

Oral presentation: 158

## Application of *Allium cepa* bioassay to study the spatial variation of potential cytotoxicity in relation to water quality in the Dandugan Oya, Sri Lanka

L. G. Y. J. G. Wadasinghe and W. M. D. N. Wijeyaratne\*

Department of Zoology and Environmental Management, Faculty of Science,  
University of Kelaniya, Sri Lanka  
\*dimuthu.wijeyaratne@kln.ac.lk

Water quality is an important indicator in measuring the health of aquatic ecosystems. Poor water quality can lead to ecological health impairment. Dandugan Oya is receiving industrial waste from multiple sources. In addition, the raw water for the public water supply in some suburban areas in the Gampaha District is obtained from the Dandugan oya. In this study, potential cytotoxic effects of the water in selected sites of the Dandugan Oya were assessed using *Allium cepa* bioassay. Surface water samples were collected from six sites (Site A: Urban site; B and D: Industrial sites; C: public water supply intake; E: Agricultural site; F: Reference site with pristine environmental conditions) at two month intervals from May to November 2017. Water samples were collected from each site (n=10) and temperature, pH, conductivity, biochemical oxygen demand (BOD), dissolved oxygen concentration (DO), total dissolved solids (TDS) and chemical oxygen demand (COD) were analysed using standard analytical methods. Potential cytotoxicity of these water samples were assessed using *Allium cepa* bioassay. Spatial variation of water quality and cytotoxic end points were analysed by ANOVA followed by Tukey's pairwise comparison using MINITAB 14 software. Significantly lower DO was recorded from sites C ( $4.0 \pm 0.3$  mg/L) and D ( $4.3 \pm 0.4$  mg/L) and significantly high COD was recorded from site D ( $267.1 \pm 56.5$  mg/L) ( $p < 0.05$ ). Significantly high TDS and conductivity were recorded from sites A and B ( $p < 0.05$ ). Mean nuclear abnormalities of the root tip cells of the *A. cepa* bulbs exposed to the surface water samples collected from the study sites ranged from 9‰ to 83‰ where significantly higher ( $p < 0.05$ ) nuclear abnormalities were recorded from site C ( $83 \pm 2.4$ ‰). Occurrence of nuclear buds and condensed nuclei in the interphase cells of the *A. cepa* root tips exposed to water samples from the site C ( $18 \pm 0.8$ ‰ and  $61 \pm 2.0$ ‰) were significantly higher compared to the reference site ( $2 \pm 0.1$ ‰ and  $4 \pm 0.1$ ‰) ( $p < 0.05$ ). Further, Site D also showed significantly high ( $p < 0.05$ ) nuclear bud formation ( $15 \pm 0.4$ ‰) and highest binuclei formation ( $6$ ‰  $\pm 0.2$ ) compared to the reference site. The results of the present study indicated occurrence of potentially high cytotoxicity in the *A. cepa* bioassay in the water at site C, which is the water intake site of Dandugan Oya for public water supply. Therefore, further investigations on the identification of the active forms of cytotoxic contaminants and continuous monitoring of water quality in these sites of Dandugan Oya is important in order to maintain the ecosystem and human health.

**Keywords:** Aquatic pollution, bio-monitoring, nuclear abnormalities, water toxicity