

“ From Waste to Wealth : Reviving grey Water with Mokra tablets and Bio-trio solution”

PROBLEM STATEMENT

Grey Water Management and Reuse Wetland Management

Water Conservation -

Untreated greywater from hostels, canteens, and wash areas pollutes nearby wetlands and groundwater, causing odour and reducing freshwater availability . Existing treatment systems are expensive, chemical-based, and unsustainable, leading to environmental harm . A green, low-cost, and scalable solution is urgently required to treat and reuse greywater safely while protecting natural water bodies.

OBJECTIVES

- ✓ Develop an eco-friendly, plant-based greywater treatment method.
- ✓ Remove turbidity, odour, and heavy metals effectively without chemicals.
- ✓ Reuse treated water for gardening, cleaning, and wetland rejuvenation.
- ✓ Establish a sustainable circular water model for campuses and rural communities.

PROPOSED SOLUTION

Using **MOKRA TABLETS** (moringa +okra) which is a natural bio-flocculant agent for grey water management and **BIO – TRIO LIQUID made of water hyacinth + neem + banana leaf extract** to detoxify wet land water along with **rhizobium based plant bed (pea, soyabean)** for longer purification and reuse the water in various application to conserve and manage it.

OPERATING PROCEDURE

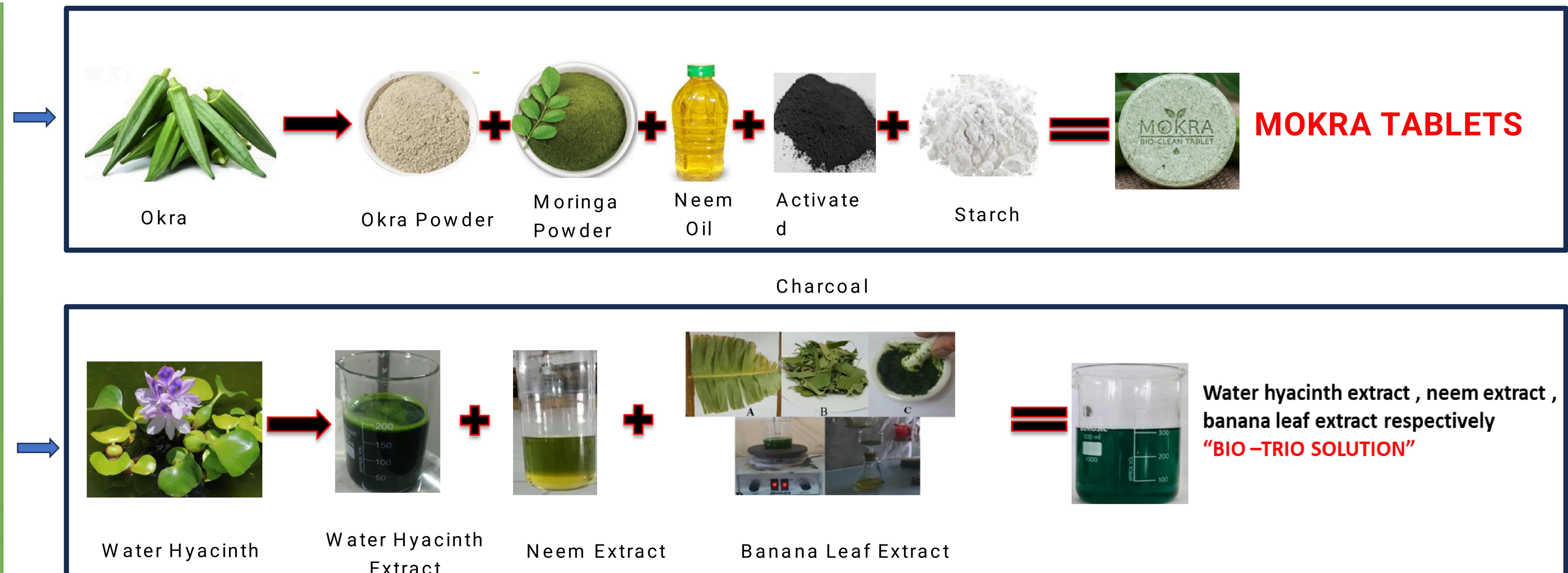
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- ❖ **Raw Material Collection:** Mature pods/seeds of Okra, Moringa, Fenugreek, and pulp of Aloe vera are cleaned and shade-dried.
- ❖ **Extraction:** Each plant is ground into fine powder; extracts are mixed in optimized ratios to increase flocculant strength.
- ❖ **Tablet Formation:** The powder mixture is compressed into small Mokra tablets (approx. 2–3 g each) using a manual tablet press.
- ❖ **Storage:** Tablets are air-dried and stored in airtight containers for use.

