Degradation studies of cochineal extract to promote natural colorants use in textile industry

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INTRODUCTION

Natural colorants are utilized to replace synthetic colorants due to their toxic effect on the environment [1]. Cochineal (*Dactylopius coccus* costa) is an insect applied as staining, since colonial time in México [2].

Photo 1. Cochineal production

Photo 2. Cochineal natural and ground

Carminic acid is obtained from its extract and has been used to dye fibers [3]. During this process, a red colored effluent is generated. It's unknown its impact on environment. It is necessary to develop studies to determine its degradability and toxicity. It has been proposed use of ligninolytic fungi to degrade pigments applied to colored effluents [4].

In this study a white rot fungus, *Trametes versicolor* CDBB-H-1051, was added to an effluent with cochineal extract to determine fungal degradation [4].

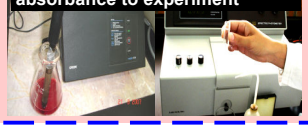
Photo 3. Fungus, *Trametes versicolor* CDBB-H-1051

MATERIALS AND METHODS

Exp.	Effluent (20ml)	treatment (20ml)	Glucose (5g/L)	Fungus (5%)
1	C	K	S	S
2	C	A	S	S
3	C	K	C	S
4	C	A	C	S
5	C	K	S	C
6	C	A	S	C
7	C	K	C	C
8	C	A	C	C
C1*	C	K	S	C
C2*	C	K	C	C

Table 1 . Experimental design. K= Kirk's media; A= Water; S= Without; C=With. *sterilized samples

Photo 5. Measurement of pH and absorbance to experiment



Fungus *Trametes versicolor,* was exposed to effluent in a liquid system with Kirk's media or water, with or without glucose considering an experimental design, Table 1. System incubated at 125 rpm, 28°C±1; during 18 days.

Photo 4. System incubated at 125 rpm, 28°C±1; during 18 days

Variables studied were pH, and discoloration of color with absorbance at λ = 494 nm.

RESULTS

Photo 6. Experiments: 5, 6, 7, 8 at the end of treatment

Photo 6 shows fungus was able to decolorize the effluent at differents concentrations on the experiments 5, 6, 7, and 8.

Exp.	pH (0 hr)	pH (18 días)	ABS (0 hr) λ= 494 nm	ABS (18 días) λ= 494 nm
1	6.93	7.47	2.7357	2.6033
2	7.07	7.78	2.7237	2.6593
3	6.34	7.43	2.8336	2.7337
4	6.77	7.79	2.9043	2.7047
5	5.48	8.19	2.9777	1.3853
6	6.25	8.24	2.8997	2.8273
7	5.19	7.68	2.9193	0.9607
8	5.85	8.18	2.9647	1.3467
C1	6.56	6.18	2.6243	2.5597
C2	6.59	6.06	2.6260	2.5640

Table 2 . Results of pH and absorbance from all experiments .

Results of pH and absorbance are shows in the Table 2, Sample analysis was performed at the beginning and the end of experiment. Experiment 7 had the most discoloration of the color in the effluent, follow experiment 8 and later experiment 5.

Photo 7. Experiment 7 at end of treatment

CONCLUSIONS

Photo 8. Experiments: C2, C1, 1, 2, 3, 4, 5, 6, 7, 8 at the end of treatment

1)Experiment 7 had the most discoloration of the color in the effluent, see Table 2, this experiment was exposed to effluent in a liquid system with solution Kirk's media, glucose and fungus.

2)Also experiments 5 and 8 had a good discoloration of the effluent. The experiment 5 was exposed to effluent with Kirk's media, without glucose and with fungus; the experiment 8 was exposed to effluent with water, glucose and fungus.

3)Fungus T. versicolor was able to reduce color in the system compare with the control without fungus. This study will establish condition for treatment of textile effluent and increase natural color applications.

4)This is a discoloration preliminary study on an effluent from cotton dying with cochineal.

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