

Characterising Pollinator Exposure Pathways Through Multi-Matrix Pesticide Residue Analysis

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INTRODUCTION

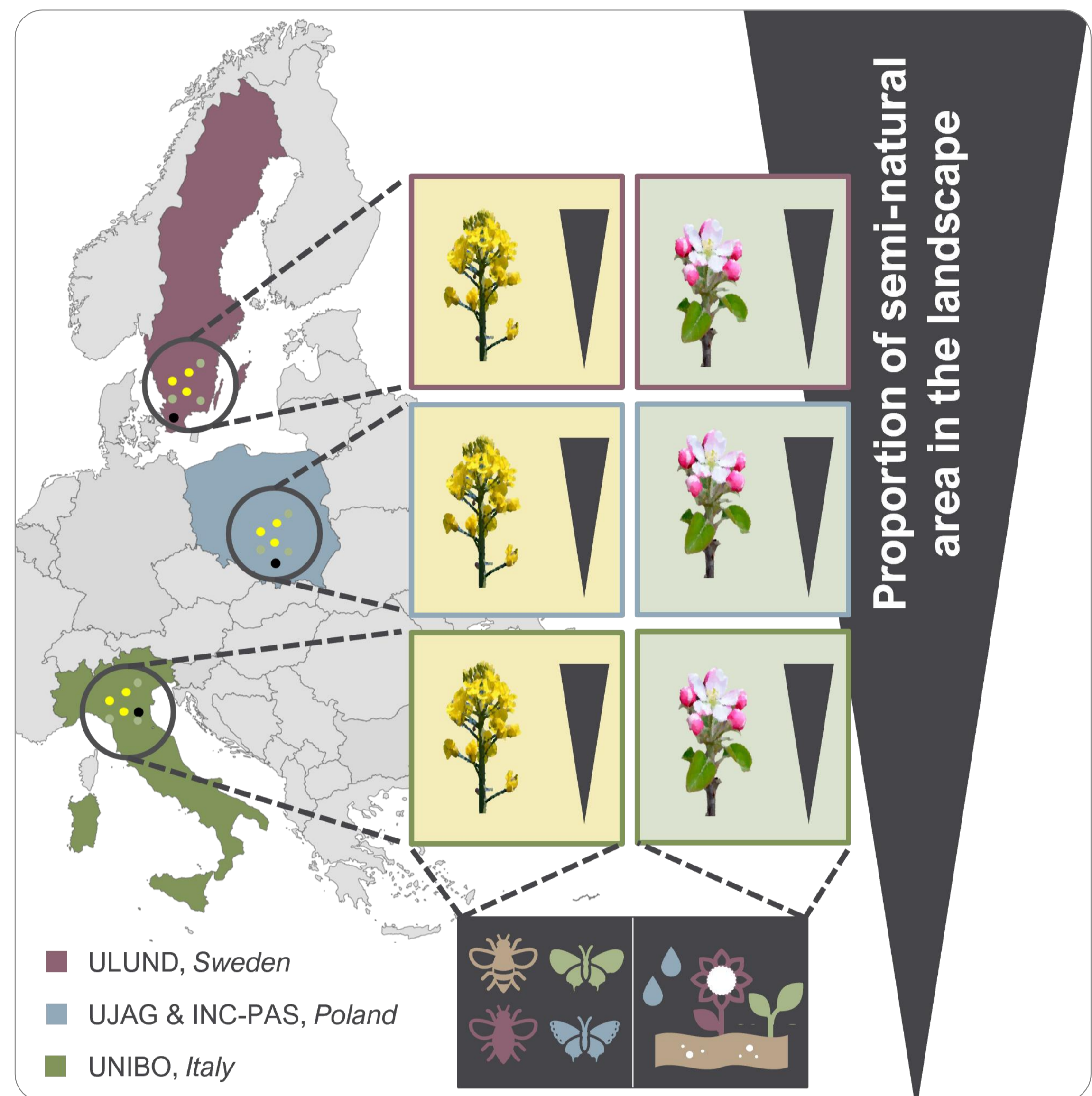
- Understanding co-occurrence of pesticide residues across relevant environmental matrices is key for characterising pollinator exposure pathways, evaluating exposure modelling, and improving risk assessment.
- Part of EU Horizon project PollinERA.
- Multi-country monitoring campaign targeting pesticide-pollinator interactions.

