

Evaluation of the potential ecotoxicity of textile industry effluent by using *Allium cepa* bioassay

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Textile effluents (TE) constitute colourants such as azo dyes and hazardous chemicals, including heavy metals. The release of untreated or improperly treated TE into the environment is an emerging issue mostly in developing countries. The present study aimed to characterize the potential ecotoxicity of TE by using *Allium cepa* bioassay which is highly applied in cyto-genotoxicity assessment. Two experiments were carried out by exposing healthy, and surface sterilized *A. cepa* bulbs and root segments to a series of TE in which concentration varied from 6.25% to 100%. To prepare the concentration series, the collected blue (B) and pink (P) coloured TE from the textile industry and a 1:1 mixture of B and P (BP) were diluted with distilled water. The experiment was arranged according to a randomized block design (RBD) with three replicates per treatment and control. At the end of 48 hours incubation period at room temperature (27°C), root growth inhibition (RGI), mitotic index (MI) and frequencies of abnormal cells with chromosomal aberrations (CA's) and nuclear abnormalities (NA's) were recorded. One-way ANOVA followed by Tukey's post hoc test was used for data analysis. The results showed a concentration-dependent significant ($p < 0.05$) upward trend for RGI and frequencies of abnormal cells with CA's or NA's compared to the control. In contrast, a downward trend was noticed for MI. The lowest RGI values recorded at 6.25% from B, P and BP were 55.56%, 25%, and 38.46%, respectively, and the highest (100%) inhibition was recorded for 25-100% TE concentrations. The calculated lowest MI for 100% TE of B, P and BP were 7.3 ± 0.1 , 4.6 ± 0.61 and 7.2 ± 0.0 , respectively. The highest frequency of abnormal cells for B, P and BP TEs were 6.73%, 17.13%, and 11.73%, respectively. The reported statistically significant ($p < 0.05$) RGI, and MI revealed the presence of potential cytotoxic agents, and the abnormal cells with NA's and CA's revealed the presence of genotoxic agents in the TE highlighting the applicability of *A. cepa* assay for assessing the potential ecotoxicity of the effluent.

Keywords: *Allium cepa*, cyto-genotoxicity, mitotic index, textile effluent

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