

## MORINGA TECHNOLOGY BY USE OF MORINGA OLEIFERA AS BIO-COAGULENT

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### ABSTRACT:

Many undeveloped countries are still facing the problems with availability of uncontaminated drinking water due to several reasons like lack of knowledge, budget and resources. Chemical coagulants like Aluminum Sulphate (Alum), Ferric Sulphate ( $FeCl_2$ ) is used in waste water treatment plant. This excess use of chemical coagulants is hazardous to human health. Use of Bio-coagulant is need for today's time. One of these there is alternative natural coagulant is moringa oleifera seeds. Moringa Oleifera is a perfect example of multipurpose tree. It has been found that Moringa to be non-toxic and recommended is to use as coagulant in treatment plant. The use of Moringa has an added advantages over the chemical treatment of water.

**KEYWORDS:** Moringa, Moringa Oleifera seeds, Activated sludge process (ASP), colloidal, Sludge.

### I INTRODUCTION

Municipal waste water is usually conveyed in a combined sewer, sanitary sewer, effluent sewer etc. sewage is the subset of waste water that is contaminated with feces or urine but it is often used to mean any waste water containing high pathogenic content. Sewage includes domestic, municipal or industrial liquid waste products disposed of usually air a pipe or sewer (sanitary or combined), sometimes in a cesspool emptier. Sewage is the physical infrastructure, including pipes, pumps and screens used to convey sewage from its origin to the point of treatment or disposal. It is found all types of sewage treatment with exception of septic system.

### ORIGIN OF WASTE WATER:

Waste water or sewage can come from –

- Human water (feces, used toilet paper or wipes, urine or other bodily fluids) also known as black water.
- Cesspit leakage

- Septic tank discharge sewage treatment plant discharge
- Washing water (personal, clothes, flowers, dishes etc) also known as green water.
- Rainfall collected on roofs ,yards, hard standing etc (generally clean with traces of oils and fuel)
- Ground water infiltrated into sewage
- Airs, foods, Vomit, paper fibers, plant materials, human etc.
- Soluble organic materials such as urea, fruit sugars, soluble proteins, drugs, pharmaceuticals etc.
- Inorganic particles such as sand, grit, metal particles, ceramics etc
- Soluble inorganic materials such as ammonia, roas-salt, sea-salt, cyanide, hydrogen sulphide, thiocyanates ,thiosulfates etc. surplus manufactured liquids from domestic sources(drinks, cooking oil, pesticide, lubricating oil, pint, cleaning liquid etc)
- Urban rainfall runoff from roads, car parking, roofs, sidewalks or pavement (contains oil, animal feces, litter, gasoline, diesel or rubber residue, metal from vehicle exhaust etc.)
- Sea water ingress (high volume of salts and microbes)
- Direct ingress of river water (high volumes of micro-biota)
- direct ingrate of manmade liquids (illegal disposal of pesticide, used oil)
- highway drainage (oil, de-licing agents, rubber residue)
- storm drains (almost anything including cars, shopping trolleys, trees, cattle)
- black water (surface water contaminated by sewage)
- industrial waste
- industrial site drainage (silts, sand, alkali, oil, chemical residues)

- industrial cooling water (biocides, heat, slimes, silts)
- industrial process water
- black water (surface water contaminated by sewage)

Waste water constituents –

The composition of waste water varies widely. This is the list sewage may contain

- water (>95%) which is often added during flushing waste down a drain
- Pathogens such as Bacteria, viruses, protozoa as well as parasitic worms.
- Non-pathogenic bacteria
- Organic particles such as feces
- Animals such as insects, arthropods, small fish
- Macro solids such as sanitary napkins, nappies/diapers, condoms, needles, children's toys, dead animals or plants etc.
- Gases such as hydrogen sulfide (H<sub>2</sub>S), carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) etc
- Emulsions such as adhesive, mayonaisse, hair colorants, emulsified oils etc
- Toxins such as pesticide, poison, herbicides

#### **SEWAGE TREATMENT DISPOSAL AND ITS IMPORTANCE:**

In some urban areas, sewage is carried out separately in sanitary sewage and runoff from roads is carried in storm drains. Access to either of these is typically through a manhole. The untreated sewage has a serious impact on the quality of the environment and on the health of people. Pathogens can cause a variety of illnesses.

