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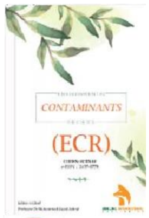

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REVIEW ARTICLE

THE UTILIZATION OF PARAGIS GRASS (Eleusine indica) AS CELLULOSE-BASED BIOPLASTIC FILM

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ABSTRACT

The goal of this research is to create biodegradable plastics made from Paragis grass (Eleusine indica) cellulose-pulp that can be used as alternatives to traditional plastics. The bioplastics were made by combining cellulose pulp from paragis grass leaves, sorbitol, acetic acid, and corn starch, with a constant amount of 8g corn starch and varying amounts of cellulose pulp (20g, 30g, and 40g), as well as 10ml sorbitol and 3 ml acetic acid. Collection and processing of paragis grass, cellulose pulp manufacturing, and bioplastic film manufacture were some of the methods used. Tensile strength, biodegradability, water absorption, and water solubility tests are used to characterize bioplastic. The mechanical properties testing shown that bioplastic produced with variation of corn starch to paragis grass cellulose pulp ratio had a tensile strength of 0.549 MPa, 0.878 MPa and 1.03 MPa; elongation at break (%) of 7.33%, 6.97% and 6.54%; biodegradability (weight loss) of 91.65%; 90.05%; and 69.46%; water absorption (weight gain) of 91.80%, 83.06% and 53.74%; and water solubility (weight loss) of 86.96%, 66.46% and54.91% respectively. The study found that Treatment 3 (40g paragis grass) has higher tensile strength (1.03 MPa) and tear strength, ability to degrade in four weeks, low water absorption (53.74%), and water solubility (54.91%).The result showed that cellulose-pulp from Paragis grass leaves could be used to make bioplastic. This research would aid in the reduction of plastic waste that pollutes the Earth's soil, air, and water, as well as the mitigation of its consequences. It can also help reduce environmental pollution by using biodegradable plastic.

KEYWORDS

biodegradability, tensile strength, water absorption, water solubility

1. INTRODUCTION

Wheat (*Triticum aestivum)*, which belongs to the family Poaceae, is one of Paragis grass (Eleusine indica) is a Poaceae family member and a terrestrial plant found in Asia, North America, Africa, and other parts of Europe. This grass grows quickly despite a lack of nutrients, making it suitable for use as plant biomass in the production of bioplastics. The most common polysaccharide found in nature is cellulose. Because it has not been converted into biodegradable plastic, the cellulose and hemicellulose content of Paragis grass can be used as a source of bioplastic. Recycling will never be able to outnumber the amount of plastic discarded in the community as waste. Toxins emitted by the accumulation of synthetic products in the environment cause long-term and irreversible harm to humans, animals, and plants. As humanity has become more aware of the threat posed by plastic waste and the importance of addressing it before it becomes out of control, bioplastics have emerged as a potential alternative. Bioplastic, also known as bio-based plastic, is a type of plastic made from plants or other biological materials as opposed to petroleum. The components of this bioplastic are cellulose, starch, and lactic acid. Grass hemicellulose and cellulose were heavily used as plant biomass in this study because they contain high percentages of total cellulose and hemicellulose. The average hemicellulose content of grass biomass is 25–50%, the cellulose content is 25– 40%, and the lignin content is 10–30% (Wongwatanapaiboon et al., 2012). Cellulose has the potential to be used as a raw material in the production of bioplastics. Experiments on bioplastic production from grasses have already been carried out, with switchgrass, elephant grass, and other grasses being used (Holik et al., 2014; Ebert, 2008). The researcher believes that developing bioplastic in the Philippines will be extremely beneficial in addressing the problem caused by conventional plastics. Based on the foregoing, the goal of this study is to determine whether the leaves of the paragis grass (Eleusine indica) can be used as an alternative bioplastic material..

2. MATERIALS AND METHODS

2.1 Apparatus

Three 250-mL beakers, two 10-mL graduated cylinders, one 50-mL graduated cylinder, three evaporating dishes, a mortar and pestle, a kitchen scale, a digital pocket scale, a micro caliper, a hot plate and a stainless tray, a fruit blender, a microwave oven, a stove, wax paper, a sifter, a spatula, a casserole, and a sauce pan were used.

