Qualitative Analysis of Water and Traditional Water Treatment using different Seeds and Root

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Abstract

Water is the driving force of all nature and essential to lead a healthy life style. The level of purity of water being consumed is directly related with health. Now a day, modern purification method is used by inorganic chemicals like, ferric chloride, aluminum chloride. Being using this method reduces mineral content and neuro toxic in nature. Instead of that, there is alternate method to purify the water which is traditional water purification. Numerous traditional water purification technique was found to purify the water among those technique using the biological materials like seeds, roots, and bark was the one which ultimately used to purify the water for better consumption On the account of this, the technique of traditional water purification was done using the bio purifiers like, *Strychnos potatorum*, *Semecarpus anacardium*, *Chrysopogon zizanioides*, *Moringa oleifera* were used to enhance the quality of water for the consumption. These samples were underwent several test like pH
, TDS, Electrical conductivity, Total hardness, chloride test. Among these plant samples, *Moringa oleifera* seeds showed best result in purifying the water. So, it is a better method for safe drinking which enriched with essential mineral compounds.

Key Words: **Water purification, Drinking water, seeds, Root.**

1. INTRODUCTION

The rural population of India comprises more than 700 million people residing in about 1.42 million habitations spread over 15 diverse ecological regions. It is true that providing drinking water to such a large population is an enormous challenge. Our country is also characterized by non- uniformity in level of awareness, socio-economic development, education, poverty, practices and rituals which add to the complexity of providing water. The resulting economic burden is estimated at $600 million a year. The problems of chemical contamination are also prevalent in India with 1,95,813 habitations in the country are affected by poor water quality. A study report from UNICEF (2005) showed that improvement in community water supply increased the primary school attendance. We are in need of a procedure, which can purify water at house to safeguard health and increase the contribution of all to the development of a nation. A major task in front of authorities in developing and underdeveloped countries is providing drinking water to their people. In many countries like India, villages are geographically apart and inhabitants may have to walk kilometers to fetch water. On such situation, supplying clean drinking water remains a major problem. However, the purity of drinking water from this process alone is not sufficient. WHO (2002) recognized the difficulty in purifying and supplying water especially to a small group of people who are geographically away from the main stream of land. Recognizing an economic and easily accessible system for improving water quality remains as essential for a community especially when it is isolated from mainland. UN and UNICEF (2005) promote household water treatment and safe storage. Some places community may have their own simple purification method. If such traditional knowledge made available will be useful to others in own country as well as in other countries.

2. MATERIALS AND METHODS

Collection of samples

Samples of water were collected from different locality of the city Tiruchirappalli. The bore water samples were collected from different places such as Thiruverumbur, Ramalinganagar, Nachikuruchi, Thogaimalai, and also in Bishop Heber College campus. Packaged drinking water, RO water and River Cauvery's water were taken into consideration.

Physico chemical tests

The collected water samples undergone different analysis like pH, TDS, Electrical conductivity, Total hardness to identify the various parameters listed.

pH Meter

A pH was measured by Digital pH meter (Hanna Digital pH/Conductivity/TDS Meter, HI98129). It is an instrument used to measure acidity or alkalinity of a solution

TDS

TDS were estimated by TDS meter, it indicates the total dissolved solids (TDS) of a solution. Total dissolved solid was derived from the difference between the total solids and the total suspended solids present in the water samples.

Electrical conductivity

The EC was measured using a conductivity meter calibrated with a potassium chloride solution. EC is directly related to the concentration of ions present in the water.

Total Hardness

Total Hardness was calculated by EDTA Titrimetric Method (APHA, 1998). Hardness is generally due to Calcium and Magnesium ions present in the water. For determination of Total hardness, in Fifty ml of the water sample 0.5 ml of buffer (EDTA) and a pinch of indicator Erichrome Black T were added. It was immediately titrated against a standard EDTA solution with continuous shaking until the color changed from wine red to blue. This was taken as the endpoint.

Total hardness (CaCo3) = 1000 ×V2
-------- V1

Where,

V1: volume of the EDTA solution ml

V2: volume of sample taken in ml

Magnesium (Mg)

EDTA titration method was followed to determine the magnesium content in sample. In fifty ml of sample 1 ml of ammonia buffer solution and 4-5 drops of a Eriochrome black-T indicator were added. It was titrated against EDTA solution until the wine - red color of solution turned blue (endpoint).

