



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 10, October 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.569

9940 572 462

6381 907 438

ijrset@gmail.com

www.ijrset.com



Treatability Study by Soil Column Treatment System Using *Murraya Koenigii* (Curry Leaves) Powder Adsorbent

Nagarajappa D P¹, Divyashree M R², Shivakeshav Kumar P³

Professor and Chairman, Department of Civil Engineering, UBDTCE, Davanagere, Karnataka, India¹

M. Tech Student, Department of Civil Engineering, UBDTCE, Davanagere, Karnataka, India²

Professor and HOD, Department of Civil Engineering, Proudadevaraya Institute of Technology, Vijayanagara
Karnataka, India

ABSTRACT: Present study identifies the productiveness of treatment of Dairy Effluent using Soil Column system in conjunction with *Murraya Koenigii* (Curry leaves) powder Adsorbent. In this method, removal efficiency is found out by varying adsorbent depth at 20%, 40%, 60% and 80% height from bottom of column. Various parameters like pH, Total Dissolved Solids, Total Suspended Solids, Biological Oxygen Demand are considered. Clayey Silts Soil with curry leaves showed maximum removal efficiency at 40% positioning of adsorbent and amongst other parameters Turbidity removal efficiency of 99.22% is maximum.

KEYWORDS: Adsorbents, *Murraya koenigii*, Dairy wastewater and soil Column Method.

I. INTRODUCTION

Now a days availability of fresh water is very rare due to numerous reasons such as population explosion, water use trends and poor water management systems. Hence there is an immense need for discovery of alternate source of water, reuse and reconsideration of wastewater (5) Soil Column System is a new generation natural treatment technology for waste effluent which generates effluent of acceptable quality. It is one of the cheapest methods of purifying wastewater. (2) Dairy industry is regarded as one of the largest producers of food processing effluent which is mainly organic in quality (3)

II. RELATED WORK

A.K. Balaji et al. [13] from his studies he enumerated the use of agro-based adsorbent like Curry Leaves powder can treat wastewater. He gained immense success in removing oil and grease from wastewater. Shivaleela Chavan et al. (18) from the studies done showed that Textile mill treatment by Soil aquifer treatment system with natural adsorbents to acceptable limit. In this method Column treatment is conducted with different adsorbent depth. Sandy Soil showed better removal efficiency than silty

III. METHODOLOGY

A. Preparation of Soil

Clayey Silts Soil was characterized through identifying geotechnical properties of soil. The in situ dry density was found to be 1.66 g/cm³ and the dry density of soil used for filling column is maintained almost same as dry density of soil in field. In order to achieve these conditions the soil weight which is to be filled in the column is calculated by multiplying field dry density of particular soil sample with the volume of the column. Single depth of 0.8m and varying heights of adsorbents were undertaken. An 8cm layer of adsorbent at 20%, 40%, 60% and 80% was positioned from bottom of column (5)

B. Preparation of Adsorbent

This Murraya Koenigii leaves are also called as curry leaves were collected from local market at Harapanahalli and washed in tap water and then in distilled water to remove any kind of impurities, Then the leaves of curry were separated manually and dried under sun light for three days. After complete drying, it was made as a fine powder using an domestic blender, and powdered curry leaves can be used as an natural adsorbent (1)

C. Collection of Wastewater

Dairy wastewater is collected from common collection from effluent treatment plant (ETP) through grab sampling

D. Experimentation

For the experiment, columns were made of PVC pipes, each 1.1 m long, with an inner diameter of 15 cm with a wayout at the bottom and an spillage at the crown. Each column is secured with a 60 micron netting inside. The columns are filled up by maintaining the field density of the soil. A container for supplying a sample of wastewater is placed on top, wastewater is supplied from above, after cleaning, new water is accumulated at the outlet, provided at the end of the columns. The flow is maintained in such a way as to maintain a constant ponding depth of 30 cm above soil level. Column 1 (C1) is filled with clayey silts, and the adsorbent is placed at a height of 20% from the bottom of the column, thus the adsorbent is placed. 40%, 60%, and 80% of the height from the bottom of the column

IV. EXPERIMENTAL RESULTS

A. Removal Efficiency of Clayey silts Soil with M.Koenigii leaves adsorbent

Experimental results are tabulated in table 1 to 4. Various parameters like pH, TDS, TSS, and BOD are found out and removal efficiencies in accordance with adsorbent positioning at 20%, 40%, 60% and 80% are represented graphically.

Table:1 performance of Clayey Silts Soil of depth 0.8m and adsorbent Positioned at 20% height from bottom.

Sl.No	Parameters	Influent	Effluent	Removal Efficiency %
1	pH	4.51	6.74	-
2	TDS (mg/l)	2422	1698	37.82
3	TSS (mg/l)	5603	464	92
4	COD (mg/l)	5852	1131	81
5	BOD (mg/l)	4456	1064	78.01

Table2 : Performance of Clayey Silts Soil of depth 0.8m and adsorbent Positioned at 40% height from bottom.

