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Performance and Efficiency of Azadirachta Indica, Guazuma Ulmifolia and Dolichos Lablab in Municipal Waste Diagnosis Process

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Abstract: ***The experiment was carried out at various dosages of the crude water extract by natural dry seeds. Using a jar test experiment, the experiment was carried out at various dosages of the crude water extract by dry seeds of Azadirachta indica, Guazuma ulmifolia, and Dolichos lablab. The optimum dosage of the coagulant was determined. Quality parameters of the waste waters were measured before and after treatment to assess the removal efficiency of major pollutants of concern in waste water treatment, such as suspended solids, COD, BOD, pH, TDS, Sulphates, and Chlorides. Azadirachta indica was found to be the most suitable natural coagulant for municipal waste water treatment when compared to Guazuma ulmifolia and Dolichos lablab. The use of a locally available natural coagulant for water treatment was found to be suitable, easier, cost effective, and environmentally friendly.***

Keywords: Azadirachta indica, Guazuma ulmifolia, and Dolichos lablab, Treatment of Municipal waste water

I. INTRODUCTION

The goal of wastewater treatment is to remove contaminants from water so that treated water meets Acceptable quality standards. The treatment of wastewater trailed far behind its collection. Treatment was deemed necessary only after the receiving waters' self-purification capacity was exceeded and the nuisance condition became intolerable. The quality standards are usually determined by whether or not the water will be reused or discharged into a receiving stream. Wastewater contains particles of various shapes, sizes, and densities, all of which influence their behaviour in water and, thus, their ability to be removed. The most common issue in waste water disposal is colour and turbidity. The colour and turbidity of waste waters are caused by finely dispersed suspended and colloidal particles. Natural metallic ions, humus and peat material, plankton, weeds, and industrial waste all contribute to the colour of water. Clay, for example, is a suspended and colloidal matter that has been slit and finely divided.

II. OBJECTIVES OF STUDY

The main Objectives of this study is to calculate the amount of waste water generated from various sources such as domestic sewage and rain water, To assess the efficacy of various treatment units in the removal of various pollutants, Using a locally available natural Coagulant, reduce the level of turbidity and other impurities in waste water and The coagulant's intended action is to neutralise that charge, allowing particles to combine to form larger particles that can be more easily removed from the raw water.

III. FLOW CHART FOR ENVIRONMENTAL DESIGN

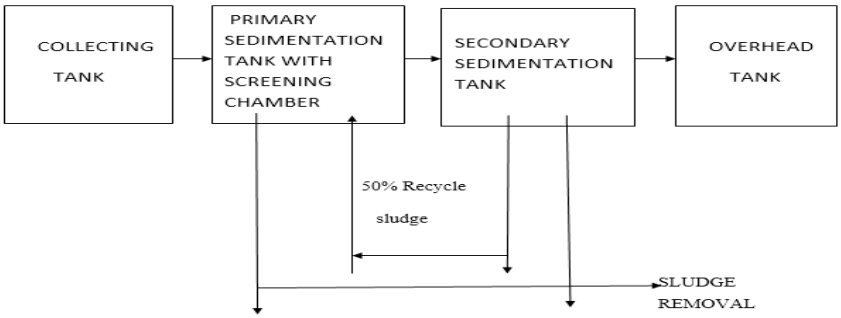

Figure 1: Process Flow Chart

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IV. MATERIALS AND METHODS

This study used waste water from municipal waste as well as three natural coagulants (Azadirachta indica, Guazuma ulmifolia, and Dolichos lablab).

A. Preparation of Natural Coagulant

1) On the tree, seed pods are allowed to mature and dry naturally to a brown colour.
2) The seeds are extracted and shelled from the harvesting pods.
3) The seed kernels are crushed and sieved (0.8mm mesh or similar). This traditional method of producing maize flour has proven to be satisfactory.
4) Finely crushed seed powder is combined with clean water to form a paste, which is then diluted to the desired strength. Dosing solutions can be prepared in concentrations ranging from 0.5 to 5% (e.g., 0.5 to 5g/l).
5) Insoluble materials are filtered out using a fine mesh screen or muslin cloth6. The coagulant solution is now ready for use.

