

Nationwide screening of herbicide risks to algae

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NORMAN workshop: Integrated Exposure and Effects Assessment

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Assessing water quality

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Compounds



Effects

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Smart Monitoring

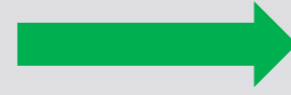
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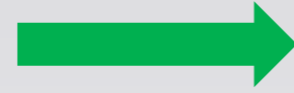
Ecotoxicological
effects

Chemical analysis



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Proof of principle:
Nationwide screening of
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Herbicides

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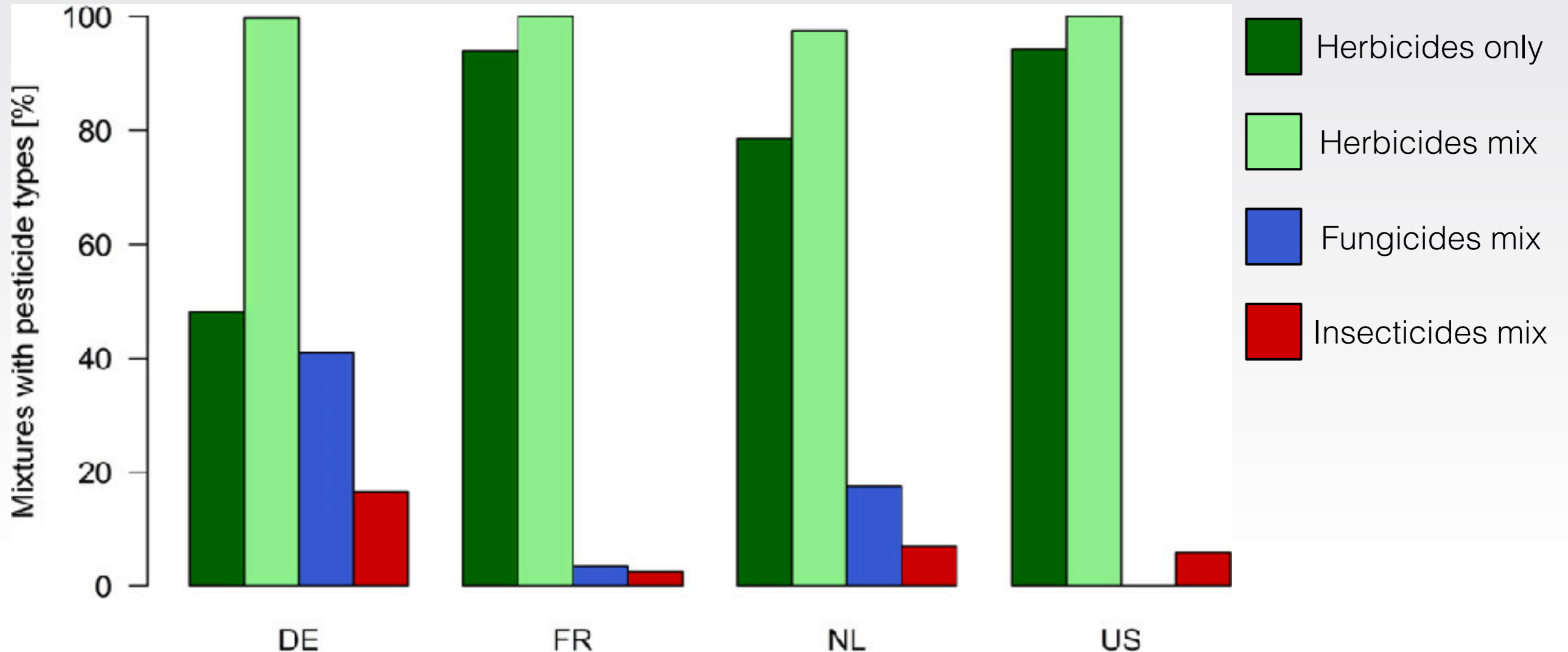
- Agricultural pesticide use is one of the main pollutant sources in freshwater ecosystems³

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Herbicides

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- Aquatic pesticide contamination in NW-Europe and USA is dominated by herbicides⁴



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Herbicides and algae

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There is a need for a sensitive diagnostic tool to identify the presence of hazardous herbicide concentrations in aquatic ecosystems

