

# Experimental Study of Moringaolifera for Treating Domestic Effluent and Quality of Water for Agriculture

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## Abstract

Domestic effluent is highly complex and is characterized by high B.O.D, C.O.D, suspended solids, total solids, and colour. Untreated domestic effluent when discharged directly in to water bodies or in to the open lands cause damage to the environment.

In the present scenario, due to the increase in population, a high demand for water resources and water reuse has surfaced in both urban and rural areas. The inflated industrial activities augmented the water requirement multifold as well as the quantity of waste water discharged. This up heaved the importance of treating the domestic as well as industrial wastewater in a higher degree and reusing it for all uses except drinking and other domestic needs. In this work, an attempt has been made to treat domestic wastewater using a bio coagulant- MoringaOleifera seeds & Beans seed powder .Moringa Oleifera seeds are famous for its properties as a natural coagulant, adsorbent and antimicrobial agent. Beans seed powder are also found to be possessing most of these properties.

**Keywords:** *Moringa olifera seeds, Domestic waste water, Coagulation, Beans seeds, Jar Test Apparatus.*

## Introduction

Water is a basic necessity of life for both animal and plants. Water covers over 70.9% of the Earth's surface, of which 97% of the total water is covered by oceans, 2.4% by polar ice caps and 0.60% by other land surface water bodies like river, lakes. Water has become the most commercial product of the century; this may sound bizarre but true. In fact what oil was to the 20th century, water is for the 21st century. Human beings are putting an increasing pressure on the planet's water resources. In the earlier days when earth's population was less, it was imagined that oceans were too big to pollute. But in the recent century with increasing population the oceans also seems to be too smaller for getting polluted. Water pollution has become major problem in the recent years due to the activity of human. The industrial revolution in the 19<sup>th</sup> century

has provided the base for the entire recent pollution problems. (Harushet *al.*2011).

Generation of wastes is part of human activity from the ancient times. Disposal of waste on land, surface water is a general practice, but the capacity to treat the waste by natural process is limited. The two different ways in which water pollution can occur. If pollution comes from a single location then it is known as Point source pollution. A great deal of water pollution happens not from one single source but from many different scattered sources, which is called Non-point source pollution.(Harushet *al.*2011).

## Objectives of the Study

- Determine the efficiency of moringaolifera & Beans seed powder as a coagulant.
- To treat the domestic waste water using moringaolifera & Beans seed powder to get the quality of water for agriculture.
- To determine the optimum dosage of moringaoleifera.

## Methods

**Preparation of MoringaOleifera:** The procedure for the preparation of MO seed powder is given below, High quality pods, those which were new and not infected with disease and insects were selected.

- Seeds were opened and from pods and then dried sun light 48 hr to remove any moisture content if present.
- Hulls and wings from the kernels were removed manually to increase the effect of powder as coagulant and to reduce to waste sludge formation.
- The seed kernels were ground to a medium fine powder in grinder and sieved to get particles of the size 600  $\mu\text{m}$  .The fine powder was used as coagulant for analysis.



**Fig.1** MoringaOleifera used in the Study

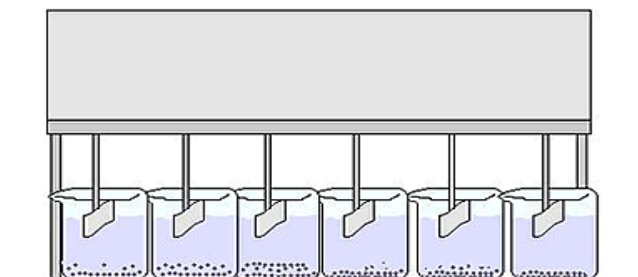
**Domestic Waste water**

Domestic waste water has been collected from underground drainage (U.G.D) in chickkabalapura city.

