Arab Academy
for Science , Technology and Maritime Transport

MARLOG 13 2024

The International Maritime Transport and Logistics Conference

# "MARLOG 13"

## Towards Smart Green Blue Infrastructure

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# Improving the River Nile Sustainability through Recycling Retrieved Plastic Waste


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# Outline

1. Introduction
2. Experimental
3. Results and Discussion
4. Conclusion and Future Work

# INTRODUCTION

# Problem Definition

**River Nile is one of ten rivers that contribute 90% of garbage in the world oceans.**

# Study Aim

Producing wood plastic composite from plastic and agricultural waste.

# Study Objective


**Cleaning out River Nile from plastic wastes.**

# VeryNile and its approach to clean River Nile

VeryNile was launched in 2020 to empower the local fishermen to clean the Nile daily.

Verynile

200

**Tons of Waste Removed**

5000

**Volunteers Engaged**

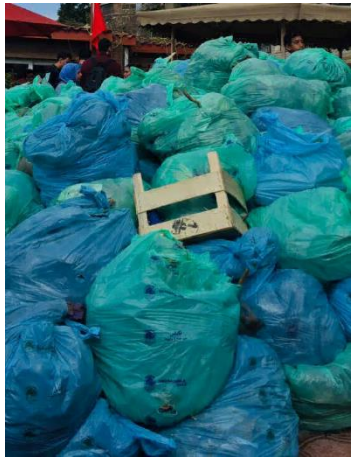
21

**Jobs Created**

60

**Fishermen Involved**

# VeryNile Collection Activities



# Wood Plastic Composite (WPC)

WOODSTOCK
PRODUCTS, INC.

**The first wood plastic composite (WPC) was produced in 1983 by American Woodstock**

# Wood Plastic Composite (WPC)

Radiate Pine

Coconut coir

# Wood plastic composite (WPC)

Pineapple leaves

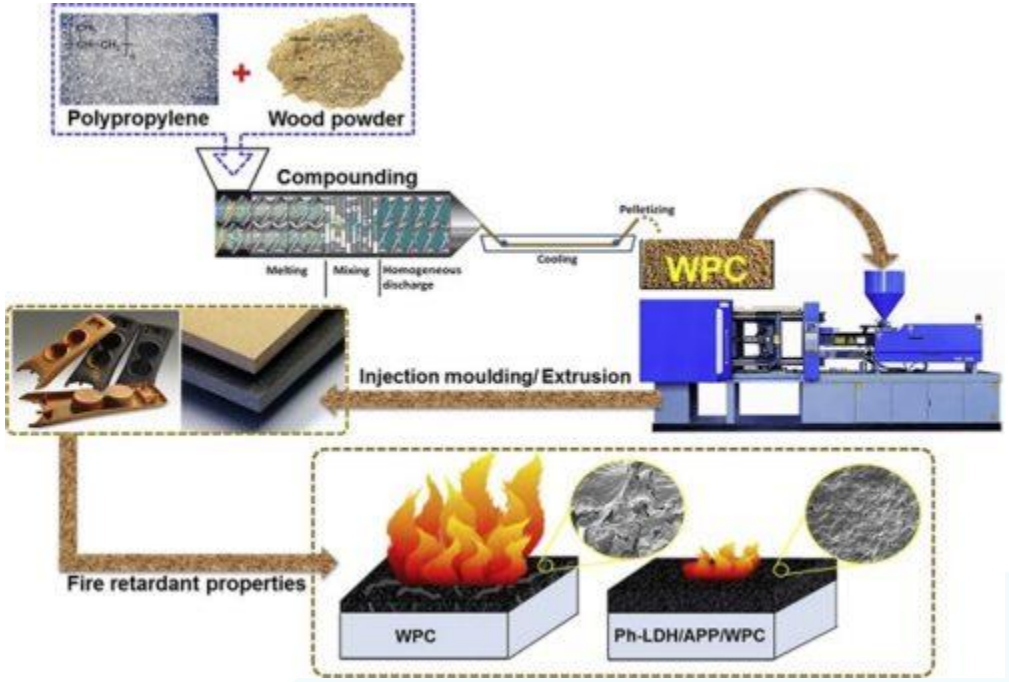
Cornstalk

# Thermoplastics used to produce WPC

- Low-density polyethylene (LDPE)
- High-density polyethylene (HDPE)
- Polypropylene (PP)
- Polystyrene (PS)
- Polyvinyl chloride (PVC)

# Production of WPC

1. Compounding
2. Forming

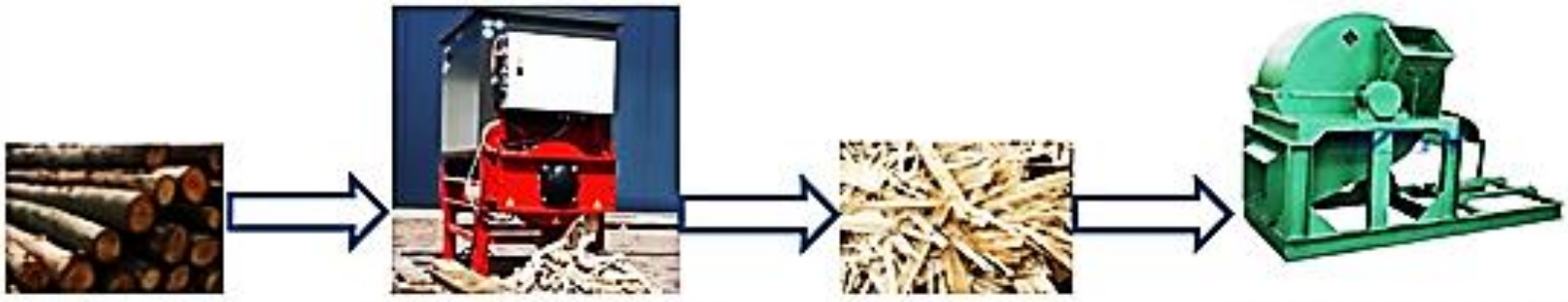


# Advantages of WPC

- Mold resistance.
- Recyclable.
- Does not generate cracks.
- Producing complex shapes.
- Additives can be added to enhance WPC properties.

