



Indiscriminate use of glyphosate and AMPA in south Brazil impregnates river epilithic biofilms

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Glyphosate (N-[phosphonomethyl]glycine) is a broad-spectrum, systemic, non-selective and post-emergence herbicide, applied intensively in agricultural crops. In Brazil, this herbicide is the most sold active ingredient, corresponding to 39% of the total pesticides marketed, mainly for transgenic corn and soybean crops. Residues of glyphosate and AMPA can be found in environmental compartments, including epilithic biofilms, that is, communities of microorganisms developed adhered to the rocks in the rivers. In this work, glyphosate and AMPA residues were monitored in epilithic biofilms along a watershed with no-tillage system and transgenic plants technological package. Epilithic biofilms samples were collected in the Guaporé River watershed in the fall and spring 2016 seasons. Four points distributed along the sub-watershed of the Capingui River were selected: a forest area (C1), a point downstream from the Capingui dam (C2) and two agricultural points (C3 and C4); four points in the Marau sub-watershed: two points upstream of the urban area of the town of Marau (M1 and M2), one point just downstream from the city of Marau (M3) and one point comprising the sub-watershed (M4), both presenting agricultural areas; and a point in the main course of the Guaporé River (G1). Globally, glyphosate concentrations were higher in the spring, due to the higher intensity of application of glyphosate in this period. Regarding the sample points, the highest concentrations of glyphosate and AMPA were found at points M3 and M4, downstream of the city of Marau, indicating that urban areas, along with agriculture, may also contribute to the contamination of the aquatic environment with residues of glyphosate. To our knowledge, this is the first study that deals with the accumulation of glyphosate and AMPA in natural epilithic biofilms. The results showed that biofilms can accumulate glyphosate resulting from the contamination of water courses and are sensitive to sources of pollution and pesticides present in rivers.