ISSN No:-2456-2165

A Review on the Use of Moringa Oleifera Extract for Water Purification Application

Abhishek A Shetty[1], Shashank Raju Poojary[2], Harsha A Devadiga[3], Devaraj B[4], Sridhar D R[5]
[1,2,3,4]UG Students, [5]Assistant Professor, Department of Mechanical Engineering
Mangalore Institute of Technology & Engineering
Moodabidri, India

Abstract:- Moringa Oleifera Cationic Protein extract used to water treatment technologies has gained in popularity because they are more ecologically friendly and provide a range of additional benefits, such as cost savings, reduced by-product creation, and increased biodegradability. Moringa oleifera has historically been utilized as a natural coagulant to remediate polluted effluents and is being employed today. In most developing countries, the high cost of construction for traditional water treatment facilities and distribution networks makes it very difficult to provide clean and enough water to all families, particularly in rural regions. Implementing RO technology for filtration in remote locations where energy may not be available continuously is not sustainable, and people find it expensive. The intention of this paper is to combine the low-cost technologies of slow sand filtration and further solar disinfection while using a popular plant-based coagulant moringa oleifera to treat the local surface and groundwater and to be implemented on a household level. The cost analysis proves that it is an excellent alternative to conventional methods and can be implemented on a large scale by communities or individual households.

Keywords:- *LPG; Gas stove; Sensors; Safety; Microcontroller;*

I. INTRODUCTION

A medium-sized plant that is native to India and suited to tropical regions, Moringa oleifera is extremely prolific all year round and resistant to water shortages. This plant is used extensively in the culinary, pharmaceutical, cosmetic, and other sectors because of its unique qualities. Its seeds and seed coats have, however, been the subject of various research for a long time now that look at the possibilities for treating drinking water. Coagulation / aggregation is the most well-studied process using MO seeds and is highly efficient. is. Proven to be an inexpensive and environmentally friendly natural coagulant. However, in recent years, research has focused primarily on understanding how the coagulation mechanism works and identifying proteins that are coagulants, and separation techniques have been increasingly strengthened. In addition, a new method for improving pollutant removal during coagulation. Functionalization by nanoparticles has been evaluated. The cationic and antibacterial proteins found in Moringa oleifera, which make up 1.2 percent of the plant's total protein and dissolve quickly in water, are present in many equatorial regions of the world where the public's health is at risk due to unclean drinking water. As a result of the leftover organic materials generated from seeds, treated water over time. Wastewater treatment is an important process in sanitary systems. One of the main challenges in the water treatment process is the removal of hydrophobic colloids. These particles are organic and are usually present in high concentrations and sizes compared to other contaminants. In the wastewater treatment process, the main processes are coagulation, followed by coagulation. Aggregation are physicochemical processes and are often used at the beginning or end of a wastewater treatment process. Water that contains disease-causing organisms is not important for water purification technologies, some of which are more effective at removing some impurities, including carbon adsorption, ion exchange, distillation, and filtration, but require different amounts of energy and water. This is true even though ion exchange is very effective at removing organic contaminants from water, and carbon adsorption removes suspended solids from water with a 99 percent efficiency rate, when being reversed, it creates high-quality water containing bacteria. Osmosis can somewhat successfully remove all sorts of impurities and is entirely effective in taking out inorganics, but the drawback is that the water needs to go through pre-treatment. However, the technique cannot get rid of ions, colloids, or particles.

II. LITERATURE REVIEW

Moringa oleifera is a small to medium-sized tree that grows to about 10m in height and is farmed for a variety of applications including vegetable, spice, medicinal, cooking oil, and cosmetic oil. The various sections of this plant contain profiles of essential minerals as well as proteins, vitamins and amino acids. Moringa trees have been claimed to be used to combat malnutrition, particularly in new born and nursing mothers, due to the availability of vital nutritional content.[1-5]

This study was carried out to evaluate realistic extraction strategies for Moringa oleifera seed and their leaf extracts, a plant species in which several different studies have indicated antibacterial activity. Three distinct solvents and two different extraction procedures were used to extract Moringa oleifera seeds. Antibiotic susceptibility testing of fourteen bacterial species was performed using sensitivity discs impregnated with the various extracts: seven typical Gram-negative and seven typical Gram-positive.[6-8].

ISSN No:-2456-2165

While metal salts and chlorine formulations are considered harmful to health, Moringa oleifera seeds are natural coagulants that purify drinking water and aggregate without compromising human health. It acts as a drug and absorbent [9-15].