Magnesium, mg/l= Y-X ×400.8
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ml of sample×1.645

Where, X = EDTA used for Ca determination for the same volume of the sample Y= EDTA used for hardness (Ca + Mg)

Chloride (Cl-)

For estimation of Chloride, Argentometric titremetric method was followed (APHA, 1998)

In ten ml of sample 1-2drops of potassium chromateK2CrO4 indicator was added. The sample became yellow. It was titrated against silver nitrate solution until a persistent brick red color appeared (end point). The following formula used to calculate mg. of Cl-/l is as follows,

$$\text{mg of Cl/L} = \frac{\text{C. B. R.} \times \text{N} \times 35.45 \times 1000}{\text{Amount of sample taken (ml)}}$$

Where,
C.B.R. = Constant Burette reading (Amount of titrant used). N = Normality of Silver Nitrate.
35.45 = Equivalent weight of Chloride.

Traditional method of waterpurifying:

In the present work we have used the following three seeds and one root (Figure) to purify the water samples based on their traditional uses and local availability.
*Strychnos potatorum (*ClearingNut); *Semecarpus anacardium (*MarkingNut);
*Chrysopogon zizanioides (*Vettiver); *Moringa oleifera (*Drumstick).

150ml of water samples (Tiruverumbur and Nachikurichi) were taken in five individual beakers, in that we added three seeds *(Semecarpus anacardium*, *Strychnos potatorum, Moringa oleifera)* and equal amount of root *(Chrysopogon zizanioides*) for the water purification. After two hours we did the physio chemical parameter tests.

Figure: Seeds and root used as Bio-purifier

4. Results and Discussion

Physico – chemical parameters of water samples:

The results of physio chemical analyses of bore water samples collected from the different location in Tiruchirappalli were presented in the table1.The samples undergone several parameters tests and it differs in their parameters ranges from samples to samples. The pH of the eight samples differs from the range 7.3 to 8.5. Electrical conductivity differs from 49 to 2027 µS/cm. The Total dissolved solids content in the different sampleswererangesfrom30to1250mg/l. The total hardness of the eight samples varies from 35 to 955 mg/l. In that total hardness the calcium content of the samples varies from 20 to 775 mg/l and magnesium content varies from 15 to 180 mg/l. The presence of chloride content varies from 4.2 to 350mg/l. According to the tests, Sample - 1 & Sample – 4 (Tiruverumbur & Nachikurichi) were beyond the normal Indian standard of specification for drinking water limit (Table. 1). So, we have chosen these two samples for our further treatment studies.

After treated with the four seeds the pH of the Tiruverumbur bore water (Table. 2) differs from 7.2 to7.8.thetotaldissolvedsaltsdifferfromvalueof742to790mg/l.Electricalconductivityvaries from1415to1504µS/cm.Totalhardnessdiffersfromthevalueof442to490mg/l.Inthatcalcium hardness differs from 326 to 358 mg/l and the magnesium hardness differs from the values of116 to 132 mg/l. chloride content varies from 305 to 320mg/l.

After treated with the four seeds the pH of the Nachikurichi bore water (Table. 3) differs from to 7.5. The total dissolved salts differ from value of 435 to 485 mg/l. Electrical conductivity varies from 960 to 985 µS/cm. Total hardness differs from the value of 375 to 420 mg/l. In that calcium hardness differs from 475 to 304 mg/l and the magnesium hardness differs from the values of 100 to 116 mg/l. chloride content varies from 204 to 222mg/l.