2.2 Materials

Materials used were paragis grass leaves (Eleusine indica), corn starch ($C_6H_{10}O_5$) n, sodium hydroxide (NaOH), acetic acid (CH_3COOH), and sorbitol ($C_6H_{14}O_6$).

2.3 Methods

Methods included the collection and processing of paragis grass leaves, the

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production of cellulose pulp and bioplastics, and the characterization of bioplastics.

2.4 Collection of Paragis Grass

The biological material, paragis grass (Eleusine indica), was gathered in the Municipality of Biñan in Laguna. The paragis grass was cleaned, dried, chopped, and sieved after being washed, dried, and cut.

2.5 Production of Paragis Grass Cellulose Pulp

The cellulose pulp was produced using methods based on Bolio-López et al. research with modifications. Paragis grass was used to make cellulose, which was then sun- dried and treated with a solution of 10% NaOH (10g/100mL) to remove waxes, resins, and pectins. The process is intended to speed up the reaction of NaOH molecules with lignin and hemicellulose. Paragis grass was cut into four longitudinal cuts with a length of 20 cm and soaked in an alkaline solution of 10% NaOH under stirring for 30 minutes at 380ºC temperature. After heating, the paragis grass was cut and ground in a fruit blender with 300mL of water until the cellulose pulp from the paragis grass was obtained. The material was weighed to determine the yield.

2.6 Production of Bioplastic Film

Sorbitol was used as a plasticizer in a paragis grass cellulose-based bioplastic. The saucepan was heated to a temperature of 380°C before the cellulose pulp was added. The silicone spatula was then used to mix in 3ml of acetic acid and 10ml of sorbitol. The mixture was then poured onto wax paper, flattened and evenly spread with a rolling pin. It was then dried in the microwave oven for 3 minutes at 50% microwave power or 175°C. After drying in the oven, it was placed in a cool, dry place, and weights were obtained.

2.7 Mechanical Properties Testing

Tests were performed at the researcher's residence to determine its water solubility, ASTM D570 for water absorption, and ASTM D6400 for soil burial method. The bioplastic sample was brought to the DOST-ITDI for tensile strength or ASTM D638/D882 testing.

Tension Test. Researchers used a tensile test to assess the strength of biodegradable plastic films. Throughout the test, the amount of force (F) applied to the sample and the elongation (L) of the sample are measured. Ten samples were created, each measuring 250mm in length, 15mm in width, and 1mm in thickness.

Biodegradability Test. Biodegradable plastic films were placed into three containers with compost soil at a depth of 10cm from the surface for 4 weeks. The initial weight of each film was recorded, and the weights of the films were tracked within a weekly interval for four weeks.

Water Absorption Test. Water absorption, or ASTM D570, was tested by immersing three samples from each treatment in distilled water and periodically removing and reweighing until a constant film mass was achieved (Putra et al., 2016).

Water Solubility Test. The water solubility of three different treatments was tested to determine how much water they could contain. The insoluble portion of the film sample was separated from the soluble portion in distilled water and dried for five minutes in a microwave oven on low heat. The difference between the samples' initial and final weights was calculated (Sanyang et al., 2015).

2.8 Statistical Treatment of Data

The researcher analyzed the data of the specimen to determine whether or not the variables were significant. ANOVA was used to see if there was a significant difference in the weights of the bioplastic film during the bioplastics during the tests and Tukey Post Hoc was also used to determine whether the three treatments showed a highly significant difference in the weights of the bioplastic films (Sanyang et al., 2016; Frost, 2020).

3. Results and Discussion

Tensile strength, elongation at break, and tear resistance are all mechanical properties tests. Tensile strength is the maximum pull that can be achieved before the film breaks up. Tear resistance is the amount of force required to stretch or elongate the film. Maximum strain bioplastic time is finally broken by elongating at break (Holik et al., 2014). Ten bioplastic strips of 250mm length, 15mm width and 1mm thickness were made for each sample type. The ASTM D882 test method was used with the instrument Instron UTM Model 5585H. The following grips were used: 250 N Pneumatic Grip (Rubber Jaw Faced), Max. Pressure: 5 Bars, and the Conditioning Atmosphere: Temperature, °C: 23\pm 2°C, and Relative Humidity of 50p\pm 5%.

