3rd EDITION

E-EXTENDED ABSTRACT

INTERNATIONAL AGROTECHNOLOGY INNOVATION SYMPOSIUM (i-AIS)

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Faculty of Plantation and Agrotechnology UiTM Cawangan Melaka Kampus Jasin

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ABOUT FACULTY OF PLANTATION AND AGROTECHNOLOGY

The Faculty of Plantation and Agrotechnology was established in 2010 at Universiti Teknologi MARA (UiTM). The mission of the faculty is to play the vital role of producing well-trained professionals in all areas of plantation and agriculture-related industries at national and international levels.

Bachelor of Science (Hons) Plantation Technology and Management is a three-year program that strongly emphasizes the various aspects of Production Technology, Management, and Information Technology highly sought after by the agricultural and plantation sectors. Students in this program will be fully trained to serve as professionals in the plantation sector and related industries. They will have ample opportunities to fulfill important positions in the plantation industry such as plantation executives. This program provides a strong balance of technology and management courses essential for the plantation industry such as management of plantation crops, soil fertility, plantation management operation, plantation crop mechanization, and agricultural precision. As an integral part of the program, students will be required to undergo industrial attachment to gain managerial skills in the plantation industry.

The faculty is highly committed to disseminating, imparting, and fostering intellectual development and research to meet the changing needs of the plantation and agriculture sectors. With this regard, numerous undergraduate and postgraduate programs have been offered by the government's intention to produce professionals and entrepreneurs who are knowledgeable and highly skilled in the plantation, agriculture, and agrotechnology sectors.

PREFACE

International Agrotechnology Innovation Symposium (i-AIS) is a platform to be formed for students/lecturers/ staff to share creativity in applying the knowledge that is related to the world of Agrotechnology in the form of posters. This virtual poster competition takes place on the 1st of December 2022 and ends on the 8th of January 2023. This competition is an assessment of students in determining the level of understanding, creativity, and group work for the subject related to agrotechnology and being able to apply it to the field of Agrotechnology. The i-AIS 2022 program takes place from December 1, 2022, to January 8, 2023. The program was officiated by the Dean of the Faculty of Plantation and Agrotechnology, namely Prof. Madya Ts. Dr. Azma Yusuf. The program involves students from faculties of the Faculty of Plantation and Agrotechnology (FPA)and HEP participating in i-AIS 2022, namely, the Faculty of Education and Pre-Higher Education. This program involves the UiTM student and some of the non-UiTM students which come from the international university and the local university. Two categories are contested, namely UiTM and non-UiTM. To date, students from these programs have shown remarkable achievements in academic performance and participation in national as well as international competitions.

This competition is an open door for the students and lecturers to exhibit creative minds stemming from curiosity. Several e-content projects have been evaluated by esteemed judges and that has led to the birth of this E-Poster Book. Ideas and novelties are celebrated, and participants are applauded for displaying ingenious minds in their ideas.

It is hoped that such an effort continues to breed so that there is always an outlet for these creative minds to grow.

Thank you.

Dean
On behalf of the Organizing Committee
Conference Chair
Universiti Teknologi MARA
Faculty of Plantation and Agrotechnology
http://fpa.uitm.edu.my

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VARIOUS PROTEIN-BASED COATING TOWARDS POSTHARVEST QUALITY OF PAPAYA (Carica papaya)

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ABSTRACT- Postharvest losses are a serious problem because produce degrade quickly when handled, shipped, and stored. Edible coatings are applied to fresh produce to maintain their quality and extend shelf life. Papaya is a significant tropical crop that is consumed globally. However, papaya's natural shelf life is limited due to its rapid ripening and susceptibility to fungal infections, necessitating postharvest treatment. This research investigated how different edible protein coatings can extend the shelf life of papaya. For this experiment, four treatments were used: control, whey, sesame, and soy, as well as 2% Tween as a plasticizer, with four replications for each treatment. The study also looked at the impact of various edible protein coatings on papaya sugar content, physiological water loss, skin color changes, and the severity of disease incidence. Soluble solid concentration results show a significant difference for treatment 1 with a value of 7.50 brix. The skin color reveals a significant difference, with treatment 1 scoring an 8.00. Disease severity score from treatment 1 differs significantly as well, with a score of 9.00. Treatment 4 has the highest mean of 26.98, and there is no significant in physiological water loss. Finally, the results of treatment 1 showed that papaya cannot be stored for more than 7 days after losing some of its shelf life. Treatment 3, which is coated with sesame protein, is the most effective method for extending the shelf life of papaya.

