RESEARCH ARTICLE

International Journal of Civil, Environmental and Agricultural Engineering

DOI: 10.34256/ijceae2021

An Experimental Study on Suitability on Treated Sewage Water for Agriculture

B. Logesh [a], S. Chandran [a], V.F.J. Kumar [a]

[a] Department of Agriculture Engineering, Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India.

* Corresponding Author:

Received : 01th April 2020, Accepted : 05th May 2020

Abstract: The present study is on the purification of sewage water for agricultural purpose by using various chemicals and natural absorbent (rice husk charcoal &Activated charcoal). The sewage water is collected and conduct pre-treatment test for various parameters like pH, Hardness, Total dissolved solids, Total suspended solids, BOD, COD, Dissolved Oxygen, Chlorides content. Then coagulant with rice husk ash, charcoal the rice husk ash is prepared by using muffle furnace at 100oC. The rice husk is low in cost and easily available. Treating of sewage water with rice husk ash & charcoal helps to decrease the pH, BOD, COD, Total hardness, chlorides, TSS, TDS. The filtration is done by using what man filter paper. After the filtration, check the parameters like pH, Hardness, Turbidity, Chloride, Total Dissolved solids, Total Suspended solids. After post treatment process pH, BOD, COD, Chlorides TSS, TDS, and Hardness are decreased. By using natural absorbent (rice husk char & charcoal).The values are neutralized at 3% of coagulant.

Keywords: Human power, Rice Husk, Activated Charcoal, Chemicals.

1. Introduction

Water is considered as one of the most important nature of the earth. It is one of the most important things that is required by every living organism. Water covers about 71% of the land on the earth's surface, of which 96.5% of the planets crust water is found in seas and oceans, 1.7% in form of ground water, 1.7% in the glaciers and the ice caps of Antarctica and Greenland, a small fraction in other large water bodies, 0.001% in air as vapour, clouds and precipitation. Only 2.5% of this water is fresh water, 98.5% of water is in ice (excepting ice in clouds) and ground water. Less than 0.3% of all freshwater is in rivers, lakes, and in the atmosphere, and even a smaller amount of the earth fresh water (0.003%) is contained within biological bodies and manufactured products.

1.1 Sewage water

Sewage is a water-carried waste, in solution or suspension that is intended to be removed from a community. More than 95% of water is characterized by rate of flow, physical condition, chemical constituents and bacteriological organisms that it contains. Implementation of conventional sewage treatment reduces vector and odors problems of water. Urban areas in India generated about 5 billion liters a day of wastewater in 1947 which has increased to about 30 billion liters per day in 1997.

1.2 Importance of Sewage water treatment

The principal aim of sewage water treatment is generally to allow the human and industrial effluents to be disposed of without danger to human health and natural environment. We consider wastewater treatment as water use because it is so interconnected with other uses of water. Most of water used by homes and industries must be tested before it is released back to the environment. If we didn't treat the billions of gallons of wastewater and sewerage produced everyday then it will cause huge quantity of water pollution.

Treatment plants reduce pollutants in sewage water to a level nature can handle. Sewage water is used water.

Rice husk is one of the natural adsorbents which is used in the sewage water treatment as filtrate material. Activated char coal is the other material used for filtration. It shows good results in the removal of the physical and chemical parameters of sewage water and make it fit for reuse, which can be used in secondary purposes The various stages involved in the treatment process are:

a. Preliminary treatment
b. Primary treatment
c. Secondary treatment
d. Tertiary Treatment

Here we are treating the sewage water using natural adsorbents like rice husk and Activated Charcoal. Rice husk ash is used as coagulant, the multilayer of rice husk and Activated Charcoal is used as filtering material. Rice husk is one of the available in rice growing countries. Also contribute their share of used water that must be cleaned. The treatment of the sewage water depends on the character and quality of sewage and sources of Generation of rice husk in India is 18-22 include substance such as human waste, food scraps, oils, soaps and chemicals in homes, this includes water million tons. Studies on the adsorption of various pollutants by rice husk are reviewed. Paddy rice (Oryza sativa) is grown on every continent except Antarctica and the extent of paddy cultivation covers about 1 percent of the earth's surface. More than half of the world's population depends on rice as a staple food and it ranks second to wheat in terms of cultivation area and production. The quantum of global production of paddy is close to 650 million tons per annum. Paddy, on an average, consists of

about 72 percent of rice, 5-8 percent of bran, and 20-22 percent of husk of all the plant residues, the ash of rice husk contains the highest proportion of silica. It is estimated that every tonne of paddy produces about 0.20 tonnes of husk and every tonne of husk produces about 0.18 to 0.20 tonnes of ash, depending on the variety, climatic conditions and geographical location.

2. Literature Review

In this paper, it is concluded that the low cost natural adsorbent materials have good performance on the removal of bad contaminants from sewage water. The multimedia filtering process gives good results in the removal of parameters like pH, Total Solids, Suspended Solids, Dissolved Solids, Biochemical Oxygen Demand, Chemical Oxygen Demand and turbidity from the effluent.

