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Utilizing pomelo (*Citrus maxima*) peelings and cotton (*Gossypium sp.*) pulp as an alternative paper packaging

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Abstract

Paper bags were traditionally made from trees, leading to habitat degradation and deforestation due to the need for fresh raw materials. To address this issue, the researchers conducted a study with the goal of creating paper bags using cotton pulp and pomelo fruit peels as a sustainable alternative to tree-based paper bags. The objective of the study was to find environmentally friendly alternatives to conventional paper and plastic bags. To evaluate the potential of the alternative paper bag, they gathered 30 respondents from Laguna University, including students, personnel, and teachers who commonly use traditional paper bags. The researchers conducted a "Do It Yourself" (DIY) test to assess the durability of the alternative paper bags and the commonly used paper bags in terms of weight capacity. Additionally, they conducted laboratory tests to compare the tensile strength, thickness, and grammage of the alternative paper with the commonly used paper bag. As a result, the researchers concluded that using an alternative paper bag made from pomelo peels and cotton pulp had significant advantages over commonly used paper bags in terms of durability, appearance, and fragrance. The study provided evidence that the proposed alternative is a viable option for paper packaging. Based on the results of the study, the researchers proposed finding other methods of creating the alternative paper bag due to a lack of heavy equipment. The researchers also suggested further improvement of the smell, color, and moisture content of the paper bag.

Keywords: Pomelo peelings; Cotton pulp; Alternative; Paper packaging

1. Introduction

Environmental issues have been tackled all over the world since the negative impacts of human activities are now being experienced (Cruz, E., 2022). One of the main contributions to this environmental concern is the cutting down of trees or deforestation, resulting in global warming, which leads to abnormal rises in temperature felt in every nation and place on the planet. Furthermore, according to Ballescas, C. (2022), another human activity that could negatively affect the environment is the use of plastics. Plastic bags have become a common choice for carrying things or objects, but they often end up in soil or freshwater as waste, harming aquatic environments and polluting the surroundings. Furthermore, plastics take hundreds of years to decompose, in contrast to the degradation rate of paper.

In the Philippines, plastic bags have been banned, and efforts are being made to address solid waste problems caused by plastics (Torrevillas D., 2019). Eco-friendly alternatives are being sought to reduce the negative impact on the environment. As future educators, the researchers feel a responsibility to introduce ways to prevent environmental degradation. In this study, the researchers aim to create an alternative to plastic bags, considering that even paper bags, while deemed more eco-friendly, can still contribute to deforestation if made from traditional wood-based paper.

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The significance of paper in various aspects of life, such as writing, printing, art, and packaging, is evident. However, the conventional papermaking process can lead to the loss of many trees and adversely affect the environment. To address this, the researchers explored the use of non-wood materials, specifically pomelo peelings and cotton pulp, to create alternative paper bags. By utilizing these materials, which do not require cutting down trees, the researchers aim to promote a more sustainable approach to papermaking.

2. Material and Method

The researchers employed an experimental research design, following the framework of protocols and procedures created for conducting experimental research with a scientific approach using two sets of variables (Sirisilla, 2023). The aim of the study was to determine whether the peelings of pomelo and cotton pulp could be utilized to create sustainable packaging as an alternative paper bag.

This study was conducted at Laguna University in Santa Cruz, Laguna. The selection of this location was based on its convenience for the study, specifically regarding the utilization of pomelo (*Citrus maxima*) peelings and cotton (*Gossypium sp.)* pulp in the development of paper packaging as an alternative paper bag. The respondents of the study consisted of ten (10) students, ten (10) personnel, and ten (10) teachers, making a total of thirty (30) respondents who regularly used traditional paper bags to carry their belongings at Laguna University. The study aimed to determine the potential of pomelo (*Citrus maxima*) peelings and cotton (*Gossypium sp*.) as an alternative to commonly used paper bags in terms of appearance and fragrance. It was implemented during the 2nd semester of the academic year 2022-2023.

The researchers designed a researcher-made survey questionnaire to gather data for evaluating the utilization of pomelo (*Citrus maxima*) peeling and cotton (*Gossypium sp.*) pulp as an alternative paper bag in terms of appearance and fragrance from the selected students, personnel, and teachers at Laguna University. The researchers conducted a "Do It Yourself" (DIY) test to determine the durability of alternative paper bags and commonly used paper bags in terms of weight capacity. Additionally, to test the tensile strength, thickness, grammage, and water absorptiveness of the alternative paper, they conducted a laboratory test. These pieces of evidence were vital for the entire study.

