"WATER PURIFICATION THROUGH MORINGA OLEIFERA LAM."

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Abstract

Water is used for variety of purposes drinking, washing, bathing etc. Reports of WHO (World Health Organization) says that about one million people lack safe drinking water and many people die every year from water borne diseases. To deal with this situation water purification is needed. There are various methods of water purfication, however biological methods are most promising and eco -friendly. The present study deals with use of *Moringa oleifera*Lam.to purify water. *Moringa oleifera* Lam. is grown in many countries as a multi - purpose tree as it possesses medicinal and nutritional values. Dry *Moringa* seeds and seed powder were used for water samples collected from different localities like water from Tube well and Well of four localities. These samples were tested for Total Hardness, Calcium Hardness, Magnesium Hardness, Acidity, Alkalanity, Acidity, TDS,TS, TSS, Chloride, Sulphate, Phosphate, pH, Temperature, etc. parameters before and after treatment. It is observed that *Moringa oleifera* Lam. Seed is an effective purifier and coagulant to treat variety of water samples. Use of seed powder is more promising as compared to entire seeds of *Moringa*.

Keywords: Moringa oleiferaLam., Water purification, seed.

Introduction

Water supply is basic need required for living creature and human. In this world available resources are limited for living creatures. Groundwater is one of the major sources of drinking water. But it's direct use for drinking is not suitable, for several reasons (Anekar N.R. 2017). Hence to make it suitable for drinking water treatment is essential. This study deals with water treatment using natural coagulant *Moringa oleifera*Lam.

Importance – water is used for several purposes by humans such as, irrigation, cooking, washing, bathing, cleaning, drinking, also provides home to millions of creature, enables

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transportation. Regulates the temperature of Earth. Our body uses water in all its cells, organs and tissues to help regulate its bodily functions. Because our body loses water through breathing, sweating, digestion. It is important to rehydrate by drinking fluids and food containing water. Water is very important substance on earth. If there is no water there would be no life possible on earth. However, there are several causes of water pollution such as sewage and wastage water, dumping garbage into river and accidental oil leakage, burning of fossil fuels, chemicals, fertilizers and pesticides, global warming, radioactive waste, urban development, animal wastage, underground storage leakage. According to United Nations estimates, the amount of waste water produced annually is about 1500 Km³,6 times more water than that exist in all the rivers of world.

Purification—Though water pollution is a major problem but it can be overcome by various ways like boiling, granular activated carbon adsorption, distillation, reverse osmosis,desalination, direct contact membrane distillation (DCMD), in situ chemical oxidation, bioremediation. Of these bioremediation is cheapest and healthier method mostly followed. For this variety of biological things can be used such as cilantro, jackfruit, java plum, peel of fruits, banana peels, along with these *Moringa Oleifera* Lam. Is also one which is easily available in each corner of world.

MORINGA OLEIFERA LAM.

It is a tree of polypetalae most widely cultivated species in genus *Moringa*, the only genus in plant family Moringaceae common name include, *Moringa*, Drumstic tree, Horse Radish, Ben oil Or Benzoil tree (oil derieved from seeds).*Moringa oleifera*Lam. is fast growing,drought resistant tree. Native to 'tropical and sub tropical' region of South Asia. Widely cultivated for its young seeds and pods and leaves used as vegetables. Also used for water purification. *M. oleifera*Lam. is considered to be an aggressive invasive species.

Water is used for several purposes by humans, but the level of purity of the water being consumed is very important since it has a direct effect on health. More than half of all illness caused by germs, which get into the mouth via water and food.Hence, purification of water is great need of time. This can be achieved through various ways. Chemical methods leads to

purification by synthetic means however, use of biological methods are most convenient and eco-friendly. Hence these are more recommended.

