

# BIO-PLASTIC (GENERATING PLASTIC FROM BANANA PEELS)

**Prof.Manasi Ghamande<sup>1</sup>, Aaditya Kulkarni<sup>2</sup>,  
Nimish Shah<sup>3</sup>, Sakshi Kothari<sup>4</sup>, Soham Bhosale<sup>5</sup>**

*Department of Engineering, Science and Humanities  
Vishwakarma Institute of Technology, SPPU, Pune*

## ABSTRACT

*The research work on synthesis of bio plastic material by using banana peels. Bio plastic prepared using the banana peels serve as potential alternative to the conventional plastic material. Making bio plastic from banana peels instead of traditional petroleum based plastic is believed to be successful solution to increase efficiency of plastic industry. The result show that the plastic produced could bear the weight one and half times more than petroleum plastic.*

*This report introduces a scientific method to generate bio plastic from banana peels and help to reduce the pollution.*

**Keywords- Bioplastic, Banana peels, Bio degradation, Plastic**

## I INTRODUCTION

Plastic causes environmental pollution because of having non-biodegradable characteristics and they are full of harmful by-products and chemicals which are released during their break down process. It's been estimated that 400,000 barrels of oil are used each day to make plastic packaging in the world. The oil-based plastics cannot be rid easily and create landfills or environmental pollution.

Bioplastics can be defined as plastics made of biomass such as banana peels and potato peels. Bio plastic is plastic made of biodegradable materials such as banana peels, fruit waste etc. They are completely safe and do not have any harmful chemicals or toxins. Bio plastics can replace petroleum-based plastics and can be made from vegetable wastes that contain starch.

## II MATERIALS REQUIRED

Banana peel, Starch, Glycerol, HCl (Hydrochloric acid), NaOH (sodium Hydroxide),  $\text{Na}_2\text{S}_2\text{O}_5$ (Sodium meta bisulphite), Distilled water

### III EXPERIMENTAL PROCEDURE

- 1) Banana peels converted into small pieces. Then it was soaked in sodium meta bisulphite (0.2M) solution for 45 minutes. It is used as antioxidant and preservative. This would increase the biodegradation period of bioplastic. (fig 1.)
- 2) Banana peels are boiled in distilled water for about 30 minutes. The water is decanted from the beaker and the peels are now left to dry on filter paper for about 30 minutes. (fig 2.)
- 3) After the peels are dried, they are placed in a beaker and using a hand blender, the peels are pureed until a uniform paste is formed.
- 4) 25g banana paste is placed in a beaker 6ml of (0.25 N) HCl is added to this mixture. 2ml Glycerol is added. 0.5 N NaOH is added according to pH desired.
- 5) The mixture was poured into a Petri dish and put in the oven at 130°C about 30 minutes. (fig 3 and fig 4.)



**Fig 1. Banana peels soaked in sodium meta bisulphite Fig 2. Banana peels boiled with water**



**Fig 3. Mixture Heated in Oven**



**Fig 4. Final Product**

#### **IV OBSERVATIONS**

##### **[1]Tensile strength-**

The tensile strength was measured by using standard machine ASTM. In the absence of starch the tensile strength is negligible and in the presence of starch its tensile strength increases.

##### **[2]Biodegradation-**

The biodegradation period was found to be 7-9 months. After 9 month there was degradation of bio-bag due to growth of micro-organism.

#### **V ADVANTAGES AND CHALLENGES**

The main advantage of bioplastics over conventional plastic is that they degrade into environment without creating any pollution. Plastic from banana peels can be used for making plastic bags and tubes due its flexibility and durability. The high production cost and the availability of low-cost petrochemical derived plastics led to bioplastics being ignored for a long time.

#### **VI FUTURE SCOPE**

In the future, instead of using banana peels, potato peels would be used for manufacturing the plastic and that is because this material has more starch and more polymer chains that form the plastic, so as a result it has higher efficiency than banana peels, as its efficiency is 90% while the efficiency of the banana peels is 80%.

Although potato peels are available as much as banana peels, they weren't used because they require more time to dry after getting them out of the oven, as the banana peels require only 1 day, while the potato peels require at least 4 days to dry.

#### **VII CONCLUSION**

The bioplastic from banana peels that can be used as packaging or as carry bag. Sodium metabisulphite prevent growth of micro organism such as bacteria, Glycerol is added to increases its flexibility. The degradation of bioplastic starts after 3 to 4 months from the date of production. The bioplastic produced through this method could be substantial and the biodegradable tractability is one of the main challenges in developing bio plastic material.

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#### **REFERENCE**

[1] Y. J. Chen," Bio plastics and their role in achieving global sustainability", J. Chem. Pharm. Res., vol.6 (1), pp.226-231, 2014.

- [2] J.H.Williams, A.DeBenedictis, R.Ghanadan, A. Mahone, J. Moore, W. R. Morrow III, S. Price and M. S. Torn. Science, 335: 53–59, 2012.
- [3] M.F. Cervera, J. Heinamaki, K. Krogars, and A.C. Jorgensen, “Solid-State and Mechanical Properties of Aqueous Chitosan-Amylose Starch Films Plasticized with Polyols”, AAPS PharmSciTech, vol.5, pp.15-20, 2005.
- [4] P. Astuti, A. A. Erprihana, “Antimicrobial Edible Film from Banana Peels as Food Packaging”, American Journal of Oil and Chemical Technologies, vol. 2, pp. 65-70, February 2014
- [5] Hester, Ronald E.; Harrison, R. M. (editors) Marine Pollution and Human Health. Royal Society of Chemistry (2011). pp. 84-85. Lytle, Claire Le Guern. "Plastic Pollution". Coastal Care. 2015; Retrieved 19 February.
- [6] Barnes, D. K. A.; Galgani, F.; Thompson, R. C.; Barlaz, M.. "Accumulation and fragmentation of plastic debris in global environments". Philosophical Transactions of the Royal Society B: Biological Sciences. 2009.
- [7] Other related books and journals.