Feasibility Study of Use of Indirect Competitive Enzyme Linked Immunosorbent Assay for Glyphosate Determination in Water

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Glyphosate is a non-selective and extensively used herbicide. Various formulations of this product are sold in Ontario including trade names like Roundup, Glyfos, Clear It and Vision. It is one of the regulated pesticides under the *Safe Drinking Water Act, 2002* (SWDA). The Ontario Drinking-Water Quality Standard (ODWQS) states the maximum allowable concentration (MAC) for glyphosate as 0.28 mg/L. Currently, glyphosate is analysed by liquid chromatography-mass spectrometry (LC-MS).

The objective of the present study is to determine the suitability of using enzyme-linked immunosorbent assay (ELISA) either as a quantitative analytical method or qualitative screening technique for water samples submitted for glyphosate analysis. Six concentrations of glyphosate ranging from 4 to 160 ng/mL in deionized water with and without preservative (sodium thiosulphate) were studied. The result showed that preservation of sample does not interfere with ELISA analysis. ELISA has a narrow dynamic range of 0.15 to 5 ng/mL and quantitation is performed using serial 10-fold dilution of the sample. The results of the least diluted sample with concentrations within the calibration range tend to be more accurate. The correlation coefficient between observed and expected results was 0.804 and 0.993 for LC-MS and ELISA, respectively. For concentrations between 20 to 160 ng/mL the average recovery was 83 % for LC-MS versus 103% for ELISA. Based on correlation coefficient and average recovery, this preliminary study showed that ELISA is more accurate than LC-MS. Thus, ELISA could be accepted as a quantitative technique for glyphosate at concentration range between one-half and one-tenth of the MAC. Implementation of ELISA would screen out approximately 95% of the water samples submitted for LC-MS.