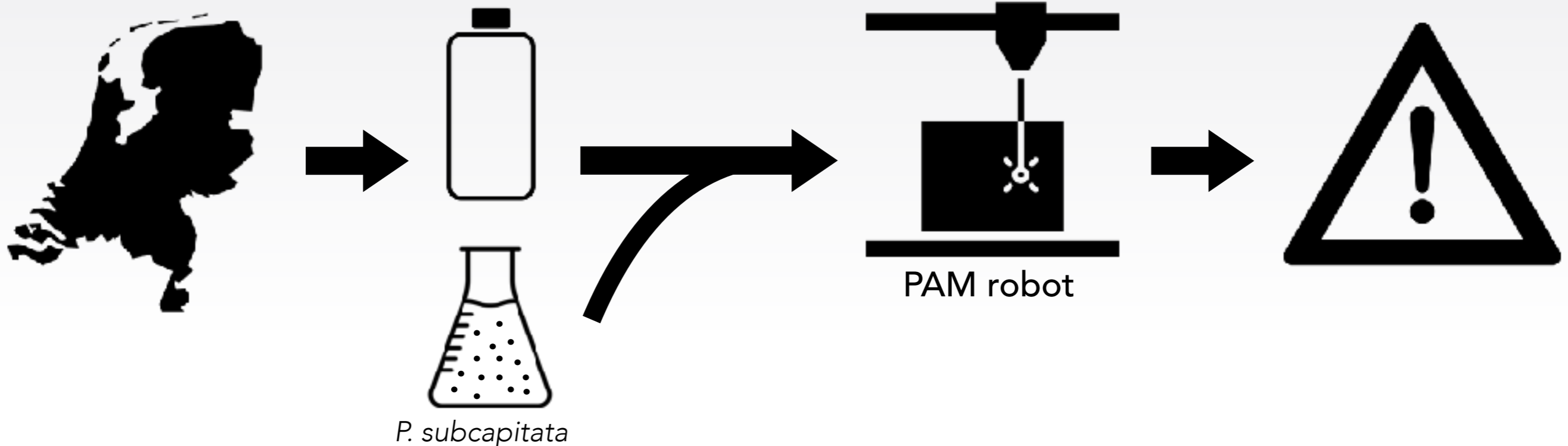
Aim

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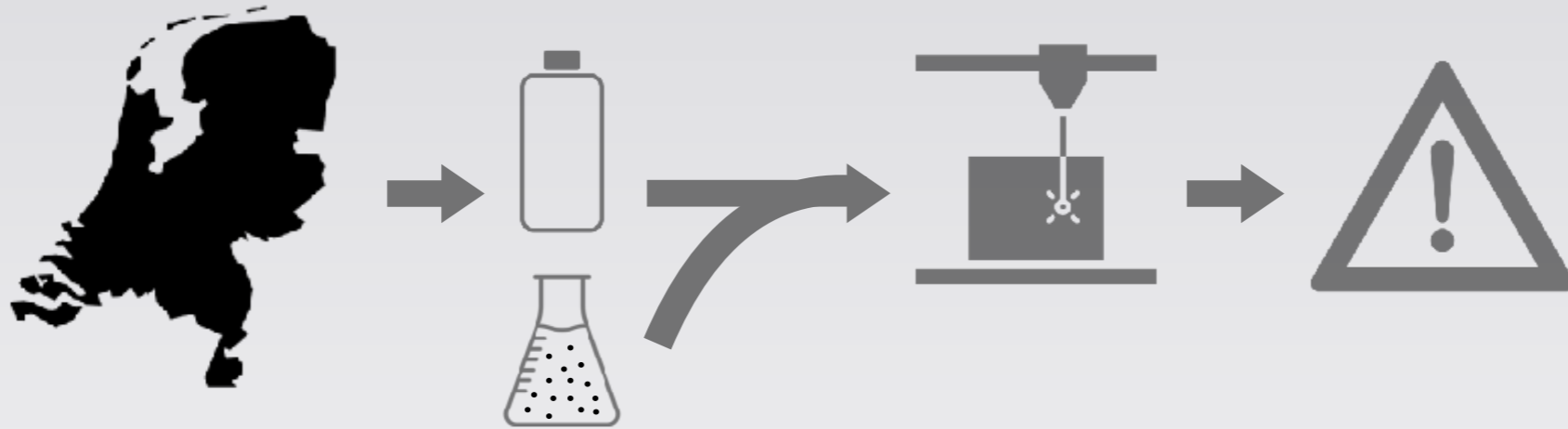
To develop and apply an innovative algal bioassay to assess surface water herbicide risks to primary producers

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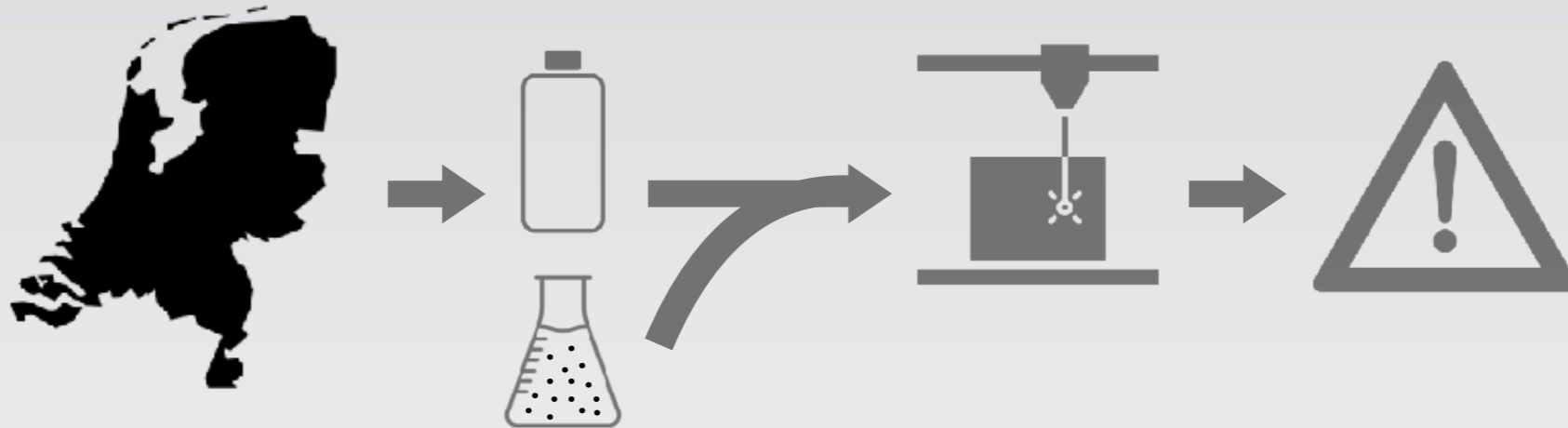
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Locations

