

Agricultural Waste Materials as Potential Adsorbent for Treating Industrial Waste Water

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ABSTRACT

Nowadays, the people suffer a lot due to water pollution and it becomes a serious problem. Therefore, it is very important to minimize the water pollution and utilize the treated waste water for domestic purpose. The principle objective of waste water treatment is to use the water for the domestic purpose without causing any damage to the human health and environment. The waste water from dyeing industries is treated by using agricultural waste such as Saccharum Officinarum leaves, Curcuma Longa leaves, CocosNucifera shell, Rice husk and Saw dust and compares the physical properties of this treated water with the distilled water and drinking water. The agro waste added as 10g, 20g and 30g to the 1000 ml wastewater and leaves it for a period of 1day, 3days, 5days, 7days and 9days and then tested. As a result, addition of 20g of CocosNucifera shell powder in 1000 ml waste water reduces pH and concentrations greatly than other agricultural waste used. Then the color of wastewater can be removed by using coconut shell ash within a period of 2 to 3 days. This study is conducted for the purpose of knowing how efficiently the wastewater could be treated and utilized for domestic purpose using low cost adsorbent such as agricultural waste.

KEYWORD: Water pollution, CocosNucifera, Curcuma Longa, Ricehusk, Saw dust etc

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1. INTRODUCTION

1.1. General

Among the various known form of pollution, water pollution is of great concern since water is the prime necessity of life and extremely essential for the survival of all living organisms. However, years of increased industrial, agricultural and domestic activities have resulted in the generation of large amount of wastewater containing a number of toxic pollutants, which are polluting the available fresh water continuously. With the realization that pollutants present in water adversely affect human and animals life, domestic and industrial activities, pollution control and management is now a high priority area. The availability of clean water for various activities is becoming the most challenging task for researchers and practitioners worldwide.



Fig: 1.1 Dyeing Wastewater

1.2. Location of Wastewater sample collected

AREA : CTEP (Common Effluent Treatment Plant), SIPCOT Industrial Growth Centre, Perundurai

QUANTITY : 24 Liters

COLOR : Violet color

PH : 10.24

TDS : 2420 mg/L

1.3. Materials Used

Table: 1.3.1 Properties of Curcuma Longa Leaves Powder

PROPERTIES	VALUES
Carbon	22%
Nitrogen	31
Moisture content	4.6
Calcium oxide	3.8
Ferrous oxide	29
Aluminum oxide	22
Sulphur trioxide	0.56
Manganese oxide	2.3
Density	0.58 Kg/m ³
Potassium oxide	2.7
Sodium oxide	1.2

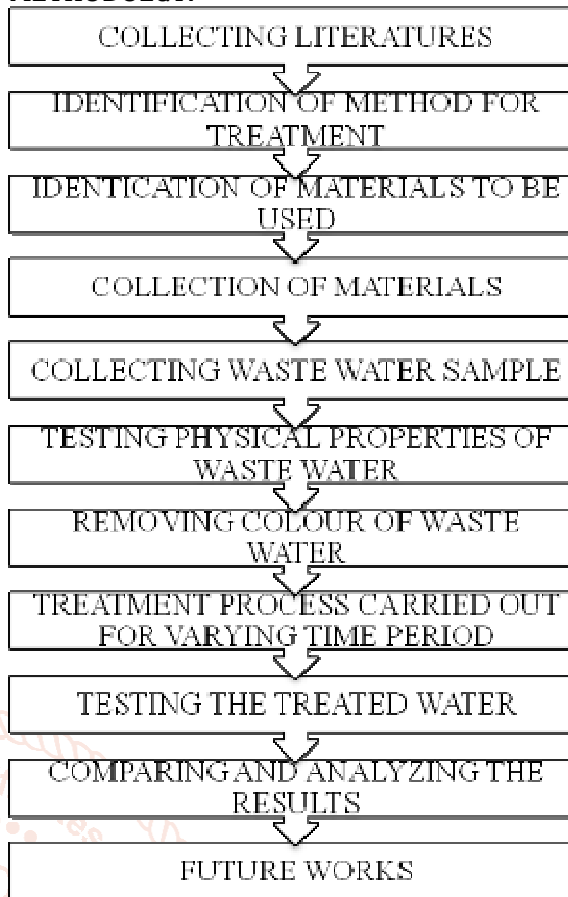


Fig: 1.2 SaccharumOfficinarum Leaves Powder

Table: 1.3.2 Properties Of SaccharumOfficinarum Leaves Powder

PROPERTIES	VALUES
Carbon	14%
Nitrogen	22
Moisture content	56.6
Potassium	3
Iron	10
Copper	3
Ash Content	4%
Manganese Oxide	17
Hydrogen	6
Density	417 Kg/m ³

2. **METHODOLOGY:**



3. **MATERIALS**

3.1. **TREATMENT PROCESS**

3.1.1. **COLOUR REMOVAL**

The Dyeing wastewater collected from the industries is of initially violet colour. Therefore, it is necessary to remove the colour from wastewater before it undergoes treatment process. For colour removal, activated carbon of coconut shell ash is used and it is left for two to three days for settle down of particles. After two to three days, particles have been settled down along with coconut shell ash and the colour has been completely removed.

