

**FROM PEEL TO PLASTIC: “A BIODEGRADABLE
REVOLUTION”**

**OMEIAT NATIONAL SCIENCE FAIR – 2025
DISPLAY SHEET**

SUBMITTED BY

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NSF-SCH-2025-20

ABSTRACT:

- ✓ This project aims to develop a biodegradable plastic by extracting starch from banana peels or corn and combining it with natural additives.
- ✓ Plastic pollution is one of the most pressing environmental challenges of our time. This research investigates the potential of fruit and vegetable peels—specifically banana, orange, and potato peel—as raw materials for producing biodegradable plastic.
- ✓ The study outlines the process of converting organic waste into bio plastics, compares their

properties, and evaluates their environmental and economic impact.

HYPOTHESIS:

“IF BANANA PEEL OR CORN STARCH IS PROCESSED WITH GLYCERINE, VINEGAR, AND HEAT, THEN IT CAN FORM A BIODEGRADABLE PLASTIC SHEET THAT CAN SERVE AS AN ECO-FRIENDLY ALTERNATIVE TO CONVENTIONAL PLASTIC.”

Research Questions:

- ✓ Can banana peel or corn starch be converted into a useful form of bioplastic?
- ✓ Which source (banana peel vs. corn starch) produces stronger and more durable plastic?
- ✓ How does bioplastic compare with conventional plastic in terms of strength, flexibility, and decomposition?

- ✓ Can bioplastic be produced at a low cost for practical use?

SELECTION OF PROBLEMS & BACKGROUND

INFORMATION:

- ✓ **Problem Identified:** Pollution caused by non-biodegradable plastics.
- ✓ **Background:**
 - Over **400 million tonnes** of plastic are produced annually worldwide.
 - Plastic waste leads to ocean pollution, microplastics, and health hazards.
 - Agricultural byproducts like banana peels and corn starch can be used to create

biodegradable plastics that decompose naturally.

PROCEDURE:

1. Banana Peel Method:

- ✓ Collect banana peels, wash, and blend into a paste.
- ✓ Heat paste with water, vinegar, and glycerin while stirring.
- ✓ Pour mixture into a mold/tray and allow it to cool.
- ✓ Dry in oven/sunlight to obtain bio plastic sheet.

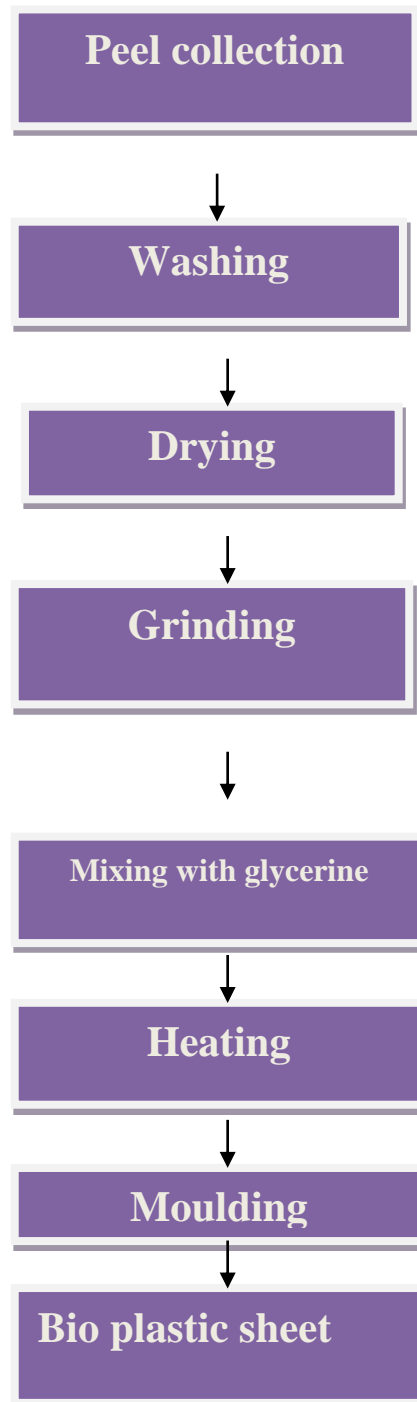


2. Corn Starch Method:

- ✓ Mix corn starch with water, vinegar, and glycerin.
- ✓ Heat mixture until it thickens and becomes gelatinous.
- ✓ Spread mixture on a tray/mold.
- ✓ Dry thoroughly to obtain corn-starch-based plastic.