Differences in varietal characteristics have significant effects on the chemical properties of rice husk the basic properties of rice husk are as follows:

Figure 1. Rich Husk ash

Table 1. Properties of rice husk ash

S.No	Properties	Range
1.	Bulk Density(kg/m3)	96-160
2.	Length of the husk(mm)	2.0-5.
3.	Hardness(Mohr's scale)	5.0-6.0
4.	Ash(%)	22.0-29.0
5.	Carbon(%)	35.0
6.	Hydrogen(%)	4.0-5.0
7.	Oxygen(%)	35.0-37.0
8.	Nitrogen(%)	0.23-0.32
9.	Sulphur(%)	0.04-0.08
10.	Moisture(%)	8.0-9.0

Figure 2. Water samples coagulation with rice husk ash

3. Results and Discussions

The results are analyzed by conducting the pre- treatment and post-treatment of following samples.

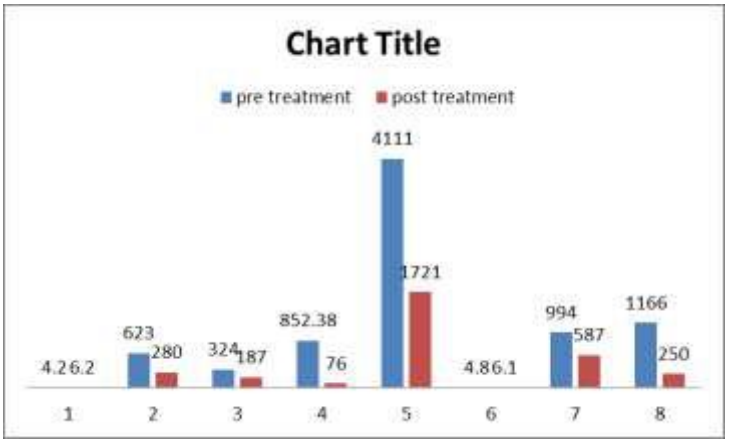
Table 2. Analysis of different parameters of sewage

Sl. No	Parameters	Pre- treatmen t value	Post- treatment value
1	Ph	4.2	6.2
2	BOD	623	280
3	COD	324	187
3	Hardness (ppm)	1166	250
5	Dissolved oxygen	4.8	6.1
6	Total dissolved solids (ppm) After filtration	4111	1721
7	Chloride content	994	587
8	Total suspended solids (ppm)	852.38	76

The above Table shows the difference between pre-treatment values and post-treatment values of pH, Hardness, Total solids, BOD, COD, Chlorides are neutralized. The optimum values are obtained at 3% of the organic material used. The Post-treatment values are neutralizing when compare to pre-treatment values. The values are in permissible limits as per BIS – 10500:2012.

The above graphs show the difference between pre-treatment values and post-treatment values of pH, BOD, COD, TSS, TDS, DO, Chlorides, Total Hardness. The Post-treatment values are neutralizing when compare to pre-treatment values. The

neutralization is done at 3% of coagulant. After the post –treatment process values are in permissible limits as per BIS –10500:2012



Graph 1: Comparison of pretreatment & post treatment values of different parameters

4. Conclusions

The sewage water is treated by using natural absorbent (rice husk Ash & activated char coal).Rice husk Ash have carbon property, due to that property pH ,BOD ,COD, TSS ,TDS ,Chlorides are neutralized .After the coagulation total dissolved solids are increased at 3% optimum .Moreover dilution of point sources and non-point sources can be adopted for agriculture which is feasible to decrease the concentration of heavy metals and other toxic substances based on the results shown in Table .It is true that there are many constraints – economic , social as well as practical in the implementation The usage of treated sewage water for agriculture is quite eco-friendly.

References

[1] El- Ashry S, Saber M, Zaghloul A. Aust J Basic and Applied Sci 2011; 5(12): 1-11.

[2] Khalifa RKhM, Abouziena HF, El-Mergawi RA, Youssef A Aust J Basic and App Sci 2011; 5 (12): 2999-3007.

[3] Saber M. Studies on the effect of sewage effluent on soil properties.Joint Egyptian –German Seminar "Water reuse in Urban and Rural Areas. Cairo Univ1982.

[4] El-Bagouri I. Final Report, ASRT, Cairo1995.

[5] Belaid N, Neel C, Kallel M, Ayoub T Ayadi A. Agric Sci 2012; 3(5) 702-713. [6] Saber M. Wat Sci Tech 1986; 18 Tokyo, pp 371-374.

[7] Masto R, Chhonkar P, Singh D, Patra A. Environ Geol 2009; 56:1237–124.

Acknowledgements: The authors are thankful to Principal, HOD, Civil Department and Management for guidance and providing facilities to complete this work.

Conflict of interest: **NIL**