SYNTHESIS OF BIOPOLYMER FROM ROTTEN MANGIFERA INDICA FOR LOCAL INDUSTRIAL POLYMER PRODUCTION

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ABSTRACT

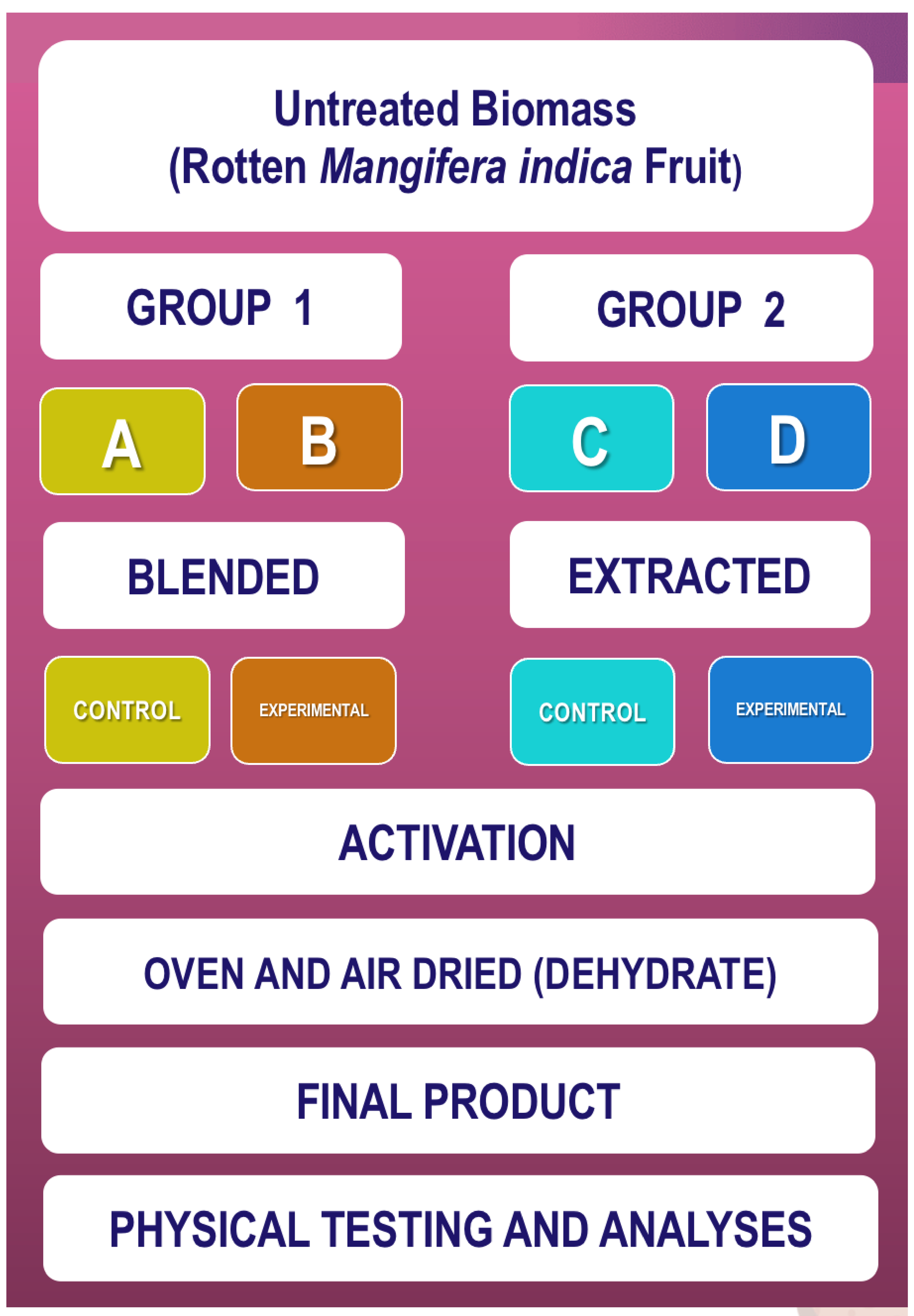
Industrial polymer productions are one of the most abundant industries that remains active where materials synthesized are able to be utilized in different manners, such as to describe plastics, fabrics, rubbers, automobile parts, adhesives, to sewer delivery systems, and even in modern-engineering. This experimental research paper utilized experimental procedures with replication of experimental measurements in order to supply physicochemical characteristics, moisture content, and elasticity measurements, which were treated using the T-Test method with three (3) trials each of the synthesized biopolymer through a randomized block design of two (2) groups: blended and extracted mangoes, respectively, consisting of two (2) treatments each, where experimental sample B of pair A exhibited a high potential based from the hypothesis claims.