Indian standard specifications for drinking water is: 10500:2012

S.NO	PARAMETERS	DESIRABLE UNIT
1.	pH	6.5 to 8.5
2.	EC	500 to 1500
3.	TDS	500 to 1000 mg /l
4.	TH	300 to 500 mg / l
5.	Ca content	150 to 200 mg / l
6.	Mg content	100 to 150 mg / l
7.	Chloride	200 to 250 mg / l

TABLE 1: Physico chemical parameters of water sample

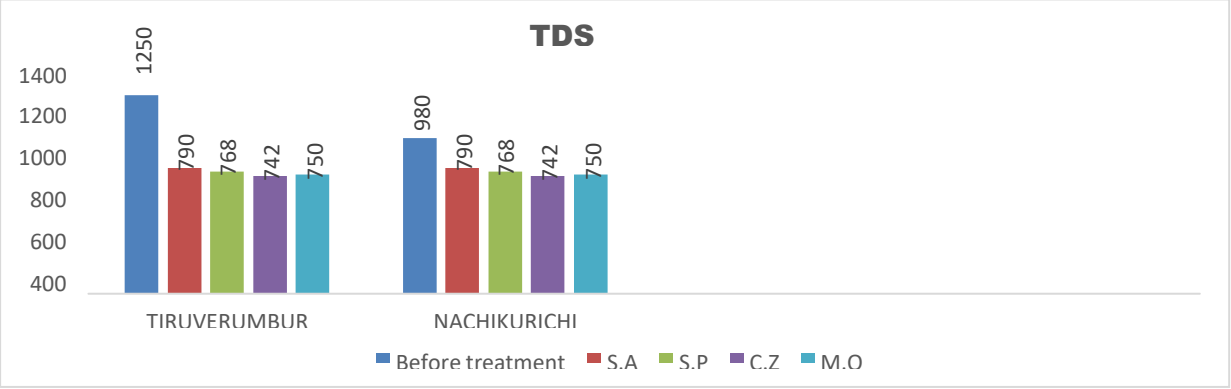
S.No	SAMPLES	pH	TDS Mg/l	EC µS/cm	Total Hardness mg /l		Chloride Mg/l
					Ca	Mg	
1.	**Tiruverumbur Bore water**	**7.6**	**1250**	**2027**	**955**	**775** / **180**	**350**
2.	Ramalinganagar Bore water	8.2	410	706	455	353 / 102	93
3.	Viralimalai Bore water	8.3	920	1593	840	685 / 155	210
4.	**Nachikurichi Bore water**	**7.8**	**980**	**1626**	**805**	**663** / **142**	**255**
5.	BHC Campus water	8.2	410	692	380	295 / 85	80
6.	RO water	6.8	30	49	35	20 / 15	4.2
7.	Packaged drinking water	6.7	92	150	70	46 / 24	11
8.	River water	7.3	450	684	320	246 / 74	74

TABLE: 2Physico chemical parameters of Tiruverumbur water sample after treated with seeds and root

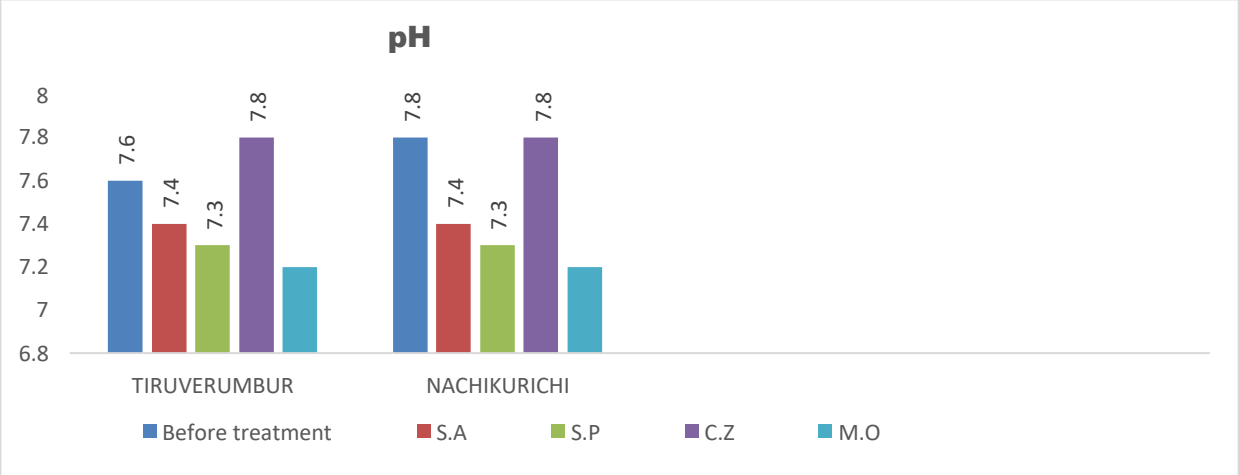
S.No	SEEDS AND ROOT	pH	TDS Mg/l	EC µS/cm	Total Hardness mg/l		Chloride mg/l
					Ca	Mg	
1.	*Semecarpus anacardium*	7.4	790	1504	455		
					335	120	316
2.	*Strychnos potatorum*	7.3	768	1468	442		
					326	116	305
3.	*Chrysopogon zizaniodies*	7.8	742	1415	490		
					358	132	320
4.	*Moringa oelifera*	7.2	750	1432	462		
					334	128	308

