REMEDIATION OF AQUACULTURE WASTE WATER WITH *MORINGA OLEIFERA* SEED POWDER

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ABSTRACT: High volumes of waste-water from an aquaculture pond are released every day during water exchange into surrounding natural water bodies which directly influence the nutrient dynamics of these bodies. Discharge of untreated or partially treated water containing high concentrations of nitrogen into water bodies will contribute to deterioration of water quality, human health problems and accelerated eutrophication (Pardueetal1994).This is especially serious when the same water is being drawn in by adjacent aquaculture facilities and more importantly, when it becomes an important source water for the needs of the surrounding communities. The second reason is the need to create a system wherein much of the water being released can be treated and recycled back into the culture system through the implementation of appropriate re-circulation technologies. This study investigated the suitability of Moringa *oleifera* seed extract as a natural coagulant for waste water treatment. Highly turbid water was collected from *Annagaripalem* of *Kavali* mandal of *SPSR Nellore* district A.P. Water samples were dosed with *Moringa oleifera* seed extract: 150mg/l. The collected water samples were analyzed before and after treatment with Moringa oleifera seed extract for different parameters– p^H, conductivity, turbidity and total solids to evaluate the suitability and effectiveness of Moringa oleifera seed extract in treating highly turbid water Significant reduction in all parameters analyzed with Moringa oleifera seed extract was observed, with the exception of the p^H, which remained fairly constant at all doses. It was therefore concluded that Moringa oleifera seed extract acts as a natural coagulant for the treatment of highly turbid water that is released from the aqua-cultural forms.

***KEYWORDS*: aqua-cultural Waste Water; Coagulation; *Moringa oleifera*: Effluent Treatment**

INTRODUCTION

Management of waste-water produced by to aqua-cultural operation is a major environmental challenge. Waste water released from the aqua-cultural ponds has unique problems including odor, high solids content, pollutants and high nutrient concentrations. waste-water treatment and reuse of the treated waste-water are potential solutions for addressing the problem so poor quantity and quality of water. High volumes of waste-water from an aquaculture pond are released every day during water exchange into surrounding natural water bodies which directly influence the nutrient dynamics of these bodies. Discharge of untreated or partially treated water containing high concentrations of nitrogen into water bodies will contribute to deterioration of water quality, human health problems and accelerated eutrophication(Pardueetal1994).

This is especially serious when the same water is being drawn in by adjacent aquaculture facilities and more importantly, when it becomes important source water for the needs of the surrounding communities. The second reason is the need to create a system wherein much of the water being released can be treated and recycled back into the culture system through the implementation of appropriate re-circulation technologies. Rosewater derived from aquaculture operations can often be isolated and treated prior to release or reuse. Because this water are typically concentrated, they can be pre treated to the desired quality for the ultimate disposal (Knightetal2000). So in the present study an attempt is made to treat effluent water from the aquaculture ponds with Moringa oleifera seed extract as a natural coagulant for waste water treatment. Various water quality parameters were studied before and after treatment with Moringa oleifera seed extract.

METHODOLOGY

The dry Moringa oleifera seeds obtained from local market were blended into fine particles after the removal of the seed coat. The seed powder was weighed and dissolved in distilled water with a concentration of 150mg/l. The solution was stirred using a magnetic stirrer for 30 minutes and filtered using a filter paper. This was considered as control. In the same way for aquaculture waste water also the seed powder of Moringa oleifera at the concentration of 150 mg/L. This is considered as experimental. They were kept on orbital shaker and mixed thoroughly at a speed of 200 rpm for five minutes to enable total dispersal of coagulant and 30 rpm for15 minutes to aid in effective flocculation of colloidal particles.

The bottles were then removed from the shaker and placed on a work bench for an hour to settle the flocs. After removal of flocs laboratory analysis was conducted both before the commencement of the treatment and after the treatment to analyze p^H, conductivity, turbidity and total solids.

Water Quality Analysis: The samples were preserved and analyzed by adopting standard methods for the examination of water and waste-water as prescribed by Strickland and Parsons (1972); Trivedy and Goebl (1986); NEERI (1988) and APHA (1989).

RESULTS

The data obtained from the analysis conducted before and after treatment of the turbid water collected from aqua-cultural wastes with Moringa oleifera seed extract were presented in Table 1.

Table -1.

Effect of Moringa oleifera seed treatment on water quality parameters of the aqua-cultural effluent waters.

(Values are mean of eight observations. +or – indicate percent increase or decrease over control. P denotes the level of significance and NS shows non significance)

S.No.	Parameter	Control	Experimental	Percent change Over control.
1	pH	7.7±0.4	7.4±0.5 NS	-3.90
2	BOD (mg/l)	33±2.4	23±1.4 (P<0.001)	-30.30
3	COD (mg/l)	110±7.44	76±7.8 (P<0.001)	-30.91
4	TSS (mg/l)	81±5.88	66±5.6 (P<0.001)	-18.52
5	N total (mg/l)	5.7±2.41	2.3±0.3 (P<0.001)	-59.65
6	P total (mg/l)	0.4±0.08	0.25±0.02 (P<0.001)	-37.50
7	DO (mg/1)	3.4±1.2	6.6±1.4 (P<0.001)	+94.12

