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Edible Coating of Aloe Gel for Maintain Quality of Strawberry Fruit During Storage

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Abstract. Strawberries are popular fruits and have high economic value. The nutritional content of strawberries is quite high but very easily damaged. One step to maintain the quality and extend the self-life of strawberry fruit is using edible coating. The Edible coating is primary packaging base on an edible material and can protect product from the environmental impact. Aloe gel is one of the ordinary components that can be formulated into edible coating. Aloe gel contains Glucomannan which is capable of forming cross linking with other ingredients, thus functioning as a barrier to mass transfer. The purpose of research is determining the length of immersion in the edible coating of aloe gel and storage time in cold temperatures to the quality of strawberry fruit. The study uses a factorial complete randomized design and two repeats. The first factor is immersion time of strawberry into Aloe gel (1, 2, and 3 minutes). The second factor is storage time of Strawberry fruit (1, 3 and 6 days). The best research results are 1minute immersion time and 3day storage. The quality of strawberry fruit include texture 3.95%, pH 3.39, total dissolved solids 4.00□ brix, water content 94.36%, and vitamin C 41.29 mg/100gr.

1. Introduction

Fruits are a favorite commodity of the world community lately. Fruits contain a lot of vitamins, minerals, and fibers that have nutritional benefits to the health. Public awareness about the importance of health and nutritional value in food is increasing. This increase can be seen from the high demand for highly qualified fruits, well-sighted, relatively durable, not fast wither and rot during storage [1]. One of the fruits that have high economic value is strawberries, in addition to having attractive colors also have a good composition for health. Strawberry fruit is commodity that has a fairly complete nutritional composition, such as calories 37.00 cal, 0.80 g protein, fat 0.50 g, carbohydrate 8.30 g, calcium 28.00 mg, phosphorus 27.00 mg, iron 0.80 mg, vitamin A 60.00 SI, vitamin B1 0.03 mg, vitamin C 60.00 mg, water 89.90 g, and edible parts are 96.00% . The disadvantage is that strawberries are quickly damaged if stored at room temperature [2].

The quality of fruits can only be filled with post-harvest handling including efforts to extend the freshness level. Various efforts can be done to maintain the quality and inhibit damage to fruits such as by packaging modifications, low-temperature storage, and applying coating materials such as edible coating. Opinion [3] said that the edible coating able to increase the shelf life of fruits because potential as a barrier mass transfer, gas, nutritional components [3].

Aloe Vera is one of the ordinary components that utilized as an edible coating. Aloe gel contains glucomannan and other bioactive components [4]. Aloe gels can make a wax-like coating so that it can be a barrier to the fruit of the surrounding media influences, and can maintain quality. Gel Aloe vera has antioxidant and antimicrobial capabilities [5][6]. Aloe gel also has several advantages such as easy to obtain, the process is simple, inexpensive and easy to replicate [7]. Aloe Gel does not affect the flavor



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or appearance of the fruit, safe to use, natural, and safe for the environment. Glucomannan and Lignins contained in the Aloe gel can withstand the loss of fluid from the skin's surface, thereby inhibiting the rate of senescence (wrinkles) and maintaining the freshness of the fruit. The purpose of research is determining the length of immersion in the edible coating of aloe gel and storage time in cold temperatures to the quality of strawberry fruit.

2. Materials and Method

This research used the complete random design factorial pattern. The first factor was Strawberry immersion time into aloe gel (1, 2 and 3 minutes). The second factor was the storage time of strawberries after applied edible coating (0, 3 and 6 days) at a low temperature (10 ± 1) °C. The implementation of research starts by sorting Aloe vera. The process of washing with water flows to eliminate the yellow zap that affects aloe gel quality. The trimming and filleting process to remove the gel. Heating treatment with temperature + 70°C for 10 minutes to reduce the number of microbes. Aloe gel is cooled at room temperature for approximately 1 hour and ready for use. Application of edible coating of aloe gel in strawberry were preceded by sorting of strawberry fruit and then dipped in an edible coating formula with a long time 1, 2, and 3 minutes. Packaged and stored at cold temperatures (10 ± 1) °C. Observations were made during storage of 0, 3, and 6 days. To find out the effect of each treatment is an objective observation that includes texture, pH, total dissolved solids, moisture content, and vitamin C. Data obtained from the results of the study analyzed statistically with a level of 1% and 5% confidence. If there was an influence between the treatment in the print range then continue with the Duncan test.

