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Post Harvest and Technology of Watermelon (*Citrullus lanatus*) Plants in Integrated Field Laboratory Faculty of Agriculture Kediri

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A B S T R A C T

Post- haverst important to study because commodities were living materials that were easily damaged after being harvested. The purpose of the experiment was to analyze the post-harvest quality of watermelon at the integrated field laboratory in Kediri. The research method uses organoleptic tests which include taste, color, type, shape, fruit weight. The results showed that the fruit with the heaviest weight was the Samara watermelon, which was 5.27 kg/fruit, red in color, artificial and the black sweet, which weighed around 4.52 kg/fruit. The organoleptic test of samara watermelon (*Citrullus lanatus*)as that the taste, type, color were very popular. Black sweet watermelon based on sensory test of taste was very preferred, yellow color was very preferred, oval shape and the type was liked by consumers.The profit from the samara watermelon harvest was Rp. 3.7 million and black sweet Rp. 3.2 million.

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INTRODUCTION

Watermelon (*Citrullus linatus)* was one of the horticultural commodities from the Cucurbitaceae (pumpkin) family, including annual plants that had prospects and priorities for development, because in addition to meeting the need for fruit, it also provides a fairly high economic value advantage. The level of fruit consumption every year was increasing in line with the increase in population and people's eating patterns. This causes the demand for fruits, especially watermelons to also increase, while the supply from production centers and local areas was not sufficient. The innovation of developing an integrated field laboratory belonging to the Faculty of Agriculture, Islamic University of Kediri, provides facilities and infrastructure for students to improve farming and agribusiness skills as well as post-harvest technology. The land area used was about 1 hectare, which has various plants such as melon, mango, longan, tomato, lombok, mustard greens, eggplant, watermelon, water guava, crystal guava, passion fruit. The fishery that is cultivated is about 200 koi fish and 400 tilapia and the results are sold to the market. The results of plant development are also sold to the community. Harvest handling is very important to learn at the producer level because it can cause high damage if not careful. This research is intended to study post-harvest and post-harvest handling so that there is little damage either physically or chemically. The benefits are increasing the selling price, extending shelf life, minimizing damage, and maintaining the quality of the crop.

According to the Central Statistics Agency (2015) Watermelon production in Indonesia in general increased by 0.6%, namely 653,995 tons from the previous year. Such conditions had not been able to make Indonesia a surplus of watermelons, because the population was increasing every year and the consumption pattern of the Indonesian population which focuses on fruit commodities, therefore the use of appropriate technology must continue to be pursued so that people's needs for watermelons will be met. Post-harvest watermelon includes sorting, grading and storage. Sorting was separating good and bad fruit, while grading was separating on the basis of fruit size so that it was easy to determine the selling value. Storage is an important factor because it slows down damage due to physical, mechanical and microbial spoilage (Widjanarko, 2012). Handling of agricultural cultivation products was related to post-harvest. Post-harvest activities start when the material was harvested until it is ready to be marketed or further processed in the industry (Pujimulyani, 2009). According to (Santoso, 2013), the potential and problems of agro-industry were very important to be discussed, especially development based on local agricultural products. According to Siregar (2014), the post-harvest stages of watermelon have 7 steps, namely collection, cleaning and sorting, classification, labeling, packaging, storage, transportation. Consumers like this fruit because it contains high water content so it is fresh, has good nutritional value and antioxidant compounds that are useful for increasing endurance and metabolism. Zaenudin (2019), How to harvest watermelon citrulus lanatus is to determine the harvest age between 70-100 days after planting. The right harvest time is in the morning at 08.00 - 10.00 WIB, in the afternoon at 16.00 - 17.00 WIB.

How to harvest using cloth gloves and scissors, cut the fruit stalk about 3-5 cm from the base of the fruit, put in a basket, harvesting can be done simultaneously or harvested in 2 stages.

The problem that occurs was that after harvesting horticultural products, many damage physiologically, mechanically and microbiologically. Research (Nursayuti, 2021), NPK fertilizer at a concentration of 250 g/plot showed the best yields. Prajnanta (2011), Fertilizer for watermelon fruit is potassium with the most potassium elements are absorbed in the form of ions which regulate osmotic pressure in cells. According to Purba et al. (2015), NPK fertilizers are more efficient than single fertilizers. Another opinion is that watermelon growth is hampered, so the transformation of nutrients as well as photosynthesis in the fruit part is disrupted so that the harvest fails (Amilda and Putri, 2019). Research results (Prawitasari, 2013), environmental factors and enzyme work affect changes in plant growth and production yields.

