A Review on Use of Mixture of Natural And Chemical Coagulant For Water Treatment

Prof.K.G.Bhagat[1], Mr.Sujay Narkhade[2], Mr.Rushikesh Waghode[3], Mr.Mayur Pawar[4], Mr.Swarup Ghuge[5]
[1]Assistant Prof., Dept of Civil Engineering
[2, 3, 4, 5]Dept of Civil Engineering
[1, 2, 3, 4, 5] Padm.Dr.V.B.K.COE,Malkapur

Abstract- *This paper establishes the importance of the overall subject of research and identifies a possible new contribution. This chapter compares and contrasts the various methods for treating water using natural coagulants.*

Keywords- coagulant, alum, optimum mixing ratio, water treatment.

I. INTRODUCTION

Technically and economically, waste water treatment is a difficult task. It invests a significant quantity of money, as well as land. Some treatment plants are facing issues as a result of rising costs, rising electricity costs, or poor plant maintenance.

This necessitates some low-cost treatment that will assist them in overcoming their difficulties. This project is a step in that direction.

II. ROLE OF COAGULANTS IN WATER TREATMENT

1. Remove organic and inorganic matter from water before it becomes toxic to humans.
2. Removing contaminants and softening hard water
3. Clean the water by removing turbidity, sludge, and dissolved solids drinking intent.
4. To keep the PH and alkalinity in check.
5. Because most colloids of relevance in water treatment are insoluble, they remain suspended in solution have a net negative surface charge, causing them to repel one another.

III.LITERATURE STUDY

A) G**asim Hayder.at.al** "Effect of mixing natural coagulant with alum on water treatment": Aluminum and other coagulation agents are commonly employed in water treatment.

Chemical water treatment can be quite expensive, and high levels of alum in water can induce diseases like Alzheimer's. Coagulant made from natural substances (such as Dolichos Lablab) mixed with alum is an alternative for coagulation in water treatment.

It is more environmentally friendly and cost-effective. Natural coagulants can help minimise the amount of alum used in water treatment. This study will look at the effects of mixing various types of natural coagulants with alum to see which combination produces the best turbidity reduction results at the optimal mixing ratio. Mixtures of natural coagulants

The study focuses on mixing Hyacinth Bean (Dolichos Lablab) with Alum as a natural treatment approach to reduce the amount of Alum needed during the coagulation process and the required mixing ratio between natural coagulant and alum to achieve optimal elimination. This was achieved by combining a natural coagulant with alum to reduce the amount of alum used in water treatment. It can be inferred that Dolichos Lablab can be utilised in water treatment as a natural coagulant in conjunction with alum. As a result, the dosage of alum necessary for therapy can be lowered, lowering the cost even more. Overall, this strategy can give a solution to the need for clean water without exposing people to health risks.

B) I.M. Muhammad. al. "Watermelon seed as a potential coagulant for water treatment": This study discusses watermelon seed's potential as a natural coagulant for water treatment. The goal was to find out if watermelon seed could replace alum and other synthetic poly electrolytes in water treatment. The amount of watermelon seed cake in any water sample treated was larger than the amount of alum, and the situation where alum was either equal to or greater than Watermelon seed cake in combination was also observed. On medium turbid water, laboratory scale studies using jar test experiments were conducted to determine the effect of dosage, pH stirring time, and speed on coagulation.

The optimal elimination of turbidity was reached at a dosage of 0.1g/L, pH of 7.0, stirring time of 8 minutes, and mixing speed of 100rpm, according to the results. The reduction in turbidity was less than the WHO's suggested value of 5NTU, while the best colour removal was less than the WHO's recommended value of 40TCU.

It generated undesirable pH changes in the treated water when used in combination with alum, but with 20% alum as a coagulant aid, the best colour and turbidity removal at an acceptable pH was achieved, with residual turbidity of 0.89 NTU and residual colour of 15TCU at a pH of 6.50.
mentioned. On moderately turbid water, laboratory scale studies using jar test tests were conducted to determine the effect.