After answering the given questions, the respondents would provide further comments and suggestions. These suggestions would be helpful to the researchers as they would support the answers to the statement of the problem.

The research was divided into two parts. The first part was to experiment or create the actual paper bag using pomelo peelings and cotton pulp as its main components. The second part involved data collection from the laboratory, where the researchers measured durability factors such as tensile strength, grammage, thickness, water absorptiveness, and conducted a DIY test for weight capacity. Additionally, survey questionnaires were administered to randomly selected students at Laguna University.

In the first part of the research, the actual making of the alternative paper bag was carried out. Below includes all the procedures or steps for how the alternative paper bag was made:

Extraction of pectin from pomelo peelings

- Cut and collect the white part of pomelo peelings.
- Boil 1 ¼ kg of pomelo peelings in 20 cups of water.
- Squeeze the peelings of pomelo in a sieving cloth in order to get the pectin.

2.1. Preparation of cotton

- Collect the cotton from the cotton tree, then clean it by removing the seeds and unwanted parts leaving only the cotton.
- Boil 1 cup of cotton with 10 tablespoons of baking soda in 8 cups of water.
- For the cotton to be more ready to blend with other ingredients, cut it in small portions and make sure it is separated and not tangled.

2.2. Making the paper mixture

- Using a blender, mix 2 cups of the white part of the pomelo peelings, ½ cup of boiled cotton, 1 cup of pectin, 2 cups of citrus extract and 2 tablespoons of water to make cotton pulp which is used in paper making.
- Mold or spread the pulp in the shape of paper using a frame screen.

- Dry the molded paper under the sun.

2.3. Making the paper bag

- Create a paper bag after drying the pulp.
- First, get the sizes in making a paper bag, height of 305 cm, width of 110 cm, and length of 210 cm.
- Use adhesive materials, in this case, rugby, to shape the paper bag.
- Then the alternative paper bag is now ready.

For the second part of the research, data gathering, the following are the methods of the researchers on providing the data needed to answer the research questions:

2.4. Testing the durability

2.4.1. Do it yourself weight capacity testing

The researchers used weight capacity to determine how much weight the paper bags could hold in kilograms. The procedure conducted by the researchers was then evaluated by a validator. Objects such as canned goods and bottled drinks were prepared by the researchers for testing the weight capacity of both commonly used paper bags and alternative paper bags. The objective of the testing was to determine the maximum weight the paper bags could hold before bursting.

To measure the weight capacity, the researchers utilized a weighing scale. The procedure involved placing one object on the weighing scale to record its weight. Then, the same object was placed inside the paper bag while it was hanging. Subsequently, another object was placed on the weighing scale, followed by a paper bag, and this process was repeated until the paper bag burst. The final weight recorded in kilograms represented the weight capacity of that specific paper bag. Both commonly used paper bags and alternative paper bags underwent the weight capacity test.

2.5. Laboratory testing

2.5.1. Tensile Strength

Tensile strength was used to measure the strength, elongation at the point of rupture, and energy absorption of the paper bags. This measurement was conducted using a testing tool that maintained a constant rate of elongation. The detailed instructions for assessing the tensile strength and strain at the point of rupture involved using an apparatus that maintained a constant elongation rate of 20 millimeters per minute. The testing process also included using formulas to calculate the modulus of elasticity, tensile energy absorption index, and other relevant quantities. The test results were considered valid as long as they fell within the capabilities of the testing device, as specified in ISO 1924.

