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Tests on Clearing Nut as a Natural Filter for Bore Well Water

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Abstract

One of the major sources is water which is essential for the environment, human beings, plants and animals. At present, in this study, in order to modify the test result with pH, Total hardness, Calcium hardness, Turbidity, TDS, Chloride, Sulphate and Nitrate for the bore well water with the help of filter unit which contains clearing nut, camel grass, fenugreek, black pepper, cumin seeds, cotton, sand, aggregate are set up with 5 inch PVC pipe with the height of 5 feet. The initial tests of bore water for pH, Total hardness, Calcium hardness, Turbidity, TDS, Chloride, Sulphate and Nitrate have done and from this experimental set up, the results were carried out for pH, Total hardness, Calcium hardness, Turbidity, TDS, Chloride, Sulphate and Nitrate. In this study, bore water efficiency and purity of water were increased with the help of these clearing nuts as a natural filter media.

Keywords*: Cotton, Cumin Seed, PVC Pipe, Clearing Nut, Fenugreek, Black Pepper*

INTRODUCTION

A safe and easy-to-access water supply is critical for both human health and society. Various water purification technology solutions are being introduced. However, in rural regions, modern water purification systems are either ineffective or too expensive. In this condition, rural inhabitants in poor nations prescribe certain low-cost strategies that are appropriate for their particular situation. This conventional water purification system can serve a small town or a single family.

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In this regard, an experimental research on clearing nut as natural filter medium is highly valuable to all households in purifying water and using it for drinking.

CHARACTERISTICS OF BORE WELL WATER

Borewater

Bore water is the primary source of drinking water and other uses in certain rural communities. The bore water sample was taken in the Tirupur area, where the ground water table was previously impacted by dyeing waste. The dyeing waste's influence is still being felt in the bore water. As a result, it cannot be consumed directly without treatment.

The pH of the water is higher in ground water, and chemical elements that are harmful to human health can be detected in collected water. The collected ground water contains living components such as microorganisms.

The initial tests are performed to determine the properties of the collected ground water, which are shown below [Table 1].

Initial test

Table 1:-Initial test results of bore water

S. No	Parameter	Units	Values
1.	pH	-	7.71
2.	TDS	mg/l	1000
3.	Turbidity	NTU	8.9
4.	Chloride	mg/l	400
5.	Calcium	mg/l	172
6.	Total	mg/l	475
7.	Nitrate	mg/l	12.12
8.	Sulphate	mg/l	128.5

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MATERIAL AND METHODOLOGY

Clearing nut, camel grass, fenugreek, black pepper, cumin seeds, cotton, sand, aggregate, and PVC pipe with a diameter of 5 inches and a height of 5 feet are the materials employed in this study. The supplies are obtained from a neighbouring Traditional herbal shop.

Clearing Nut

Clearing nut is so named because it immediately clears water. It is commonly used for eye care and water purification. Icajine, strychnine, brucine, mannogalactan, oleanic acid, and its glycoside are all found in the nut. This content aids in the separation of dirt from water and allows dirt to settle on the subsequent cotton layer. (Fig.1)



Fig.1:-Clearing nut

Camel Grass

Camel grass is used to minimise heavy metal toxicity. It also decreases the bacterium that spreads sickness. It is more effective on sewage water and water contaminated by pollution. (Fig.2)



Fig.2:-Camel grass

Black Pepper

Pepper contains the piperine. It gives taste and smell to pepper. It contains antioxidant. It also contains anticancer and antitumor activity. The pepper is used in this treatment to reduce the disease causing elements. (Fig. 3)



Fig.3:-Black pepper

Cumin Seeds

The cumin seeds contain cuminaldehyde, cymene and terpenoids. These components are used to reduce the body heat. It is used in this filter media for the same purpose. The cumin seed increase the iron content, Vitamin B, Vitamin E, magnesium and manganese content. (Fig.4)

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Fenugreek

Fenugreek is used to reduce body heat. It contains the nutrients which are essential to body. It contains high magnesium content. It is used to tackle issues like water retention. (Fig.5).