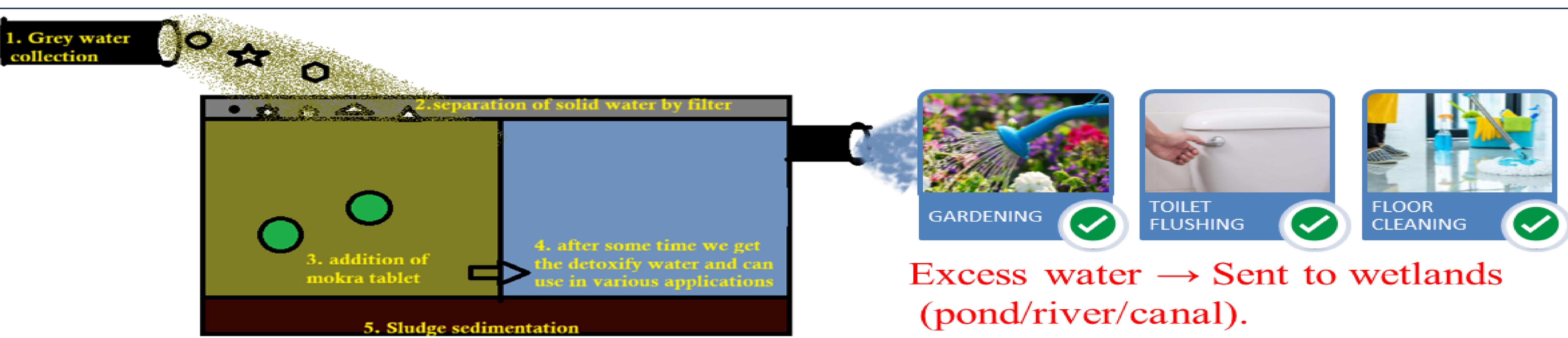
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- ❖ **Collection:** Fresh water hyacinth, neem leaves, and banana peels are washed and chopped.
- ❖ **Extraction:** The mix is boiled in distilled water for 30–40 minutes and filtered to obtain a concentrated plant extract.
- ❖ **Formulation:** The filtrate is cooled and diluted to a working concentration, forming the Bio-Trio detoxifying solution.
- ❖ **Storage:** Stored in dark bottles to prevent degradation.

MAIN INGREDIENTS OF TWO PRODUCTS



PROCESS OF IMPLEMENTATION



RESEARCH FINDINGS

Point of Discussion	Mokra Tablets	Bio-Trio Solution
Major Findings	<ul style="list-style-type: none"> ▶ Caused visible floc formation and rapid sedimentation of suspended solids. ▶ Achieved 90– 98% reduction in turbidity within 1 hour of treatment. 	<ul style="list-style-type: none"> ▶ Significantly reduced odour and organic contaminants through natural phytoremediation. ▶ Showed 100% biodegradability and no harmful residues post-treatment.
Feasibility	<ul style="list-style-type: none"> ✓ Dissolves easily, stable, proper formulation needed. ✓ Affordable raw materials, reasonable production cost. 	<ul style="list-style-type: none"> ✓ Ready-to-use, effective for intended purpose. ✓ Cost-effective ingredients, easy storage/transport.
Viability	<ul style="list-style-type: none"> ■ Fulfils a real need (health, agriculture, or cleaning). ■ Can be sold at profitable price. 	<ul style="list-style-type: none"> ■ Meets demand for bio-enhancement or solution-based products. ■ Affordable, profitable, scalable production.

REFERENCES

- ▶ Moringa Seeds → Reduced turbidity by 90– 98% and BOD by 85% in wastewater. (Ndabigengesere et al., Water Research, 1995; NIT Jalandhar Study, 2022).
- ▶ Plant-Based Alternatives (Okra, Tamarind, Banana peel) → Achieved 85– 90% turbidity removal in lab tests. (VIT Vellore, 2020; Yin, Process Biochemistry, 2010).
- ▶ Legume-Based Agents (Innovation) – Fenugreek gum & Guar gum show strong flocculant properties; rarely applied to greywater. (Ghosh et al., Desalination & Water Treatment, 2013; Sharma et al., Colloids & Surfaces A, 2006).

METHODOLOGY

- o **Collection:** Greywater from hostels, canteens, and wash basins is collected in a storage tank
- o **Filtration:** Water is passed through sand and activated carbon layers for final polishing.
- o **Treatment (Bioflocculation):** Add Mokra tablets made from Okra, Moringa, Fenugreek, and Aloe vera extracts. They cause suspended solids to clump and settle, reducing turbidity and odour.
- o **Detoxification (Phytoremediation):** Add Bio-Trio solution prepared from water hyacinth, neem leaves, and banana peel. It removes heavy metals like arsenic and cadmium naturally.
- o **Reuse:** The treated, odour-free water is reused for gardening, cleaning, and wetland irrigation.

SUMMARY

This project introduces an innovative, plant-based greywater purification system that replaces chemical treatments with natural bioflocculants and detoxifiers . Using **Mokra tablets** (from legume extracts) and **Bio-Trio solution** (from water hyacinth, neem, and banana peel), greywater is treated through bioflocculation and phytoremediation, achieving complete purification within 24 hours . The process efficiently removes turbidity, odour , and heavy metals, producing clear, odour-free, and reusable water for gardening, cleaning, and wetland restoration . This low-cost, eco-friendly model supports water conservation, waste minimization, and sustainable resource management, representing a significant step toward a clean, green, and water-positive future.