

Treatments of Water Pollutants of Agyara Dam (Hans Sarowar Dam), at Matsya Industrial Area, Alwar by Moringa Oleifera Seeds (Adsorption Medias)

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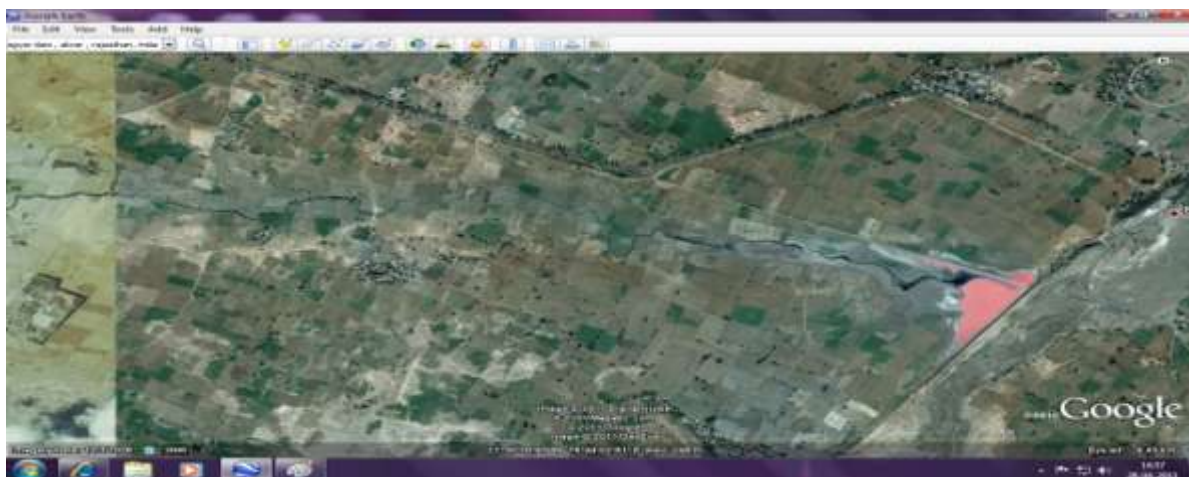
Abstract: *In this paper, author discuss the present study deals with the water quality of Agyara Dam, which is assessed by examine various physio-chemical parameters of polluted water of this Dam. The study reveal that the water quality of Agyara Dam has contaminated due to discharge of untreated or partially treated effluents generated from the industries located at Matsya Industrial Area, Alwar. The colour of water of Agyara Dam is converting from Muddy to Pink. It may be possible that colour might have changed due to some microbial or bio-chemical reactions.*

Keywords: Agyara Dam, Water pollution, Moringa oleifera seeds, Microfiltration, Natural coagulant

1. Introduction

At present time, it is a burning issue to study the water quality of Agyara Dam because the colour of this Dam has changed to light pink. The industrial and domestic effluents generated from the industries located at Matsya Industrial Area and then flow through kachcha drain for about 5 km, which ultimately take path into Agyara Dam. So due to the

continuous discharge of contaminated waste water from the industries and factories of MIA region, the water quality of Agyara Dam has deteriorated at large scale. All the industrial effluents are discharge into this water body and due to which the water of the Dam is being polluted and the people in this area face acute problem.



Satellite Image of Agyara Dam at Matsya Industrial Area, Alwar

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The author will try to treat the polluted water of Agyara Dam by various adsorption medias like Moringa Oleifera Seeds. It has been known for some time that seeds can also be used to purify polluted water through adsorption process. Seeds could provide a low cost water purification system for developing nations. In general seeds are powdered, mixed with polluted water and act as adsorbent for the removal of the pollutants present in it.

