

Variuous Packaging Effects of Loker Telun Berasap Chili Damage During Storage

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Abstract—General characteristics of fresh horticultural products like chili, is easily get damaged after harvest. The chili declining quality and loss after harvesting occur due to ongoing respiration process. Hence, the chilies become wither or rot. This damage happens due to physical, microbiological, and physiological influences. Physical damage and yield loss can be caused by packaging uses during storage. The study aimed to determine the effect of packaging use type for Locker Telun Berasap chillies on the weight loss and damage during storage. The treatments were the commonly community packaging use types which consists of: a) polyethylene plastic (PE), b) paper and c) banana leaf. Each treatment was performed two replications and stored at room temperature. Observation parameters during storage were weight loss, and physical, physiological, microbiological damages. The lowest weight loss percentage for 12 days' storage by PE packaging was 45.5%. The total damage was 30% lower compared to paper and banana leaf packaging. Optimal freshness can be achieved until the 8th day of storage with physical damage only 1.03% on PE packaging. The results of the study showed that the dominant microbiological damage was found in the banana leaf packaging treatment.

Keywords— *Loker chili, damage, packaging*

I. INTRODUCTION

Red chili (*Capsicum annuum* L) is one of the vegetable commodities that has high economic value. Chili is a horticultural product that is easily damaged. Consequently, it cannot be stored for a long time due to high water content reaching 90.09%, easily contaminated and attacked by microbes (Utami and Syahri, 2016). Damage occurs cause by physical, chemical, microbiological, and physiological influences. Loss of chili postharvest products ranges from 25-40% (Muhtadi, 1992). Sugianti, et.al., (2018) stated that, chili quality lessening caused by microbes that continue to attack until in the storage stage.

One region that is famous for its local chili is named Kerinci. Some people prefer to consume local chili because they have a special taste. The local Kerinci chili is called the locker 'Telun Berasap' chili, which has been known since 2004. Local Kerinci chili production continues to rise along with the growing public demand for its availability. In account, an increasing in chili production requires good postharvest handling, maintained freshness, extended fresh times and maintained its quality of agricultural products (Trisnawati and Rubiyo, 2004).

Maintained quality by using suitable packaging method during storage, can help maintain the freshness of

chili. Good packaging can prevent yield loss, maintain quality and appearance also extend ordinary product life (Rochayat and Munika, 2015). Brown (1992) states that the use of plastic films as packaging materials can extend the ledge life of fresh horticultural products. Besides the use of plastic packaging, other types of packaging that are often used by the public such as newsprint and banana leaf. Considering the shelf life and damage arising from Locker Telun Berasap chili during storage, it is important to recognize. Therefore, the purpose of this study was to determine the effect of various type packaging on the weight loss and damage to the locker Telun Baerasap chili during storage.

II. RESEARCH METHOD

A. Place and Time

The research was carried out in Telun Berasap Village, Gunung Tujuh District, Kerinci Regency and a study of shelf life observations was carried out at the Post-Harvest Laboratory of AIAT Jambi, from July to August 2018.

B. Materials and Tools

The materials used in this study included local fresh Telun Berasap chillies, panel cloth, polyethylene

plastic (PE) packaging, paper and banana leaf. Other tools needed were Camry brand digital scales of 5 kg capacity, plastic meter and digital camera.

C. Research Methods

The Research consisted of three treatments tested which were packaging types that were often used by the local community : a) poly-ethylene, b) paper, c) banana leaf and each treatment consisting of two replications. Place has storage for chili designated at room temperature.

D. Data Collection and Analyzeds

Data collected included the percentage of chili damage due to physical, physiological, and microbiological disorders. Physical damage was characterized by chili that has not intact such as broken, wrinkled and bruised. Physiological damage includes a change in the color of the chili due to physiological disorders such as brown and rot. Meanwhile, microbiological damage is injury caused by microbes that are characterized by decayed, mushy, or the appearance of fungi on the chili stalk. Observation of chili damage was done by separating any visible damage from each package; physically damaged, physiologically damaged and affected by microbes. Measurements were made related to weight loss, losses and diameter loss of chili. The data obtained were tabulated and analyzed descriptively. Calculation of weight loss, as follows:

$$(\%) \text{Weight Loss} = \frac{B_0 - B_t}{B_0} \times 100 \%$$

Whereas,

Bt: Weight of fruit on day n (kg)

B0: Initial weight of fruit on day 0 (kg)

Determination of damage was untiring by observing chili damage level (physical, physiological and microbiological). The increase in chili damage during storage can be calculated based on the following equation:

$$(\%) \text{ Damage rate} = K0 - K1$$

Whereas,

K0: Initial Condition (on day 0 = 100%)

K1: Damage during observation (n-th day)

III. RESULT AND DISCUSSION

A. Effect of Packing Type on Chili Weight Loss during Storage

Loss of yield or damage can occur during storage sign by reduction of product weight. The amount of damage can be affected by packaging used type. Decrease of Locker Telun Berasap chili weight based on variation of packaging used type during storage can be seen in Table 1.

