HARVEST AND POST-HARVEST HANDLING TECHNIQUES OF SWEET PLANT (Brassicia juncea L.) BY HYDROPONIC FLOWERS

Evi Julianita Harahap[1]*, Amitalia Tumanggor[2], Mawaddah Putri Arisma Siregar[3], Muhammad Afrillah[4], Juldi Saputra[5]
Faculty of Agriculture, Universitas Teuku Umar, Indonesia
*Corresponding author: evijulianita@utu.ac.id

Abstract

Proper harvest and post-harvest handling techniques can influence the quality of the harvest, such as cleanliness, freshness and visual quality. In hydroponic mustard cultivation, harvest and post-harvest handling is very important because hydroponic mustard plants require special treatment to ensure the quality of the harvest. The research was carried out at the UF (University Farm) Land of Teuku Umar University, West Aceh Regency in October 2023. Procedures for carrying out the research included harvesting, washing and removing manure, sorting, packaging, cooling and storage, transportation, marketing. The conclusions are (1) good harvesting is done in the morning and evening to avoid sunlight which can trigger wilting of mustard plants and (2) good packaging can increase the safety of products that will be marketed to consumers.

Keywords: ***Mustard greens, Post-harvest, Wick hydroponics***

1. INTRODUCTION

Mustard plants are vegetables that have high nutritional value which can be used as an effort to prevent stunting. The content contained in mustard plants is rich in vitamins A, B, C, E and K. Mustard also contains carbohydrates, protein, and good fats that are useful for the health of the body (Nasir dan Jasmi, 2022). In terms of economics and business, mustard greens are worth cultivating to meet the high consumer demand because mustard greens are a popular vegetable among Indonesians. Consumers range from the lower class to the upper class. This fact at least provides opportunities for farmers and beginners who want to do business in the field of vegetable cultivation, especially mustard greens (Novianto et al., 2020). The hydroponic method is a widely used agricultural method today to increase the production of agricultural products with better quality and quantity so as to encourage agriculture in Indonesia to become more modern (Singgih et al., 2019). Wick hydroponics is one of the simplest hydroponic methods because it uses wicks as a link between nutrients and the root part of the growing medium (Kamalia et al., 2017).

In mustard cultivation, harvest and post-harvest handling techniques are essential to ensure yield quality and improve production efficiency. Proper harvest and post-harvest handling techniques can affect the quality of the harvest, such as cleanliness, freshness, and visual quality. In hydroponic mustard cultivation, harvest and post-harvest handling is particularly important because hydroponic mustard plants require special treatment to ensure the quality of the harvest. Ginanjarsari's research (2014) showed that proper post-harvest handling can improve the quality of hydroponic mustard crops. Another study by Kartini et al. (2018) showed that proper harvest and post-harvest handling can increase the production efficiency of hydroponic mustard plants. Horticultural commodities have a high value in fresh form, however, horticultural products are generally quickly damaged so they require special handling to maintain product quality (Pitaloka, 2020). Mustard is a vegetable that is easily rotten and quickly damaged or shrinks. To maintain the freshness of their production quality, post-harvest handling is required. Vegetables easily lose water content so their storage requires 95-100% humidity.

Vegetable leaves should never be submerged in water, because they will easily rot. Mustard is one of the horticultural products that has a fairly large transpiration and respiration rate so it is very important to suppress both of these (Lindiawatie et al., 2022). Increased transpiration

rates can cause faster evaporation of water in mustard vegetable cells so that it wilts faster, as well as increased respiration rates can increase the metabolic rate in mustard vegetables and cause mustard to rot faster, so in terms of packaging, good packaging is needed, the best mustard packaging is to use plastic wrap by giving perforation holes as many as 4 holes (Anggraini and Permatasari, 2017). Packaging with plastic wrap is useful for reducing the transpiration rate, while the perforation holes are useful for suppressing the respiration rate (Sari et al., 2023). Due to the metabolic physiology of the product itself and due to various kinds of damage either due to tools, harvesting methods, weather or disease, the quality of horticulture after harvesting can decrease and rot, causing prices to fall. In connection with this, the harvest and post-harvest techniques of mustard plants need to be handled and developed intensively (Nofriati and Oelviani, 2013).

2. IMPLEMENTATION METHOD

2.1 Time and Place

The research was conducted at the University Farm of Teuku Umar University, West Aceh Regency in October 2023.

2.2 Tools and Materials

The tools used included buckets, cutters, scissors, scales, and a set of stationery. The materials used were water, plastic wrap, foam tray, printed labels, and solatip.

2.3 Implementation Procedure

Harvesting

Harvesting was done in two ways, namely 1) pulling out the whole plant along with the roots and 2) cutting the base of the stem above the wick hydroponic media. Mustard is harvested at the age of 35 days.

Post-harvest

Newly harvested plants are placed in a shady place to prevent rapid wilting by sprinkling water. Next, do sorting to separate the old, rotten or diseased parts of the plant.

Washing and debris removal

Harvested crops are washed before marketing to prevent the entry of microbacteria from adhering dirt, protect consumers from harmful residues and to attract more consumers.

Sorting

Sorting is carried out with the aim of separating good crops (no physical damage and look attractive) from bad ones (crops that have experienced spoilage/physical damage due to evaporation or attack by pests and diseases as well as unwanted foreign objects).

Packaging

Mustard packaging is done by packing with foam tray and cling wrap which will be labeled to attract consumers.

Refrigeration and Storage

For vegetables that require low temperatures to maintain their freshness and quality, cooling before or after packaging can be considered in a cooling room or coll room. The optimum environmental conditions for storage of agricultural commodities are cold and humid conditions that allow agricultural commodities to be stored longer without much loss of quality properties such as flavor, texture and moisture content.

