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Water Treatment Using Moringa Oleifers Seeds

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ABSTRACT

Moringa Oleifera seed is applied as coagulant in place of aluminum sulphate (Alum) used in conventional treatments plants. In this work, water is treated using moringa Oleifera seeds. The parameters were tested before and after the water were treated for seven days with the moringa seeds. The water samples (sample A, B, C, and D) were collected from four deferent locations in Gwange Word, Maiduguri. The results for the water samples before treatment showed that the sample from all the four locations (200ml each) are turbid and have a pH of 8 with the exception of location D which has a pH of 9. The samples showed a varying total bacteria count (10^3cfu), A (297), B (272), C (92) and D (71). All the moringa treated water samples are not turbid and showed a pH of seven (7) and a varying total bacteria count (10^3cfu) of 3 for sample A, sample B(1), sample C and D showed Zero(0). The present study was carried out to confirm the effectiveness of seed powder extracted from mature dried Moringa Oleifera seeds which are commonly available in most communities.

Keywords: pathogens, alum, drumstick, horseradish

INTRODUCTION

Water is used for a variety of purposes like drinking, washing, bathing, recreation as well as numerous other varied industrial applications. WHO (1971), reports that wholesomeness of water means absence of suspended solids, inorganic solids and pathogens. The report also specifies the minimum amount of 25ltrs (per capital per day) of portable drinking water. About one billion people lack safe drinking water and more than six million people (of which 2 million are children) die from diarrhea every year (Cheesbrough, 1984). The situation persists and it will continue to cause substantial loss of human live unless it is seriously dealt with at all levels. In developing countries such as Nigeria, water treatment is expensive. The ability to pay for services is minimal and skills as well as technology are

scarce. In other to alleviate the prevailing difficulties, approaches should be focus, robust and require minimal maintenance and operating skills. Locally available materials can be exploited towards achieving sustainable safe portable water supply.

Drinking water treatment involves a number of unit processes depending on the quality of the water source, affordability and existing of guidelines or standards. The cost involved in achieving the desired level of treatment depends among other things, on the cost and availability of chemicals. Commonly used chemicals for the various treatment units are synthetic organic and inorganic substances.

In many places, these are expensive and have to be imported in hard currency. Many of the chemicals are also associated with human health and environmental problems (Matawal and Kulack, 2004) and a number of them have been regulated for use in water treatment systems.

Natural materials can minimize or avoid the concerns and significantly reduce cost available locally. Generally, coagulants are used for physical and chemical purification of turbid raw waters. They are applied to transform water constituents into forms that can be separated out physically. For instance, in Benue state of Nigeria, muddy water mixed with powdered moringa seeds result in purified water after one hour of storage, just as if it had been treated with the common aluminum sulphate (Alum).

Moringa Oleifera is grown widely throughout the topics. It is also found in many states of northern Nigerian and other southern states it is sometimes known as the DRUMSTICK or HORSERADISH tree. Ranging in height from 5 to 12m with an open, umbrella-shape straight trunk and corky, whitish bark, the tree produces a tuberous taproot. The evergreen or deciduous foliage (depending on climate) has leaflets 1 to 2cm in diameter; the flowers are white or cream coloured. The fruits (pods) are initially green slim and tender

eventually becoming dark green, firm and up to 120cm long, depending on the variety. The dried moringa seeds are round or triangular, the kernels is surrounded by a lightly wooded shell with three papery winds.

Jahn (1986), reports that moringa leaves have outstanding nutritional qualities, among the best of all perennial vegetables. The protein content is 27% and there are also significant qualities of calcium iron and phosphorus as well as vitamins A, B and C. In Borno State for instance, fresh moringa leaves are eaten as vegetables while the roots are used in a variety of traditional medicines. Moringa plant and seeds have no secondary effects on human.

According to Eilert (1978), the seeds of moringa Oliefera contain significant quantities of low molecular – weight (water-soluble protein) which carries positive charge when the crushed seeds are added to raw water, the proteins produce positive charges acting like magnets and attracting the predominantly negatively charged particles (such as clay silt bacteria and other toxic particles in water). The flocculation process occurs when the proteins bind the negative charges forming flocs through the aggregation of particles which are presents in water. These flocs are then easily removed by setting or filtration. The main objective of this research work is to evaluate the effectiveness of moringa seed powder as a coagulant in treating water sample collected in Gwange area. Application for eco-friendly non toxic, simplified water treatment where rural and peri urban people living in extreme poverty.

MATERIALS AND METHOD

Four (4) samples of water were collected from four (4) different locations which include Dupcharima street, Sheikh Ibrahim Saleh Al-Hussain street, General Mamman Shuwa street and Zuwa da Wuri within Gwange area, Maiduguri Borno state of Nigeria , samples were collected in a sterile bottles to avoid contamination. And it has been labeled.

Moringa oleifera (good quality dried drumstick were selected and) wings and coat from seeds were removed, fine powder was prepared by using mortar and pestle and this powder was directly used as coagulants.

pH Determination

Proof pH meter was employed; the pH electrode was inserted into the sterile bottle containing the water samples, the result was read from the monitor (Azeeza et al, 2008).

