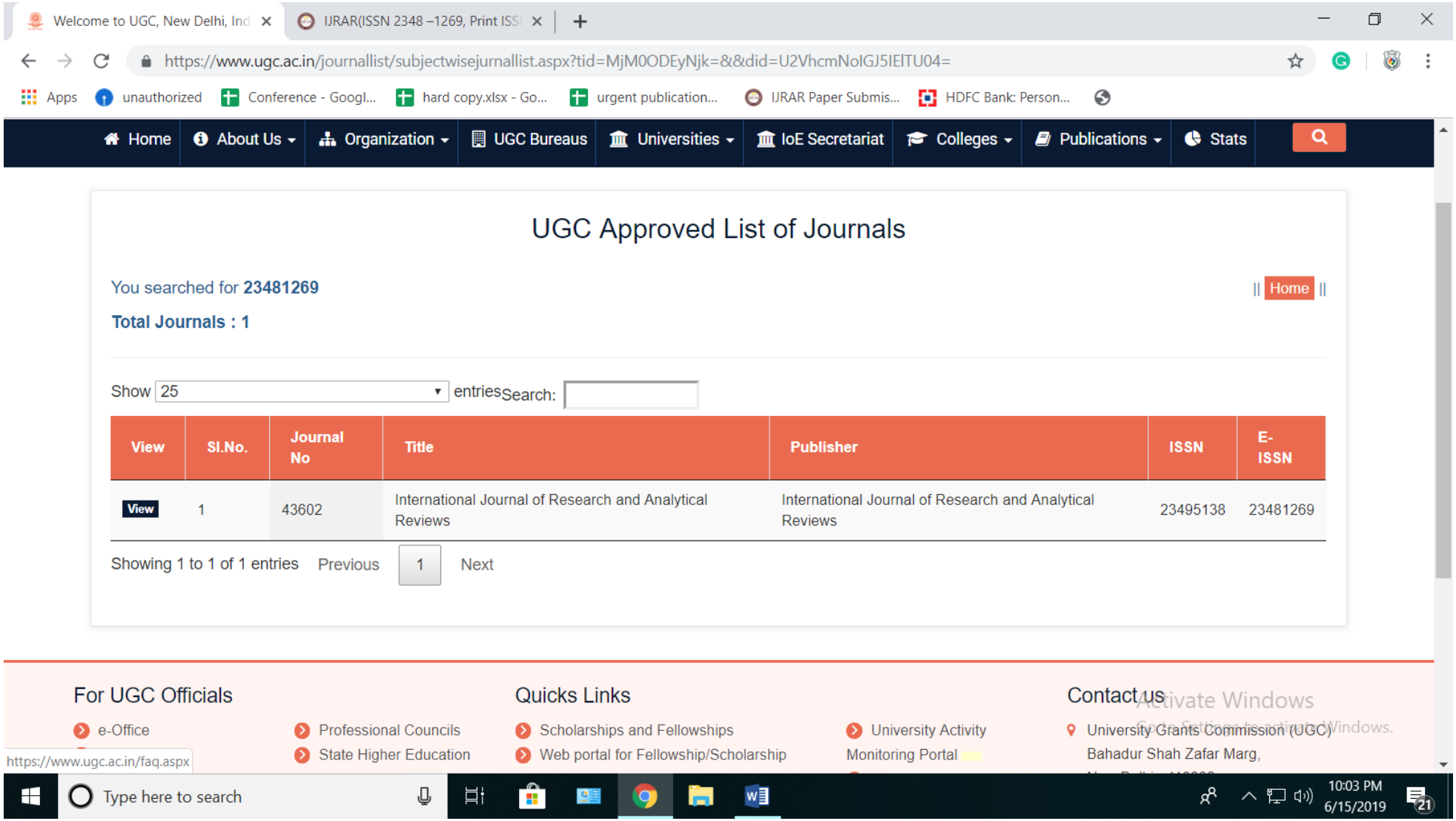
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