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Experimental Study of Waste Management System for Malpani Group of Tobacco Industry

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Abstract—The tobacco industry is one of the most profitable industries in the worlds. The tobacco industry damages the environment in many ways. The harmful impact of the tobacco industry are deforestation, climate change, litter, and forest fires is enormous and growing. The manufacturing of tobacco products also produces an immense amount of waste Tobacco wastewater which contains many toxic chemical compounds and also the heavy metals which may have adverse impact on the environment and human health. To study the toxicity or genotoxic potential of the wastewater various test were conducted and compared with the other industries.After which the remedial measures to reduce the heavy metal concerntration were suggested by using eichornia.

Keywords–Tobacco industry, liquid waste, solid waste, Heavy metals.Eichornia.

I. INTRODUCTION

The tobacco industry is one of the most profitable industries in the world. Tobacco companies use their enormous wealth and influence both locally and globally to market their deadly products. Even as advocacy groups and policy makers work to combat the tobacco industry's influence, new and manipulative tactics are used by tobacco companies and their allies to circumvent tobacco control efforts. It is important for tobacco control advocates to know whichcompanies are present in their country, how and where they operate, the types and quantity of products sold, and marketing tactics used to sell tobacco products. By being informed about all aspects of the tobacco industry within a country, advocates are better equipped to fight for effective tobacco control policies. The tobacco industry damages the environment in many ways, and in ways that go far beyond the effects of the smoke that cigarettes put into the air when they are smoked. The harmful impact of the tobacco industry on deforestation, climate change, litter, and forest fires is enormous and growing

Damage to environment

The tobacco industry damages the environment in many ways, and in ways that go far beyond the effects of the smoke that cigarettes put into the air when they are smoked. The harmful impact of the tobacco industry on deforestation, climate change, litter, and forest fires is enormous and growing.Tobacco farming is a complicated process involving heavy use of pesticides, growth regulators, and chemical fertilizers. These can create environmental health problems, particularly in low- and middle-income countries with lax regulatory standards. In addition, tobacco, more than other food and cash crops, depletes soil of nutrients, including nitrogen, potassium, and phosphorus. As a result, in many low- and middle-income regions of the world, new areas of woodlands are cleared every year for tobacco crops (as opposed to re-using plots) and for wood needed for curing tobacco leaves, leading to deforestation. This deforestation can contribute to climate change by removing trees that eliminate CO2 from the atmosphere..Litter from cigarettes fouls the environment as well. Internationally, cigarette filters (which are not generally biodegradeable) are the single most collected item in beach cleanups. Material that leaches out of these filters is toxic to aquatic life. To combat this, a bill to ban the sale of single-use filtered cigarettes was submitted to the California Legislature in 2014.

II. LITERATURE REVIEW

AkinsemoluAdenike , 2014 studied that Tobacco wastewater contains many toxic chemical compounds, which may have adverse impact on the environment and human health. To study the toxicity or genotoxic potential of the wastewater, biological tests, such as Ames Salmonella test and SOS Chromotest test were employed. The variability of the results obtained from the entire tests, show a correlation of mutagenic and genotoxic potential of the wastewater. Microbiological and physicochemical analyses were also carried out. The wastewater contained a large number of bacteria: (9.78 X 107 ± 2.00 X 107) and fungi: (3.83 X 104 ± 1.10 X 104). Microorganisms isolated from this study are Staphylococcus cohnii, Anaerococcushydrogenalis, Propionibacterium acne, Proteus vulgaris, Vibrio vulnificus, Penicillium sp., Aspergillusfumigatus, Aspergillusniger and Rhodotorulaglutinis. These microorganisms have been linked with varieties of diseases in living organisms. Physicochemical analysis of the wastewater shows that it contained constituents that can induce mutation in living systems.

Azza I Hafez*, Maaly MA Khedr, and HanaaGadallah 2015 studied that Tobacco industry wastewater generated from one of the factories of the Eastern Tobacco Company in Egypt, contains some toxic contaminants which inhibit, due to the shock loadings, the microbial consortium in biological treatment plants. Therefore, chemical coagulation/flocculation, chemical oxidation with hydrogen peroxide, ozone and ultra violet lamp, and finally, electrocoagulation treatment techniques were investigated in the present work.

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Sangya S. Bais1, Kapil Lawrence1, Vriddhi Nigam 2015 studied that The pollutants discharged into the environment pose a serious threat living organisms. In view of this, levels of some heavy metals like Cd2+, Fe3+and Ni2+ were determined in water samples collected from the waste water bodies formed due to domestic sewage and slum areas in Allahabad nearby regions. The levels of heavy metals were determined by Atomic Absorption Spectroscopy. The results obtained shows the pattern of the sites having highest heavy metal accumulation in the plant was Cd2+> Ni2+> Fe3+. The degree of water phytoremediation from these sampling sites followed the order: rainy>winter> summer seasons. The main objective of the study is the tremendous capacity of E. crassipes to reduce and absorb toxic heavy metals and other pollutants from wastewater bodies

Anjali Verma, Ram NareshBharagava, Venkatesh Kumar, Ashima Singh, NamitaDhusia, Nandkishor More 2016 studied that Heavy metal pollution in an aquatic ecosystem due to anthropogenic activities poses a major threat to its viability and environmental sustainability. The present study is an attempt to investigate metal accumulation potential of metals Cd, Fe and biochemical aspects of aquatic macrophytesEichhorniacrassipes and Trapanatans as a model phytoremediation tool. Investigations have been carried out using Atomic Absorption Spectrophotometer and biochemical parameters of Chlorophyll, Protein, Proline, Malondialdehyde (MDA), Nitrate and Nitrite content. Our observations indicate that Eichhorniacrassipes have high accumulation efficiency of Fe over Trapanatans. Among the plant parts, roots showed the high metal accumulation potential as compared to shoot. However on high concentration, metal accumulation photosynthetic pigments and protein content is reduced.

