404/D

Application of Direct Toxicity Assessment Technique for Assessing Potential Ecological Impacts of Rubber Industry Effluents Reaching Kalu River, Sri Lanka

*H.K.A.D. Silva and A. Pathiratne**

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

The rubber processing industry is one of the major water polluting industries in Sri Lanka. This study applied the Direct Toxicity Assessment (DTA) technique using aquatic organisms belonging to different trophic levels,*viz*.,*Lemna perpusilla* (plant), *Daphnia magna* (crustacean), and *Poecilia reticulata* (fish), and physico-chemical analysis in order to evaluate the potential ecological impacts associated with rubber industry effluents reaching the Kalu River. Treated effluent samples (Effluent A: Crepe rubber manufacturing industry and Effluent B: Technically specified rubber manufacturing industry) were collected in dry and wet periods in 2016 from the effluent receiving points. The test organisms were exposed in the laboratory to undiluted and diluted effluents following standard toxicity testing procedures. Toxicity thresholds were estimated statistically by probit analysis with 95% confidence limits. Physico-chemical analysis showed that the effluents in some cases exceeded the specified tolerance limits for discharge of rubber industry effluents (pH, total solids, total suspended solids, BOD_5, COD, total nitrogen and sulphides) into inland surface waters. Based on DTA, estimated toxicity thresholds of the effluents were significantly lower (P=0.05) in the dry period compared to the wet period. In the dry period, estimated EC_{20} values for 7 days growth inhibition of *L. perpusilla* exposed to effluents A and B were 27% and >100% respectively. Estimated EC_{20} values for 48 hour immobilization test of *D. magna* exposed to effluents A and B were 3% and 16% respectively. LC_{20} values for 96 hour mortality of *P. reticulata* exposed to the effluents A and B were 7% and 28% respectively. Considering the toxicity thresholds, *D. magna* is the most sensitive organism for rubber effluent exposure. Hence, the estimated dilution of the effluents A and B should be at least 3% and 16% respectively in the dry periods in order to protect sensitive species in the receiving waters under short term exposure. Yet, effluents should be subjected to further dilution considering potential health impacts under chronic exposure. The study highlights the importance of applying DTA at industry levels in regulating rubber industry effluents that are discharged into important water resources.

Keywords: Direct Toxicity Assessment, Kalu River, Rubber industry effluent, Water pollution

*asoka@kln.ac.lk 0718121050