

Can an aquatic macrophyte bioaccumulate glyphosate? A watershed scale study using a non-target hydrophyte *Ludwigia peploides*

Debora Perez (1), Elena Okada (1), Mirta Menone (2), Virginia Aparicio (3), and Jose Luis Costa (3)

(1) CONICET, INTA Balcarce, Balcarce, Argentina, (2) CONICET, UNMdP. Mar del Plata, Argentina, (3) INTA Balcarce, Balcarce, Argentina

The hydrophyte *Ludwigia peploides* is widely distributed in South America streams, and therefore, it can be used as a biomonitor for pesticides used in agricultural production. Glyphosate is one of the main pesticides used in Argentina. This has resulted in its occurrence in non-target wetland ecosystems. The objectives of this study were to: 1) establish and validate an extraction and quantification methodology for glyphosate in *L. peploides* plants, and 2) evaluate the role of this species as a glyphosate biomonitor in the agricultural watershed of the El Crespo stream. For the first objective, we collected plant material in the field. The leaves were dissected and oven dried at 60° C, grinded and sieved through a 0.5 mm mesh. Different solutions were tested for the extraction step. Labeled glyphosate was used as an internal standard to evaluate the recovery rate and the matrix effect of the different extraction methods. Glyphosate was derivatized with FMOC-Cl and then quantified by ultra-performance liquid chromatography (UPLC) coupled to a mass tandem spectrometer (MS/MS). The method based on an aqueous phase extraction step 0.01 mg/mL of activated carbon as a clean-up to decrease the matrix interference had a recovery of $117 \pm 20\%$ and the matrix effect was less than 20%. This method was used to analyze the glyphosate levels in *L. peploides* in the El Crespo stream. For the second objective, plants of *L. peploides* were collected on March 2016 in eight monitoring sites of the stream from the headwaters to the stream mouth. Surface water and sediments samples were collected at the same time to calculate the bioconcentration factors (BCFs) and biota-sediment bioaccumulation factors (BSAFs). The BCFs ranged between 28.57 - 280 L/Kg and the BSAFs ranged between 2.52- 30.66 at different sites. These results indicate that *L. peploides* can bioaccumulate glyphosate in its leaves and the major bioavailability is given mainly by the herbicide molecules present in surface water, rather than sediment. In this sense, *L. peploides* could be used as biomonitor organism to evaluate a glyphosate levels in the freshwater aquatic ecosystems