

Research Paper :

Purification- clarification of lake water by natural coagulant (*Moringa oleifera*) seed powder

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ABSTRACT

In the present investigation, seeds of *Moringa oleifera* have been used to determine its efficiency in treating lake water and compared with the performance of Alum + bleaching powder, poly aluminum chloride and ferric chloride. Residual turbidity, Hardness, Alkalinity, TDS Values are within the WHO limit or not has also been examined.

KEY WORDS : Natural coagulant, Lake water, *Moringa oleifera*, Ahmedpur

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In rural areas, surface water and ground water are the preferred sources for drinking or daily usage. However only simple primary treatment plant is given for treatment of such water at village level is not only a theoretical exercise but practically impossible due to several reasons (8). Natural poly electrolytes of plant origin have been used for many centuries in developing countries for clarifying or purifying turbid water (9). According to literature, several works (3,4,7,10) has shown powdered *Moringa oleifera* seeds as most promising coagulant in water treatment. *Moringa oleifera* seeds treat water on two levels acting both as a coagulant and antibacterial agent (2).

EXPERIMENTAL METHODOLOGY

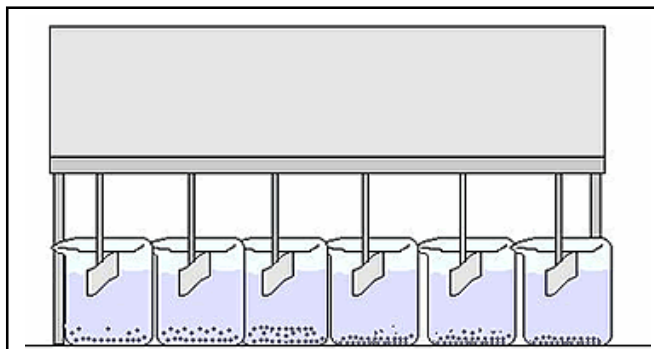
For lake water, selected site is Manjara dam, dist. Beed, Maharashtra. From this dam water supplies to Latur and several areas of Beed district. Turbid water samples were collected in plastic bottles of two liters. Total four samples were collected having approximately same turbidity. Samples were analyzed before and after treatment by using prescribed methods from APHA (1998) and NEERI (2007) (1,6)

Dried pods of *Moringa oleifera* were collected and seeds were separated from the pods and then

pulverized.

Jar-test:

- Coagulation/flocculation is the process of binding small particles in the water together into larger, heavier clumps which settle out relatively quickly. The larger particles are known as floc. Properly formed floc will settle out of water quickly in the sedimentation basin, removing the majority of volumetric flask (1,000 ml)
- Analytical balance
- Coagulants and coagulant aids
- Magnetic stirrer (optional)
- A stirring machine with six paddles capable of variable speeds from 0 to 100 revolutions per minute (RPM)



- Beakers (1,000 ml)
- Watch or clock
- Turbidometer and sample tubes
- Stirring mach

The method applied was according to Zane Satterfield (11). After placing the beakers of 1000 ml water sample, speed of paddles maintained up to 125 rpm for 10 minutes without mixing any coagulant. Then immediately 10 mgs of all coagulants are mixed with rapid mixing of 125 rpm for 10 minute followed by slow mixing at 50 rpm for 45 minutes and settling time of 1 hour. After settling all the water samples were filtered by using wattmann filter paper No.40 and then turbidity, TDS, total hardness, total alkalinity were analyzed.

EXPERIMENTAL FINDINGS AND ANALYSIS

Overall results of present investigation are summarized in Table 1.

