



# Environmental risk assessment of OMPs in public WWTPs in Flanders, Belgium

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## Introduction

- WWTP effluents are a major source of organic micropollutants (OMPs) in a surface water
- Environmental risk assessment (ERA) is an approach to prioritizing concerned OMPs and WWTP sites
- This study performs ERA using monitoring data of OMPs in Flanders public WWTPs effluents from 2017 to 2021



## Method

### Monitoring data of OMPs in WWTP effluents

- Over 100 WWTPs sites in Flanders, Belgian and 129 measured OMPs
- Quantified measured environmental concentration (MECs) is used in the analysis (in total 38 OMPs; 40 WWTP sites):

MEC ≥ Method detection limits  
OMP detected ≥ 100 samples and 10 WWTP sites

### Effect data

- PNEC – predicted no effect concentration from NORMAN Ecotoxicology Database (<https://www.norman-network.com/nds/ecotox/lowestPnecsIndex.php>)

### Prioritization of concerned OMPs

#### Risk characterization

$$\text{Risk Quotient (RQ)} = \frac{\text{MEC } (\mu\text{g/L})}{\text{PNEC } (\mu\text{g/L})}$$

**RQ ≥ 1 indicate environmental risk**

### Prioritization of public WWTP sites

$$\Sigma\text{RQ}_{\text{WWTP}} = \sum_{i=1}^n \text{RQ95}_i$$

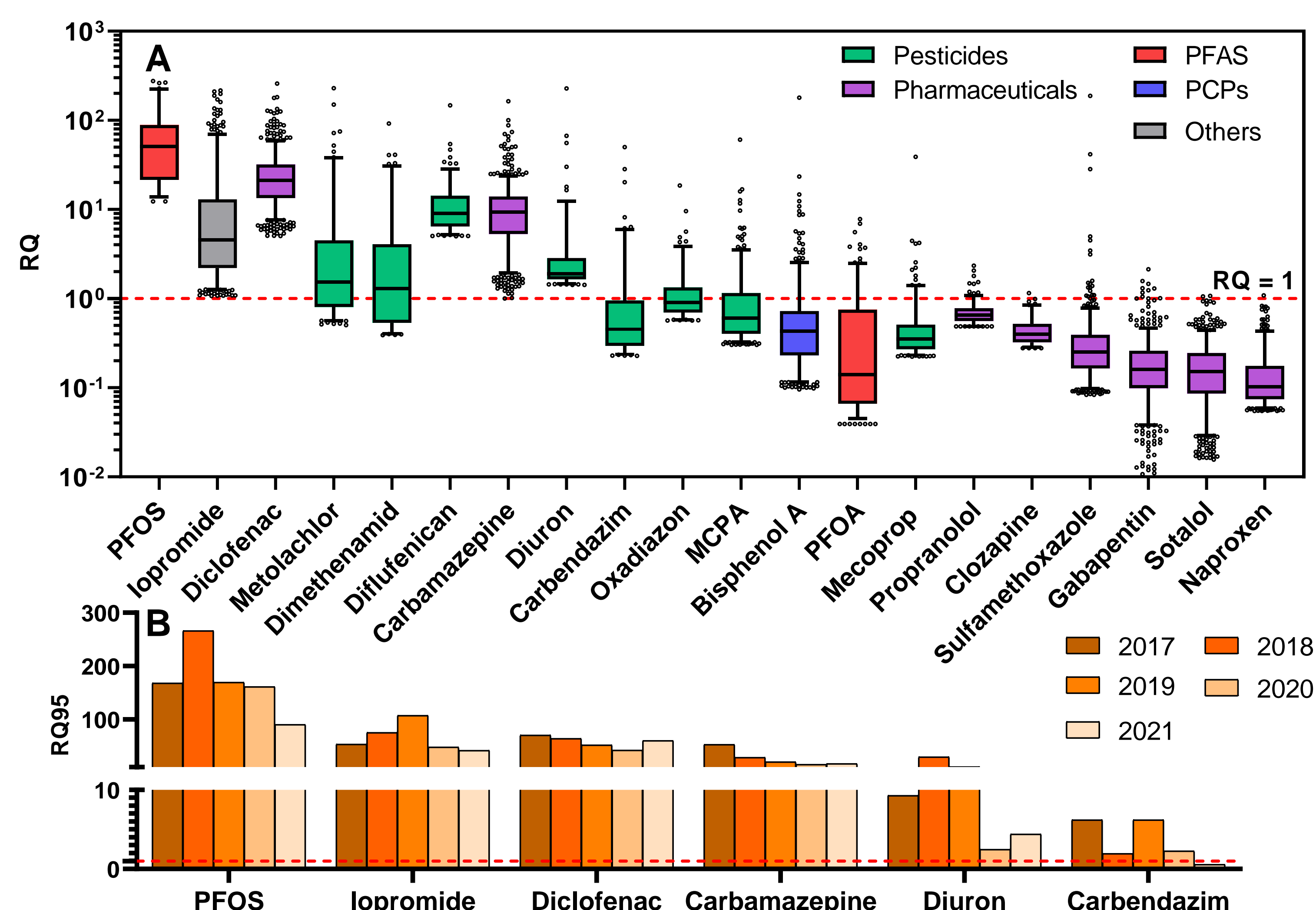
RQ95<sub>i</sub> = RQ at percentile 95; assuming all chemicals in each site act in concentration addition (CA)