Table 1: Tensile strength of three bioplastic treatments

Treatment	Tensile Strength (MPa)	
	Mean	SD
Treatment 1	0.549	0.324
Treatment 2	0.878	0.290
Treatment 3	1.03	0.381

Table 2 shows the mean tensile strength (MPa) of the three bioplastic treatments. The mechanical properties of thin sheets of bioplastic were tested in terms of tensile strength and percent elongation. Treatment 1 has a pressure of 0.549 MPa, while Treatment 2 has 0.878

MPa and Treatment 3 has 1.03 MPa. The elongation at break for Treatment 1 is 7.33%, 6.97% for Treatment 2, and 6.54% for the Treatment 3. Treatments 1 and 3 received 9 out of 10 for Tear Failure (TF), while Treatment 2 received 8 out of ten. However, Treatments 1 3 received one out of five for Failure at Grip (FG) The number of specimens that failed at Tear Failures (TF) was also higher than the number that failed to fail at Grip. Treatment 3 has the highest mean tensile strength mean of 1.03 MPa, and Treatment 1 has the most value of elongation at break with a mean of 7.33%. Both Treatments 1 and 3 have high tear resistance, as shown in Table 2. It also shows that both treatments and have high mean tear resistance. The presence of cellulose in the form of hydrogen bonds increased as the amount of paragis cellulose-pulp increased. The value of elongation at break of bioplastics produced increased as the number of hydrogen bonds increased (Holik et al., 2014).

A soil burial method based on ASTM D6400 was used to test the product's biodegradability. Table 3 shows the percentage weight loss of the three bioplastic treatments in terms of biodegradability. Treatment 1's weight loss percentages for Replications 1, 2, and 3 are 91.89, 86.00, and 97.06, respectively. Furthermore, for Replications 1, 2, and 3, the percentage of weight loss for Treatment 2 is 87.04, 90.91, and 92.19, respectively. Furthermore, the percentage weight loss of Treatment 3 is 52.54, 81.69, and 74.16 for Replications 1, 2, and 3. It shows that Treatment 1 has the highest percentage of weight loss with a composite mean of 91.65%, Treatment 2 has a composite mean of 90.05%, and Treatment 3 has the lowest percentage of weight loss with a composite mean of 69.46%.

Table 2: Weight Loss in Percentage of the Three Bioplastic treatments in terms of biodegrability

Treatment 1 (20 grams Paraggis Grass (*Eleusine indica*) 8 grams corn starch)	Initial weight	Final weight	Weight Loss (%)
Replication 1	0.74	0.06	91.89
Replication 2	1.00	0.14	86.00
Replication 3	0.68	0.14	86.00
Composite Mean	0.81	0.11	91.65
Treatment 2 (30 grams Paragis Grass(Eleusine indica) and 8 grams Corn Starch)			
Replication 1	0.54	0.07	87.04
Replication 2	0.66	0.06	90.91
Replication 3	0.64	0.05	92.19
Composite Mean	0.61	0.06	90.05
Treatment 3 (40 grams Paragis Grass(Eleusine indica) and 8 grams Corn Starch)			
Replication 1	1.18	0.56	52.54
Replication 2	0.71	0.13	81.69
Replication 3	0.89	0.23	74.16
Composite Mean	0.93	0.31	69.46

This demonstrates that the biodegradable plastic containing less paragis grass cellulose-pulp degrades faster than the biodegradable plastic containing more paragis grass cellulose-pulp. Yaradoddi et al. (2016) conducted a degradability test using a soil burial test in their study. They discovered that cellulose is the most abundant constituent by mass in most grasses. Its content, however, varies depending on the stage of growth, the plant fraction such as node, internode, leaf, and so on, as well as the specific species and variety of grass (Celignis Analytical, 2019).

In this study, it was discovered that the bioplastic with the highest amount of paragis cellulose-pulp formed a stronger bond than the bioplastic with the lowest amount of paragis cellulose-pulp, causing it to degrade slower in Treatment 3.

