

Herbicides in surface and underground water from Argentina

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Argentina is a major agricultural producer of soybean, corn, wheat, sunflower, sorghum among other extensive crops. In the last two decades, many different transgenic crops were introduced, leading to a steady increase in the use of pesticides mainly herbicides, currently surpassing 30 million hectares the areas cultivated under no tillage. A selected group of herbicides such as glyphosate (N-(phosphonomethyl) glycine), atrazine (1-Chloro-3-ethylamino-5-isopropylamino-2,4,6-triazine), 2,4 D (2,4 Dichlorophenoxy-acetic acid), glufosinate (ammonium(S)-2-amino-4-[hydroxyl(methyl) phosphinoyl] butyrate) are in the top rank of use in this country. The most representative case is undoubtedly the use of glyphosate resistant soybeans that involved annual loads of about 200,000 tons of this herbicide since 1995.

To evaluate the occurrence and impact of these environmentally concerned pesticides, widely used in the central region of Argentina (Provinces of Santa Fe and Entre Rios), several field studies were carried on. The work comprised the analysis of over 500 surface and underground water samples for glyphosate, AMPA, glufosinate, atrazine and 2,4 D with results that are described in this presentation.

A simplified analytical tool for the residue determinations was developed. Sample preparation was based on solid phase extraction for 2,4 D and atrazine, and FMOC derivatization followed by liquid-liquid partition for glyphosate, AMPA and glufosinate determination. The methodology development assays involved also the optimization variables of UHPLC-MS/MS to achieve satisfactory analyte identification, confirmation and sensitivity. The whole methodology fits adequately with current purposes on environmental evaluation.

In general low concentration levels were detected complying with standard regulatory values. Higher levels were detected mainly concerning punctual contamination sources. The underground water samples studied showed very low impact regarding herbicides contamination. Evidences found of the studied herbicides in surface water, turns of first importance to follow exhaustive monitoring, under rigorous control plans, and the expansion of prevention through proliferation of sustainable practices.

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