

German Environment Agency

Umwelt
Bundesamt 

Understanding TFA's health risks and the urgent need for a ban of PFAS pesticides

TFA contamination of EU groundwater due to PFAS pesticides

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1974–2024

TFA contamination in groundwater due to PFAS pesticides

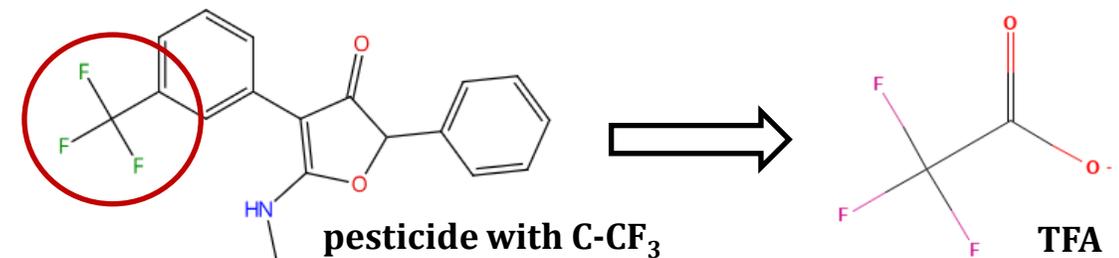
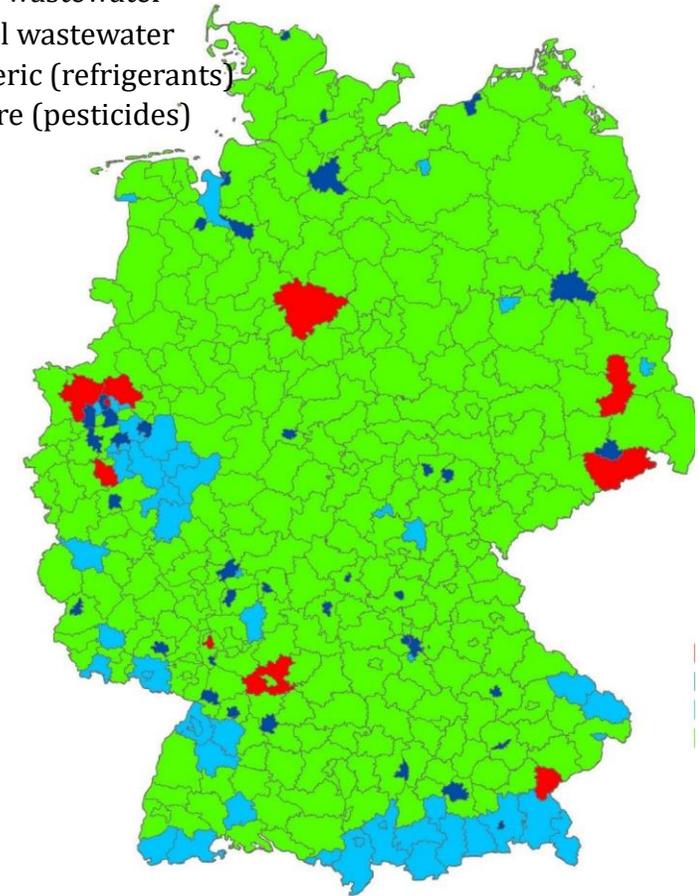
main input pathway in German counties

- industrial wastewater
- communal wastewater
- atmospheric (refrigerants)
- agriculture (pesticides)

PFAS pesticides = one of the main sources for TFA in groundwater (green parts)

30 EU-approved pesticides with C-CF₃, potentially forming TFA

- For 2: proof **how much TFA is formed in soil** in what time
- For 8: proof **that TFA is formed** (but not in soil / not from guideline studies)
- For 20: **no proof** of TFA formation, but very likely