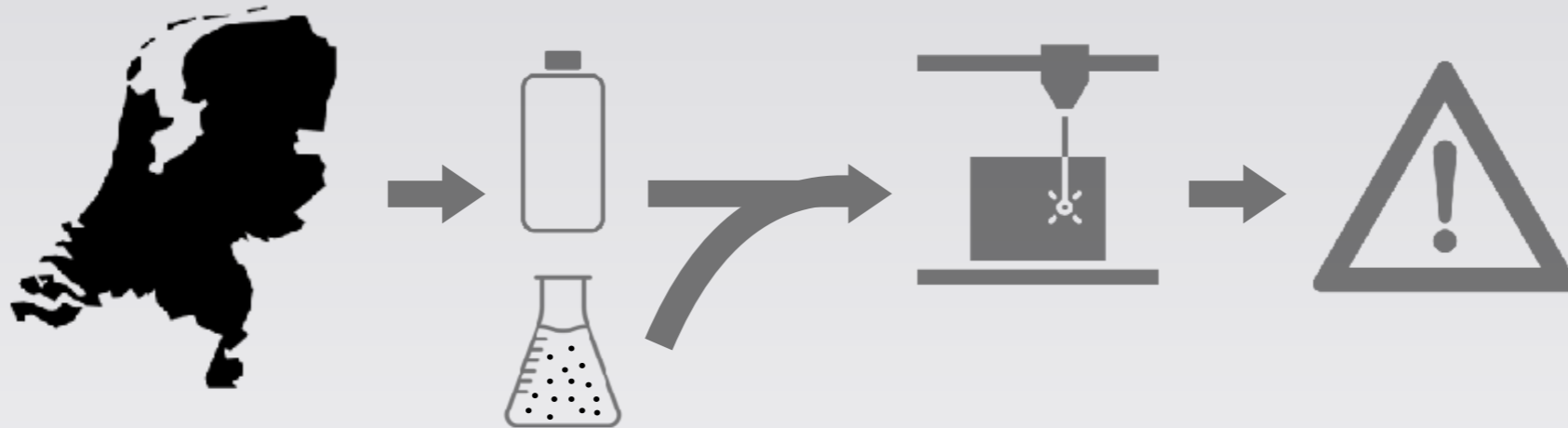


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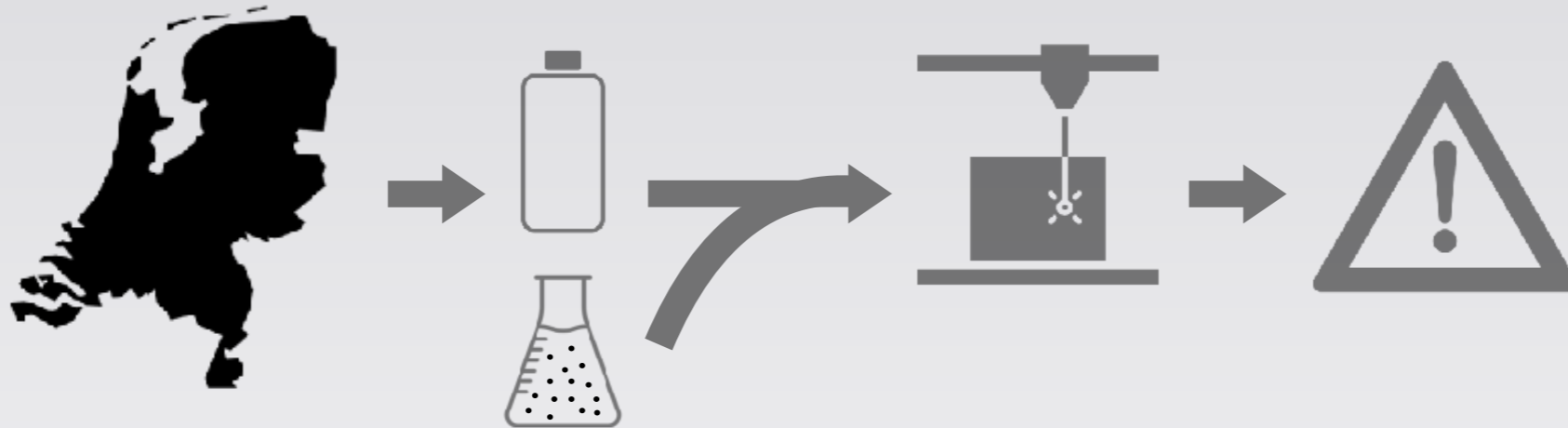
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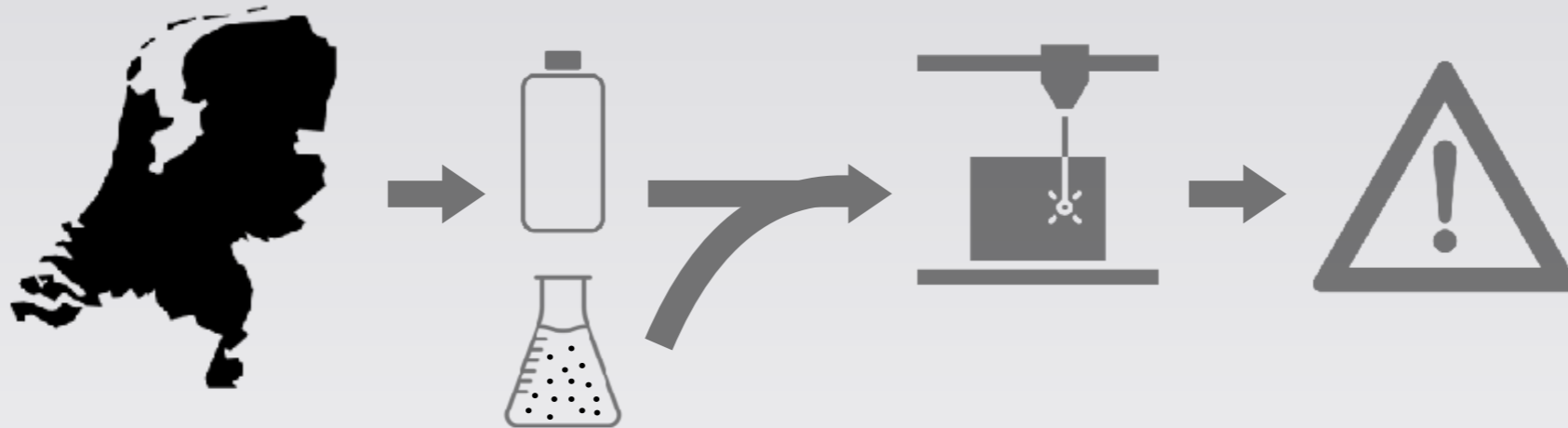