3.1.2. **TREATMENT USING AGRICULTURAL WASTE**

10g, 20g, 30g of each agricultural waste were added to the separate 1000ml beake containing wastewater. These samples after mixing with agricultural waste were left out for 3days, 5 days, 7 days and 9 days. After the treatment period of 3days, 5days, 7days and 9days, these samples were filtered using the filter paper and then tests has been carried out. Once the testing has been these samples were again treated with the coconut shell ash for removing the colour of wastewater. The agricultural wastes used for treatment were Curcuma Longa Leaves, SaccharumOfficinarum Leaves, CocosNucifera shell, Rice husk and Saw dust. Then the tested result should be compared with the physical characteristics of distilled water and drinking water.

3.2. **PHYSICAL CHARACTERIZATION**

DETERMINATION OF VOLATILE AND FIXED SOLIDS

The four numbers of cleaned and dried crucibles were weighed and 10 ml of samples were added. The crucibles were kept in a muffle furnace for 20 minutes. After the complete evaporation of water samples, the crucible can be cooled for sometimes and then weighed.

4. **RESULT AND DISCUSSION**

TABLE: 5.1 PH OF TREATED WASTEWATER

SAMPLES	TEMPERATURE (°C)	AGRICULTURAL WASTE MATERIALS	PH		
			10g	20g	30g
A (Day 1)	28	Sugarcane leaves powder	10.2	10.16	10.22
		Turmeric leaves powder	10.19	10.12	10.2
		Coconut shell powder	10.1	10.04	10.16
		Rice husk powder	10.13	10.18	10.21
		Saw dust powder	10.11	10.08	10.19
B (Day 3)		Sugarcane leaves powder	10.11	9.86	9.77
		Turmeric leaves powder	10.15	9.89	9.83
		Coconut shell powder	9.10	9.68	9.87
		Rice husk powder	9.8	9.3	9.73
		Saw dust powder	9.5	9.7	9.91

C (Day 5)	Sugarcane leaves powder	9.21	9.3	9.43
	Turmeric leaves powder	10	9.7	9.12
	Coconut shell powder	8.6	9.2	8.01
	Rice husk powder	9.2	8.91	9.1
	Saw dust powder	9.1	8.93	9.36
D (Day 7)	Sugarcane leaves powder	9.08	8.9	8.92
	Turmeric leaves powder	9.16	8.8	8.78
	Coconut shell powder	8.2	8.79	8.63
	Rice husk powder	8.7	8.63	8.76
	Saw dust powder	8.6	8.52	8.81
E (Day 9)	Sugarcane leaves powder	8.64	8.41	8.6
	Turmeric leaves powder	8.89	8.5	8.59
	Coconut shell powder	7.9	7.8	8.38
	Rice husk powder	8.3	8.42	8.49
	Saw dust powder	8.1	8.36	8.4

