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"Distillery Wastewater Treatability Studies by Using Soil Aquifer Treatment in Conjunction with Different Leaves Powder as a Adsorbent"

Nagarajappa D. P.[1*], Tippnagouda B[2]shiva Keshava Kumar[3]
[1]Professor and Chairman, University BDT College of Engineering and Technology, Davanagere, Karnataka.
[2]PG student , University BDT College of Engineering and Technology, Davanagere, Karnataka.
3 Professor, proudadevaraya institute of technology, Hospet, Karnataka.
*Corresponding Author: *TIPPANAGOUDA B*

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ABSTRACT: Distillery industry is one of oldest industries which is highly complex and characterized by high BOD, COD, Total solids, Odor and Color. Untreated Distillery wastewater when discharged directly into the water bodies o onto the open land causes irreversible damage to environment wastewater. The large quantity of wastewater generated at all stages of sugar production are highly contaminated because of improper water management. This type of wastewater is discharged to surface water or on land. Therefore treatment of wastewater for disposal and reuse is necessary for safe and sustainable environment. Soil aquifer treatment system is adopted for better management of distillery wastewater. Sandy soil was used for the experimentation. Along with neem leaves, almond leaves, teak leaves peepal leaves, banyan tree's leaves and jackfruit leaves powder as an adsorbent. These leaves powder proved efficient adsorbent and gives good removal efficiency. Without adsorbent for sandy soil removal efficiency for Color 94.40%,for TDS 78.96%, Turbidity 88.27%, COD 70%,and BOD 70.2%. similarly sandy soil with adsorbent at 20% height for Color 94.72%, for TDS 90.12%, for Turbidity 88.01%,for COD 73.50%, BOD 72.2%.Sandy soil with 40% adsorbent height from bottom for Color 94.56%,for TDS 90.15%,for Turbidity 87.81%, for COD 74.6%, for BOD 74.6% and finally Sandy soil with 60% adsorbent height from bottom, for Color 94.89%,for TDS 89.69%, for Turbidity 91%, for COD 75% and for BOD 78%.

KEYWORDS:—Distillery Wastewater, Mixed leaves powder adsorbent, Removal Efficiency, SAT.

I. INTRODUCTION

Water is a basic service, a basic material, and one of the regulating services that keeps our planet functioning while also controlling temperature and weather. Despite the fact that humanity has always recognized the importance of water, Europeans are becoming increasingly aware that the supply is finite and that we must value it appropriately. Water needs to be regulated and safeguarded. It's not just a consumer item; it's a valuable natural resource that will benefit future generations as well as our own. No living can exist without water. Despite the fact that humanity has always recognized its need on water, Europeans are increasingly conscious that the supply is finite and that we must value it properly.

SAT is a clear, odorless liquid that flows into a stream or low zone from a well, depletion, or common waste. In contrast to a sewage treatment facility or a sewerage system. The SAT is the most common method of artificial recharging because it does not necessitate a high level of technology. It's simple to use and maintain, and it can treat replenished water to an exceedingly high standard. The SAT system is a tried-and-true way of increasing the quality of wastewater. It improves people's living conditions. SAT stands for "geo-purification." Aquifer storage has a higher storage capacity than surface water reservoirs, requires less acreage, is less expensive, prevents evaporation, and can give extra purification to the treated effluent by recharging through unsaturated soil layers. SAT aids in the polishing of storm water and treated wastewater, as well as providing natural storage capacity for reuse or groundwater recharge.

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1.1 WASTEWATER

Wastewater treatment Process for removing pollutants from wastewater and converting it into an effluent that may be returned to the water cycle with little environmental effect or utilized directly. The kind of wastewater to be treated distinguishes wastewater treatment plants. As the globe faces rising fresh water demand and difficulties connectedwith wastewater disposal, water recycling and reuse has become a key component of current water management methods. . Wastewater is any water that has been contaminated by human use.

II. MATERIALS AND METHEDOLOGY

2.1 Wastewater Sample Collection

1.2 ABOUT INDUSTRIAL WASTEWATER

Industrial wastewater is a wastewater which is generated from various industrial activities .an industrial wastewater is one of the most important pollution source in our environment and it has a substantial impact on water contamination. . It also has severe consequences on human health and the environment. Textile, sugarcane, soap, pulp, and tannery industries are only a few of the main sectors that contribute significantly to water pollution in our environment. Industrial wastewater contains a variety of physicochemical properties.

Waste water sample collection is very much necessary.Here the wastewater is collected from sugarcane industry
Duggavati.

Plate 2.1 Collection of Wastewater

Details of Wastewater

- Collection location – sugarcane industry duggavati.
- Collection season – summer
- Date and time- 6th April 2021 at 3 pm
- Temperature - 33ºC

2.2 Characterization of Wastewater

The untreated distillery wastewater was analyzed for Color,Total dissolved solids, Turbidity, Chemical oxygen demandAnd Biological oxygen demand parameters.The concentration determines the toxicants and impurities,the quality of the water.