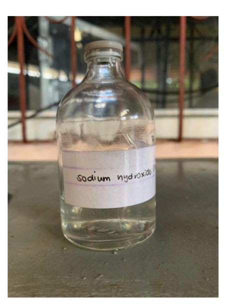
INTRODUCTION

Biopolymers are artificially synthesized from natural resources to achieve promising sustainability like naturally – sourced polymers. Polymers are the chain-like structure of molecules that are bonded and consist of smaller molecules, monomers, that are formed through chemical reactions. Replacing natural polymers helped the industry offer ranges of application from the said material. Fast-fashion, one of the industries who most benefited from the polymer material production, and the second contributor of pollution right next to the oil industry [1].

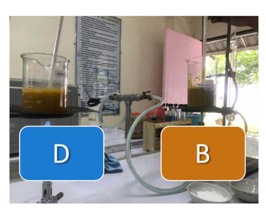
This paper focuses on synthesizing biopolymer material from rotten **Mangifera indica** (RMI) to determine the viability as biopolymer material in local industry and battle excess production and waste of mangoes in local agricultural industry adhering to SDG 12 Responsible Consumption and Production.

RESEARCH METHODS



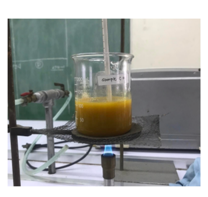


Pretreatment process: Alkaline Pretreatment
(20% sodium hydroxide)



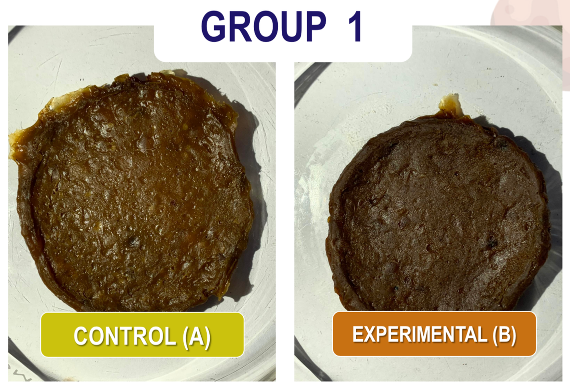
Pretreatment process: Boiling

Starch Activation reagents
(lemon extract, salt, corn starch)