Fig.6:-Cumin seeds

Table 2:-Name of the ingredients

S.No	Name of the	Botanical name
1.	Clearing nut	Strychnos
2.	Camel grass	Cymbopogon
3.	Black pepper	Piper nigram
4.	Fenugreek	Trigonella foenum-
5.	Cumin seeds	Cuminum cyminum
6.	Cotton	Gossypium arboretum

PREPARING OF NATURAL PRODUCTS

Cumin seeds, fenugreek, black pepper, clearing nut and camel grass are dried in sunlight for three days. Then 30g of cumin seeds, 30g of fenugreek and 20g of black pepper are shredded and powdered separately and then mixed in a beaker. In addition, 10g of clearing nuts are mixed with these natural products.

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EXPERIMENTAL SETUP

A PVC pipe with 5” diameter and 4’3.9” height is placed in the experimental setup. Inlet pipe is connected with the tank with bore well water. 2.5” freeboard is provided in the top portion of the pipe. Aggregate layer, mixed ingredients, camel grass and another aggregate layer are provided for the depth of 1”, 1.5”, 2.5” and 3” respectively. Then the river sand is compacted and provided for 2’3” depth. Again, the aggregate layer is provided for 3” depth. Cotton and cotton clothes are provided for 0.5” thickness between each layer. The freeboard of 8” is provided at the bottom. The outlet pipe is connected with the top of the collecting tank. The experiment set up is shown in fig.7 and fig.8.

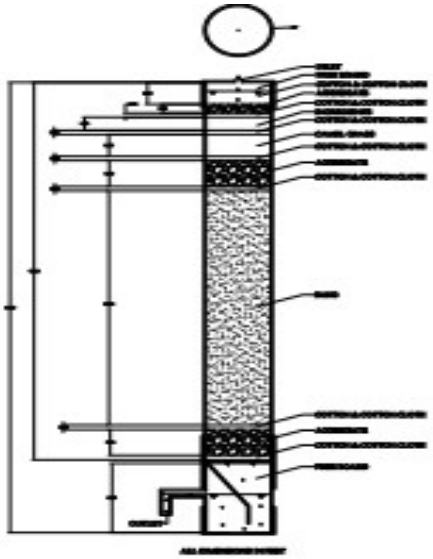




Fig.7:-Layout of Experimental Setup ***Fig.8:-Experimental Setup***

RESULT AND DISCUSSION

Table 3:-Comparison result on bore well water and filter water

S. No	Parameters	Initial values	Filtered water with natural filter media values	Desirable limits	Permissible limits
1	pH	7.71	7.66	6.5-8.5	-
2	TDS	1000 mg/l	500 mg/l	500 mg/l	2000 mg/l
3	Turbidity	10.9 NTU	4.5 NTU	5 NTU	10 NTU

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4	Chloride	400 mg/l	260 mg/l	250 mg/l	1000 mg/l
5	Calcium	172 mg/l	400 mg/l	200 mg/l	600 mg/l
6	Total Hardness	475 mg/l	350 mg/l	300 mg/l	600 mg/l
7	Nitrate	12.12 mg/l	5.78 mg/l	45 mg/l	-
8	Sulphate	128.5 mg/l	101.8 mg/l	200 mg/l	400 mg/l

The desirable limit is the point at which water cannot be utilised for drinking or other purposes. However, if there is no alternative source, this limitation may be tolerated. The permissible limit is the limit beyond which water cannot be utilised even if no alternative sources are available.

CONCLUSION

In this experimental study, it was concluded that rural people have adopted simple treatment techniques of clearing nut as filter media, with the main goal of filtering out the impurities present in the water collected from underground sources, with low cost treatment, and which is used for drinking. When compared to other treatment procedures, this cleaning nut approach is ideal for filtering water in rural communities across the world.

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