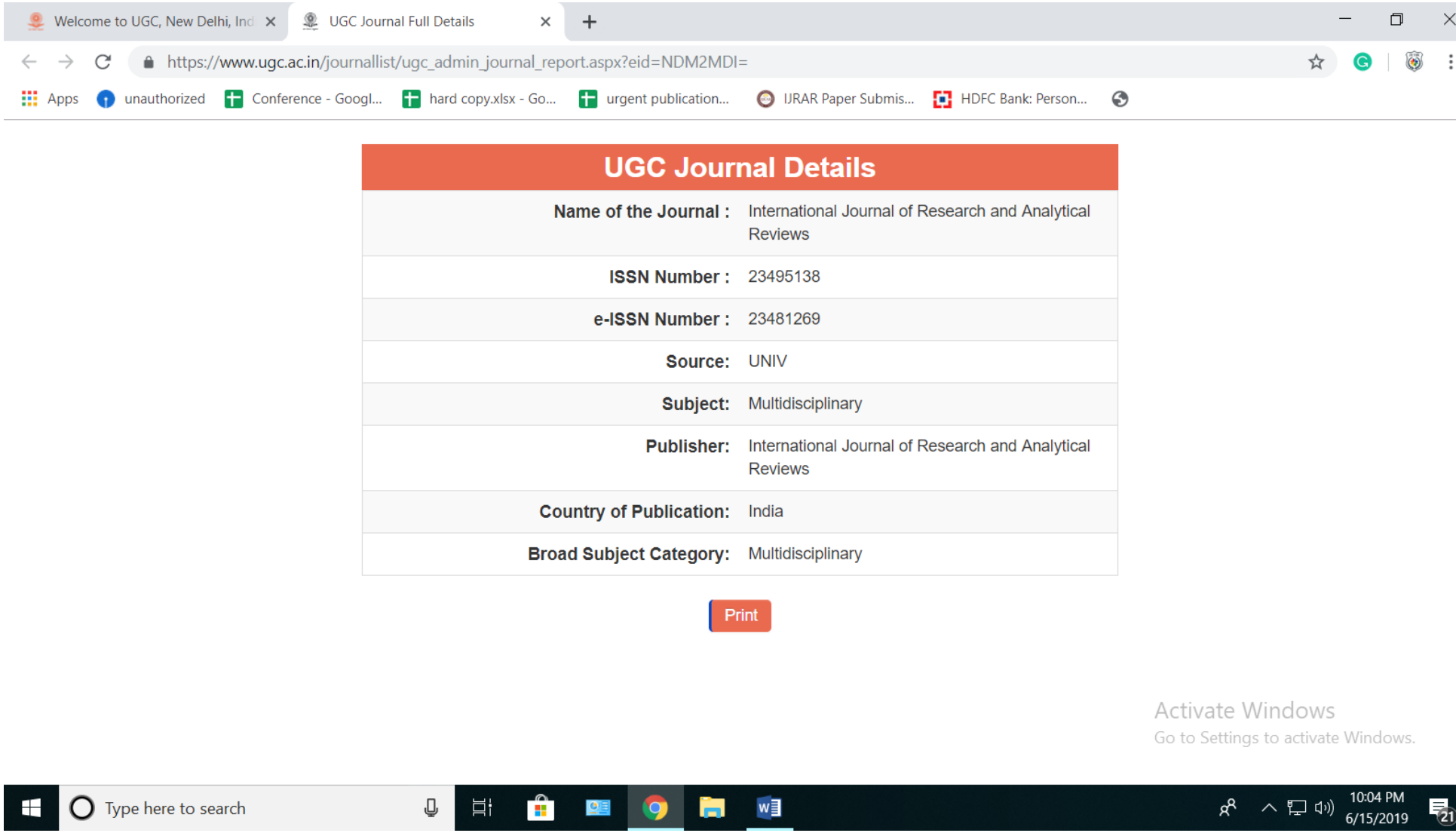
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Environmental Pollution