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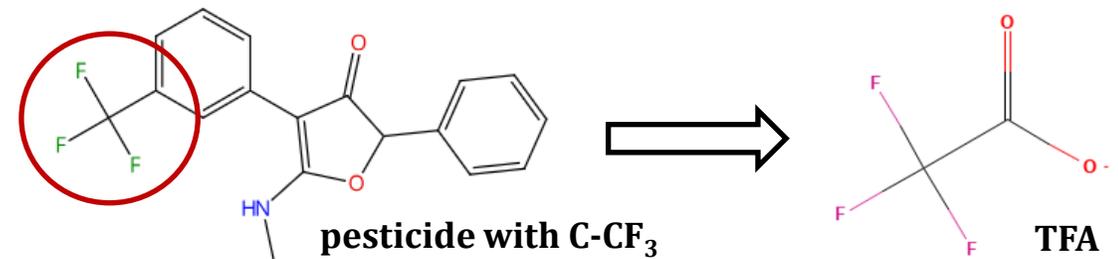
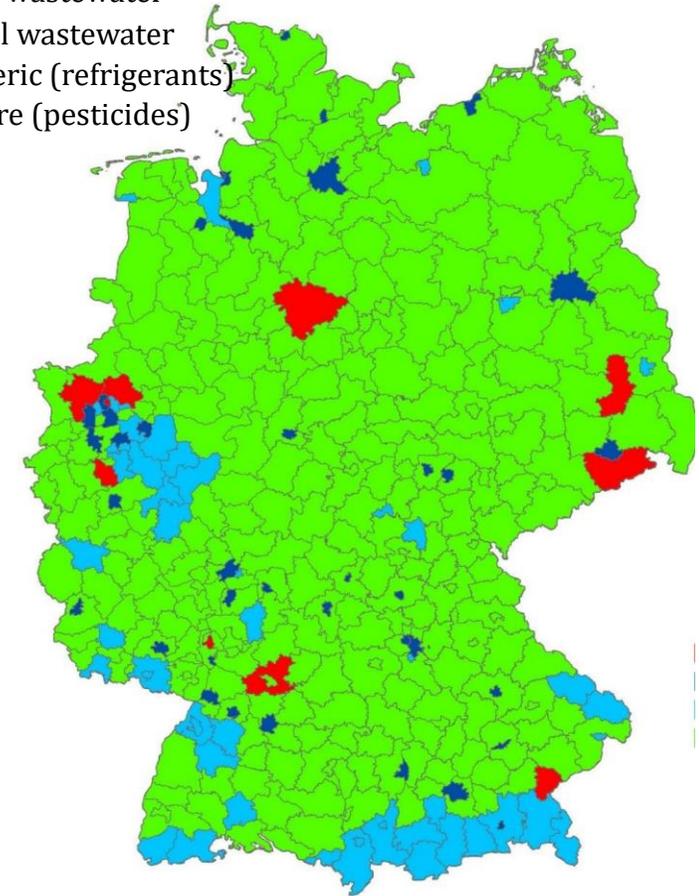
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