#### **REUSE OF TREATED WASTE WATER:**

Treated waste water can be reused as drinking water, in industry (cooling towers) in artificial recharge of aquifers, in agriculture (e.g. 70% of Israel's irrigated agriculture is based on highly purified waste water) and also in rehabilitation of natural ecosystems [3].

Use of untreated waste water in agriculture. Around the 90% of waste water produced globally remains untreated causing widespread water pollution, especially in economically backward countries. Increasingly, agriculture is using untreated waste water for irrigation. Cities provide lucrative markets for fresh produce, so are attractive to farmers.

#### **HEALTH HAZARDS OF USING POLLUTED WATER FOR IRRIGATION:**

There can be significant health hazards related to using waste water in this way. Waste water from cities usually contains a mixture of chemical and biological pollutants. In low-income countries, there are often high levels of pathogens from excreta, while in emerging nations, where industrial development is outpacing environmental regulations, there is an increasing risk from inorganic and organic chemicals. The World Health Organization (WHO) has developed a guide for safe use of waste water management institute (IWMI) has worked in India, Vietnam, Ghana, Ethiopia, Mexico and other countries on various projects aimed at assessing and reducing risks of waste water irrigation [3]. They advocate a "multipurpose-barrier" approach to waste water use where farmers are encouraged to adopt various risk-reducing measures before actually using sewage irrigation a few days before harvesting to allow pathogens to die off in the sunlight. Applying carefully so it does not contain leaves likely to be eaten raw, cleaning vegetables with disinfectant or allowing fecal sludge used in farming to dry before being used as human manure.

#### **LITERATURE REVIEW:**

Waterborne diseases are the persistent health problem throughout the world. According to Schwarz (2000) as estimates 1.6 million people in developing countries are compelled to use contaminated water resources for drinking and food preparation. Yet in many rural communities of these countries water clarification methods like flocculation, coagulation and sedimentation are often impractical because of the high cost of equipment and low availability of chemical coagulant. The use of natural material to clarify water has been practiced for centuries. Extracts of seeds from the Moringa Oleifera tree have been found to be one of the most effective clarifiers. Studies to test its effectiveness for treating water have been conducted since the early 1970's. These early investigations established its effectiveness as a coagulant for treatment of water either high level of turbidity of equal importance to the coagulation efficiency is the human health issues in use of such coagulant for potable water production. The use of non-toxic natural coagulant obtained from local resources would lessen the economic hardship of the developing countries of procuring conventional chemical coagulant. Several depth studies

have confirmed that Moringa Oleifera seeds possess effective coagulation properties. Treatment efficiency of the natural coagulant is high. In-turbidity is ranging from 1.5 to 350 NTU. These studies are also revealed that the crude water extract of Moringa Oleifera compares quite positively with aluminum sulphate and as such its use has been suggested for use of water treatment agents.

**II BIO-COAGULENT:**

They are naturally occurring completely non-toxic type of coagulant prepared from biodegradable materials like exoskeleton of crabs and dry seed of drumsticks. Bio coagulant has natural buffering capacity so no pH alkalinity adjustments are required. Beside reduction level of turbidity they also reduce the level of micro-organisms in water. They are completely biodegradable. The volume of sludge character is non-toxic and nonorganic in nature. Bio coagulants are eco-friendly and easily available.