Keywords: C. papaya, Protein-based, Coating, Shelf life

INTRODUCTION

The natural shelf life of papaya is limited due to its rapid ripening and susceptibility to fungal infections, necessitating postharvest treatment. Edible coatings are used to improve the quality and shelf life of fruits and vegetables. It acts as a moisture and gas barrier during handling, processing, and storage. The problem statement for this study is that papaya fruits are typically harvested at Index 2 and then left to ripen for 4-6 days at room temperature (25-28^{o}C). The fruit is also sensitive to cold temperatures, which causes chilling injury and a rapid decline in fruit quality. As a result, transporting fruit at temperatures lower than the recommended 10^{o}C will not extend its shelf life. It is possible to coat the fruits and maintain slower respiration with the help of coating because if the fruits were harvested later, they would ripen more quickly due to ethylene production, which could result in overripening and subsequent postharvest losses. The objective of this study is to compare various protein-coatings towards postharvest shelf life of papaya and to determine the effectiveness of various protein-based coatings for postharvest quality of papaya. This study's significant study is because papaya is one of the most popular fruit crops, demand has grown in tandem with the world's population. This study will help identify the most effective protein-based covering for papaya to extend its shelf life and protect it from microbiological contamination, color, and aesthetic degradation. Plants and animals can both be used to create protein-based edible coatings. Egg albumen, collagen, and other animal-based proteins are edible covering materials, whereas plant-based proteins include milk protein casein, whey protein, zein (from maize), gluten (from wheat), soy protein, and others.

MATERIAL AND METHOD

Experimental setup

The research will be placed in UiTM Jasin, Melaka's laboratory. Using an experimental design, papaya will be use in this experiment when it reaches a suitable maturity index. The papaya variety known as Sekaki will be used, and it will be coated with four different protein-based edible coatings. Papaya with no edible coating, coated with whey protein coating, soy protein coating, casein coating and zein coating will all be used in this experiment.

Material and preparation

To conduct this experiment, a healthy papaya variety (Sekaki) will be purchased from the market. The papaya will be selected using maturity index.

Protein edible-based coating

The protein-based edible coating was formed by heating distilled water to 60^{o}C, mixing in 2% of Tween 20 and 1% of protein, letting it cool to below 40^{o}C, and then dip the papaya into the coating mixture.

Dipping

The fruits are immersed in a vat filled with a coating solution when using the dipping technique. This technique is especially helpful for food items that need a thorough coating or have complex or rough surfaces. The fruit material is dried at room temperature, by air drying, or by using a specialized drying device after the fruit material has been dipped and any remaining coating has been drained.

Treatment

The papaya will be coated with various protein edible coatings as shown in Table 1 and kept at room temperature with good aeration in this research.

Parameter of research

Various physico-chemical changes will be taken every two days, the firmness of the papaya will be examined, as well as all other data such as pH value and color. The physiological weight loss will be measured on the first and last days.

Disease

By visual inspection, the occurrence of spontaneous disease was determined. Each fruit received a 6-point severity rating: No infection or disease 0, 1 (no fruit area affected), 3 (no fruit area affected), 5 (no fruit area affected), 6 (no fruit area affected), 7 (16–25% of the fruit area affected), and 9 (> 25% of the fruit area affected).

Sugar content

Brix is designed to use refraction to determine the sucrose concentration of a sample. Brix is a scale of measurement that indicates how many grammes of sugar are present in 100 grammes of fruit or vegetable juice, with the value expressed as a percentage (%). Degrees. The sugar concentration of an aqueous solution is measured in Brix (°Bx). This test will be measured by using handheld refractometer atomo brand Atago.