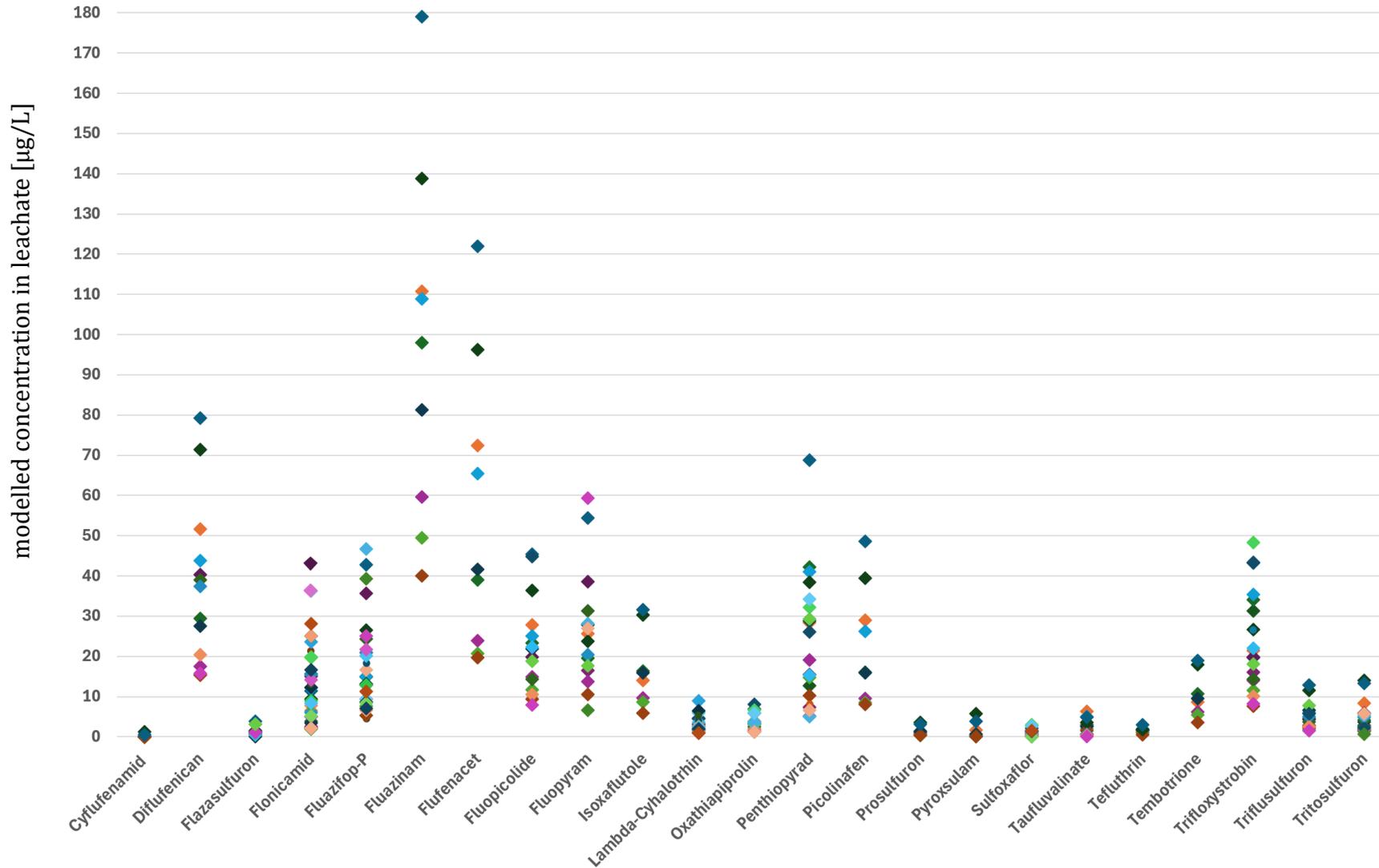
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What we did: estimate maximum possible TFA formation to set an upper limit

