Comparison of the Effect of Moringa Extract and Powder on Coliform and BOD Variation with Time

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Abstract - The study investigated the use of moringa extract and powder on coliform and BOD variation with time. Jar test analysis revealed optimum dosages that were used in the experimentation. Raw and waste water samples were treated separately with the extract and powder at detention periods of 1, 24, 48 and 72 hours respectively. Coliform and BOD values of the water samples, which were either flocculated or not, were measured. The results revealed that, raw water coliform in excess of 1700cfu/ml and BOD of 78mg/L were reduced to 540 cfu/ml and 60mg/L after 72 hours of using moringa extract in the treatment. But the same treatment using particle sizes of the powder indicated poor performance, especially in waste water treatment. The study reveals that *moringa oleifera* extract is comparatively better than powder in raw and waste water treatment.

Keywords - Comparison, moringa extract, powder treatment.

1 INTRODUCTION

In Nigeria, where majority of people live in rural areas, ponds, streams and rivers represent significant sources of drinking water due to insufficiency of pipe-borne water. Even in urban areas and cities, the story is not different. The bacteria quality of many sources of drinking water clearly reveal that they are endemic leading to all sorts of diseases, sometimes a health hazard (Matawal and Ndububa, 1996). It is estimated that 90% of waste water is discharged directly into the rivers and streams without treatment in developing countries like Nigeria (Okoli et al., 2009).

Matawal and Ndububa (1996) surveyed drinking water sources in North eastern Nigeria and revealed that certain diseases like Guinea worm, Cholera, Dysentery, and the like, are prevalent in the rural areas. In the urban centres, the quality of pipe-borne water, streams and other sources of water supply have recorded coliform counts for exceeding the WHO limits. Many of the researches confirming this situation have been reported by authors like Adesiyu et al. (1983); Umoh et al. (1984) and Dada et al. (1990).

But conventional treatment methods involve the use of synthetic chemicals. Natural materials have been reported to have advantages over synthetic ones (such as alum and chlorine) in that, they produce much lower sludge volume and are safe to humans (Aho and Agunwamba, 2014). Apart from that, they (natural materials) are biodegradable and cost effective for developing countries, since they can be locally grown and have a wider effective dosage for raw and waste water treatment.

The coagulative effect of using *moringa oleifera* in raw and waste water treatment has been established. Many of the researches confirming the above assertion have been reported by authors like Aho and Agunwamba (2014), Lagasi et al. (2014) and Aho and Lagasi (2012). Consequently, careful study into the use of moringa extract and powder, for bacteriological treatment of water needs to be investigated.

2 MATERIALS AND METHODS

2.1 SEED SAMPLING AND PREPARATION

Seeds of *moringa* plant were obtained within Makurdi metropolis. Seed pods were allowed to mature and dry naturally to a brown colour on the tree. The seed kernels were crushed and sieved through 0.3, 0.6, 1.0 and 1.7mm diameter sieves, commonly available in the water laboratory of the university. To obtain the water extract of *moringa*, the finely crushed seed powder 10 grams were mixed with 100ml of clean water to form paste. The insoluble material was removed by filtering the paste through a funnel containing cotton wool into 100ml containers.

2.2 DETERMINATION OF BOD AND COLIFORM

Water samples were siphoned into two BOD bottles, one for 5 days incubation and the other for the determination of initial dissolved oxygen. BOD was subsequently calculated. Multiple tube method was adopted for coliform determination following standard procedure as described by (Rand et al., 1995).

3 RESULTS AND DISCUSSION

The coliform count for raw water after 72 hours remained 1800 cfu/ml as seen in figure 1. The addition of moringa extract in the raw water samples without flocculation, marginally reduced load count to 920cfu/ml at 72 hours of detention time. But the rapidly flocculated moringa extract in raw water treatment significantly reduced load count to 540 cfu/ml at 72 hours.

Similarly, raw water BOD (mg/L) of values 72, 66, 66 and 66 without flocculation at detention times of 1, 24, 48 and 72 hours respectively, were reduced considerably with flocculated moringa extract to 60, 48, 41 and 48 mg/L as shown in figure 2 at the same detention periods. For waste water samples, the use of moringa extract did not show any reaction coliform reduction between the non-flocculated and the flocculated samples as shown figure 3. However, BOD values were marginally reduced in waste water treatment with the extract as presented in figure 4.
It was equally observed (figure 5) that no significant reduction was noticed in coliform count, at any of the particle sizes investigated. However, the combined sizes of the powder used as whole, recorded a slight treatment as seen in figure 6. From the results as indicated in figure 7 and 8, it is clear that particle sizes of moringa cannot be used effectively in the removal of coliform and BOD in raw water treatment.

Comparatively, moringa extract has proven to be better than the powder in coliform and BOD treatment of raw water as shown in figures 1 and 2. The performance is worst in waste water treatment. Even though significant treatment is achieved with moringa extract in raw water, the values as presented are far above the limit specified by World Health Organization.

4 CONCLUSION

From the study carried out on the effect of moringa extract and powder on coliform and BOD variation with time, it is safe to conclude that, moringa oleifera extract is capable of significantly reducing pollution in raw water flocculation better than when applied in powder form. Further research beyond 72 hours of detention period using moringa extract in raw water treatment is recommended.

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