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Potential of Strychnos Potatorum and Eirchorrnia Crassipes in Treating Dyeing Industry Waste

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Abstract: The research aim is to the treatment of industrial dyeing waste water for the analysis of improved water treatment using natural coagulants. For waste water treatment, natural coagulants such as Strychnos potatorum (nirmali seeds) and Eirchorrnia crassipes (water hyacinth) are used. We have test the various properties of dyeing waste water before and after treatment like pH, sulphates, chlorides, total solids, total suspended solids (TSS), total dissolved solids (TDS), acidity, alkalinity, optimum coagulant dosage (jar apparatus), biological oxygen demand (BOD) and chemical oxygen demand (COD) .The test results showed that natural coagulants produce better results when used alone or in conjunction with the chemical coagulant alum. Since the natural coagulant generates less floc, the cost of sludge treatment is reduced. Water hyacinth outperforms nirmali seed in terms of natural coagulants. Natural coagulants may be used to manage and treat the dyeing waste water, anywhere there is an abundance of it.
Keywords: Dyeing waste water, Strychnos potatorum, Eirchorrnia crassipes, efficiency of treatment.

I. INTRODUCTION

The contaminants in tannery wastes are inorganic, organic, and radioactive, and they must be thoroughly treated before disposal to avoid physical, chemical, and biological contamination of the receiving body of water. Every day, tannery wastewater with high concentrations of dissolved solids, suspended solids, chloride, colour, ammonia, and other contaminants is discharged into the receiving water. This document is a template. Industrial wastewater pollution is a big issue all over the world. In developing countries such as India, approximately 10% of industrial wastewater is treated before disposal. However, the remaining 90% of industrial wastewater is normally discharged untreated. Natural and Chemical Coagulants used for those projects. The main objective of this study is to evaluate the potential of Strychnos potatorum and Eirchorrnia crassipes as a natural coagulant in Dyeing industry waste water Treatment. The results are compared with Water treatment by Chemical Coagulant.

II. LITERATURE REVIEW

Amirreza Talaiekhozani et al., (2020) Found that the efficiencies of COD removal by the UV/TiO2/Electroflotation microreactor are approximately 25% higher than those by the UV/TiO2 microreactor and are more than 81% higher than those by the UV microreactor, using the HRTs of 15 and 30 min. The use of UV/TiO2/Electroflotation process could be useful for the treatment of high organic content wastewater to contribute to advanced wastewater technology needed in the future.

Pinapala Chanikya et al., (2021) found that Instantaneous current efficiency was found to increase with increase in persulfate concentration and with reduction in COD. EAOP followed by EC was found to be better approach than EC followed by EAOP as the former combination yielded higher COD reduction of 93.5% with lesser specific energy consumption and lesser sludge generation. Sludge generated after the treatment process was characterized using scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS) and X-ray powder diffraction (XRD) techniques.

Yiqian Yuan et al., (2020) found that the treatment process and effluent, trichlorobenzene is the main pollutant and accounted for 39.51% of all CB. CB removal was found only in the anaerobic system, while the aerobic system did not have the corresponding removal effect on CB and total organic carbon. According to ecological risk assessment, CBs in effluent has not been found the significant potential harm to human health (AS < 1), but posed moderate ecological risk to aquatic ecosystem (RQs > 0.1).

III.MATERIALS USED

A. Chemical Coagulant

Alum used as a chemical coagulant for this work. When alum is added to water, it reacts with the water and results in positively charged ions. The ions can have charges as high as +4, but are typically bivalent.

B. Natural Coagulant

1) *Strychnos Potatorum:* Strychnos potatorum (nirmali) is a medium-sized tree native to southern and central India, Sri Lanka, and Burma, and is primarily used as a traditional medicinal extract. According to Sanskrit writings from India, the seeds were used to explain turbid surface water over 4000 years ago, making them the first known plant-based coagulant used for water treatment.

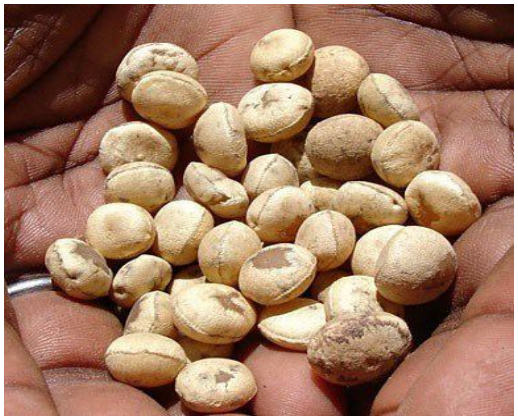

Figure 1: Strychnos potatorum

2) *Eichorrnia Crassipes:* Water hyacinth can reach a height of 1 metre above the water's surface thanks to its long, dense, glossy, ovate leaves. Water hyacinth is a free-floating perennial aquatic plant (or hydrophyte) native to South America's tropical and subtropical regions.