SAMPLING IN 2024

- Conducted in three countries
- Two cropping systems:** Perennial apple orchards and annual oilseed rape
- Two sampling periods:** Spring (during focal crop bloom) and Summer (regional peak in pollinator activity)
- Samples:**
 - Environmental matrices: nectar, pollen, plants, soil, and water
 - Different pollinator groups (not included in this poster)

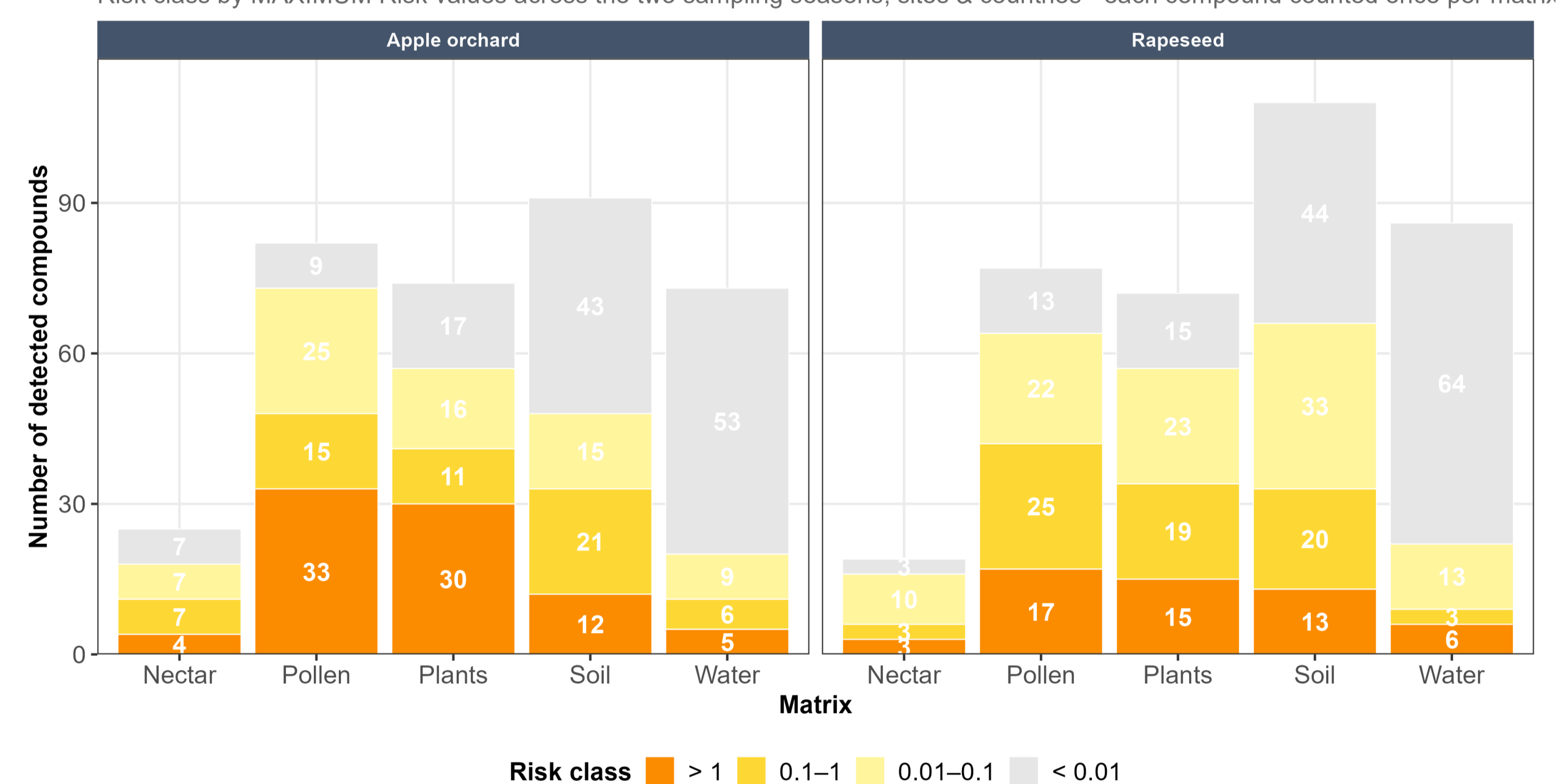
METHODS

Samples were analysed using multi-residue **LC-MS/MS** and **GC-MS** methods covering up **182 active substances and transformation products**.



