PILOT STUDY ON REUSE OF SANITARY WATER FROM TIRUPATTUR LAKE (ANANTHENARI LAKE) FOR AGRICULTURE

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Abstract

Water is the most essential compounds of all livings. So far the people suffered a lot due to unsafe water. Objects that are no more useful that is called waste. Waste must be subjected to treatment, especially in rural areas. The people continuously suffered through a series of disease spread over through an improper management of drinking water. The crisis of availability of water and pollution is worsening day by day. In my studies I was treated the sewage water collected from Tirupattur drainage lake by using activated carbon and it was used for the agricultural purposes. Activated carbon has application in areas such as wastewater treatment, water purification, discoloration, and removal of toxic organics, heavy metals ions and recovery of organic and inorganic compounds from gaseous and liquid streams.

Index Terms: Activated carbon, waste water treatment, toxic compounds, heavy metals.

1. Introduction

Vellore district, Tamilnadu, India is highly polluted place due to tannery industries apart from chrome chemicals, refractories, ceramic, and other chemical industries which release heavy metals into the environment (Gowd and Govil, 2008). There are nearly 250 tanneries in and around Vellore district. Vellore district lies between 12^{o} and 13^{o} 15’ of Northern latitude and 78^{o} 20’ and 79^{o} 50’ of Eastern longitude. It slopes from East to West and the land in Eastern part is flat. Vaniyambadi, Ambur, Pernambat, Melvisharam, Ranipet and Tirupattur are municipal towns of Vellore district. As per the government’s estimate, our cities produce near 62,000 mld of sewage out of which only 18,883 mld sewage is treated. Rest of the untreated sewage goes directly to water bodies polluting our water resources. As per the latest world water bank report, 21 percent of communicable diseases in India are related to unsafe water. In India, diarrhoea alone cause more than 1600 death daily. Another critical issue is the increasing levels of pollutants in drinking water making unsafe consumption. According to data by the central pollution control board nearly half of the country’s 445 rivers are polluted for safe consumption without extensive treatment.

The United Nation has ranked India 120th of 122 countries for water quality, estimating that 70 percent of the supply is contaminated with high arsenic levels. The business world release water facts about India are At least 21 Indian cities moving towards zero ground water level by 2020. About 40 percent people in India may not have water to drink by 2030. A study on the quality of drinking water in around Tirupattur has expressed concern at the presence of high levels of total dissolved solids in ground water. The Ananthenari Lake was located near the Salem – Tirupattur main road. It was contaminated by drainage water released from in and around Tirupattur living mankind. Due to this fashion the water could be greenish color

and it was performed has causative agents of some vulnerable disease (Royal and Kumar., 2016). This lake was creating most bad smell due to this reason the people disrupted while across that lake.

Hence the lake water was subjected to treat. The crisis of availability of water and pollution is worsening day by day. In my studies I was treated the sewage water collected from Tirupattur drainage lake by using activated carbon and it was used for the agricultural purposes. The origin of activated carbon (AC) is associated with Ancient Egypt (1500 BC), whereby the Egyptians make use of its adsorbent characteristics for water purifications and medicinal purposes. During the last few years, adsorption of gases on charcoal has been reported by a Swedish chemist, Karl Wilhelm. It finds application in areas such as wastewater treatment, water purification, discoloration, and removal of toxic organics, heavy metals ions and recovery of organic and inorganic compounds from gaseous and liquid streams . The aim of this study is to reuse the drainage water, reduce the water crisis for agriculture.

2. MATERIALS AND METHODS

Chemicals

Activated carbon and all other reagents used were of analytical grade.

2.1 Experimental plant:

We used Fenugreek (*Trigonella foenum graecum)* seeds as an experimental plant. The seeds were purchased from local market and authenticated by institutional botanist.

2.2 Activated Carbon

Take 100 gram of activated carbon for 1000 ml of sanitary water. The activated carbon was purchased by the analytical grade.

2.3 Sanitary Water Collection

The sanitary water sample was collected from the Ananthenari lake Tirupattur. Vellore district, Tamil Nadu, India and it was stored in dark for further experiments.

2.4 PRIMARY TREATMENT

2.4.1 Filtration

The sample was filtered with Whatmann No 1 filter paper.

2.4.2 Secondary treatment (Treatment with activated carbon)

Treatment with activated carbon – the filtered water was treated by using activated carbon. 10 grams of activated carbon was interacting with 100 ml of filtered water collected from the Ananthenari Lake.