### Whole effluent testing (WET) of WWTP effluent with ΣRQ > 10

- Whole effluent testing of WWTP effluent based on OECD201 – Freshwater Alga and Cyanobacteria, Growth Inhibition Test with *Microcystis aeruginosa* (96h) and *Raphidocelis subcapitata* (72h)
- Sample: Aquafin WWTP effluent in Gent (October, 2020)

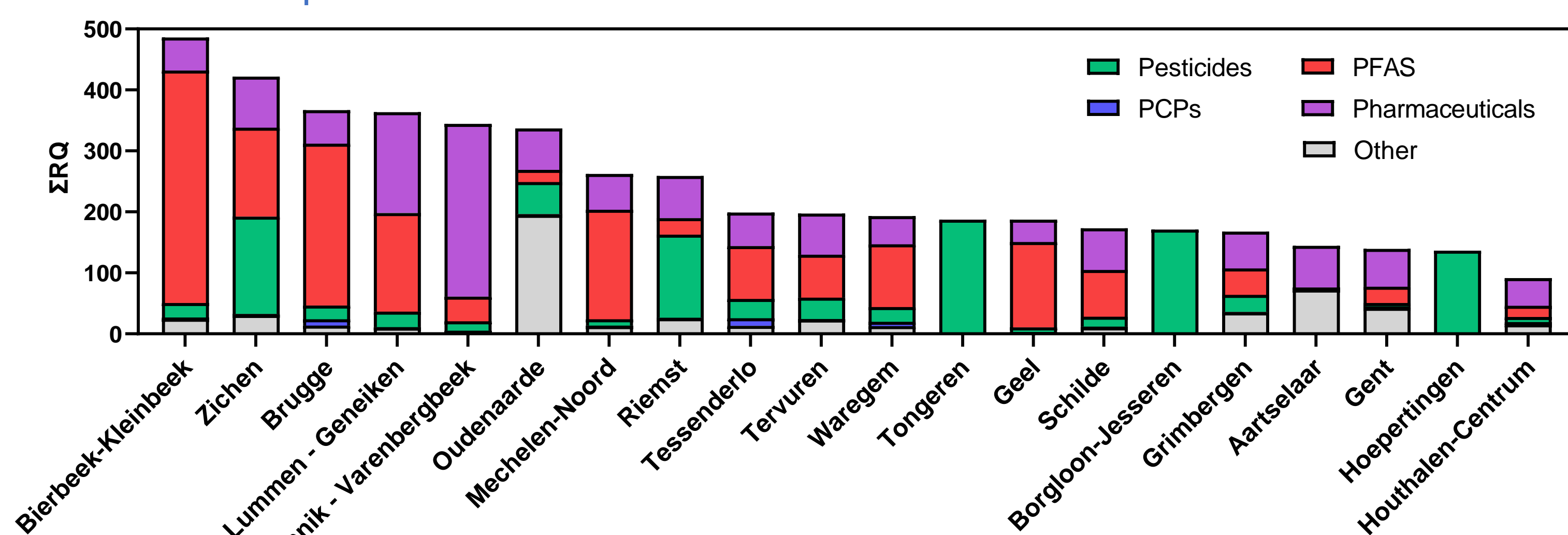
## Results and discussion

### Prioritization of concerned OMPs



**Figure 1** (A) Top 20 of OMPs detected from 2017-2021 arranged by RQ95 (B) RQ95 of OMPs from different year of monitoring; red dash line indicates RQ = 1

