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Effects of different exposure regimes of an insecticide on freshwater outdoor microcosms

Theme: Water Framework Directive

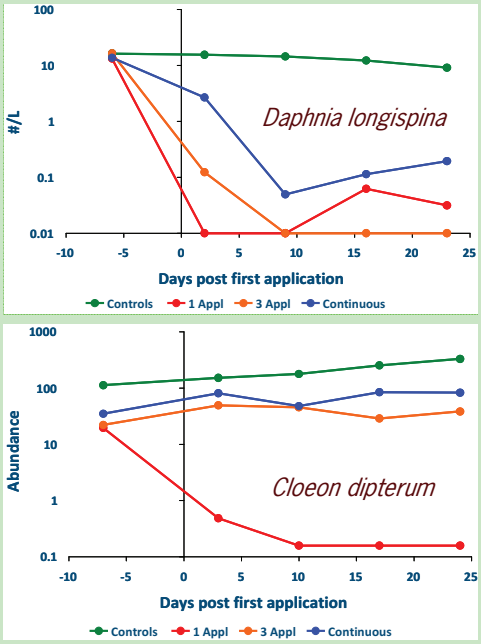
BO-06-006-001

Problem

Pesticides risks are often assessed by performing semi-field experiments evaluating e.g. a pulse application, not necessarily corresponding with the exposure part of risk assessment (e.g. multiple applications). This mismatch is one of the biggest challenges in contemporary ecological risk assessment.

Approach

- The objective of this research was to compare the effects of different time-variable exposure regimes with the same time weighted average concentrations of chlorpyrifos (CPF) towards freshwater communities. This to enable an extrapolation of effects across exposure regimes
- The experiment was performed in 16 outdoor microcosms, using three different regimes: (1) A single application of 0.9 µg a.s./L, (2) three applications of 0.3 µg a.s./L, with a time interval of 7 days and (3) a continuous exposure of 0.1 µg a.s./L for 21 days, based on the same 21d-Time Weighted Average (TWA). The invertebrate community was sampled using artificial substrates and a plankton net



Response of water flea Daphnia longispina (top panel) and mayfly Cloeon dipterum (bottom panel) to the different treatments.

Microcosms used for the experiment.

Results

- *Cloeon dipterum*, Phryganaidae (insects), *Gammarus pulex*, *Daphnia longispina* and *Alona sp.* (Crustaceans) decreased strongly in abundance after CPF treatments
- These results are in accordance with those previously evaluating the effects of CPF in micro- and mesocosms
- *C. dipterum* only responds strongly to the 1 application treatment regime, not to the others
- *D. longispina* and many other species are reduced in all CPF treatments at the end of the experimental period

Future use in risk assessment

- Differences in response between *C. dipterum* and other species can probably be explained by differences in toxico-kinetics and -dynamics of this compound in this species compared to others
- For long-term effects of CPF the weighted concentration seems more important than the peak concentration
- The use of weighted in stead of the peak concentration in risk assessment should be investigated further

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