3. Result and Discussion

Research the quality of strawberry fruit using the immersion method into the edible coating of aloe gel at different times during storage of 6 days in cold temperatures. Fresh strawberry fruit if stored without edible coating at room temperature only lasts for 1 day. Moderate strawberries without edible coating stored at cold temperatures persist for 2 days.

3.1. Texture

The increasingly impressionable fruit texture shows the process of fruit maturity. Based on statistical analysis results shows that immersion time and length of storage do not affect strawberry fruit texture. Changes in the value of violence occurring in strawberries during storage can be seen in Figure 1. The texture test is used as a parameter to determine the freshness or quality of strawberries. The storage of fruit texture values tends to be more tender. In line with the opinion [8], softness due to the degradation of the compounds of the fruit cell walls such as cellulose into simpler compounds. This is also due to the storage of strawberries experiencing a change in maturity that affects the level of fruit hardness.

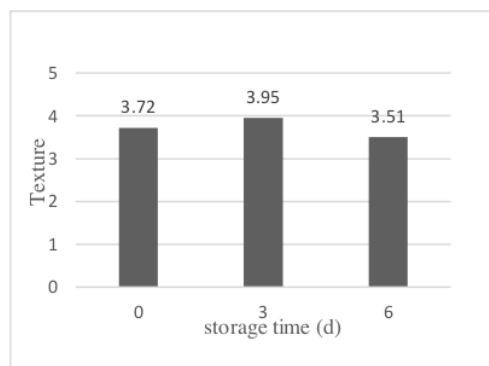


Fig 1. Texture of strawberry fruit with edible coating during storage

Based on the results of the study on Figure 1 showed that the highest texture of strawberry fruit in the treatment of 3 days of storage 3.95%. This is likely because after the 3rd day the fruit textures are softened although it looks still fresh. Formula Edible coating on immersion time 2 minutes able to maintain and inhibit the occurrence of transpiration and respiration in the fruit. Edible coating of Aloe gel permeable against gas and water vapor that can avoid chilling injury. Aloe gel is also shown to reduce enzyme activity on the wall of the fruit cells, thereby reducing browning reactions and texture decisions [9].

3.2. Acidity (pH)

The value of acidity strawberry fruit is correlated to the organic acids contained therein. Decreased acidity is characterized by increased pH value. The low pH value indicates that the organic acids contained inside are still in good condition [10]. The changes in the pH value of strawberries during storage can appear in Figure 2. Based on Figure 2 that the pH value tends to stabilize. Statistical analysis results showed the immersion time and the storage time in cold temperature did not significant changes of strawberry fruit pH. It is compliant with [9], which says that the pH value of a strawberry nudge fruit is constant during storage.

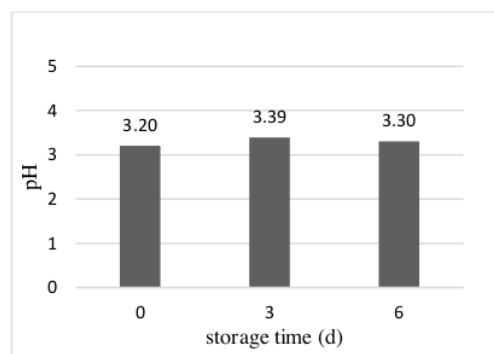


Fig 2. pH of strawberry fruit with edible coating during storage.

3.3. Total Dissolved Solids

Based on statistical analysis results shows that prolonged storage of cold temperature affects the total solids dissolved strawberry fruit. The average value of total dissolved solids can be seen in Figure 3. The total soluble solids of the strawberry during storage varies. The initial total dissolved solids are 4.00 Brix, the 3rd day is 3.16 Brix, and the 6th day is 3.53 Brix. The total dissolved solids in the strawberry fruit decrease during storage is insignificant. This is due to the edible coating of aloe gel that can inhibit the renovation of carbohydrates. The composition of the total soluble solids of the strawberry fruit is high at the beginning of observation [11]. Strawberry fruit has undergone a maturation of meaning there has been an oxidative reshuffle of complex materials such as carbohydrates, proteins, and fats and the formation of simple sugars, fructose, and glucose. According to Ref. [12], The content of sugar levels as total dissolved solids determining the fruit quality. This is due to strawberry fruit after harvest and the storage period is still undergoing physiological changes until entering the period of Withering, sugar decline and dissolved solids.