Sl.No	Parameters	Influent	Effluent	Removal Efficiency %
1	pH	4.51	7.28	-
2	TDS (mg/l)	2422	1179	56.82
3	TSS (mg/l)	5603	638	89
4	COD (mg/l)	5852	654	89.01
5	BOD (mg/l)	4456	1161	76.01



Table:3 Performance of Clayey Silts Soil of depth 0.8m and adsorbent Positioned at 60% height from bottom.

Sl.No	Parameters	Influent	Effluent	Removal Efficiency %
1	pH	4.51	6.64	-
2	TDS (mg/l)	2422	1371	49.79
3	TSS (mg/l)	5603	290	95
4	COD (mg/l)	5852	595	90
5	BOD (mg/l)	4456	871	82.01

Table:4 Performance of Clayey Silts Soil of depth 0.8m and adsorbent Positioned at 80% height from bottom.

Sl.No	Parameters	Influent	Effluent	Removal Efficiency %
1	pH	4.51	7.11	-
2	TDS (mg/l)	2422	1428	47.71
3	TSS (mg/l)	5603	348	94
4	Cod (mg/l)	5853	535	91
4	BOD (mg/l)	4456	532	89.01

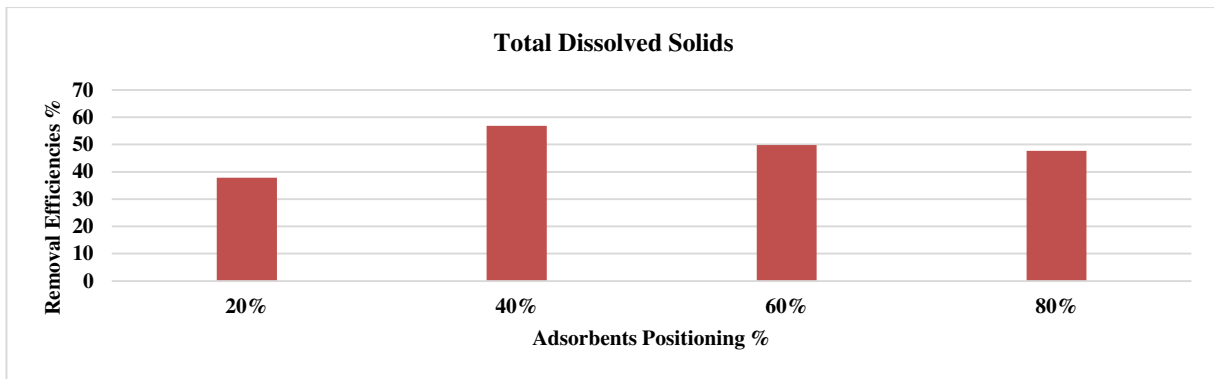


Fig1.0: Removal Efficiency of TDS at different Positioning of Adsorbent

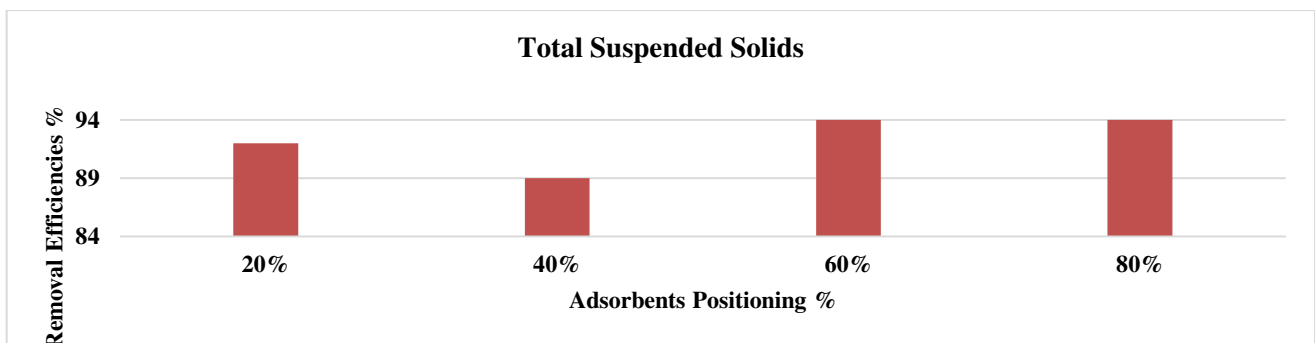


Fig2.0: Removal Efficiency of TSS at different Positioning of Adsorbent

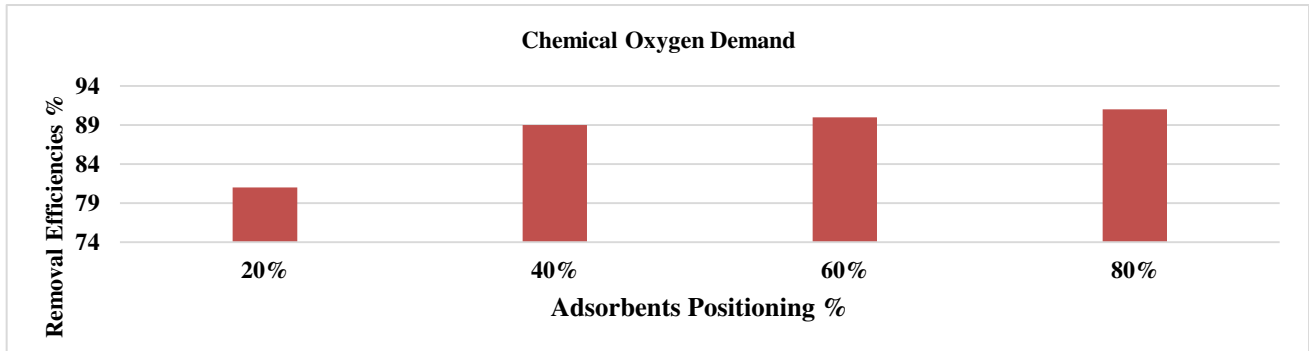


Fig3.0: Removal Efficiency of COD at different Positioning of Adsorbent

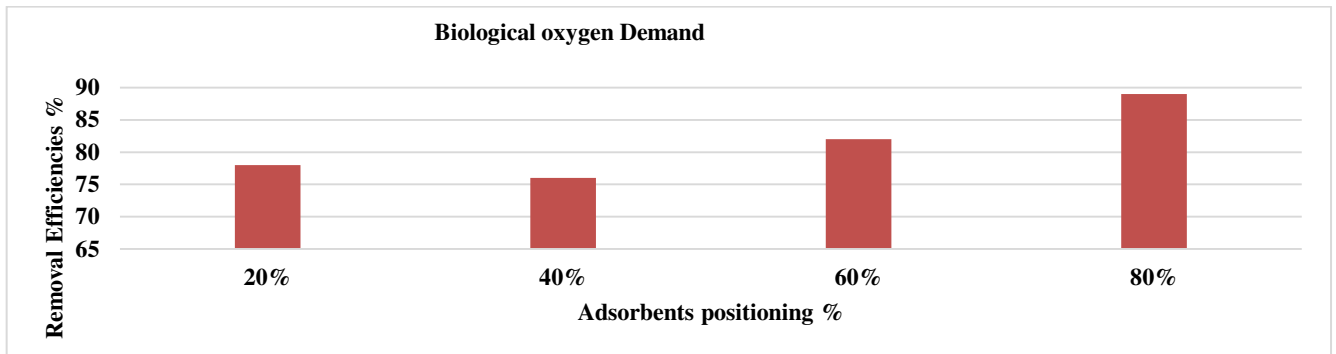


Fig4.0: Removal Efficiency of BOD at different Positioning of Adsorbent

V. CONCLUSION