This study aims to study post-harvest and watermelon handling technology in an integrated field laboratory at UNISKA Kediri. The benefits were in order to maintain the quality of the fruit after harvest and have a high economic value and reduce damage due to physical, mechanical and microbial spoilage. This research was conducted based on the problem that after the fruit is harvested, it tends to experience a decrease in quality, which requires action to maintain its quality. The cause of post-harvest quality decline is due to internal factors and environmental factors that must be handled properly. The research objective was to study and analyze the post-harvest yield of watermelon (*Citrullus lanatus*) from 2 types of varieties. Parameters analyzed included organoleptic tests, weight loss tests, proper processing and packaging methods and proper post-harvest handling. Watermelon plant (*Citrullus lanatus*) is one of the horticultural commodities from the Cucurbitaceae family, a seasonal plant that has prospects and priorities for development, because it fulfills the needs of the fruit and provides quite high economic value benefits (Sunarjono, 2002). Post-harvest activities aim to maintain the quality of fresh products so that they remain excellent until they reach consumers, reduce losses or losses due to shrinkage and damage, extend shelf life and increase the economic value of agricultural products. It is estimated that the loss of fruit/vegetable yields is still relatively high, exceeding 20%. Various studies have recommended various ways of implementing post-harvest horticulture which, although quite effective, still do not optimally prevent damage to commodities in long storage times. This is due to the many factors that affect the quality of these commodities. Efforts to improve the quality of horticulture are still being carried out both among scientists and industry players. (Samad, 2006).

LITERATURE REVIEW

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consumption pattern of the Indonesian population which focuses on fruit commodities, therefore the use of appropriate technology must continue to be pursued so that people's needs for watermelons will be met. Post-harvest watermelon includes sorting, grading and storage. Sorting was separating good and bad fruit, while grading was separating on the basis of fruit size so that it was easy to determine the selling value. Storage is an important factor because it slows down damage due to physical, mechanical and microbial spoilage (Widjanarko, 2012). Handling of agricultural cultivation products was related to post-harvest. Post-harvest activities start when the material was harvested until it is ready to be marketed or further processed in the industry (Pujimulyani, 2009). According to (Santoso, 2013), the potential and problems of agro-industry were very important to be discussed, especially development based on local agricultural products. According to Siregar (2014), the post-harvest stages of watermelon have 7 steps, namely collection, cleaning and sorting, classification, labeling, packaging, storage, transportation. Consumers like this fruit because it contains high water content so it is fresh, has good nutritional value and antioxidant compounds that are useful for increasing endurance and metabolism. Zaenudin (2019), How to harvest watermelon citrulus lanatus is to determine the harvest age between 70-100 days after planting. The right harvest time is in the morning at 08.00 - 10.00 WIB, in the afternoon at 16.00 - 17.00 WIB. How to harvest using cloth gloves and scissors, cut the fruit stalk about 3-5 cm from the base of the fruit, put in a basket, harvesting can be done simultaneously or harvested in 2 stages.

METHODOLOGY

The research was conducted in the integrated field laboratory of the Faculty of Agriculture, UNISKA, from August to October 2022. The stages of experimental analysis are as follows:
a. Observation : The team went directly to the field to observe and see what was actually happening on the field. b. Interview : Finding sources of data information by discussing and discussing the activities that have been carried out. c. Documentation : This activity takes pictures directly on every activity carried out in the field. d. Literature review : In the literature study method, you can collect the necessary data yourself and supporting literature through libraries or other sources of information such as scientific articles, journals, research articles and others. e. Organoleptic test involving about 30 panelists including taste and color, type of preparation, appearance of fruit (seeds and non-seeds). f. Watermelon weight test consisting of 2 types (weighing 30 samples of fruit harvested from 2 varieties).

