Effects of a realistic multiple low dose pesticide exposure scenario on aquatic communities in stream mesocosms

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Introduction

The current EU risk assessment for pesticides refers to effects of single substances, which derives a regulatory acceptable concentration (RAC) for each pesticide. However, combinations of pesticides, which are commonly used in agriculture, are not considered in the risk assessment.

Here, we studied a realistic pesticide spray scenario for a apple crop protection on aquatic communities in stream mesocosms.

First results

1. **RNA:DNA of caged invertebrates**
   - **No significant difference** between control and treatment mesocosms. Test were done at four events with different tested taxa.

2. **Drift - day/night - of invertebrates (4 fungicides)**
   a. **No significant difference** in community drift behavior in control and treatment.
   b. **Significant differences on** taxon scale (only night drift).
      - Tanytarsus p = 0.03*
      - Orthocladiinae p = 0.62
      - Beatidae p = 0.03*

Preliminary conclusion

**Event-driven effects**
- Realistic mixtures (RAC) of pesticides had no short-term effects (exception: single drifting taxa).
- Gives the impression of safety of RAC mixtures on a short time scale.

**Long-term effects**
- Complete spray scenario resulted in a reduction of fitness and primary production of considered taxa.
- Cumulative effects also of RAC possible on a longer time scale.

Material & methods

**Realistic scenario**
- 4 control & 4 treatment mesocosms
- 9 fungicides, 4 insecticide & 4 herbicides
- application of RAC for each pesticide
- At 19 days in total 36 pesticide application

**Measured parameters (selection)**
- Drift of invertebrates (Berghahn et al. 2012)
- RNA:DNA ratio as proxy for fitness and growth (Wagner et al. 2001)
- Stable isotope analysis of δ15N & δ13C for trophic level [TL] (see Brauns et al. 2012)
- Floating leaves of Potamogenton natans (cf. Berghahn et al. 2007)

References:

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References: