



## REMOVAL OF TURBIDITY BY USING NATURAL COAGULANTS SUCH AS *MAGNIFERA INDICA* AND *MORINGA OLIFERA* SEED POWDER

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### ABSTRACT

Drinking water is essential for human consumption, but raw water consists of organic and inorganic matter, which is hazardous to health. Hence, it is necessary to remove these from water to make it potable. Water treatment has is carried out to remove these particles; generally, chemical coagulants treat turbid water. Water treatment usually trailed by coagulation-flocculation sedimentation; in flocculation, water continuously stirred after the addition of chemical coagulants, which leads to the formation of 'flocs' by the accumulation of microscopic particles present in it, to remove the flocs formed filtration and sedimentation is adopted. To carry out water treatment in developing countries, the use of coagulation, flocculation, and sedimentation is severe because of high initial cost, maintenance cost, and inadequacy of chemical coagulants such as alum, aluminium sulphate.

Hence various natural coagulant with high efficiency is used in removing turbidity in domestic and industrial water, and this methodological brief gives the various applications of natural coagulant powders and alternative result instead of using chemical coagulants.

### I. INTRODUCTION

The world is attractive and universal; a sudden increase in the population has become the main risk to all countries around the world, causing many problems, leading to a shortage of water. The water source systems are an unadorned problem while looking into these difficulties construction of apartments, malls, multi-storeyed buildings, and other developments is carried out at all the places.

Water is getting turbid because of pollutants present in it, which causes a threat to our environment, human beings, plants, animals, and aquatic life. Lead uptake, transport, and accumulation by plants and animals, as well as the potential for its propagation into the food chain, exacerbate its toxic health effects. Presently there

are no appropriate low-cost technologies available for removal of several commonly present groundwater contaminants.

Excessive cloudiness or turbidity in intake water causes lot of health issues. Turbidity leads to avail food accommodation for micro-organisms. If it is not removed, turbidity will lead to increased growth of pathogens in water, which further causes to epidemic outbreaks such as water borne diseases. Hence removal of turbidity plays a significant role in water treatment.

Therefore, the objectives of the present study are (i) to remove turbidity for wastewater using natural coagulants such as *Moringa oleifera* seed powder and mango seed powder.

## II. OBJECTIVES

To recognize workable, cost efficient, nearby available, simple, effective, eco-friendly water treatment method which is appropriate for rural and urban population especially for developing countries like India.

To determine optimum dosage in jar test of moringa olifera, mango seed powder and compare with chemical coagulant.

Evaluate turbidity efficiency of *Moringa olifera* and mango seed powder and compare with Alum its impact on water quality and physical characteristics.

Examine the various possibilities of *moringa olifera* and mango seed powder in water treatment.

Examine the potentials of using moringa olifera and mango seed powder on an industrial scale, about accessibility and reliability of manufacture and supply.

## III. MATERIALS AND METHODOLOGY

### a) COAGULANT MATERIALS

Coagulant constituents used are moringa olifera and magnifera indica seed powder where fine quality dried drumstick was carefully chosen, wings and coat from seeds were separated and mango seed powder where good quality seeds were picked, dried. Each fine powder was made with mortar and pestle and the handmade powder obtained was used as coagulant. Seed powder was used as coagulant directly and water samples were collected for treatment purpose. The turbidity test was carried out pre- and post-treatment.

Good quality dried moringa oleifera and magnifera indica seeds were removed from coat. Fine powder was used as coagulant directly added to sample. Industrial water samples were collected for experimental purpose. Turbidity of water was tested before and after the addition of coagulant Doses of moringa seed powder i.e., 2.5,5,7.5 and 10gm/L, Doses of magnifera indica seed powder were added i.e., 10,20,30,40,50, and 60mg/L.



FIG 1: MORINGA OLIFERA SEED POWDER



FIG 2: DRIED MAGNIFERA INDICA SEED (MANGO SEED).

