

Fish (*Danio rerio*) Avoid Single Environmentally Relevant Concentrations of Glyphosate, Chlorpyrifos and Chorothalonil, but Is the Same Response for Mixtures?



In the context of mixture pollution, a component of the mixture can interfere with the behavioural response of avoidance favouring exposure to other components.

Background

Pollution with pesticide residues in agricultural landscapes



Risk for the ecosystems?



Relevant sublethal responses - Behavior - Avoidance

Avoidance in the scenario of mixture pollution?

Methods



Glyphosate



Chlorothalonil



Chlorpyrifos

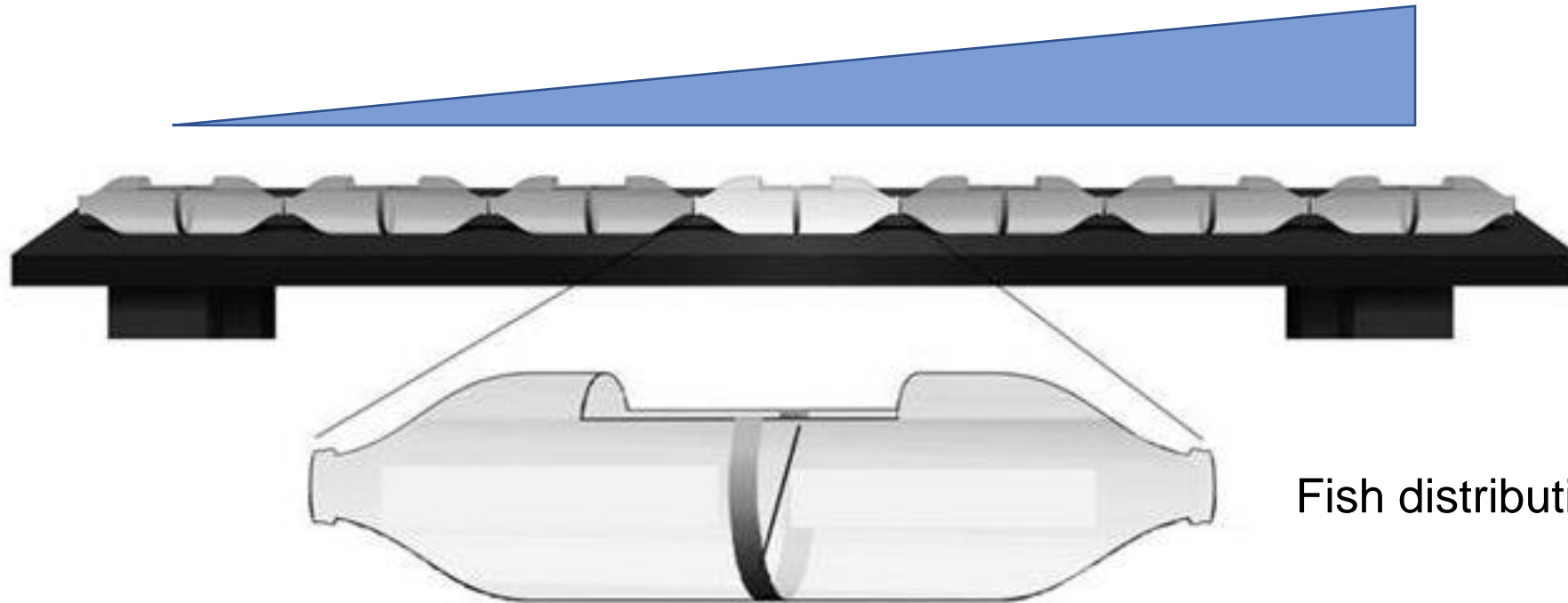
Selection of the substances

Methods

Unforced exposure

Single substance exposure

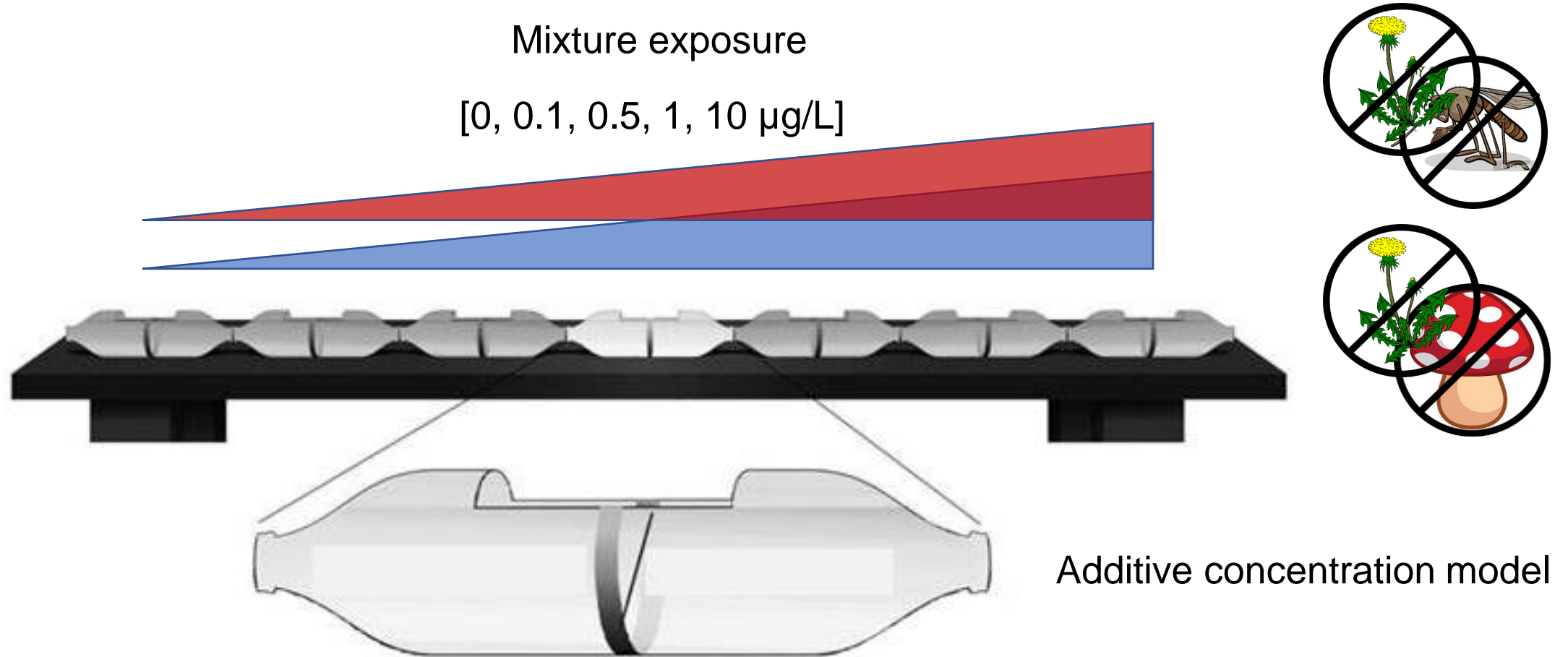
[0, 0.1, 0.5, 1, 10 $\mu\text{g}/\text{L}$]



