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# Biodeclorization of Congo red Dye by using two species of Fungi

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## Abstract

This research is interested in using the two species of fungi such as *Aspergillus terreus* and *Asp. flavus* for Biodegradation of Congo red dye as industrial and Carcinogenic dyes,The results showed that *Asp. flavus* was the more efficient from *Asp. flavus* in Biodegradation of the Congo red dye. The percentage of Bio decolonization about 46.89% during incubation at 72 hours, while when use *Asp. terreus* the percentage of Bio decolonization was about 34.59% during same time of incubation.

**Keywords**; congo red; biodecolorization, pollution.

## Introduction

Textile dye produces huge amount of polluted effluents that are normally discharged to surface water bodies and ground water aquifers. These wastewater causes damages to the ecological system of the receiving surface water capacity and certain a lot of disturbance to the ground water resources. Most of the dyes are used in the textiles industries are stable to light and are not biodegradable. In order to reduce the risk of environmental pollution from such waste [1].

It is necessary to treat them to before discharging it receiving in the environment. Today more than 10,000 dyes such as congo red (figure 1)have been incorporated in color index [2]. In order to remove hazardous materials like dyes, adsorption is a method which has gain considerable attention in the recent few years adsorption is such a useful and simple technique [3].Industrial and sewage water containing colored dyes on chemical contaminated and harmful so it became necessary for the time being this water treatment for danger on the environment[4,5]

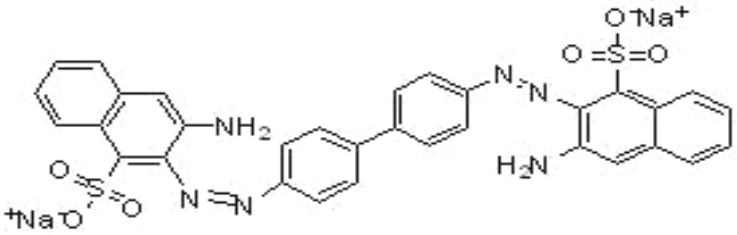

**Fig. 1:**The chemical structure of a- Congo Red dye

In recent years, fungi used in many research and intensely on the removal of dyes from wastewater[6].

Textile industry produces a large amount of liquid waste that can cause serious environmental problems. It is estimated that the liberalization of 10-15% of dyes in the treated water[7] which is responsible for colors dyes affect the photosynthetic activity in aquatic life by reducing the intensity of light propagation may also be toxic to some aquatic animals and plants due to the presence of aromatic materials, metals, chlorides[8].

The best way for the removal of color from effluent is chemical coagulation. Synthetic dyes are coloring agents mainly used in textile industries which generate a huge amount of waste water in the process of dying. It is estimate that these industries discharge around 28,000 tons of dyes worldwide every year in the environment.[9] In This studied examination of the fungi toward biodegradation of as industrial and Carcinogenic dyes such as Congo red dye by used the two species of fungi were *Asp. terreus* and *Asp. flavus*.

## Materials and Methods

## Preparation The fungal inoculums

After isolate The fungus from soil ,The fungal inoculum was attended the audacity to take disk of a fungal culture seven days old by using a cork borer diameter of 5 mm and add 10 ml of sterile distilled water to the fungal disk [10].

## Preparation Dye Solution

The dye Congo red (Chemical formula=C23H22N6O6S2Na2, Formula weight=696.65g.mol-1) supplied by BHD Chemicals. The solution of Congo red were prepared by dissolving appropriate amounts (accurate weighed) of dry powdered dye in double distilled water to prepare Stock solution(1000 mg $L^{1}$). The experimental solution was obtained by dilutions were made to obtain the working solution at desired concentrations[11].

## Experimental

## Effect of speciesfungion the Dye

Add The fungal inoculum Previously the record to 100ml of congo red solution of the solution Congo red was measured and added to the content in each conical flask. The content was shaken rigorously and continuously for 30,60,90,120,150, 180, 210, 240, 270, and 300 min respectively. The particles of the adsorbent was separation by centrifuged from solution to obtain the equilibrium concentration.

The final concentration of Congo read was estimated for each sample spectrophotometrically at the wavelength corresponding to maximum absorbance for Congo red (λmax=498nm) using a

spectrophotometer (UV/VIS-Jenway ,6800, German) as in the Figure 1. A graph of removal Congo read percentage (g/L) versus time (hour) was plotted for Congo red. Generally the amount of dye removal was calculated from following equation:

**Biodecolorization% = $(A° - A) / A° \times 100$**

$A^o$ and A is the absorbance of concentration of dye before and after Biodecolorization respectively[11, 12].

## Results and Discussion

The results of this research show that more efficient use of *Asp. flavus* in Biodecolorization Congo red dye from the use of *Asp. terreus*, The results showed that the amount of absorbance decreases with time treatment, so that the concentration of dye is decrease.

When used *Asp. flavus* the absorption of Congo red during 72 hours of treatment become 0.4816 compared with control while the absorption when used *Asp. terreus* at 72 hours about 0.5932 (figure 2,3,4).