### b) TURBIDITY REMOVAL

The removal of turbidity from wastewater is very important prior to disinfection hence it is suitable for human consumption. In water treatment turbidity removal can be achieved by adding chemical coagulants which modifies water from a liquid to a semi-solid state. This is generally carried out by flocculation, the process of gentle and continuous stirring of coagulated water, which encourages the formation of 'flocs' through the aggregation of the minute particles present in the water. Flocs can be easily removed by settling or filtration. In this study jar test was carried out and optimum coagulant dosage of Alum is 8 mg/ litre for bellandur lake water and optimum coagulant dosage of Alum is 6 mg/ litre for Surya city lake water sample. Jar test was also carried out after addition of both natural coagulants.



FIG 3: JAR TEST APPARATUS SETUP

**c) COLLECTION OF TURBID WATER**

In this analysis turbid water was collected from nearby two lakes namely bellandur lake and surya city lake. The initial turbidity was found to be 58 NTU for bellandur lake and 43.2NTU for surya city lake water. Turbidity test was carried out before and after addition of natural coagulants.



FIG 4: VIEW OF BELLANDUR AND SURYA CITY LAKE WATER

**d) PROCESS OF WATER TREATMENT USING NATURAL COAGULANT**

India is a developing country for such developing countries its necessary to carry out low-cost treatment instead of using high cost and low availability treatments. However chemical coagulants such as aluminium sulphate, ferric chloride and other ferric salts requires coagulation, flocculation, and sedimentation. This scientific idea provides various applications of home grown and naturally obtained seed powders as coagulant, especially seed powder of magnifera indica and moringa olifera which acts an alternate method instead of using expensive chemical coagulants.

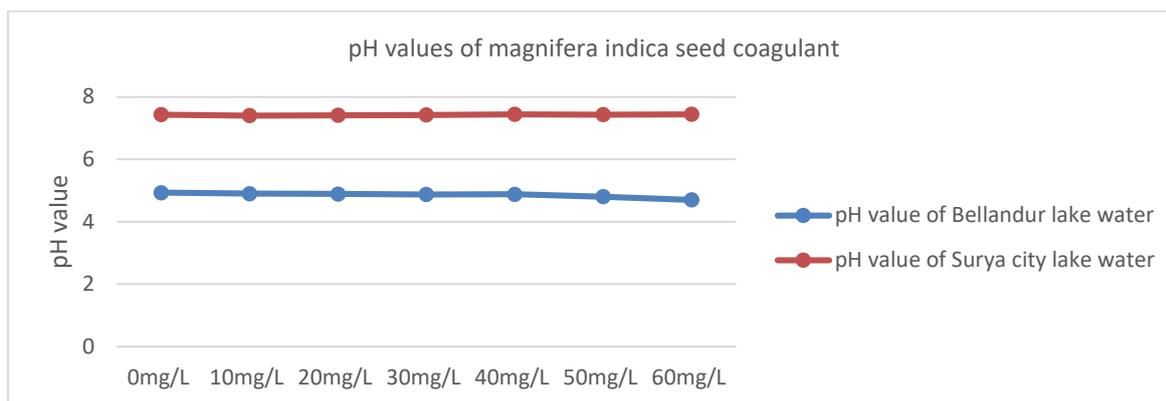
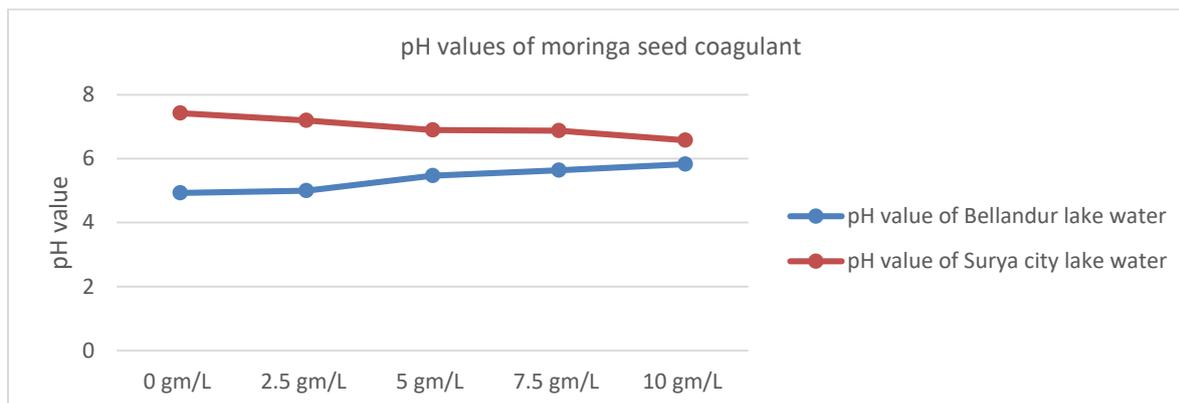
**IV. RESULTS AND DISCUSSIONS**