In practise, this means that the best combination of Watermelon seed cake and alum for water purification should not require any further chemicals. addition for pH adjustment This indicates that the amount of alum in the mixture is significant.

Watermelon seed cake quantity should not be exceeded. The amount of alum used should be based on and should be a percentage of the recommended Watermelon seed cake dosageIt's about water. However, with the combined coagulant dose, the suggested ratio was The greatest water treatment was 80 percent watermelon seed powder and 20 percent alum.

Watermelon seed can be used as a natural coagulant for water treatment, according to the findings. As a result, when watermelon seed powder is combined with 20% alum as a coagulant aid, the natural coagulant can be more effective. Watermelon seed has been discovered to be a possible natural coagulant for surface water treatment based on the findings.

C) J. Oloruntade. al. "A case for moringa olifera as a natural coagulant to improve water supply in Nigerian rural farms": The goal of this study was to determine the best combination of MO and alum in the treatment of natural pond surface water for home use utilising alum as a coagulant aid. Ph, Total Dissolved Particles (TDS), turbidity, colour, and total suspended solids were the physic-chemical parameters studied in the raw, settling, and filtered water (TSS). The raw water from the pond was treated with a variety of coagulant combinations, including Moringa oleifera (MO) seed powder only (i.e., 100 percent MO), aluminium sulphate (alum) only (i.e., 100 percent alum), 20 percent alum and 80 percent Moringa oleifera seed powder, 40 percent alum and 60 percent Moringa oleifera seed powder, and 40 percent alum and 60 percent 50% alum, 50% Moringa oleifera seed powder, 60% alum, 40% Moringa oleifera seed powder, and 80% alum, 20% Moringa oleifera seed powder Five of the seven coagulant combinations examined resulted in satisfactory turbidity reduction, i.e., less than 10 NTU. When Moringa oleifera seed powder was utilised as the sole coagulant, a filter was required to achieve a turbidity value of 7.8 NTU, but no pH modification or correction was required. Moringa oleifera seed powder can be used as a solitary coagulant or in conjunction with alum (using the alum) as a coagulant aid in the treatment of domestic drinking water. If the same results are to be achieved, the MO seed powder must settle longer than the combined coagulants.

D) Mangale Sapana M. al. "Ground water treatment using Moringa Oleifera (drumstick) seed as a natural absorbent and antibacterial agent": There are currently no low-cost solutions available to remove certain common contaminants.pollutants in groundwater Fluoride is one such chemical that is found in abundance in the environment.worldwide groundwater It is vital to address chemical coagulant issues.Increase the use of natural coagulants in the purification of drinking water. Natural occurrences Coagulants are commonly assumed to be harmless to humans. Some natural science research coagulants have been tested, and different natural coagulants have been developed or created.derived from microbes, animals, or plants. Moringa oleifera seeds are one of these choices. It is a sub-Himalayan tree endemic to Northwest India, Pakistan, and Afghanistan. Moringa has previously been shown to be non-toxic and has been recommended for usage as a coagulant in impoverished countries. Moringa has a distinct advantage over chemical water treatment in that it is biological and has been reported as edible. Its seeds contain 1% active polyelectrolytes, which neutralise the negatively charged colloid in contaminated water. As a result, this protein could be used as a nontoxic natural polypeptide for sedimentation of mineral particles and organics in drinking water purification. The seed is thought to be an organic natural polymer. For the treatment of ground water, Moringa oleifera seeds operate as a natural coagulant, flocculent, and absorbent. Total hardness, turbidity, acidity, alkalinity, and chloride are all reduced. It also acts as a naturally occurring antibacterial active agent against microorganisms found in drinking water, reducing the quantity of bacteria present. The MPN test came back positive, indicating that there is a focused contamination and that the water is unsafe to consume. If a combination of Moringa oleifera seed powder and chlorine is employed, the best results are obtained, and ground water can be used for drinking. The seed of Moringa oleifera is not poisonous. It is a more environmentally friendly and cost-effective way of water treatment. Moringa seeds can be used in rural regions where there are no drinking water purification facilities.

