

EFFECT OF VARIOUS PLASTIC PACKAGING IN MAINTAINING THE QUALITY OF BOK CHOY (*Brassica rapa* L.) AND GREEN ONION (*Allium fistulosum* L.)

Nurjannah^{1*}, Tasrifah², Titik Ismandari³

^{1,2,3}Department of Agrotechnology, Borneo Tarakan University, Indonesia

*email : nurjannah905@borneo.ac.id

ABSTRACT

Bok choy and green onion are vegetable commodities that are easily damaged caused by the rate of transpiration which causes these vegetables to wilt and rot easily. The use of packaging has been proven to reduce damage on several types of vegetables such as cabbage, chili, okra and green mustard . However, the types and suitable packaging conditions are not the same for all types of vegetables, this is due to the different characteristics and environmental requirements. So it is necessary to carry out further research on the types of packaging that are able to maintain the quality of bok choy and green onion. In this research, bok choy and green onion packed using three types of plastic packaging, namely PP (polypropylene), PE (Polyethylene), and Wrapping plastic. Packaged bok choy and green onions then stored for six days. Observations were made for weight loss, texture changes , color changes, and water content. Data on weight loss and water content were analyzed using the Anova method (Analysis of Variance), physical test data (change in color and texture) were analyzed using a quantitative descriptive method. From this study it is known that packaging has a significant effect on changes in weight loss and water content of bok choy and green onion during storage. Packaging using PP plastic can best suppress the weight loss of bok choy for up to four days of storage at room temperature. Meanwhile, for green onions, the best packaging for reducing weight loss was Plastic Wrapping, the packaging was able to maintain the weight of green onion until the 5th day of storage at room temperature. In contrast to chemical observations, physical observations showed that bok choy and green onions packaged using polyethylene plastic produced the highest scores in physical tests. Packaging of bok choy and green onions using plastic is able to maintain the quality of these commodities better than not being packaged, and the best type of packaging is Plastic Wrapping.

Keywords:

packaging, bok
choy, green onion



INTRODUCTION

In Asian countries, bok choy and green onions are vegetables with very high consumption levels. Apart from its popular taste, bok choy contains vitamins A, B, C, E and K which are needed by the body [1]. Green onions also contain various nutrients needed by the body such as high amounts of vitamins A, B, C, phosphorus and potassium [2]. Not only used as a vegetable, green onion is also used as a condiment and garnish in almost all types of Asian cuisine [3]. However, bok choy and chives are perishable so they cannot be stored for a long time.

Like most other vegetable commodities, bok choy and green onion are prone to post-harvest shrinkage if they are not given proper treatment. The damage that occurs to bok choy and green onions is caused by the rate of transpiration which causes these vegetables to wilt and rot easily. Damage that can occur to these two commodities includes physical, chemical, microbiological, and physiological damage. To prevent weight loss, slow down unwanted chemical changes, prevent contamination of foreign materials and other damage, it is necessary to carry out proper post-harvest handling [4].

Damage and weight loss in bok choy and green onions during storage is caused by water loss due to physiological processes due to the processes of transpiration, respiration and other reactions. Loss of water will be faster at high temperatures than at low temperatures. The weight loss that occurs during storage of bok choy and green onions can be overcome by proper packaging and storage techniques.

The use of packaging has been proven to be able to reduce damage to several types of vegetables such as cabbage, chili, okra and mustard greens [5], [6]. However, the types and conditions of suitable packaging are not the same for all types of vegetables, this is due to the different nature and requirements of the environment [7]. So it is necessary to carry out further research on the types of packaging that are able to maintain the quality of bok choy and green onions. Several types of packaging can be used including those made of plastic, paper, wood, but the effectiveness of this type of packaging can differ between commodities and storage conditions [8], [9].

METHOD

This research was conducted at the Agricultural Product Technology Laboratory, Faculty of Agriculture, Borneo Tarakan University. In this research, bok choy and green onions were packaged using three types of plastic packaging, namely PP (polypropylene), PE (Polyethylene), and Plastic Wrapping. Packaged bok choy and green onions were then stored for six days and observations were made for weight loss, changes in texture, color changes, and water content. Data on weight loss and moisture content were analyzed using the Anova method (Analysis of Variance), physical test data (change in color and texture) were analyzed using a quantitative descriptive method.

The weight loss value was obtained by measuring the difference between the initial sample weight and the final sample weight during the six days of observation. The value of the water

content was measured using the dry oven method, the difference between the wet weight and the dry weight of the sample was the obtained water content value. The color change value is measured using a Chromameter. Texture measurement was carried out by physical testing using the sense of touch by pressing the softness of the vegetable texture and determining the softness using a scale of 1-5, from soft to hard.

