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To study on development and treatment of textile waste water by using microbiological processes and root-bed treatment in Jhunjhunu, Rajasthan

Sushil Kumar Barolia [1,*] and Sandeep Kumar [2]

[1] *Department of Biotechnology, University of Kota, Rajasthan, India.*

[2] *Department of Biotechnology, Shri JJT, University Jhunjhunu, Rajasthan, India.*

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Abstract

Textile wastes often have an intense color, with high concentrations of dyes, dyeing of various chemicals, additives, and some are non-biodegradable and toxic, mutagenic or carcinogenic. Therefore, it is essential to treat the waste water from the tissues to eliminate these substances before discharging them into the environment. In the present and in the last decades, in-depth research has been conducted on the elimination of dyes from different waste waters using chemical and biological treatment technologies or a combination of both. Therefore, the goal was to study the microbial community in the active tissue that worked well compared to the municipal for two seasons (winter and summer) sludge, and explain the differences observed by environmental variables bacterial taxonomy, phylogenetic tree, Chloroflexi, Choroid and Acidobacterias were more abundant in active sludge textile samples. In addition, reducing exfeated bacteria detected almost exclusively in the textile industry, while nitrification and denitrification of bacteria and phosphate accumulation bacteria were more abundant in the city. It was also clear that the textile microbial communities were more different than municipal, perhaps due to a wider variety of environmental stress to which microbial communities are subjected in textile purification plant. High salinity, high organic loads and a higher water temperature have been found as important variables that guide the composition of the microbial community.

Keywords: Anaerobic Filter; Advanced Pond System; Biological Oxygen Demand; Chemical Oxygen Demand Waste Water

1 Introduction

Water is one of the abundantly available substances in nature. It is an essential constituent of all animals and vegetable matter and forms about 75% of the matter of earth's crust. The earth has about 1.35 cubic kilometers of water of which about 97% is found in the oceans. The main source of land water is atmospheric rain. It is estimated that about 27% of rain. It is estimated that about 27% of rain water flows into oceans and about 73% is evaporated. A little percentage of water enters the soil whose some part reaches the deep zone due to force of gravity and called gravitational water. The upper layer of it called water table. Surface water usually contains small amount of suspended particles (organic and inorganic) and a number of micro-organisms such as bacteria, algae, viruses, protozoans etc. Water becomes polluted when concentration of these increases. Water pollution is a serious health hazard in India. About 50-60% Indian population suffers from water borne diseases and 30-40% all deaths are due to water pollution. Availability of fresh water has declined by 2-3rd in the past 55 years.Water is chemical substance that is essential to all known forms of life. It appears colorless to the naked eye in small quantities, though it is actually slightly blue in colour. It feels wet to the touch. It covers 71% of Earth's surface. The United Nations Environment Programme estimates there are 1.4 billion cubic kilometers (330 million) of it available on Earth, and it exists in many forms. It appears mostly in the oceans (saltwater) aquifers, lakes, and sea ice. Water in these bodies perpetually moves through a cycle of evaporation,

* Corresponding author: Sushil Kumar Barolia

precipitation, and runoff to the sea. Clean water is essential to human life. In many parts of the world, it is in short supply. Significant quantities are believed to exist on the moons Europa and Escalades.

1.1 Wastewater

Planet earth is full of water. Seven tenth of earth is covered by water. Water as 97% is contained in oceans, 2% locked up in ice cap and glaciers, less than 1% is available for human use in the form of surface water. The hydrological cycle begins with condensation of atmosphere water and its precipitation as rain or snow which ultimately falls on the earth surface. Then it flows into surface source of water such as lakes, streams, river and pond etc. in which the surface run off is available for human use. The rain water melted snow which enters the ground by infiltration constitutes the groundwater which peculates through the subsoil and reaches the aquifers or pores rocks where it accumulate as the underground water source. Underground water is eventually discharged into surface water. Evaporation from surface water returns the water back into atmosphere to repeat the cycle.