RESULT

Observations on post-harvest handling of fruit were carried out in the morning at 07.00 -10.00 WIB. Its physiological age was 65 days to 80 days after planting. There are 2 types of watermelon planted, namely Samara (non-seed) as many as 1100 fruit and black sweet (seeded) as much as 420 fruit. The stages of harvesting include sorting, cleaning, grading, and labeling as well as storage in

baskets sold in fresh form and processing technology into fruit juice and fresh peeled fruit put in containers. In the research, organoleptic tests were carried out including taste, color, type of processing, fruit shape and harvest weight test. Table 1 shows the taste and color test, shape, type of processing, Table 2. fresh fruit weight. Organoleptic test code 110 is watermelon samara (S), code 111 is black sweet (B). Conditions for a score of 1 strongly disliked, a score of 2 did not like, a score of 3 liked, a score of 4 was very much like, and a score of 5 was very much like.

Table 1. 2 Types of Watermelon Organoleptic Test

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Test sample	Friedman Test Tukey		Test Average Value	Description
1. Code 110, S	Taste p-value = 000	a	3,44	Really Like
		a	3,74	Really like
	Type p-value = 000	a	3,28	Really like
	Color p-value =000	b	2,86	like
	Form p-value =			
2. Code 111, B	000	a	3.54	Really Like
		b	2.21	Like
	Taste p-value = 000	a	3,36	Really Like
	type p-value = 000	b	2,58	Like
	Color p-value = 000			
	form p-value = 000			

Table 2 was the estimated weight for observing 30 fruit with different weights in post-harvest with the same physiological age.When watermelon cultivation is carried out properly, it includes soil processing, giving organic liquid fertilizer, compost and KCl, with the right dose, irrigation, removing weeds, plant maintenance by spraying plant pests, harvesting according to physiological age, harvest time in the morning from 6.00 to 9 00. WIB. The marketing of the harvest is carried out in the integrated field laboratory by students and a team of lecturers, a lot of buyers come to the independent picking locations. Processing of watermelons into fruit juices and fresh fruit which was cut into small pieces and packaged in an airtight condition.

Table 2. Observation Data on Watermelon Fruit Weight

No.	Fruit Weight Code 110 Samara (Kg)	Fruit weight code 111 Black sweet (Kg)
1	5,2	4,8
2	5,6	5,1
3	5,8	5,3
5	4,7	4,4
6	4,9	4,6
7	5,4	5,2
8	5,7	4,7
9	6,0	4,9
10	6,2	5,0
11	6,1	5,1
12	5,9	4,8
13	5,8	4,6
14	5,6	4,5
15	5,3	4,5
16	5,5	4,8
17	5,1	4,9
18	4,9	4,3
19	4,8	3,9
20	5,0	3,8
21	5,7	4,3
22	5,8	4,6
23	5,5	4,5
24	5,2	4,6
25	5,6	4,2
26	5,4	4,6
27	5,8	4,8
28	5,2	4,7
29	5,4	4,8
30	5,6	5,3

Analysis of watermelon production in 1 harvest that has been cultivated by a team of students and lecturers gets a fairly high profit, which is around 3.7 million fruit harvests, can be seen in Table 3.

Table 3. Analysis of Samara Watermelon Farming (Seedless)

No	Production cost	Yields	Profit
1	Land preparationRp. 500.000		
2	Seed Rp. 150.000		

3	Organic fertilizerRp 300.000	@kg Rp. 10.000	
4	Potassium FertilizerRp400.000		
5	Plant medicineRp 550.000		
6	LaborRp 400.000		
7	Total cost Rp 2.300.000	Rp. 6.000.000	Rp.3.700.000

In Table 4. Shows the analysis of black sweet farming in 1 harvest which has a sweet taste, contains little seeds, the color of the fruit is yellow, has a profit of 3.2 million rupiah.