2.3 Collection and Preparation of soil sample

To maintain field environment several soil sample is to be collect from J H patel nagar davanagere.Bycore cutter method, to maintain the field density.

Plate 2.1Collection of Soil Sample by Core Cutter Method

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2.4 Preparation of Adsorbent

Collect the Almond leaf (Terminaliacatappa Leaves**)** and Peepal leaf (Ficusreligiosa) Neemleaves banyan tree leaves, tectona leaves, jackfruit \tree leaves etc collected from trees available in our college campus. After collecting the leaves are rinse away with water few times till no dirt particles. After washing the leaves we have to dry those leaves sunlight for 3 days till they becomes fully dry. After drying the leaves, collect and crush thoseleaves in a gunny bags and make those crushed leaves into powder form by using domestic grinder it becomes powder again wash that powder by using distilled water. The washed powder is should be dry in oven for 9 hours andthen sieves of different sizes. Store in air tight container.

2.5 Experimental Setup

To investigate the behavior of the SAT system in conjunction with natural adsorbent in the treatment of distillery spent wash wastewater with and without adsorbent columns. The experiment necessitates the use of four columns of PVC pipes. Each column has a 120cm length and a 15cm inner diameter. The outlet should be at the bottom of the column, with the overflow pipe on the side of the column. A 60 micron mesh is installed within the bottom of each column to prevent soil and effluent from escaping. While filling the soil in the column, the field density of soil is maintained. Wastewater is collected in the feeding tank and stored at the top of the tower Wastewater from the feeding tank is allowed to flow into the column to be treated. To keep the water flowing, a 30cm ponding depth is given above the soil.

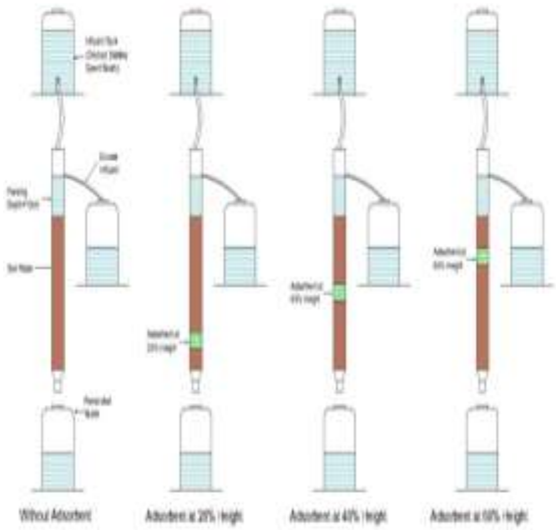

Fig 2.1 Schematic line diagram of SAT system.

III. RESULTS AND DISCUSSIONS

To find Out the Behavior of Soil Aquifer Treatment (Sat) System In treating diluted distillery spent wash with and without adsorbent experimental studies were conducted. The soil aquifer treatment (SAT) Performance is considered are to be noted. And also noted the efficiency of filtration or removal efficiency at 20%, 40% and 60% adsorbent height. The procedure Results from the experiments are mentioned in the tables and graphs and charts are used to illustrate the results.

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Table 3.1 Optimum Removal Efficiency for Sandy Soil in Performance with SAT System.

Parameters	Time	0%	20%	40%	60%
Color	390	94.4	94.72	94.56	94.89
TDS	360	78.96	90.12	90.15	89.69
Turbidity	510	88.27	88.01	87.81	91
COD	360	70	73.50	74.6	75
BOD	420	70.2	72.2	74.6	78

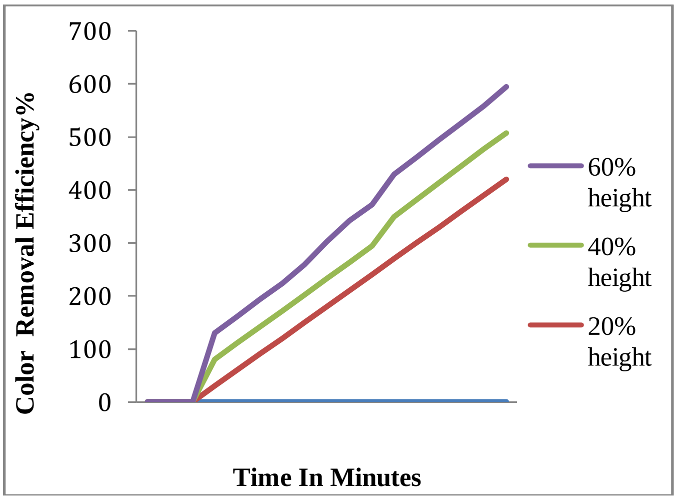

Fig 3.1 Removal Efficiency of Color For Sandy Soil Without Adsorbent And With Adsorbent At 20%, 40%, And 60% Heights From Bottom.

