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THE EFFECT OF *Averrhoa bilimbi* L. EXTRACT AS ANTIMICROBIAL IN EDIBLE COATING TO EXTEND SHELF LIFE ON TOMATOES (*Lycopersicum esculentum*)

Ririn Ernawati, Nafi Ananda Utama, Mulyono
Email: ririnernawati99@yahoo.com

ABSTRACT

Tomatoes have limited marketability due to high degree of perishability and higher moisture content which lead to the extensive postharvest losses. The aim of this research was to study *Averrhoa bilimb*i L extract immersed in edible coating, i.e. Chitosan to prevent microbial attack on tomatoes and to extend shelf life of tomatoes. The extract was obtained from leaves of *Averrhoa bilimbi* L using maseration method. The experiment was designed with Completely Randomized Design using three treatments as follows: (1) Chitosan as edible coating, (2) Extract of *Averrhoa bilimbi* L as antimicrobial smeared onto tomatoes, and (3) Chitosan mixed with extract of *Averrhoa bilimbi* L and used as edible coating. Analysis used to test the quality of tomatoes were: firmness, weight loss, colour, titrable acid, acorbic acid, sugar and microbial attack. Result showed that Extract of *Averrhoa bilimbi* L. was succeed in prolong the shelf life on tomatoes into 25 days and prevented microbial attack. Chitosan mixed with extract of *Averrhoa bilimbi* L and used as edible coating gave the best result in maintaining quality of tomatoes based on analysis on firmness, weight loss, colour, titrable acid; acorbic acid and sugar.

Key Words: Edible coating, Chitosan, Averrhoa blimbi L, Shelf Life, Tomatoes.

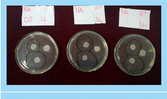
INTRODUCTION

Tomatoes (Lycopersium esculentum)is important horticulture commodity in Indonesia due to highly nutrient content (Lathifa, 2013). The tomatoes productivity in Indonesia increase 6,9 % each year and placed second highest productivity compare to other horticulture product (Marlina, 2014). The nutrient content of tomatoes will be change due to metabolic process. This process degrades the nutrient and cannot be replace causing nutrition loss and increase ripening and senescence rate (Novita, 2012). The water content and nutrients in tomatoes as well as the presence of microbial exposure during harvesting, transportation and marketing cause fruit damage due to bacterial activity. Activities of bacteria capable of degrading nutrients in tomatoes.

An effort to prevent damage to the fruit as a result of metabolic processes and microbial attack is through the use of an edible coating such as Chitosan. Chitosan has the ability to decreasing senescence process in fruit by making a permeable coat. This coat can prevent oxygen to entering fruit (Lathifa, 2013), but its lack of ability to inhibition of bacterial growth. Averrhoe blimbi extract has the ability to improve shelf life through the mechanism of inhibition bacterial growth.

This Research Aims to study Averrhoa bilimbi L extract immersed in edible coating, i.e. Chitosan to prevent microbial attack on tomatoes and to extend shelf life of tomatoes

MATERIAL & METHOD



Bacteria Isolation to get the dominant bacteria that causing rotten on tomatoes

Averrhoa bilimbi L leaves extract : Dried leaves of *Averrhoa bilimbi* crushed and macerated with ethanol 96% for 2 days

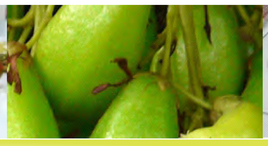
Preparation of Chitosan : Chitosan dissolved in distilled water & acetic acid. 0,2 ml Starch and 5 ml glycerol was added into solution.

Coating Application : The Fruit with the same identical color, age, and diameter were harvested and washed, coated with the solution according to treatment

Observation : Weight Losses (%), Hardness Test (N / m2), Titrable acidity (%), Concentration of Vitamin C(%), reduction Sugar (%) and Microbiological Testing (CFU)

The laboratory experiment was carried out after first harvesting time of tomatoes in October 2016 at Postharvest Laboratory, Faculty of Agriculture, Universitas Muhammadiyah Yogyakarta. The research was conducted through four stages

A	Chitosan
B	*Averrhoe bilimbi* L. Extract
C	*Averrhoe bilimbi* L. Extract + Chitosan
D	Without Treatment



RESULT & DISCUSSION

Tabel 1. Weight Losses (%), Hardness Test (N / m2), Titrable acidity (%), Concentration of Vitamin C(%), reduction Sugar (%) and Microbiological Testing (CFU) in days 15 after harvested

Treatment	Weight Losses (%)	Firmness (N/m^2)	Titrable acididy (%)	Reduction Sugar (%)	Vitamin C (%)	Total Microbe (cfu/ml)
Chitosan	13.3b	0.3b	8.5b	0.070bc	3.4b	74.6ab
Averhoe bilimbi L.	12.9b	0.2b	11.0a	0.106b	4.6a	4.6b
Averhoe bilimbi L. **+ Chitosan**	13.3b	0.3a	11.3a	0.041c	3.7b	3.8b
Without Coating	17a	0.2c	10.2ab	0.157a	3.1c	119.0a

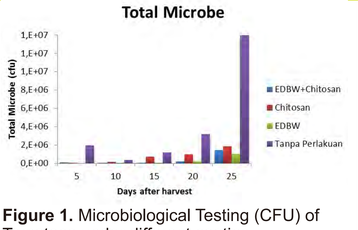


Figure 1. Microbiological Testing (CFU) of Tomatoes under different coating

The most dominant bacteria causing decay in tomatoes is the genus Bacillus. Chitosan and Averrhoe bilimbi can inhibit the growth of microbes. A combination between Averrhoe bilimbi leaves extract with Chitosan shown not significantly different compare with an individual application. there is an antagonist effect between Chitosan and Averrhoe bilimbi thereby reducing inhibitory of bacteria.

Averrhoe bilimbi act as antimicrbial. It's contain tannins, sulfur, saponin, format acid, peroxide, calcium oxalate, potassium citrate which is able to inhibit microbial growth. And finally prevent tomatoes from decay.

Chitosan coatings act as a hydrophobic barrier and therefore prevent water loss due to transpiration. This barrier is able to prevent the ingress of oxygen into the fruit as well as closing lenticels and cuticle where the place to exchange between gas and water (Lathifa, 2013). Chitosan coating also act as inhibition of respiration and the use of organic material during storage

CONCLUSION

- Provision of Chitosan and or *Averrhoa bilimbi* L leaf extract has a different effect significantly without edible coating on all parameters observed. Chitosan mixed with extract of *Averrhoa bilimbi* L and used as edible coating gave the best result in maintaining the quality of tomatoes.

- The result showed that Extract of Averrhoa bilimbi L. was succeeded in prolonging the shelf life of tomatoes into 25 days and prevented a microbial attack.

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