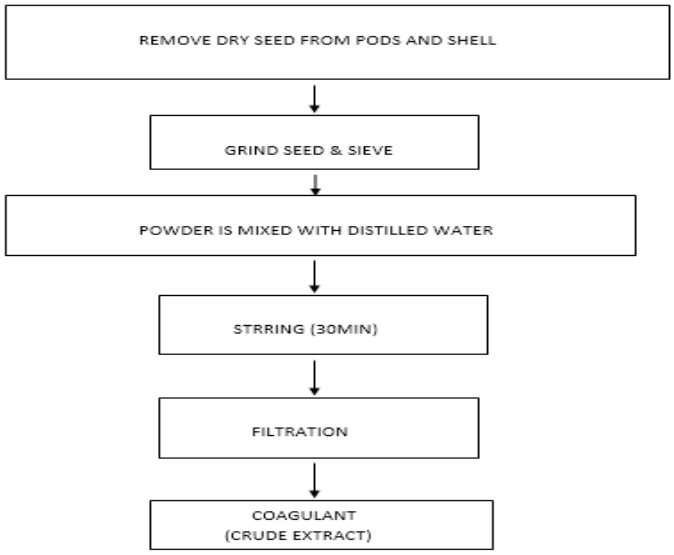

Figure 2: Preparation of Natural Coagulant

Figure 3: Azadirachta indica seed

Figure 4: Dolichos lablab seed

Figure 5: Guazuma ulmifolia seed

V. EXPERIMENTAL INVESTIGATION

A. Jar Test

Each jar is filled with 1 litre of waste water sample. The sample jars are attached to the stirring device by lifting the paddles upward. Coagulant is added to the series of five sample jars in the optimal dosage of 1,2,3,4,6,8,10 gm. The coagulant dosage can be chosen at random based on the waste water's characteristics. The paddles are lowered into the jars and immersed in the sample. The sample is rapidly mixed for about 10 minutes with mechanically operated paddles at 180 rpm, followed by gentle stirring for about 10 minutes at 30-40 rpm. After the stirring is finished, the jars are removed from the stirring device. Allow the sample in the jars to be standard for 30 minutes to allow flocs to settle. The graph depicts the coagulant dose versus floc formation. The optimum coagulant dosage is the one that produces the best floc.

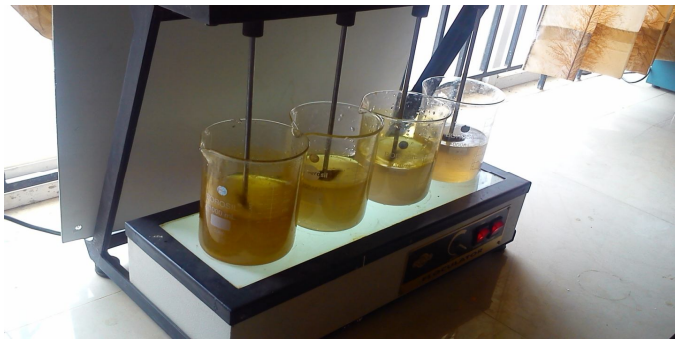

Figure 6: Jar test

B. Characteristics of Waste Water Before Treatment

The collected municipal waste water properties tested before treatment and it shows that the waste water having pH range7.75, Total Suspended solids range 1310 mg/lit, Total dissolved solids range 4230 mg/lit, Biological Oxygen demand range 530 mg/lit, Chemical Oxygen demand range 1750 mg/lit, Sulphates range 825 mg/lit and chlorides range 145 mg/lit.