**NEED OF BIO-COAGULANT:**

Potential health and environment hazards have been encountered due to the use of chemical coagulants. Conventional water using metallic salts as coagulants have some inherent disadvantage such as removal of suspended and colloidal particles only and leaving behind dissolved solids, heavy metals like chromium, lead, cadmium, mercury which are toxic even in small concentration.

Aluminum has also been indicated as a causative agent in neurological diseases such as pre-senile dementia. There is fear that ingestion of aluminum ions may induce Alzheimer’s disease. Sludge produced after treatment is voluminous and non-biodegradable and therefore possess disposal problem leading to increased cost of treatment. Recently most of the water treatment companies of chemical coagulant along with decline revenues and funding. Water treatment chemicals constitute 35% to 70% of the recurrent expenditure and these too are imported with scarce foreign currency. Moreover the diverse effect of this chemical coagulant on health and environment are also big problem.

**III MORINGA TECHNOLOGY:**

Moringa Technology is a techniques of processing the Moringa Oleifera seeds into an effective bio-coagulant and its application in waste water treatment.

Advantages of Moringa Oleifera

- It is natural , completely non toxic
- The Moringa Oleifera seeds extract appears to have natural buffering capacity so no pH and alkalinity adjustments are required.
- Besides the level of turbidity it also reduces the level of micro organism in water\it is completely bio-degradable.

**IV METHODOLOGY**

Preparation of Moringa Oleifera solutions

- Dry Moringa seeds were obtained from commercial seed supplier
- Mature seeds showing no signs of discoloration, softening and extreme desiccation were used.
- The seeds kernels were ground to fine power of approximate size 600 micron to achieve solubilization of active ingredients in the seeds.
- Tap water added to the powder to make 2% suspension ( 2g of M. Oleifera powder in 100 ml water)
- The suspension was vigorously shaken for 30 min using stirrer to promote water extraction of the coagulant proteins and this was then passed through filter paper (Whitman no. 1 )
- Fresh solutions were prepared daily and kept refrigerated to prevent any ageing effects (such as change in pH viscosity and coagulation activity)

**IV. RESULTS**

**Table No 1 Reduction in Turbidity using Alum as a coagulant**

SAMPLE	ORIGNOL TURBIDITY	NEW TURBIDITY	REDUCTION OF TURBIDITY
I	84.5	55.4	32.14
II	85.6	65.4	22.11
III	75.6	42.1	41.91
IV	77.4	38.1	49.84

**Table No 2 Reduction in Turbidity using Moringa Oleifera as a coagulant**

SAMPLE	ORIGINOL TURBIDITY	NEW TURBIDITY	REDUCTION OF TURBIDITY
I	84.5	49.5	43.5
II	85.6	55.1	37.5
III	75.6	42.3	45.48
IV	77.4	38	48.91

**Table No 3 Reduction in Turbidity using both coagulant**

COAGULENT	DOSAGE	AVERAGE TURBIDITY REDUCTION
Moringa Oleifera	15	36.4
Alum	30	22.1

### V. MORINGA CAPSULES

As per the results it has been cleared that moringa oleifera can remove turbidity from water. In rural areas, still people are facing the problems of turbid water. So I worked on same that from village the peoples are illiterate & they do not know about dosage and all. So as same as medical capsules, I invented the moringa capsules which contain moringa powder. There is no need to think about dosage of moringa powder only to think about how many no of capsules to be added for the related turbidity. So they required to add only that no of capsules to get clean water. The capsules are designed according to the turbidity ranges. Ex- 0-50 mg/lit – 1 No's; 50-100 mg/lit – 3 No's



### V CONCLUSION

- Cost of sewage treatment using bio-coagulant is less than cost of sewage treatment using chemical coagulant
- Efficiency of treatment using bio-coagulant is more than efficiency of treatment by using chemical coagulant
- Coagulation efficiency of moringa solution is more than coagulation efficiency of alum
- We can reduce the coast of treatment plant by using bio-coagulant as Moringa Oleifera instead of traditional coagulant.

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