Color

Maturity indices are a sign or indicator of a commodity's preparation for harvest. For determining the color of the fruit, color meters and color charts have been devised. This can be accomplished solely using a visual aid shown in Figure 1 and a maturity index chart [2].

Physiological loss in water (PLW)

Throughout the study, two fruits per treatment were used to quantify physiological weight loss, or PLW as the formula shown in Figure 2. An electronic balance is used to take the measurement, which is then converted to a percentage.

Experimental design

For this study, a Complete Randomized Design (CRD) with 4 replications of each treatment will be used. A CRD assigns treatments entirely at random, giving every experimental unit an equal chance of receiving any given treatment.

Statistical analysis

With four replications, the experiment was designed using the completely randomized design (CRD). The platform for SPSS Statistical software was employed in this experiment for data analysis, and one-way ANOVA was performed.

RESULTS AND DISCUSSION

Data were collected from the papaya from day 1 after harvesting until day 12 after harvesting for all treatments including T1 as the control, T2 which is the papaya were coated with whey protein coating, T3 which is the papaya were coated with sesame protein coating and lastly T4 which is the papaya were coated with soy protein coating. In this analysis, the experiment's hypothesis was tested, and the results were displayed using one-way ANOVA. The P-value for this experiment demonstrated that the treatments either have a significant difference or do not, depending on the ANOVA confidence interval. The data were tested on the disease severity score, sugar content, skin color and physiological water loss. The results showed the significant difference between the treatments for 3 parameter which is disease severity score, sugar content and skin color but there is no significant difference for the physiological water loss.

Papaya's relatively high levels of bioactivity as a climacteric fruit, including high respiration rates and postharvest ethylene production, shorten its shelf life. Various natural coatings are currently being investigated throughout the shelf life for their effectiveness in slowing ripening and maintaining fruit quality due to consumer concerns about the use of synthetic chemicals [4]. Our research showed that different edible coatings could effectively stop papaya from ripening, improve its quality after harvest, and prevent decay. These findings suggest that protein edible coating might be a different and efficient method for extending papaya's postharvest life. On a 6-point scale, samples from the untreated papaya at room temperature had a high severity of natural decay. All samples degrade over time when kept at 24°C, but uncoated fruits had a higher disease severity compared to other treatments. After-harvest coating application is known to affect the spore of several pathogens, impede mycelial growth, and cause cytoplasmic damage in the fungal species. Since the control sample was unable to resist fungal growth, it had a higher microbial count at the end of storage [3].

When the papaya fruit was stored for an additional 12 days after harvest, the percentage of water loss increased significantly. When papaya was stored at room temperature weight loss was significantly reduced by all treatments. The papaya treated with soy coating loss the most higher water loss compared to others followed by the sesame protein coating and whey protein coating. The control one who were not treated with any coating loss the least amount of water compared to the papayas that were coated with protein edible coating. This is since mature fruits and vegetables have developed peels or outer structures, which serve as barriers against moisture loss (Robert, et al, 2020). Fruits and vegetables that are still developing commercially lose more moisture than mature products do. The papaya that are coated with edible protein coating shows no signs of ripening or immature compared to the control that are ripen and mature that cause higher water loss after 12 days being observed

During the ripening process, papaya peel changes from green to orange due to chlorophyll degradation. Hue angle may serve as a more accurate measure of color because it can capture the papaya's typical transformation from green to orange as it ripens. The postharvest metabolism and ongoing anthocyanin accumulation may be to blame for the reduction in hue angle during storage. At a later stage of storage, fruit treated with different protein edible coatings had a lower relative delay rate for anthocyanin content than the control group. This may be caused by the inhibition of enzymes involved in anthocyanin synthesis and respiration [1]. Over the course of a 12-day storage period, total sugars were gradually increased in both coated and uncoated samples. The non-coated or control sample showed the greatest increase, followed by other coatings. Coating T2 had the lowest percentage increase in sugar content (1.80) compared to the control, where the increase was highest (7.50) on the 12^{th} day of storage. Basically, the whey protein coatings serve as a semipermeable membrane on the fruit's surface, reducing respiration rate and, in turn, papaya biosynthesis and causing slow conversion of polysaccharides to sugars.

