

# Sensitivity distinctions of lotic insect larvae exposed to Imidacloprid

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## Introduction

Macroinvertebrates are common throughout the world and important for the functional integrity of streams (Wallace et al. 1996).

The contamination of running or stagnant water with harmful substances, in particular insecticides, can be very dangerous for macroinvertebrates, especially for lotic insect larvae.

Until now, only a few species are used in bioassay studies (Sweeney et al. 1993) despite their potential as indicators of toxicity, bioavailability and bioaccumulation (Walton 1989).

The sensitivity differences of various lotic Ephemeroptera, Plecoptera and Trichoptera (EPT) larvae were examined.

Imidacloprid (IMI) was used as the test substance due to the fact that this neonicotinoid is one of the most commonly used insecticides worldwide.



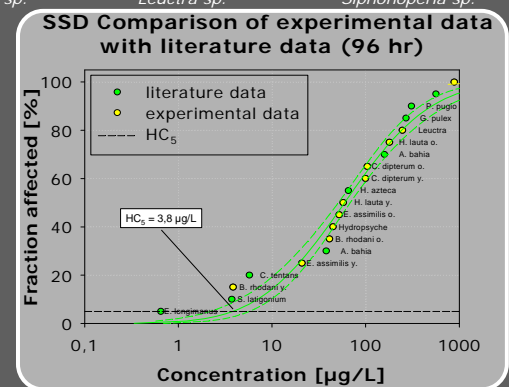
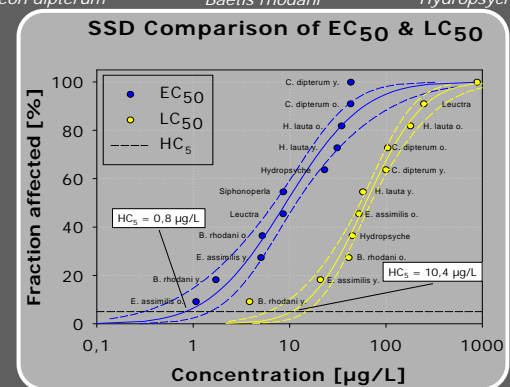
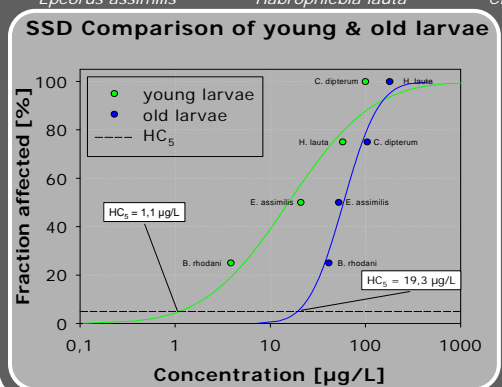
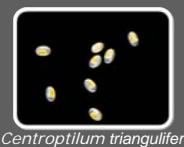
## Material & Methods

- Toxicity test for 96 h in M4-medium (ELEN2T)
- Sampled larvae from pristine streams or laboratory breeding
- Acclimatisation for 48 h before testing
- Test setup
  - 100 ml beakers with 50 ml medium (aerated)
  - 5 concentrations with 5 replicates each
  - 10 replicates as control
- Observed endpoints: immobility (EC<sub>50</sub>), mortality (LC<sub>50</sub>)



## Results

Species young (y.) old (o.)	Dry weight [mg]	LC <sub>50</sub> [IMI µg/L] after 96 hr	EC <sub>50</sub> [IMI µg/L] after 96 hr	Survival rate in control [%]	Introduced individuals per replicate	Order
<i>Epeorus assimilis</i> o.	9,74 (± 4,87)	52,33	1,07	95	2	Ephemeroptera
<i>Epeorus assimilis</i> y.	7,15 (± 2,57)	20,89	5,06	100	2	Ephemeroptera
<i>Habrophlebia lauta</i> o.	0,65 (± 0,22)	179,92	34,65	98	5	Ephemeroptera
<i>Habrophlebia lauta</i> y.	0,17 (± 0,09)	57,62	31,18	96	5	Ephemeroptera
<i>Cloeon dipterum</i> o.	0,65 (± 0,18)	104,63	43,03	100	5	Ephemeroptera
<i>Cloeon dipterum</i> y.	0,13 (± 0,05)	100,00	43,33	98	5	Ephemeroptera
<i>Baetis rhodani</i> o.	0,51 (± 0,16)	41,23	5,21	94	5	Ephemeroptera
<i>Baetis rhodani</i> y.	0,10 (± 0,05)	3,85	1,72	66	5	Ephemeroptera
<i>Hydropsyche</i> sp.	3,44 (± 1,28)	44,93	23,07	80	1	Trichoptera
<i>Leuctra</i> sp.	0,64 (± 0,17)	247,09	8,57	100	5	Plecoptera
<i>Siphonoperla</i> sp.	0,55 (± 0,33)	883,89	8,63	100	6	Plecoptera
<i>Centroptilum triangulifer</i>	-	8,88 (72 hr)	4,98 (72 hr)	100	10	Ephemeroptera



## Conclusions

- Toxicity tests with EPT taxa are possible with low mortality in controls.
- Young larvae are more sensitive as compared to older larvae (factor of 20).
  - Most sensitive species should be considered in SSD.
- The EC<sub>50</sub> for immobility is ten times lower than the LC<sub>50</sub> (more sensitive).
- For lotic insect larvae, immobility in streams leads to mortality.
- EPT taxa can be useful test species for SSD.
- It is important to use non-standard organisms to better assess the situation in the field.

## References

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