

Publication

Effects of the herbicide Roundup[®] on the metabolic activity of *Gammarus fossarum* Koch, 1836 (Crustacea; Amphipoda)

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Pesticides can easily reach surface waters via runoff and their potential to have detrimental impacts on freshwater organisms is high. Not much is known about how macroinvertebrates react to glyphosate contamination. In this study we investigated lethal and sublethal effects of the exposure of *Gammarus fossarum* to Roundup[®], a glyphosate-based herbicide. The LC₁₀ and LC₅₀ values after 96 h were determined to be 0.65 ml/L Roundup[®] (230 mg/L glyphosate) and 0.96 ml/L Roundup[®] (340 mg/L glyphosate), respectively. As a sublethal measure of toxicity we conducted eight experiments with the feeding activity and the respiratory electron transport system (ETS) activity as endpoints. All experiments lasted seven days. Although the LC₁₀ concentration of Roundup[®] was used for the feeding activity tests, 49% of the gammarids died before the end of the experiments, which is inconsistent with the calculated LC₁₀-values. The feeding activity was significantly higher in Roundup[®]-enriched water (mean = 0.18 mg/mg x d) in comparison to pure spring water (mean = 0.079 mg/mg x d). No significant difference was observed between the ETS activity, which was determined after 24, 48 or 96 h after the start of the experiment, of the gammarids in Roundup[®] solution and in the control. The LC-values determined here are rather high, and exceed background glyphosate concentrations in most anthropogenically influenced surface waters. The increased feeding activity when exposed to Roundup[®] in combination with an unchanged ETS activity suggests effects on the metabolic efficiency of *G. fossarum*. We argue that Roundup[®] enhances the anabolic activity (feeding activity) in order to maintain the catabolic activity (ETS activity).

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