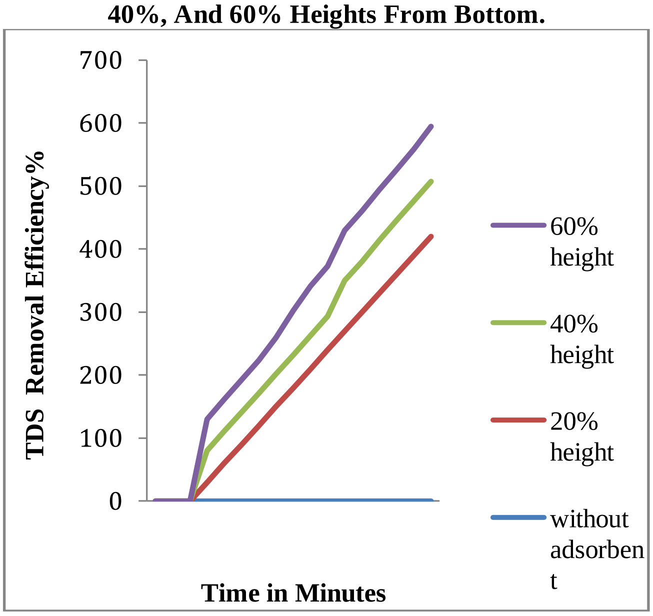

Fig 3.2 Removal Efficiency of TDS for Sandy Soil without Adsorbent and With Adsorbent At 20%, 40%, And 60% Heights from Bottom.

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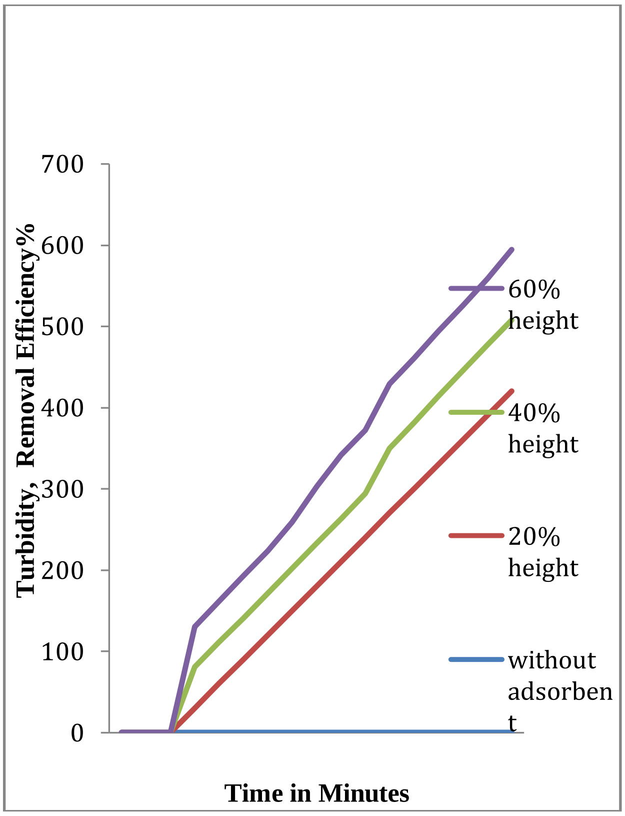

Fig 3.3 Removal Efficiency of Turbidity for Sandy Soil without Adsorbent and With Adsorbent At 20%, 40%, And 60% Heights from Bottom.