Table 4: Weight Gain in percentage of the three bioplastic treatments in terms of water absorption

Treatment 1 (20 grams Paraggis Grass (*Eleusine indica*) 8 grams corn starch)	Initial weight	Final weight	Weight Loss (%)
Replication 1	0.55	1.06	92.73
Replication 2	0.67	1.30	94.03
Replication 3	0.60	1.16	93.33
Composite Mean	0.61	1.17	91.80
Treatment 2 (30 grams Paragis Grass(Eleusine indica) and 8 grams Corn Starch)			
Replication 1	1.09	2.07	89.91
Replication 2	1.63	2.84	74.23
Replication 3	1.01	1.89	87.12
Composite Mean	1.24	2.27	83.06
Treatment 3 (40 grams Paragis Grass(Eleusine indica) and 8 grams Corn Starch)			
Replication 1	1.68	2.87	70.83
Replication 2	1.99	2.65	65.83
Replication 3	2.23	3.77	69.06
Composite Mean	4.41	6.78	53.74

Table 4 displays the percentage weight gain of the three bioplastic treatments in terms of water absorption. The weight gain in Treatment 1 has a composite mean of 91.80%. This was followed by Treatment 2 with a composite percentage of 83.06%. Treatment 3 had the lowest weight gain, with a composite mean of 53.74%. As a result of the table, it is clear that Treatment 1 is the most absorbent of the three, while Treatment 3 is the least absorbent. Table 5 shows the percentage of water solubility for the three bioplastic treatments. Treatment 1 has a weight loss percentage of 85.37, 93.91, and 81.88 for Replications 1, 2, and 3. Furthermore, the percentage of weight loss of Treatment 2 for Replications 1, 2, and 3 is 54.86, 68.45, and 74.59, respectively. Furthermore, the percentage weight loss of Treatment 3 for Replications 1, 2, and 3 is 65.09, 45.06, and 55.95, respectively.

Table 5: Percent weight loss of the three bioplastic treatments in terms of water solubility

Treatment 1 (20 grams Paraggis Grass (*Eleusine indica*) 8 grams corn starch)	Initial weight	Final weight	Weight Loss (%)
Replication 1	0.82	0.12	85.37
Replication 2	1.15	0.07	93.91
Replication 3	1.49	0.27	81.88
Composite Mean	1.15	1.15	86.96
Treatment 2 (30 grams Paragis Grass(*Eleusine indica*) and 8 grams Corn Starch)			
Replication 1	1.44	0.65	54.86
Replication 2	1.68	0.53	68.45
Replication 3	1.81	0.46	74.59
Composite Mean	1.64	0.55	66.46
Treatment 3 (40 grams Paragis Grass(*Eleusine indica*) and 8 grams Corn Starch)			
Replication 1	2.12	0.74	65.08
Replication 2	2.33	1.28	45.06
Replication 3	2.27	1.00	55.95
Composite Mean	2.24	1.01	54.91

Treatment 1 has the highest percentage of weight loss, with a composite mean of 86.96; Treatment 2 has a composite mean of 66.46; and Treatment 3 has the lowest percentage of weight loss, with a composite mean of 54.91. It indicates that of the three treatments, Treatment 1 is the most soluble in water, while Treatment 3 is the least soluble. Because it contains cellulose, hemicellulose, and lignin, the use of paragis cellulose-pulp in the current study affects the solubility rate of the bioplastic film. Furthermore, starch-based films are hydrophilic, which promotes microorganism growth (Hii et al., 2016). Treatment 1, a biodegradable plastic containing less paragis grass cellulose-pulp (20 grams), has the lowest composite mean percentage in terms of tensile strength, biodegradability, water solubility, and water absorption, according to the results. Treatment 3 has a higher composite mean percentage in terms of tensile strength, biodegradability, water solubility, and water absorption because it contains a higher amount of paragis grass cellulose pulp (40 grams). This demonstrates that bioplastic film containing less paragis grass cellulose- pulp is less durable, more biodegradable, and more soluble, reducing its ability to contribute as a pollutant. However, advancements are required because exposure to moisture or water may reduce its strength as a bioplastic material.

Table 6: Test for a significant difference in tensile strength among three bioplastic treatments

	Sum of Squares	DF	Mean Square	F	Sig
Between Groups	.877	2	.438	3.208	.045
Within Groups	11.892	87	.137		
Total	12.769	89			

Table 6 depicts the test for a significant difference in tensile strength between the three bioplastic treatments. The results revealed that the difference between the mean values of the three treatments is significant, with a computed F-value of 3.208 and a p-value of.05. The results show that Treatment 1, Treatment 2, and Treatment 3 have different tensile strengths.

