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BIOLOGICAL AND AGRICULTURAL ENGINEERING

EVALUATING TAMARIND *Tamarindus indica* SEED EXTRACT AS A NATURAL COAGULANT FOR AQUACULTURE WASTEWATER TREATMENT

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INTRODUCTION

- Aquaculture wastewater contains suspended solids that increase **turbidity**, reduce oxygen transfer, and impair system performance.
- Conventional coagulants effectively reduce turbidity but generate **chemical sludge** and introduce challenges related to pH control, cost, and environmental sustainability.
- Tamarind (*Tamarindus indica*) seeds are an **agricultural by-product** from food processing with potential application as a biodegradable, natural coagulant.

MATERIAL & METHODS

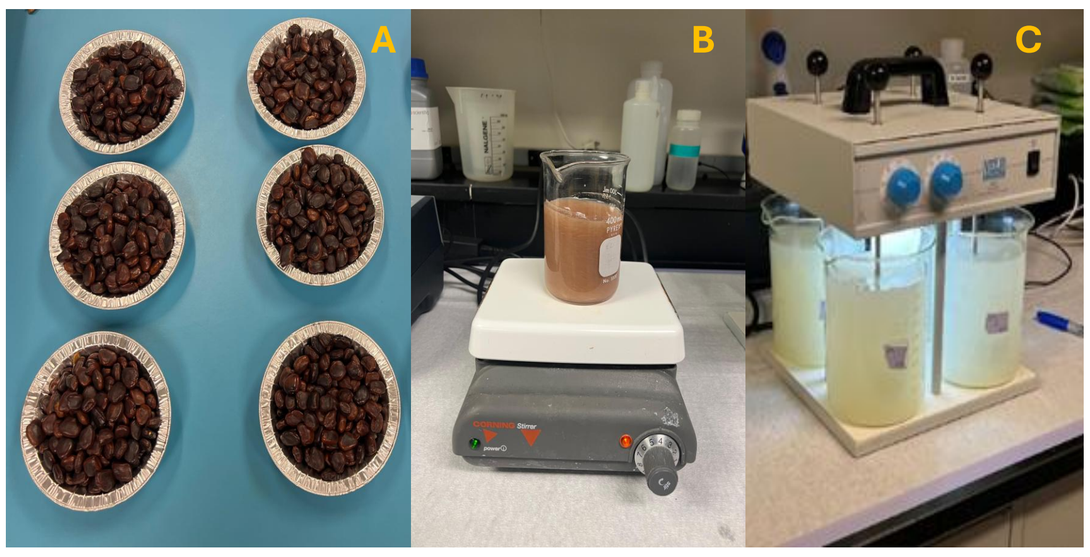

Figure 1. Tamarind seed extract preparation and jar test evaluation:(A) dried seeds; (B) extract preparation; (C) batch jar tests in synthetic aquaculture wastewater.

- Tamarind seed extract prepared via **saline extraction** and evaluated as a natural coagulant.
- Batch jar tests conducted under controlled mixing and settling conditions.
- Coagulant dosages tested: 0, 0.3, 0.4, and 0.5 g/L at natural pH.

RESULTS & DISCUSSION

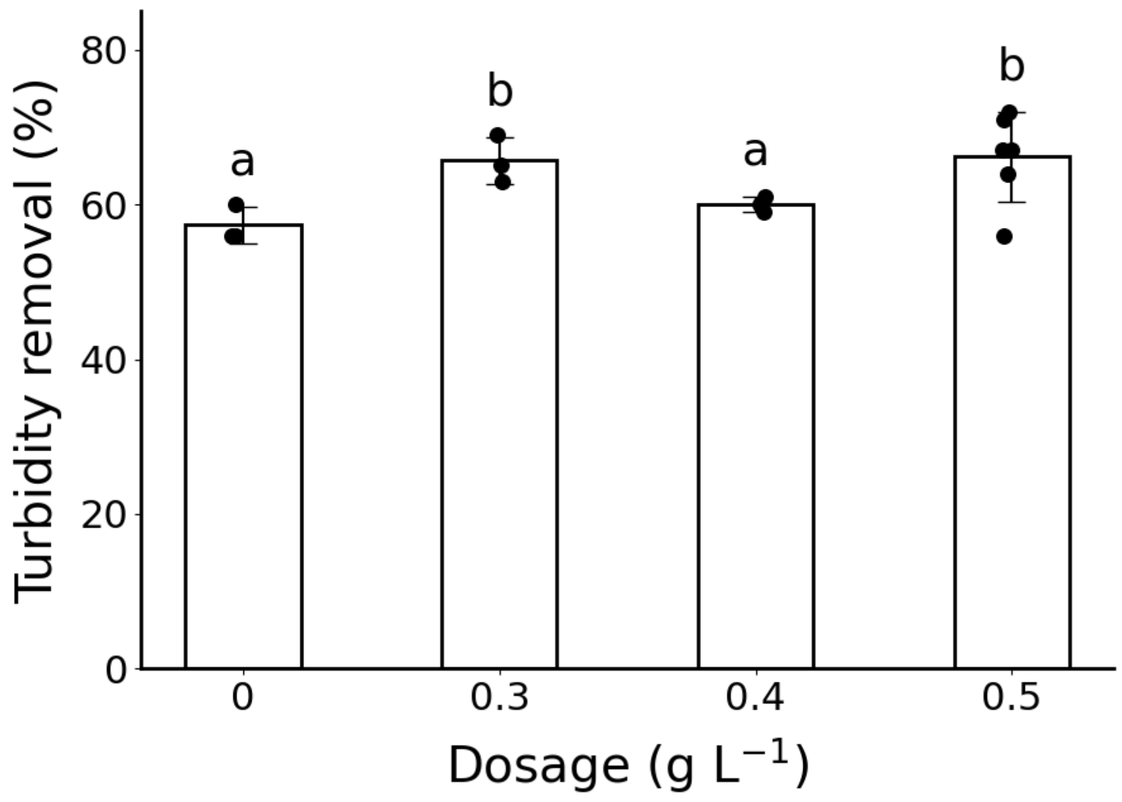

Figure 2: Effect of tamarind seed extract dosage on turbidity removal (%) in aquaculture wastewater. Different letters indicate statistically significant differences relative to the control.

- Peak turbidity removal **(~66%)** was observed at 0.3 g L^{-1}, with comparable performance at 0.5 g L^{-1}.
- At 0.4 g L^{-1}, turbidity removal decreased to near-control levels.
- Overall, turbidity removal showed a **non-linear response** to coagulant dosage, with effective performance confined to a narrow dosage range.
- Reduced performance at the intermediate dosage was consistently observed across repeated tests, despite experimental variability.

CONCLUSION

- Tamarind (*Tamarindus indica*) seed extract achieved up to **66% turbidity removal** in aquaculture wastewater within a narrow effective dosage range.
- Ongoing work will **optimize pH** conditions and evaluate performance using real aquaculture wastewater.

CONTACT INFORMATION

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