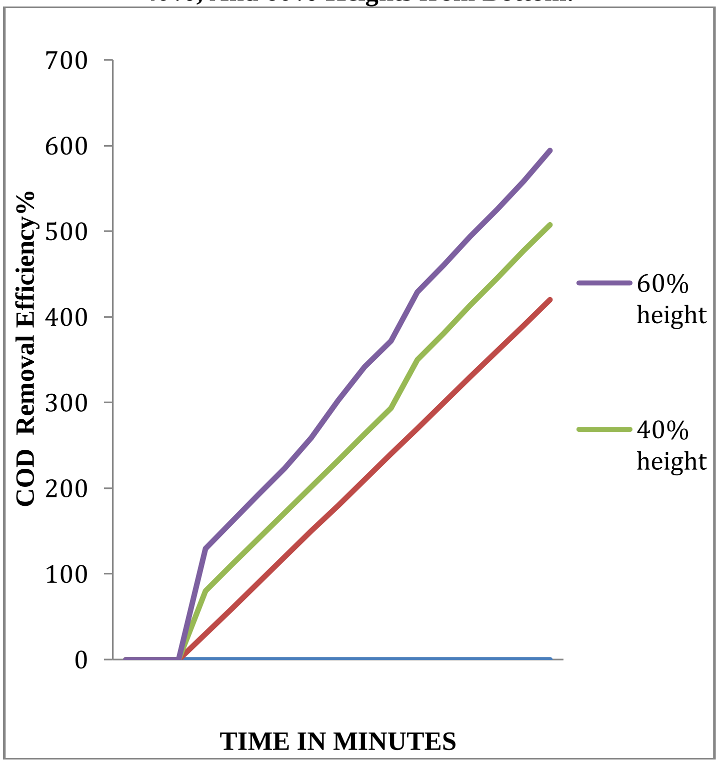

Figure 3.4 Removal Efficiency of COD For Sandy Soil Without Adsorbent And With Adsorbent At 20%, 40%, And 60% Heights From Bottom.

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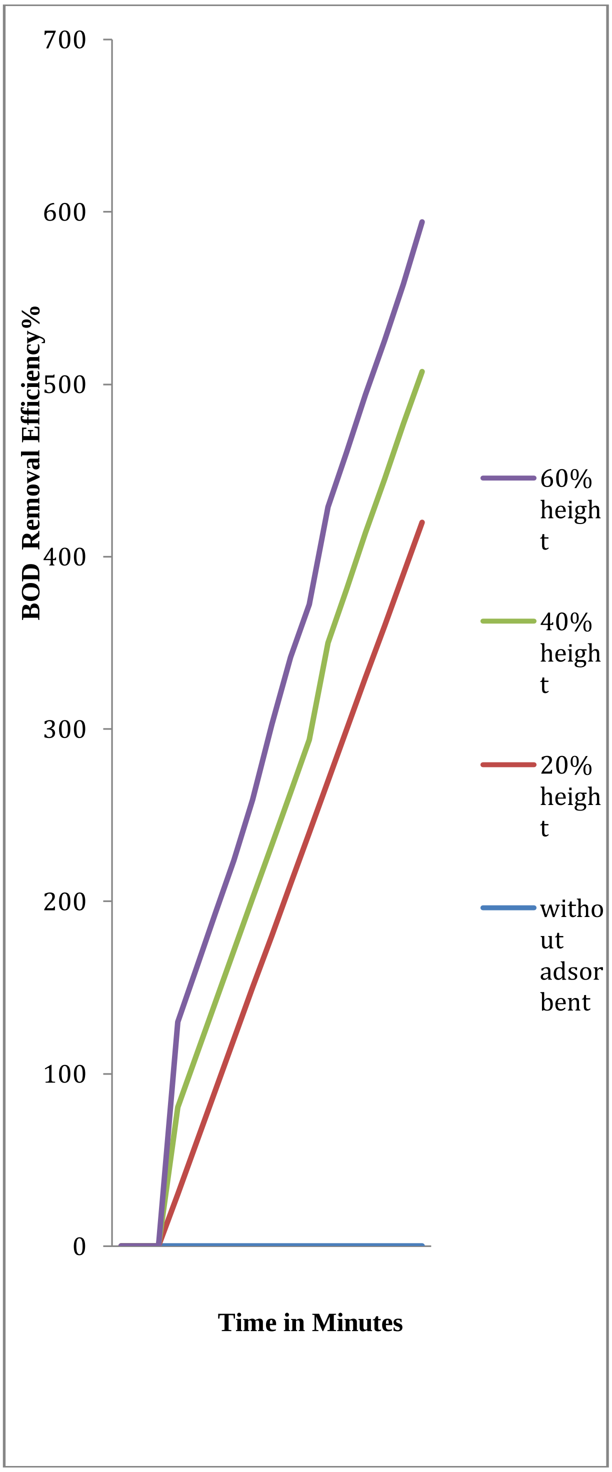

Figure 3.5 Removal Efficiency of BOD For Sandy Soil Without Adsorbent And With Adsorbent At 20%, 40%, and 60% Heights From Bottom.

IV. CONCLUSIONS

SAT process behavior with adsorbent in treating diluted distillery spent wash was more efficient in sandy soil than compared to red clayey soil.Removal efficiency of various parameters for sandy soil with adsorbent are as follows Color (Pt Co) 94.89%, for 390 minutes at 60% height from bottom, TDS (mg/l) 90.15%, for 360 minutes at 40% height from bottom, BOD (mg/l) 74.6%, for 420 minutes at 40% height from bottom, COD (mg/l) 75%. Color (Pt Co) 94.40 p, TDS (mg/l) 78.96 %, BOD (mg/l) 70.2 %, COD (mg/l) 70% for 360 minutes at 60 % height from bottom of column and Turbidity 91 % for 510 minutes at 60 percent height from bottom of column for sandy soil without adsorbent.

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