2. Experiment

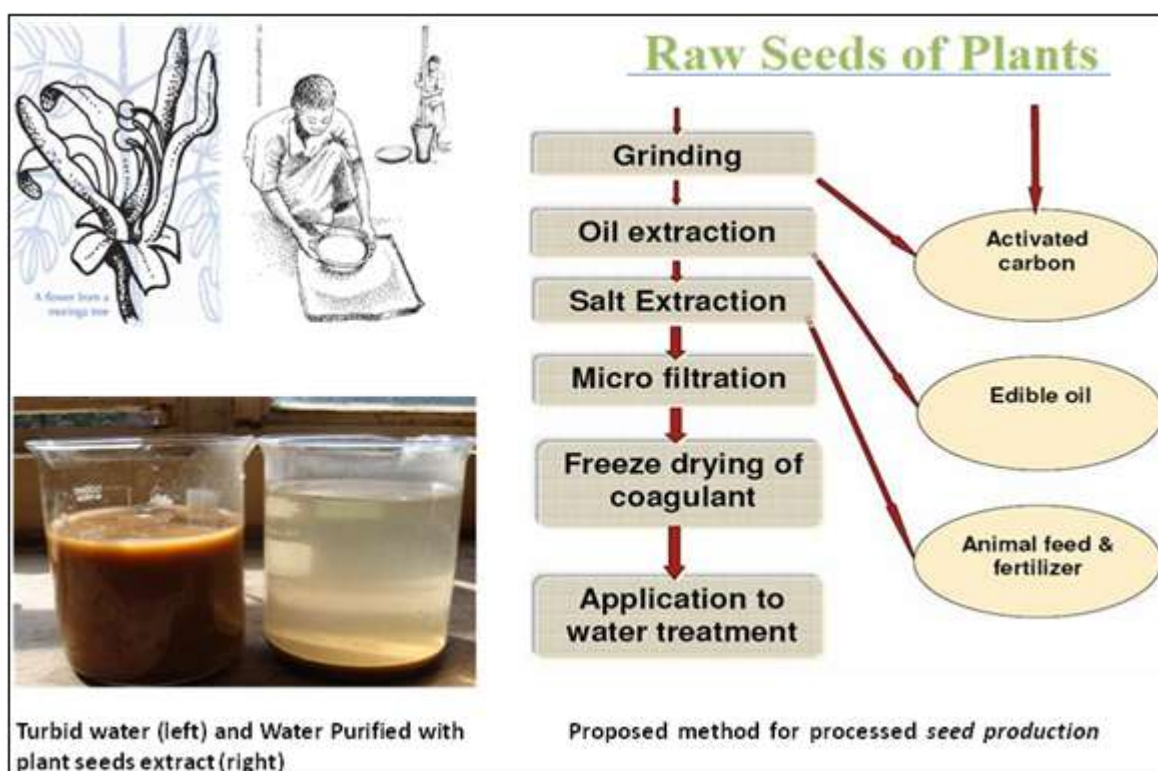
This paper presents the production methodology of natural coagulant from *Moringa oleifera* seeds. It is produced by cost effective technique (oil extraction, salt extraction, and microfiltration through 0.2 µm). The turbidity removal was 94.82% by adding a dosage of 0.8 mg/L of processed *Moringa oleifera* seeds to Agyara Dam water.

Seeds of the *Moringa oleifera* tree are cheaply available. Water will require different amounts of *M. oleifera* powder to purify it, depending on the impurities present. Around 50-150 mg of ground seeds treat one litre of water. Powder from one seed will be sufficient for one litre of very turbid or two litres of slightly turbid water. Experimenting with small amounts of water in a jar will help work out the correct amount of powder and the optimal stirring times. Compare the water quality achieved with *M. oleifera* seeds to that achieved with other different water purification method.

- 1) Remove the seeds from the dried pods, if still present, and shell them, leaving a whitish kernel. Discard any kernels with dark spots or other signs of damage.
- 2) Crush the seed kernels to a fine powder and sieve them (0.8 mm mesh or similar).
- 3) Add the powder (approximately 2 gm) to one cup of clean water, pour into a bottle and shake for 5 minutes.
- 4) Filter the mixture through a clean cloth into a bucket of dirty water that is to be treated.
- 5) Stir the water quickly for 2 minutes and slowly for 10-15 minutes (do not use metal implements, since this may re-introduce unwanted metal ions removed by *M. oleifera*). During the slow mixing, the fine particles and bacteria will begin to clump together and sink and settle to the bottom of the bucket.
- 6) Cover the bucket and leave it undisturbed until the water becomes clear and the impurities have sunk to the bottom. This may take up to an hour.
- 7) The clean water may be siphoned or poured off the top of the bucket or filtered through a clean cloth. The process removes at least 90% of the bacteria and other impurities that cause turbidity.

