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*Research Article*

**Assessment of Phytoremediation Potential of** Chara vulgaris **to Treat Toxic Pollutants of Textile Effluent**

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Textile effluent released into water bodies is prone to be toxic for aquatic flora and fauna. In the present study, the phytoremediation potential of *Chara vulgaris* (*C. vulgaris)* is investigated for treatment of textile effluent. The highly concentrated and toxic textile effluent is diluted to different concentrations 10%, 25%, 50%, and 75% to check the accessibility of macroalgae to bear pollutant load of textile effluent. The toxicity of textile effluent is analysed by determining different water quality parameters, namely, pH, TDS, BOD, COD, and EC. The maximum reductions in TDS (68%), COD (78%), BOD (82%), and EC (86%) were found in the 10% concentrated textile effluent after 120 h of treatment. The highly concentrated textile effluent showed its toxic effect on macroalgae and it was found unable to show a remarkable change in water quality parameters of 75% and 100% textile effluent. The correlation coefficient values are determined using correlation matrix to identify the high correlation between different water quality parameters. The removal of toxic organic pollutants by *C. vulgaris* was confirmed by using UV-visible absorption spectra. Typical X-ray spectra recorded using EDXRF technique indicated the presence of heavy metals Cd in the dried sample of macroalgae after treatment which show its capability to remove toxic heavy metals from textile effluent. The reliability model has been proposed for treated textile effluents to identify percentage level of toxicity tolerance of waste water by macroalgae.

         

**1. Introduction**

Textile effluents released from the textile industry play a major role for polluting the water streams [1]. Textile effluents released into the environment not only cause water pollution, but also cause aesthetic problems as dye bearing effluents changed the colour of the water bodies which interferes with sunlight penetration and disturbs the aquatic ecosys- tem [2, 3]. Most of the dyes have carcinogenic action and also cause other skin problems like allergies, dermatitis, skin irritation, etc. Moreover, half-life time period of dyes is of several years, so their long time persistence in the environment causes accumulation in sediments, fishes, or other aquatic creatures [4]. Hence, it is mandatory to remove the contaminants from textile effluent before their discharge into the water bodies; otherwise it disrupts the aquatic environment.

A large number of conventional congenital methods, for instance, activated carbon adsorption, separation through the membrane, electrochemical coagulation, and ultrafiltration,

are used by textile industry to treat its effluents [1]. All these methods have a potential to treat textile effluent to varying extent but high cost of these technologies puts the financial burden on industries and effluent without treatment results into hazardous water pollution. This problem leads to generation of other methods of textile effluent treatment [5]. Treatment of textile effluents by using solar driven plants through phytoremediation is a time tested, attractive, aesthetic, pleasant, eco-friendly, and cost-effective approach [6]. Researchers have identified the potential of *Typhonium flagelliforme, Phragmites australis, Ipomoea hederifolia,* and *Blumea malcolmii* for specific textile dyes removal [7–10]. Some decorative plants such as *Portulaca grandiflora, Aster amellus, Petunia grandiflora, Glandularia pulchella, Zinnia angustifolia,* and *Tagetes patula* have also shown their poten- tial for degradation of textile dyes and effluents [11–15]. Chanshive et al. reported the use of various decorative plants *Tagetes patula, Aster amellus, Portulaca grandiflora,* and *Gaillardia grandiflora* for treatment of textile wastewater with constructed wetlands [16].