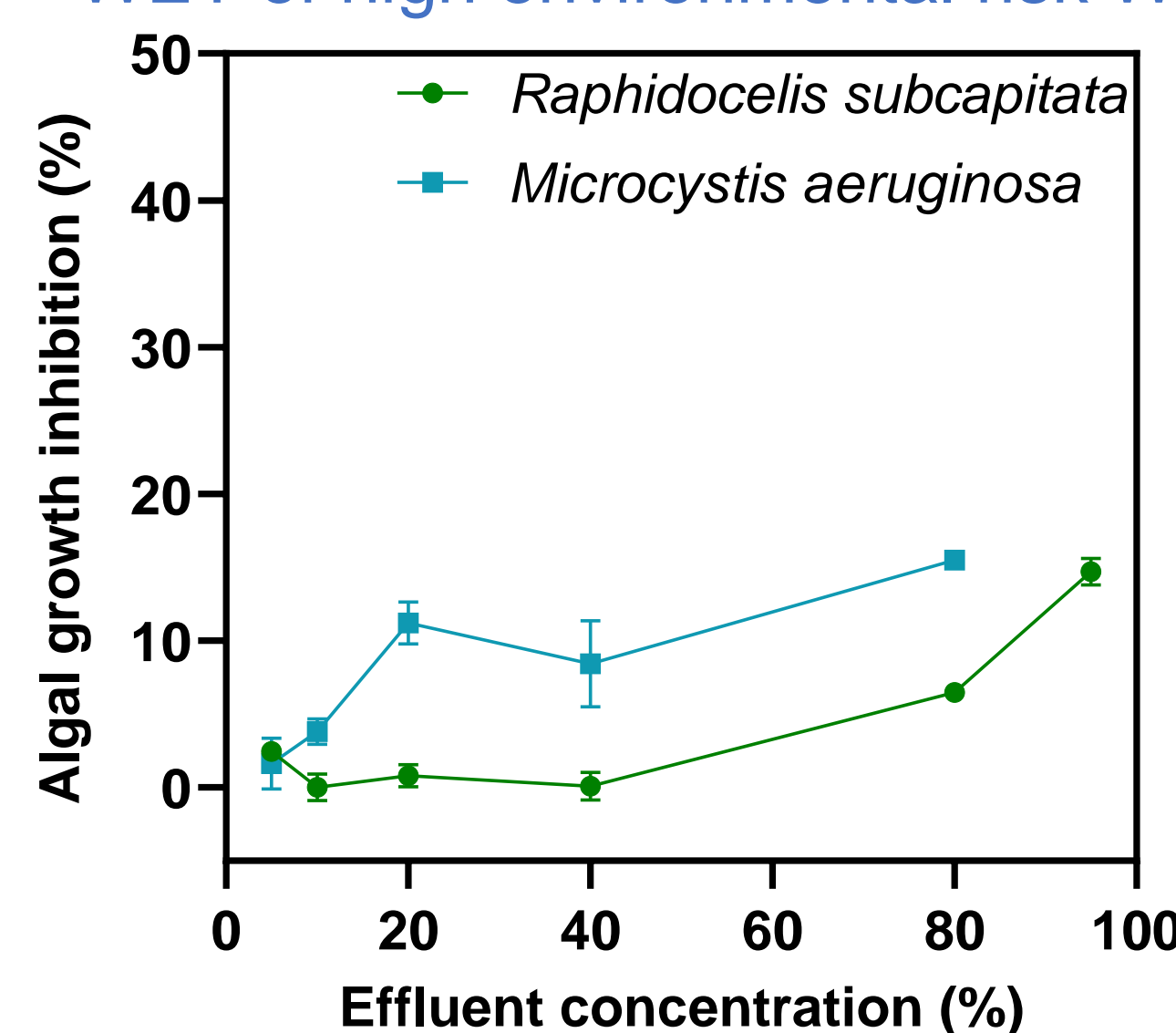
### Prioritization of public WWTP sites



**Figure 2** Top 20 of WWTP sites with high predicted environmental risk (ΣRQ > 10)

- Pesticides are the dominant group of concerned OMPs
- RQ95 of most PFAS and pharmaceuticals remains constant over the past 5 years, while RQ95 of pesticides decreases
- PFAS and Pharmaceuticals are the main contributors of ΣRQ in most WWTP effluents

### WET of high environmental risk WWTP site



**Figure 3** Algal growth inhibition of WWTP effluent sample from Gent (2020)

The maximum percent growth inhibition reached 15.5 and 14.8% at the highest test concentration for *Microcystis aeruginosa* and *Raphidocelis subcapitata* respectively

## Conclusion

- In this study ERA is still not an early warning sign for OMP in WWTP effluents due to overestimation of environmental risks
- Some OMPs (PFOS, iopromide, and diclofenac) have constant predicted environmental risk throughout 5 years of monitoring
- The predicted environmental risk could provide an additional information for future effect-based monitoring campaigns

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