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Dried Corn Husk and Banana Stalk Usage Test Analysis as A Secondary Packaging Material for Solid Soap BeeKella

Luh Putu Ida Harini (Corresponding author)

Dept. of Mathematics, Udayana University

Jl. Raya Kampus Unud Jimbaran, Kabupaten Badung, Bali 80361, Indonesia

I Gede Santi Astawa

Dept. of Informatics, Udayana University

Jl. Raya Kampus Unud Jimbaran, Kabupaten Badung, Bali 80361, Indonesia

Desak Putu Raka Paramita

Dept. of Tropical Biology, Gadjah Mada University

Jl. Teknika Selatan, Sleman, Daerah Istimewa Yogyakarta 55281, Indonesia

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Abstract

BeeKella soap is a natural solid soap made from propolis and trigona bee honey, produced by a group of bee livestock as part of an MSME business scheme. This soap is made without heating using a soft soap that is slightly soft/oily. The purpose of this study is to investigate the properties of some secondary packaging materials with a natural impression, such as dry corn husks, dried banana fronds, and paper boxes. The organoleptic test was conducted for three months on the packaging materials and soap conditions, as well as the packaging cost calculation. After one month of storage in a small portion of sample with the packaging material of corn husks and banana stalks. The result showed signs of organoleptic changes, whereas soap products did not show any changes until three months of testing. The average packaging time for dry corn husk material was 88 seconds per soap in the packaging cost test, and the average packaging

time for banana stalks was 72 seconds. The use of dried banana stalks caused physical damage to the material during packaging due to its more flexible nature. less than using dry corn husks. A change in the color of the packaging materials is the most prevalent form of alteration that happens in the second month. In conclusion, corn husks and banana stalks are only appropriate for a one-month storage when used as packaging materials for BeeKella soap products. The test also demonstrates that utilizing these two packaging materials increases packaging time significantly.

Keywords: Packaging materials, dried corn husk, dried banana stalk, organoleptic

1. Introduction

Food packaging protects and preserves food by forming a physical barrier against contamination caused by foreign matter and environmental variables. This, in turn, adds to a longer shelf life of the food product. Mechanical and physical strength, convenience, and communication through product labeling are some of the other purposes (Mathlouti, 2013; Han *et al*, 2018).

In the supply chain of a food product, packaging plays a critical role in product protection and shelf-life extension (Ivanković *et al*. 2017). Because of their availability and ease of manufacture, plastic polymers have been used in the development of food packaging materials. Petroleum polymers are poorly degradable, causing problems in the environment (Mangaraj *et al*. 2019). Furthermore, according to O'Brine and Thompson (2010), polymer plastic materials might take up to 100 years to degrade. Similarly, Webb et al. (2013) observed that landfilled polymer plastics could take more than 20 years with no change in the plastic's properties. As a result, efforts are being made to replace petroleum-derived plastic with biodegradable alternatives.

Biodegradable packaging comes in a variety of form, including gels, film, bag, and box, according on the needs of different items (Ivanković *et al*., 2017). Eco-friendly materials are used to create biodegradable packaging. As a result, recycling is easily managed. They use less energy to manufacture. They are non-toxic, emit less carbon dioxide, and help to mitigate climate change. Biodegradable packaging has a number of advantages over plastic packaging, but it also has certain drawbacks. Long-term use of plant-based biodegradable packaging may result in a higher need for plant materials for their production. They may also require a special composting facility (Pawar and Purwar, 2013).

Natural packaging materials for non-food products are frequently available on the market. Natural packaging materials are frequently used to improve the aesthetics of a product in addition to maintaining its quality. Packaging materials with dry conditions, such as palm fronds, banana fronds, corn husks, coconut fiber, and so on, are frequently used for this purpose (Sucipta, 2016). According to (Winarno & Andieta, 2020), natural packaging materials are widely used in Indonesia, particularly banana stalks, which are frequently used in dry conditions to extend the shelf life of the product. Furthermore, it is said that banana stalks have a strong and broad character but are difficult to form. Quality of frond as a packaging material is determined by parameters such as folding resistance, tear resistance,

tensile strength, and water vapor permeability (Habib & Supriyadi, 2016). Dried banana stalks have high permeability, making them ideal for packaging products that deteriorate quickly. Dry corn husk is another material that is frequently used as a packaging material. According to (Purwono & Hartono, 2005), the packaging material for dry corn husks has a coarse character (textured), is hard but crunchy, and is difficult to form, and corn husk also has good permeability properties. Corn husks are well-known as an ingredient in traditional snacks like dodol, wajik, and other traditional desserts (Sucipta, 2016).

