

Clarification and Disinfection of Water Using Natural Herbs (Neem and Tulasi) *Azadirachta Indica* and *Ocimum Sanctum*

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ABSTRACT

Rural populace in India acquires their water supply from unprotected sources, for example, open wells, streams, lakes and waterways which are frequently contaminated. Because of practical and political limitations, the arrangement of channeled water is not achievable. This conditions leaves millions without access to safe drinking water. There are different techniques accessible for purifying drinking water yet not monetarily plausible for destitute individuals. Interval arrangements are obviously required. *Ocimum sanctum* (Tulsi) and *Azadirachta indica* (Neem) are natural plants which have antimicrobial movement against a significant number of the microorganisms usually found in water sources making sicknesses individuals. The motivation behind this task is to give data on unit water treatment utilizing characteristic herbs like *Azadirachta indica* and *Ocimum sanctum* in country zones. Suspended matter in crude water is uprooted by different strategies to give a water suitable to drinking. This study manages the coagulation, flocculation, sedimentation and cleansing methodology utilizing neem and tulasi seed as an eco-accommodating characteristic coagulant and disinfectant water. Common herbs like neem and tulasi seed powder is utilized to illuminate and sterilize the water. This strategy is useful for treating turbid water in lakes and lakes in country territories which is in the scope of 0-40NTU viably and productively.

KEY WORDS: Clarification, Disinfection, Turbidity, Water Treatment, *Azadirachta indica*, *Ocimum sanctum*.

1. INTRODUCTION

Water is the characteristic asset needed for the survival of living things, step by step the populace development is expanding which makes the increment in the interest of compact water. Because of open aloofness and uncalled for administration of water sources the sullyng of water is expanding. The degree contamination of water relies on the thick populace of the microorganisms which shift in blustery, winter and summer seasons. So the consumable water must be free from contaminants. The unprotected water sources get contaminated from surface spillover consequently it needs treatment. The normal techniques for water medicines are coagulation, sedimentation, filtration and sterilization.

Clarification: Suspended matter in crude water supplies is uprooted by different systems to give a water suitable to household purposes. The suspended matter evacuation is by and large fulfilled by coagulation, flocculation, and settlement. The combination of these three methods is alluded to as illumination. Coagulation is the methodology of destabilization by charge balance. Once killed, particles no more repulse one another and can be united. Coagulation is essential for the evacuation of the colloidal-sized suspended matter.

Disinfection the cleansing of water gives a level of assurance from contact with pathogenic creatures including those creating cholera, polio, typhoid, hepatitis and various other bacterial, viral and parasitic infections. Sterilization is a procedure where a noteworthy rate of pathogenic life forms are murdered or controlled. As an individual pathogenic life form can be hard to discover in a huge volume of Disinfection is typically the last stage in the water treatment prepare with a specific end goal to cutoff the impacts of natural material, suspended solids and different contaminants.

Routine illumination is excessively immoderate and it can't be completed in all the spots. The basic disinfectant utilized is chlorine and it has numerous detriments that gives the danger of getting malignancy. In this way, we are leading the investigation to clear up and purify the water utilizing common herbs i.e., Neem (*Azadirachta indica*) and Tulasi (*Ocimum sanctum*).

2. MATERIALS AND METHODS

Sampling systems: A purposive inspecting method was utilized as a part of gathering specimen water from the Sipcot Lake found close to Rangapuram VLR DT region. Autoclaved Sample jugs were utilized to gather tests for physical, substance and organic parameters.

Plant materials: Adult seeds of *Ocimum sanctum* and *Azadirachta indica* were gathered. The seeds were powdered utilizing a blender. The seed powder is then sieved to acquire a fine powder on a sifter of 1 mm lattice size. The finely sieved seed powder is blended with clean water to make a glue and is then weakened to the obliged focus. Insoluble material is separated out utilizing required setup.

Water quality parameters: The estimations of water quality parameters are essential for the water treatment process. Here likewise all physical, chemical & organic parameters are checked prior and then afterward treatment process.

Clarification: Water treatment was done utilizing Batch test. Required amount of example water was taken into a receptacle and the introductory turbidity was measured. A certain dosage of coagulant concentrate was included and the receptacle was set into the Jar Test contraption with five different concentration jars. It was settled to hundred rotations/minute for 5 mins. After this, the contraption was settled to 30 rotations/minute for 30 mins. Measuring glasses were then permitted to settle for 1 hr after the Batch test. The ideal measurement is found by perusing the clearest arrangement from the distinctive fixation. At that point, the reasonable arrangement from the treated specimen was taken from the surface in the middle of every container for investigation. For this gathering micro pipette is utilized.

Disinfection: Particular media like Macconkey agar utilized for discovering restraint of bacterial development utilizing these seeds. Supplement agar is additionally utilized for list of bacterial check. The water prior and then afterward treatment is utilized for list. The diminishment in number of provinces was checked. This gives immediate evidence of antibacterial properties of tulasi and neem seeds.



Figure.1. Neem and Tulasi seed power extracts in different proportions.

3. RESULTS AND DISCUSSION

Preliminary Test Results: The raw sample is taken and is tested for various physical and chemical parameters.

