



GREENPEACE

EFSA 2019 Roundtable with NGOs:

Risk Assessment of Chemical Mixtures

Brussels, 13 February 2019

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GREENPEACE RESEARCH LABORATORIES

Innovation Centre Phase 2

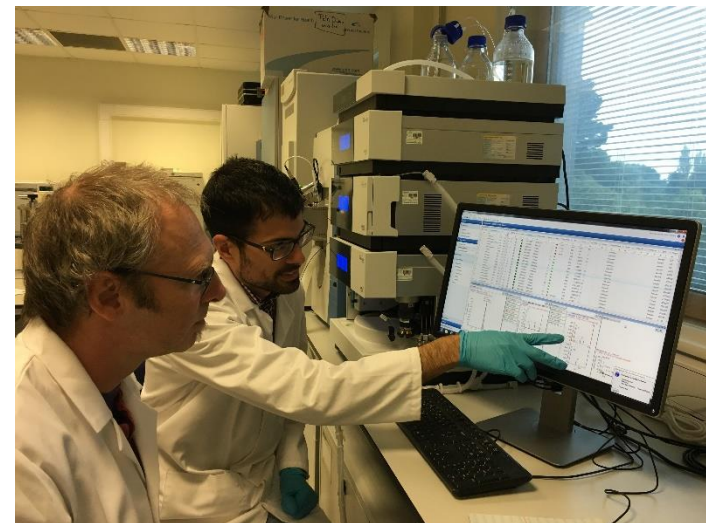
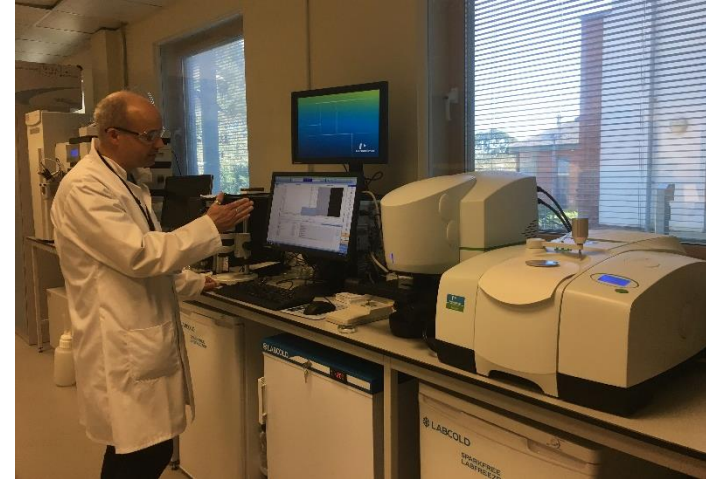
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GREENPEACE SCIENCE UNIT

- Analytical chemistry and toxicology
- Terrestrial and marine ecology
- Climate sciences

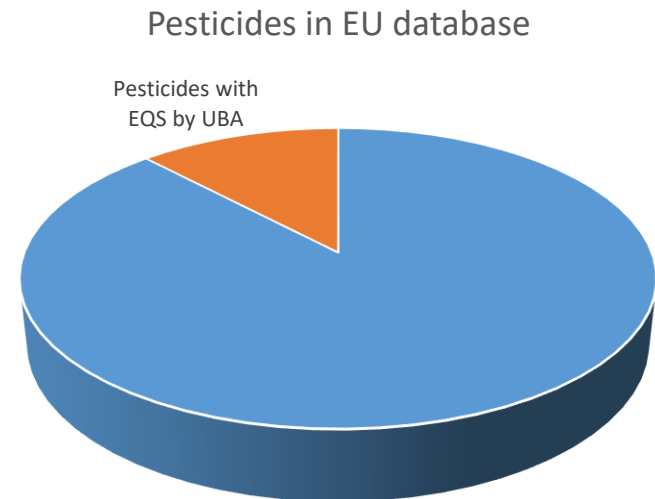


PESTICIDES RISK ASSESSMENT

- 1300 pesticides in EU database¹
- 490 pesticides approved in the EU²
- Individual pesticide risk quotient:

$$RQ_i = \text{concentration}_i / EQS_i$$

- UBA: EQS for 157 pesticides³
- Different sources for EQSs, different figures
- Which EQSs should be used?



¹ Council European Union Regulation 1107/2009, L309/1, O. J. Eur. Union (24.11.09), n.d.