There are various ways by which water is purified biologically. Such as use of <u>Jack fruit seeds</u>: PrapatPentamwa, Wanwisa Tanta, PornwarinMilamai (2011) have studied effect of Jackfruit seeds on water in their work entitled "Water Treatment by Using Lychee, Jackfruit, and Rambutan seed coagulants".MuhammadRaziqRahimiKooh, Muhammad KhairudDahri,Linda B.L. Lim (2016) also found effect of Jackfruit seed as sustainable adsorbent for the removal of Rhodamine B dye".<u>Use of Coriander (cilantro)</u>:Research done by undergraduate students at a community college, Douglas Ph. D. Said that Cilantro, also known as coriander shows activity as a new "Biosorbent" for removing lead and other toxic heavy metals from contaminated water.(Phys.org, 2013)<u>Use of Jatropacurcus seeds</u>:"Preliminary study on Jatropacurcas as coagulant in waste water treatment" had been studied by Zurina Zainal Abidin, N. Ismail, RobiahYunus, I.S. Ahamad (2011) Robert Natumanya have worked on "Evaluating coagulant activity of locally available *Syzygiumcumini, Artocarpusheterophyllus* and *Moringa oleifera*Lam.for treatment of community drinking water, Uganda."

Materials And Methods

The study was conducted under a controlled environment in order to eliminate interference from human activities, rainfall and solar intensity.

Sample collection -The water samples were collected from Jalgaon district, Maharashtra.The two samples of water are taken. One of well and othertubewell. The geographical condition of Jalgaon i.e. latitude is $20^{0}99$ "N and longitude is $75.5626^{0}E$

Materials –Dry *Moringa oleifera*Lam. seeds are used in this study. These seeds were harvested from the trees of residential area of Jalgaon, Maharashtra, India. Seeds of *Moringa oleifera*Lam.act as natural coagulants and biocoagulants. Wings and coat from seeds were removed, fine powder was prepared and sieved.

Procedure - Extraction of *Moringa* seed powder: mature seeds of *Moringa oleifera* were chosen from dry dehiscent pod. The outer covering of seed kernels were removed using a sharp knife, and using a laboratory mortar and pastle. The containers were cleaned

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thoroughly before taking the sample to avoid contamination. The initial volume of each sample was recorded at the collection point. The following parameters were determined: Temperature , PH , alkalinity , TDS , conductivity , oil grease , total hardness , calcium hardness , chloride hardness , phosphate , acidity.

In this procedure crushed seed powder 7.5 grams were mixed with 250 ml water sample for 7 days. And also 15 grams seed powder were soaked in 250 ml water for 14 days. Stir quickly for 30 seconds, then slowly and regularly for Five minutes. Water is covered without disturbing it for at least an hour. After 7 days and 14 days the extraction were filtered using filter paper. And water samples are collected. Again the water is treated and all parameters are measured such as acidity, TDS, oil grease, temperature, total hardness, calcium hardness, pH , chloride hardness , phosphate , conductivity, etc.The results of treated water samples were compared with raw water sample along with WHO standards.

Observations

Sr.	Parameters	Units	S1	S2	S3	S4	BIS
No.							Limits
1	Total Hardness	Mg/l	320	290	330	460	300
2	Acidity	Mg/l	110	180	120	160	120
3	Alkalinity	Mg/l	90	230	390	390	200
4	Chloride	Mg/l	290	420	370	410	250
5	Calcium	Mg/l	100	180	150	200	200
	Hardness						
6	P ^H		7.68	7.63	7.94	7.48	6.5 to 8.5
7	Temperature	⁰ c	33.3	33.8	33.5	33.4	
8	Sulphate	Mg/l	37.0	93.6	64.0	85.6	200
9	Phosphate	Mg/l	9.6	35.4	15.3	35.6	5
10	MPN	MPN/100ml	130	50	8	4	0/100ml
11	Magnesium	Mg/l	220	110	180	260	100
	Hardness						
12	Total	Mg/l	460.4	415.1	317	410.2	500
	Dissolved						
	Solids						
13	Total	Mg/l	189.2	121.65	160.85	204.05	No
	Suspended						Standard

