Research Article Open Access

Keywords: Cyanobacteria; Textile industry; COD; BOD; Decolourization

Introduction

e textile industry is one of the oldest and largest industries in India centered in Kanpur, Mumbai, Ahamadabad, and Coimbatore. Textile industries depend on various stages of processing operation during the conversion of ber to textile fabric which consume large volumes of water and generate waste water approximately 2400 to 2700 m^3/day [1]. Synthetic dyes are extensively used in the textile dyeing commonly used dyes are azodyes (orange3R), anthraquinone (blue3R) and indigo dyes. More than 100,000 types of dyes including azo dyes and di erent pigments are widely used in various stages of processing in the textile industries thus the pollution generated by dye materials is unavoidable. Dye presence, as little as 10 to 20 mg/l, in water a ects water transparency and causes a part of aesthetic deterioration [2]. Further, Because of the high BOD, the untreated textile waste water from a typical cotton textile can cause rapid depletion of dissolved oxygen if it is directly discharged into the surfaces water sources. In addition to that, textile industry e uents with high levels of COD are toxic to biological life [3]. Treatment of textile e uent involves mainly physical and chemical methods that are very costly [4]. erefore there has been increased interest in using biological methods for remediation of textile e uent [5]. In recent years, the use of microalgae in bioremediation of colored waste water has attracted great interest due to their central role in carbon dioxide xation [6]. Although, bacteria play a key role in the biodegradation of organic pollutants, recent studies have indicated that in addition to providing oxygen for aerobacterial biodegraders, microalgae can also degrade organic pollutants directly [7]. It was reported that more than 30 azo compounds were biodegraded and decolorized by Chlorella pyrenoidosa, Chlorella vulgaris and Oscillatoria tenuis in which azo dyes were decomposed into simpler aromatic amines [8]. Cyanobacteria are unique organisms which occupy and of incubation, the asks were kept in an incubator shaker at 100 rpm for the purpose of uniform mixing of the media and e uents. Periodic weekly monitoring of the samples was done for investigating the physio-chemical characteristics and biodegradability of the e uents. For determining decolouration of the e uents, the media were centrifuged at 5000 rpm for 15 mins to get cell free ltrate. e clear ltrate was analysed in the spectrophotometer for measuring its absorbance at 485 nm wavelength. Decolorization was expressed in terms of percentage decolorization. is was calculated using the following formula% of decolorization=(Initial ab.- nal ab.)/initial ab.*100. COD was measured a er removing algal cells by centrifugation at 3000 rpm.

Elemental analysis

Metals in the e uents were determined by atomic absorption spectrophotometer following wet oxidation of the e uent sample by di-acid digestion method with a mixture of concentrated HNO_3:$HClO_4$ (3:1 v/v) [11].

Results

Physico-chemical parameters of untreated textile industry e uent are presented in (Table 1). Most of the physico-chemical parameters such as TDS, BOD, Magnesium, Calcium, and Zinc are beyond the discharge range proposed by WHO [12]. A er 25 days of incubation with Cyanobacterial sp such as *Nostoc muscorum*, *Anabaena variabilis*, *Lyngbya majuscula* and *Oscillatoria salina*, the physico-chemical parameters and color from the textile industry e uent were analyzed pH in the textile industry e uent (Table 6). 108 mg/l of calcium had been reduced to 65.1 mg/l in the e uent sample treated with Nostoc muscorum (Table 2) whereas Anabaena variabilis reduced from 108 mgl/l to 89 mg/l (Table 3). e concentration of calcium in the e uent sample treated with Lyngbya has been reduced from 108 mg/l to 78.1 m/l (Table 4). Whereas Oscillatoria salina reduced from 108 mg/l to 59.7 mg/l (Table 5). Calcium uptake e ciency of Anabaena variabilis (17.5%) was greater than other Cyanobacterial sp. Magnesium of the sample treated with Nostoc muscorum has been changed from 78 mg/l to 44.1 mg/l (Table 2) whereas Anabaena variabilis reduced magnesium to 56.4 mg/l (Table 3) Lyngbya majuscula reduced from 78 mg/l to 50 mg/l (Table 4) and Oscillatoria salina reduced magnesium from 78 mg/l to 38 mg/l on 25th day (Table 5). 28% decrease in the magnesium content has been observed in the e uent sample treated with Anabaena variabilis (Table 6). e amount of sulphate in the mg/l to 14.7 mg/l, it reduced Nickel from 8.4 mg/l to 2 mg/l whereas it reduced Zinc from 12.1 mg/l to 3.2 mg/l (Table 5) on 25th day. As far as decolourization potential of studied Cyanobacterial sp was concerned *Nostoc* reduced color from the initial OD value 1.83 to 0.45 mg/l (Table 2). Whereas *Anabaena variabilis* reduced to 0.25 mg/l (Table 3) *Lyngbya majuscula* reduced to 0.75 mg/l (Table 4) and *Oscillatoria salina* reduced color from 1.83 to 0.63 (Table 5).

Discussion

Phycoremediation is a novel technique that uses algae to clean