2.5.2. Thickness

The thickness of an alternative paper bag was measured to determine how thick or thin it is. To conduct the thickness test, the micrometer should be calibrated and cleaned properly to avoid any errors caused by small fiber pieces. If thickness gauges were used in calibration, they should be gently wiped with alcohol using a non-linting absorbent material. The micrometer should be calibrated at appropriate time intervals in the conditioning atmosphere used for the measurement to ensure its accuracy. For the measurement of single sheet thickness, the test should be conducted in standard atmospheric conditions. The micrometer should be placed on a horizontal, vibration-free surface, and the test piece should be positioned between the open pressure faces, at least 20 mm away from any edge of the test piece. Carefully move the movable pressure face toward the anvil at a velocity of less than 3 mm/s to avoid punching. After a dwell time of 1 to 2 seconds, record the micrometer reading, ensuring that no manual stress is applied. Only one measurement should be taken per test piece, and the procedure should be repeated for all samples. For the determination of bulking thickness, a similar procedure should be followed, but the test piece should be placed in different positions, between 40 mm and 80 mm from the edges along the two cross-direction edges of the paper. The measurements should be repeated for each position and for all test pieces. It is important to adhere to the procedure consistently to obtain reliable results, as stated by ISO 534.

2.5.3. Water Absorptiveness

Water absorptiveness refers to the ability of the resulting paper bag to absorb water and maintain its structural integrity without significant damage. To test the water absorptiveness of a paper bag, the following method was employed: Conduct the test in the same atmospheric conditions used to condition the specimens. Before conducting each test, ensure that the top surface of the base plate and the edge of the cylinder that will come into contact with the test piece

are dry. Place the test item on the base plate with the surface being tested facing upwards and weigh it to the nearest 1 mg. To prevent water leakage, position the cylinder so that the machined edge is in contact with the test piece and clamp it tightly. For the test duration, defined as the time between water contact and the commencement of blotting, pour 100 ml ± 5 ml of water into the cylinder to create a 10 mm head and immediately start the timer. Use fresh water for each determination. The test procedure should adhere to the conditions summarized in 10.3, with the exposure time selected based on the paper's water absorptiveness. For example, if a 60-second test is chosen, pour off excess water after 45 seconds, ensuring no water contacts the test piece's surface beyond the designated area. Quickly unclamp the cylinder and remove it. Take the test piece and place it with the test face upwards on a sheet of dry blotting paper previously positioned on a flat rigid surface. After 60 seconds from the start of the test, place a second sheet of blotting paper on top of the test piece and remove excess water using a hand roller, making two rolls (forward and backward) without applying pressure, as stated by ISO 535.

2.5.4. Grammage

Grammage refers to the mass of a unit area of paper or board. The apparatus used for this measurement includes a cutting device, balance, and a special sheet-weighing balance. The procedure for determining grammage is as follows: First, prepare and weigh the test pieces in the same atmospheric conditions as those used to condition the specimens in order to determine the condition of grammage. Cut test pieces from the conditioned specimens using the cutting instrument to determine both the conditioned grammage and the oven-dry grammage. Cut as many test pieces as possible from at least five samples, with the same number taken from each. Use the same process to determine the "as-taken" grammage while minimizing the impact of the surrounding environment on the test pieces' moisture content. When a test area is limited, and it is not possible to construct a test component out of multiple smaller parts, a test area of at least 10,000 mm2 (100 cm2) may be employed. This deviation from the protocol needs to be documented accordingly. Measure each test piece to the closest 0.5 mm and compute its area if there are any changes in the test pieces' area depending on the type of paper or board being tested, the moisture content of the test pieces, or if these factors are unknown. Weigh each test piece on a balance, and the mass (or suggested grammage, if a special sheet-weighing balance is being used) should be expressed to three significant figures. It is advised to avoid touching the test pieces with bare hands, especially when working with small components, as stated in ISO 536.

Survey for commonly used paper bags and alternative paper bags in terms of appearance and fragrance.

Before gathering data, the researchers asked the VPAA for permission to conduct a study at Laguna University, specifically for the students at the College of Education. Additionally, the researchers sought permission from the Dean of the College of Computing Studies and the OIC President of Laguna University to conduct a survey among the faculty, teachers, and personnel of the institution. This was the initial step for the research. Subsequently, the researchers administered survey questionnaires to the selected respondents, based on the variables of the research. The appearance of the paper bag, which included size, texture, shape, and color, as well as the fragrance of the paper bag, including sweet smell, strong smell, pleasant smell, fruity smell, and musty smell, were assessed during the survey while the respondents observed the paper bag.

There were two sets of survey questionnaires given to the study respondents. The first survey questionnaire was for the alternative paper products made by the researchers, and the second questionnaire was for the commonly used or traditional paper bag. Both sets of questionnaires contained the same questions, which would be compared to the answers to the fourth research question of the study, exploring the difference between the alternative paper bag made by the researchers and the commonly used paper bag.

