

### Interspecific competition impact on organism responses to chemical stress: an SSD based approach

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**ECOBIO** 

Rennes

# Interspecific competition impact on organism responses to Continentale et Continetale et Cont



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## Introduction and objectives

Grass strips are vegetated areas that act as buffer strips against agricultural pollutants flows towards streams. They present a community of plant species that are simultaneously exposed to various pollutants  $\rightarrow$  interactions between competition and chemical stress responses is an important topic. The objective of this study is to :

- assess whether interspecific competition modifies tolerance of herbaceous plants to the herbicide isoproturon

- evaluate SSD, a tool widely used in risk assessment that permits to integer data from monospecific tests to produce a theoretical sensitivity distribution of the community.



SETAC



- Bromus erectus as model competitor

- 25-days exposure to 6 isoproturon concentrations, from 0 to 1.75 µM, in

| Isoproturon tolerance |        |      |  |  |  |
|-----------------------|--------|------|--|--|--|
| Low                   | Medium | High |  |  |  |

presence and absence of Bromus erectus (8 replicates).

- measurement of 12 endpoints expected to respond to isoproturon and/or competition stress (linked to biomass, photosynthesis, resource allocation...).

| Competitiveness Low<br>High | Low  | Poa trivialis         | Poa pratensis      | Trisetum flavescens |
|-----------------------------|------|-----------------------|--------------------|---------------------|
|                             | High | Arrhenatherum elatius | Lolium multiflorum | Dactylis glomerata  |

### **Results and discussions Examples of fit** Toxicity effect **Competition effect** Absence of competitor Measured endpoint 0.2 0.4 0.6 0.8 endpoint Presence of competitor +: IC<sub>10</sub> 0 Measured ( 5 0 0 1.5 0.5 0.0 1.0 0.0 1.0 0.5 1.5 IPU concentration (µM) Both N red endpoint ) 80 ed endpoint Effect of competition



In every case,  $HC_5$  values derived with BMDsd,  $IC_{10 \text{ or } 50}$  and  $EC_{10 \text{ or } 50}$ , used in every different SSD types used are **1,04 to 7,21 times lower** 



Depending on species and endpoints, fitted curves present **competition effect** (differences at intercept) and/or **toxicity effect** (differences in toxicity values).





for organisms in presence of the competitor.

The choice of toxicity value used and the handling of multiple toxicity values for a same species can result in important changes in final  $HC_5$  values and their differences between situations with and without interspecific competition.

Interspecific competition → decrease in tolerance to isoproturon → impact on obtained SSD models.
Toxic value choice & processing of multiple toxic value for each species → changes in HC<sub>5</sub> values and their modification by competition.
It seems important to assess in the future whether this ecological interaction, and others, should be further highlighted in risk assessment.
Other experiments are actually in progress to define if these conclusions can be applied to metabolomic data and to complex assemblages of tested species.

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