Anova: Two-Factor Without Replication

SUMMARY	*Count*	*Sum*	*Average*	*Variance*
Row 1	2	15.1	7.55	0.045
Row 2	2	56	28	50
Row 3	2	186	93	578
Row 4	2	147	73.5	112.5
Row 5	2	8	4	5.78
Row 6	2	0.65	0.325	0.01125
Row 7	2	10	5	5.12
Column 1	7	241.2	34.45714	1923.74
Column 2	7	181.55	25.93571	1009.341

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Rows	17101.18	6	2850.196	34.38773	0.000216	4.283866
Columns	254.1516	1	254.1516	3.066349	0.130492	5.987378
Error	497.3046	6	82.88411			
Total	17852.63	13				

DISCUSSION:

Water pollution is largely associated with the use and discharge of water in shrimp ponds. Each time water is exchanged; waste-water is discharged in to the surrounding surface waters, thus waste-water carries a number of pollutants. These pollutants ultimately stem from chemicals, fertilizers and feed added to the ponds. Lime ($CaC0_3$, $Ca0H)_2$ or CaO is

used to neutralize the acidity of the soil in the pond in the preparation phase, and the amount used depends on the pH of the soil. Typically 200-250 kg of lime is applied to the surface water during the grow-out phase to stabilize the acidity of the water. In coastal area of Nellore district the soil often has a pH below 6 or5. According to the experiences of the farmers, 1.0 to 1.5 tons/ ha of Lime is required. Fertilizers are used for increasing the food(algae) for shrimps in the preparation phase (also referred to as coloring). Intensive farming, pellet industrial feed is increasingly being used instead of fertilizers. Fertilizers are typically organic such as molluscan, fish or cow manure, or inorganic such as ammonium phosphate called NPK (N:P:K=16:20:0), Di-ammoniumphosphates-called DAP(N:P:K=16:46:0), applied in NPK:DAP ratio of 1:3. The average dose is 0.7 kg per1000m3 of water per crop. For this study the total amount of fertilizer is estimated at 3.5kg/pond/crop, including NPK and DAP. Chemical flocculants like aluminum-sulfate and Kali-sulfate are used at concentration of10-20mg/ 1 to reduce the turbidity of water. Zeolite is used at100-500 kg /ha to remove NH3 in the pond. EthylendiaminTetraacetic(EDTA) is used to reduce the effects of heavy metals in the water by chelating compound matter. Decontaminants used include chlorineat25-30ppm, KMn04 at 5-lO ppm and formalinat15-250 ml/l. Other anti biotic agents, despite being illegal such as Nitrofuran, Phenicol,4-Quinolon, Tetracycline and other pesticide agents such as Rotenone, organic phosphate, and Saponin are used to kill other fish in the pond preparing phase. Use of chemical fertilizers and drugs, as antibiotics in to the shrimp ponds can accumulate into sediment. Antibiotic concentration in shrimp ponds may do harm to the environment and contribute to the increase in drug resistant diseases (Tuanetal.2003).

CONCLUSIONS:

The findings from this research demonstrate that the use of Moringa oleifera seed extract is highly effective as a natural coagulant for water treatment. Research results showed that the pH and conductivity of the aqua-cultural waste water after treatment with Moringa oleifera seed extract was not affected. The pH remained within neutral pH range, not significantly different from the pH of the aquaculture waste water before treatment. This observation reinforces the findings from previous studies investigating the viability of Moringa oleifera seed extract for the treatment to turbid water (Ndabigengesere and Narasiah1998, Pritchard *et.al.* 2008) the use of Moringa oleifera seed extract as a natural coagulant maintains the neutral state of water after treatment. Hence, the use of Moringa oleifera seed extract could be more suitable and have a distinct advantage over the use of chemical coagulants such as aluminwater treatment.

A notable observation of this study is the ability of the Moringa oleifera seed extract to significantly reduce the water turbidity as well as the number of total solids present in the water.

REFERENCES;

1) APHA, AWWA – WPCF (1989). Standard Methods for the Examination of Water and Wastewater (Lenorre S. Clesceri, Arnold E. and Green Berg, eds.). 17thedn. American Public Health Association, Washington, D.C. 2000
2) Knight, R. L. (2004). Use of constructed wetland effluent treatment system in the pulp and paper industry. *NCASI Technical Bulletin*. 876.
3) Ndabigengesere and K.S. Narasiah (1998) Quality of water treated by coagulation using Moringa seeds. *Water Res*. 32(2): 781-791
4) NEERI (1988). Water and Wastewater Analysis, Course Manual. *National Environmental Engineering Research Institute*, Nagpur, India.
5) Pardue, J. H. De laune, RD; Patrick JR., WH; and Nyman, JB 1994. Treatment of alligator farm waste-water using land application. Aquaculture Engineering, 13, 129-146.
6) Pritchard M. ; T. Mkwandawire; A Edmodsin; J. O'Neil and G. Kululanga (2009) Potential of using plant extracts for purification of shallow well water in Malawi. *Physics and chemistry of the earth journal* 34, 799-805.
7) Strickland, J.D.H. and Parsons, T.R. (1972). A Practical Handbook of Seawater Analysis. *Bull. Fish. Res. Bd*.Canada, 167: pp. 310
8) Trivedhy, R.K. and Goel, P.K. (1986). Chemical and Biological methods for water pollution studies.Environmental publications, India, pp. 167-171.
9) Tuan, L. X., M. Yukihiro, N. H. Tho and P. T. A. Dao (2003). Environmental Management in Mangrove Areas.*Environmental Informatics Archives.* I 38-52..