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ASSESSMENT OF MORINGA OLEIFERA SEEDS AND KERNALS IN STREAM WATER

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Abstract - *Need of good drinking water increases in all countries, particularly in developing countries like India. In such countries people drinks untreated water due to high cost of water treatment methods. So it is necessary to discover some sustainable and cost effective methods to replace the current methods. The main purpose of this study is to replace the chemical coagulant Alum by natural coagulant Moringa oleifera, commonly known as Drumstick. The seeds of Moringa have the capacity of coagulation as well as antibacterial activities. This substitution is necessary because of high cost of Alum and its potential to produce Alzemer's disease. From previous works it is found that Moringa can replace Alum as a coagulant. But when compared to Alum, the anti-microbial activity of Moringa is relatively less. So we can combine alum and Moringa powder for coagulation. It may give good results in both coagulation and bacterial reduction.*

1.INTRODUCTION

Water is an essential component of life and search for hygienic and esthetically acceptable water was already a subject of priority concern. The world Health Organization (WHO) defines potable water as it is clear, transparent, odorless, no objectionable taste and free from microorganisms or chemicals in concentration lead to a risk to human health. A large number of people are exposed to the hazards from pollutants in potable water. To remove those pollutants and to obtain palatable drinking water, water treatment usually comprises water clarification and disinfection in conventional water treatment. Many chemical coagulants are widely used in conventional water treatment processes for tap water production. However, studies have reported that all these chemicals lead to many health problems. Naturally occurring coagulants are biodegradable and presumed safe for human health. The use of natural material of plant origin to clarify turbid raw water is not a new idea.

PHYSICAL PROPERTIES OF PODS AND SEEDS OF MORINGA:

- Average weight of pod (g) 7.60 - 7.95
- Average weight of seeds (g) / pod 3.59 5.03 4.83
- Average number of seeds / pod 12 17 16
- Average weight (g) / 100 seeds 29.9 29.6 30.2
- Average weight of kernels (g)/100 seeds 21.2 - 22.5
- Percent weight of kernel in relation to entire seed 72.5 - 74.5
- Percent weight of hull in relation to entire seed 27.5 - 25.5
- Moisture in kernel (%) 4.5 - 6.5
- Moisture in hull (%) 9.2 - 12.9
- Moisture in whole seed (%) 5.8 - 7.5

WATER PURIFICATION:

When crushed into a powder, the seeds from Moringa trees act as a natural flocculent which can be used to purify dirty water, eliminating between 90-99% of bacteria. The powder joins to the solids in the water and sinks to the bottom. The residue (seed cake) left over from making Ben Oil from the seeds. The sludge left over from the water after treatment can also be used as a bio-fertilizer/bio-compost which has been shown to increase yields of other staple food crops. This therefore presents an excellent cycle for the seeds which can be used by rural communities: firstly using the seeds to make Ben Oil then using the seed cake from the oil extraction process to purify water and then finally using the sludge left over from the water purification process as a bio-fertilizer for other crops.

COAGULANT DOSE REQUIREMENT:

As for all coagulants, the amount of seed required will vary depending on the raw water source and on the raw water quality. One advantage of seed use is that, in general, there is a wide dose range over which effective treatment may be achieved and maintained. Jar testing should be carried out to determine more specific dose requirements for the raw water. Dosages are given as equivalent weight of seed powder or press cake material required to make up the dosing solution.

ECONOMIC ANALYSIS:

Moringa seed contains 40% by weight of oil and laboratory work at Leicester confirmed that the press cake remaining after oil extraction still contains the active coagulant. The high quality and hence high market value of this vegetable oil was confirmed during the recent visit to Malawi. The oil is of equal value as a cooking oil and as the principal ingredient for soap manufacture. The demand for oil in Malawi far outstrips the available raw materials

required for extraction. An economic analysis in the Malawi context reveals that the press cake may be obtained at zero net cost as a by-product of oil extraction.

2. MATERIALS AND METHODS

Palakkarai is located at 11*16' N and 77* 34'60 E at about 10 Meters above mean sea level. Palakkarai is located within Perundurai. Due to unregulated population growth and industrial development, Perundurai experiences an exponential growth in the vehicular usage and fuel consumption, which results in an increased concentration of particulate matter present in the river water."

Fig 1: Palakkarai

TURBIDITY:

The term turbid is applied to waters containing fine suspended impurities (clay, sand, decomposed vegetable and animal matters) that interface with the passage of light through water. Turbidity in water may be measured on standard silica scale. Turbidity meter and Nephelometer are the instruments used for the determination of turbidity in water. The recommended concentration of turbidity in drinking water should be less than 5 units,

PH MEASUREMENT:

The pH of the sample was read using a calibrated Elico pH meter. A volume of 200 ml of the supernatants obtained from the beakers containing the treatments was measured into a beaker. The pH meter probe was then inserted making sure it did not touch the beaker. The pH reading was then taken from the LCD display after it had stabilized.

CONDUCTIVITY MEASUREMENT:

The samples used for the pH measurements were used for the conductivity test. A calibrated Elico Conduct meter Basic C30 was used. The conductivity meter probe was then inserted making sure it did not touch the beaker. The reading was recorded from the LCD display after it had stabilized.

