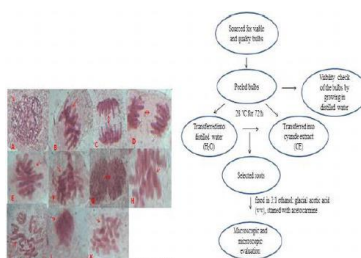


Alkaline extracted cyanide from cassava wastewater and its sole induction of chromosomal aberrations on *Allium cepa* L. root tips

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Abstract

Cassava, a staple crop in Nigeria, processed by numerous factories in rural and sub-urban locations is known to contain some level of cyano compounds. Lack of stringent environmental regulations on management of cassava wastewater (CWW) from cassava processing factories had led to its indiscriminate discharge on the environment. CWW samples were obtained from cassava processing factories from selected states (Lagos (A), Oyo (B), Ogun 1 (C1), Ogun 2 (C2) and Cross River (D)) in Nigeria to determine the cytotoxic and genotoxic effects of extracted cyanide from the wastewaters. The cyanide was hydrolyzed via chemical degradation utilizing 1.25 M NaOH and subsequently titrated using silver nitrate with p-dimethylaminobenzalrhodamine as indicator. Further, in order to explore the potential toxicity of this pollutant present in the effluent, a battery of short-term biological assay (*Allium cepa* chromosomal aberration test) was used. Bulbs with roots of *Allium cepa* L. were treated with different concentrations (0.05%, 0.1%, 0.2%, 0.4%, and 0.8%) of CWW, and after 48 h the root tips were processed for cytological studies by the aceto-orcein squash procedure. The results revealed that cyanide concentrations on re-fluxing were in the range of 1.0 mg/L and 1.3 mg/L. All concentrations induced a number of chromosomal aberrations in the root tip cells. The mitotic index decreased significantly ($p < 0.05$) with increasing concentration. The cytotoxic effects showed strong concentration dependent root growth inhibition with EC_{50} values of 30, 20, 37, 43 and 22 % for A, B, C1, C2 and D, after 72 h. The findings thus indicate that alkali treatment is very efficient in degrading the cyanide content of CWW and has shown that the combination of physico-chemical analysis along with the sole toxicity assessment could provide valuable information about the sole toxicity of cyanide as a chemical pollutant present in the cassava effluent.



Keywords:

Allium cepa L Cassava wastewater Chromosome aberrations Cytotoxicity Genotoxicity hydrolysis Alkali

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