The data gathering process began with laboratory testing of the durability of the paper bag. Next, the survey questionnaire on the commonly used paper bag and traditional paper bag was given to the respondents. First, the respondents answered the survey questionnaire for the commonly used paper bag. Then, the research product, an alternative paper product, was observed by the respondents, and they provided evaluations on it. Finally, survey questionnaires for the alternative paper products were given to them, following the respondents' observation of the alternative paper bag.

After the data collection, the researchers analyzed the gathered data and formulated the conclusion and recommendations.

3. Results and Discussions:

This chapter summarizes the findings of the statistical analyses that led to data interpretation.

Table 1 Level of acceptability of pomelo peeling and cotton pulp as alternative paper packaging in terms of Durability

Test	Result
Grammage	497.258 g/m^2
Tensile Strength	7.777 kN/m
Thickness	2, 901.800 µm
Water Absorptiveness	110.810 g/m^2
Weight Capacity	6.75 kg

Table 1 illustrates the level of acceptability of pomelo peeling and cotton pulp as alternative paper packaging in terms of durability. The grammage of the alternative paper bag is 497.258 g/m^2, the tensile strength is 7.777 kN/m, the thickness is 2,901.800 µm, the water absorptiveness is 110.810 g/m^2, and the weight capacity is 6.75 kg.

Table 2 Level of acceptability of commonly used paper bag in terms of Durability

Test	Result
Grammage	65 g/m^2
Tensile Strength	3.5 kN/m
Thickness	68 µm
Water Absorptiveness	230 g/m^2
Weight Capacity	5.35 kg

Table 2 shows the level of acceptability of the commonly used paper bag in terms of Durability. According to Shieldplus Graphic 65 (n.d.), which provides properties of recyclable brown paper bags, the grammage of the commonly used paper bag is 65 g/m^2. The tensile strength is 3.5 kN/m, and the thickness is 68 µm. Additionally, according to Jimenez-Francisco M. et al (2018), the water absorptiveness is 230 g/m^2. Lastly, the weight capacity is 5.35 kg.

Table 3 Level of acceptability of pomelo peeling and cotton pulp as alternative paper packaging in terms of Appearance

Indicators	Mean	SD	Interpretation
The appearance of an alternative paper bag has a bright and fine color that is suitable for a paper bag.	4.47	0.68	Highly Acceptable
The color of an alternative paper bag is appealing to the eye and is presentable to carry.	4.57	0.57	Highly Acceptable
The texture of the alternative paper bag is pleasant to handle and touch.	4.37	0.72	Highly Acceptable
The alternative paper bag is evenly shaped.	4.50	0.68	Highly Acceptable
The alternative paper bag is fine and light to carry.	4.50	0.63	Highly Acceptable
General Weighted Mean	4.48	0.65	Highly Acceptable

Legend: Mean on Scale: 4.21 – 5.00 = highly acceptable, 3.41 – 4.20 = acceptable, 2.61 – 3.40 = neutral, 1.81 – 2.60 = less acceptable, 1.00 – 1.80 not acceptable

Table 3 shows the data on the level of acceptability of pomelo peeling and cotton pulp as an alternative paper packaging in terms of appearance. Among the statements above, "The appearance of the alternative paper bag has a bright and fine color that is suitable for a paper bag" received a mean score of 4.47 and SD of 0.68, interpreted as highly acceptable. Next is "The color of the alternative paper bag is appealing to the eye and is presentable to carry" with a mean score of 4.57 and SD of 0.57, also interpreted as highly acceptable. Then "The texture of the alternative paper bag is pleasant to handle and touch" with a mean score of 4.37 and SD of 0.72, interpreted as highly acceptable. Furthermore, "The alternative paper bag is evenly shaped" with a mean score of 4.50 and SD of 0.68, interpreted as highly acceptable. Lastly, "The alternative paper bag is fine and light to carry" with a mean score of 4.50 and SD of 0.63, interpreted as highly acceptable. Overall, the general weighted mean of the appearance of the alternative paper bag is 4.48 with an SD of 0.65, interpreted as highly acceptable.

