

MONITORING OF TRIAZYNE HERBICIDES IN SURFACE WATER, AND SOIL SAMPLES FROM SUGARCANE AGRICULTURE REGION-BRAZIL BY GAS CHROMATOGRAPHY: THE INFLUENCE OF MANY YEARS OF TRIAZYNE HERBICIDE APPLICATION

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Abstract: Several analytical works were focused on the determination of triazine herbicides in surface water and soils, because they are the basis for important decisions such as application annually in agriculture protection and environmental monitoring. The influence of many years of application of triazine herbicides on the sugarcane agriculture was a possibility that we were very interested to monitoring, starting from 2004 with two kinds of triazine herbicides: atrazine and simazine were monitoring in our research group. For separation of herbicides from different matrices, solid phase extraction (SPE) and solid phase microextraction (SPME)¹ have been applied and compared on the basis of recovery. The objective of this study was to develop and characterize an extraction method for atrazine and simazine determination in soils and surface water during a period of time about five years. In the present study, therefore, surface water and soil samples were collected in sugarcane agriculture region at a period from August 2004 to November 2009 to obtain information on the environmental risk contamination of atrazine and simazine under field conditions. On each sampling date, 10 soil cores were randomly taken. Soil samples were stored at 4 °C until extraction by Soxhlet with acetone/dichloromethane (1+1), during 6 hours. Waters samples were collected monthly from four sites and stored at 4 °C until extraction by SPE and liquid-liquid extraction (LLE). All water samples were homogenized, extracted with a polar organic solvent by LLE and SPE. The extractant was evaporated *ca.* 40 °C under N₂ stream, the sample was dissolved to 1 mL, 1 µL was injected in capillary gas chromatographic (GC) – electron capture detector (⁶³Ni-ECD) – TRACE – ThermoFinnigan. The determination of the herbicides extracted from water samples by off-line solid-phase extraction (SPE) with a C-18 cartridge, were performed by gas chromatography (GC-ECD). Applied methodologies provided good linearity and precision data, and the detection limits were in the ng/mL level. The average amount of herbicide residues found in the three sites of soil samples were: atrazine: 0.14; 0.02; 0.04 mg.kg⁻¹ soil and simazine: 0.08; 0.16; 0.09 mg.kg⁻¹ soil during the first year and in the second year these three sites remained with environmental risk contamination. The best results were obtained using SPE for waters samples, which detected one site contamination with atrazine during the last year. The influence of triazine herbicides application on the sugarcane agriculture are been undertaken.

References: [1] OUYANG, G., PAWLISZYN, J. Recent developments in SPME for on-site analysis and monitoring Trends in Analytical Chemistry, Vol. 25, No. 7, 2006.