Transportation

The transportation tool used is motorcycle transportation which makes it easier to move, especially to keep the mustard fresh. A slow transportation process can result in damage to the mustard such as wilting.

Marketing

The marketing strategy carried out is by marketing through online and going directly to the field to market well-packaged mustard greens to friends and people who have businesses such as meatball businesses, neighborhood stalls, and marketing offers to boarding students.

3. RESULTS AND DISCUSSION

3.1 Harvest

Harvesting in agricultural science is the collection and acquisition of harvested fruits, which are then distributed directly to direct consumer traders (Lestari, 2017). Harvesting is an activity carried out to harvest a plant at the appropriate level of maturity, with minimal damage or loss of yield, and is carried out as quickly as possible (Syadah, 2012). Harvesting was done in two ways, namely 1) pulling out the whole plant along with the roots and 2) cutting the base of the stem above the wick hydroponic media. Harvesting is done in the morning and evening with the mustard plant product in a fresh state. A suitable time to harvest or harvest is in the morning before the sun shines or in the afternoon after sunset (Reid and Jiang, 2012). Proper plant handling can reduce potential damage, so harvesting criteria must be considered. According to (Mutirawati, 2007), there are several techniques to assess the timeliness of harvest, maturity, and harvest time.

Harvesting in the early morning and late afternoon is preferred because the temperature is low and there is little sunlight, so the transpiration rate is low and the plants will remain fresh. According to Lindiawatie et al. (2022), increasing the transpiration rate can cause faster evaporation of water in mustard vegetable cells so that it wilts faster, as well as increasing the respiration rate can increase the metabolic rate in mustard vegetables and cause mustard to rot faster. Harvesting is done in two ways, namely 1) pulling out the whole plant along with the roots and 2) cutting the base of the stem above the wick hydroponic media. Harvesting is done in the morning and evening with the mustard plant product in a fresh state. Choosing to harvest in the morning and evening because of low temperatures and little sunlight so that the transpiration rate is low and the plants will remain fresh. According to Lindiawatie et al. (2022), increasing the transpiration rate can cause faster evaporation of water in mustard vegetable cells so that it wilts faster, as well as increasing the respiration rate can increase the metabolic rate in mustard vegetables and cause mustard to rot faster.

3.2 Post-harvest

Sorting and grading are carried out simultaneously by separating good and damaged mustard greens. After the harvest is collected, sorting is carried out by removing leaves that are affected by disease, damaged, or abnormal. Mustard plants are washed in clean water, namely RO gallon water, the water is collected in a black bucket. Clean mustard plants are drained in a bucket and arranged neatly and after drying will be continued in the packaging. According to Nofriati and Oelviani (2013), grading is the sorting of products based on quality class. The purpose of grading is to provide more value (higher price) for better quality. The purpose of sorting here is to select or separate good mustard greens from bad ones. Sorting is the process of distinguishing good quality vegetables from poor quality vegetables such as defects, wounds, rotten and irregular shapes. Cleaning or sorting is done by removing rotten, damaged or old leaves.

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Figure 1: Washing and Removal of Impurities

Temperature is one of the most important factors in postharvest strategies to improve the quality of horticultural crops (Sari and Simbolon, 2020). (Herdiani, 2015) stated that postharvest quality is reduced due to physiological and biological processes influenced by product temperature. Temperature during the storage process must also be considered, as an increase in indoor temperature can cause delays in product storage. In particular, high humidity is said to accelerate the breathing process of the product, resulting in faster loss of energy and moisture. Cooling is done using a refrigerator with a temperature of 100C - 150C. Vegetables that require low temperatures to maintain their freshness and quality can be considered for cooling before or after packaging. According to Kartini et al. (2015), cooling using a refrigerator is done when the product has not been sold out and the waiting period for delivery to consumers who order.

Thus, the moisture content of mustard leaves is maintained at around 95% so that it remains fresh until it reaches consumers. Packaging is done using cling wrap and foam tray, then the mustard greens are placed into a foam tray with a size of 22 cm x 15.5 cm x 2 cm, and the mustard greens are sprayed and a logo is given on the front of the mustard greens packaging. According to Lindiawatie et al. (2022), packaging aims to facilitate delivery, maintain damage, and make the appearance more attractive and to maintain product goodness. Packaging of vegetables must be done with appropriate containers so that the purpose of packaging can be achieved, namely protecting or preventing commodities from mechanical damage, maintaining cleanliness, creating consumer appeal, providing added product value and extending product shelf life. The commonly used packaging is plastic packaging.

Figure 2. Packaging

Transportation is carried out using a motorcycle driven by two people in a bucket load of products accompanied by vigilance so as not to damage the mustard vegetable products that will be marketed, this process requires balance in transportation so as to experience a good product in

delivery to consumers, this transportation goes well without damaging the product or the outer packaging of mustard. According to Srilestari and Suwardi (2021), transportation is a critical point in post-harvest handling with the aim of delivering products to the market or consumers. During the transportation process, direct contact with sunlight should be avoided because exposure to sunlight will accelerate the transpiration process, causing the plant to experience a decrease in freshness. Marketing of the mustard harvest is done through WhatsApp and direct offers to the field. Consumers who buy mustard products include lecturers, meatball vendors, student stalls, boarding houses, and close relatives of the research team. According to Lindiawatie et al. (2022), marketing is influenced by post-harvest handling. In post-harvest handling, it is necessary to pay attention to marketing channels from producers to consumers. The sooner mustard is consumed, the higher the selling price.

4. CONCLUSION

1. Harvesting is best done in the morning and evening to avoid sunlight that can trigger the mustard plants to die.
2. Good packaging can increase the safety of products that will be marketed to consumers

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