

Phytobeds with *Fimbristylis dichotoma* and *Ammannia baccifera* for Treatment of Real Textile Effluent: An in situ Treatment, Anatomical Studies and Toxicity Evaluation

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Abstract : *Fimbristylis dichotoma*, *Ammannia baccifera*, and their co-plantation consortium FA were found to degrade methyl orange, simulated dye mixture, and real textile effluent. Wild plants of *Fimbristylis dichotoma* and *Ammannia baccifera* with equal biomass showed 91 and 89% decolorization of methyl orange within 60 h at a concentration of 50 ppm, while 95% dye removal was achieved by consortium FA within 48 h. Floating phyto-beds with co-plantation (*Fimbristylis dichotoma* and *Ammannia baccifera*) for the treatment of real textile effluent in a constructed wetland was observed to be more efficient and achieved 79, 72, 77, 66 and 56% reductions in ADMI color value, chemical oxygen demand, biological oxygen demand, total dissolve solid and total suspended solid of textile effluent, respectively. High performance thin layer chromatography, gas chromatography-mass spectroscopy, Fourier transform infrared spectroscopy, Ultra violet-Visible spectroscopy and enzymatic assays confirmed the phytotransformation of parent dye in the new metabolites. T-RFLP analysis of rhizospheric bacteria of *Fimbristylis dichotoma*, *Ammannia baccifera*, and consortium FA revealed the presence of 88, 98 and 223 genera which could have been involved in dye removal. Toxicity evaluation of products formed after phytotransformation of methyl orange by consortium FA on bivalves *Lamellidens marginalis* revealed less damage in the gills architecture when analyzed histologically. Toxicity measurement by Random Amplification of Polymorphic DNA (RAPD) technique revealed normal banding pattern in treated methyl orange sample suggesting less toxic nature of phytotransformed dye products.

Keywords : constructed wetland, phyto-bed, textile effluent, phytoremediation

Conference Title : ICEBB 2018 : International Conference on Environmental Biotechnology and Bioremediation

Conference Location : Zurich, Switzerland

Conference Dates : January 15-16, 2018