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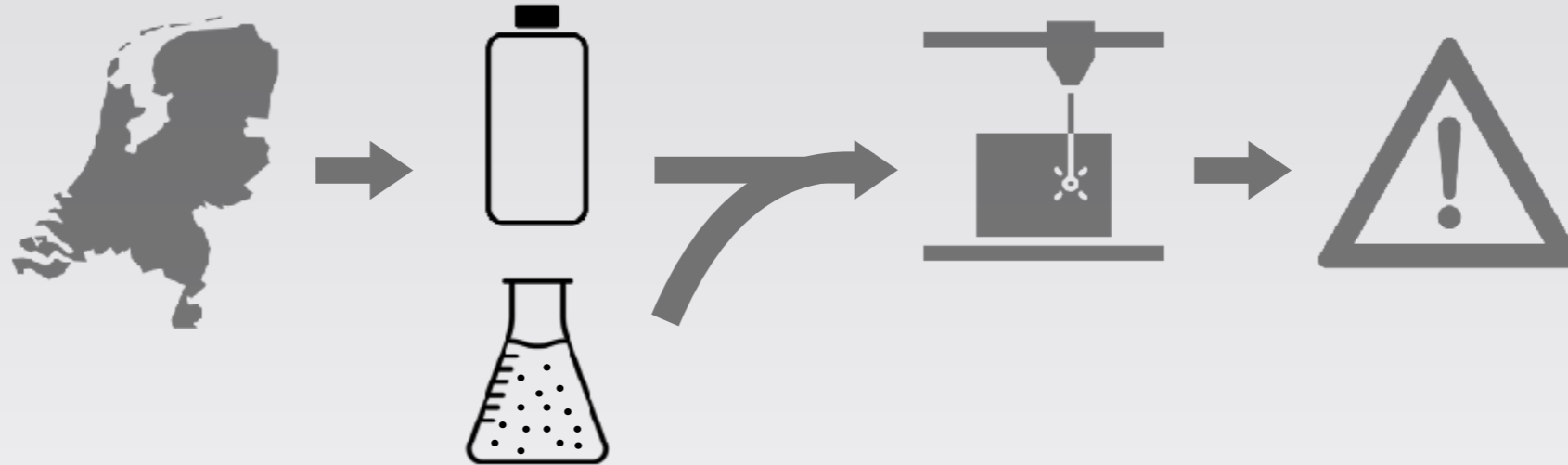
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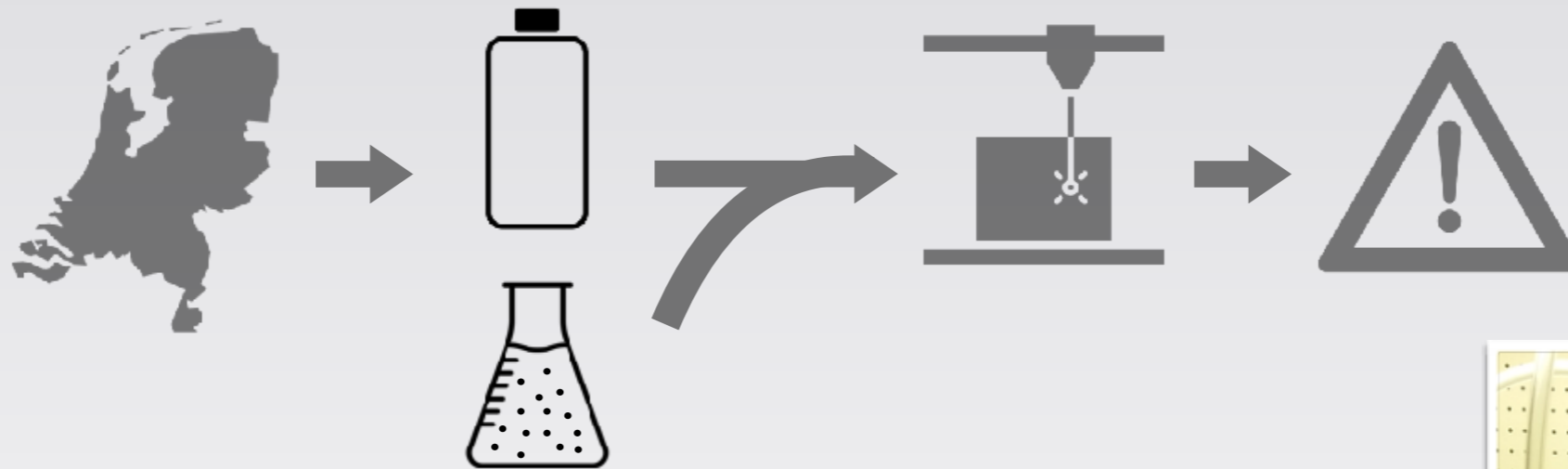