2.5 Assay of Microbial population

Microbial population was examined by using spread plate technique. The microbial colony was counted by using microbial colony counter and number of colonies was calculated by using this below formula

Colony forming unit (CFU) /ml = No. of Colonies × Dilution factor /Amount of sample

2.6 Physicochemical characterization studies

The physical parameters were examined by using water quality analyzer. The parameters are pH, Total Dissolved solids (TDS), turbidity, dissolved oxygen (DO) electrical conductivity (EC). The sodium potassium levels are examined by flame photometer.

2.7 Evaluation studies on agriculture

The studies were performed by using Trigonella *Foenum-Graecum* (Fenugreek) plants. The growth was compared between the treated water and untreated water. The germination percentage was calculated.

Germination percentage

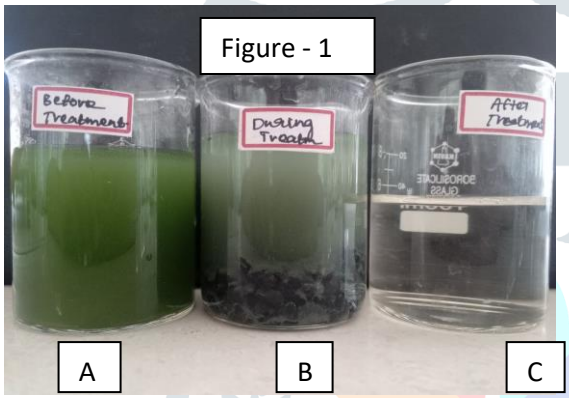
Seed germination = no of seeds germinated / total no of seeds x 100

RESULTS AND DISCUSSION.

Based on the results obtained it was documented that sewage water treatment with activated carbon shown an encouraging and interesting findings.

TREATMENT WITH ACTIVATED CARBON

The filtered sanitary water sample was subjected to activated carbon by soaking activated carbon in water sample for 24 hours. After twenty four hours treatment the water was used for physicochemical characteristics (Table -1).



A- Sanitary water

B- Sanitary water with activated carbon

C- Treated water

3.1 Physical parameters

Table – 1

Parameters	Untreated water	Treated water
Color	Greenish Color	White
p ^{H}	9.0	7.2
TDS	741	623
OD (670 nm)	0.05	0.01
EC (electrical conductivity)	0.06	0.04

ASSAY OF METALS (Na^+ and K^+):

The concentration of sodium and potassium present in water sample collected from sanitary water (Ananthenari Lake) was compare against standard solution (concentration in ppm) of sodium and potassium by using flame photometer.

Table – 2

S.NO	Concentration in ppm	Emission for Na +	Emission of K+
1	20	25	27
2	40	37	43
3	60	55	62
4	80	78	83
5	100	100	100
6	Sample A	108	98
7	Sample B	106	94

The concentration of sodium and potassium ions present in the sanitary water collected from the Ananthenari lake 108 ppm obtained before the treatment (sample A) and it can be reduced up to 70 ppm after treatment (sample B) with activated carbon. Similarly the potassium concentration also reduced after the treatment with activated carbon from 98 ppm to 64 ppm.