Table no.1 Results Obtained Before Physio-chemical study of raw water

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	Solids						
14	Total Solids	Mg/l	649.6	536.75	477.85	614.25	500
15	Turbidity	NTU	7	6.8	10.2	15.4	5
16	Ca ion	Mg/l	60.9	77.7	48.3	73.5	75
17	Mg ion	Mg/l	31.60	21.88	14.59	19.54	50

Table no. 2	Results obtained after Physio-chemical Study of Treated water with Seed
Powder	

	7 Days				14 Days			
Parameters	S1	S2	S3	S4	S1	S2	S3	S4
Total Hardness	280.00	250.00	277.00	247.00	270.00	309.00	351.00	305.00
Acidity	10.00	30.00	10.00	20.00	40.00	30.00	10.00	20.00
Alkalanity	310.00	230.00	90.00	290.00	620.00	230.00	210.00	260.00
Chloride	180.00	360.00	150.00	230.00	250.00	410.00	320.00	460.00
Calcium Hardness	144.00	139.00	139.00	103.00	150.00	148.00	168.00	117.00
P ^H	7.87	8.55	7.42	7.70	6.80	6.96	6.83	6.30
Temperature	23.80	24.20	23.60	23.30	24.00	23.90	24.10	23.50
Sulphate	25.80	80.30	54.10	75.30	25.10	81.40	55.20	77.40
Phosphate	7.20	24.20	7.55	24.60	7.70	23.10	7.20	24.20
MPN	130.00	50.00	8.00	4.00	130.00	50.00	8.00	4.00
Magnesium	136.00	111.00	138.00	144.00	120.00	161.00	183.00	188.00
Hardness								
Total Dissolved	420.40	399.10	295.00	405.20	421.20	293.04	368.02	400.36
Solids								
Total Suspended	160.20	100.65	120.85	196.05	165.20	125.03	155.04	164.00
Solids								
Total Solids	580.60	499.75	415.85	601.25	586.40	418.07	523.06	564.36
Turbidity	9.70	8.90	9.50	17.30	10.30	10.10	10.90	18.40
Ca ion	63.20	56.30	37.10	70.10	52.20	64.02	33.30	69.70
Mg ion	21.64	15.60	7.60	8.43	26.02	9.10	10.80	11.50

		7 Da	ys		14 Days				
Parameters	S1	S2	S3	S4	S1	S2	S3	S4	
Total	290	257	284	251	246	320	360	312	
Hardness									
Acidity	30	20	40	20	30	40	20	30	
Alkalanity	180	410	190	410	120	250	430	610	
Chloride	310	450	850	350	360	280	140	320	
Calcium	140	147	152	110	110	163	178	138	
Hardness									
P ^H	8.28	8.30	8.05	7.96	6.89	8.36	6.82	7.62	
Temperature	22.8	22.9	23.1	22.7	23.8	23.9	24.1	24.2	
Sulphate	24.1	79.8	53.1	75.9	25.9	80.20	50.4	70.5	
Phosphate	7.9	23.8	7.64	25.7	7.5	23.6	7.15	22.8	
MPN	130	50	8	4	130	50	8	4	
Magnesium	150	110	132	141	136	157	182	174	
Hardness									
Total	428.69	392.5	283.20	428.21	400.36	421.02	256.08	274.32	
Dissolved									
Solids									
Total	156.08	104.96	126.78	209.34	164	165.02	155.01	144.02	
Suspended									
Solids									
Total Solids	584.77	497.46	409.98	637.55	564.36	586.02	411.09	518.34	
Turbidity	7.9	8.6	9.2	16.7	9.6	8.8	9.4	17.2	
Ca ion	56.3	70.1	38.1	63.2	53.4	71.02	32.4	61.1	
Mg ion	20.80	11.44	10.2	9.12	19.40	10.12	9.8	9.2	

Table no. 3 Results obtained after Physio-chemical study of Treated water with Seeds

Results and Discussion

The results of the treated water samples were compared with raw water samples along with World Health Organization Standard. Total Dissolved Solids (TDS), Conductivity, Temperature,

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and pH of raw and treated water samples were determined. Turbidity and Total suspended solids were also determined. According to Eilert (1978), the seeds of *Moringa oleifera* Lam.contains significant quantities of low molecular-weight water soluble protein which carries positive charge when the crushed seeds are added to the raw water, the proteins produce positive charges acting like magnets and attracting the predominantly negatively charged particles.