2 Materials and Methods

Textile waste collected from the textile sector Jhunjhunu. The sample was treated with various combinations of physical and biological filters and verified the effect of various filters on wastewater. The table shows several observations observed during treatment filters. Overall, this thesis has clearly increased our knowledge of microbial ecology and microbial communities in the textile sector, as well as textile wastewater treatment. In the end, this study should contribute to a more effective, viable and sustainable treatment of the dye-contaminated wastewater.

To propose a successful method for treating wastewater through the treatment plant, we have to comprehend the negative ecological effects delivered by untreated wastewater by entering encompassing biological systems. We have to realize precisely how untreated wastewater could influence encompassing biological systems. With the continuation of untreated wastewater released into water frameworks, the biological system will keep on breaking down at a quickened rate.

Substance precipitation, gas exchange, adsorption and disinflation are the most widely recognized precedents utilized in a wastewater treatment. In substance precipitation, the treatment is done by creating a concoction hasten which is saved.

2.1 Physical parameter

Odor, turbidity and color.

2.2 Chemical parameter

pH, EC, Salinity, TDS, DO, BOD, COD, Chloride, Hardness, Carbonate and Bicarbonate.

2.3 Biological parameter

Total bacteria count (TBC). The effluent is treated biologically. In this unit Bacterial mass is kept alive as an impurity removal agency. Urea, DAP and Jaggery is added to make bacteria alive. Continues aeration is also provided by Blowers capacity. These Bacteria removes the BOD and COD from the effluent.

The best result was obtained by combination of filters –

- Physical filter – Vermicompost + Coal + Brick + Sand +Net + Coir
- Biological filter – Vermicompost + Soil with Grass
- Physical filter – Coal + Brick + Sand + Net + Coir

A sludge recycling line is essential for activated sludge systems. The aeration unit can be an activated sludge or a fixed film reactor. Wastewater treatment plants can be divided into two main types: transfer, which solids created in the essential treatment are included.

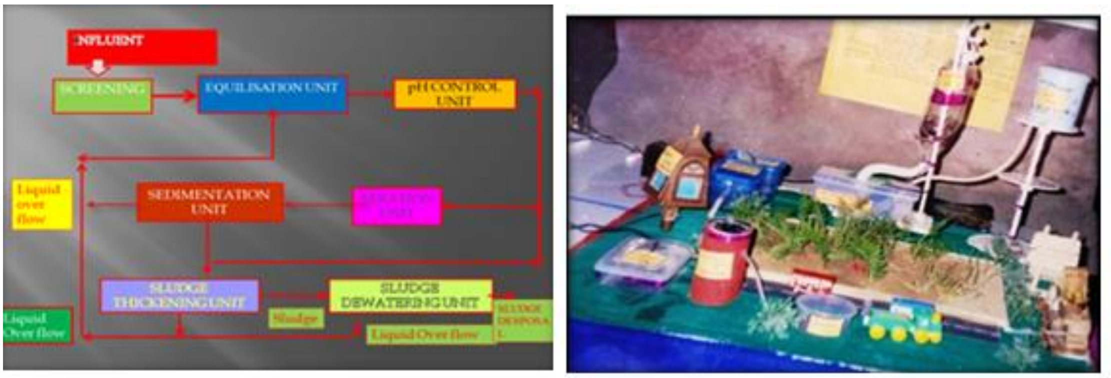

Figure 1 Presentation of water treatment in the modal west (Biological and physical / chemical).

Table 1 Number of isolated bacterial colonies from different types of soil

S. No.	Soil Habitat	No. of Soil Samples Examined	Types of isolated Bacterial Colonies
1	Sewage	5	25
2	River	5	20
3	Garden	5	15
4	Agriculture	5	10

These bacterial colonies were isolated from the total bacterial population counted in 10^9serial dilutions of soil samples collected from different areas (Table 2) Studies have revealed clearly that the maximum types of bacterial colonies were observed in the soil of waste water, while a minimum number of bacterial colonies was found in agricultural soil (Table:1).