- Surface water from 39 locations in The Netherlands
- May, June, July 2016
- Locations provided by the Dutch waterboards
- Representative of Dutch surface water pollution sources

Test species



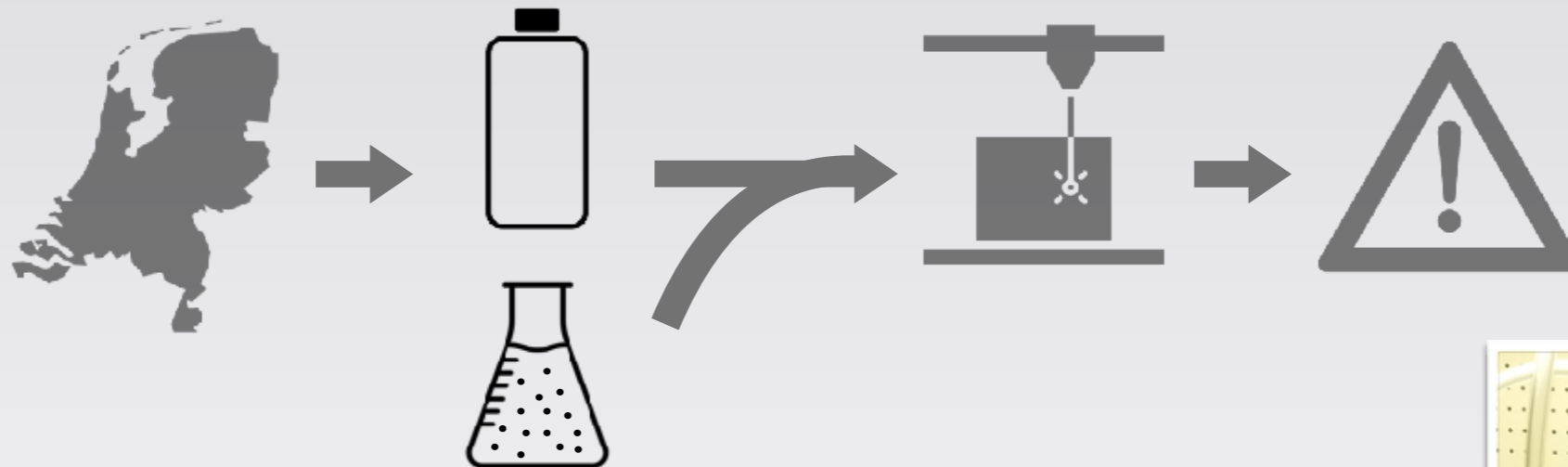
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- *Pseudokirchneriella subcapitata*



