COMPARING THE SENSITIVITIES OF OYSTERS AND STANDARD AQUATIC SPECIES TO PESTICIDE ACTIVE SUBSTANCES

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Background

- Globally, the registration of pesticides typically relies on three taxonomic groups for aquatic environmental risk assessment.
- There are some geographic variants: marine mollusk endpoints are a data requirement in the USA, but not in the EU.

Aims

→ Comparing sensitivities of mollusks to standard aquatic test species to contribute to understanding if mollusks are protected in the existing EU risk assessment framework.

→ This poster highlights the initial findings of such a comparison.

Data collection

Conduct NPIRS search to identify pesticides that (potentially) had oyster data

- Search terms: "oyster" and "OCSPP 850.1025"

Search databases and regulatory documents for oyster endpoints

Step 1:
- Match NPIRS pesticides to ECOTOX & PPDB
- ECOTOX: *Crassostrea virginica* and *C. gigas*

Step 2:
- Search regulatory documents if oyster data were not available in ECOTOX or PPDB

Collect fish & invertebrate data for pesticides with corresponding oyster data

- Record LC/EC_{50} data for standard species (*D. magna*, *O. mykiss)*
- Use PPDB database for pesticides with oyster data from Step 1 or 2 above
- Additionally, search: **1.** EFSA documents for pesticides containing ECOTOX oyster data (step 1 above) and **2**. US EPA documents for pesticides containing US EPA oyster data (Step 2 above)

Data processing

Collate, tidy, and filter data in Knime Analytics Platform 5

- Merge data collected from all sources
- Filter for lowest standard species endpoint and lowest mollusk endpoint for each pesticide (e.g. if multiple *D. magna* endpoints existed from different data sources, the lowest was used)
- Data from both oyster species were considered
- Include unbound endpoints
- No consideration of analytical confirmation of test substance
- No consideration of reliability of endpoints based on e.g. data source

Calculate sensitivity ratios (SRs) and classify into 3 major categories

$$SR = \frac{fish\ or\ invertebrate\ endpoint}{mollusk\ endpoint}$$

SR < 0.3 = mollusks are less sensitive
0.3 < SR <3 = mollusks are similarly sensitive
SR > 3 = mollusks are more sensitive

→ **SRs calculated for 178 pesticides**

Results

- Oysters are less, or similarly, sensitive compared to standard aquatic species for 132 pesticides or 74% of 178 pesticides investigates (Figure 1).
- Where oysters were found to be more sensitive than the standard species, a Sensitivity Ratio (SR) of 3 to 50 was calculated (Figure 3c)).
- When considering pesticide type, 20 (40%), 18 (24%), and 6 (13%) number of Fungicides, Herbicides and Insecticides, and, respectively, had SR > 3 (Figure 2).
  - Further investigation will include:
    - Considering algae/aquatic plant data for Herbicides and Fungicides.
    - Explore additional available endpoints for Fungicides (e.g. lowest endpoint of the respective risk assessment).