- Groundwater models and scenarios commonly used for risk assessment
- EU agreed parameters for pesticide + metabolites
- maximum possible TFA formation (100 %) (default)
- 24 pesticides, approved and non-approved
- published in [Diehle et al. \(2025\), Env. Sciences Europe](#)



Groundwater modelling results for TFA from 23 pesticides used in the EU

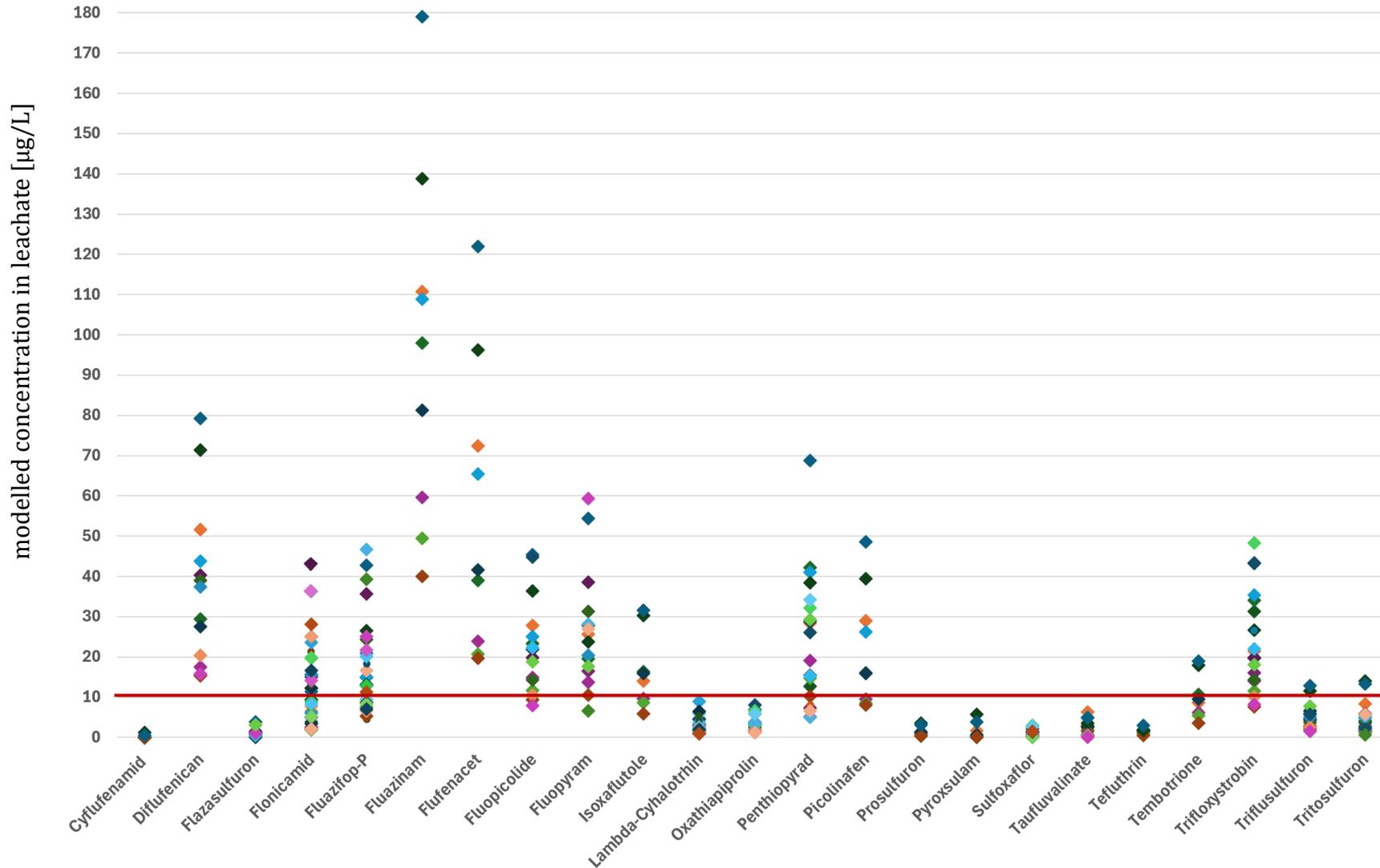


The different colours cover the variety of **representative application patterns** and **climate/soil scenarios** used in EU approval procedures

TFA formation assumed to be 100 % (maximum possible).

data from: Diehle et al. 2025
(Flutolanil excluded: 158-845 µg/L)