Figure 2: Eichorrnia crassipes

C. Preparation of Natural Coagulant

1) *Strychnos Potatorum*
   a) The seeds of the tree is collected and dried in sunlight.
   b) Then the seeds are powdered and used as a coagulant.

Figure 3: Powdered form of Nirmali seeds

2) Eichorrnia Crassipes

a) The collected water hyacinth root was extensively washed with tap water to remove soil and dust.
b) The dried water hyacinth roots were sliced into pieces.
c) The sliced material was dried by exposure to the sunlight for 3days and subsequently at 80c for 3 hour in a hot air convection oven.
d) The dried material was milled into a powder using 'domestic mix'
e) The powder is used as coagulant and ready for use.

Figure 4: Powdered form of Water hyacinth

IV. EXPERIMENTAL INVESTIGATION

A. Jar Test

The following procedure followed to test waste water suing jar test apparatus. Take 0.5 litter of sample in 4 beakers and keep in jar test apparatus. Switch on the motor and adjust the speed of the paddles.

1) Add various doses of alum (i.e.) 1ml, 2ml, 3ml, 4ml to different beakers.
2) Allow flash mix rapidly for 1 minute
3) Reduce the speed of the paddles and continue it for 10 minutes
4) Switch off the motor and allow the solution to settle for 20 minutes
5) Measure the amount of sludge produced at the bottom
6) Draw the graph between amounts of alcohol added to sludge produced. From the notes the ideal dosage of coagulant.

Figure 5: Jar test

B. Characteristics of Dyeing Waste

The properties of Dyeing industry waste water before treatment test and the results shows that, the dyeing industry waste have pH 7.35, Turbidity 15 NTU, Chlorides 767 mg/lit, Alkalinity 134 mg/lit, Acidity 131 mg/lit, total Suspended Solids 2581 mg/lit, Total Dissolved solids 1765 mg/lit, Biological Oxygen demand 690 mg/lit and Chemical oxygen demand 1932 mg/lit.

C. Dosage of Chemical and Natural Coagulants

The results of this experiment indicate that natural coagulants outperform alum. According to the findings, Eichorrnia crassipes (water hyacinth) outperforms Strychnos potatorum (nirmali seeds). It lowers the pH and turbidity of the waste water. The water used for treatment in this case is washing water from the textile industry. This water can be used for washing, watering, and other uses after it has been handled. The dosage of chemical and mineral Admixture given in following table 1 to 3 respectively.

S. No	Coagulant dosage(gm)	Floc formation(ml)
1	0.5	15
2	1	25
3	1.5	30
4	2	38

Table 1: Optimum Dosage of Chemical Coagulant

S. No	Coagulant dosage (gm)	Floc formation(ml)
1	3	18
2	3.5	10
3	4	15
4	4.5	20

Table 2: Optimum Dosage of Strychnos potatorum

S. No	Coagulant dosage (gm)	Floc formation(ml)
1	4	8
2	5	18
3	6	20
4	7	25

Table 3: Optimum Dosage of Eichorrnia crassipes

Efficiency of Chemical and natural coagulant in treating dyeing waste were given below as figures. The results shows that there was a increase in efficiency while using alum as chemical coagulant in treating industrial waste water by comparing natural coagulant.