RESULT AND DISCUSSION

1.1. Effect of packaging type on weight loss and water content of bok choy and green onions

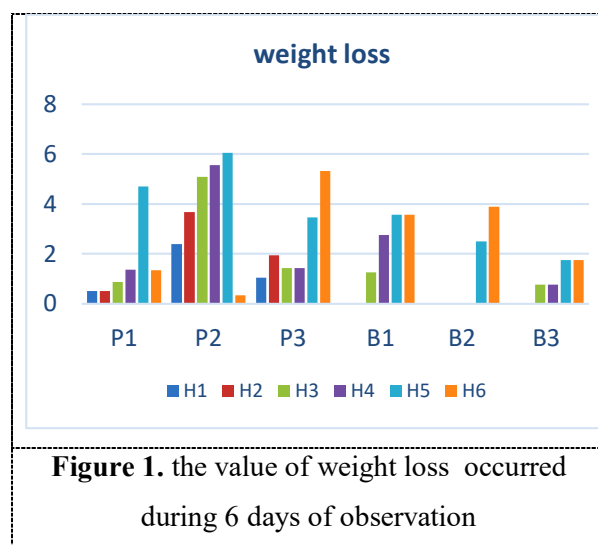


Figure 1. the value of weight loss occurred during 6 days of observation

The weight loss that occurs in the sample can show how much damage has occurred due to the transpiration process [10]. Loss of weight is the amount of weight or weight lost during the storage process. This occurs due to the process of respiration, transpiration, and bacterial activity, in bok choy and green onions [11]. The change in weight loss was observed to determine the change in shrinkage of bok choy and green onion during storage.

From the results of this study it is known that packaging has a significant effect on changes in weight loss and moisture content of bok choy and green onions during storage. Figure 1 shows that packaging using PP plastic (P1 treatment) was able to best suppress the weight loss of bok choy for up to four days of storage at room temperature. Meanwhile, for green onions, the best packaging for reducing weight loss was Plastic Wrapping (B3 treatment), the packaging was able to maintain the weight of green onions until the 5th day of storage at room temperature.

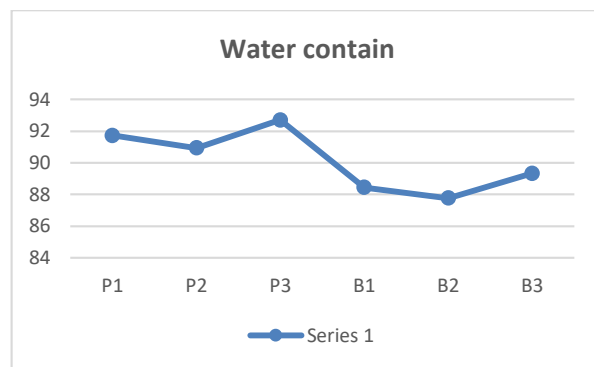


Figure 2. water content value of bok choy and green onions

Moisture content has a crucial role because it determines softness or wrinkles [12]. Figure 2 shows the highest water content value in the bok choy sample which was packaged using plastic wrapping (P3 treatment) with a water content value of 92,722. the longer it is stored, the water content in the sample tends to decrease, this is due to the transpiration process that occurs naturally. A decrease in weight loss and a decrease in the water content of the sample causes the vegetables to become dry and the freshness of the vegetables decreases [13].

1.2. The effect of the type of packaging on the color and texture of bok choy and green onions

1.3. Determination of the value of changes in texture and color was carried out to determine the extent to which physical changes occurred in bok choy and green onions during storage. Texture changes are influenced by the water content in the cells and the damage that occurs in the sample [14]. The damage can be in the form of physical damage, physiological or damage caused by contamination of microorganisms. The color change is affected by the reduced amount of chlorophyll found in the cells of bok choy leaves and green onions. The reduced amount of chlorophyll can be caused by physiological processes such as chlorophyll degradation. In addition to chlorophyll degradation, the reduced amount of chlorophyll can also be caused by cell damage caused by decomposing microorganisms [13].

In several types of packaging treatment there was a change in weight loss and color and texture of bok choy and green onions during storage. These changes include vegetables becoming wilted, a little dry then the freshness of vegetables is different from before storage and after storage.

During storage, Bok choy and chives experienced changes in color, texture, and weight loss. These changes include a soft texture, the leaves are not fresh and a little dry and there are some rotten leaves [15]. Figure 3 shows the use of packaging capable of maintaining the texture of bok choy and green onion during storage. The best packaging used to maintain the texture of bok choy

is PE plastic (treatment P2), while green onions use PP plastic (treatment B1).