Change in the color of the dye from red to colorless gradually has been observed when using fungal. It was rated assessment of the deterioration / decolourization as the disappearance of the color of the plate Petri, during the growth of fungal mycelium.

Congo red dye, has applied fungus showed a positive result and biodegradable. The color of this dye has turned to pale, finally the current yellow zone around the mycelium. A small part of the dye has also accumulated applied mushrooms, mycelium have turned to red[13].

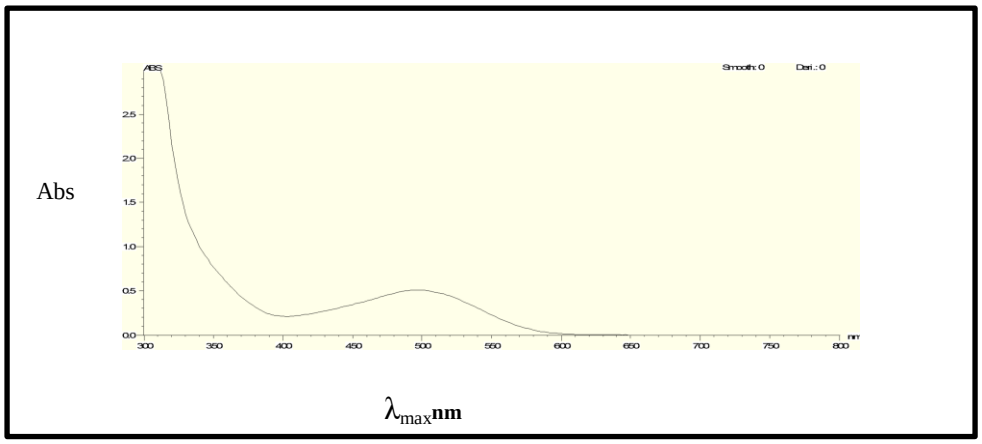


**Fig.2**:$\lambda_{max}$length Estimateof Congo red dye.

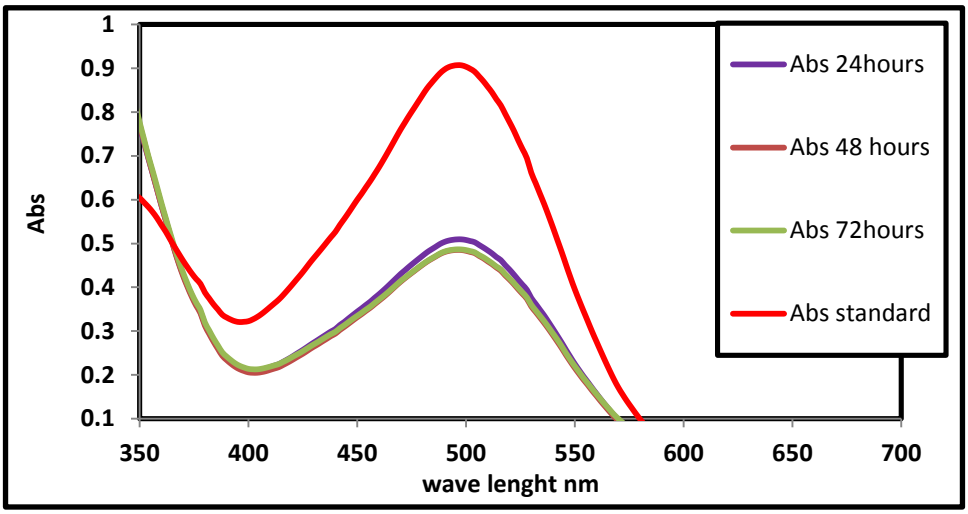


**Fig.3:**removal Congo read percentage by using *Aspergillus flavus.*

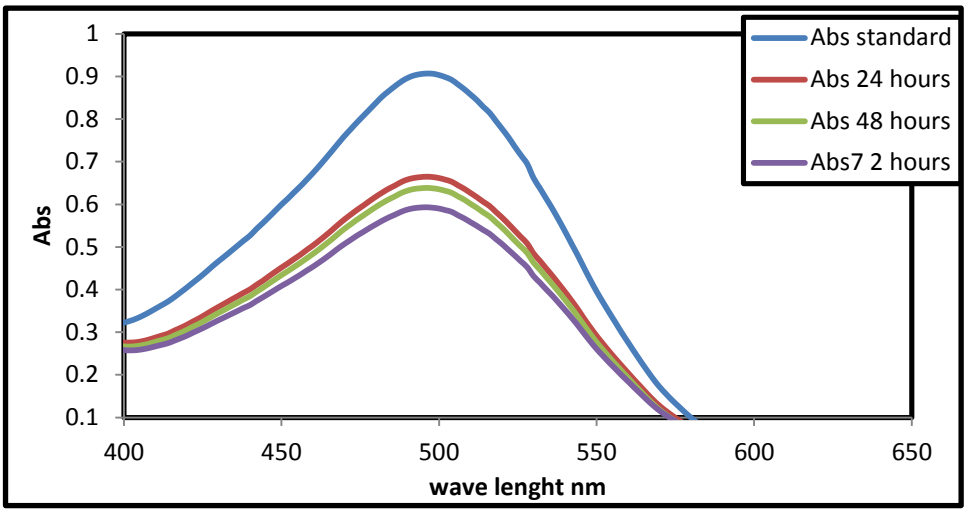


**Fig.4:**removal Congo read percentage by using *Aspergillus terreus.*

When using *Asp. flavus* was removal percentage of dye Congo red about46.89% at 72 hours from treatment compared with removal of dye on the first day of treatment using the same fungus it's about 43.83.%(figure 5,table 1), application of fungal and bacterial strains capable of adsorbing or degrading [14,15,16] of many dye groups which was considered as a source of concern in this field during last year. While Biodegradation