Fish distribution and AC_{50}

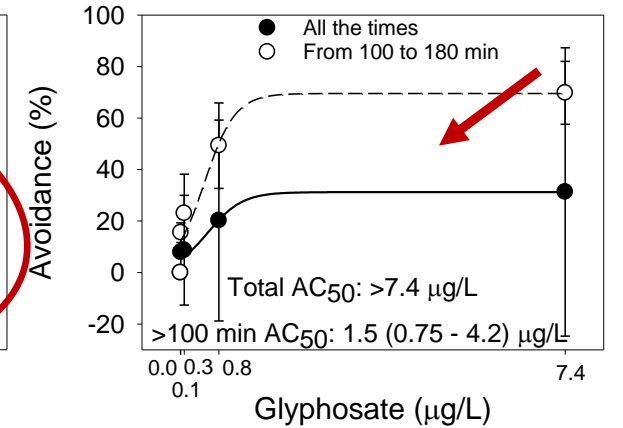
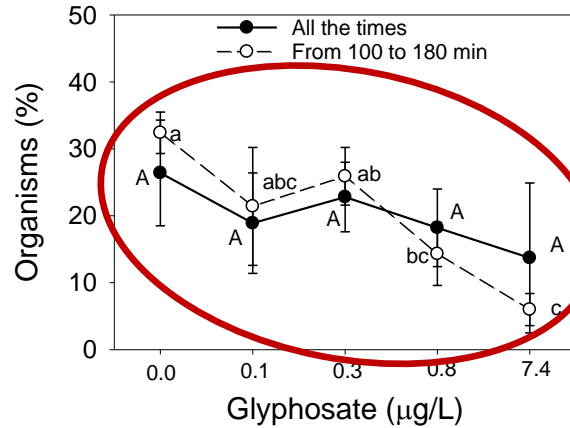
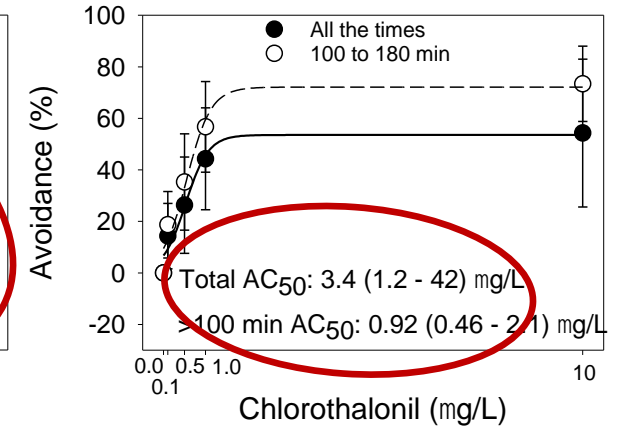
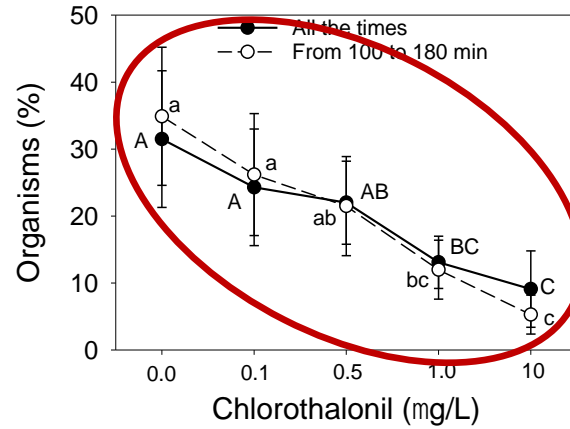
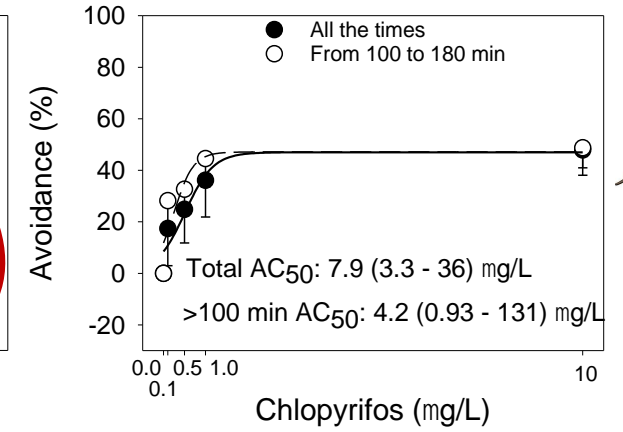
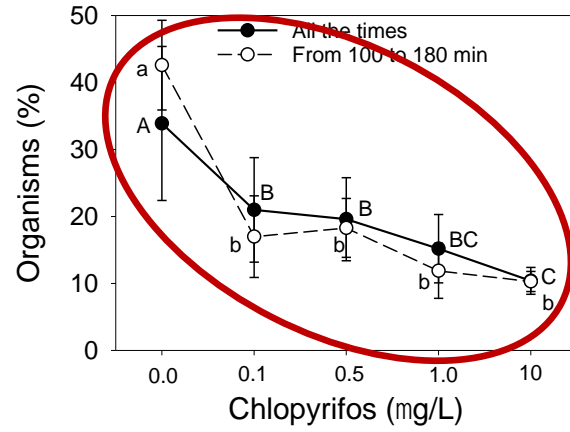
Methods

