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بسم اللّه الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني

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التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

PRODUTION OF BIO PLASTIC FROM AGRICULTURAL WASTES

By

AYA MOHAMED MAHMOUD ALI KOBASH
B.Sc. (Agricultural Engineering), Fac. of Agric., Ain Shams Univ., 2013

Thesis Submitted in Partial Fulfillment
Of
The Requirements of the Degree of

MASTER OF SIENCE
in
AGRICLTURAL SIENCES
(Agricultural Mechanization)

Department of Agricultural Engineering
Faculty of Agriculture
Ain Shams University

2022

Approval Sheet

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ABSTRACT

Aya Mohamed Mahmoud Ali Kobash: Production of Bio Plastic From Agricultural Wastes. Unpublished M.Sc. thesis, Department of Agricultural Engineering, Faculty of Agriculture, Ain Shams University, 2022.

This study was conducted to reduce the accumulation of wastes by using Agricultural wastes "unmarketable potato tubers and banana peel" for producing biodegradable plastic films to be substitute of oil based plastics "OBP" which is often not biodegradable. Starch extracted from unmarketable potato tuber used to produce starch based plastic samples "SBP" with different of glycerol concentrations (5, 10, 15, 20, 25, 30, 99.5% v/v) as a plasticizer, by casting after gelatinization. Banana peel bio plastic "BBP" produced using glycerol 20 % only. The physical properties of SBP films samples including thickness; density, water absorption capacity, rate of weight loss, "biodegradability" were studied, as well as mechanical properties at (25 °C and RH 48 %) including tensile strength, modulus of elasticity, elongation %, firm force, and required energy for firm were also investigated compared with OBP samples. Based on the tests results, It was found that, the maximum value of extracted starch from unmarketable potato tuber was 13.5% obtained by blending potato tubers. As far physical properties, SBP films with elevated glycerol concentration increased the sample thickness but decreased its density. Glycerol 20% gave the best flexible compact structure SBP films. Average thickness and density of SBP film (20% glycerol) were 0.25 mm and 80.11 Kg/m^3 respectively. Meanwhile, the average thickness and density for BBP films were 0.345 mm and 58.22 Kg/m^3. On the other hand the corresponding values for OBP were 0.41 mm and 24.39 Kg/m^3 respectively. The water absorption capacity for SBP and BBP films with 20 % glycerol were 83.33 and 55.5 % after 24 hour and the corresponding value for OBP was 35.11 %. The rate of weight loss of SBP and BBP films with 20% glycerol concentration was 72% and

82.3 % after 96 days and nearly to be 90 % after 103 day with BBP samples, while the rate of mass loss for OBP films with 15% HDPE not exceed 1.8 % and can be neglected. As far the mechanical properties of SBP; BBP 20% glycerol and OBP 15% HDPE films, the maximum values of tensile strength were (13.23, 1.73 and 1.12 MPa) respectively, modulus of elasticity were (1556.73, 96.36 and 44.97MPa), firm force were (0.916, 0.82 and 1.08 N), mean consumed energy for firm were (44.05, 54.45 and 31.06 N.mm), the optimum elongation were (100.77, 133.33 and 107.26 %) respectively. Although the high water absorption capacity of bio-plastic samples produced from potato starch or banana peels makes them unsuitable for using in the food service industry, they can be used with same additives in (one time use) packaging materials. Since it is biodegrade very fast, therefore, producing starch based biodegradable plastic from un-marketable potato tuber and banana peel can be used instead of the traditional oil based plastic.

Keywords: Municipal Solid Waste “MSW”, Agro waste, Starch based plastic “SBP”, Oil based plastic “OBP”, Unmarketable potato tubers, Banana peel and Biodegradability.

ACKNOWLEDGEMENT

I would like to express my deep gratitude to my supervisor, **Prof. Dr. Mobarak Mohamed Mostafa**, Professor Emeritus of Agricultural engineering, Dep. of Agricultural Engineering, Faculty of Agriculture, Ain Shams University, for valuable discussions.

Private thanks to **Dr. Fathi Abdel Haleem**. Senior Researcher, Agricultural Engineering, Research Institute of Agricultural Engineering. For his suggestion the theme of study and helping me always during period of study.

I would like to express all thanks and appreciation for **Dr. Mohamed Mayhoub**, Associate professor, Agricultural Engineering, Faculty of Agriculture, Ain Shams University, for helping me in making mechanical tests of bio plastic samples.

Finally, I would like express my thanks for my friends and my brother **Abd-Elrahman** and my sisters **Naglaa , Samera** and private my sister **Samia** for helping and support and stimulation me during period the study.

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LIST OF ABBREVIATIONS

OBP	Oil Based Plastics
SBP	Starch Based Plastic
BBP	Banana Based Plastic
HDPE	High Density Poly Ethylene
MSW	Municipal Solid Waste
GHG	Global Greenhouse Gas
FW	Food Waste
AW	Agricultural Waste
Mt	Million Metric Tons
SWM	Solid Waste Management
MSWM	Municipal Solid Waste management
MSWMS	Municipal Solid Waste Management System
PW	Plastic Waste
USD	United State of Dollar
EGP	Egypt
FLW	Food Loss and Waste
NENA	Near East and North Africa
IUPAC	International Union of Pure and Applied Chemistry
EPI	Environmental Product Incorporation
SPI	Society of the Plastics Industry
BSI	British Standards Institution
ISO	International Standards Organization
PCL	Poly Capro Lactone
PBS	Poly Butylene Succinate
PE	PolyEthylene
NY11	Nylon 11
AcC	Acetyl Cellulose
PLA	Poly Lactide Acid
PHB	Poly Hydroxy Butyrate
HMF	Hydroxy Methyl Furfural