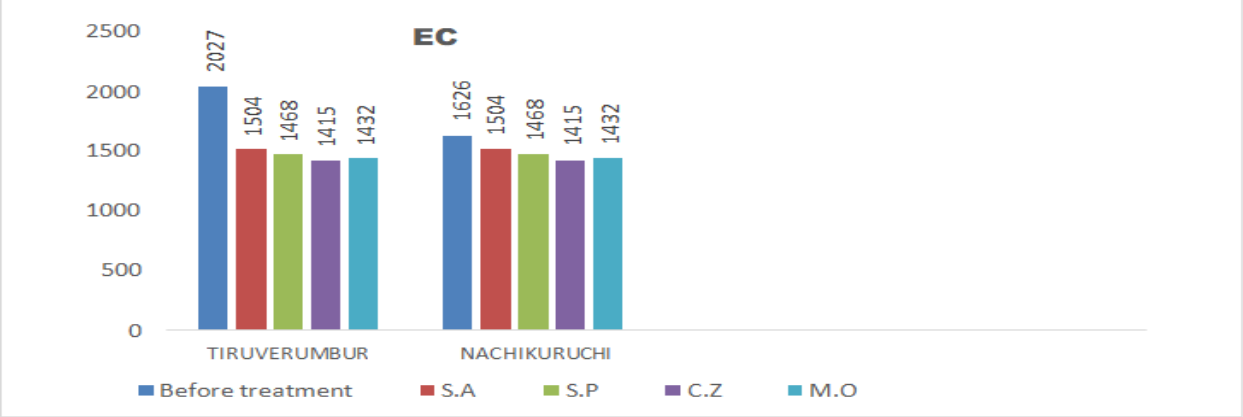
TABLE 3: Physico Chemical Parameters of Nachikurichi WaterSample after treated with Seeds & root

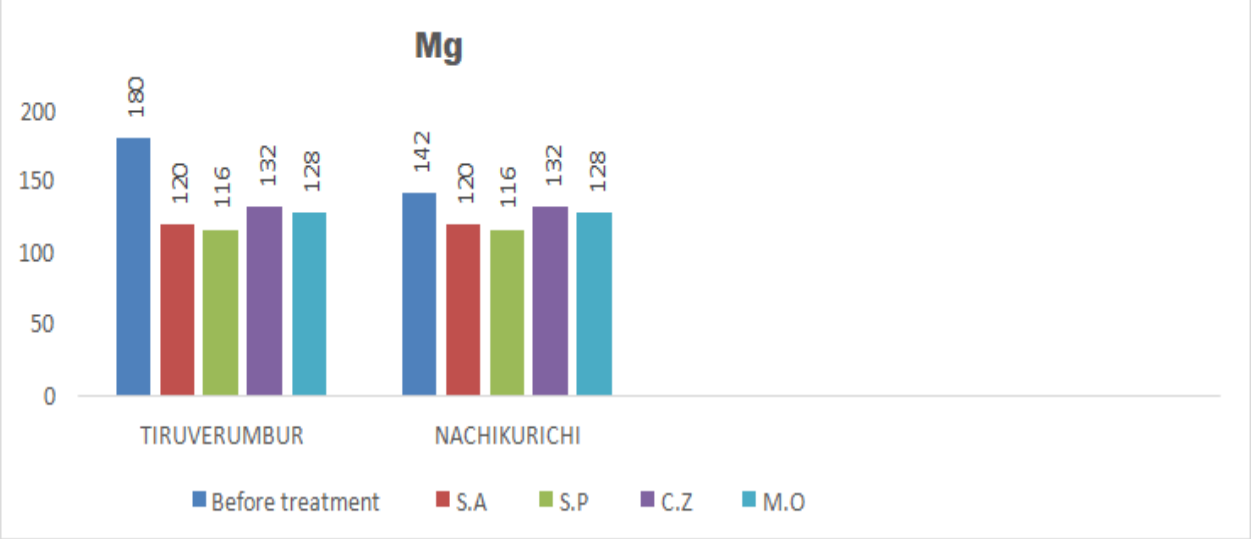
S.No	SEEDS AND ROOT	pH	TDS mg/l	EC µS/cm	Total Hardness mg/l		Chloride mg/l
					Ca	Mg	
1.	*Semecarpus anacardium*	7.4	485	985	388		
					286	102	215
2.	*Strychnos potatorum*	7.1	280	485	375		
					275	100	204
3.	*Chrysopogon zizaniodies*	7.8	255	436	420		
					304	116	222
4.	*Moringa oleifera*	7	260	439	392		
					284	108	208