E) Md. Asrafuzzaman. al. "Water turbidity reduction utilising locally accessible natural coagulants": Turbidity is a major issue in water treatment. Moringa oleifera, Cicer Arietinum, and Dolichos lablab were employed as locally accessible natural coagulants to minimise turbidity in synthetic water in this investigation. The tests were conducted with manufactured turbid water and a traditional jar test gear. Mixing intensity and duration were found to be optimal. Natural coagulants performed better in high-turbidity water than in medium- or low-turbidity water. Water treatment techniques that are acceptable, simpler, and environmentally benign were discovered using locally accessible natural coagulants. The goal of this study was to use locally accessible natural coagulants to minimise turbidity and bacterial pollutants in water, making the water treatment process easier. The jar test operations with different coagulants were carried out in three turbidity ranges of synthetic turbid water, namely greater (90–120) NTU, medium (40–50) NTU, and lower (25–35) NTU. The effectiveness of Moringa oleifera, Cicer arietinum, and Dolichos lablab extracts make them natural coagulants for water clarity. Doses ranged from 50 to 100 mg/L for each of the six beakers. Before and after treatment, turbidity was assessed. The raw water turbidity was measured to be 100 NTU. Turbidity was reduced to 13.1, 12.7, 10.6, 10, 9.2, and 5.9 NTU, respectively, corresponding to dosages of 50, 60, 70, 80, 90, and 100 mg/L Moringa oleifera. Cicer arietinum had the highest turbidity reduction efficiency (95.89 percent). Natural coagulant treatment of turbid water resulted in overall coliform reductions of 89 to 96 percent.

Higher-turbidity water is better for Moringa oleifera than lower- and medium-turbidity water. As the dose is increased, the turbidity decreases.

F) Ms. Renuka A. Binayke. al. "Watermelon seed (Citrullus Lanathus) as a possible coagulant for surface water treatment": An illness outbreak occurs whenever drinking water sources are contaminated and water logging occurs after rain. Everyone is concerned about water quality. Experiments were conducted in the lab to determine the efficacy of stock solutions made from Moringa Oleifera (Drum sticks) herbs, Okra gum, and mucilage isolated from C. Procera dry flowers as flocculents for the treatment of turbid water samples containing synthetic turbidity caused by clay materials. Jar tests were conducted with flocculent dosages of 0mg/l for high (250NTU and 500NTU), low (15NTU, 30NTU, and 50 NTU), and medium (100NTU) turbidity levels. The results have been compared with the results of alum. The supernatant turbidities obtained from this phase of the study were > 5 NTU. In the next phase again,jar tests results were obtained from adding nearly 50% optimum dose of the natural coagulant was kept as constant and dosage of alum was varied. The supernatant turbidities obtained from this study were nearly equal to 5 NTU.

G) C. P. Pise. al. "A New Natural Coagulant-Based Water Purification Technique": Moringa Oleifera is generally utilised as a coagulant in water treatment, but only on a small scale, and most research has been done on a laboratory basis. Moringa oleifera is not employed in the field due to several disadvantages, such as the need for vast amounts of seeds for a modest water treatment plant. In addition, the settling time is longer. When a Moringa oleifera and alum blended coagulant is employed, the disadvantages of alum and Moringa oleifera are decreased, and this blend coagulant delivers the best results, removing about 99.4% of the turbidity. Moringa oleifera seed powder can be used as a solitary coagulant or in conjunction with alum (using the alum) as a coagulant aid in the treatment of domestic drinking water.