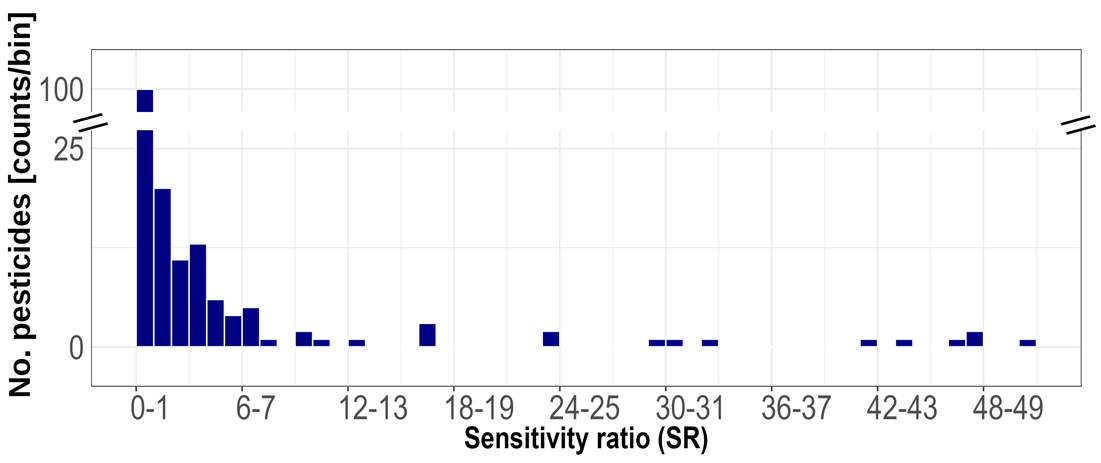

Figure 1: **Histogram** – Sensitivity Ratio distribution of 178 pesticides (bin width = 1)

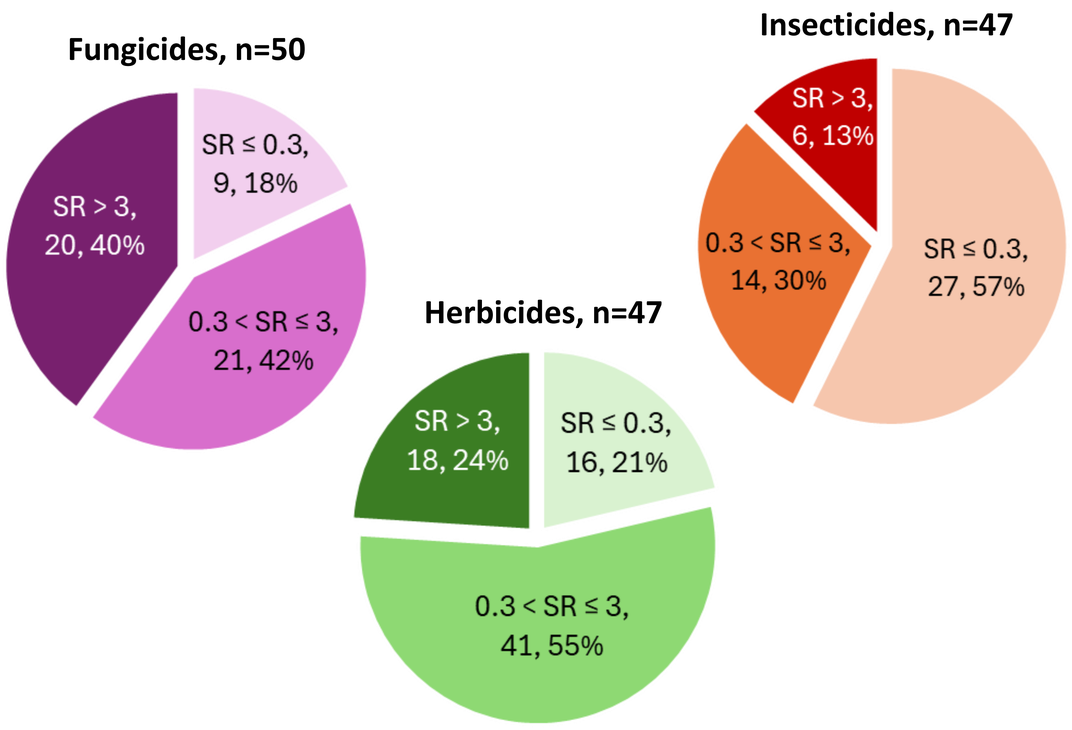

Figure 2: **Pie charts** – Distribution of SR categories for Fungicides, Herbicides and Insecticides in SR groups SR ≤ 0.3; 0.3 < SR ≤ 3 and SR > 3. The pie charts show the SR group, number of pesticides and percentage within the corresponding SR group. Acaricides and other compounds not shown.