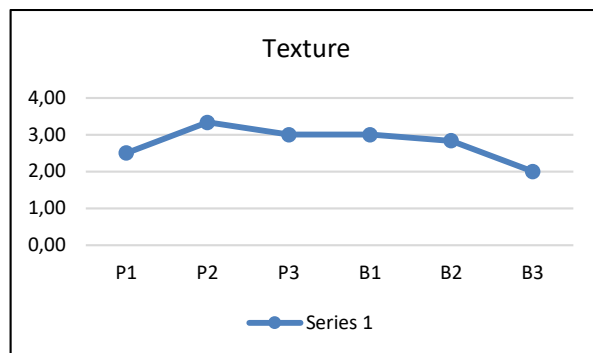


Figure 3. chart of bok choy and green onions texture

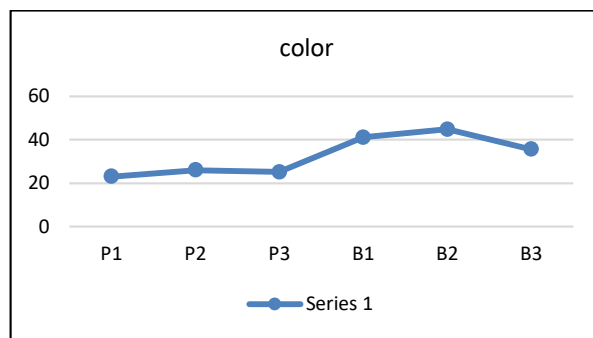


Figure 4. chart of bok choy and green onions color changes

Figure 4 shows that the packaging of bok choy has not been able to maintain the fresh color of the sample during storage, while the packaging of green onions can maintain its green color with the best type of packaging being plastic PE (B2 treatment).

CONCLUSION

From this study it is known that packaging has a significant effect on changes in weight loss and moisture content of bok choy and green onions during storage. Packaging of bok choy and green onions using plastic is able to maintain the quality of these commodities better than not being packaged, and the best type of packaging is Plastic

Wrapping. Packaging using Plastic Wrapping can best suppress the weight loss of green onions for up to 5 days of storage at room temperature.

ACKNOWLEDGMENTS

The completion of this research and publication could not have been separated from the assistance of various parties. For this reason, we would like to thank the Dean of the Faculty of Agriculture, Borneo University of Tarakan and the ICIKSA reviewer team for their input and opportunity to publish the results of this research.

REFERENCES

- [1] Direktorat Jendral Hortikultura, 2017. Pertumbuhan dan produksi tanaman sawi pakcoy (*Brassica rapa* L.) akibat dibudidayakan pada berbagai media tanam dan dosis pupuk organik. Agroteknologi. Fakultas Pertanian, Universitas Tembalang Campus, Semarang, Indonesia.
- [2] Nilnakara S, Naphaporn C, Sakamon D. 2009. Production of antioxidant dietary fibre powder from cabbage outer leaves. *Food and Bioproducts Processing*.
- [3] Dewi. E. 2015. AnalisaUsahatani dan Efisiensi Pemasaran Bawang Daun (*Allium Porrum* B) di Kecamatan Ngantru Kabupaten Tulungagung. (Studi Kasus di Desa Pinggirsari Kecamatan Ngantru Kabupaten Tulungagung). *Jurnal Agribisnis Fakultas Pertanian*Unita Vol. II No. 13 April 2015.
- [4] Mutiarawati. T. 2007. Penanganan pasca panen hasil pertanian. Fakultas pertanian, universitas padjajaran.
- [5] Waryat, Handayani Y. 2020. Implementasi jenis kemasan untuk memperpanjang umur simpan sayuran pakcoy. *Respati*.
- [6] Sukma D, Martunis, Irfan. 2018. Variasi kemesan dan lama penyimpanan terhadap mutu sayur okra (*Abelmoschus esculentum*). *Jurnal Ilmiah Mahasiswa Pertanian*.
- [7] BPPHP. 2002. Penanganan Pascapanen dan Pengemasan Sayuran. Departemen Pertanian, Jakarta.
- [8] Johansyah A, Prihastanti E, Kusdiyantini E. 2014. Pengaruh plastik pengemas low density polyethylene (LDPE), high density polyethylene (HDPE) dan polipropilen (PP) terhadap penundaan kematangan buah tomat (*Lycopersicon esculentum* Mill). *Buletin Anatomi Dan Fisiologi*.
- [9] Arianto DA, Supriyanto, Laila KM. 2013. Karakteristik jamur tiram (*Plerotus ostreatus*) selama penyimpanan dalam kemasan plastic polypropilen (PP). *Agrotek*.
- [10] Kader AA. 2002. Postharvest Technology of Hortikultural Crops (3rd edition). University of California, California.
- [11] Nurjannah and Zakiyah N 2023 Implementation of Packaging Types on The Physicochemical Changes of Cabbage and Bok Choy *J-PEN Borneo* VI 1. 58-62
- [12] Rahman MM, Miaruddin MD, Khan MDHH, Matin MA. 2012. effect of different packaging systems and chlorination on the

quality and shelf life of green chili.

Bangladesh Journal Agril.

- [13] Rahmawati, A. 2015. Pengaruh penggunaan plastik polyethylene (PE) dan high density polyethylene (HDPE) pada campuran lataston-wc terhadap karakteristik marshall. Jurnal ilmiah semesta Teknik. Vol.18, No.2.147-159.
- [14] Mareta dan Shofia, 2011. Pengemasan Produk sayuran dengan bahan kemasan plastik pada penyimpanan suhu ruang dan suhu dingin. Dalam Jurnal –Ilmu Pertanian, Vol.7 No.1:26-40.
- [15] Sugiyono. 2001. Fisiologi Pasca panen Hasil Tabaman Pangan. Institut Pertanian Bogor, Bogor.
- [16] Rukmana, 2011. Bawang Daun. Yogyakarta: Penerbit Kanisius.