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Effect of Textile Mill Waste on Soil Microflora

Snigdha Majumder * and Sankar Narayan Sinha
Environmental Microbiology Research Laboratory
Department of Botany, University of Kalyani
Kalyani 741235, West Bengal, India

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ABSTRACT: Textile industry is one of the most important and potent industry that contributes high COD, color and organic matter in the form of wastewater to aquatic bodies. The textile industries are also one of the most water consuming sectors and releases wastewaters having variable characteristics and are of complex nature Soil is the most suitable habitat for a wide range of microbes which includes bacteria, viruses, microalgae, microfungi, protozoa etc. Industries are continuously releasing toxic effluents that create problems for the survival of soil microflora due to deleterious effect of toxic chemicals. Textile industries are not an exception.In the present study we have analyzed the effluent of textile industry and their deleterious effects on the soil microflora. The microbial flora was adversely affected by the effluent in comparison with the control water sample due to high BOD and COD values.

I. INTRODUCTION

Now-a-days textile industries are one of the largest organized sector of India and environmental impact of textile mill's wastes is fairly documented. Textile industries generate pollutants mainly at the time of processing of cloth, which consists of scouring, bleaching, mercerizing, dyeing, scouring, bleaching, mercerizing, dyeing, printing and finishing operations. Such processing operation involves use of a large number of chemical including acids, alkalies, oil detergents, dyes etc. The wastes released from textile industries cause soil, surface and groundwater pollution, besides causing a number of adverse effects on agricultural products, animals and health of people living in that area. The degradation of soil quality ultimately affects the groundwater quality as well as crops or other vegetation production in and around the contaminated areas. The toxicity introduced into the soil by effluents may persist for years and adverse effects may be felt aver a long period of time[1] . In the present study, an attempt has been made to assess the impact of textile industries on the soil quality by monitoring various microbiological parameters of contaminated soil of textile industries.

II. MATERIALS AND METHODS:

Study area: The textile mill effluent samples were collected from Sunil Ghosh Printing shop, ChatraBou Bazar, Sheoraphuli, west Bengal, India.

Sample collection: The effluent samples from the textile mill was collected as per standard procedure (APHA,1989)[2] and were analyzed in the environmental Microbiology Research Laboratory of the department.

Physico-chemical analyses of textile mill effluents: Sampling site was identified at point where effluent is discharged from the mill. The colour and odour of the effluent was noted during sampling in sterilized bottles. Other physico-chemical parameters viz. pH, total dissolved solids, total suspended solids, biochemical oxygen demand and chemical oxygen demand were analyzed as per standard methods as given by APHA (1989)[2].

Bacteriological analyses of the Soil samples: One gram of soil sample was mixed with 9ml of sterilized water and shook vigourously. 1ml of this mixture was then mixed with 9ml sterilized water to make 10^{-2} dilutionand in the same pattern upto 10^{-4} dilutions were made. 20g of nutrient agar was kept in 1000ml graduated flask and the volume was made upto mark by adding sterilized water. pH of the media was adjusted with the help of cone. NaOH or conc.H_2SO_4 by pH meter. Then the medium was sterilized in autoclave at 15 psi and 120^o C for 20min and cooled to a pouring temperature of about 37^oC. Serial soil dilutions were prepared for proper counting of the bacterial population. 1ml of the required dilution was spread evenly on the petriplates containing agar to determine the number of populations per g soil

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incubation of the petriplates was done in the laboratory set at 35(+/- 2)^{o} C[3].