Unforced exposure



Results and Discussion

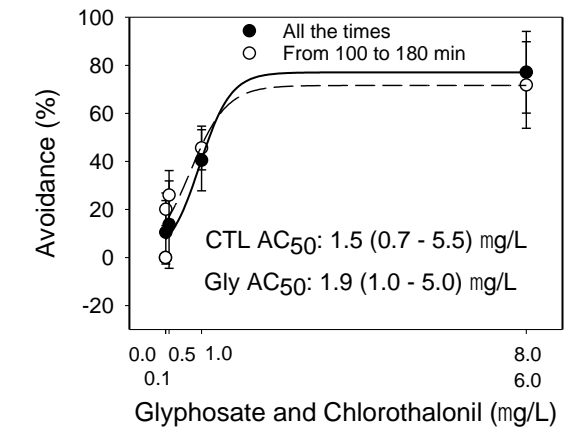
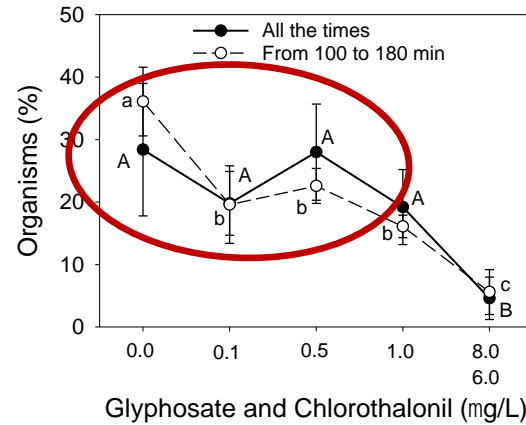
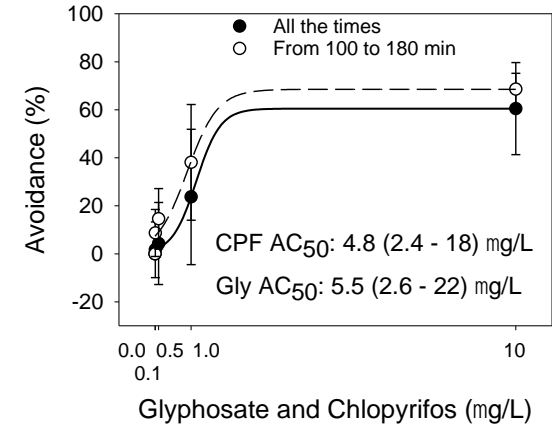
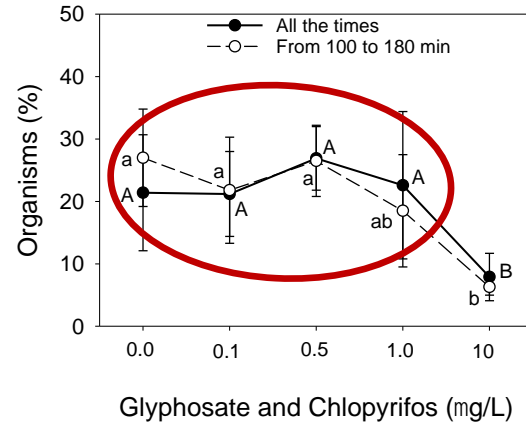
Avoidance of individual substances



Results and Discussion

Avoidance of mixtures

No addition



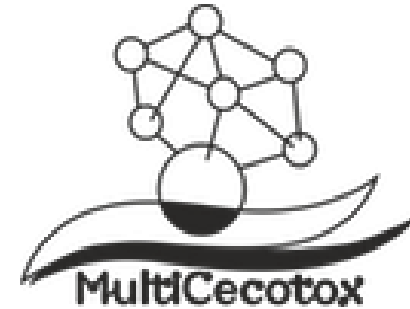
Conclusions

- Juveniles of *D. rerio* are sensitive to three current use pesticides, showing **clear avoidance of environmentally relevant concentrations** of them.
 - The **avoidance of glyphosate presented a particular behavior** with an early period during which fish showed **tolerance** to the herbicide.
 - In the context of mixture pollution, **a component of the mixture can interfere with the behavioural response of avoidance** and favour exposure to other components.

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Thank you!
Obrigado!
Gracias!

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