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RESEARCH ARTICLE

Isolation and Biodegradation Capabilities of Native Fungi of Sanganer Region of Jaipur

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ABSTRACT

The removal of the polluting dyes is an important problem, particularly for small scale industries where working conditions and economic status do not allow them to treat their waste water before disposal and they have no choice other than dumping all effluent into the main stream of water resources. Microbial declourisation and degradation is an environment friendly and cost competitive alternative to chemical decomposition processes (Verma and Madamwar, 2003). In the present study, we focused our attention on the screening of dye decolorizing fungi isolated from the contaminated soil and water samples from Sanganer and the extent of declourisation of synthetic dyes by these isolated fungi.

Key words: Polluting dyes, Microbial declourisation, Biodegradation, Endophyte, Fungi

INTRODUCTION

The term Endophyte refers to the organisms which throughout or part of its life cycle invade the tissues of living plants and cause a symptomatic infections. Endophytic organisms have received considerable attention after they were found to protect their host against insect, pest, pathogens and even domestic herbivorous (Webber, 1981). Almost all the plant species (-400,000) are harbor one or more endophytic organisms (Tan and Zou, 2001). Endophytes are sheltered from environmental stresses and microbial competition by the host plant and they seem to be ubiquitous in plant tissues, having been isolated from flowers, fruits, leaves, stems, roots and seeds of various plant species (Kobayashi and Palumbo, 2000). Leaves, roots, and stems part of one adult plant with healthy appearances were collected from the site area. After the disinfection, fragments of each plant parts were homogenized in 5 ml of sterile distilled water with a blender and prepared three serial dilutions of each sample. 50µl of each dilution of a sample was spreaded onto the media plates of Potato Dextrose Agar for isolation of fungi. The isolation of pure fungal culture can be achieved by single spore culture method. In this technique a previously diluted mixture of fungal spores is spread onto the surface of agar medium. Once discrete, well separated fungal colonies are obtained, then each may be picked up with a sterile needle and transferred to fresh Potato dextrose agar slant. These slants can be preserved as the pure or stock cultures. Microbial decolourisation and degradation is an environmentally friendly and cost competitive alternative to chemical decomposition processes (Verma and Madamwar, 2003).

MATERIALS AND METHOD

Leaves, roots, and stems part of one adult plant with healthy appearances were collected from the site area. The samples were disinfected immediately with water for removal dried of dust and soil, in absorbent paper and cut in fragments with about 0.5 cm wide. The fragments were successively treated with ethanol 70% (1 min), mercuric chloride 0.01% (available chlorine) for 1 min. and exhaustively rinsed with sterilized distilled water. The fragments were then submitted in ultra-violet bathing for 10 min., then rinsed again with sterilized distilled water for 3 times and submitted again to a bathing with ethanol 70% for 30 seconds and washed twice with sterilized distilled water. Aliquots of 1.0 mL of the last wash water were inoculated onto the media plates of Potato Dextrose Agar in order to evaluate the effectiveness of the disinfection process. After the disinfection, fragments of each plant parts were homogenized in 5 ml of sterile distilled water with a blender and prepared three

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serial dilutions of each sample. 50µl of each dilution of a sample was spreaded onto the media plates of Potato Dextrose Agar for isolation of fungi. The uninoculated Potato Dextrose Agar was taken as their respective controls. All the plates were incubated at 28°C for 7 days and observed daily for growth of different type of fungal colonies and were picked up for raising pure cultures at different time intervals as they developed. The isolation of pure fungal culture can be achieved by single spore culture method. In this technique a previously diluted mixture of fungal spores is spread onto the surface of agar medium. Once discrete, well separated fungal colonies are obtained, then each may be picked up with a sterile needle and transferred to fresh Potato dextrose agar slant. These slants can be preserved as the pure or stock cultures. The six commercial synthetic dyes Red-5B, Orange-3R, Yellow-GR, Black B, Turquoise Blue-G and Blue-3R, were used without any further purification. The dye decolorizing capabilities of the fungal cultures were tested against the all six textile dyes. Two different culture media were tested for the dye decolorization experiment. At 1st Minimal medium supplemented with dye Red-5B at the concentration of 10mg/L was taken as the decolorization media. 2nd media i.e. Potato dextrose broth supplemented with Red-5B (10mg/L) was then tested. The culture flasks were incubated under two culture conditions namely: static (without shaking) and agitated (with shaking). In order to select the best decolorizing fungal cultures among the dye decolorizing cultures (obtained on the basis of previous experiment), the cultures were subjected to increasing concentrations of dyes.