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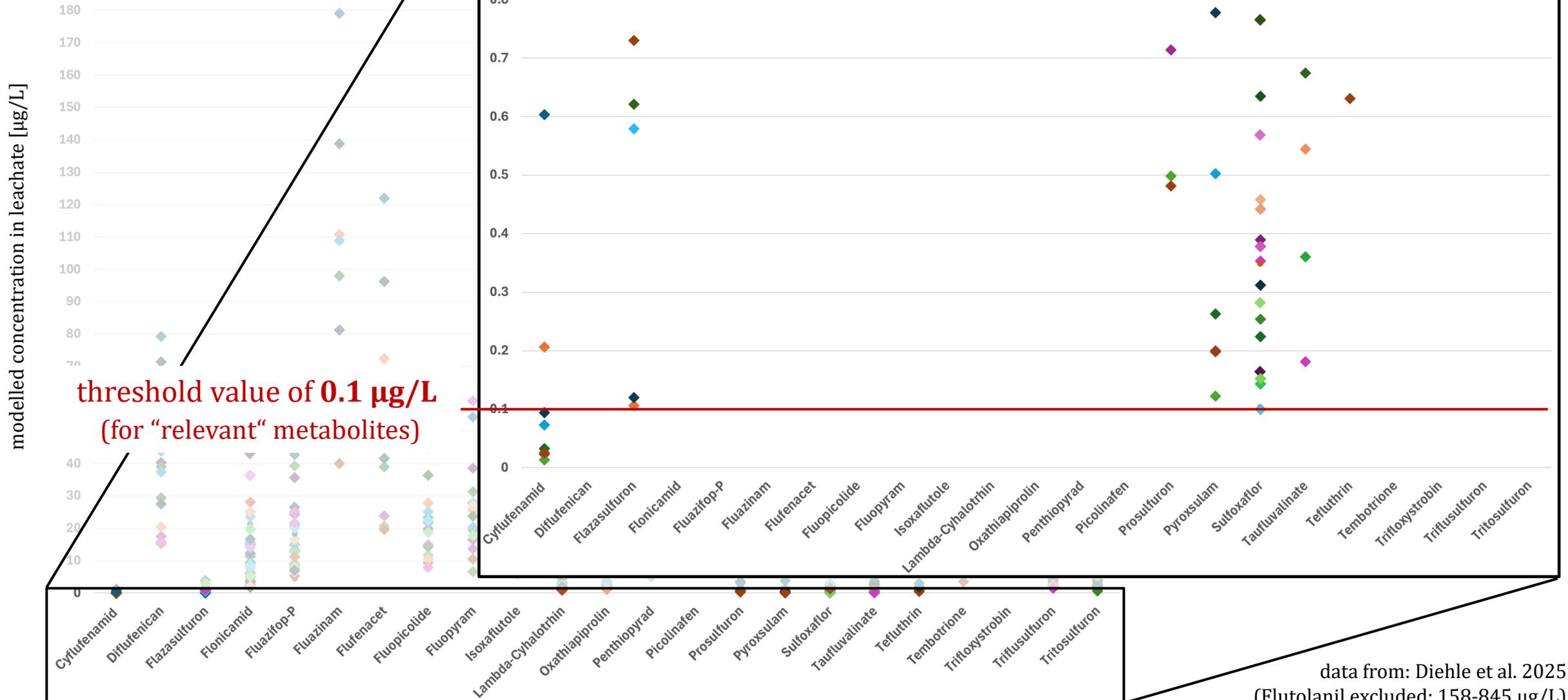
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threshold value of 10 µg/L
(for “non-relevant” metabolites)