**i. PH TEST**

Sl no	SAMPLE	Coagulant dosage	pH value	
			Bellandur lake water	Surya city lake water
1	Initial turbid water	-----	4.93	7.43
2	Final turbid water	2.5gm/L Moringa olifera seed powder.	5	7.2
3	Final turbid water	5gm/L Moringa olifera seed powder.	5.47	6.9
4	Final turbid water	7.5gm/L Moringa olifera seed powder.	5.64	6.88
5	Final turbid water	10gm/L Moringa olifera seed powder.	5.83	6.58

Sl no	SAMPLE	Coagulant used	pH value	
			Bellandur lake water	Surya city lake water
1	Initial turbid water	-----	4.93	7.43
2	Final turbid water	10mg/L magnifera indica seed powder	4.9	7.4
3	Final turbid water	20mg/L magnifera indica seed powder	4.89	7.41
4	Final turbid water	30mg/L magnifera indica seed powder	4.87	7.42
5	Final turbid water	40mg/L magnifera indica seed powder	4.88	7.44
6	Final turbid water	50mg/L	4.8	7.43

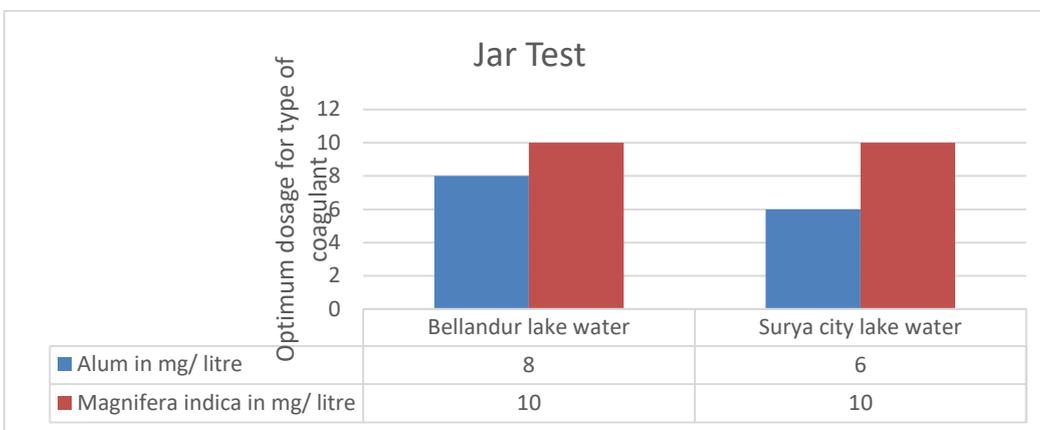
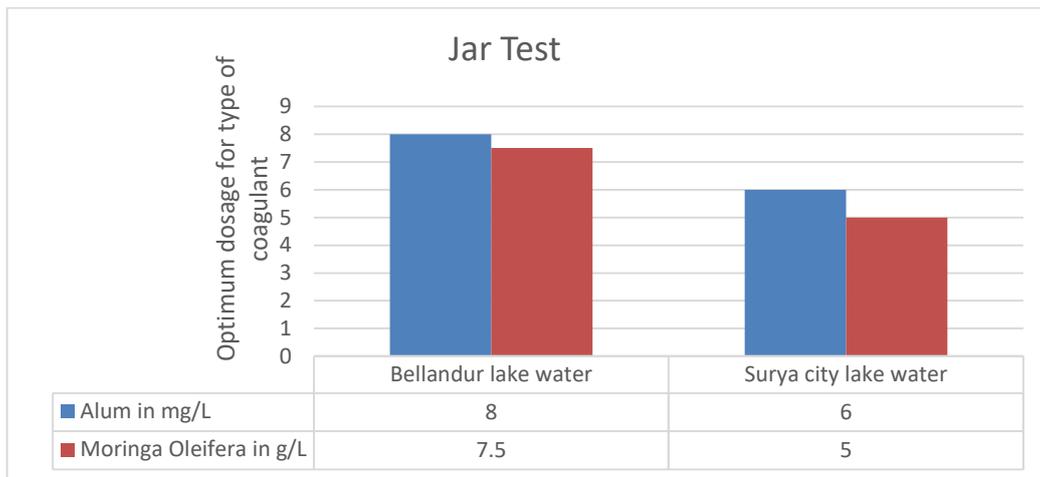
		magnifera indica seed powder		
7	Final turbid water	60mg/L magnifera indica seed powder	4.7	7.44