From the experimental study we can conclude that Clayey Silts Soil in Conjunction with *Murraya koenigii* leaves powder as adsorbent showed over all good removal efficiency for all parameters. The removal efficiency obtained in each parameters are as follows: Total Dissolved Solids (56.82%), Total Suspended Solids(95.0%), Chemical Oxygen Demand(91.0%) and Biological Oxygen Demand(89.01%)

REFERENCES

1. Akber A, E. Al-Awadi and Rashid (2003) “Assessment of the use of Soil Aquifer Treatment (SAT) Technology in Improving the Quality of Tertiary Treated Wastewater in Kuwait”, Emirates Journal for Engineering Research, 8(2), pp :25-31.
2. Essandoh H.M.K , Tizaoui C, Mohamed M.H.A, Amy. G and Brdjanovic (2011), “ Soil Aquifer Treatment of Artificial Wasterwater under Saturated Conditions”, Journal of Water Research,45 pp:4211-4226.
3. Nagarajappa D.P, Manjunatha K and Manjunath N.T. (2010),“Effects of Soil Types on Performance of Soil Aquifer Treatment (SAT) System” Journal of Indian Geotechnical Conference,pp 425-42
4. Samanpreet K. and Mandeep S. (2002), “Soil Aquifer Treatment (SAT) System: A Case Study”,Ind. J. Env.,44(3),pp 244-246
5. Singh N. B., Ruchi S. and Mohammed M.I. (2014),”Wastewater Management in Dairy Industry Pollution Abatement and Preventive Attitude”.International journal of Science , Environment ,3(2),pp 672-683



**Impact Factor:
7.569**



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details