3. Compare flexibility, strength, and decomposition rate of both plastics.

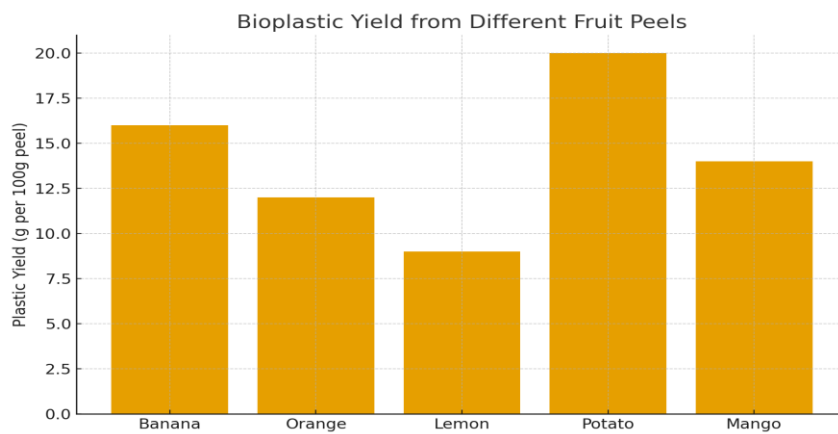
4.FLOW CHART:



IMAGES:

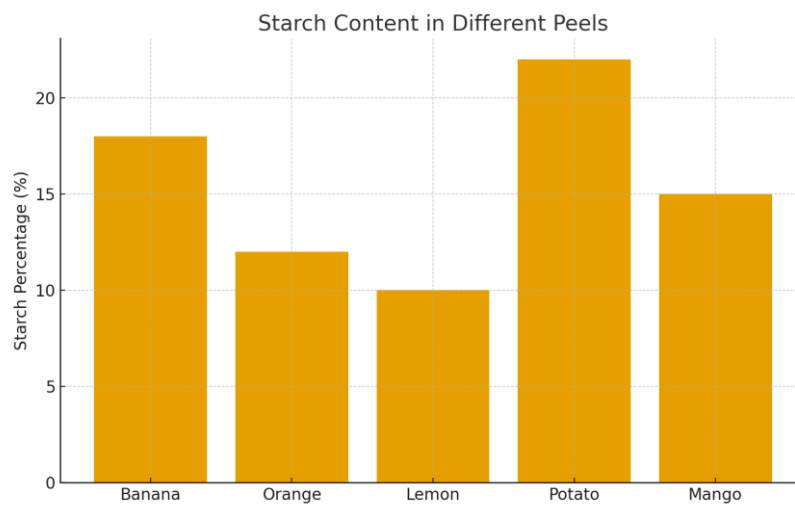


BAR CHART:



Bio plastic yield from different fruit peels

Starch Percentage:

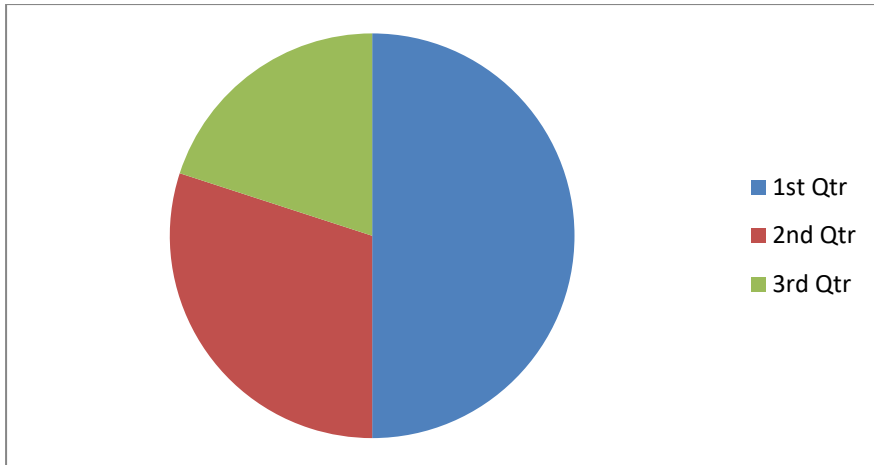


Starch content in different peels

PIE CHART – RAW MATERIAL

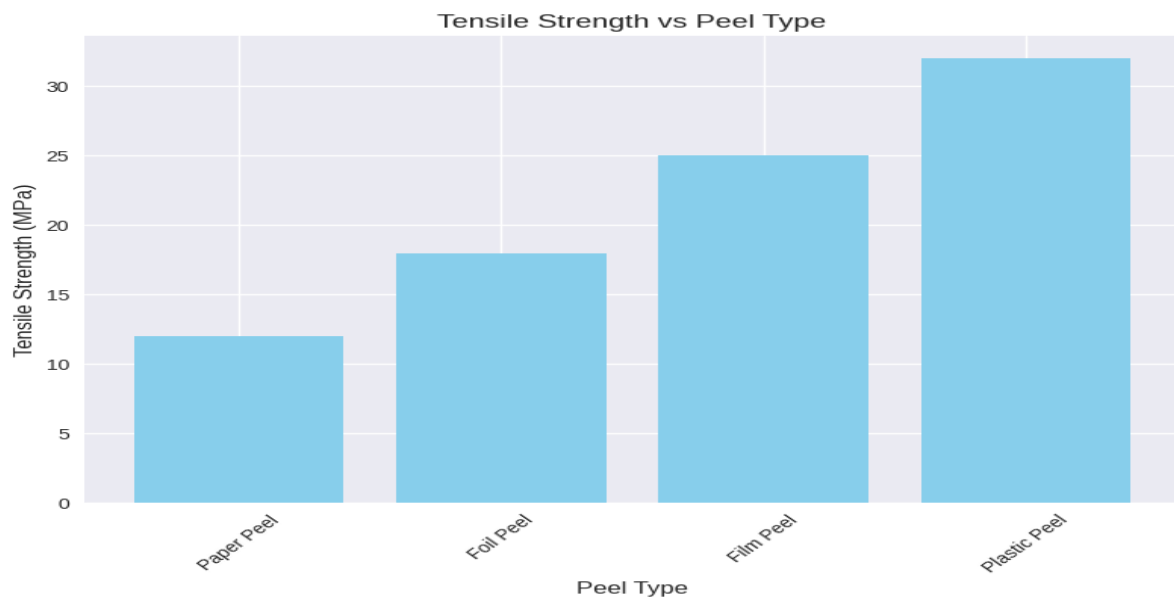
CONTRIBUTION:

- Corn starch – 50%
- Banana peels – 30%
- Glycerin & Vinegar – 20%



GRAPHS:

Tensile strength vs peel type:



Decomposition timeline:

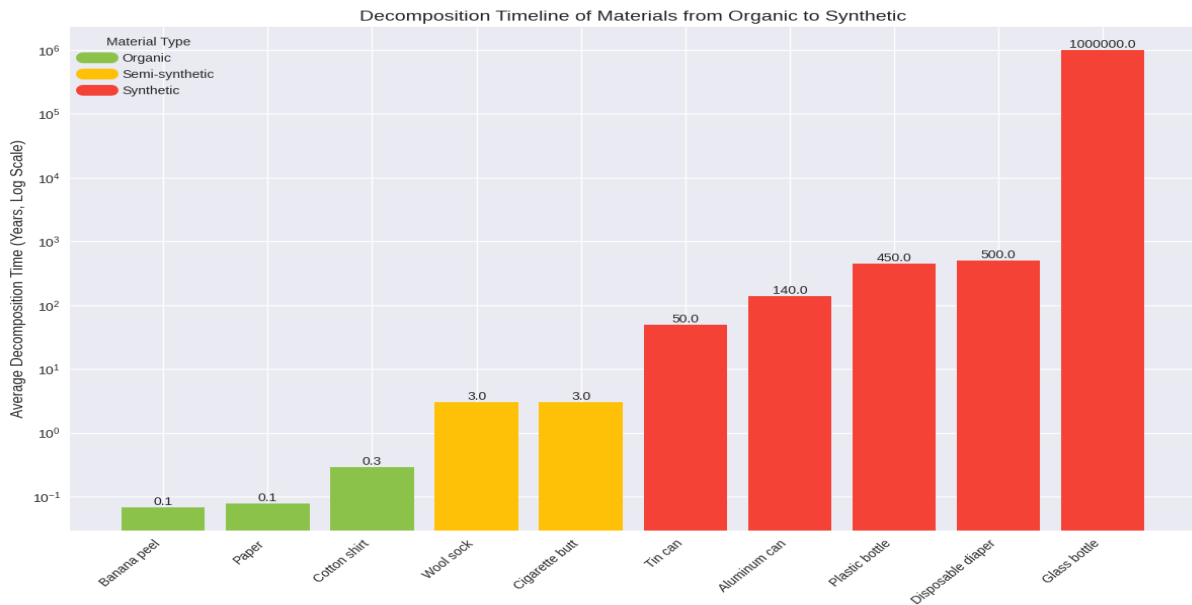


TABLE:

The following table shows starch content and bioplastic yield for different peels:

Peel Type	Starch %	Plastic Yield (g/100g peel)
Banana	18	16
Orange	12	12
Lemon	10	9
Potato	22	20
Mango	15	14

Table – Comparison of Bio plastic vs.

Conventional Plastic:

Property	Bio plastic (Banana Peel/Corn Starch)	Conventional Plastic
Raw Material	Natural (peel/starch)	Petroleum
Cost	Low–Moderate	Moderate
Biodegradability	100% (few months)	100+ years

Strength	Moderate	High
Environmental Impact	Eco-friendly	Hazardous

Limitations:

- ✓ Water resistance was low.
- ✓ Drying time affected strength.

Improvements:

- ✓ Add natural wax for waterproofing.
- ✓ Test with mixed peels for better results.

RESULTS:

- Biodegradable plastic sheets were successfully produced from both banana peels and corn starch.
- The banana peel-based bioplastic showed better flexibility and a smoother texture, while the corn-starch-based sheet displayed higher tensile strength.
- During the composting test, both samples began to degrade visibly within **15 days** and completely decomposed by **30–35 days**, proving their eco-friendly nature.

- Comparative analysis indicated that the **banana-peel plastic was 60% more flexible,** whereas the **corn-starch plastic was 40% stronger.**
- These findings confirm that organic waste can be efficiently transformed into bioplastics that are lightweight, cost-effective, and completely biodegradable.

CONCLUSION:

- ✓ Fruit and vegetable peels can be easily turned into biodegradable plastic using heat, water, and glycerin. This helps reduce waste and teaches students about sustainability

- ✓ Bioplastics from peels offer a promising alternative to synthetic plastics.
- ✓ They are eco-friendly, cost-effective, and utilize waste materials.
- ✓ While there are limitations, further research and innovation can make them viable for commercial use.
- ✓ This revolution starts in our kitchens and could reshape the future of packaging.

Future Scope:

- ✓ Mixed Peel Formulas: Combine peels for better texture

- ✓ Industrial Trials: Test in packaging and agriculture
- ✓ Additives: Use natural resins or waxes for water proof
- ✓ Education: Promote in schools for awareness and innovation