Chart: 5.1 pH value of addition of 10g of Agricultural waste Materials

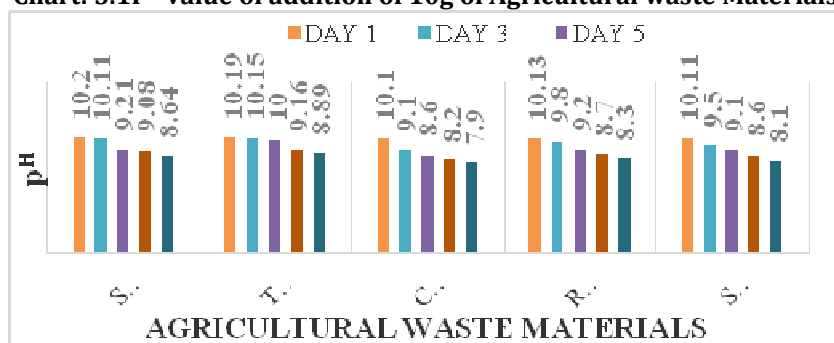


Chart: 5.2 pH value of addition of 20g of Agricultural waste Materials

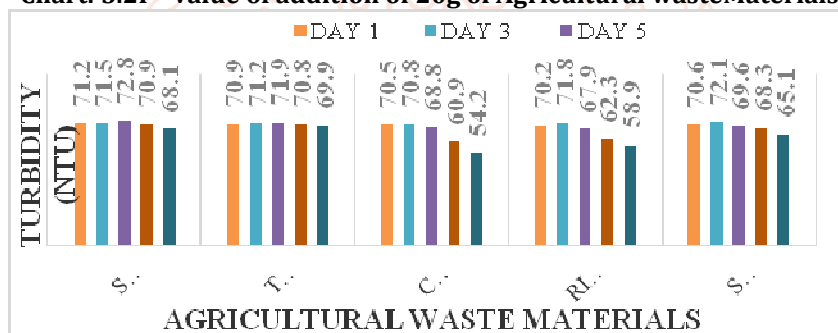


TABLE: 5.2 TURBIDITY OF TREATED WASTEWATER

SAMPLES	TEMPERATURE (°C)	AGRICULTURAL WASTE MATERIALS	TURBIDITY (NTU)		
			10g	20g	30g
A (Day 1)	28	Sugarcane leaves powder	71.2	71.3	71.4
		Turmeric leaves powder	70.9	71.6	71.9
		Coconut shell powder	70.5	71.7	72.3
		Rice husk powder	70.2	71	71.5
		Saw dust powder	70.6	71.8	71.2
B (Day 3)		Sugarcane leaves powder	71.5	70.9	70.9
		Turmeric leaves powder	71.2	71.3	71.2
		Coconut shell powder	70.8	70.2	69.6
		Rice husk powder	71.8	70.1	69.8
		Saw dust powder	72.1	69.6	69.6
C (Day 5)		Sugarcane leaves powder	72.8	70.2	70.3
		Turmeric leaves powder	71.9	70.9	70.8
		Coconut shell powder	68.8	63.7	66.7
		Rice husk powder	67.9	63.6	65.9
		Saw dust powder	69.6	67.9	67.1
D (Day 7)	Sugarcane leaves powder	70.9	69.8	69.6	
	Turmeric leaves powder	70.8	70.5	70.1	
	Coconut shell powder	60.9	59.8	59.8	
	Rice husk powder	62.3	68.1	62.7	
	Saw dust powder	68.3	67.2	66.4	

E (Day 9)	Sugarcane leaves powder	68.1	69.6	68.2
	Turmeric leaves powder	69.9	70.2	69.8
	Coconut shell powder	54.2	54.4	55.3
	Rice husk powder	58.9	59.3	58.1
	Saw dust powder	65.1	65.7	65.9

Chart: 5.3 Turbidity value of addition of 10g of Agricultural waste materials

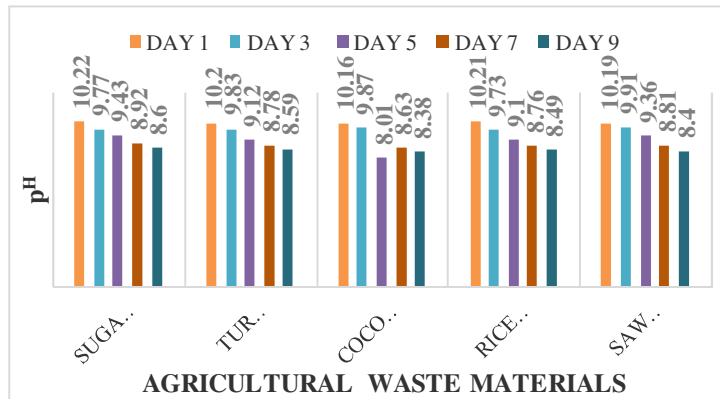


TABLE: 5.3 CONDUCTIVITY OF TREATED WASTEWATER

SAMPLES	TEMPERATURE (°C)	AGRICULTURAL WASTE MATERIALS	CONDUCTIVITY (µmho)		
			10g	20g	30g
A (Day 1)	28	Sugarcane leaves powder	558	549	581
		Turmeric leaves powder	551	546	576
		Coconut shell powder	540	523	568
		Rice husk powder	549	526	572
		Saw dust powder	569	534	579
B (Day 3)		Sugarcane leaves powder	572	562	548
		Turmeric leaves powder	569	568	531
		Coconut shell powder	544	542	544
		Rice husk powder	509	539	552
		Saw dust powder	540	548	547
C (Day 5)		Sugarcane leaves powder	591	587	565
		Turmeric leaves powder	578	581	557
		Coconut shell powder	492	559	558
		Rice husk powder	478	579	568
		Saw dust powder	490	569	559
D (Day 7)	Sugarcane leaves powder	530	546	529	
	Turmeric leaves powder	545	539	521	
	Coconut shell powder	401	487	476	
	Rice husk powder	446	492	491	
	Saw dust powder	455	476	487	
E (Day 9)	Sugarcane leaves powder	498	482	503	
	Turmeric leaves powder	479	471	493	
	Coconut shell powder	368	353	386	
	Rice husk powder	430	421	442	
	Saw dust powder	426	419	439	

