

## **Application of cytogenetic model *Allium cepa* for screening potential cytogenotoxicity of herbal-based hair dyes**

**Semini K. Nawalage and Asoka Pathiratne**

Department of Zoology and Environmental Management, Faculty of Science, University of Kelaniya, Kelaniya, Sri Lanka

### **Abstract**

Plant models may be useful as test organisms for initial screening of potential toxicity of personal care products. The objective of the present study was to assess the efficacy of the *Allium cepa* (common onion) test system as a bioanalytical tool for screening potential cytotoxicity and genotoxicity of herbal-based hair dye formulations. Exposure of black hair dye formulations for 48 hours resulted in root growth retardation and mitosis suppression in the root meristems of *A. cepa* bulbs indicating concentration dependent cytotoxicity. At the 72 hour post exposure, cytotoxic effects on the roots were reduced but not recovered completely signifying prolong toxic action of the hair dyes. The condensed nuclei was the most frequent nuclear abnormality found in the dye exposed root meristematic cells indicating the cell death process. Induction of micronuclei and chromosomal aberrations in the root meristematic cells even at the post exposure stage indicates persistent genotoxicity of the hair dyes which may be attributed to the interactive effects of chemical mixtures present in the commercial hair dye formulations. The results revealed that *A. cepa* test system is an effective bioanalytical tool for screening cytogenotoxicity of commercial hair dye formulations.

**Keywords:** Personal care products; screening toxicity; cytotoxicity; genotoxicity; bioanalytical tool; plant bioassay