OBSERVATION AND RESULTS

During one week of incubation, a large number of fungal colonies were observed on the plates of Dextrose Agar. No fungal growth was observed at 10^{-3} and 10^{-4} dilution but some fungal colonies were observed at 10^{-2} dilution. However, a large number of fungal colonies were observed at Cr (Pure) dilution of sample plants. With the completion of the purification step 04 fungal isolates were obtained.

The three decolorizing fungal cultures were subjected to textile dyes, after 7 days of incubation the results were recorded and are being presented in (**Table 1**).

Table 1: Decolorization capabilities of fungal cultures against textile dyes

S. No	Isolate No	Dye Name	Growth	Dye Decolorization
1	Control	Yellow-GR	-ve	-ve
		Orange-3R	-ve	-ve
		Black-B	-ve	-ve
		Turquoise Blue-G	-ve	-ve
		Blue-3R	-ve	-ve
2	$S.1.1_F$	Yellow-GR	+ve	-ve
		Orange-3R	+ve	-ve
		Black-B	+ve	-ve
		Turquoise Blue-G	+ve	-ve
		Blue-3R	+ve	-ve
3	$S.1.2_F$	Yellow-GR	+ve	+ve
		Orange-3R	+ve	Very less
		Black-B	+ve	-ve
		Turquoise Blue-G	+ve	-ve
		Blue-3R	+ve	+ve
4	$S.2.4_F$	Yellow-GR	+ve	-ve
		Orange-3R	+ve	Very less
		Black-B	+ve	-ve
		Turquoise Blue-G	+ve	+ve
		Blue-3R	+ve	+ve

DISCUSSION

On the basis of the observations it was found that all the three cultures (best decolorizes) were growing in the presence of all the five dyes (Yellow-GR, Orange-3R, Black-B, Turquoise Blue-G and Blue-3R). **$S.1.1_F$** was unable to decolorize any of the five textile dyes. **$S.1.2_F$** was showing decolorization for dyes Yellow-GR and Blue-3R and **$S.2.4_F$** was showing decolorization of dyes Turquoise Blue-G and Blue-3R. Also both **$S.1.2_F$** and **$S.2.4_F$** were showing some decolorization in case of dye Orange-3R, but to a very lesser extent. On the basis of these results fungal cultures **$S.1.2_F$** and **$S.2.4_F$** were selected to study their dye degradation profile against dyes Red-5B, Yellow-GR and Blue-3R (for **$S.1.2_F$**) and Red-5B, Turquoise Blue-G and Blue-3R (for **$S.2.4_F$**).

REFERENCES

1. K. Wuhrmann, K. Mechsner and T. Kappeler, Investigation on rate determining factors in the microbial reduction of azo dyes, Appl. Microbiol. Biotechnol.**9** (1980), pp. 325–338.
2. K.C. Chen, J.Y. WU, D.J. Liou and S.C.J. Hwang, Decolorization of the textile azo dyes by newly isolated bacterial strains, J. Biotechnol.**101** (2003), pp. 57–68.
3. N. Supaka, K. Juntongjin, S. Damronglerd, M.L. Delia and P. Strehaiano, Microbial decolorization of reactive azo dyes in a sequential

anaerobic-aerobic system, Chem. Eng. J.**99** (2004), pp. 169–176.

4. M.S. Khehra, H.S. Saini, D.K. Sharma, B.S. Chadha and S.S. Chimni, Comparative studies on potential of consortium and constituent pure bacterial isolates to decolorize azo dyes, Water Res.**39** (2005), pp. 5135–5141.