C. Dosage of Various Natural Coagulant for Treatment

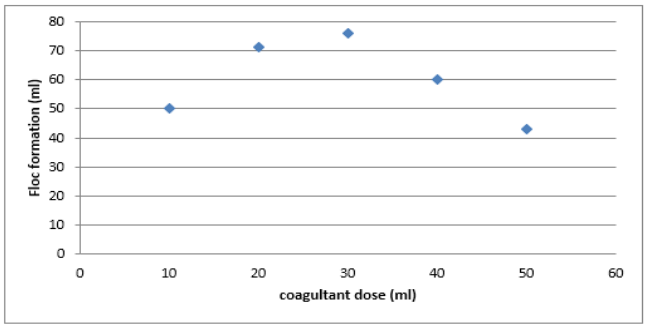

Figure 6: Azadirachta Indica dosage

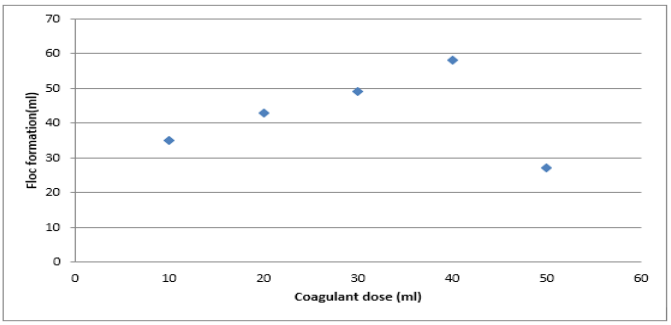

Figure 7: Dolichos lablab dosage

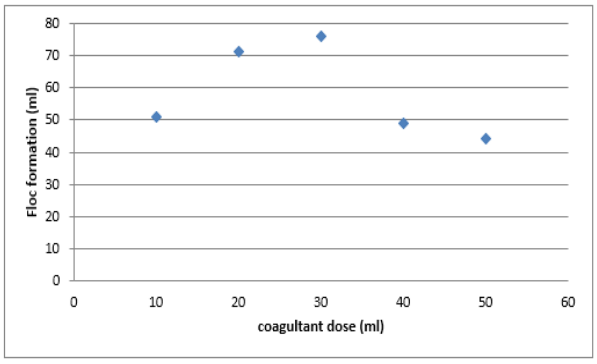

Figure 8: Guazuma ulmifolia dosage

D. Experimental Results

1) Azadirachta Indica: The collected municipal waste water properties tested after treatment with Azadirachta indica and it shows that the waste water having pH range7.2, Total Suspended solids range 480 mg/lit, Total dissolved solids range 2025 mg/lit, Biological Oxygen demand range 370 mg/lit, Chemical Oxygen demand range 1210 mg/lit, Sulphates range 425 mg/lit and chlorides range 137 mg/lit.

2) Dolichos Lablab Dosage: The collected municipal waste water properties tested after treatment with Dolichos lablab and it shows that the waste water having pH range7.35, Total Suspended solids range 1128 mg/lit, Total dissolved solids range 3200 mg/lit, Biological Oxygen demand range 359 mg/lit, Chemical Oxygen demand range 740 mg/lit, Sulphates range 565 mg/lit and chlorides range 116 mg/lit.

3) Guazuma Ulmifolia: The collected municipal waste water properties tested after treatment with Guazuma ulmifolia and it shows that the waste water having pH range7.3, Total Suspended solids range 562 mg/lit, Total dissolved solids range 3379 mg/lit, Biological Oxygen demand range 460 mg/lit, Chemical Oxygen demand range 1554 mg/lit, Sulphates range 532 mg/lit and chlorides range 129 mg/lit.

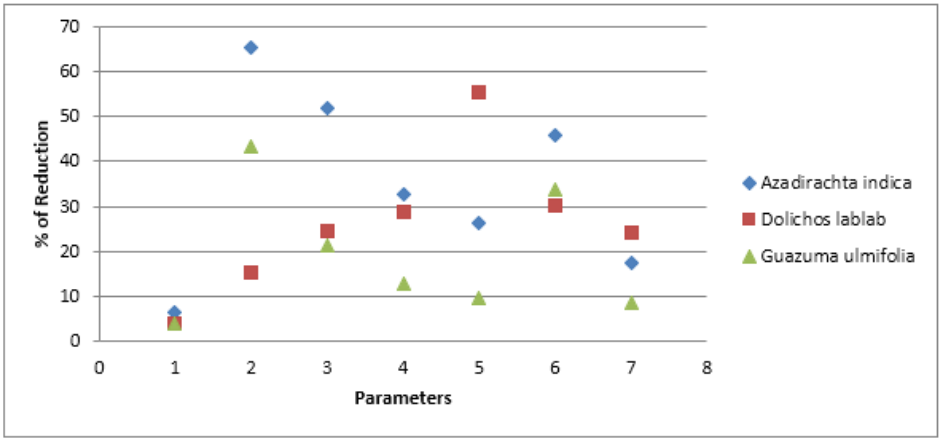

Figure 8: Comparison of Azadirachta indica, Dolichos lab lab and Guazuma

VI. CONCLUSION

At the end of this work, the following point we got as results that are, all three natural coagulants like Azadirachta indica, Dolichos lab lab and Guazuma are eligible to use as a natural coagulant for treatment of municipal waste water. We found that Azadirachta indica, Dolichos lab lab and Guazuma have property to reduces pH, Total Dissolved solids, Total Suspended Solids, Chemical and Biological oxygen demand and also Chloride content in water after nominal dosage of 30 mg/litre. By using Azadirachta indica, Guazuma ulmifolia and Dolichos lablab the maximum efficiency for the removal of suspended solids from the hostel waste as 64 %, 45 % and 16 %. Out of the above three natural coagulant Azadirachta indica will give more efficiency in treatment of municipal waste water by comparing Dolichos lab lab and Guazuma. But The maximum efficiency of COD is achieved by Dolichos lablab as 54 %. So we prefer Azadirachta indica is the best natural coagulant comparing Dolichos lab lab and Guazuma.