Table 4 Level of acceptability of pomelo peeling and cotton pulp as alternative paper packaging in terms of Fragrance

Indicators	Mean	SD	Interpretation
The fragrance of the alternative paper bag is noticeable to me.	4.47	0.63	*Highly Acceptable*
The alternative paper bag has a strong smell.	3.37	1.11	*Neutral*
The alternative paper bag is pleasant to smell.	4.30	0.70	*Highly Acceptable*
The alternative paper bag has a musty smell.	2.67	1.58	*Neutral*
The alternative paper bag has a hint of fruity citrus smell.	4.13	0.97	*Acceptable*
General Weighted Mean	3.86	1.23	Acceptable

Legend: Mean on Scale: 4.21 – 5.00 = highly acceptable, 3.41 – 4.20 = acceptable, 2.61 – 3.40 = neutral, 1.81 – 2.60 = less acceptable, 1.00 – 1.80 not acceptable

Table 4 shows the data on the level of acceptability of pomelo peeling and cotton pulp as an alternative paper packaging in terms of fragrance. Among the statements above, "The fragrance of the alternative paper bag is noticeable to me" received a mean score of 4.47 and SD of 0.63, interpreted as highly acceptable. Next was "The alternative paper bag has a strong smell" with a mean score of 3.37 and SD of 1.11, interpreted as neutral. Then, "The alternative paper bag is pleasant to smell" with a mean score of 4.30 and SD of 0.70, interpreted as highly acceptable. Furthermore, "The alternative paper bag has a musty smell" with a mean score of 2.67 and SD of 1.58, interpreted as neutral. Lastly, "The alternative paper bag has a hint of fruity citrus smell" with a mean score of 4.13 and SD of 0.97, interpreted as acceptable. Overall, the general weighted mean of the fragrance of the alternative paper bag is 3.86 with an SD of 1.23, interpreted as acceptable.

Table 5 Level of acceptability of commonly used paper bag in terms of Appearance

Indicators	Mean	SD	Interpretation
The appearance of commonly used paper bag has a bright and fine color that is suitable for a paper bag.	4.07	0.83	*Acceptable*
The color of commonly used paper bag is appealing to the eye and is presentable to carry.	3.90	0.80	*Acceptable*
The texture of the commonly used paper bag is pleasant to handle and touch.	3.93	0.94	*Acceptable*
The commonly used paper bag is evenly shaped.	4.03	0.81	*Acceptable*
The commonly used paper bag is fine and light to carry.	4.07	1.01	*Acceptable*
General Weighted Mean	4.00	0.87	*Acceptable*

Legend: Mean on Scale: 4.21 – 5.00 = highly acceptable, 3.41 – 4.20 = acceptable, 2.61 – 3.40 = neutral, 1.81 – 2.60 = less acceptable, 1.00 – 1.80 not acceptable

Table 5 shows the data of the level of acceptability of commonly used paper bag in terms of appearance. Among the statements above, "The appearance of commonly used paper bag has a bright and fine color that was suitable for a paper bag" receive a mean score of 4.07 and SD of 0.83 interpreted as acceptable. Next is "The color of commonly used paper bag is appealing to the eye and is presentable to carry" with a mean score of 3.90 and SD of 0.80 interpreted as acceptable. Then, "The texture of the commonly used paper bag is pleasant to handle and touch" with a mean score of

3.93 and SD of 0.94 interpreted as acceptable. Furthermore, "The commonly used paper bag is evenly shaped" with a mean score of 4.03 and SD of 0.81 interpreted as acceptable. Lastly, "The commonly used paper bag is fine and light to carry" with a mean score of 4.07 and SD of 1.01 remarked as acceptable. Overall, the general weighted mean of the appearance of commonly used paper bag is 4.00 with a SD of 0.87 interpreted as acceptable.

Table 6 Level of acceptability of commonly used paper bag in terms of Fragrance

Indicators	Mean	SD	Interpretation
The fragrance of commonly used paper bag is noticeable to me.	3.53	1.01	*Acceptable*
The commonly used paper bag has a strong smell.	3.27	1.14	*Neutral*
The commonly used paper bag is pleasant to smell.	3.30	1.06	*Neutral*
The commonly used paper bag has a musty smell.	2.83	1.32	*Neutral*
The commonly used paper bag has a hint of fruity citrus smell.	2.63	1.45	*Neutral*
General Weighted Mean	3.11	1.23	*Neutral*