Tabel 4. Analysis of black sweet watermelon farming (seed)

No	Production cost	Yields	Profit
1	Land preparation Rp. 400.000		
2	Seed Rp. 120.000		
3	Organic fertilizer Rp 300.000	@ kg Rp.8000	
4	Potassium Fertilizer Rp 400.000		
5	Plant medicine Rp 350.000		
6	Labor Rp 400.000		
7	Total costRp 1.970.000	Rp. 5.170.000	Rp.3.200.000

DISCUSSION

The fruit sensory test activity in the sensory laboratory at the Faculty of Agriculture Uniska laboratory involved 30 unskilled panelists, consisting of 5 students, 5 students, 10 employees and 10 elderly people aged 45 to 60 years. Food products are generally rich in active components such as carotenoids, lycopene, terpenoids, flavonoids, and other phenolics belonging to the group of catechins from green tea which are efficacious in preventing aging and the risk of cancer (Irawan and Wijaya 2002; Sloan 2002). functional (nutrient and non-nutritional) components into 12 components, namely dietary fiber, oligosaccharides (prebiotics), sugar alcohols, glycosides, certain proteins, vitamins, choline, lecithin, lactic acid bacteria (probiotics), long chain unsaturated fatty acids, minerals, phytochemicals. , and antioxidants (Sloan, 2002). The results of the Friedman test organoleptic analysis on fruit taste code 111,B have a higher score but the type of fruit code 110, S is preferred because it was non-seed, the color of the fruit is very popular with consumers, namely red and yellow, there are also round and oval shapes, the value of both treatments was preferred (Table 1). The weight of the fruit after being harvested was

weighed to determine the price of seeds. Samara watermelon (non-seed) per kg was Rp. 10,000 while black sweet watermelon (seeds) costs Rp. 8000. per kg.

In Table 2 was the weight of watermelon with 2 types observed in this study, as many as 30 test samples. The average weight of samara after harvest was 5.27 kg and the average weight of black sweet wa 4.52 kg, so the heaviest watermelon was the Samara type with a round shape without seeds and the color of red and sweet fruit is very popular with consumers.Post-harvest technology includes determining the age of harvest, at harvest and after harvest what must be prepared is good harvest handling so that it does not experience much damage and has a long shelf life, quality, safe for consumption. Marketing of watermelon is very good because it gets high profits. Production costs are around Rp. 6, 8 million and fruit sales were Rp. 10.7 million, so that the profit was Rp. 3.9 million in one planting. Fresh fruit can be sold with skin or without skin, which is made into fruit juices, placed in a plastic cup at a price of Rp. 5000 rupiah. Consumers buy a lot of fruit that is still unpeeled compared to drinks because it is more guaranteed quality and can last a long time. According to Mardhiyyah, et al., (2019), explaining that traditional drink extracts from secang wood and cat whiskers produce antioxidant compounds that were useful for functional drinks that were beneficial for the body. Watermelon juice is also very good to drink to increase nutritional value for the body.

At this time the need for traditional drinks was increasing, especially those derived from natural ingredients such as wedang ginger, sinom, turmeric acid, bajgur, instant temulawak, rice kencur, wedang pokak, and others (Septiana, *et al*., 2017). Drinks developed by researchers aimed at health especially contain antioxidants (Suratno, *et al*., 2014). The nutritional content in 100 grams of watermelon was 30 calories, such as carbohydrates, fiber, protein, calcium, magnesium, potassium, vitamins A, B1, B2, B3, C. And antioxidant compounds lycopene, beta carotene, cucurbitacin E. There are 7 benefits of watermelon namely relieve muscle pain, ward off free radicals, maintain joint health, maintain eye health, prevent dehydration, maintain heart health, nourish the digestive tract (Agustin, 2021). The yields obtained showed that the samara watermelon had a higher profit than the black sweet variety. This was influenced by several factors, among others, physical properties, fruit shape, level of sweetness, consumer tastes, and price

CONCLUSION AND RECOMMENDATION

Post-harvest handling of watermelons was very important to prevent damage, namely determining the age of harvest, the right harvest time in the morning at 6.00 WIB to 9.00 WIB or in the afternoon from 15.00 WIB to 17.00 WIB. Sorting, cleaning, grading, packaging, storage, processing and marketing of products.It weight of the 2 types of watermelon is about 4.5 kg for yellow watermelon with seeds and 5. 2 kg for red watermelon without seeds, both of which taste sweet and were liked by consumers.Farming analysis Samara had a profit of Rp. 3.7 million while black sweet Rp. 3.2 million. The author suggest that there are post-harvest activities for fruits and vegetables in that location.

FURTHER RESEARCH

Post-harvest is important to study because commodities are living materials that are easily damaged after being harvested. This research is not without flaws. The researcher hopes that future researchers will be more detailed in researching topics with the same theme.

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