Pesticide Risk Overview by Matrix & Crop

Risk class by MAXIMUM Risk values across the two sampling seasons, sites & countries - each compound counted once per matrix



$$\text{Risk (toxicity-weighted concentrations)} = \text{Concentration in matrix} / \text{LD}_{50}^*$$

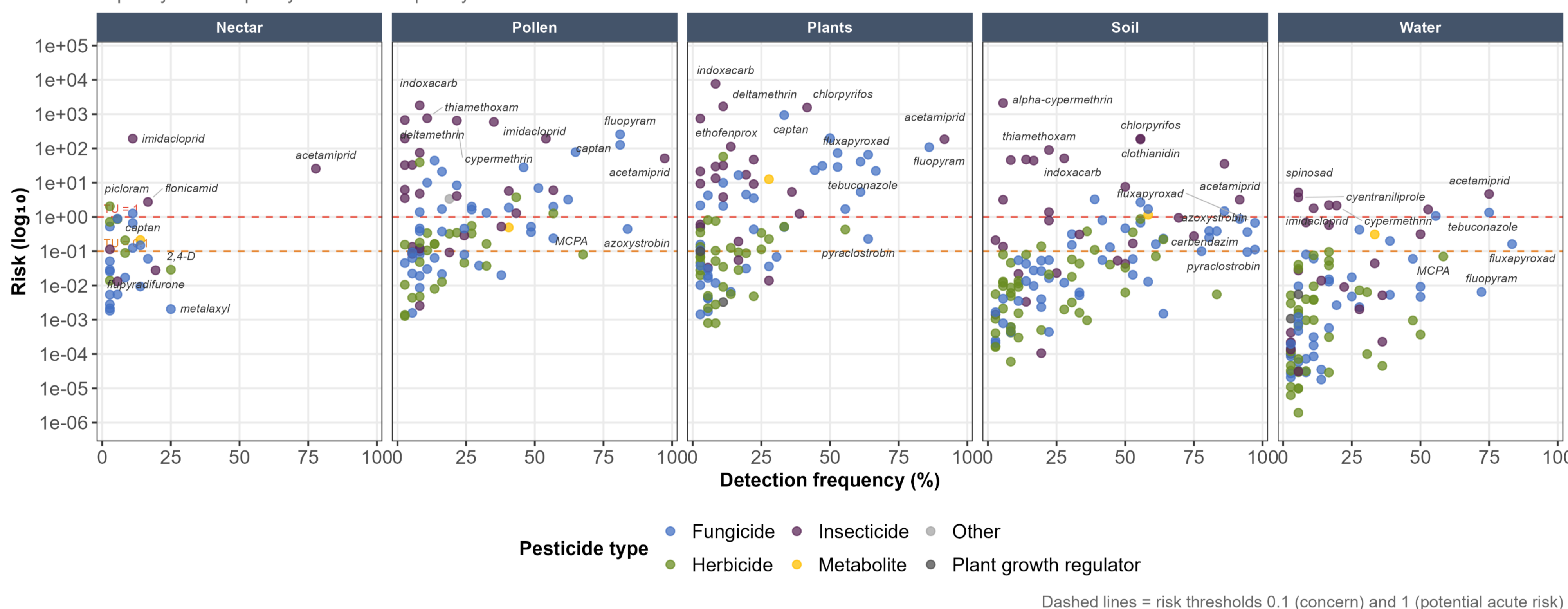
*We averaged the acute oral and contact LD₅₀ from honey bees for each compound to provide an overall indicator of toxicity

RESULTS

- Insecticides contributed most to overall risk across matrices
- Pesticides with highest risk were mostly banned insecticides
- Pollen, plants and soil – high number of more risky pesticides detected >75

Detection Frequency vs. Risk per Matrix

Top 5 by risk & top 5 by detection frequency labelled - uniform axes across all matrices



MATRIX

- Pollen exhibited the highest number of compounds exceeding Risk > 1, with 33 exceedances in apple orchards and 17 in oilseed rape
- Soil contained the highest number of detected pesticides, while nectar showed the lowest
- Nectar lowest number of detected pesticides, but a few insecticides contributing to risk (i.e. acetamiprid and imidacloprid)
- Water consistently showed high detection frequency and low overall concentration → low risk detects

CONCLUSIONS

- All matrices represent potential exposure pathways for pesticide risk to pollinators
- Risk mostly driven by insecticides in both crop systems
- Exposure risk is matrix-specific rather than uniform



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CENTRE FOR PESTICIDES
IN THE ENVIRONMENT