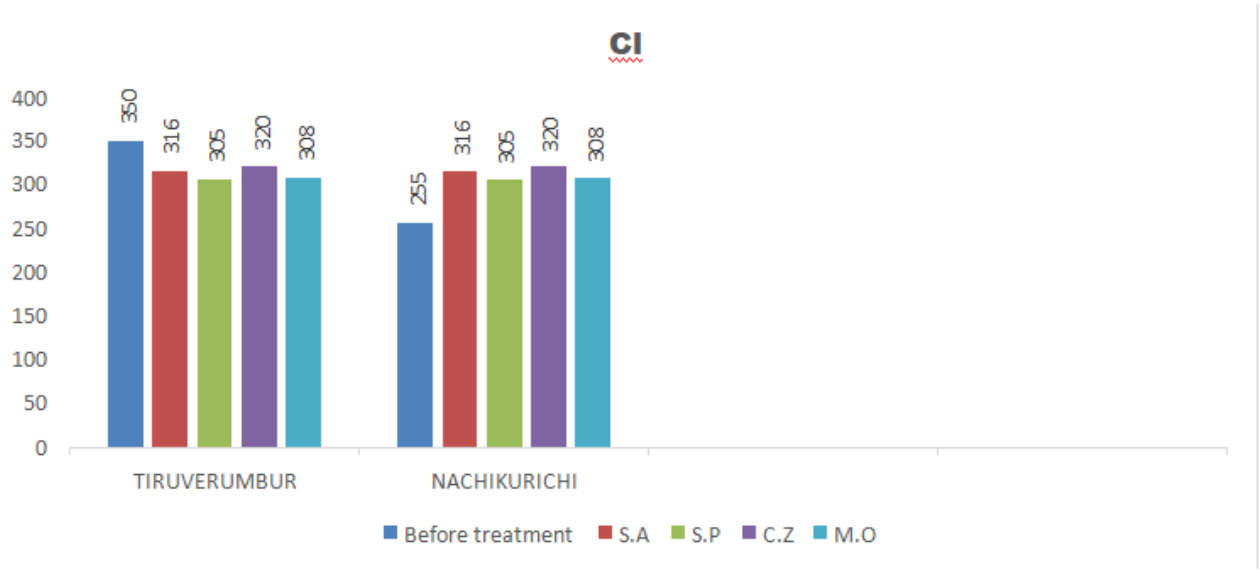


Graphical comparative value for before and after treatment of water









Conclusion:

Though numerous technologies have come up to purify water, majority of population in developing countries, finds it difficult to use them. In such circumstance's simple techniques with low level of mechanization can be applied. Functionally significant, these simple techniques have been utilized in many parts of the world to obtain safe drinking water. In Tiruchirappalli various location of water samples were taken for the different physio chemical test in that two samples were proven low quality. So that two samples were taken for the traditional method of water purification using three different seeds and one root. *Moringa oleifera* seeds purify the water sample better than another seeds & root.

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