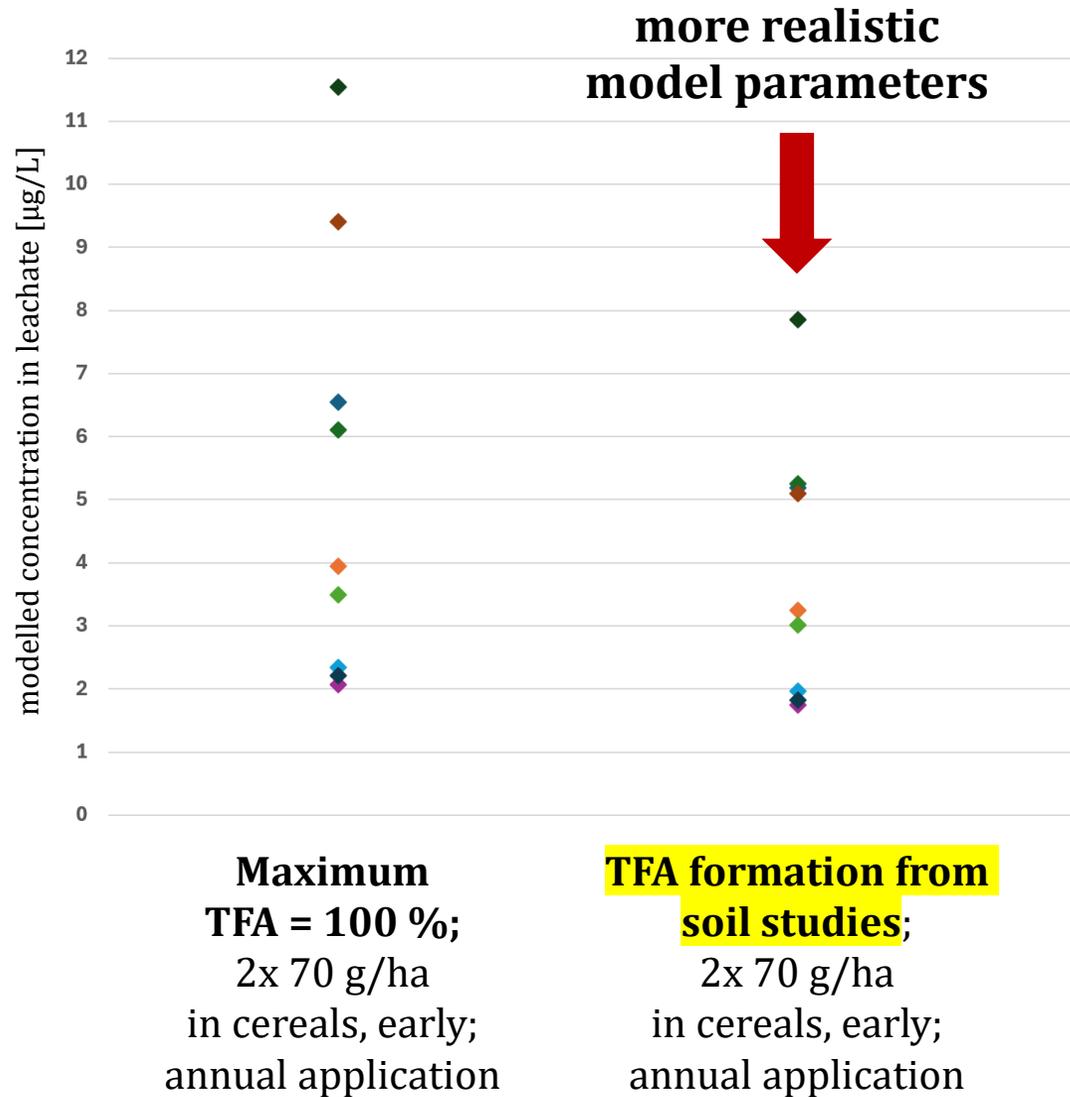
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