percentage of Congo red dye by using *Aspergillus terreus* at 72 hours about 34.59%compared with exposing the dye to the same fungus during the first 24 hours of treatment it's about 26.68%(figure 6,table 1).

Fungal organisms such as *Phlebiatre mellus, Phanerochaete chrysosporium, Tranmetes versicolor, Fusarium oxysporum, Aspergillus flavus and Trichoderm aviride* are also able to decolorize the dyes. Most studies have been limited to the decolourization of a single dye or even to mixtures of dyes. Nevertheless, a biodecolourization system must sustain its ability upon exposure to real wastewater conditions [17].

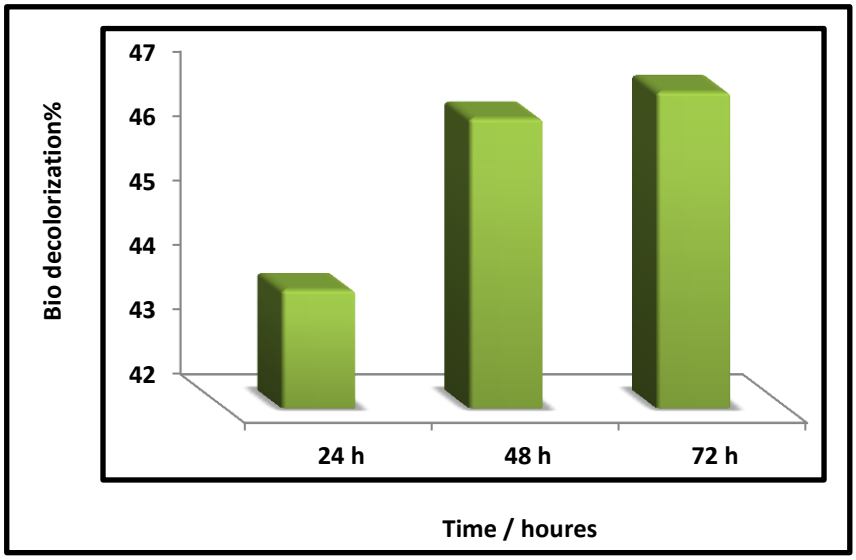


**Fig.5:**percentage of bio decolonization to congo red destroyed by *Aspergillus flavus*

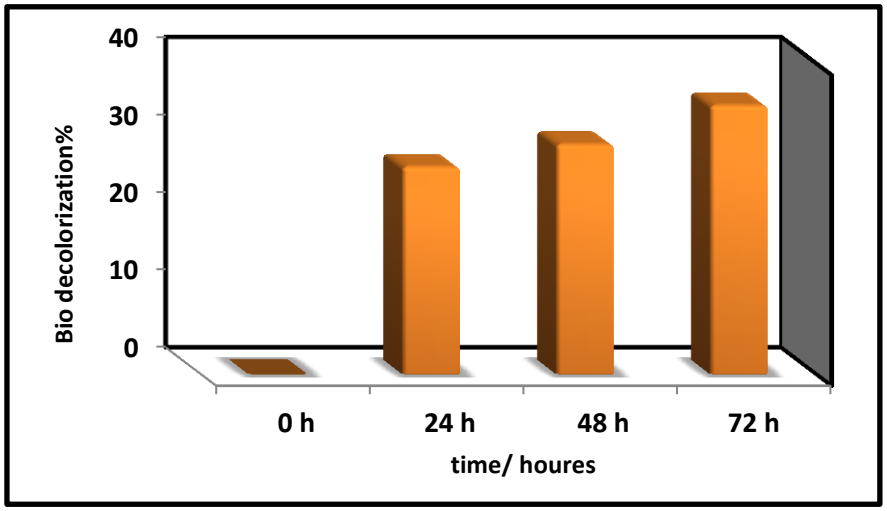


**Fig.6:**percentage of bio decolonization toCongo red dye treated by *Aspergillus terreus*

**Table 1**: percentage of bio decolonization to Congo red dye treated by *Aspergillus flavus, Aspergillus terreus.*

| **Time/hours 24 h** | **percentage of Biodecolorization by fungi** | |
|---|---|---|
| | *Aspergillus flavus* | *Aspergillus terreus* |
| 24 h | 43.83 | 26.68 |
| 48 h | 46.48 | 29.58 |
| 72 h | 46.89 | 34.59 |

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