ii. JAR TEST

Sl no	Optimum dosage for type of coagulant	Bellandur lake water	Surya city lake water
1	Alum in mg/L	8	6
2	Moringa Oleifera in g/L	7.5	5

Sl no	Optimum dosage for type of coagulant	Bellandur lake water	Surya city lake water
1	Alum in mg/ litre	8	6
2	Magnifera indica in mg/ litre	10	10

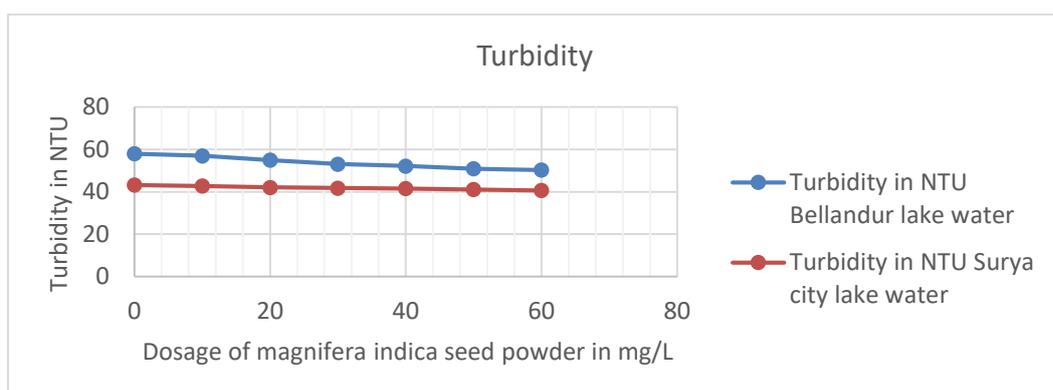
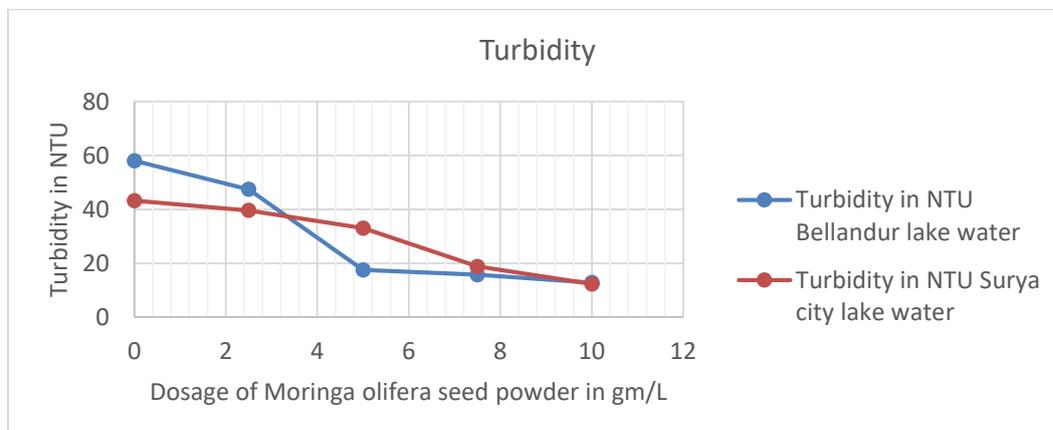