Aho, I. M. (2014) in his study reported that the coagulative efficiency of using *Moringa oleifera* Lam. seed extract is almost 100%, when compared with alum which is commonly used in conventional water treatment. Our study is in accordance with them as in terms of availability, *Moringa oleifera*Lam. seed or seed powder extract is a better alternative as compared to alum coagulant because it's high cost and non – biodegradability.Raw water treated with *Moringa* seeds for seven days have shown positive results as compared to water treated for fourteen days. In seven days treatment, total hardness, Calcium hardness, Ca ions, Mg ions have been reduced and these values have come to standard range of BIS (Bureau of Indian standard). While pH and Chloride have increased in all samples those treated for seven days and treated for fourteen days.

If we compare these results sample wise then it is observed that sample number 3 which is sample of Tube well collected from residential area of Jalgaon city have shown positive results after treating with *Moringa* seeds and seed powder. The experimental study includes treatment of raw water with *Moringa* seeds and another set of treatment of raw water with *Moringa* seed powder. Both treatments had shown improvement in quality of water. However it is faster in water treated with seed powder which can be observed through values obtained from Table number 2 and 3. Thus from this, we can conclude that use of *Moringa* seed powder as a water purifier is more effective as compared to entire seeds. During this study two experimental sets were laid, one of seven days and another of 14 days. It has been observed that 7 days are quiet enough to purify water using *Moringa* seeds.

Conclusion

From present experimental study following conclusions are drawn.

Moringa oleifera Lam. seed is an effective purifier and coagulant to treat variety of water samples.Use of seed powder is more promising as compared to entire seeds of *Moringa*.The water can be purified effectively using seed powder or seed within one week only.Quantity of

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Moringa seed powder required to purify one litre of raw water is around 30 gms.*Moringa oleifera* Lam. Being medicinal plant not only work as water purifier but also add and improve quality of water as it posseses many phytochemicals that have wide scope in medicines.The present study deals with biological method of water purification thus it is eco-friendly.

References

1) Aho I. M. and Agunwamba J. C. (2014) "Use of water extract of *Moringa Oleifera* seeds (WEMOS) in raw treatment in Makurdi, Nigeria"(*American journal ofEngineering &Reasearch*) vol-3, p.p.50-53.

2) Eilert, U. Antibiotic Principles of seeds of *Moringa oleifera* Lam, Indian Medical Journal 38, (235), 1013-1016.

3) Muhammad RaziqRahimiKooh, Muhammad KhairudDahri, Linda B. L. Lim(2016) "Jack fruit seeds as sustainable adsorbent for the removal of Rhodamine B dye.

4) PrapatPentamwa, Wanwisa Tanta, PornwarinMilomai (2011) "Water treatment by using Lychee, Jackfruit and Rambutan seed coagulant seed coagulant"

5) Robert NATUMANYA and James OKOT-OKUMU(2015) "Evaluating coagulant activity of locally available *Syzygium cumin, Artocarpousheterophyllus,* and *Moringa oleifera* for treatment of community drinking water, Uganda.

6) Sushruta Samhita. 7th revised ed. Banaras: ChaukhambaOrientalia;2002.

7) WHO :Water series. Geneva:AITBS publisher; 2002.

8) Zurina Zainal Abidin, N Ismail, RobiahYunus, I.S.Ahmad (2011) "preliminary study on *Jatropacurcus*as coagulant in waste water treatment.