² Pesticides database of the European Commission, 2018. <http://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?Event=activesubstance.selection&language=EN>

³ Regulatory acceptable concentration for selected crop protection agents. Federal Environment Agency of Germany [WWW Document], n.d. URL <https://webetox.uba.de/webETOX/public/basics/literatur.do?id=24559>

MIXTURES OF SUBSTANCES

- Is it possible to have a real sample containing only one bioactive substance?
 - Pesticides
 - Antimicrobials
 - Steroids
 - ...
- Is it possible to quantify all the bioactive agents present in a sample?
- Is it feasible to consider all the possible interactions between all the bioactive compounds in the sample?
 - Potentiation
 - Synergism
 - Antagonism
 - ...

MIXTURES OF SUBSTANCES

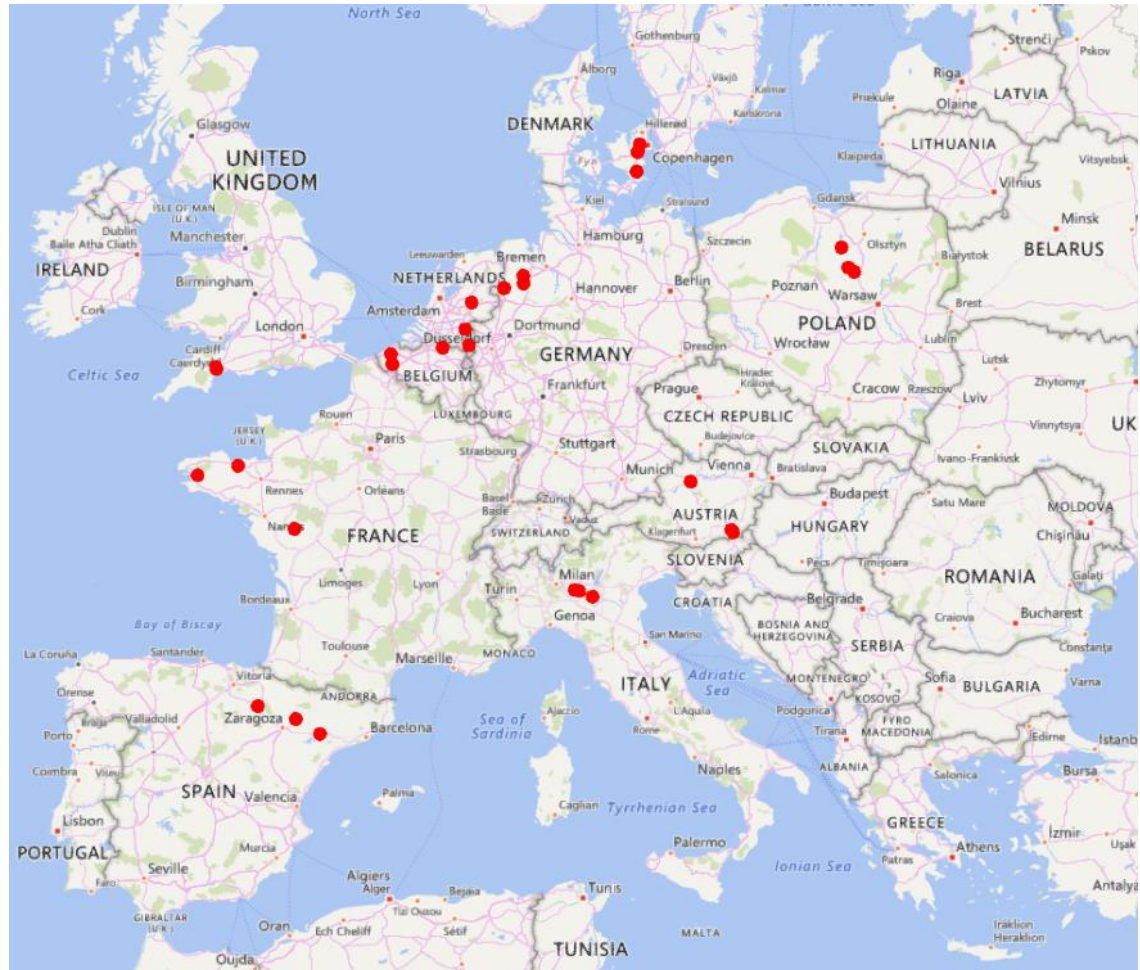
The concentration addition approach is used by default:

$$RQ_{\text{sample}} = \sum Rq_i$$

- Not all the bioactive agents are monitored
- Not even all the pesticides are monitored
- Different EQSs for the same compound in the literature
- EQSs are not available for all the substances
- Effects of all the different compounds cannot have the same weight

SUMMER 2018 SCREENING

- Samples:
 - 29 snap samples
 - Small streams
 - 10 countries in the EU
- Screening for:
 - Pesticides
 - Veterinary drugs