iii. **TURBIDITY**

Sl no	Dosage of Moringa olifera seed powder in gm/L	Turbidity in NTU	
		Bellandur lake water	Surya city lake water
1	0	58	43.2
2	2.5	47.4	39.6
3	5	17.5	33
4	7.5	15.7	18.8
5	10	12.8	12.3

Sl no	Dosage of magnifera indica seed powder in mg/L	Turbidity in NTU	
		Bellandur lake water	Surya city lake water
1	0	58	43.2
2	10	57	42.8
3	20	55	42.1
4	30	53.1	41.8
5	40	52.2	41.6

6	50	50.9	41.1
7	60	50.3	40.7



## V. APPLICATIONS, ADVANTAGES AND DISADVANTAGES OF COAGULANTS

### Applications of moringa oliefera coagulant

- Complete plant can be used for various medications.
- Greeneries of moringa olifera can be feed to animals.
- Oilcakes synthesized by oil extraction can be used as fertilizer to improve nutrients in soil.
- Fully grown as living railings and shelters.
- Wood can be used as fuel.
- Moringa olifera can be grown as multicrop.
- Pulp can be used for paper manufacturing industry.

### Applications of magnifera indica coagulant

- Helps in removal of floc.
- It is an organic coagulant which removes polysaccharide and proteins.
- It can remove high levels of turbidity.
- It can also remove inorganic matter present in water.

### Advantages of moringa oliefera coagulant

- Moringa oleifera has high nutrients.
- Moringa oleifera helps in lowering blood-sugar levels.
- Moringa oleifera can also heel irritation and redness on skin.
- Moringa oleifera helps to reduce cholesterol.
- Moringa oliefera leaves and plant is rich in antioxidants.

Advantages of magnifera indica coagulant

- Magnifera indica can be used in composting.
- Mangifera indica is popular fruit among all.
- Magnifera indica is high in polyphenolic antioxidant.

Disadvantages of moringa oliefera coagulant

- Availability of seed causes lot of problems.
- It requires large quantity of growing.
- Cost is little high due to processing of seed powder.
- Smell may cause after using in water treatment.

Disadvantages of magnifera indica coagulant

- Water extract may increase organic carbon after post treatment.
- Cost is high than alum.
- Processing seed and collection is bit difficult.

VI. CONCLUSION

- i. Moringa oliefera and magnifera indica is purchaser friendly and eco-friendly, a replacement for small scale water treatment.
- ii. Both are renewable sources which can be grown in huge scale.
- iii. Using moringa oliefera and magnifera indica as alternative coagulant which meets water quality parameters.
- iv. Both are simple to use, easily available, maintenance is also very easy which can be used as household coagulant.
- v. Moringa olifera and magnifera indica can remove turbidity.
- vi. It is eco-friendly expertise which has more advantages over other treatment substitutes.

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