

**PRODUCTION, TESTING AND EVALUATION OF
BIODEGRADABLE PLASTIC MULCH
USING RICE STRAW**

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ABSTRACT

PICHAY, JHUN-BEE P. and SORZA, JAMILLAH S., Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines. **June 2023, PRODUCTION, TESTING AND EVALUATION OF BIODEGRADABLE PLASTIC MULCH USING RICE STRAW.**

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Plastic mulches greatly increase agricultural output by reducing weeds in the soil, protecting and promoting plant growth with nets, extending the growing season, and boosting crop yields. However, removing these plastic mulches from the field after the cropping season presents a considerable challenge to appropriate disposal. This study was conducted to find a solution to the problems caused by burning rice straw and using it as plastic mulch in agriculture, both of which endanger sustainable farming. Additionally, it intends to turn rice straw into practical, biodegradable plastic mulch.

The general objective of this study was to produce, test and evaluate the performance of biodegradable plastic mulch made from rice straw. This study specifically aimed to formulate a method for producing biodegradable plastic mulch from rice straw, produce biodegradable plastic mulch from rice straw, test its tensile strength and biodegradability, assess its effectiveness in the production of tomatoes, and evaluate its biodegradability in terms of moisture content reduction and perform simple cost analysis.

Plasticizers used in this study with a ratio of 4 liters of water; 80 ml of glycerin; 80 ml of vinegar; 80 ml of 5% acetic acid; 80 g of corn starch; 80 g of gelatin powder were used at the same ratio for each treatment. In which 10 grams, 20 grams and 30 grams of grinded raw rice straw were used for Treatment 1, Treatment 2 and Treatment 3,

respectively, while treatment 4 was the control in which the Polyethylene (PE) plastic mulch was used. The production of biodegradable plastic mulch was done at CLSU Hydroponics Aquaponics Technologies (CHAT). The testing and performance evaluation were done at Philippine Center for Postharvest Development and Mechanization (PhilMech) and CLSU Hydroponics Aquaponics Technologies (CHAT). Randomized Complete Block Design, Analysis of Variance (ANOVA) and comparison among means using Least Significant Difference (LSD) were used to analyze the gathered data from the study.

Based on the results on the tensile strength test, it revealed that there was a significant difference in tensile strength among the T1, T2, T3 and T4. For the biodegradability test, the Treatment 3 with the 30g of rice straw revealed to have a highest weight loss. On the evaluation for the performance of biodegradable plastic mulch and Polyethylene plastic mulch on the growth of the tomato, the results revealed that there was significant difference on the plant height, soil moisture, and water consumption among the treatments. A one-way ANOVA revealed that there was a statistically significant difference in the number of weeds among the treatments at 0.05 level for the four groups. The total production cost of making 9 samples of 1m x 0.80m biodegradable plastic mulch film using rice straw is Php 2, 557. 00.

Keywords: biodegradability; plastic mulch; Polyethylene; rice straw; tensile strength

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