TOTALCOLIFORM USING MOST PROBABLE NUMBER (MPN) PROCEDURE:

In determining the most probable number of coli forms that were Present in each of the treated water samples. Lactose broth was used as the medium for the bacteria growth. Two types of the lactose broth were prepared. These were the single strength lactose broth (SSLB) and the double strength lactose broth (DSLB).In the single strength, 13.0 g of the lactose powder was weighed and dissolved in 1000 ml of distilled water. An amount of 0.08 g Alazin Red was measured and added to the solution. The solution was then stirred gently for 10 min on a magnetic stirrer to dissolve and mix well. The double strength was prepared using exactly a double of each of the weights of the reagents used. This solution was put on a magnetic stirrer and stirred gently for 10 min. A volume of 1.0 ml of the control, 10.0 and 12.0 g of both Moringa and alum treatments supernatants were measured and introduced into test tubes containing 10 ml of the double strength lactose broth and 10 ml of the single strength lactose broth. Another volume of 0.1 ml of the same supernatants above was measured and introduced into another set of test tubes containing 10 ml of the single strength lactose broth.

The test tubes were then incubated for 24 h at 37°C after which they were analyzed. The results obtained were compared with Wright et al. (2004) to obtain the most probable number at 95.0% confidence level.

COAGULANTS USED:

The seeds were harvested when they were fully matured. This is determined by observing if there are any cracked pods on the plants. The pods that were plucked were cracked to obtain the seeds which were air-dried at 40°C for two days. The shells surrounding the seed kernels were removed using knife and the kernels were pounded using laboratory mortar and pestle into powder and sieved using a strainer with a pore size of 2.5 mm2 to obtain a fine powder. This was the coagulant prepared from Moringa.

PREPARATION OF SEEDS EXTRACT:

Dry Moringa oleifera seeds were obtained from the Botanical Garden. The seeds were air dried and after being ground up the ground material were sieve No. 26 and kept in a dark well closed container.

3. RESULTS AND DISCUSSION

In the characteristics of water analysis test the Chlorides are present in the range of 8.2NTU. Turbidity may be caused when light is blocked by large amounts of silt, microorganisms, plant fibers, sawdust, wood ashes, chemicals and coal dust. Any substance that makes water cloudy will cause turbidity. The treatments used gave significant differences ($p < 0.001$) on turbidity. The declared WHO

guideline for conductivity provided for safe drinking water is 5 NTU. Conductivity is used to determine the total amount of dissolved solids in the water. In the Alkalinity are present in the water sample from the range of 152mg/l. In the pH values are present in the range from 7.4. The acceptable range for drinking water is between 6.5 to 8.5. pH measures water acidity or alkalinity. Levels below 6.5 may be corrosive, while levels above 8.5 may create scaling problems and a bitter taste. In the Fluorides are present in the water sample from the range of 0.92.In the water sample analysis the Hardness are present in their 126.72mg/l. In the Nitrate are present in the water sample from the range of 8mg/l. The potassium are present in the range of 134.8mg/l. The recommended limit is 200 mg/L. Levels above 100 mg/L may cause a laxative effect, while levels above 340 mg/L may affect taste.

Table 1: Laboratory Value & Standard Value

PARAMETERS	LABORATORY VALUE	STANDARD VALUE
TURBIDITY	56	8
ALKALINITY	1.52	300
pH	7.4	6-9
FLUORIDE	0.2	3
HARDNESS	27	350
TOTAL DISSOLVED SOLIDS	382	520
CHLORIDES	82	600

DISCUSSIONS:

- From the analysis of water characteristics the acceptable range for drinking water is between 6.5-9.2 pH measures water acidity and alkalinity.
- Conductivity is used to determine the total amount of dissolved solids in the water. The recommended limit is 20 mg/L. Levels above 100 mg/L may cause a laxative effect, while levels above 340 mg/L may affect taste.
- Excessive calcium may contribute to the formation of kidney or bladder stones. Calcium also contributes to the hardness of water and may cause problems with laundering, washing and bathing.
- Magnesium is a salt that contributes to the hardness and taste of water. Excessive magnesium may give water a bitter taste, but is normally not a health hazard.
- Total hardness less than 80 mg/L may result in corrosive water, while hardness above 100 mg/L may result in the need for more soap during bathing and laundering.
- Excessive hardness may also lead to scale deposits in pipes, heaters, and boilers. Water softeners will reduce hardness to acceptable levels, but will consequently increase sodium concentrations Hardness values exceeding 500 mg/L are generally unsuitable for domestic purposes without treatment.

SUMMARY:

In this study, water was collected from Palakkarai stream at specified sites. Various Characteristics was analyzed at Environmental Engineering laboratory, Moringa Oleifera seed Powder and Kernel powders were prepared .Based on these studies, the plan for phase – II will be set.

4. CONCLUSION

The results of Water investigation show that the water in the studied area are highly contaminated with turbidity, total dissolved solids. As a result of high concentration of total dissolved solids the water loses its portability and reduces the solubility of oxygen in water. Water of almost study point is contaminated because of this, people of pallakarai area are prone for the immediate health problems as stomach diseases, gastric troubles.

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