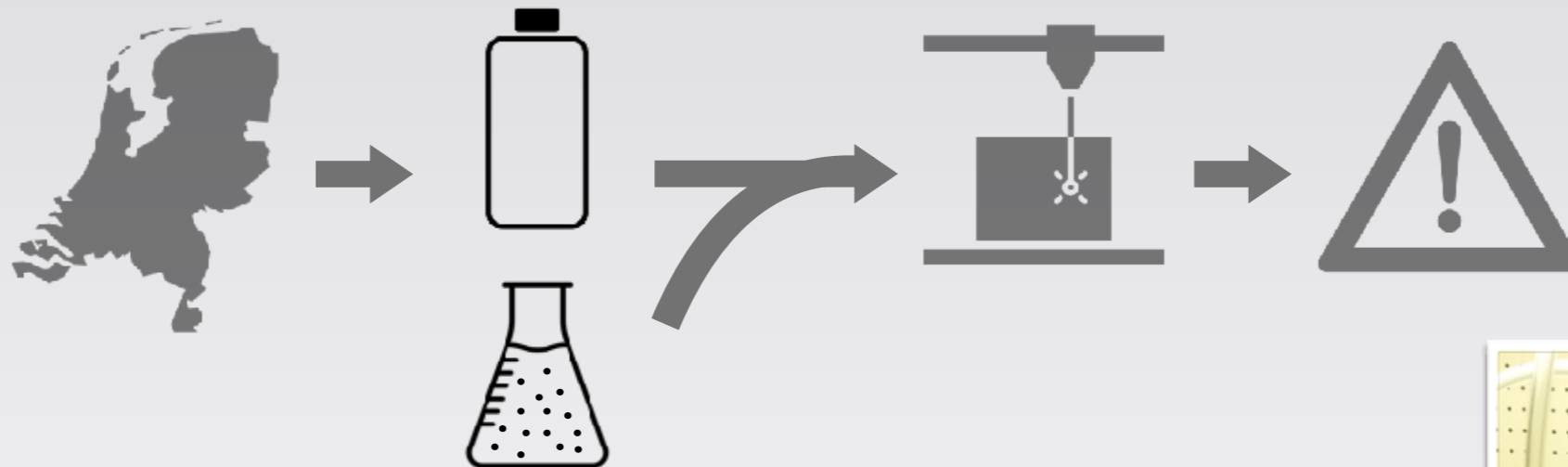
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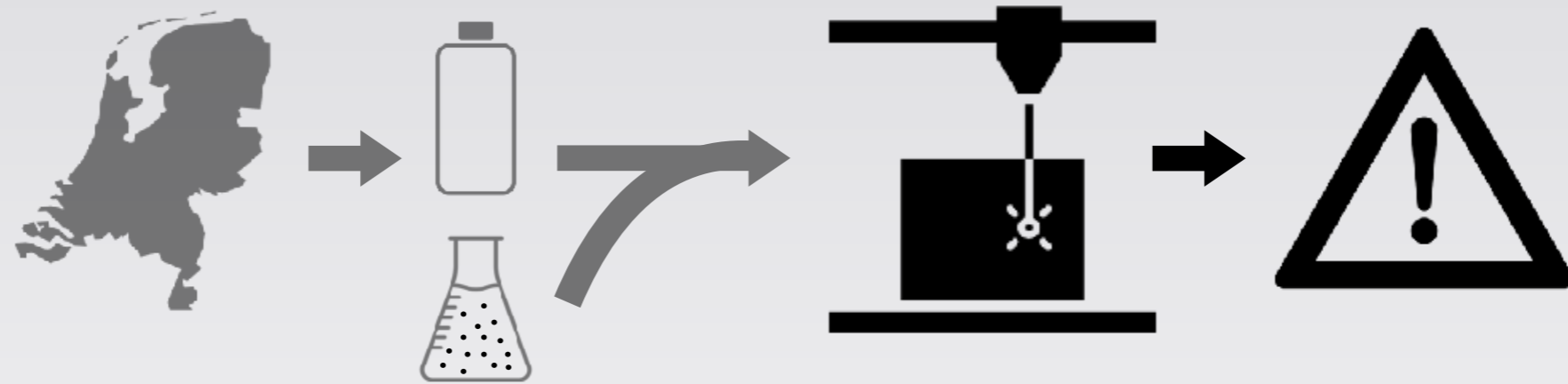
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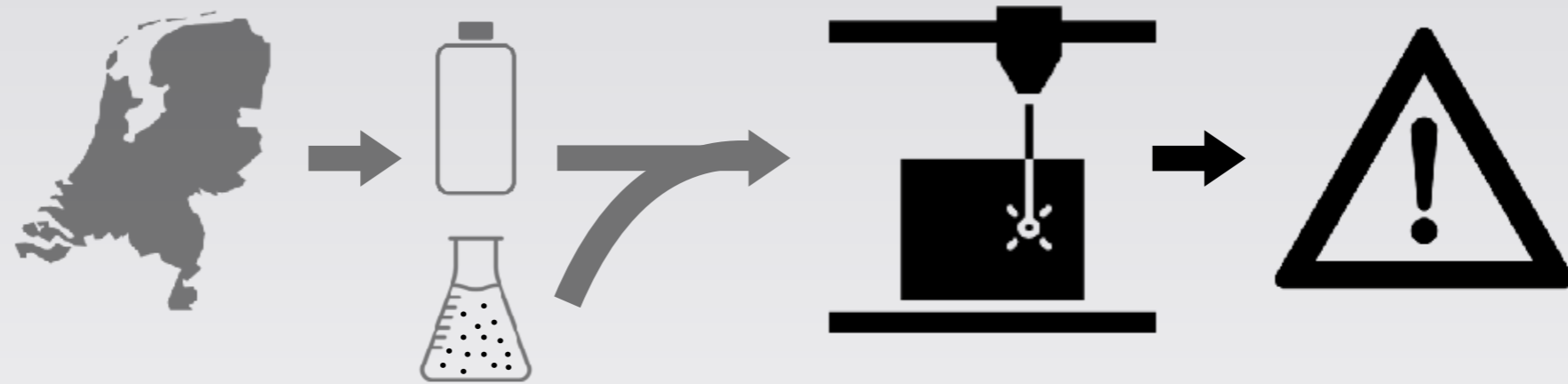
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- Widely distributed microalgal species
- Sensitive and recommended species for bioassays (OECD)