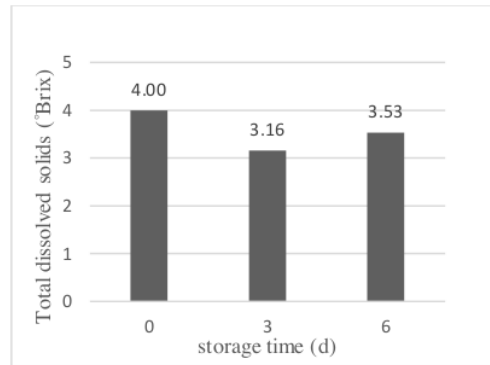


Fig 3. Total dissolved solids of strawberry fruit with edible coating during storage (°Brix)

3.4. Moisture Content

The length of storage affects moisture content of strawberry fruit. The average rate of strawberry fruit moisture content can be realized in Figure 4. Moisture content is a very important component in foodstuffs, as it can affect the appearance, texture, and flavor. Moisture content in foodstuffs determines the receipt, freshness, and shelf life of a material [13].

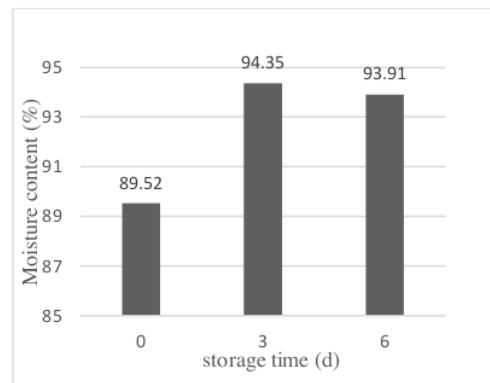


Fig 4. Moisture content of strawberry fruit with edible coating during storage (%).

Figure 4 shows that the strawberry moisture content is obtained from the treatment of 3 days storage is insignificant with 6 days. The value of moisture content is around 93,91-94,36%. This is likely because on the 6rd day edible coating of aloe gel can still maintain the quality of strawberry fruit so that the moisture content in strawberry fruit is still high and the ability of an edible coating to maintain the moisture content most Most precise thickness.

3.5. Vitamin C

Based on statistical analysis results shows that the length of storage affects of vitamin C strawberry. The value of vitamin C strawberry fruit can be perceived in Figure 5. Vitamin C in strawberry fruit is highest obtained from the treatment of 3 days storage with a value of 41.29%. The lowest level of vitamin C is on a 6-day storage of 24.79%. It is likely because on the 3rd day of vitamin C The fruit is still relatively

constant and the fruit looks still fresh. Aloe gel can maintain the high quality of strawberry fruit on the 3rd day. The increase because some of active enzymes convert carbohydrates into vitamin C [13].

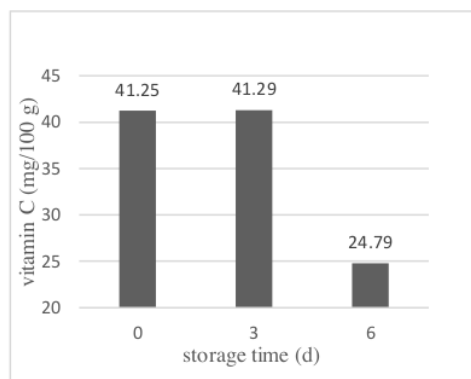


Fig 5. Vitamin C of strawberry fruit with edible coating during storage (mg/100g)

4. Conclusion

Based on results and discussion can be concluded that the quality of the strawberry fruit is best obtained from the time of immersion into the edible coating for 1 minute and the length of storage 3 days. The quality of strawberry fruit is obtained texture 3,95, pH 3.39, Total dissolved solids 4.00, the water content of 94.36%, and vitamin C rate of 41.29 mg/100g, and strawberry fruit still looks fresh visually up to 6 days storage.

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