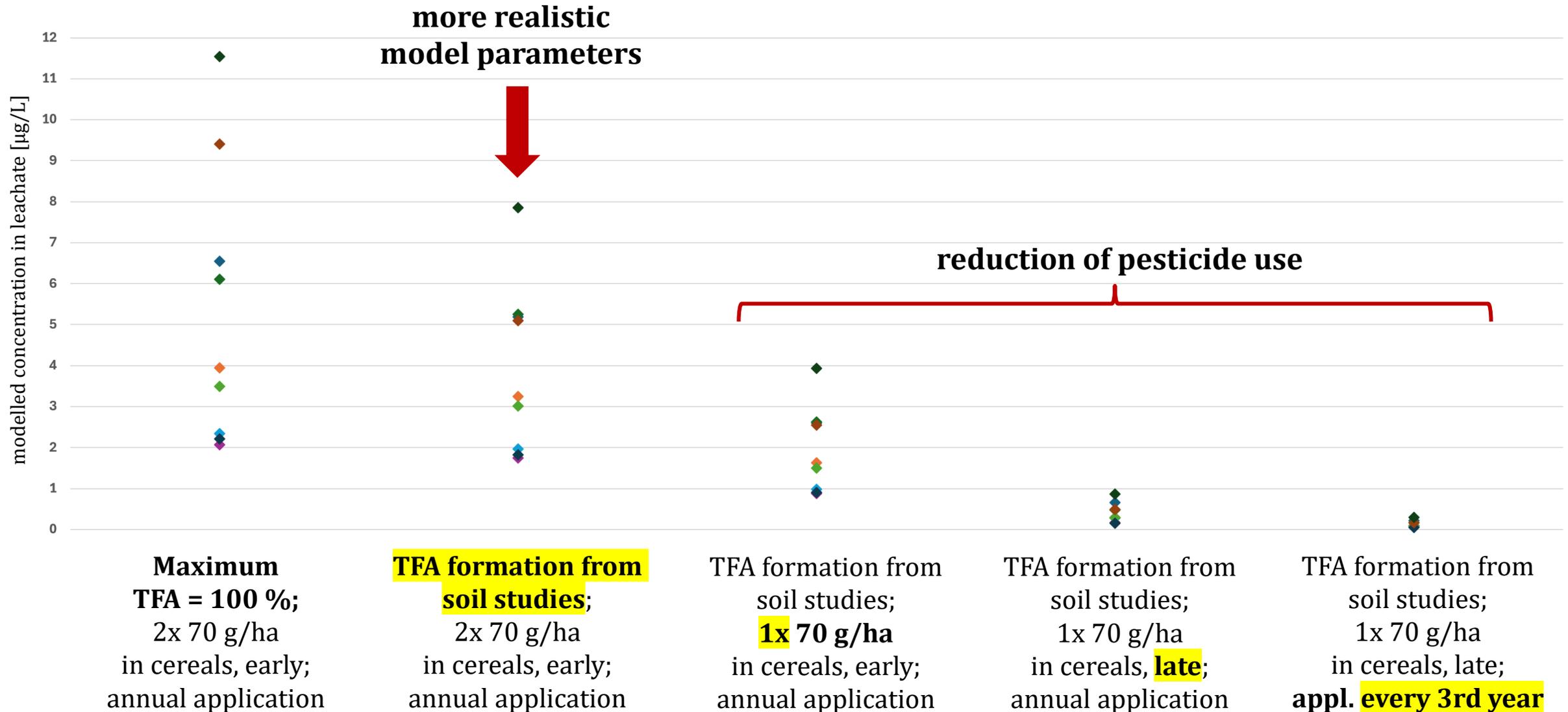