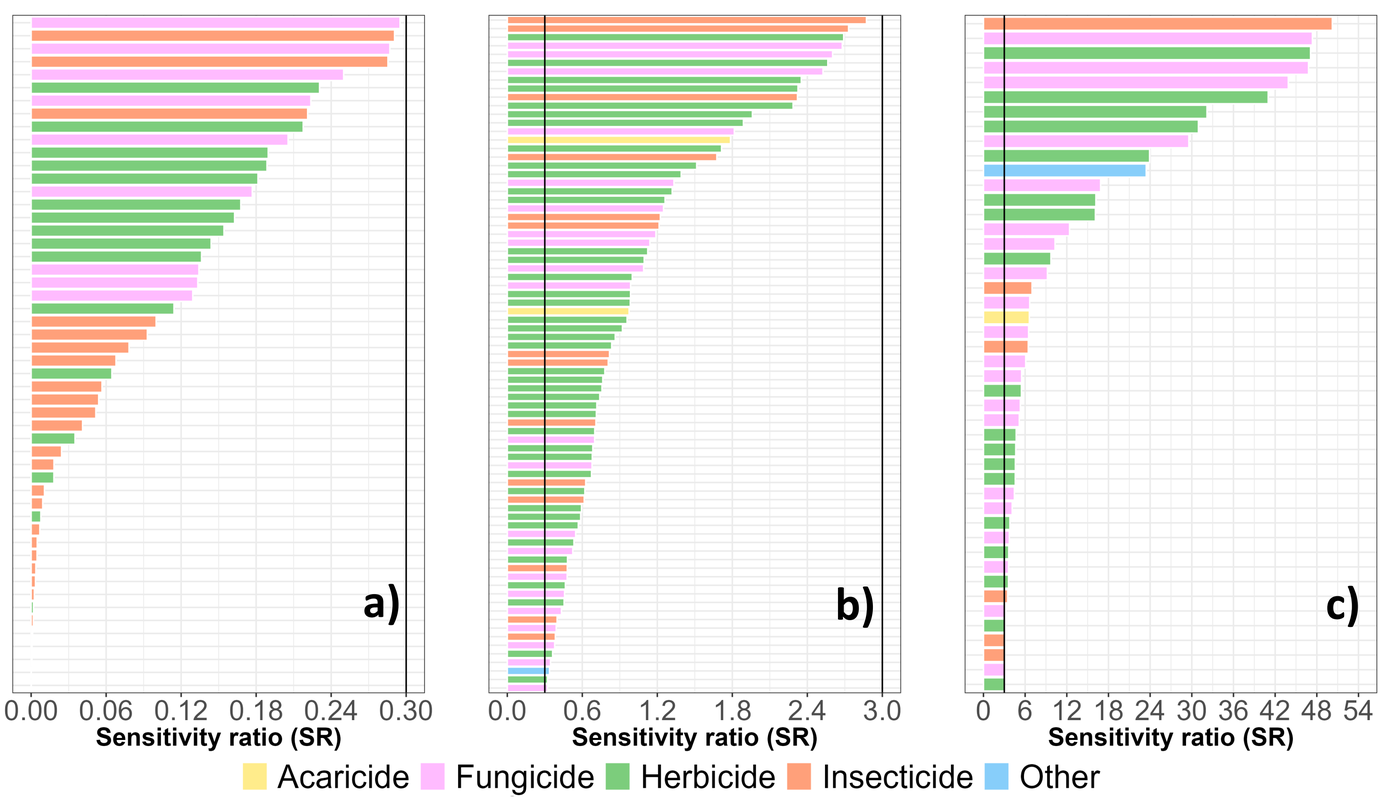

Figure 3: Distribution of sensitivity ratio colour-coded by pesticide type; **a)** SR ≤ 0.3; **b)** 0.3 ≤ SR ≤ 3; **c)** SR > 3

Conclusions

- These preliminary results suggest that oysters would be covered in the European aquatic risk assessment framework for all pesticide types using the standard assessment factor of 100 applied to the acute fish LC50 or the invertebrate EC50.
- Future work will include a check for potential refinements, reliability of data, considering algae and aquatic plant endpoints for Fungicides and Herbicides and further investigation of the 46 pesticides with a SR > 3.

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