the level of maturity and the longer the storage of changes in the value of a (red) look increasing continuously, the increase in a (red) value is influenced by the temperature of the room at the time of storage of papaya fruit. This is in accordance with the statement Pantastico (1986) room temperature greatly affects the occurrence of changes in chlorophyll and the formation of pigments in fruits and vegetables. After harvest, chlorophyll is degraded, this results in the color of green fruits and vegetables turning yellow. The crop color change is a process that goes into the direction of the crop, which during the process occurs chlorophyll discharge due to the influence of chemical and physiological changes (Kartasapoetra 1994).

The change in value b at the level of maturity and length of storage is seen continuously. Temperature is one of the factors that influence the activity of chlorophylase enzyme in chlorophyll degradation process. With the loss of chlorophyll it appears carotenoids and xantofil which act as the cause of the yellow color in ripe fruit (Seymor, 1993) in (Iswari, 2002). Color is the main indicator used by consumers in determining fruit maturity. Therefore, discoloration during maturation becomes a very important indicator.

Figure 1 shows the degree of papaya maturity, papaya skin appearance during the study shown in Figure 2, and the color of papaya meat at three maturities and storage duration is shown in Figure 3.

The results of sensory evaluation showed the highest color of fruit flesh favored by panelist that is at maturity level of green color with 25% yellow tinge compared with other maturity level, it is predicted at maturity level of green color with 25% yellow tinge has bright yellow flesh color and looks fresh. At long storage indicates that the highest value for color based on panelist preferences is on the 6 days old storage treatment, the appearance of the color of the meat is still in good shape and looks attractive. While the treatment at 9 days storage is lower than the panelist's favorite value on the color of the meat, the low color value of the flesh is suspected because of the bruising on the fruit. Damage to the color of the flesh may be caused by bruises during the hardness test on the fruit or when the fruit is cut into pieces before serving to the panel. (Table 4).

According to Winarno and Aman (2002), the colors found in fruits and vegetables are due to the pigment they contain. Pigments are generally divided into four groups namely chlorophyll, anthocyanin, flavonoids and carotenoids. Color is one indicator that shows the identity of fruit maturity visually.

The green color signifies a young fruit, while the yellowish, pink or scarlet color is a sign that the quality of the fruit is good (Sumoprastowo, 2004). Generally the color and appearance is the deciding factor for consumers to declare acceptable or rejected fruits and vegetables. Each type of fruit, as well as each variety, has a distinctive skin color and is also the best way to see the fruit maturity level (Sjaifullah, 1996).

One of the quality factors that determines the quality of fruits is flavor. Flavor or flavor is a delicate and difficult thing that senses are captured, which is a combination of flavors (acid, sweet), smell (essential substances), and tastes on the tongue (soft, sweet). Maturation usually increases the amount of simple sugars that sweeten, decreases organic acids and phenolic compounds that reduce the splint and sour taste, and increases the volatile substances that give the typical flavor to the fruit (Pantastico, 1986). The same result is expressed by Novita (2000) when the fruits begin to mature the sugar content will rise due to the happening of hydrolysis of polysaccharides into sugar, this is because sugar content in papaya fruit is more dominant than acid content, so the flavor is sweet.

The table above shows that the longer the storage value of the value of anxiety to the aroma is decreasing because the panelist does not like the aroma of papaya is too sharp. A typical flavor arises when the fruits are ripe. The temperature of the room and the environment greatly affect the volume and composition of essential oils (odors).

This is consistent with Pantastico's (1986) assertion although the degree of maturity is a major physiological factor affecting the production of volatile substances in fruits, but the composition of the flavor is strongly influenced by environmental conditions during storage.

Aroma is a nasal response to the stimuli contained in fruits and vegetables. In accordance with the statement Suryanti (1999) which states that a distinctive aroma will arise in the fruits that are ripe physiological than those that are still pre physiological and post-physiological. Aroma is one factor that is important for consumers to choose the preferred product. Winarno (2002) states that in many ways the delicacy and enjoyment of fruits and vegetables is determined by the smell and smell of the ingredients.

The level of violence that consumers favored varies, the panelists average judging the maturity level of the green fruits with 50% yellow tinge and 6 days storage duration. Panelists like the fruit hardness on the maturity level of the green color with 50% yellow tinge and 6 days storage period is due to panelists like the softness of the fruit flesh that is not too soft, the fruit is too soft will reduce the pleasure in the presentation.

On the maturity level of the green color with 75% yellow tinge and 6 days storage period is decreased because the average panelist gives an unhappy rating because the aroma is not fresh and the softness of the flesh is too soft on the fruit. In general, panelists like the softness of fruit flesh that is not too soft because it will reduce the enjoyment of taste in the presentation. Papaya fruit hardness decreases due to the maturity process, the longer the papaya fruit is stored then the more decline in quality, due to the influence of fruit and enzymatic metabolism and microbiology so that the fruit experience decay. This is in accordance with the statement of Cadre (1992)the microorganisms that contaminate the papaya fruit will multiply during the storage period, at the same time the microorganism will release the remnants of its metabolism affecting the action of the enzyme and affect the softness of the fruit, watery flesh, the smell of alcohol and fruits occur heavy decay eventually lead to fruit can be consumed.

This indicates that the harvesting of papaya fruit on the maturity level of green fruit with 50% yellow tinge produces the best fruit so that the overall acceptance of the higher value is found in the green color treatment with 50% yellow tinge compared with other maturation level treatment. It is assumed that the maturity level of green fruit with 50% yellow tinge is the peak of fruit enlargement and initiation as a result of the photosynthesis process, while the respiratory process is still smaller. In a 3-day storage treatment the Sensory value of overall acceptance level was higher,due to the long treatment of such storage quality and better resistance compared with the treatment of storage duration for 6 days and 9 days.

The cause of the decrease in sensory evaluation on overall acceptance rate is due to the bruising which resulted in the decay of the pawpaw which is stored too long causing various changes and its taste image. Changes that can be seen from the outside such as skin color change, texture, softness of fruit flesh, acid smell, bad smell, and other changes (Fardiaz, 1992). The maturation stage that causes the papaya fruit undergoes many changes such as taste, color, and texture resulting in physiological changes that determine the quality of the fruit when consumed (Syska, 2006). (Figure 1, 2 and 3).

Conclusion

Maturity Levels Green fruit with 50% yellow tinge provides the best quality for papaya fruit as it provides the highest value of maintaining water content, vitamin C, hardness, meat color of L value (brightness), organoleptic taste, hardness, aroma, and overall test.Storage for 3 days gives the best quality to papaya fruit. Because the longer is stored then the weight shrinkage, the skin color of the value of L (brightness), the value of a (red) and the value b (green), the color of the meat value of L (brightness), the value of a (red) and value b (green) will increase . While water content, vitamin C, hardness, total dissolved solids (PTT) and organoleptic test of aroma will decrease more.Based on physical and chemical changes that occur at the level of maturity with long storage, the best papaya fruit is found in the treatment of maturity level of 50% with 3 days storage period.

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