III METHODOLOGY

1. Area Study: The study was carried out at a Tobacco Company. The industrial area utilizes a lot of fresh water per day. However, specific amount of water used was not documented. The effluent discharge, treated and untreated is released into neighbouring environment.

2. Sampling of the Industrial waste water effluent and Sample Preparation: The industrial waste water effluent samples (number of samples collected, *n*=4) were collected randomly from all discharge points of the tobacco company malpani group of industries. Polythene bottles of 2.5 L and major 2.0 L were used to collect the grab water samples.

3. Physiochemical Analysis: Analysis Of Water QualityFor the assessment of water pollution status of the water bodies the following water quality parameters are analyzed:

a. Measurement of Temperature: The temperature is measured by using digital thermometer the thermometer is dipped in the sample and the temperature is recorded.

b.Measurement of pH: The pH is important parameter of water, which determines the suitability of water for various purposes such as drinking, bathing, cooking, washing and agriculture etc.

c. Measurement of DO: The determination of dissolved oxygen present in River is very important, because aquatic life of river is depend upon DO and minimum 4 ppm DO is required to survival of aquatic life.

d. Measurement of BOD: Biological Oxygen Demand (BOD) is a measure of the oxygen used by microorganisms to decompose this waste.

e. Measurement of COD: Chemical oxygen demand is related to biochemical oxygen demand (BOD), another standard test for assaying the oxygen demanding strength of waste waters.

f. Measurement of TS: Total suspended solids are those solids which are retained by the filter of 1 micro m pores, and they are, therefore, also called as non-filterable solids.

g. Measurement of Turbidity: Determine turbidity as soon as possible after the sample is taken. Gently agitate all samples before examination to ensure a representative measurement. Sample preservation is not practical, begin analysis promptly.

h. Measurement of Heavy Metals: Each acid digested water sample of 100 cm^3 was taken in the beaker and the beaker was kept in an oven at 70°C to reduce the volume of the water up to 50 cm^3. The concentration of Cd, Co, Cr, Cu, Ni, Pb and Zn in each water sample were determined by using an Atomic Absorption Spectrometer.

IV. RESULTS AND CONCLUSION

Table No.1 represents the characteristics of five grab wastewater samples collected during year 2017, (each sample was the average of three collected samples/month) from the final effluent. The wastewater samples are characterized by remarkable brown color, acidity, high COD, BOD and SS.

Parameter	Sample No1	Sample No2	Sample No3	Sample No4	Sample No5
Color	dark yellow	yellow	yellow	dark yellow	dark yellow
Turbidity, NTU	250	403	312	419	Nil
PH	4.87	4.0	5.0	5.4	Nil
TSS, mg/L	2235	611	2112	1905	400
D.S, mg/L	1565	580	1513	419	400
SS, mg /L	391	420	890	971	Nil
COD, mg /L	5316	3987	5611	4046	980
BOD, mg /L	724	1818	795	2217	800

Table 1: Wastewater Characteristics for Final Effluent

Treatment of tobacco effluent by coagulation experiments yields negative results in case of using the two inorganic coagulants: alum and ferric chloride as well as the three commercial polymers: anionic, cationic and nonionic to treat

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tobacco effluent. While the use of calcium oxide (CaO) exhibits fairly good removal percent. As observed, increases in the COD and SS removal percent is accomplished by increases in the coagulant dose, except that the removal rate of SS is much higher than that of COD, e.g., at 25 mg/l CaO dose, about 45% and almost 70% removals of COD and SS are achieved respectively.

Table no 2(a) and Table 2(b)represents the characteristics of five grab wastewater samples collected during year 2017, (each sample was the average of three collected samples/month) from the final effluent. The table shows the heavy metal analysis of ink waste and gum waste respectively.

Parameter	**Unit**	**Result**	**CPCB guidelines HAZwams/ 2009-2010**
Lead	mg/kg	4556	5000
Chromium (III)	mg/kg	4176	5000
Copper	mg/kg	4325	5000
Nickel	mg/kg	4717	5000

Table 2(a): Heavy Metal Analysis Final Effluent of INK waste

Parameter	**Unit**	**Result**	**CPCB guidelines HAZwams/ 2009-2010**
Lead	mg/kg	4196	5000
Chromium (III)	mg/kg	4280	5000
Copper	mg/kg	4220	5000
Nickel	mg/kg	4684	5000

Table 2(b): Heavy Metal Analysis Final Effluent of GUM waste

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