III. RESULTS AND DISCUSSION :

The parameters analyzed for the textile mill effluents are presented in table 1. The results revealed the high levels of pH(8.2) and fell within the permissible limits. The effluent pH was towards the higher value indicating the alkine condition and thus will have an adverse effect on the soil permeability as well as on soil microflora. The values of TDS and TSS were 4562 mg l^{-1} and 212 mg l^{-1} respectively which exceeded the permissible limits and were high in respect of the control sample indicating soil pollution. The concentration of solids is another matter of concern and the carcinogenicity of the dyes used adds to it. The values of BOD (192.5mg l^{-1}) and COD (3684.2 mg l) as compared to the control sample indicated high level of pollution of effluent discharged from the textile mill into the environment. The high BOD Value are indicators of pollutional strength of water and effluent. They also indicate the less oxygen availabity in the wastewater for living beings. The high level of COD value indicated the toxicity of the effluents and the presence of huge amount of biologically resistant organic substances[4,5,6,7,8].The results in Table 2 indicated a decrease in the bacterial soil microflora as compared to the control. The textile mill effluent polluted the soil to a greater extent , which might be due to the higher BOD and COD values of the effluents.The intensity of the colour change was also noticeable when the dilutions of soil samples were compared (Table 3) . The results showed that the bacterial counts decreased due to pollution of the soil samples by the effluents from textile mill.

Table 1. Physico-chemical analysis of the textile effluent sample.

Parameters	Effluent	FMENV limit	NEQS/BIS limit
pH	8.2	6-9	5.5-9.0
TDS	4562	2000	2100
TSS	212	30	200
BOD	192.5	50	100
COD	3684.2	80	250

TDS total dissolved solids, TSS Total suspended solids, BOD Biochemical oxygen demand, COD Chemical oxygen demand.

Table 2. Bacterial count in the effluent contaminated soil samples.

Sample	Bacterial count (cfu×10^{3})
Control	350
Contaminated soil	180

Table 3. Change of colouration of agar agar after 48h of incubation

Sample	Dilution	Colour of Agar agar
Control soil sample	10^{-2}	Yellow
	10^{-3}	Yellow
Effluent Contaminated Soil Sample	10^{-2}	Dark brown
	10^{-3}	Muddy brown

IV. CONCLUSION:

In developing country like India small scale industrial units such as textile mills from a major industry and in fact treatments of textile mill effluents are not taken care of. The costs of water treatment add to woes of the sick smaller units. As a result, the important parameters like pH, TDS, TSS, BOD and COD are always above the permissible limits. These effluents exert deleterious effects on the soil near the vicinity of effluent discharge. The present investigation revealed that the effluents made the soil unsuitable for any type of cultivation of crops or vegetables. The ammonifying bacteria dominated flourishing in the soil samples. The elevated levels of TSS and TDS are the major cause of concern due to increased incidence of cancer.

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REFERENCES:

[1]. Deka, G, Bhattacharyya, K.G, 2007 "Physico-chemical characterization of soil in and around a textile mill at Rangia- A case study", Indian Journal of Environment Protection 27(7):631-633.

[2]. APHA (American Public Health Association), American Water Works Association and Water Pollution Control Federation. 1989 standared methods for the examination of water and wastewater 17th edition. APHA, New York, USA.

[3]. Harley J.P. and Prescott LM. 1993, Basic laboratory and culture techniques. In: Laboratory exercises in Microbiology. 2nd edition. 1993. W.C. Brown Publishers, Dubuque. Pp. 14-46.

[4]. Sawyer CC. and McCarty PL. 1978, Chemistry for environmental engineers. McGraw Hill, New York. Pp. 331-514.

[5]. McMullan G. Poonam NS. Franklin S. and Oxspring D. 1995,"Bioremedation and Chemical analysis of textile industry Waste Water". Biotechnol. Let. 17:760-764.

[6]. Robinson T. Chandran B. and Nigam P. 2002,"Textile effluent decolourization and dye-adsorbed agricultural residue biodegradation". Biores. Tech. 84:299-301.

[7]. Yusuff RO. and Sonibare JA. 2004,Characterization of textile industries effluents in Kaduna, Nigeria and Pollution implicatios.

[8]. Geetha A. Palanisamy PN. Sivakumar P. Ganesh PK. and Snjatha M. 2008 "Assessment of underground water contamination and effect of textile effluents on Noyal river basin in and around Tirupur town, Tamil Nadu". E.J. of Chem. 5(4):696-705.