The use of Moringa oleifera coagulant in combination with alum and ferric chloride has been shown to reduce inorganic salt consumption by an average of 70%. Moringa oleifera seed extract had no recognizable effect on water PH. The remaining turbidity measured on most test runs corresponds to the drinking water supply guidelines. The results of this study are consistent with previous studies that proposed the use of Moringa oleifera as an alternative natural material for water purification.[16-17]

Moringa oleifera seeds are used in an indigenous water treatment approach as a water-soluble extract in suspension, making it an excellent natural clarifying agent, especially for cloudy ones, an efficient reduction in turbidity from 80% to 99% results in an aesthetically clear supernatant, which is accompanied by a 90% to 99% reduction in bacteria.

The efficiency of mixing naturally occurring coagulants derived from plants and manufactured coagulants in raw water treatment is compared in the study. Due to the difficulty in commercialising natural coagulants due to their low production rates, combining synthetic coagulants was believed to be a more suitable application strategy for this investigation. The efficacy of the coagulant was evaluated by measuring turbidity, pH, and conductivity.

This report offers details on the effectiveness and use of M. oleifera seeds in water treatment, as well as their comparative performance to other coagulants that are chemically based. The development of a workable water purification system in impoverished nations therefore still requires additional joint research on alternative greener water purification methods [18].

III. METHODOLOGY

With the use of a magnetic stirrer and 100 cc of water, Moringa dry seed powder and sand were dissolved for around 30 minutes to produce Moringa extract. To get the suspended particles out of the extracted, filter paper was used. The liquid will be removed and filtered until soaking through sand with uniform grain size. The sand grains are let to come in touch with the extract for a full 24 hours. The extract's cationic protein now adheres to the sand grains. At room temperature, the prepared sand particles are dried. The first concentration was made by combining 2g of moringa seed powder and 300g of sand in 100ml of water and stirring for 30 minutes. Then the extracted was filtered with filter paper to remove the unwanted particles.

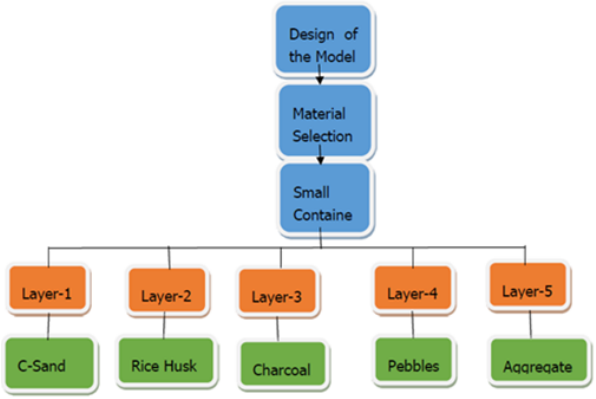

Fig 1:- Layer Design

Correspondingly the Same quantity of sand and water with different quantity of moringa oleifera seed powder of different concentration was prepared. Burn the rice husk at 300-600° C to get activated carbon. Which is used in layer 2 in filter shown in Fig 1.

The filter will be constructed from locally and naturally occurring materials and will be used to clean water for residential and drinking purposes. The project's process is shown in Fig 1. This water filtration system is constructed using plastic containers in order to save expenses while keeping filter performance. By making water filters more affordable to rural homes, we will surely improve people's quality of life and lower the danger of waterborne diseases, ultimately saving lives.

The filtering system is made up of many layers of locally available materials, as well as water samples obtained from three separate locations, including ground water, tap water, and lake water. The many layers of identifiable materials employed in the models are displayed in Fig 1.

IV. RESULT AND DISCUSSION

By covering the extract with sand and keeping it dry, Moringa extract is stored. C-sand, anions, chloride, and turbidity are formed as a result of the positive charges on the surface of the Moringa oleifera cationic protein. With the exception of salt water and necessary minerals, charcoal purges contaminants from water. Up to 96 percent of turbidity and germs in water can be captured by burned rice husk (activated carbon).

V. CONCLUSION

This study's proper evaluation of Moringa Oleifera as a sustainable material for water purification processes indicated that it may be successfully used to takeout different contaminants from water utilizing various water treatment techniques. Furthermore, while positive reported outcomes from Moringa oleifera seed use in water treatment, significant information have been noted, as have the lack of standard review study, the huge variation of content in Moringa Oleifera seeds, and the diverse circumstances used.