This process actually involves hydration of seed followed by chemisorption. Chemisorption is a non reversible process in which diffusion occurs first followed by bond formations (chemical reactions). Hence it is very suitable for the removal of pollutants from water bodies.

3. Process





Determination of Optimum Dosage using Jar Test Machine:

A stock solution was prepared by weighing one gram (1gm) of the seed powder of *Moringa Oleifera* and transferring same quantitatively into a 1000ml flask, made up to the mark with distilled water and shaken vigorously for 10-15mins. Five different clean beakers labeled A to E were placed on a working desk, a dose of 60, 90,120,150 and180mg of the stock solution were measured and transferred into the flasks respectively. Each beaker was made up to 1000ml with the water sample collected and placed under the stirring paddles, the jar test mixer was turned on and a flash fast mixing was done for 1minute at a speed of 120 rpm, followed by slow mixing for 15 minutes at 30 rpm. The jar test mixer was turned off and the optimum dosage of the sample that started flocculating and settling first among the labeled samples A to E was recorded under 30 minutes. The coagulation took place and the flocculants settle at the bottom leaving the transparent medium at the top due to the presence of a water-soluble cationic coagulant. The transparent medium of the most optimally purified water at 90mg/L dosage was transferred into a plastic container for further analysis.

Determination of Some Physiochemical Parameters:

Turbidity: This test was determined by Nephelometric method using Naphla – HACH 2100N turbidity meter, before and after treatment of the water sample.

pH: The test was carried out using pH meter model 400.

Conductivity: The test was determined using conductivity meter.

Dissolve Oxygen (Do): 200ml of water sample was measured and transferred into a bottle, covered and incubated in the dark at a temperature of 27°C for a period of three days, and then the sample was removed and read in order to get the difference between the Dissolved Oxygen concentration in the sample before and after the incubation period.

Hardness: 50ml of water sample was measured and transferred into a beaker, two drops of Erodinine black

indicator was added and the colour changed to wine red. A standardized Ethylene Diamine Tetra Acetic acid (EDTA) was run into the sample until the sample changed to blue which indicated the endpoint. Total hardness CaCO₃ in mg/L was calculated from the hardness obtained from the relation.

Determination of Some Heavy Metals: Both the most optimally purified water sample of 90mg/L dosage and the untreated raw water sample were digested using the standard method of Association of Official Analytical Chemistry (AOAC) for further analysis of some metals (Mn, Zn, Ni and Fe) using Atomic Absorption Spectrophotometer (AAS).

4. Result and Discussion

The results of this research work showed that the processed *Moringa oleifera* seed is a natural coagulant of high efficiency, it was possible to treat water with low initial turbidity. The processed *Moringa oleifera* seed was added to water sample and residual turbidity was measured. In the same time, other test were carried out to compare between the use of aluminium sulphate (the most common coagulant), and the natural coagulant (processed *Moringa oleifera* seeds).

Seeds of *Moringa oleifera* is highly recommended for purification of contaminated turbid/domestic water/polluted waste water. It reduces the number of suspended particles, the quantity of microorganisms, organic matter, toxic metals and water born deceases. The harvest of a mature single tree (3 Kg) will treat about 30000 liters of water. Polluted water is cleaned and usable for domestic/agriculture purposes but not completely purified. *Moringa* does not guarantee that the polluted water ends up completely (100%) free of pathogenic germs and other toxic metals.

5. Conclusion

Some of the metals analyzed were within the World Health Organization (WHO) maximum permissible limit and some were not detected. The quality and accessibility of drinking water are of paramount importance to human health. Drinking water may contain disease-causing agents and toxic chemicals and to control the risks to public health, systematic water quality control and monitoring are required. This research revealed that *Moringa Oleifera* seeds has the potential of being an alternative or a supplement to aluminium sulphate or other proprietary polyelectrolytes and can save cost. The advantage of *moringa oleifera* seed over the conventional chemical coagulants is that it is an environmentally safe method of water purification. Therefore more research work needs to be done on the optimum dosage determination, elemental determination and some physiochemical parameters that give water potability for drinking/irrigation purposes. This will go a long way in improving the quality of drinking water in the rural areas.

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