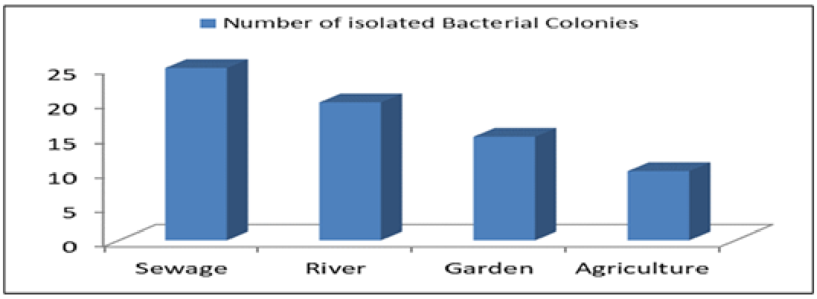

Figure 2 Graphical representation of the types of bacterial colonies isolated from various soil sources

2.4 Observations

Table 2 After treatment with the Bajri filter

Parameter name	Unit	Normal range	Before treatment	After treatment with the Bajri filter
pH	-	6-8	1:45	7. 94
THERE IS	Ms.	1. 75 to 2. 25	27. 2	3. 95
TDS	ppt	1	14. 9	2:15
Saltiness	ppt	1	12. 5	5:29
Color	-	colorless	Dark yellow	color
Smell	-	toilet	acre	smell

Table 3 After sand filter treatment

Parameter name	Unit	Normal range	Before treatment	After treatment with the Bajri filter
pH	-	6-8	1:45	7. 94
THERE IS	Ms.	1. 75 to 2. 25	27. 2	3. 95
TDS	ppt	1	14. 9	2:15
Saltiness	ppt	1	12. 5	5:29
Color	-	colorless	Dark yellow	color
Smell	-	toilet	acre	smell

Table 4 After the biological filter treatment

Parameter names	Unit	Normal range	Before treatment	After the sand filter treatment
pH	-	6-8	1:45	7:09
THERE IS	Ms.	1. 75 to 2. 25	27. 2	10. 8
TDS	ppt	1	14. 9	3. 74
Saltiness	ppt	1	12. 5	14. 5
Color	-	colorless	Dark yellow	Less colors
Smell	-	toilet	acre	Less odor

Several individual materials used in wastewater recycling with pH, EC, TDS and optimal salinity observed respectively with soil, coal, bricks, sand, bajri, granite and individual biological products.

Table 5 After biological filter treatment.

Parameter names	Unit	Normal range	Before treatment	After treatment with biological filter
pH	-	6-8	1:45	8:21
THERE IS	Ms.	1. 75 to 2. 25	27. 2	6:23
TDS	ppt	1	14. 9	3:43
Saltiness	ppt	1	12. 5	8. 60
Color	-	colorless	Dark yellow	Less colors
Smell	-	toilet	acre	Less odor

Several individual materials used in wastewater recycling with pH, EC, TDS and optimal salinity observed respectively with soil, coal, bricks, sand, bajri, granite and individual biological products.

3 Results

In the present study samples of the model was made in association with the Textile wastewater collected from Textile industry Jhunjhunu. The combination of various physical biological filters consisted by soil, coal, marble, brick, and vermicompost and biological filter prepared by soil, vermicompost and grass west material etc.The fresh wastewater was passed through various combinations of physical and biological filters and analysis physical, chemical and biological parameters before and after treatment. By analyzing all the parameters of water, air, Hazardous and Non-Hazardous waste

However, the textile Industry work on water minimization techniques to minimize the quantum of water produced from the process as wastewater by different techniques like bioscouring. Dyes and chemicals can be replaced with less harmful chemicals which can result in less toxic wastewater.

After treatment it was found that the values of different parameters of wastewater come to permissible range and the treated wastewater can be used for irrigation purpose.