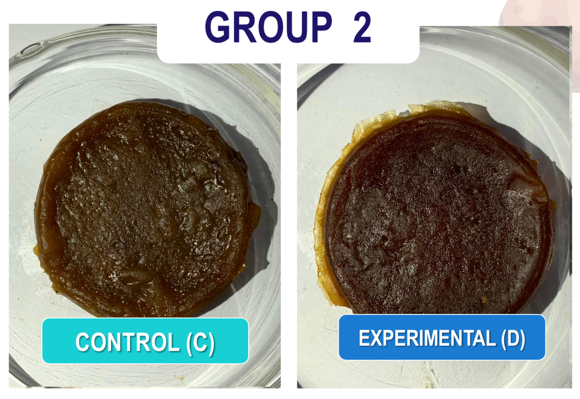


Starch Activation boiling process

GROUP 1



GROUP 2



RESULTS AND DISCUSSION

Light Optical Microscopy

At 4x scanning objective x 10x eyepiece = 40x magnification

Solubility Test

	SAMPLE A	SAMPLE B	SAMPLE C	SAMPLE D
WATER	DISINTEGRATED			
SODIUM HYDROXIDE				
HYDROCHLORIC ACID				
ETHANOL				

Concentrated Inorganic Acids

	SAMPLE A	SAMPLE B	SAMPLE C	SAMPLE D
HYDROCHLORIC ACID	**With precipitate (7 drops)**	**With precipitate (7 drops)**	With precipitate (9 drops)	With precipitate (27 drops)
NITRIC ACID	Without precipitate (30 drops)	With precipitate (17 drops)	With precipitate (9 drops)	**With precipitate (7 drops)**
SULFURIC ACID	**With Precipitate (Black)**	**With Precipitate (Black)**	**With Precipitate (Black)**	**With Precipitate (Black)**

Biuret Reaction and Benedict's Test

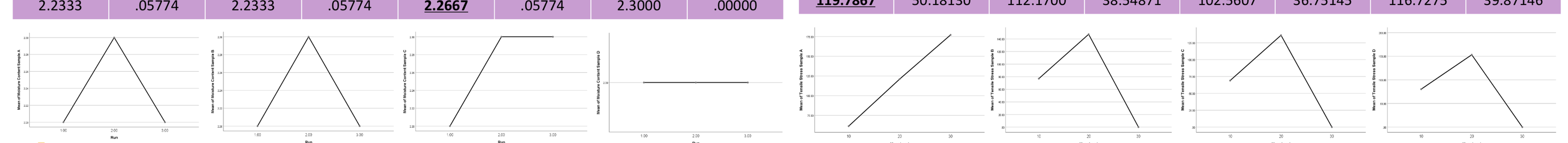
	(5 drops sodium hydroxide and 3 drops copper)	(Benedict's reagent)
Sample A	Yellow Green (Negative)	Yellow (Positive)
Sample B	Brown (Negative)	Yellow (Positive)
Sample C	Yellow green (Negative)	Yellow (Positive)
Sample D	Brown (Negative)	Yellow (Positive)

Moisture Content

SAMPLE A		SAMPLE B		SAMPLE C		SAMPLE D	
MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
2.2333	.05774	2.2333	.05774	**2.2667**	.05774	2.3000	.00000

Tensile Stress

SAMPLE A		SAMPLE B		SAMPLE C		SAMPLE D	
MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
119.7867	50.18130	112.1700	38.54871	102.5607	36.75145	116.7275	39.87146

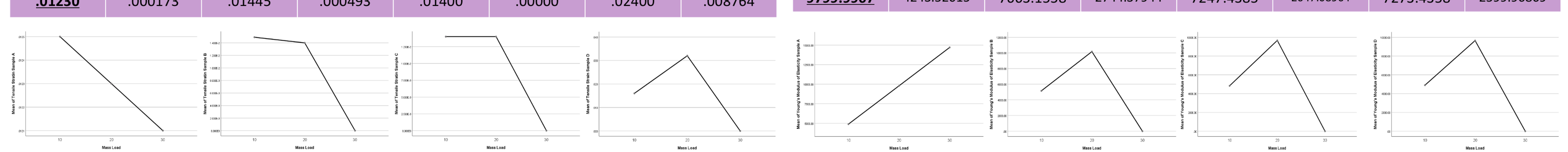


Tensile Strain

SAMPLE A		SAMPLE B		SAMPLE C		SAMPLE D	
MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
.01230	.000173	.01445	.000493	.01400	.00000	.02400	.008764

Young's Modulus of Elasticity

SAMPLE A		SAMPLE B		SAMPLE C		SAMPLE D	
MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
9799.9967	4243.52015	7663.1558	2744.37944	7247.4385	2647.08964	7273.4358	2599.96869



CONCLUSION

Based on the experimental and statistical results, alkaline treated blended RMI yields promising viability of biopolymeric material in terms of tensile strength and elasticity, and other related physical properties. Still, to further validate the experimental results, it is fully recommended to run more analytical tests that determine other significant characteristics such as thermal stability, structural composition, and integrity. Nevertheless, it opened the door of possibilities in utilizing biomass sources into industrial materials for building sustainable communities and societies.

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