Bioremediation for the Decolorization of Textile Dyes

Dr.Smita .K.Kadwe and Tahsin S. Kazi

K.V.N.Naik Senior College, Canada Corner,Nashik.

H.P.T Arts & R.Y.K Science College, College Road Nashik.

Abstract

Textile dyeing effluents containing recalcitrant dyes are polluting waters due to their color and by the formation of toxic or carcinogenic intermediates such as aromatic amines from azo dyes. Since conventional treatment systems based on chemical or physical methods are quite expensive and consume high amounts of chemicals and energy, alternative biotechnologies for this purpose have recently been studied. .

Phytoremediation of textile dyes can be used as a scientific experiment. Experiments were set up with 20-40 mg L(-1) dye solutions of different colors. In its simplest forms, we use two-week-old sunflower seedlings and place them into a test tube of known volume of dye solution. Color change and/or dye disappearance can be monitored by visual comparison or with a spectrophotometer. Among the many dyes tested, Evan's Blue proved to be the most readily decolorized azo dye.

Introduction

The world's ever increasing population and her progressive adoption of an industrial– based lifestyle has inevitably led to an increased anthropogenic impact on the biosphere. In textile production, opportunities exist for the release into the ecosystem of potentially hazardous compounds at various stages of the operation. These pollutants are produced in an effort to improve human standard of living and fashion but ironically, their unplanned intrusion into the environment can reverse the same standard of living by impacting negatively on the environment.

Textile effluents can seep into the aquifer and pollute the underground water, or where it is discharged without proper treatment into water bodies, the pollutants cannot be confined within specific boundaries. They can therefore affect aquatic life in enormous ways. Textile dyeing effluents containing recalcitrant dyes are polluting waters due to their color and by the formation of toxic or carcinogenic intermediates such as aromatic amines from azo dyes.

Traditional methods for the cleanup of pollutants usually involve, the removal of unwanted materials through sedimentation and filtration, and subsequent chemical treatments such as flocculation, neutralization

and electro-dialysis before disposal. These processes may not guarantee adequate treatment of the effluent. Moreover, they are often laborious and expensive, considering the volume of wastes released during the industrial production process. Since conventional treatment systems based on chemical or physical methods are quite expensive and consume high amounts of chemicals and energy, alternative biotechnologies for this purpose have recently been studied. A number of anaerobic and aerobic processes have been developed at laboratory scale to treat dyestuff.

Of all the technologies that have been investigated, bioremediation has emerged as the most desirable approach for cleaning up many environmental pollutants in effluents. Bioremediation uses living systems especially microorganisms to catalyze the degradation of wastes without disruption of the environment.

Phytoremediation, the use of plants to clean up contaminated soil and water, has a wide range of applications and advantages, and can be extended to scientific education. Plants can be used to contain, remove, or degrade contaminants. It is a name for the expansion of an old process that occurs naturally in ecosystems as both inorganic and organic constituents cycle through plants. Plant physiology, agronomy, microbiology, hydrogeology, and engineering are combined to select the proper plant and conditions for a specific site. Phytoremediation is an aesthetically pleasing mechanism that can reduce remedial costs, restore habitat and clean up contamination in place rather than entombing it in place or transporting the problem to another site.

Objectives:

- Determine the rate of decolorization of several diazo textile dyes in hydroponic systems with sunflowers.
- To provides a cost-effective means to treat water from production facilities.

Materials and Method

Plant Material: Two weeks old Sunflower (*Helianthus annuus* L)seedling.

Dye s and Stains: Evan's Blue, Brilliant Green, Methyl Violet, Methyl Green ,Neutral Red Toludene.

Protocol:

Experiments were set up with 20-40 mg /lit dye solutions of different colors. Two-week-old sunflower seedlings were used and placed into a test tube of known volume of dye solution. Color change and/or dye disappearance can be monitored by visual comparison or with a spectrophotometer.

Result and Conclusion:

Among the many dyes tested, Evan's Blue proved to be the most readily decolorized azo dye. Results could be observed within 1-2 hours. From our experience, dye phytoremediation experiments are suitable and easy to understand. Understanding the mechanisms of the biodegradation role of sunflower seedling is very important if one must explore the unique enzyme system in it for remediation of colored and complex, toxic effluents. This paper is written in the hope that it would stimulate interest and investigations into the development and adoption of biotreatment of colored and toxic effluents in developing countries.

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