Photosynthetic inhibition

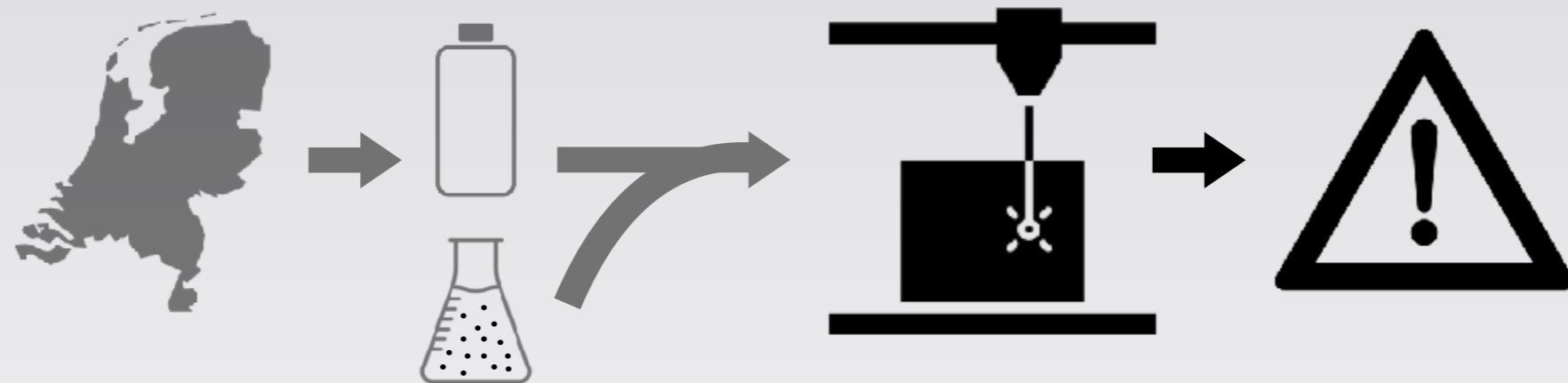


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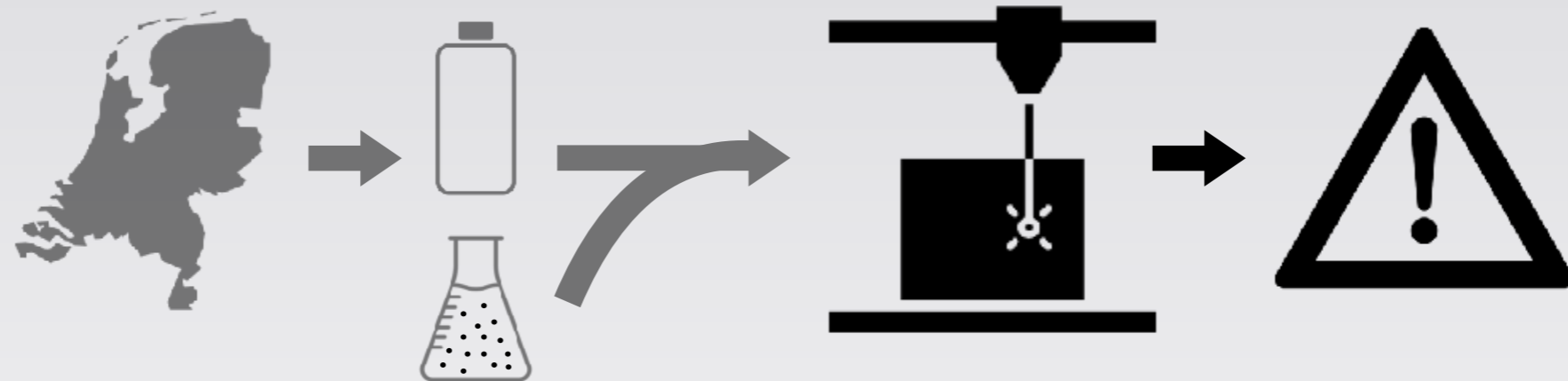
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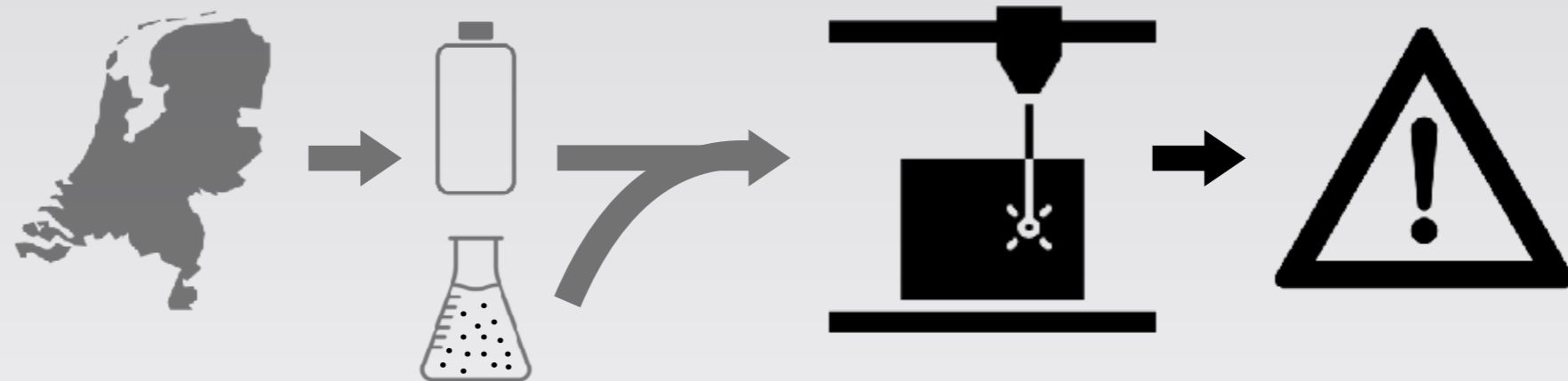