SUMMER 2018 SCREENING



SPE-LC-HRMS/MS



Thermo
SCIENTIFIC
Q Exactive Focus LC-MS

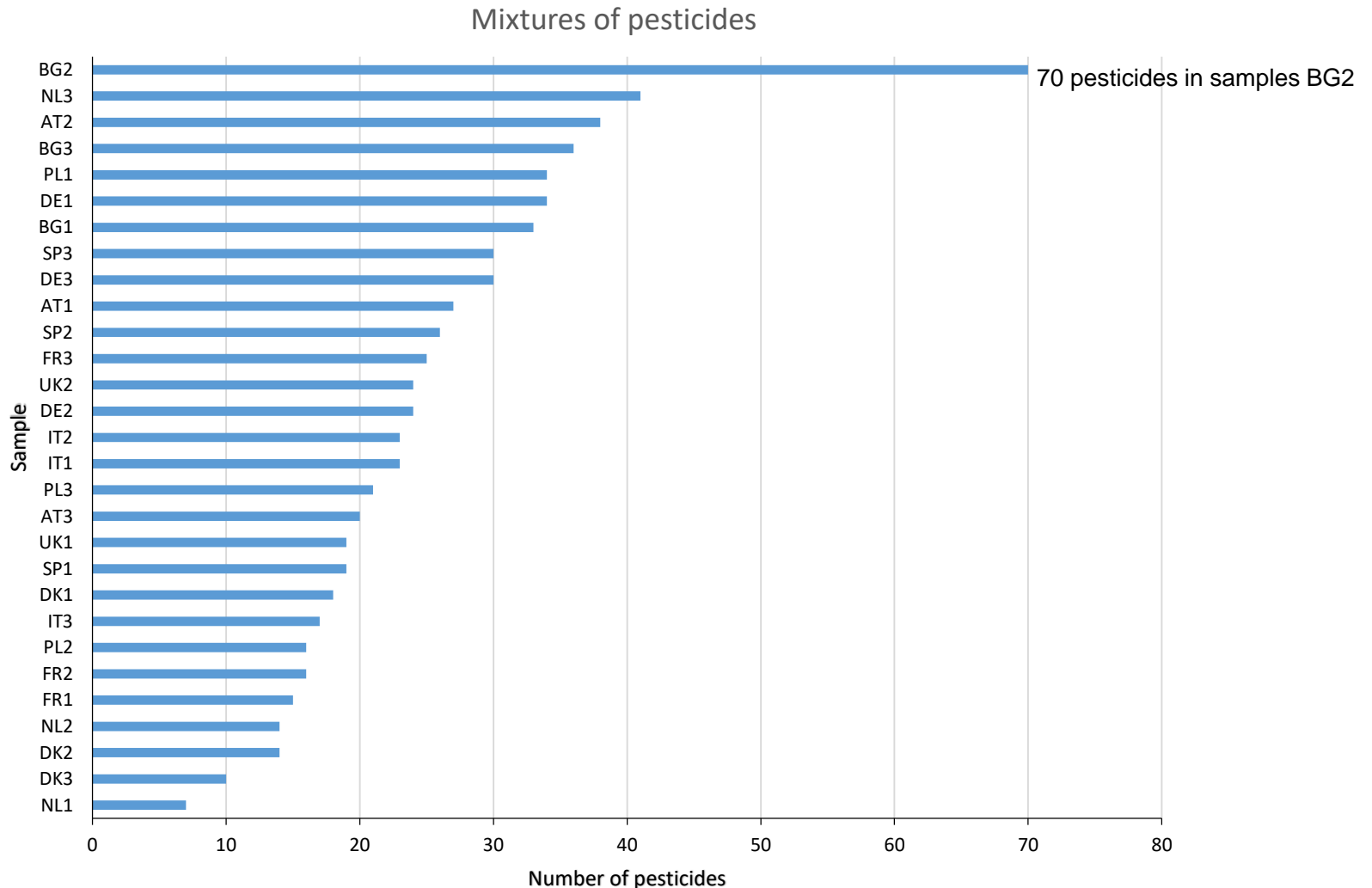
- Detection of:
 - 275 pesticides
 - 101 veterinary drugs
- Quantification of:
 - 254 pesticides
 - LOQs < 5 ng L⁻¹

Compounds found across samples:

- 103 different pesticides
- 21 different veterinary drugs

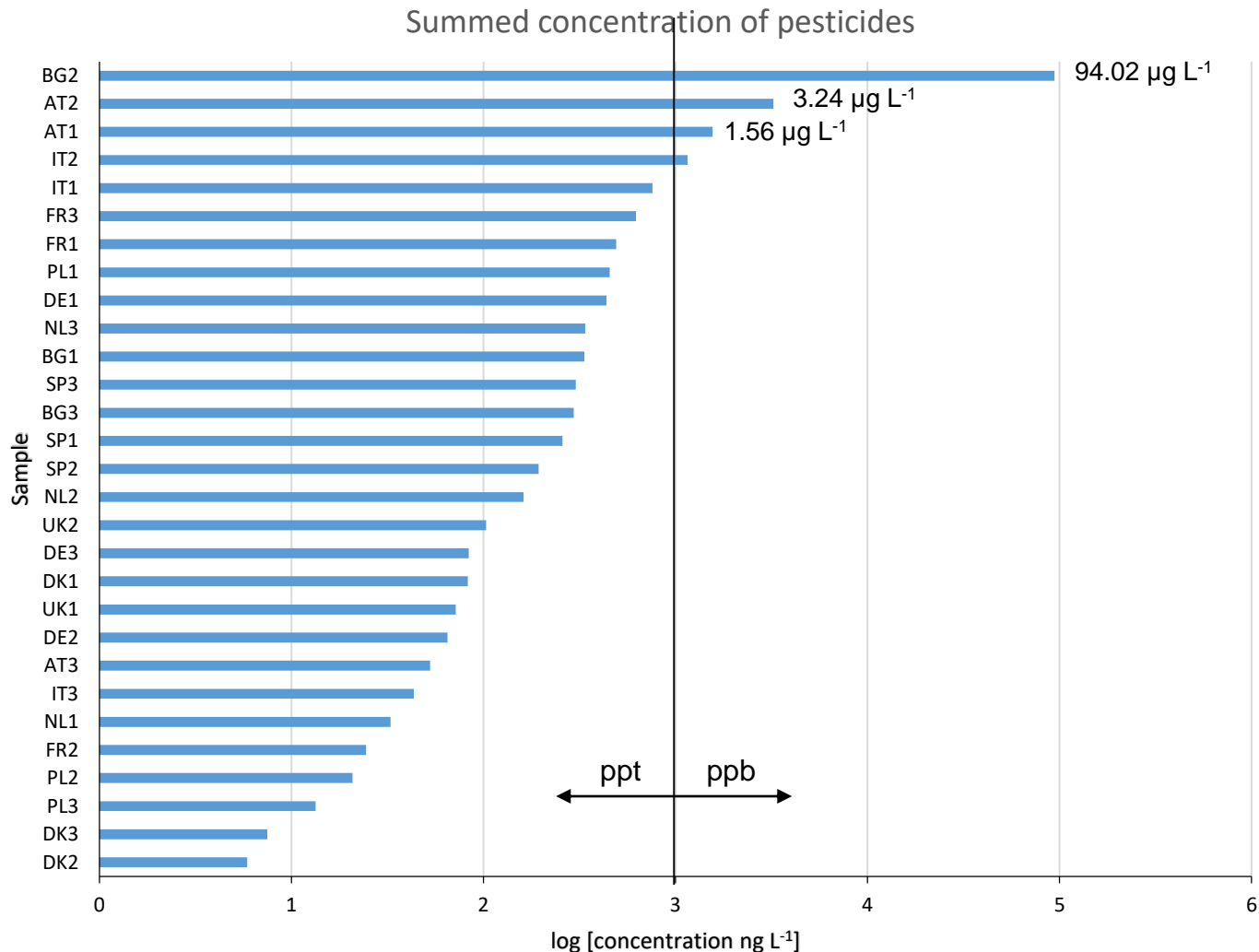
SUMMER 2018 SCREENING

All the samples carried a mixture of pesticides and, in most cases, other bioactive substances:



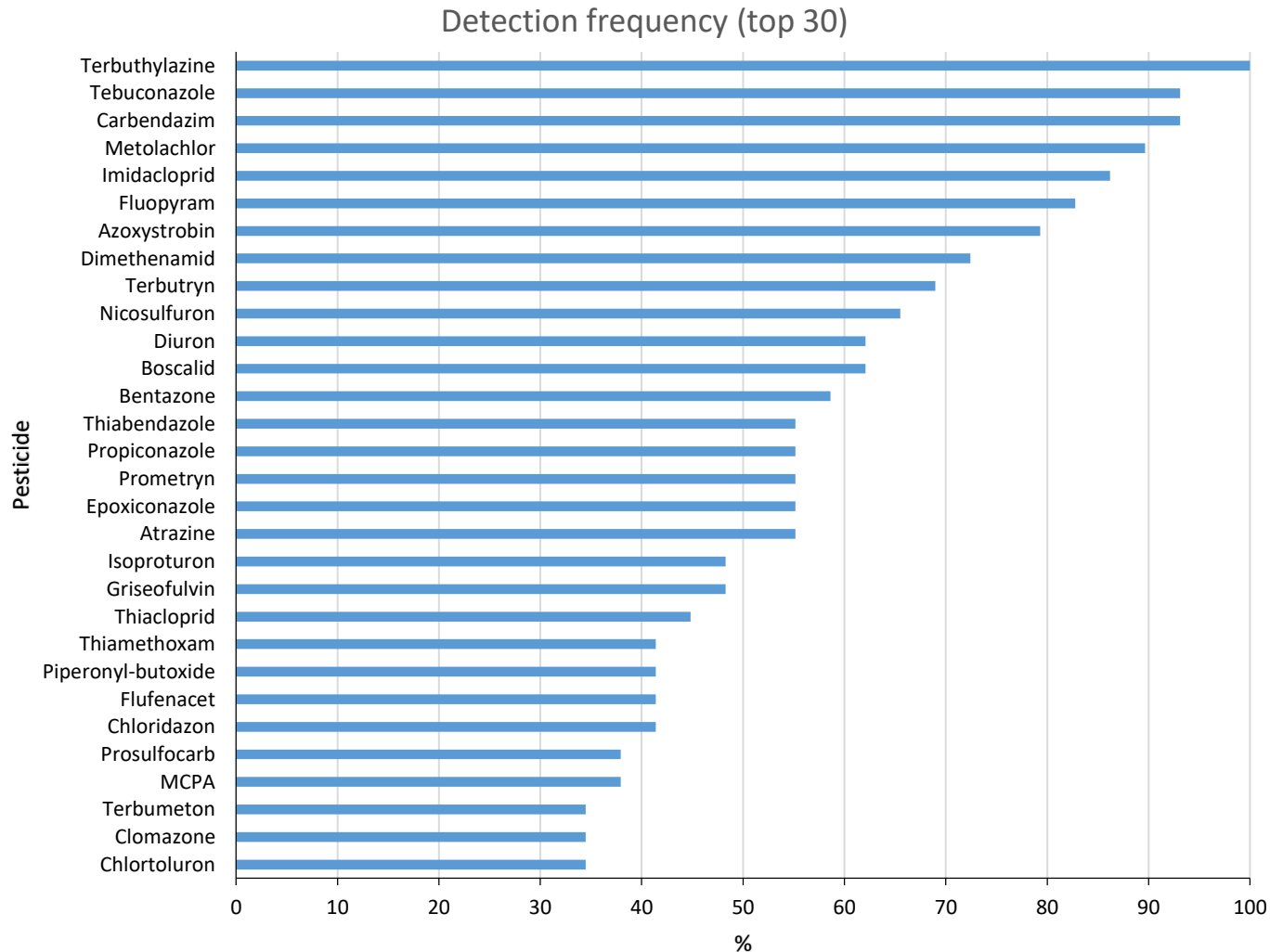
SUMMER 2018 SCREENING

Very high summed concentrations of pesticides in some samples:



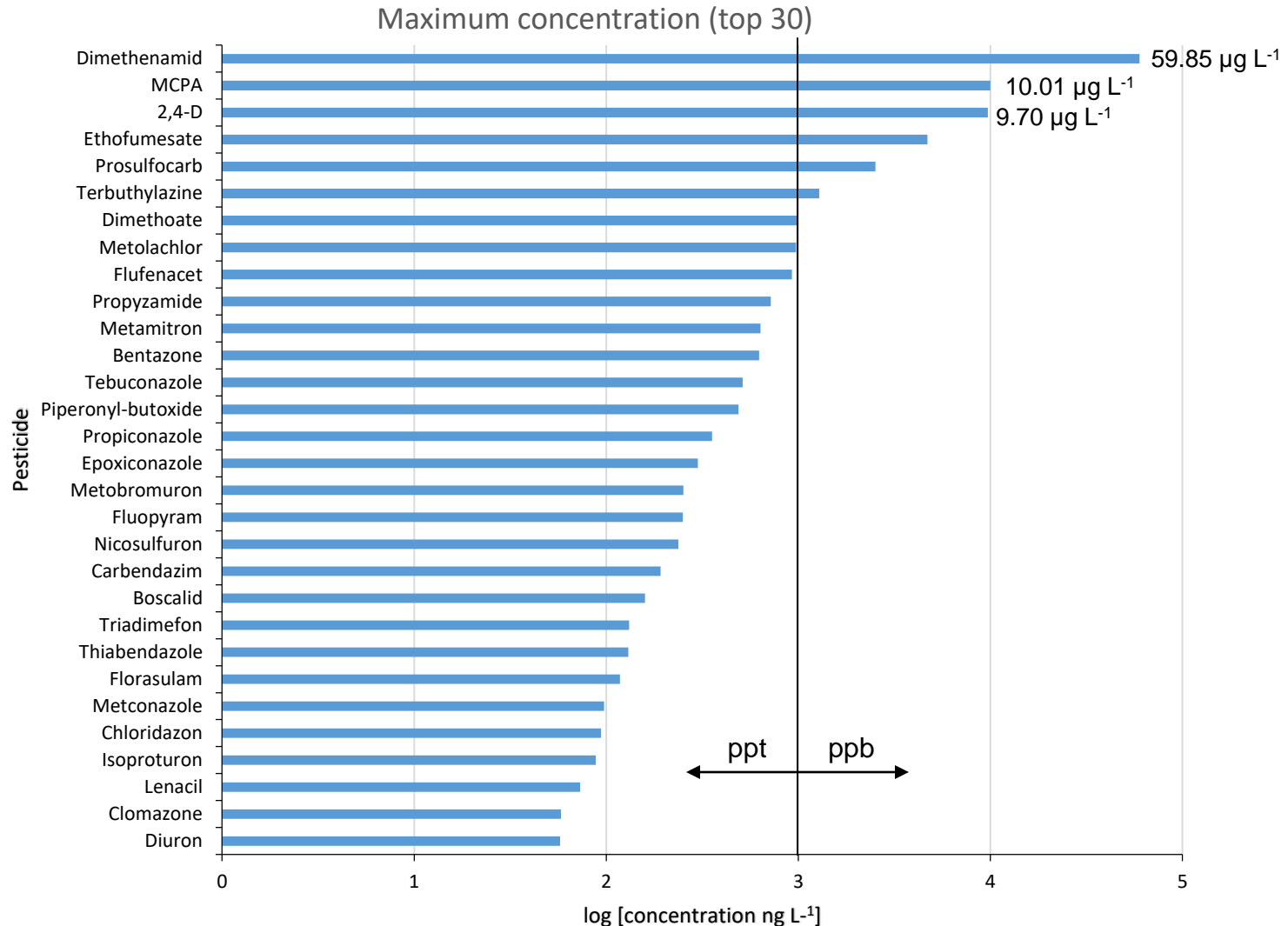
SUMMER 2018 SCREENING

Herbicides detected more frequently than fungicides and insecticides:



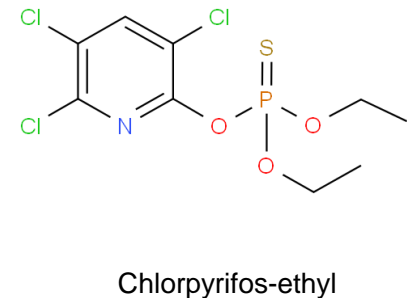
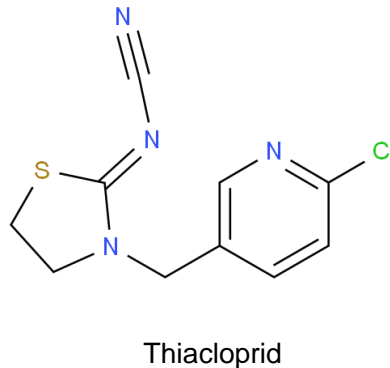
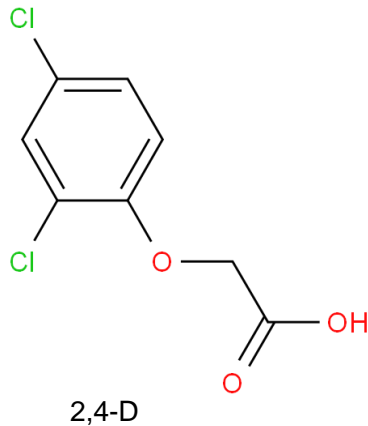
SUMMER 2018 SCREENING

Some very high maximum concentrations:



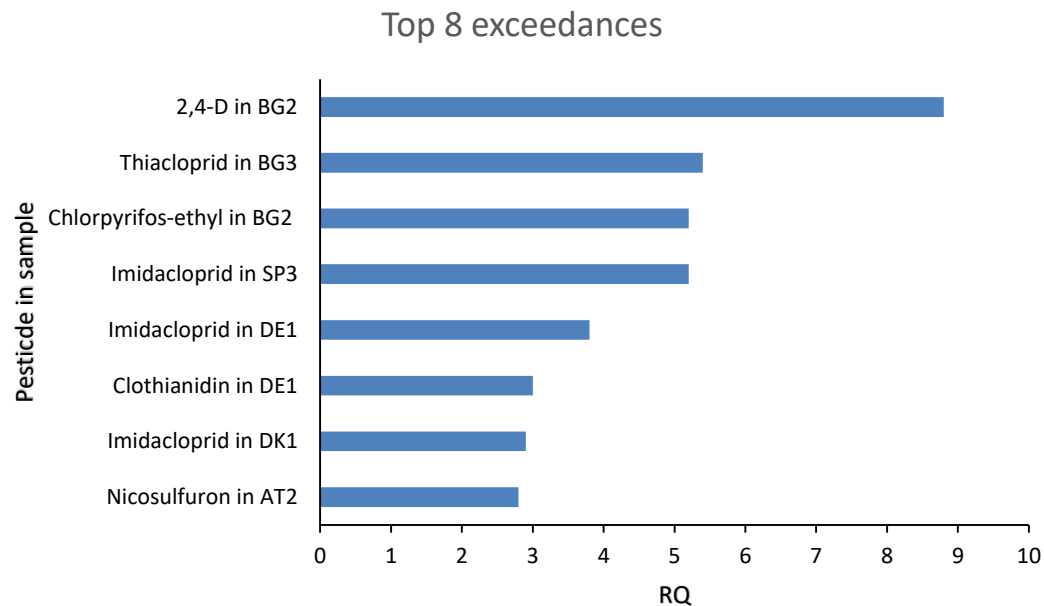
SUMMER 2018 SCREENING

- 103 pesticides detected in the samples
 - Only 58 of these pesticides had an EQS for acute toxicity by the UBA
- 24 pesticides detected are banned in the EU
 - Only 2 of these banned pesticides had an EQS



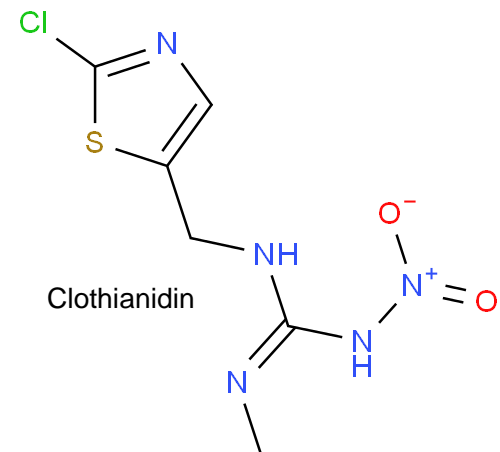
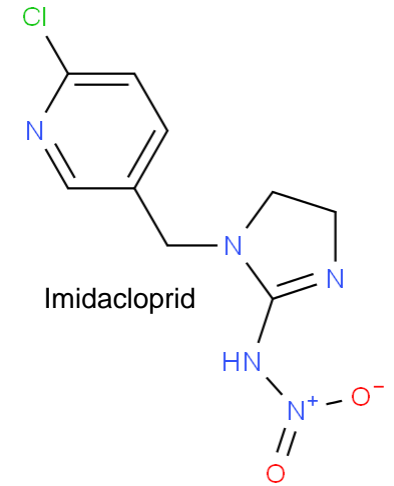
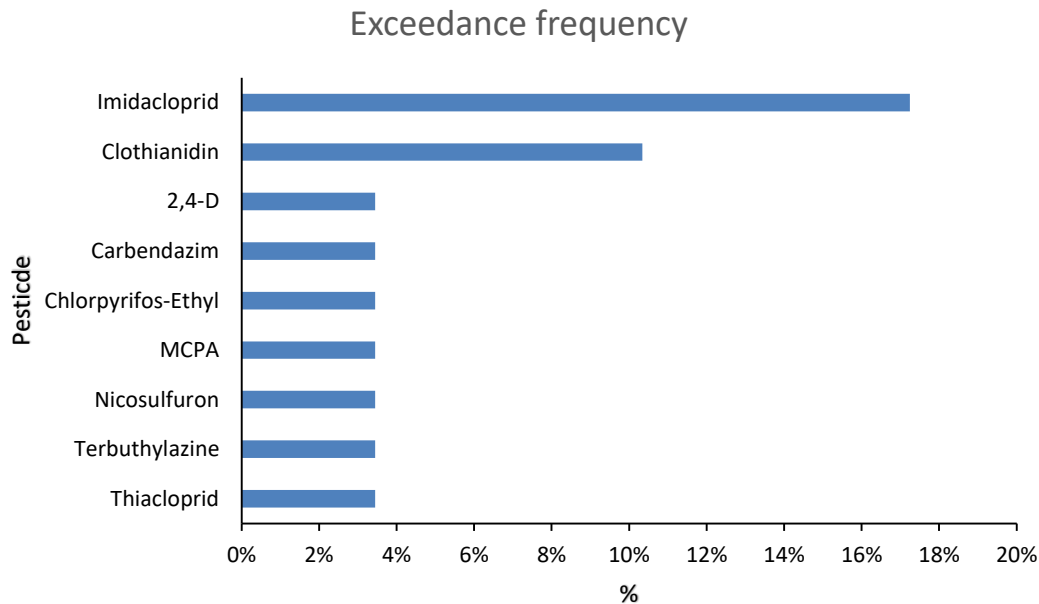
SUMMER 2018 SCREENING