TABLE 1.
 WEIGHT LOSS BY PACKAGING CHILI TYPE DURING STORAGE.

No.	Packaging Type	Weight Loss (%)		
		Day in Storage		
		4	8	12
1	PE	14.8	18.6	45.5
2	Newspaper	15.6	22.5	55.5
3	Banana Leaf	15.1	35.7	50.0

The use of PE plastic packaging shows the lowest weight loss percentage for 12 days storage by 45.5% compared to newspaper packaging 55.5% and banana leaf 50.0%. In general, weight loss occurs because at the chili postharvest time periods still conducting respiration process. Different types of packaging have different effects on holding the respiration rate. The weight loss of PE packaging is lower compared to newspaper and banana leaf packaging. This is because plastic packaging has a certain permeability that can block chili water content loss rate. Reducing weight will affect chili freshness. High weight loss can make chili become wrinkled due to loss of water content and brightness so that the appearance of chili looks unattractive. Weight loss has a large role in determining the shelf life of chili products.

Agricultural products with high weight loss will cause decreasing of freshness, chili becomes wrinkled with wrinkled skin so that the appearance becomes unappealing (Nofriati and Asni, 2015). Wrinkles on fresh products cannot be avoided during the storage period because the composition and peel surface structure can trigger damage especially mechanical damage resulting in weight loss (Lara, I. et.al. 2013). Therefore, postharvest handling must pay attention to the physical character of the product.

Some previous research verify the results related to the packaging usage in extending the freshness effect of chili. Lamona et al., (2015) stated that chili packaging with plastic film at a storage temperature of 10 °C, was the most optimum in reducing amount of chili weight loss and can maintain chili freshness until the 29th day storage. Chili storage with a box will eliminate the weight about 3.5% at a temperature of 24 °C every day, but only 0.5% if using a storage temperature of 8°C. Whereas, if using PE packaging (polyethylene) chili weight losses will be smaller amount (Walker, 2010). Zaulia, et al. (2006) reported that the use of PE plastics can maintain the quality and freshness of chili s for more than 4 weeks at 2 °C temperature storage.

B. Percentage of Physical Damage during Storage

The effect of various packaging types on the physical damage for loker Telun Berasap chili during the storage period is presented in Table 2 below.

TABLE 2.
 PERCENTAGE DAMAGE TO CHILLIES BY TYPE OF
 PACKAGING DURING STORAGE

No	Packaging Type	Weight Loss (%)		
		Day in Storage		
		4	8	12
1	PE	0.83	1.03	1.84
2	Newspaper	1.64	2.09	3.40
3	Banana Leaf	0.97	1.16	1.46

The percentage of physical damage on the 4th day of storage did not show significant difference. However, on the 8th to 12th day of storage, a percentage of physical damage can be found. The greatest physical damage to newspaper packaging by 3.40% on the 12th day was higher than the physical damage to PE packaging and banana leaf. Physical damage found during storage is wrinkles and broken. Chili becomes wrinkled as a result of weight loss that happens while chili is broken due to physical pressure from the external factors, especially on newspaper packaging. Newspaper packaging cannot protect chili perfectly, so the yield loss is quite high. The thin and easily damaged packaging texture makes frequent external physical contact such as when removing chili position during observation. The percentage of total damage during storage by type of morphological destructions can be seen in Table 3.

TABEL 3
 PERCENTAGE OF TOTAL CHILI DAMAGE BASED ON
 THE MORPHOLOGICAL DESTRUCTION TYPE
 DURING STORAGE

No	Packaging Type	Percentage (%)	Type of Morphological Destruction
1	PE	30	Rotten
2	Newspaper	60	wrinkled and broken
3	Banana Leaf	70	Rotten and Moldy

The total yield loss can reach up to 70% on the 12th day of storage for “Loker Telun Berasap” chili which is packed using banana leaf. Damage caused by microbiological factors by chili white moldy appearance at the base of the stem and part of fruitlet. This is possible to occur as a result of storage temperature factor. The average room temperature during the study was 24^oC. High temperatures cause the rate of respiration can not be controlled. Respiratory gas accumulation on the package can stimulate microbial growth. Regarding the use of banana leaf as a packaging, Sembiring (2009) states that banana leaf packaging materials actually provides the best quality in the storage of fresh red chili in packaging when stored at 6^oC. In general, the results of the study showed that the packaging type greatly affected the level of chilli damage during the storage period. Damage was caused by mechanical, physiological and microbiological physical

disorders.

IV. CONCLUSION

Loker Telun Berasap chili Packaging type, which is stowed at room temperature, affects the yield loss during the storage period. The use of PE (polyethylene) can better reduce damage and maintain optimum freshness until the 12th day. Banana leaf packaging usage during chili storage can be recommended because the packaging is organic and environmentally friendly. However, it's still need to obtain optimal results for study the use of various packaging types during storage at cold temperatures.

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