Natural ingredient packaging frequently serves purposes other than the basic function of packaging, such as adding aesthetics or reinforcing the impression that a product is natural or environmentally friendly. This packaging material is also very easy to obtain; it just requires a difficult processing process, so products that use miniature materials as packaging will indirectly increase employment opportunities for the surrounding community (Prima, 2016). However, because natural packaging materials have a shorter shelf life than plastic packaging materials, the flow of product production and distribution must be considered to reduce losses due to packaging damage. One of the goals of this study is to determine the shelf life of products with natural packaging on BeeKella solid soap products with test characters based on the actual product storage environment.

BeeKella kelle soap is a solid bath soap with a 90% formula made from the best natural ingredients for skin health. Olive oil, VCO oil, palm oil, trigona bee crude propolis, and trigona bee honey are five natural ingredients found in BeeKella soap products. BeeKella soap was created as a result of a desire to use waste material from the trigona honey bee farm, specifically honeycomb juice dregs, also known as trigona bee raw propolis. This material is frequently discarded by breeders and, according to local wisdom, has numerous benefits and is well-proven in curing a variety of problems, particularly skin problems. Furthermore, this BeeKella soap innovation can address the issue of coconut plantations. Abundant coconut can be used to make Virgin Coconut Oil (VCO), which is one of the basic ingredients in BeeKella soap. This expands business opportunities for the surrounding community, which primarily consists of coconut plantations. As a result, the BeeKella soap innovation is a very good solution for optimizing the income of kele bee breeders as well as the results of coconut plantations in the Bali village of Aan Klungkung. BeeKella soap has been introduced to the natural soap market in several cities in Indonesia since 2019, and it has even been introduced as a souvenir by European and American tourists visiting Bali.

During its development, there was an issue with Beekella soap products, specifically BeeKella soap packaging, which frequently failed to penetrate the foreign tourist market segment because it was perceived as less unique and had a natural impression. Seeing this issue, the research team, which is also a team of BeeKella soap inventors, decided to conduct research on BeeKella soap packaging with a natural concept for the foreign tourist market. The study is based on Indonesian people's local wisdom, who frequently use natural ingredients as packaging, such as corn husks, banana stalks, and other ingredients. Some of the issues that will be addressed in this study include the quality and quantity of natural packaging materials used as secondary packaging materials for BeeKella soap, such as corn husks and banana stalks.

This study aims to renew the packaging of BeeKella soap in order to obtain a package that supports the natural concept without compromising the packaged product's quality, as well as to examine the effects of packaging material characteristics on the condition of BeeKella soap products by understanding the properties of natural packaging materials when used as secondary packaging for BeeKella soap. Through the organoleptic test, the ability of the packaging materials to maintain the condition of the product for as long as possible is tested. The elasticity of the packaging material is also tested, as is the difficulty of the workers in carrying out the packaging process and the possibility of the packaging materials being damaged during the packaging process. The second step is to select the best packaging materials and conduct market research on new BeeKella soap packaging.

2. Method

Research conducted to obtain the best product packaging character is an experimental research model. There are two research objects studied, namely:

1. Natural packaging material from dry and sterile corn husks
2. Natural packaging materials from the outside of banana stalks are dry and sterile

2.1 Corn husks treatment

Corn husks that are about three months old are chosen. Because it is of high quality, the second sheet of skin is taken up to the fifth sheet. After that, the corn husks are boiled for an hour and turned back and forth. The corn husks then were removed and drained before being aerated to dry. The dry corn husks are ironed at a medium temperature.

2.2 Banana skin treatment

Banana stalks with a good width and condition are chosen and dried in the sun for three days until completely dry. The fronds are soaked in a citronella solution for two hours to separate them from the skin and other parts. The fronds have been thoroughly washed and no longer contain citronella compounds. The drying process is conducted, and the garment is ironed on a medium heat setting after it has dried.