15 individual pesticides exceeded the EQS:



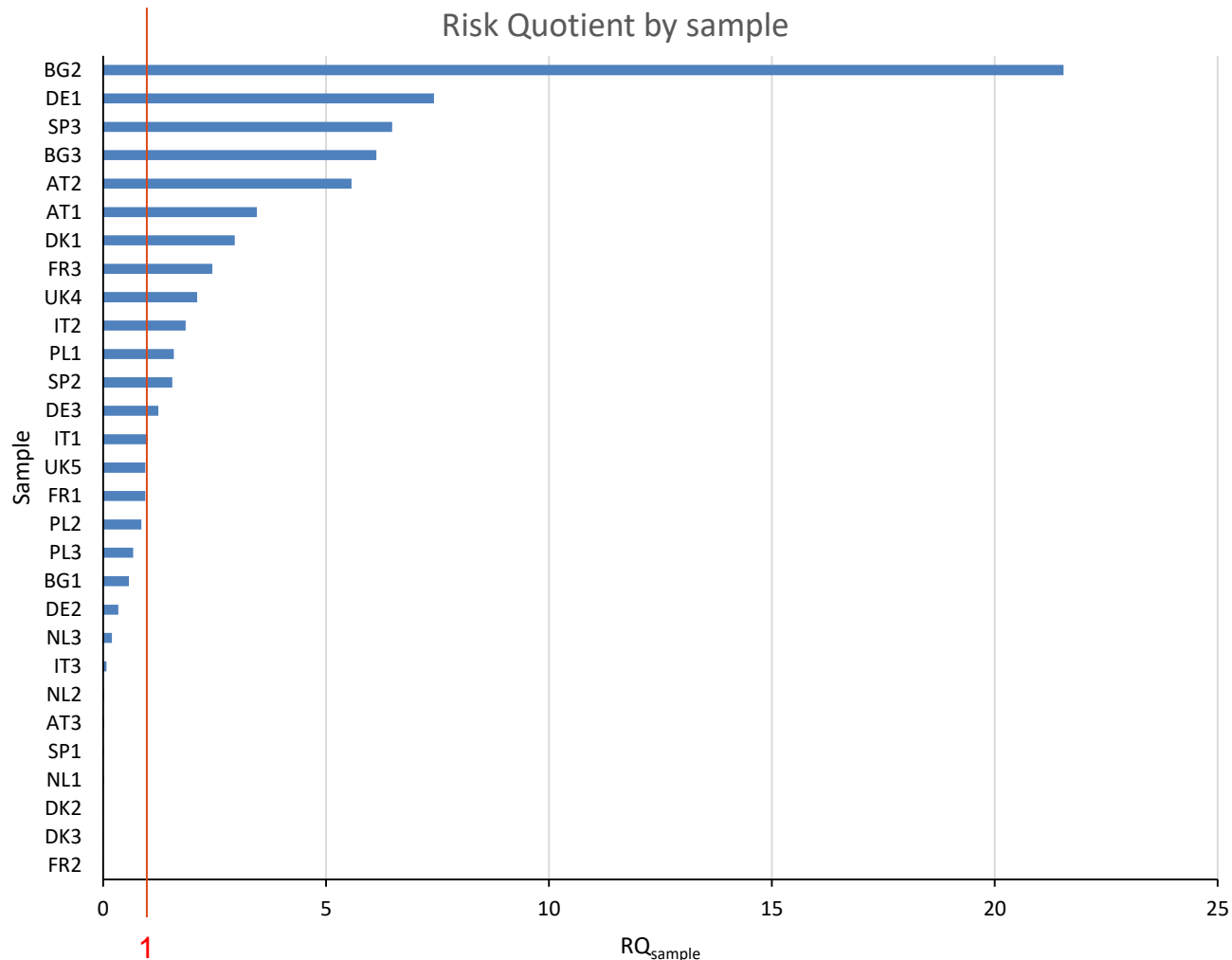
SUMMER 2018 SCREENING

Neonicotinoid insecticides exceeded the EQSs more frequently:



SUMMER 2018 SCREENING

13 samples with total RQ >1:



SUMMER 2018 SCREENING

Limitations of this risk assessment:

- Only 254 pesticides were quantified
- No other bio-active compounds were taken into account at quantitative level
- Only 56% of pesticides detected have an EQS
- Only 8% of legacy pesticides detected have an EQS



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SAFE
THE **BEES!**

THANKS!

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