**Coagulation Test**

Jar test is most widely used experimental methods for coagulation-flocculation. A conventional jar test apparatus was used in the experiments to coagulate sample of domestic wastewater using moringaoleifera and beans seed powder. It was carried out as a batch test, accommodating a series of six beakers together of 1 liter capacity with six spindle steel paddles. Before operating the jar test, the sample is mixed homogenously. Then analyzing the parameters pH, total dissolved solids, suspended solids, total solids, color, BOD and COD for both the moringaoleifera and alum by referring APHA book. Then results are plotted on graphs than they are compared. (Nabiet *al.*2007)

The batch experiment involving rapid mixing, slow mixing and sedimentation. The apparatus consists of six beakers to be agitated simultaneously. 500 ml of the domestic wastewater samples is put in to each 6 one-liter beakers and placed under jar test apparatus. The required dose Moringaoleifera and Beans seed powder is added simultaneously. The paddles are inserted in the jars, the apparatus is switched on and the whole procedures in the jar test are conducted in different rotating speed, which consist of rapid mixing (100 rotations per minute, rpm) for 1 minute and slow mixing (30rpm) for 10 minutes. After the agitation being stopped, the suspensions are allowed to settle for 20 minutes. Finally, a sample was withdrawn using a pipette from the middle of supernatant for physicochemical measurements, so that the effect of coagulant dose on coagulation could be studied. Then, the samples are measured for different parameters.



**Fig.3.2:** Jar Test Apparatus

**Analysis of Sample**

- Parameters like BOD, COD, pH, Turbidity, TS, TSS, TDS, Chlorides, Alkalinity, Total hardness, Conductivity of wastewater has been analyzed as per standard methods referring APHA book.(American Public Health Association)
- Coagulation has to be conducted by jar test apparatus with MoringaOleifera & beans powder.

**Results**

The domestic waste water was analyzed to understand the basic characteristics of wastewater in terms of parameters like pH, colour, turbidity, Total Solids, Total Suspended Solids, BOD, COD, Oil and grease, Total Nitrogen, Electrical Conductivity, Iron and Copper.

The results of the analysis are tabulated in Table 4.1.

Sl. No	Parameter	Units	K.S.P.C.B	Raw water	Treated water	% Efficiency
1	pH	-	5.5-9.0	9.37	7.15	76.30
2	Turbidity	N.T.U	2.0 Max	85.1	28.5	32.9
3	T.D.S	Mg/l	600	1100	800	72
4	B.O.D	Mg/l	0	166	68	40.96
5	Chloride s	Mg/l	250	85.1	51	59.92
6	Total hardness	Mg/l	300	650	500	76.92
7	Total alkalinity	Mg/l	200	600	500	83.33
8	Total solids	Mg/l	600	2180	1400	64.22
9	Electrical conductivity	µmhos /cm	2250 Max	8050	3100	38.50
10	Dissolved oxygen	Mg/l	4-8	8.5	6.1	71.76
11	Chemical oxygen demand	Mg/l	250	289	187	64.70
12	colour	-	Agreeable	-	Agreeable	Light pink

From the table it is clear that parameters like colour, turbidity, Conductivity, BOD, COD, Total Suspended Solids, Oil and Grease content and Total Nitrogen of the domestic wastewater are more than KSPCB Standards. Whereas pH, Iron as Fe and Copper as Cu are well within the permissible limits prescribed by KSPCB.

- Tests carried out with MOSP (MoringaOleifera Seed Powder)

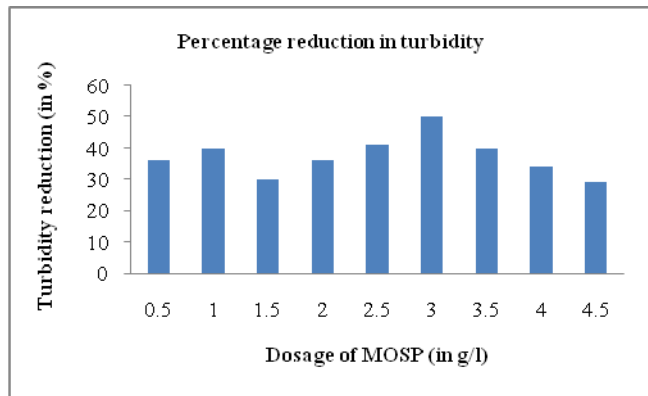
Jar tests were performed to obtain the optimum dosage of MOSP. Tests had shown that the best dosage of MOSP is in the range of 0.75g/l to 1.5g/l of domestic wastewater. The initial turbidity of waste water had been reduced in the range of 8% to 36% after using MOSP as a coagulant.