In the treatment scheme covered for study, membrane filtrations have been in operation. Other treatment system like activated carbon adsorption, ozonation etc. are used to make the effluent suitable for use in membrane filtration. Multiple effect evaporation system has been in use for minimizing effluent volume. The multiple effect evaporation with crystallizer has been installed for recovery glauber salt. The analysis results indicate that reverse osmosis membrane filtration can produce colour less treated effluent with dissolved solids as low as 196 mg/l and zero hardness. Nano filtration on other hand allows passage of maximum salt with the permeable, which when used in dyeing process, requires less addition of common salt. The membrane filtration particularly, reverse osmosis is extensively being used for water purification purposes. However, its application for industrial effluent treatment is relatively new experience in India. There is also problem associated with safe disposal of membrane rejects, which contain high pollution The reuse of textile industry effluent is assuming greater importance in recent times primarily due to scarcity of water resources and increasingly stringent regulatory requirements for the disposal of the effluent. With suitable treatment, effluent can be made fit for reuse or recycle in the production process for which technological options are available. The returns on account of water and chemical recovery can offset operating cost of effluent treatment recycling system. The recycling and reuse of the treated effluent directly conserve natural resources and a step towards sustainable development.

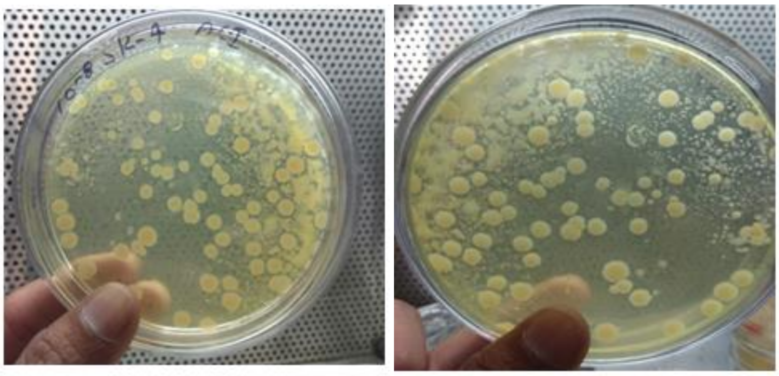

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Figure 3 Total bacterial count Benefits of advance treatment methods

3.1 Benefits of advance treatment methods

Application of appropriate advance treatment methods while reducing the pollution problems, enable industry to recover water and salt. The quality of permeate from membrane filtration systems is reasonably good for reuse in textile operation. Returns on accounts of reuse of water and salt can offset recurring cost of treatment system. The reverse osmosis system can produce permeate water with TDS as low as 196 mg/l. Low TDS water when used in textile processing minimizes consumption of sequestering agents which are added to suppress effect of TDS in chemical treatment of cloth. Use of reverse osmosis permeate can lead to water conservation by way of reduction in number of washes in fabric processing. More washes may be required where normal water is used in order to wash out hardness already held in the fabric. The permeate water has negligible hardness. This avoids use of chemicals required for water softening. Corrosion and scale formation in sensitive parts like flow sensors, temperature sensors etc. can be minimized, which leads to less maintenance cost, less breakdown and more output.When the condensate water from evaporation system having low TDS is used as boiler feed water, the efficiency of boiler can be improved since formation of scale on the boiler tubes is reduced. This intern reduces fuel consumption and maintenance cost. Use of nano filtration system permeates salt water (brine) but rejects other contaminants from effluent stream. The brine when reused in dyeing requires less additional salt. Crystallization also facilitates recovery of salt. While recovering the salts these methods also reduce problems relating to disposal of high TDS effluent streams of the Textile Industry. The recycling and reuse of the treated effluent and salt directly conserve natural resources and a step towards sustainable development. Installation of advance treatment methods along with recycling arrangement gives goodwill in the market.

Various combined filters used in waste water recycling optimum parameters of treated water observed in filter (Phy.1 + Bio. + phy.2)

Flow rate : - 5 liter water passed through .196 ft^2 filter area 95 sec.

Figure 4 Textile wastewater Before Treatment and After Treatment

Figure 5 Image showing west water treatment Plant

Compliance with ethical standards

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Disclosure of conflict of interest

There is no conflict of interest.

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