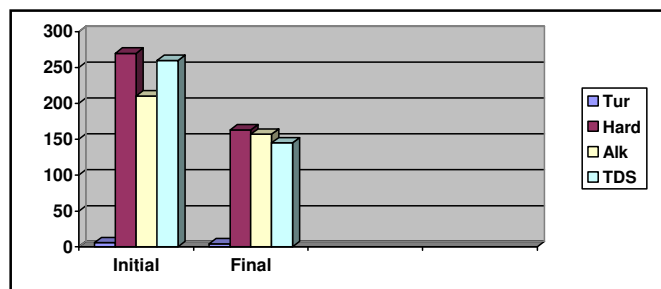


Fig. 1 : Alum+ Bleaching powder dose

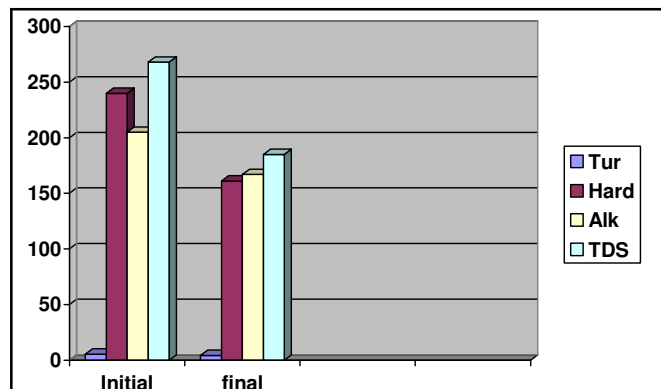


Fig. 2 : Ferric chloride dose

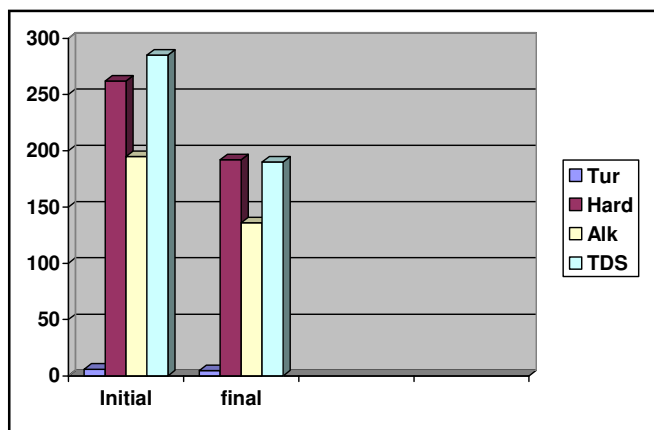


Fig. 3 : Poly aluminium chloride dose

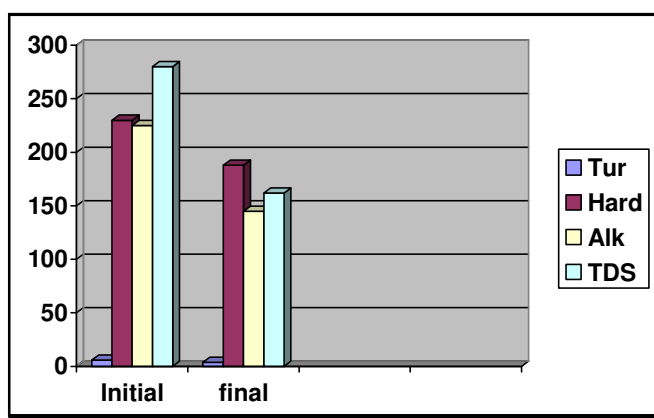


Fig. 4 : Moringa oleifera Dose

Alum + Bleaching powder:

In this case initial values and final values of turbidity, Alkalinity and TDS show good working of Alum as Coagulant. In case of turbidity, initial value is 5.7 and final value 4.1 NTU. The final value is within the limit prescribed by WHO.

Poly-aluminium chloride:

In the present investigation, lowering in turgidity values is less in case of poly aluminium chloride as compared to other coagulant. It works better in case of lowering hardness of dam water.

Table 1 : Purification – clarification of lake water by *Moringa oleifera*

Sr. No	Sample	Coagulant used	Dose	Turbidity		Hardness		Alkalinity		TDS	
				Initial	final	Initial	Final	Initial	Final	Initial	Final
1.	S ₁	Alum +Bleaching powder	10mg /l	5.7	4.1	270	163	210	157	260	145
2.	S ₂	Ferric chloride	10mg /l	5.4	4.2	240	161	205	167	268	185
3.	S ₃	Poly- aluminium chloride	10mg /l	5.9	4.5	262	192	195	136	285	190
4.	S ₄	<i>M. oleifera</i>	10mg /l	5.8	3.7	230	188	225	145	280	162

Ferric chloride:

According to Table 1 ferric chloride reduces alkalinity with major difference. In case of turbidity lowering it is much poor as compared to other coagulants observed.

Moringa oleifera:

The best result is has been noted in case of lowering turbidity Initial turbidity 5.8 NTU which has been noted 3.7NTU after treatment with *Moringa oleifera*. Malay Chaudhari [5] also noted similar results from 7 NTU to 4 NTU. In case of TDS and hardness it works better and noted final values are within the WHO values specified for drinking water.

Conclusion:

Present observation shows powdered *Moringa oleifera* seeds are effective as prime coagulant as compared with alum, poly aluminium chloride and ferric chloride etc.

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