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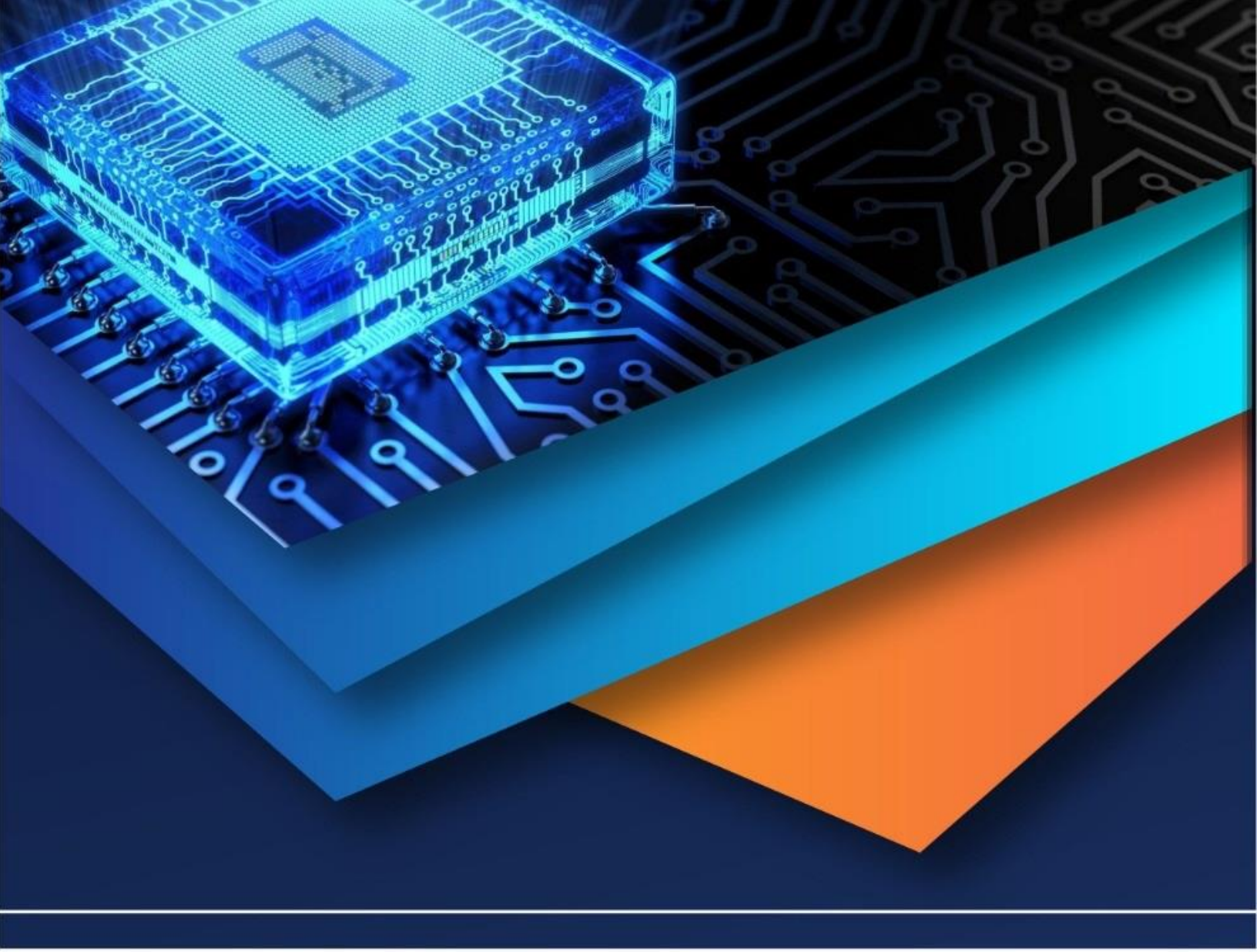

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