All of the above procedures are followed to ensure that the packaging materials are completely dry, do not contain residues of chemical compounds used during the manufacturing process, and do not contain fungi or bacteria.

Figure 1. BeeKella Soap Products with secondary packaging made from natural packaging

2.3 Packaging Process Testing

The purpose of this test is to determine the level of difficulty of the packaging materials used in the packaging process. The average time to pack and the amount of packaging materials damaged during the packaging process are used to generate data. In three trials, each packaging material is used to pack a total of 60 bars of soap, with each experiment packing a total of 60 bars of soap. The packaging is done by the product packaging division staff CV. Sari Amertha, who has two to three employees.

2.4 Product Expiration Testing

The purpose of this test is to determine the ability of packaging materials to maintain product quality. Performed with three different types of scenarios, namely

1. The product is kept on a glass shelf in a non-air-conditioned room away from direct sunlight.
2. The product is kept on a glass shelf in an air-conditioned room, away from direct sunlight.
3. The product is kept on a glass shelf outside the room, but it is not exposed to sunlight.

Organoleptic testing was carried out on samples taken every 7 days and tested with a pH meter.

3. Results and Discussion

3.1 Packaging Materials Testing

Three packaging officers packaged 60 BeeKella soap products as part of the test. As a comparison, the same mechanism is used for paper box packaging materials; the average results of the three tests are as follows.

Tab 1. Results of packaging process testing

Packaging materials	Amount Received (a)	Amount Rejected (b)	Number of used packaging materials (c)	Torn and damaged	Time(d)
Corn husks	40	20	65 (+8%)	42%	88 sec
Banana stalks	45	15	61(+2%)	26%	72 sec
Paper box	60	0	60	0%	45 sec

Based on the test results in Table 1. It can be seen that the use of packaging materials for corn husks and banana stalks is quite difficult for packaging workers. This is reflected in the use of packaging materials that exceeds the number of packaged products, implying that there are packaging materials that were damaged during the packaging process, particularly in the packaging materials for dry corn husks, where the damaged packaging materials reached 8%.

3.2 Product Expiration Testing

This test is performed to determine the length of time the product can be stored. The organoleptic method is used to test the packaging as well as the packaged soap product, and a pH meter is used to test the pH of the soap product. Table 3 displays the results of the packaging conditions tests.

Table 2. Shelf-life test results for secondary packaging materials

Materials	**Scenario**	**Change in color**			**Damage**			**Stains appeared**			**Change in smell**		
		1	2	3	1	2	3	1	2	3	1	2	3
Dried corn husks	In a non-closed air-conditioned room	0	3	6	0	0	1	0	3	5	0	0	0
	In a closed air-conditioned room	0	4	3	0	1	0	0	0	2	0	0	0
	In a non-closed room	0	4	4	0	0	0	0	4	5	0	0	2
Dried banana stalks	In a non-closed air-conditioned room	0	2	6	0	0	0	0	1	2	0	0	0
	In a closed air-conditioned room	0	1	3	0	0	0	0	0	2	0	0	0
	In a non-closed room	0	4	3	0	0	0	0	4	3	0	0	0

The two materials have a shelf life of one month based on the four categories of organoleptic testing of secondary packaging of products stored in three different scenarios. The most common type of change that appears beginning in the second month is a change in the color of the packaging materials. Other changes that frequently accompany color changes are the appearance of spots and stains on packaging materials. Meanwhile, the soap's characteristics did not change as a result of the primary packaging, which is made of plastic wrap and protects the soap.

4. Conclusion

The organoleptic quality testing of packaging materials for three months of storage revealed no damage in BeeKella soap products, but after more than one month of storage, changes appeared in the secondary packaging, in this case dry corn husks and dried banana stalks. This change will almost certainly reduce consumer trust in product quality. As a result, it can be concluded that the use of corn husks and banana stalks as packaging materials for BeeKella soap products is only suitable for a storage period of less than one month. The packaging cost test also reveals that using these two packaging materials will significantly increase packaging time, from 60 percent to 100 percent.

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