Water quality can be improved by including a filter medium into residential water treatment. Because an equal weight of MO seed powder achieves more treatment than an equal weight of alum, its application is cost effective. The total turbidity removal effectiveness of all these coagulants at a constant time interval demonstrates that the blended coagulant Alum and MO has the highest removal efficiency, followed by MO, and then Alum. When compared to typical Alum coagulants, blended coagulant Alum and MO provides the highest removal efficiency with the shortest settling time. In this blending method with purification of MO seeds extract, the Alum dose was lowered by 60% for beginning turbidity samples of 150 NTU and 450 NTU, and by 50% for high turbidity samples of 1000 NTU. As a result, the disadvantages of Alum can be mitigated. The amount of MO seeds extracted can be lowered by purification, removing the unnecessary components of MO seeds extracts and lowering the content of organic matter or load in the treated water. Using a natural coagulant (MO) instead of a standard coagulant can further minimise treatment costs (Alum).

H. **Suleyman A. Muyibi. al.** "Moringa Oleifera seeds as a natural coagulant for treatment": Chemical coagulants are commonly used to treat severely turbid surface water. Chemicals used in water treatment in poor nations account for a large portion of water treatment companies' annual operating costs. Because local manufacturing companies are unable to meet the demand for these chemicals in other industrial uses, their costs have been rising at an alarming rate. Natural coagulants, on the other hand, are widely assumed to be harmless for human health. The seeds of Moringa oleifera, a tropical plant, contain coagulating/flocculating chemicals.

Moleifera seed has been employed as a major coagulant by several researchers because it has a strong coagulation activity for high turbidity water. For low turbidity water, coagulation activity was modest. Despite all of the advantages, natural coagulants and polymers should only be used in the process of water clarity on a large scale after passing tests to ensure their non-toxicity, biodegradability, and viability. We'll combine natural coagulants such as MO and Gram seed powder with alum in the most effective proportion for enhanced surface water treatment**.**

IV. SIGNIFICANCE OF STUDY

Technically and economically, waste water treatment is a difficult task. It invests a significant quantity of money, as well as land. Some treatment plants are facing issues as a result of rising costs, rising electricity costs, or poor plant maintenance.

This necessitates some low-cost treatment that will assist them in overcoming their difficulties. This project is a step in that direction.

REFERENCES

[1] Berns, J., Caesar, C.; Practical experiences in the production of panels using agricultural based fibers" Proceedings No 7259, The Use of Agricultural-based fibers in the Manufacture of Composite Panels, Forest Products Society, Winnipeg, Manitoba (2000), pp.7-20.
[2] D. Maldas, B.V. Kokta.; Studies on the preparation and properties of particle boards made from bagasse and PVC: II. Influence of the addition of coupling agents". Bioresource Technology (1990), Volume 35, Issue 3, pp 251-261.
[3] Daniella Regina Mulinari, Herman J.C. Voorwald, Maria Odila H. Cioffi, Maria Lúcia C.P. da Silva, Tessie Gouvêa da Cruz, Clodoaldo Saron.; Sugarcane bagasse cellulose/HDPE composites obtained by extrusion". Composites Science and Technology (2009), Volume 69, Issue 2, pp 214-219.
[4] FAO Statistic; Major Food and Agriculture Commodities and Producers. Online at http//www.fao.org. (2006).
[5] Lee, S.T., Park, C.B., Ramesh, N.S.; Polymeric Foams: Science and Technology. CRC Press, Boca Raton (2007), p. 134.
[6] Misra Anadi and Singh V. K.; Experimental Analysis of Two Dimensional Photo elastic Properties Used in Fracture Mechanics (2010), Journal of IEI, Vol. 91, April 18, 2010, pp 21-24.
[7] Xu, F., Sun, J.X., Liu, C.F., and Sun, R.C.; Comparative Study of alkali and acidic organic-soluble hemicellulose polysaccharidesfrom sugarcane bagasse (2006), Carbohydrate Research 341, pp.253-261.
[8] Singh V. K. and Gope P.C.; Silica-Styrene-Butadiene Rubber Filled Hybrid Composites: Experimental Characterization andModeling (2010), Journal of Reinforced Plastics and Composites, Vol. 29, No. 16/2010, pp 2450-2468.