Table.1. Preliminary Test Results

	Sample 1	Sample 2	Sample 3	Sample 4
pH	8.55	8.05	7.65	7.85
EC ($\mu\text{S}/\text{cm}$)	460	450	410	420
TDS (ppm)	295	290	250	270
Turbidity (NTU)	21.66	21.25	22.33	21.56
Hardness (mg/L)	280	260	220	240
Alkalinity (mg/L)	240	220	190	200
BOD (mg/L)	300	280	250	260
DO (mg/L)	6	8	9	7

The Biological tests on the sample gives the following results. We identified the following group of bacteria; *Staphylococcus aureus* (Yellow Pinpoint); *Bacillus* (Spread / Muroid); *Jantheno* (Voilet); *Chromobacteria* (Voilet); *Dugenella* (Voilet); *Streptococcus* (White Pinpoint).

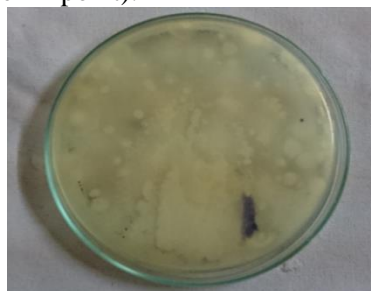


Figure.2. Presence of bacterial organism in fresh sample

At that point the sample is treated with neem and tulasi seed powder separate in distinctive extents and the ideal measurements is found. At first the craved measurements is assessed and measured ground dwelling insect made into an answer. The specimen is taken in cluster test jugs containing distinctive extents of the concentrates and kept in the bunch testing device for testing. At first the specimen experiences quick blending for five minutes and afterward it is taken for standard blending for thirty minutes at the rate of thirty RPM. At that point the specimen is undisturbed to let the particles settle down this may take one hour. At that point the acceptable arrangement is taken for further testing. The elucidation part which incorporates the coagulation, flocculation and sedimentation of particles is done and the result got is as per the following which provides for us the ideal measurement of the specimen.

Table.2. Optimum Dosage

NTU	Tulasi Seed Extract	Neem Seed Extract	Neem & Tulasi Seed Extract
0-10	25mg/l	10mg/l	15mg/l
10-20	35mg/l	15mg/l	22mg/l
20-30	42mg	20mg/l	30mg/l

Table.3. Clarification Test Results

Turbidity (NTU)	Sample 1	Sample 2	Sample 3	Sample 4
Tulasi seed extract	4.66	4.20	4.15	4.50
Neem seed extract	6.75	6.55	6.40	6.72
Neem and Tulasi	5.55	5.50	5.35	5.35

After the clarification of the sample the obtained clear water obtained results in the range of 4-7NTU. Tests on the disinfection part the clear sample is kept in the petri plate with respective agar for 24 hours which results in the following output.



Figure.3. Bacterial growth reduction after treating with tulasi seed extract

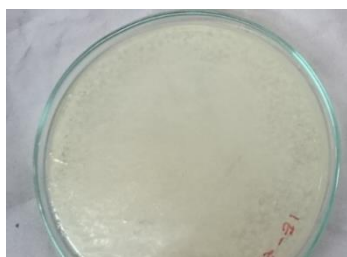


Figure.4. Bacterial growth reduction after treating with tulasi and neem seed extract

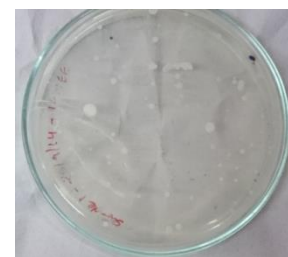


Figure.5. Bacterial growth reduction after treating with neem seed extract

Comparing the fig.2 & fig.3, we can clearly notice the reduction in the growth rate of bacterial organisms. Thus the tulasi seed extract acts as a disinfecting agent.

Comparing the fig.2, fig.3 & fig.4, we can clearly notice the reduction in the growth rate of bacterial organisms. But not greater than the tulasi seed extract.

Comparing the fig.2, fig.3, fig.4 & fig.5, we can clearly notice the reduction in the growth rate of bacterial organisms. But it is greater than the tulasi seed & neem tulasi combined extract.

Table.4. Disinfecting Ability

Material	Disinfecting Ability
Tulasi seed extract	low
Neem seed extract	Better
Neem and Tulasi	Moderate

4. CONCLUSION

The significant populace in our nation is living in provincial territories, where these characteristic herbs are effortlessly accessible. The routine strategy for sanitizing water are financially non doable and likewise individuals are hesitant to utilize chemicals as disinfectants. The compelling antimicrobial action of plants leaf concentrates is because of the synergistic impact of the dynamic segments present in plant takes off. This procedure can be powerful for the water acquire from water sources having low level of sullyng or else water can be given earlier filtration with charcoal or fine sand to lessen the pollution load. It stays to be checked whether daylight investigations can be consolidated with home grown sterilization of water to accomplish complete decimation of enteric microscopic organisms. Both the Neem and Tulasi seed concentrates acts well as elucidating and sanitizing executor, yet at the same time the Neem seed concentrate can perform better as a disinfectant. This strategy can be executed in provincial territories to make utilization of the compelling and efficient system for water treatment to dodge the danger of getting water borne ailments.

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