

# EFFECTS OF INSECTICIDES USED IN CONVENTIONAL AND ORGANIC FARMING ON THE NATURAL FOOD BASE OF FISH

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## INTRODUCTION

- ✿ The utilization of pesticides assumes a significant role in securing a sustainable global food provision
- ✿ The Organic farming practices are supported by the EU
- ✿ Increasing usage of pesticides approved for organic farming
- ✿ The widespread use of pesticides also affects non-target aquatic ecosystems species affected include, among others, important fish food components such as Daphniidae, Naididae, and Chironomidae larvae
- ✿ The aforementioned organisms belonging to the macrozoobenthos form the food base of fish, especially in European carp
- ✿ **Are pesticides suitable for organic farming safe for aquatic organisms?**

## RESULTS

### Median lethal concentrations

- ☞ Median lethal concentrations were calculated with R *ecotox* package

Tab. 1 Median lethal concentrations for *Daphnia magna*

Insecticide	48h LC 50 (mg/l)
Sivanto Prime	489
Mospilan 20 SP	140
Spintor	<b>0,004</b>

Tab. 2 Median lethal concentrations for *Chironomus riparius* larvae

Insecticide	48h LC 50 (mg/l)
Sivanto Prime	0,107
Mospilan 20 SP	0,087
Spintor	<b>0,053</b>

Tab. 3 Median lethal concentrations for *Tubifex tubifex*

Insecticide	96 LC 50 (mg/l)
Sivanto Prime	2
Mospilan 20 SP	<b>0,033</b>
Spintor	3606

## CONCLUSION

- ! The sensitivity of individual invertebrate non-target organisms to insecticides varies considerably.
- ! From the above results it can be concluded that organisms that form the food base of fish, such as *Daphnia magna*, *Chironomus riparius* or *Tubifex tubifex* are very sensitive not only to conventional pesticides, but in the case of *Daphnia m.* and *Chironomus r.* also to pesticides that are approved for use in organic farming.
- ! The approval of new pesticide products and their application requires a very sensitive and sensible approach so that they have the least possible impact on aquatic ecosystems.
- ! The study shows that products approved for use in organic farming can be more toxic to some organisms and affect them more than conventional pesticides.
- ! When assessing the use of pesticide substances, it is necessary to consider not only the effects of the pure active substance but also the effects of the pesticide product itself.