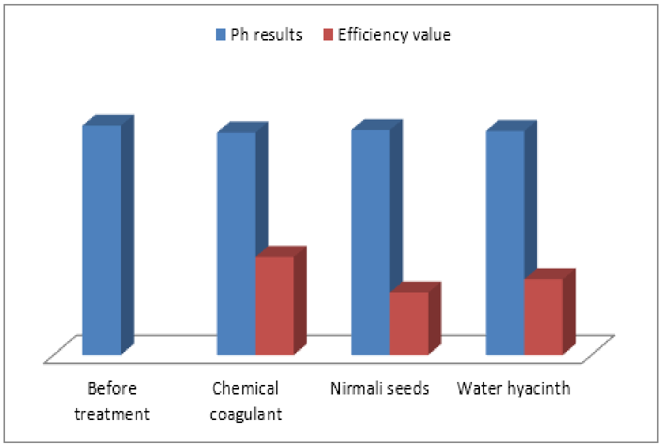

Figure 6: efficiency value of pH in waste water

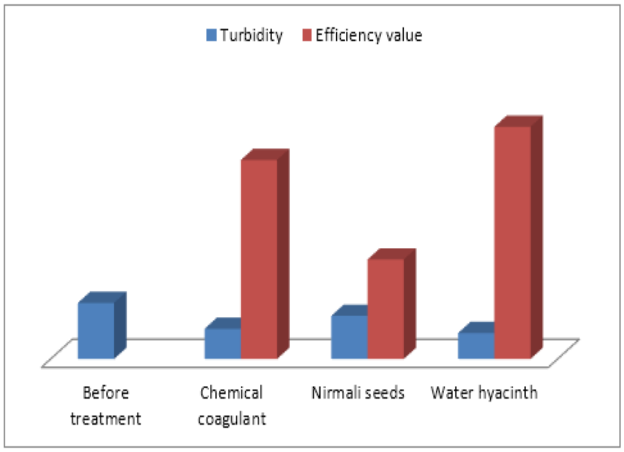

Figure 7: efficiency value of Turbidity in waste water

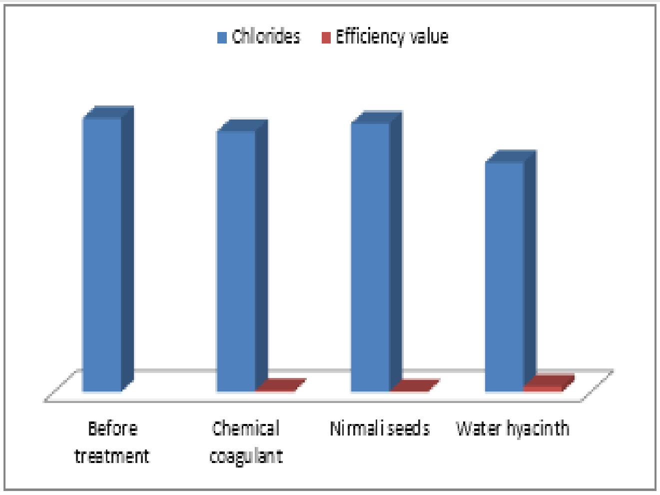

Figure 8: efficiency value of Chlorides in waste water

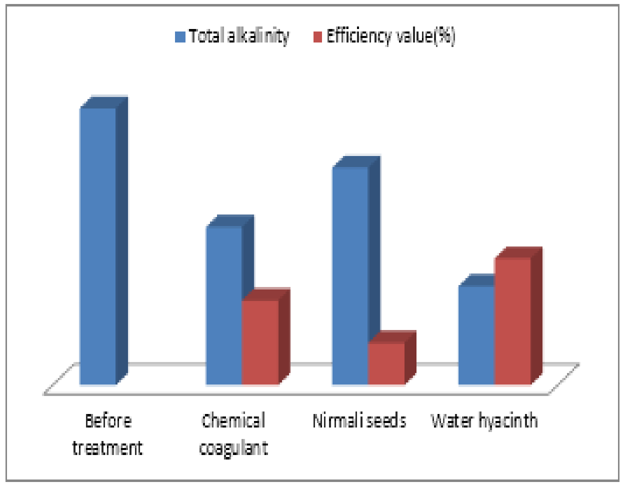

Figure 9: efficiency value of Alkalinity in waste water

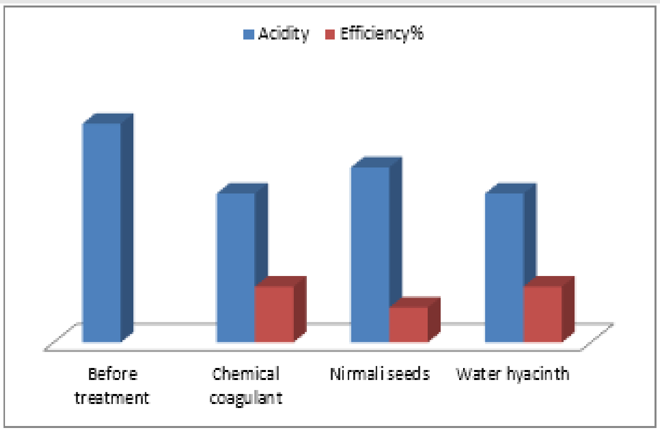

Figure 10: efficiency value of Acidity in waste water

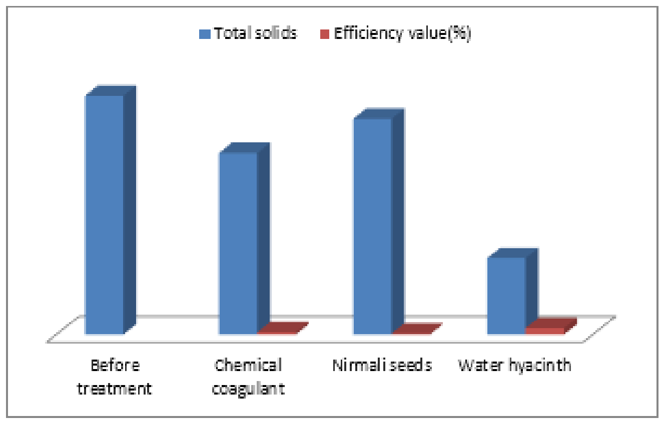

Figure 11: efficiency value of TSS in waste water

V. CONCLUSION

The following conclusions drawn at the end of this current study

A. Natural coagulants extracted from plant sources reflect a significant advancement in ‘grassroots' sustainable environmental technology since it focuses on improving the quality of life for underdeveloped communities.