REFERENCES

[1]. Adamu Idris Maizuwo, Aminu Sharif Hassan, Hassanah Momoh, Jabir Abdullahi Muhammad. Phytochemical Constituents, Biological Activities, Therapeutic Potentials and Nutritional Values of Moringa oleifera (Zogale): A Review. Journal of Drug Design and Medicinal Chemistry. Vol. 3, No. 4, 2017, pp. 60-66. doi: 10.11648/j.jddmc.20170304.

[2]. Blanka Frydrych ova Klimova, Petra Poulova, Michal, "eLeaming studymaterials and students' preferences" Faculty of Informatics and Management.

[3]. *Omodamiro OD*, Nwankwo C. I, Ejiofor E. U.; Antimicrobial and Coagulant Property of *Moringa Oleifera* Seed in Water Purification; *Sch J Agric Vet Sci 2014; 1(4B):279-287*.

[4]. Oria-Usifo E. E., Anyata, B.U. and Ekenta, E.O.; Use of moringa oleifera seed extracts as alternative natural material for water purification.

[5]. Michael Lea; Bioremediation of Turbid SurfaceWater Using Seed Extract from Moringa oleifera Lam. (Drumstick) Tree

[6]. Optimisation of using a blend of plant based natural and synthetic coagulants for water treatment: (Moringa Oleifera-Cactus Opuntia-alumblend) B.I. Gandiwa, L.B. Moyo, S. Ncube, T.A. Mamvura, L.L. Mguni, N. Hlabangana.

[7]. "APPLICATION OF MORINGA OLEIFERA LAM. SEEDS IN WASTEWATER TREATMENT''; Nargis Nisar and Bhupendra Koul; e-ISSN:2581-6063 (online), ISSN:0972-5210.

[8]. Boya Xiong, Bethany Piechowicz, ziyuhan wang, Rose Marinaro, Emma Clement, Taylor Carlin, Adam Uliana, Manish Kumar, Stephanie Butler Velegol; "Moringa Oleifera f-sand Filters for Sustainable Water Purification'' sbvelegol@engr.psu.edu.

[9]. Ahmad Faizal Abdul Razis, Muhammad Din Ibrahim, Saie Brindha Kntayya; DOI: http://dx.doi.org/10.7314/APJCP.2014.15.20.8571 Health benefits of Moringa Oleifera.

[10]. Omodamiro O. D*, Nwankwo C. I, Ejiofor E. U. Antimicrobial and Coagulant Property of Moringa Oleifera Seed in Water Purification. Sch J Agric Vet Sci 2014; 1(4b):279-287.

[11]. Macharia Jane Wanjiru Development of A Low-Cost Water Purification System – A Case Study Ceramic Filters And Moringa Oleifera Seeds I56/70025/2011.

[12]. Rockwood, J.L.1*, Anderson, B.G.2, Casamatta, D.A.3 Potential Uses of Moringa Oleifera And An Examination Of Antibiotic Efficacy Conferred By M. Oleifera Seed And Leaf Extracts Using Crude Extraction Techniques Available To Underserved Indigenous Populations.

[13]. Krishan Kumar, Lily Trivedi; ISSN: 2455-541X; "Moringa oleifera seeds: An efficient & cost-effective bio alternative for wastewater treatment"

[14]. Nargis Nisar and Bhupendra Koul; "Application of Moringa Oleifera Lam Seeds In Wastewater Treatment" DOI:https://doi.org/10.51470/PLANTARCHIVES.2021 .v21.S1.393;

[15]. Sonal Chonde And Prakash Dattatray Raut; Article in World Journal of Pharmaceutical Researh -July 2017 Doi: 10.20959/Wjpr20178-9015; Treatment Of Dairy Wastewater By Moringa Oleifera Seeds.

[16]. Kebread A. Ghebremichael TRITA 1650-8602; Moringa Seed and Pumice as Alternative Natural Material for Drinking Water Treatment.

[17]. Tássia Rhuna Tonial dos Santos & Gustavo Affonso Pisano Mateus & Marcela Fernandes Silva & Carolina Sayury Miyashiro & Leticia Nishi & Murilo Barbosa de Andrade & Márcia Regina Fagundes-Klen & Raquel Guttieres Gomes & Rosângela Bergamasco; "Evaluation of Magnetic Coagulant (α-Fe2O3-MO) and its Reuse in Textile Wastewater Treatment" doi: https://doi.org/10.1007/s11270-018-3747-8

[18]. R. R. Nisha1 P. Jegathambal1, K. Parameswari2, K. Kirupa2; "Biocompatible water softening system using cationic protein from moringa oleifera extract" doi: 10.1007/s13201-017-0591-8.