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Refinements of risk assessment and risk mitigation: example insecticide in winter cereals



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TFA leaching from PFAS pesticides – conclusions from our maximum modelling approach

For some PFAS pesticides, uses with **TFA < 0.1 µg/L**
may be possible

- **Refinement of model parameters** with new studies (2nd EFSA mandate on e fate)
- **Strong reduction of pesticide** amounts/frequency
- Requires **more strategic approaches**, e.g. non-chemical combinations, precision application etc.

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For many PFAS pesticides maximum TFA leaching is **>> 0.1 µg/L**

- Pesticide uses with **TFA < 0.1 µg/L very unlikely**
- **Unlikely to meet requirements** of pesticide regulation, **even with new studies or reduced pesticide use**
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urgent action required

Not justified to wait until the data base is complete for all PFAS pesticides
Case-by-case assessment if TFA can stay < 0.1 µg/L realistically
Maximum TFA leaching modelling = **good starting point**

Future emissions vs. existing residues – choosing the right threshold values

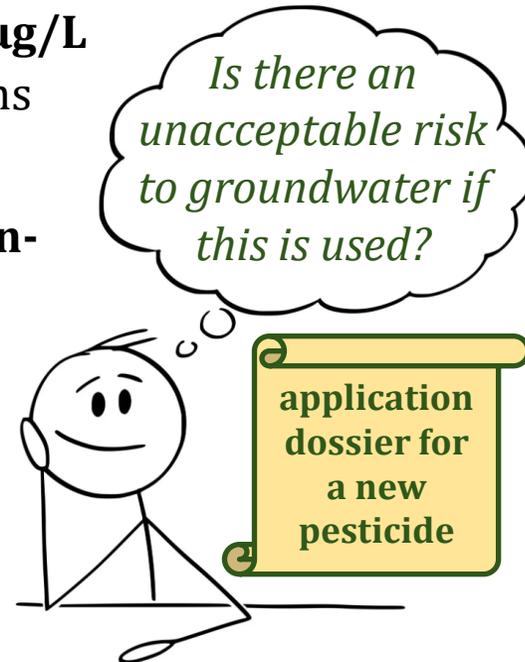
RISK ASSESSMENT IN PESTICIDE REGULATION

Prediction of possible future emissions to groundwater if pesticide will be used every year

→ Reproduction toxic properties (*hazard based*)

→ Leaching **must not be “significant”** = 0.1 µg/L for pragmatic reasons

→ For TFA: **high persistence** and **non-removability** cause accumulation, TFA ubiquitous already



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Is there an unacceptable risk to groundwater if this is used?



RESIDUES IN DRINKING WATER AND FOOD

Assessment of existing TFA residues in water and food

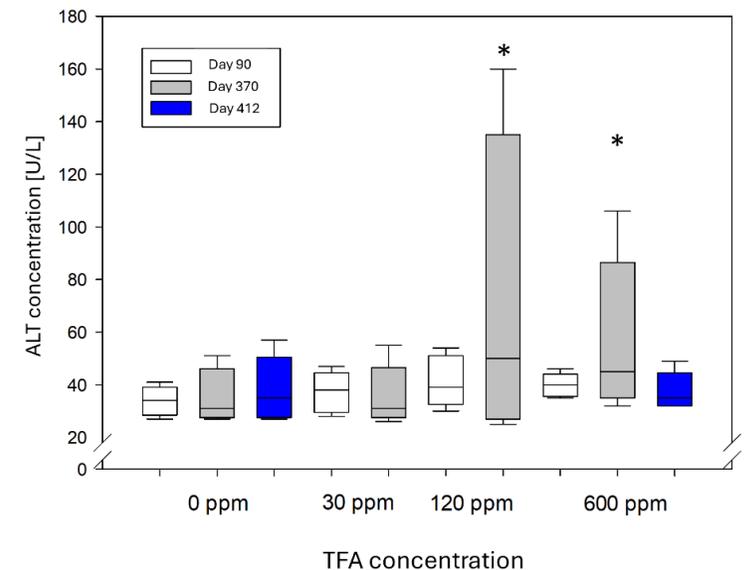
→ Tolerable at **concentrations that are not harmful** to humans (*risk based*) → determination of “safe level”

→ In Germany: drinking water value of 60 µg/L based on 52 week rat study (+ uncertainty factors)

Concentration of the liver enzyme ALT as a function of time and TFA administration in the 52 week rat study.

* p values < 0.01

UBA (2020), translated



Thank you for your attention

Dr. Helena Banning

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Our publications on TFA (selection):

[Trifluoroacetate leaching potential from fluorinated pesticides: an emission estimation and FOCUS modelling approach | Environmental Sciences Europe | Full Text \(Diehle et al. 2025\)](#)

[Reducing the input of chemicals into waters: trifluoroacetate \(TFA\) as a persistent and mobile substance with many sources | Umweltbundesamt](#)

[Trifluoroacetate \(TFA\): Laying the foundations for effective mitigation | Umweltbundesamt](#)

[Langzeittrends für Trifluoressigsäure in terrestrischen Umweltproben | Umweltbundesamt](#)

[Persistent degradation products of halogenated refrigerants and blowing agents in the environment: type, environmental concentrations, and fate with particular regard to new halogenated substitutes with low global warming potential | Umweltbundesamt](#)

[Ableitung eines gesundheitlichen Leitwertes für Trifluoressigsäure \(für UBA-Homepage\) \(UBA 2020\)](#)



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