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Toxicity response of aquatic bio-indicators exposed to water polluted with glyphosate

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Herbicides based on glyphosate ($C_3H_8NO_5P$ / CAS 1071-83-6) have been used (actually close to 150 million kg/year) since 1974 on crop soils to eliminate invasive plant species. Sources water can be reached by this herbicide through runoff, leaching and direct exposure of the water receiving body by aerial application. On aquatic environmental, the glyphosate has been found at concentrations up to 4.0 µg/L. Despite the glyphosate has been designed to be lethal in plants (inhibition of the shikimato pathway), the presence of surfactants from commercial formulations and metabolites formation (e.g. Aminomethylphosphonic Acid or AMPA) by biodegradation could change its toxicity on organisms aquatic. The aim of this work was the eco-toxicological evaluation of freshwater and marine water polluted with glyphosate on *Daphnia magna, Emerita analoga* and *Tisbe longicornis*. The methodology used the exposition the aquatic organisms to GLIFOPAC (480 g/L of active ingredient) at concentrations between 0.5 and 4.8 g/L of active ingredient. The acute toxicity of *D. magna* (48 hours -LC_{50}). *E. analoga* (48 hours -LC_{50}) and *T. longicornis* (96 hours -LC_{50}) were studied. Moreover, chromatographic analysis of freshwater and marine water polluted with glyphosate was evaluated. Results demonstrated that acute toxicity reported values for *D. magna*, *E. analoga* and *T. longicornis* of 27.4, 806.4 and 19.4 mg/L, respectively. Chromatographic analysis described around 45 substances of the GLIFOPAC composition such as structures from the surfactants (aliphatics chain with ester/ether group), metabolites (AMPA) and other substances (glucofuranose, glucopyranoside, galactopyranose). Preliminary assessments showed differences in the glyphosate composition within the freshwater and marine water, which may influence the toxicity in each aquatic environment.

Recent Publications

1. Villamar C A, Silva J, Bay Schmith E and Vidal G (2014) Toxicity evaluation identification of anaerobically treated swine slurry: A comparison between *Daphnia magna* and *Raphanus sativus*. *Journal of Environmental Science and Health: Part: B*; 49(11): 880-888.
2. 2Villamar C A, Cañuta T, Belmonte M and Vidal G (2012) Characterization of swine wastewater by toxicity identification evaluation methodology (TIE). *Water Air and Soil Pollution*; 223(1): 363-369.

References

1. Xavier C R, López D, Chamorro S, Scholze A and Vidal G (2017) Sensitivity study comparing Daphnia obtusa (Kurz 1874) and *Daphnia magna* (Straus 1820) exposure to treated kraft mil effluents, diethylstilbestrol and androstenedione. *BioResources*; 12(3): 6558-6567.
2. Chamorro S, Vergara J P, Jarpa M, Hernández V, Becerra J and Vidal G (2016) Removal of stigmasterol from Kraft mill effluent by aerobic biological treatment with steroidal metabolite detection. *Journal of Environmental Science and Health part A: Toxic/Hazardous Substances and Environmental Engineering*; 51(12): 1012-1017.

Biography

Soledad Chamorro has her expertise in Toxicology Evaluation (lethal, sublethal, chronic and metabolic) trough bio-indicators and biomarkers as algae, microcrustacean and fish.

Notes:

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