Microbial determination

The spread plate method was employed in determining the microbial load of the water sample before and after treatment, ten fold serial dilutions of the samples were made. 1ml was pipetted into a sterile Petri plate containing nutrient Agar (growth medium) and spread evenly. This was incubated at 37°c for 24hours. All colonies appeared on the plate were counted using colony counter and recorded adequately (Cheesebrought, 2004).

Preparation of media (nutrient agar)

Nutrient agar was prepared by weighing exactly 28grams of the powder in 1litre of distilled water contained in a conical flask then boiled to dissolve the medium completely. It was sterilized by autoclaving at 121°c for 15 minutes and was dispensed in Petri plate and allowed to settle for used.

RESULT AND DISCUSSION

Table 1: Microbial analysis of water sample before treatment with moringa seed.

Water sample (ml)	Total bacteria count (10^3cfu)	Turbidity	pH
A. 200	297	Cloudy	8
B. 200	272	Cloudy	8
C. 200	92	Cloudy	8

D. 200	71	Cloudy	9

Table 2: Microbial analysis of water sample after 7days treatment with moringa seed.

Water sample (ml)	Total bacteria count (10^3cfu)	Turbidity	pH
A. 200	3	Clear	7.0
B. 200	1	Clear	7.0
C. 200	0	Clear	7.0
D. 200	0	Clear	7.0

DISCUSSION

Table 1 shows physical and microbial analysis of water sample before treatment with moringa seed. Water sample A which was collected from dupcharima street in Gwange area has the highest total bacteria count of 297 x 10^3cfu than other samples. In the table shown, the pH value of water sample D which was collected from Sheikh Saleh Al-Hussain street is 9 which is soluble base, it is not recommended acceptable range of pH for drinking water specified by WHO (2006) and the turbidity of all the samples was cloudy. It was reported that the action of Moringa Oleifera as a coagulant lies in the presence of water soluble cationic proteins in the seeds. This suggests that in water, the basic amino acids present in the protein of moringa seeds powder would accept a proton from water resulting in the reduce of hydroxyl group making the solution basic (Amagloh and Benang, 2009).

Table 2 shows the physical and microbial analysis of water sample after 7days treatment with moringa seed. Bacteria count that were too numerous to count before treatment were reduced to manageable levels after treatment. During the analysis, it was observed that after treatment with moringa seed; pH decreases, the recommended acceptable range of pH for drinking water specified by WHO (2006) is between 6.0 and 8.0 the treatment gave a pH range of 7.0 which falls within the reducing trends as the concentration of the dosing solutions were increased. It is also observed that the initial turbidity was cloudy and after the treatment it become clear, moringa oleifera seed powder removed 90-99% of turbidity in the treated water

(Madsen et al, 1987). These shows that among all the plant materials that have been tested over the years, powder processed from the seeds from moringa oleifera has been shown to be one of the most effective as a primary coagulant for water treatment and can be compared to that of Alum (conventional chemical coagulant) (Madsen et al, 1987; Olsen , 1987). It was inferred from their reports that the powder has antimicrobial properties.

It has been concluded that application of plant coagulant such as moringa is highly recommended for domestic water purification in rural, urban of Nigeria. Most of the people use contaminated turbid water in there day to day activities, moringa oleifera seeds act as a natural coagulant, flocculent, absorbent for the treatment of drinking water. It reduces the turbidity, alkalinity, acidity, chloride after the treatment. It also acts as a natural antimicrobial active against the microbes which is present in the drinking water and decreases the number of bacteria. Moringa oleifera seed does not give a toxic effect. It is eco-friendly and cheaper method of purification of water and therefore can be used in rural and peri urban areas where no facilities are available for the treatment of drinking water.

REFERENCES

Amagloh and Benang, "Effectiveness of Moringa Oleifera seeds as a coagulant for water purification", University for Development Studies, Faculty of Applied Sciences, Department of Applied Chemistry and BIOCHEMISTRY, Navrongo, Ghana 2009.

Cheesbrough, M. (1984): Medical Laboratory Manual for Tropical countries. Tropical Health Technology, Buterworth, P. 228

Eilert U., (1978): Antibiotic principles of seeds of moringa oleifera. Indian medical journal 38, (235), 1013 – 1016.

Jahn, S. A. (1986), Proper use of African Natural Coagulants for rural water supplies. Manual No. 191, pub. GT2, Eschborn, Germany.

Matawal D. S. and Kulack P. A. (2004): Alternative to chlorination as a water disinfectant: case study of Ultraviolet (uv) radiation NJTE, pp 93-103.

Olsen A., Water Research, 1987, 21 (3):517-522

WHO (1971): International Standard for drinking water (3rd edition), Academic press, Geneva, pp. 18-40.

Madsen ., Schlundt J. and Omer E. F., J. Trop. Med. Hyg., 1987, vol. 90:101-109.