Table 7 shows the Tukey Post Hoc Multiple Comparison of the three treatments in terms of bioplastic tensile strength. Treatment 1 differs significantly from Treatment 3. Similarly, Treatment 3 differs significantly from Treatment 1. According to the results, Treatment 3 had the highest mean difference in terms of tensile strength, which is significantly different from Treatments 2 and 3. As a result, among all treatments, the bioplastic with the highest amount of paragis cellulose-pulp has the highest water tensile strength. The likelihood of cellulose interaction increased as the amount of paragis cellulose-pulp increased. Hydrogen bonds are formed during the interaction of corn starch and cellulose in bioplastics. The value of elongation at break of bioplastics produced increased as the number of hydrogen bonds increased. Tensile strength is the maximum strength that plastic can withstand before breaking. Tensile strength values may have decreased as a result of the modest mixing method used, which resulted in decreased bioplastic tensile strength in the formed columns (Holik et al., 2014).

Tensile values increased as the amount of corn starch and cellulose interaction between bioplastic components increased. Similarly, as tensile strength increased, so did tear resistance of bioplastic as the amount of paragis cellulose pulp was added to the bioplastic. One of the important mechanical parameters of rubber or plastic products is torn strength, which is used to characterize tear resistance. It is the amount of force required to rip a material and keep the crack going until it fails (Tang and Feng, 2019). A group researchers investigated the "Mechanical Properties of Bioplastics Product from Musa Paradisica Formatypica Concentrate with Plasticizer Variables (Sofiah et al., 2019)." The content of the added plasticizer has a significant impact on the tensile strength of bioplastic films. The results of the tests revealed that the higher the plasticizer content, the lower the tensile strength of the bioplastics produced. This is because increasing the concentration of the plasticizer reduces hydrogen bonds in the film, increasing flexibility. By increasing flexibility, the tensile strength of the film decreases because the resulting film becomes flexible, soft, and flexible, resulting in a decrease in tensile strength. The researcher used a small amount of sorbitol as a plasticizer in this study, which contributes to the higher tensile strength of the bioplastic made from paragis grass.

Table 8: Test for a significant difference in biodegradability among three bioplastic treatments

	Sum of Squares	DF	Mean Square	F	Sig
Between Groups	.101	2	.0.51	2.868	.134
Within Groups	.106	6	.018		
Total	.207	8			

Table 8 shows the test for a significant difference in biodegradability among the three bioplastic treatments. The results revealed that the computed F-value of 2.868 and p-value >.05 indicate that there is no significant difference in biodegradability between the three treatments' means. This implies that the degradation rates of Treatments 1, 2, and 3 are the same. The Tukey Post Hoc Multiple Comparison for biodegradability of bioplastic is shown in Table 9. There was no significant difference between Treatments 1, 2, and 3 with p-values greater than.05. This implies that the bioplastic degrades at nearly the same rate in all three treatments. In their study, they stated that starch has a direct effect on the thickness of bioplastic (Santana et al., 2017). In their study, they discovered that as the concentration of starch increased, so did the thickness. That increase in starch concentration was linked to higher concentrations of amylopectin and amylose, which resulted in higher solids content in the film and, as a result, thicker films.

Some researcher stated a similar method for bioplastic production (Zavareze et al., 2012). Thicker films resulted from the increasing amount of paragis cellulose-pulp shown in Treatments 2 and 3. The reason for this is that grasses have extremely high levels of total cellulose and hemicellulose. In general, grass biomass has 25-40 percent cellulose, 25-50 percent hemicellulose, and 10-30 percent lignin on average (Wongwatanapaiboon et al., 2012). Corn starch contains amylose and amylopectin, which were then combined with the paragis grass's cellulose and hemicellulose. Furthermore, the rate of degradation of bioplastics in soil was affected by the components present in each film (Adhikari et al., 2016). This slow weight loss is caused by an excess of cellulose, hemicellulose, amylose, and amylopectin, as shown in Table 3.