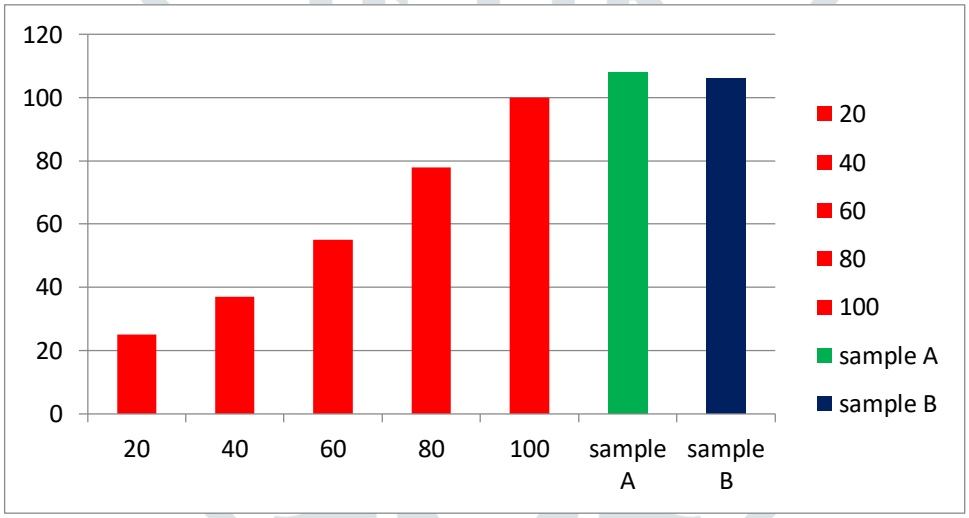


Figure-2

Estimation of Sodium Concentration

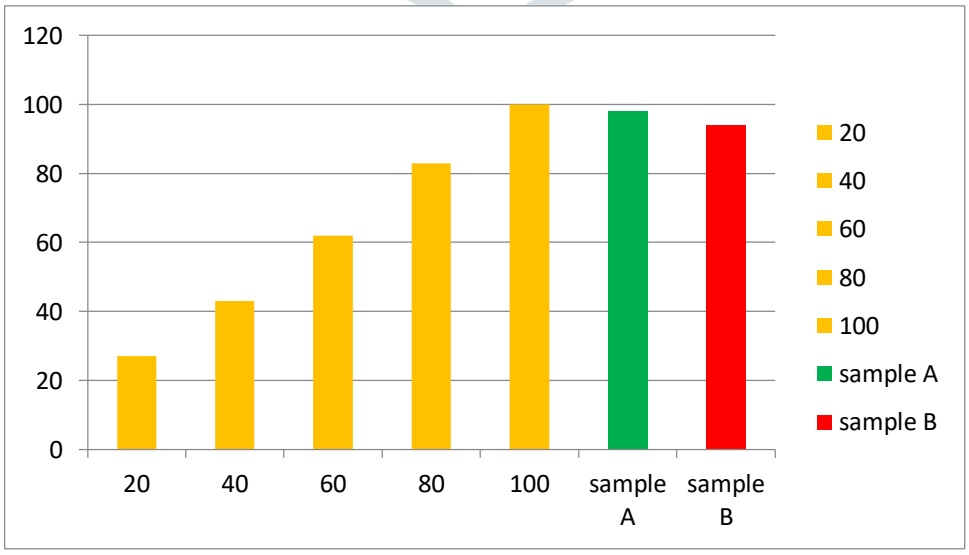


Figure-3

Estimation of Potassium Concentration

3.2 Evaluation studies on agriculture

The study was performed by using *Trigonella Foenum-Graecum* (Fenugreek) plants. In this study was compared between the treated water and the untreated water. The germination percentage was calculated and the plants heights are measured**.**

Figure - 4

Figure - 5

Figure – 4 explained the germination stage of untreated and treated water. Figure -5 explained the growth of the plants.

Germination percentage

$$\text{Seed germination} = \frac{\text{no of seeds germinated}}{\text{Total no of seeds}} \times 100$$

Table – 3

S.No	Water	Total number of seeds	Number of seeds germinated	Germination percentage %
1	Untreated water	100	81	81 %
2	Treated water	100	41	41 %

Germination percentage was calculated by using the above formula. The treated water was low number of microbial colonies when compared to untreated water.

PLANTS HEIGHT MEASUREMENT

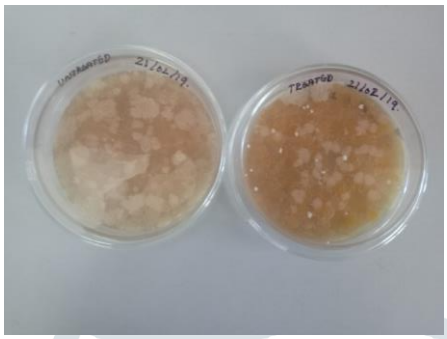
Trigonella Foenum-Graecum (fenugreek) plant seeds were implanted in the soil. Totally hundred seeds are used. The water sample was applied two days once. The track was divided in to two one is for treated water sample another one is for untreated water sample. After 15 days the plant can be removed from the track and measure the heights of plant in Cm. The measurement was plotted on the below.

Table – 4

Types	Average plants height %
Untreated water	74
Treated water	100

Microbial population count

Microbial population was counted by spread plate technique and microbial colonies are counted by using microbial colony counter**.**



Colony forming unit (CFU) = no of colonies ×dilution factor / amount of sample

Untreated water = $40 \times 10^2 / 0.1$

$= 400 \times 10^2$ cfu/ ml.

Treated water = $25 \times 10^2 / 0.1$

$= 250 \times 10^2 / 0.1$ cfu /ml.

Table – 5

Sample	**Amount of sample (ml)**	**Dilution factor**	**No. of colonies**	**CFU / ml**
Untreated water	0.1 ml	10^2	40	400×10^2 CFU/ml.
Treated water	0.1 ml	10^2	25	$250 \times 10^2 / 0.1$ CFU /ml.

Conclusion

In rural area the waste water management is important because without waste water management the people is suffering different type of diseases. Activated carbon can be used for the treatment of waste water. Our main of this study to explore that the sanitary lake water (Ananthenari) is useful for agricultural purposes. From the result and discussion that water is optimal for the agricultural usage. Hence we conclude from our above study the treated sewage water can be reusable.

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