# EXPERIMENTAL

# Preparation of wood powder from agriculture wastes



Wood Cutting Machine

Wood Crushing Machine

Wood Grinding Machine

# Preparations of plastic pellets from plastic wastes

Plastic Waste

Plastic Crushing Machine

Plastic Flakes

Plastic Pelletizer

Plastic Pellets

# Production of WPC from wood flour and plastic pellets

+

+

Additives

# Testing

## Tensile Test setting

## Bending Test setting

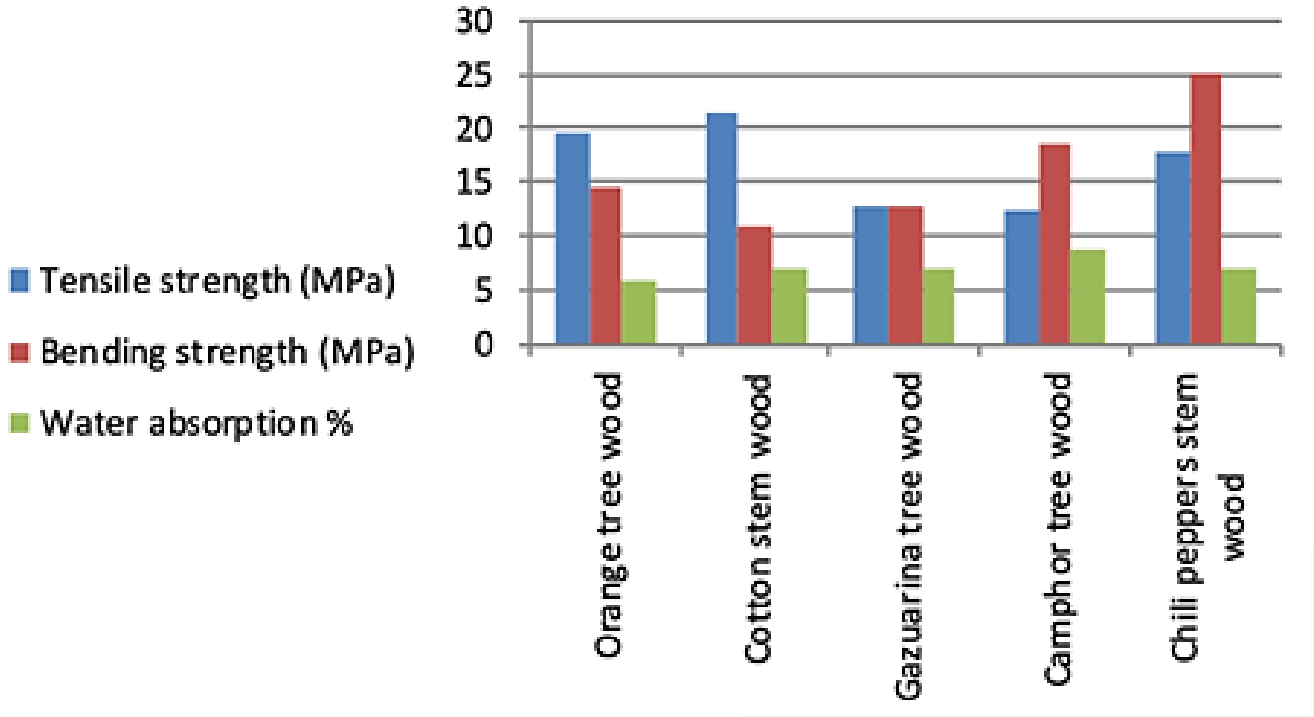
Tensile test, bending test, and water absorption test were done on the produced WPC according to ASTM D7031 standard (Standard Guide for Evaluating Mechanical and Physical Properties of Wood-Plastic Composite Products).

# RESULTS AND DISCUSSION

# Properties of the produced WPCs

| Wood type | Tensile strength (MPa) | Bending strength (MPa) | Water absorption % |
|---|---|---|---|
| Orange tree wood | 19.6 | 14.6 | 6 |
| Cotton stem wood | 21.5 | 11.1 | 7 |
| Casuarina tree wood | 12.8 | 12.9 | 7 |
| Camphor tree wood | 12.5 | 18.4 | 9 |
| Chili peppers stem wood | 17.9 | 25.1 | 7 |

# Properties of the produced WPCs



# CONCLUSIONS AND FUTURE WORK

# Conclusions

- WPC produced from cotton stem has maximum tensile strength.
- WPC produced from chili peppers stems wood has maximum bending strength.
- WPC produced from orange tree wood has minimum water absorption.

# Conclusions

Decking

Fencing

**The results show that the mechanical and physical properties of the produced WPC are suitable for many applications.**

# Future Work

- Investigating other types of agricultural wastes.
- Investigating other types of plastic wastes.
- Studying the effect of different types of compounding chemicals on the physical and mechanical properties of the produced WPC.

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*Thank You*