B. By using Eichornia crassipes as a natural coagulant, the treated waste water produces better results. The best results are obtained by combining natural coagulants in the proper proportions and determining the optimal coagulant dose.

C. The use of Eichornia crassipes decreases the amount of sludge generated in waste water treatment compared to chemical coagulants, and it is environmentally friendly and biodegradable.

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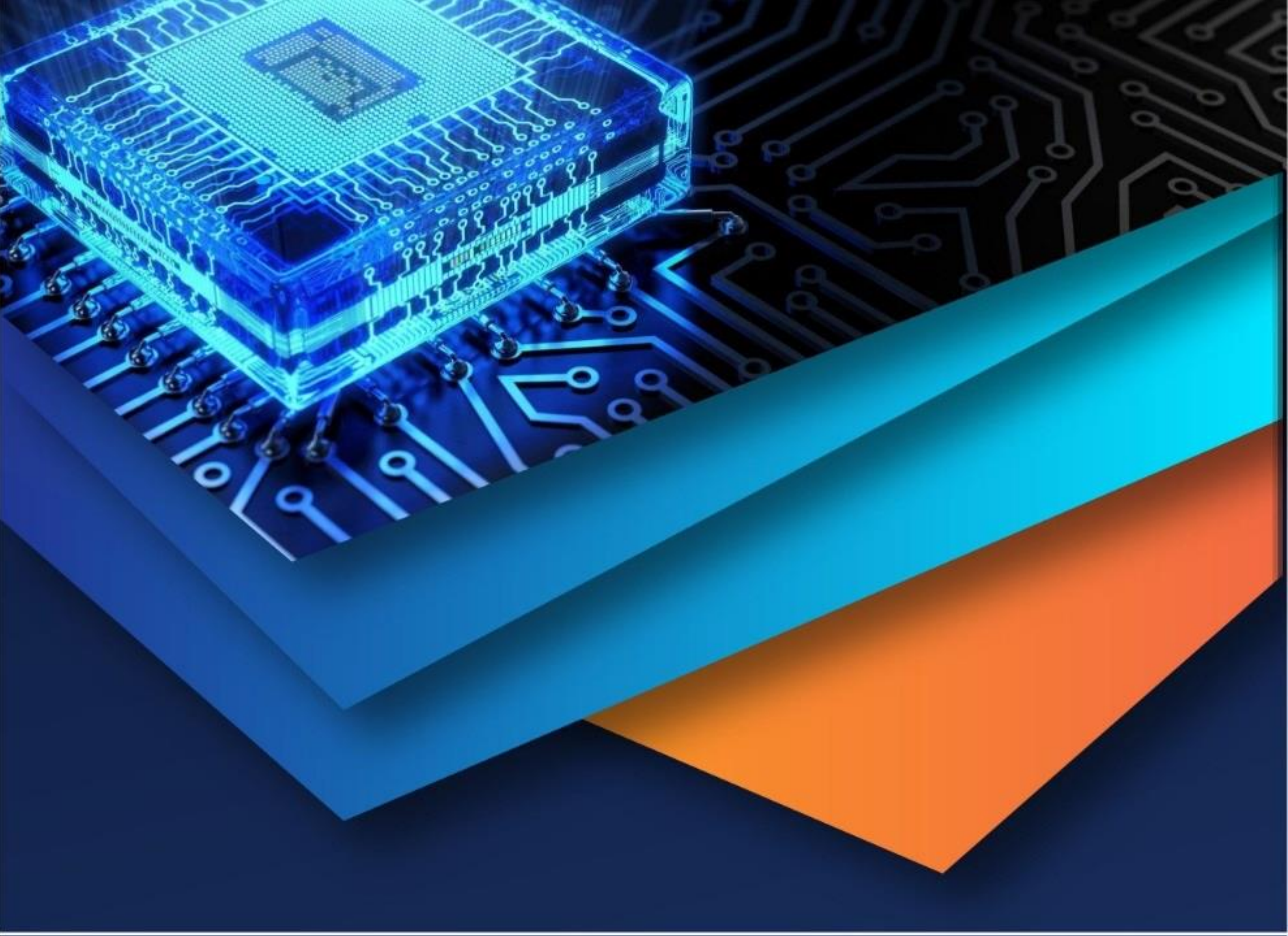

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