TABLE, IMAGE, AND FIGURE

Table 1: Types of treatment applications of papaya.

TREATMENT	DESCRIPTION
T_1	No edible coating
T_2	Whey protein coating
T_3	Sesame protein coating
T_4	Soy protein coating

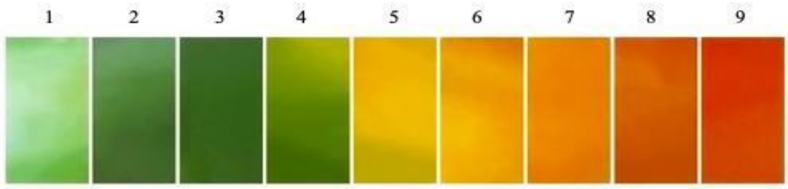

Figure 1: Color chart for papaya

$$\text{PLW (\%)} : \frac{initial\ weight\ (g) - final\ weight\ (g)}{initial\ weight\ (g)} \times 100$$

Figure 2: The physiological loss in water formula

CONCLUSION

The pre-harvest, harvest, and post-harvest regimes along the value chain have an impact on the postharvest water loss that occurs during storage, distribution, and retail marketing of fresh fruit and vegetables. As food products are stored, edible coatings have become increasingly used to improve their quality and shelf life. By using the edible coatings, we tried to increase the papaya's shelf life. As a conclusion, with a value of 7.50 for Treatment 1, the results of the brix test demonstrate a significant difference. Next, the skin color test shows a significant difference with Treatment 1 having a value of 8.00. The disease severity score with a value of 9.00 also from Treatment 1 differs significantly. The highest mean is 26.98 with Treatment 4, and there is no statistically significant difference with the physiological of water loss. In conclusion, the results of Treatment 1 (the control) show that papaya cannot be stored for more than 7 days after it started to lose some of its shelf life. The best method for prolong the shelf life of papaya is Treatment 3, which involves coating the fruit with sesame protein. This treatment shows low disease infection, high sugar content, and changes in skin color, all of which indicate that the papaya is becoming mature without losing to much its shelf life.

REFERENCES

[1] Aisyah, Y., Murlida, E., & Maulizar, T. A. (2022). Effect of the edible coating containing cinnamon oil nanoemulsion on storage life and quality of tomato fruits. IOP Conference Series.Earth and Environmental Science, 951(1), 012048. doi: https://doi.org/10.1088/1755-1315/951/1/012048

[2] Barad, S., Sela, N., Dubey, A. K., Kumar, D., Luria, N., Ment, D., Prusky, D. (2017). Differential gene expression in tomato fruit and during colonization of the tomato line with reduced fruit acidity and higher pH. *BMC Genomics, 18*, 1. doi: http://dx.doi.org/10.1186/s12864-017-3961-6

[3] Hassan, H. S., EL-Hefny, M., Ghoneim, I. M., Mina S R Abd, E., Akrami, M., Al-Huqail, A., . . . Abd- Elkader, D. (2022). Assessing the use of 0RW1S34RfeSDcfkexd09rT2aloe vera1RW1S34RfeSDcfkexd09rT2 gel alone and in combination with lemongrass essential oil as a coating material for strawberry fruits: HPLC and EDX analyses. Coatings, 12(4), 489. doi: https://doi.org/10.3390/coatings12040489

[4] Lo'ay, A.A.; Dawood, H. Minimize browning incidence of banana by postharvest active chitosan/PVACombines with oxalic acid treatment to during shelf-life. *Sci. Hortic.*; 2017; *226,* pp. 208-215.

[5] DOI: https://dx.doi.org/10.1016/j.scienta.2017.08.046

[6] Robert, L., Alemayehu, A., Umezurulke, L., (2020). Water loss of fresh fruit: Influencing pre-harvest, harvest and postharvest factors. Scientia Horticulturae 272 (102): 109519. Doi: 10.1016/j.scienta.2020.109519

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