5. COMAPRISON

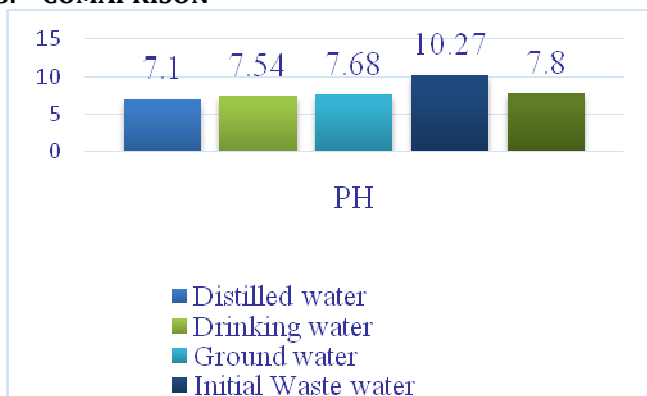


Chart: 6.1 PH Value of Different Types of Water

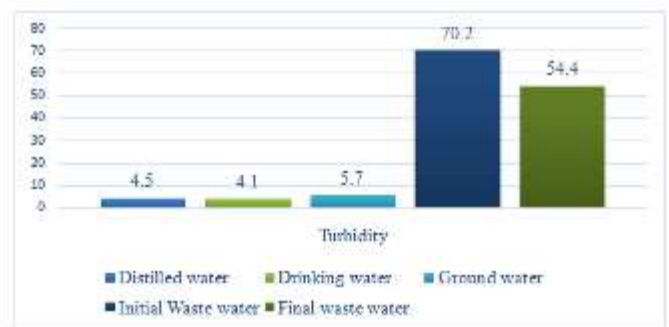


Chart: 6.2 Turbidity Value of Different Types of Water

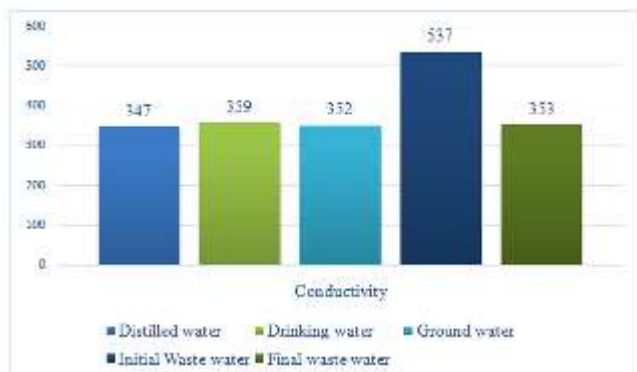


Chart: 6.3 Conductivity Value of Different Types of Water

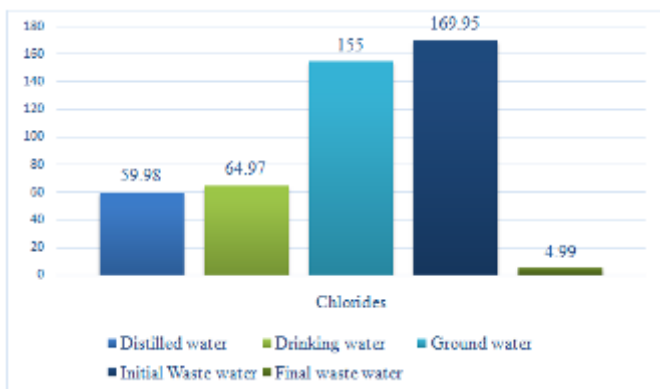


Chart: 6.4 Chlorides Value of Different Types of Water

6. CONCLUSION

The study on the wastewater treatment is a promising work as there is always a need to overcome the problem of water pollution. As from the above results, Cocos Nucifera shell powder is one of the best agro waste among all other agro waste used which reduces the concentration of wastewater

to a maximum of 480 mg/L with a addition of 20g of agro waste at the end of treatment period of 9 days. And also it is clear that increase in the addition of agro waste increases the concentration of wastewater.

So that from the result it is concluded that the wastewater after undergoing a treatment period of 9 days with Cocos Nucifera shell powder of 20g can matches the properties of surface water from comparison analysis and hence this treated water is used for irrigation purposes.

Environmental pollution and also helps in the efficient use of agricultural waste.

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