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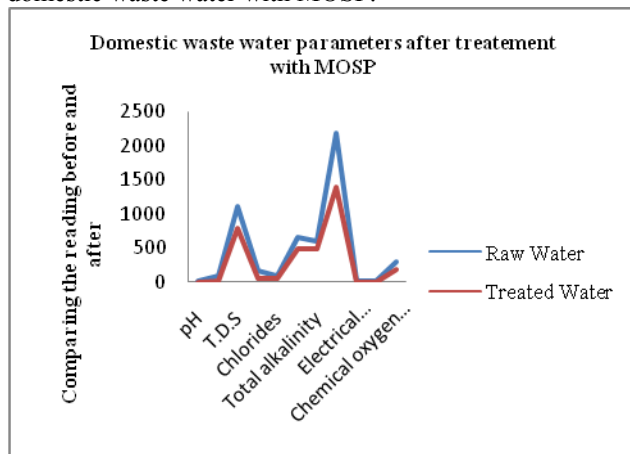
Figure 1 shows the variation in the reduction of turbidity with respect to various MOSP dosages. The various parameters of Domestic Waste water were found to vary with the treatment of MOSP. The following test results give an insight to change in parameters occurred after the treatment of domestic waste water with MOSP.



**Fig. 4.1: Percentage reduction in turbidity with varying MOSP dosages**

Some parameters like turbidity, total hardness, total solids and Electrical Conductivity had greatly reduced after treatment with MOSP. Total hardness content was reduced to 650mg/l from 500 mg/l (76.92%). Turbidity was reduced from 85.1 to 28.5 NTU (32.9%). EC reduction was from 8.050µmhos/cm to 3.100µmhos/cm (71.76%) and Total Dissolved solids content reduced from 1100 mg/l to 800 mg/l (72%).

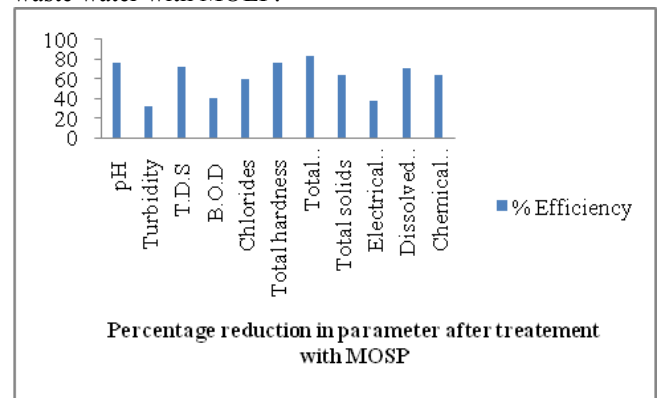
Figure 2 shows the variation in the reduction of parameters after treatment with MOSP. The various parameters of Domestic Waste water were found to vary with the treatment of MOSP. The following test results give an insight to change in parameters occurred before & after the treatment of domestic waste water with MOSP.



**Fig.4.2: Test results after treatment with MOSP**

Figure 3 shows the percentage reduction in parameter after treatment with MOSP. The various parameters of domestic waste water were found to vary with the treatment of MOSP. The following test results give an insight into the change in

parameters efficiency occurred after the treatment of domestic waste water with MOLP.



**Fig.4.3: Percentage reduction in turbidity with varying MOSP dosages**

### Conclusion

MoringaOleifera Seeds are an environmentally-affable natural coagulant suitable for the treatment of waste water containing undesirable parameters like BOD, COD, EC, Total Nitrogen etc. Founded on the experimental test results; the following conclusion can be drawn.

- The best dosage of MOSP in treatment of domestic waste water is in the range of 0.75g/l to 1.5g/l.
- The initial turbidity of waste water had been reduced in the range of 8% to 36% after using MOSP as a coagulant.
- On the other hand, some parameters which can be easily removed, like turbidity, oil and grease, total nitrogen and Electrical Conductivity, total solids and total hardness had greatly reduced after treatment with MOSP.
- The trials with MOSP had decreased the following parameters; Electrical conductivity decreased by around 71%. Turbidity content of waste water was decreased by 32%.

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