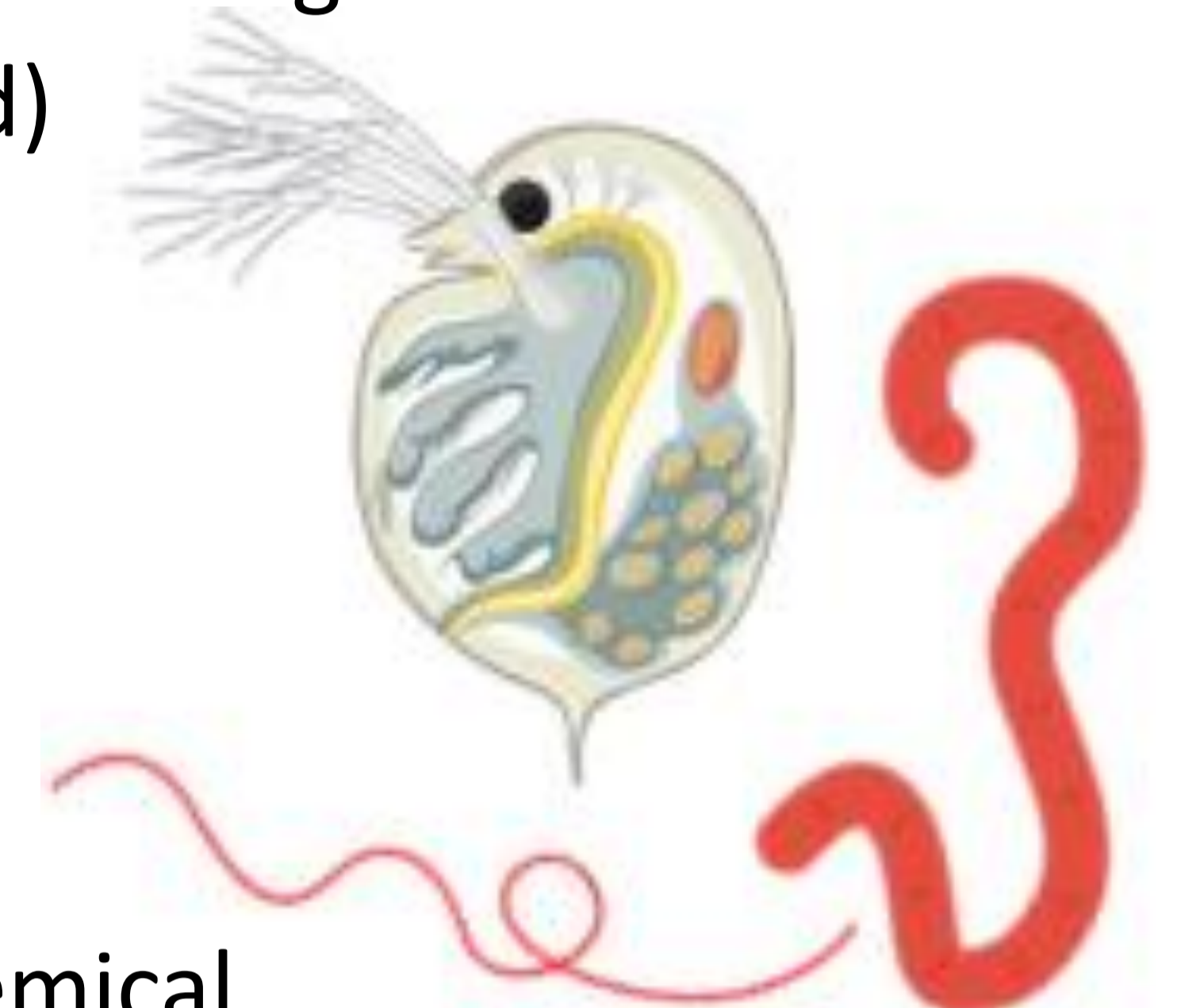
## MATERIAL AND METHODS

### Chemicals

- ✿ Conventional pesticides
  - ✿ Sivanto Primse (17.1% of flupyradifurone)
  - ✿ Mospilan 20 SP (20% of acetamiprid)
- ✿ Pesticide suitable for organic farming
  - ✿ Spintor (22.75% of spinosad)

### Test organisms

- ✿ *Daphnia magna*
- ✿ *Tubifex tubifex*
- ✿ *Chironomus riparius* (larvae)



### Design of experiment

- ✿ 6 concentrations of each chemical
- ✿ Concentrations based on preliminary tests

### *Daphnia magna*

- ✿ Toxicity test carried out according to:
  - ✿ OECD Methodology no. 202<sup>1</sup>
- ✿ 20 organisms in each group
- ✿ 100 ml vessels
- ✿ 48 hours

### *Chironomus riparius* larvae

- ✿ Toxicity test carried out according to:
  - ✿ OECD Methodology no. 235<sup>2</sup>
- ✿ 30 organisms in each group
- ✿ 10 ml vessels (6-well macroplate)
- ✿ 48 hours

### *Tubifex tubifex*

- ✿ Toxicity test carried out according to:
  - ✿ Maestre et al. (2009)<sup>3</sup>
- ✿ 30 organisms in each group
- ✿ 10 ml vessels (6-well macroplate)
- ✿ 96 hours



## REFERENCES

- <sup>1</sup>OECD. (2004). Test No. 202: Daphnia sp. Acute Immobilisation Test. OECD Guidelines for the Testing of Chemicals, OECD Publishing.
- <sup>2</sup>OECD. (2011). Test No. 231: Chironomus sp., Acute Immobilisation Test. OECD Guidelines for the Testing of Chemicals, OECD Publishing.
- <sup>3</sup>Maestre, Z., Martinez-Madrid, M., & Rodriguez, P. (2009). Monitoring the sensitivity of the oligochaete Tubifex tubifex in laboratory cultures using three toxicants. *Ecotoxicology and Environmental Safety*, 72(8), 2083–2089.

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