Transforming Waste Plantain Pseudostems into Biodegradable Paper As An Alternative to Single-Use Packaging Plastics

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Introduction

Plastic pollution has become one of the most pressing environmental challenges globally, threatening ecosystems, biodiversity, public health, and sustainable development. In Nigeria, indiscriminate disposal of single-use plastics, coupled with poor waste management systems, continues to degrade terrestrial and aquatic ecosystems. Simultaneously, millions of tonnes of agricultural residues, including plantain pseudostems, are generated annually and are often left to decompose or are openly burned, contributing to environmental pollution and greenhouse gas emissions.

This project demonstrates an innovative circular economy model that converts discarded plantain pseudostems into biodegradable paper products, providing an environmentally friendly alternative to conventional plastic packaging while creating green jobs, improving livelihoods, and strengthening community resilience. The initiative also integrates environmental education, policy advocacy, community participation, and enterprise development to promote sustainable production and consumption.

Objectives

The project aimed to:

- Convert discarded plantain pseudostems into biodegradable paper and packaging materials.
- Reduce plastic pollution through the promotion of sustainable alternatives.
- Strengthen sustainable agricultural practices through plantain nursery establishment and Farmers' Field Schools.
- Promote environmental education through school environmental clubs and community awareness programmes.
- Support policy development for improved waste management and single-use plastic reduction in Ondo State.
- Improve livelihoods of women, youth, and vulnerable groups through circular economy enterprises.

Fig. 1: L: Training participants carrying out the plantain stem to paper conversion. R: Moulded paper being sundried

Methodology

The project adopted a participatory, community-driven approach comprising six major components:

1. Baseline Assessment

2. Capacity Building: Training programmes were organised on Recycling and upcycling; Biodegradable paper production; Plantain nursery production; Sustainable agriculture; and Financial literacy and enterprise development

3. Demonstration and Technology Transfer

4. Environmental Education: Eight Green Guardian Environmental Clubs were established in secondary schools,

5. Policy Engagement and Influencing

The project collaborated with the Ondo State Waste Management Authority to review existing legislation and develop the Waste Management and Single-Use Plastic Control Policy Guidelines.

6. Monitoring and Evaluation and Knowledge Management

Results and Discussions

The project successfully demonstrated the technical and economic viability of converting agricultural waste into environmentally friendly products.

Key Achievements

- Over 420 direct beneficiaries received practical technical training.
- Approximately 90,000 people were reached through environmental radio sensitisation.
- Eight Green Guardian Environmental Clubs were established in secondary schools with practical sessional learning module.
- A fully functional Community Demonstration Centre was established.
- Pilot production successfully converted plantain pseudostems into biodegradable paper sheets and products.
- More than 30 beneficiaries have begun applying acquired skills at the household level.
- Women constituted a significant proportion of trainees across technical and enterprise development activities.
- The project facilitated the development and validation of the Waste Management and Single-Use Plastic Control Policy Guidelines for Ondo State.

Conclusion and Future Work

The project demonstrates that plantain pseudostems, previously regarded as agricultural waste, can be transformed into valuable biodegradable products that contribute to environmental protection, livelihood improvement, and sustainable development.

Future Work

- Improve processing technologies and product quality.
- Expand implementation to additional communities and states.
- Scale up commercial production of biodegradable paper products.
- Strengthen private sector partnerships and market access.
- Promote wider adoption of sustainable packaging alternatives across Nigeria.

References

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