Legend: Mean on Scale: 4.21 – 5.00 = highly acceptable, 3.41 – 4.20 = acceptable, 2.61 – 3.40 = neutral, 1.81 – 2.60 = less acceptable, 1.00 – 1.80 not acceptable

Table 6 shows the data on the level of acceptability of the commonly used paper bag in terms of fragrance. Among the statements above, "The fragrance of the commonly used paper bag is noticeable to me" received a mean score of 3.53 and SD of 1.01, interpreted as acceptable. Next is "The commonly used paper bag has a strong smell" with a mean score of 3.27 and SD of 1.14, interpreted as neutral. Then, "The commonly used paper bag is pleasant to smell" with a mean score of 3.30 and SD of 1.06, interpreted as neutral. Furthermore, "The commonly used paper bag has a musty smell" with a mean score of 2.83 and SD of 1.32, interpreted as neutral. Lastly, "The commonly used paper bag has a hint of fruity citrus smell" with a mean score of 2.63 and SD of 1.45, interpreted as neutral. Overall, the general weighted mean of the fragrance of the commonly used paper bag is 3.11 with an SD of 1.23, interpreted as neutral.

Table 7 Summary Table

	Alternative Paper Bag		Commonly Used Bag	
	General Weighted Mean	**Verbal Interpretation**	**General Weighted Mean**	**Verbal Interpretation**
Appearance	4.48	*Highly Acceptable*	4.00	*Acceptable*
Fragrance	.86	*Acceptable*	3.11	*Neutral*

Overall, in terms of appearance, the general weighted mean of alternative paper bag is 4.48 with a verbal interpretation of highly acceptable while the commonly used paper bag is 4:00 with a verbal interpretation of acceptable. In terms of fragrance, the alternative paper bag has a general weighted mean of 3.86 with a verbal interpretation of acceptable while the commonly used paper bag is 3.11 with a verbal interpretation of neutral.

Table 8 T-test of alternative paper bag and commonly used paper bag

	T-value	P-Value	Interpretation	Decision
Appearance	-2.93635	.002378	*significant*	Reject Ho
Fragrance	-3.33282	.000751	*significant*	Reject Ho

$p < 0.05$

The T-value of alternative paper bag and commonly used paper bag in terms of appearance is -2.93635, P-value of .002378, with an interpretation as significant; it means that the null hypothesis is rejected. The T-value of alternative paper bag and commonly used paper bag in terms of fragrance is -3.33282, P-Value of .000751, with an interpretation as significant; it means that the null hypothesis is rejected.

Based on the results of the study, the null hypothesis that there is no significant difference between using paper packaging as an alternative paper bag made of pomelo peeling and cotton pulp and a commonly used paper bag in terms of durability, appearance, and fragrance was rejected. The data gathered from the survey questionnaires showed that alternative paper bag made of pomelo peelings and cotton pulp are more durable than commonly used paper bag. This proves the study of Sannapapamma et al. (2020) that with the combination of cotton, the paper can exhibit stronger bursting and tensile strength, in this case with the use of pomelo peelings to create a more durable paper bag. As for the appearance, the alternative paper bag was highly acceptable, while the commonly used paper bag was acceptable. This means that people value the appearance of alternative paper bags more. And for the fragrance, the alternative paper bag was acceptable while the commonly used paper bag was neutral, indicating that the alternative paper bag's fragrance was good and much appreciated compared to the commonly used paper bag.

4. Conclusions

Based on the study's findings, the researchers conclude that there is a significant difference between using an alternative paper bag made of pomelo peeling and cotton pulp and a commonly used paper bag in terms of durability, appearance, and fragrance.

The researchers recommend exploring other materials or methods to improve the smell of the paper bag without relying on oils or chemical-based fragrances. Second, the process of making the alternative paper bag requires a long period of time, and it has a bad smell without essential oils. The researchers conclude that this could be due to the lack of heavy equipment and knowledge. Therefore, they suggest investigating alternative methods or equipment for making paper that would require less time. Third, the alternative packaging absorbs room temperature. The researchers recommend that future studies investigate how to maintain the moisture content of the alternative paper bag to address this issue. Fourth, the researchers recommend conducting further studies to explore the potential of using this alternative paper packaging to create other products. Lastly, the researchers suggested exploring or implementing a method to change the appearance color of the paper bag, as this aspect was not within the scope of the current research.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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