Table 10: Test for a Significant Difference in Water Absorption Among Three Bioplastic Treatments

	Sum of Squares	DF	Mean Square	F	Sig
Between Groups	5.583	2	2.792	13.480	.006
Within Groups	1.243	6	.207		
Total	6.826	8			

Table 10 depicts the test for a significant difference in water absorption between the three bioplastic treatments. The results revealed that the difference between the mean values of the three treatments is significant, with a computed F-value of 13.480 and a p-value. 05. The results show that Treatment 1, Treatment 2, and Treatment 3 have different water absorption capacities. Water absorption, according to ASTM D570, demonstrates a material's ability to absorb water in humid or watery environments (Intertek, 2020). The durability and strength of a product are increased if it has a low water absorption rate (Behiels, 2019). This means that the biodegradable plastic with the most paragis cellulose-pulp (Treatment 3) is more water-absorbent and thus more durable in water and humidity than the biodegradable plastic with the least paragis cellulose-pulp. According to a study, starch-based films are hydrophilic, which increases the water activity of the films and thus their water absorption capability (Hii et al., 2016). Sultan and Johari discovered that biopolymers can absorb up to 60.65% of their weight in water (Sultan and Johari, 2017). In contrast to the current study, films with uniform corn starch content but increasing amounts of paragis cellulose-pulp had lower water absorption.

Table 11 shows that the mean percentages of water absorption for Treatments 1 and 2 are not significantly different, implying that they have nearly the same rate of water absorption, despite Treatment 1 having a higher absorption rate than Treatment 2. The mean difference between Treatments 1 and 3 is, however, significant. This means that the rate of absorption of Treatment 1 is significantly higher and different from that of Treatment 3. As a result, the bioplastic containing the most paragis cellulose-pulp has the lowest capacity to absorb water.

Table 12: Test for a significant difference in Water solubility among three bioplastic treatments

	Sum of Squares	DF	Mean Square	F	Sig
Between Groups	1.094	2	.547	17.653	.003
Within Groups	.186	6	.031		
Total	1.280	8			

The test for a significant difference in water solubility between the three bioplastic treatments is described in Table 12. The results showed that there is a significant difference between the mean values of the three treatments, with a computed F-value of 17.653 and a p- value of.05. This demonstrates that the rates of water solubility in Treatments 1, 2, and 3 differ. Table 13 shows the results of multiple comparisons of the three treatments in terms of bioplastic water solubility. Treatment 1 differs significantly from Treatment 3. Similarly, Treatment 2 differs significantly from Treatment 3. According to the results, Treatment 1 had the highest mean difference in terms of water solubility, which is significantly different from Treatments 2 and 3. As a result, among all treatments, the bioplastic with the least amount of paragis cellulose-pulp has the highest water solubility rate.

The findings of a study conducted revealed that bioplastics composed of lignin and cellulose have notable mechanical strength, resistance to ultraviolet light, water stability, and thermal stability (Xia et al., 2021). It was also discovered that this type of bioplastic can be naturally recycled and is safer for the environment. Only green and recyclable chemicals were used in the in-situ lignin regeneration strategy, resulting in a strong biodegradable and sustainable bioplastic that can be used as an alternative to petroleum-based plastics. The bioplastic film with paragis grass (Eleusine indica) cellulose-pulp has a low bonding strength due to the low amount of cellulose, hemicellulose, and lignin.

This explains why the biodegradable plastic with less paragis grass cellulose-pulp is more water-soluble than the biodegradable plastic with more paragis grass cellulose- pulp. Some researchers on the other hand, claimed in their study that increasing the concentration of starch in the film increases the rate of solubility (Santana et al., 2017). This is in contrast to the current study, where the addition of paragis cellulose-pulp slows the solubility rate, resulting in Treatment 1 having the highest solubility. Given all of the data, Treatment 3 (40g paragis grass) was found to be more moisture resistant due to its high tensile strength mean (1.03 MPa) and tear strength, ability to degrade in four weeks, low water absorption (53.74 percent), and water solubility (54.91 percent). As a result, Treatment 3 with the highest concentration of paragis cellulose-pulp is ideal for use as a bioplastic.

4. Conclusion

In this study, the researcher uses cellulose pulp from paragis grass leaves as a biodegradable plastic to help reduce environmental pollution. According to the statistical results, Treatment 3 (40g paragis grass) has higher tensile strength (1.03 MPa) and tear strength, the ability to degrade in four weeks, low water absorption (53.74%), and water solubility (54.91%). The results demonstrated that cellulose-pulp from Paragis grass leaves could be used to make bioplastic. However, increasing the concentration of paragis grass cellulose pulp can improve the physical properties of the bioplastic film and could be formed into a plastic bag, benefiting the community by lowering the cost of purchasing commercial plastic and providing a viable source of income.

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