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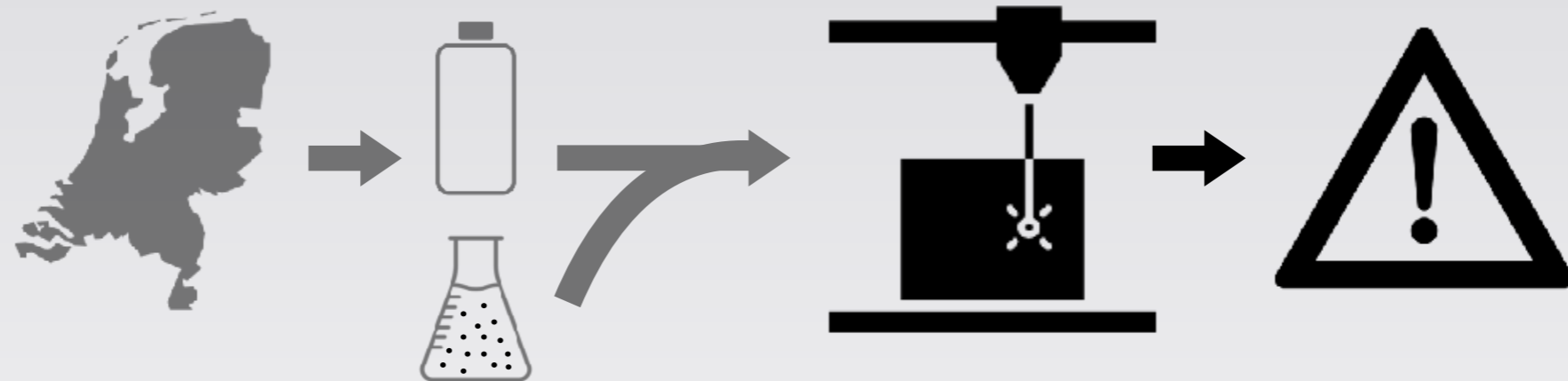
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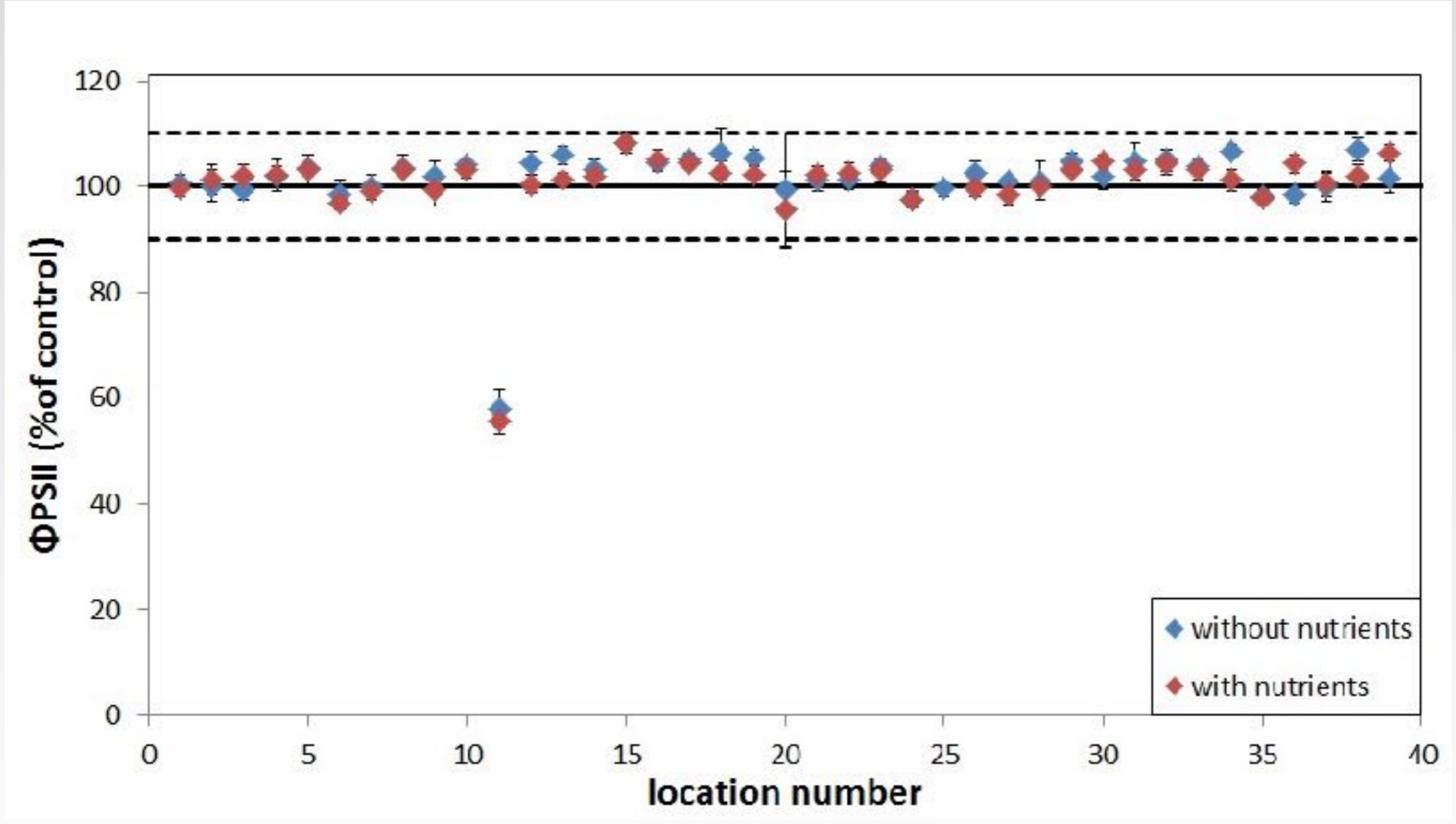
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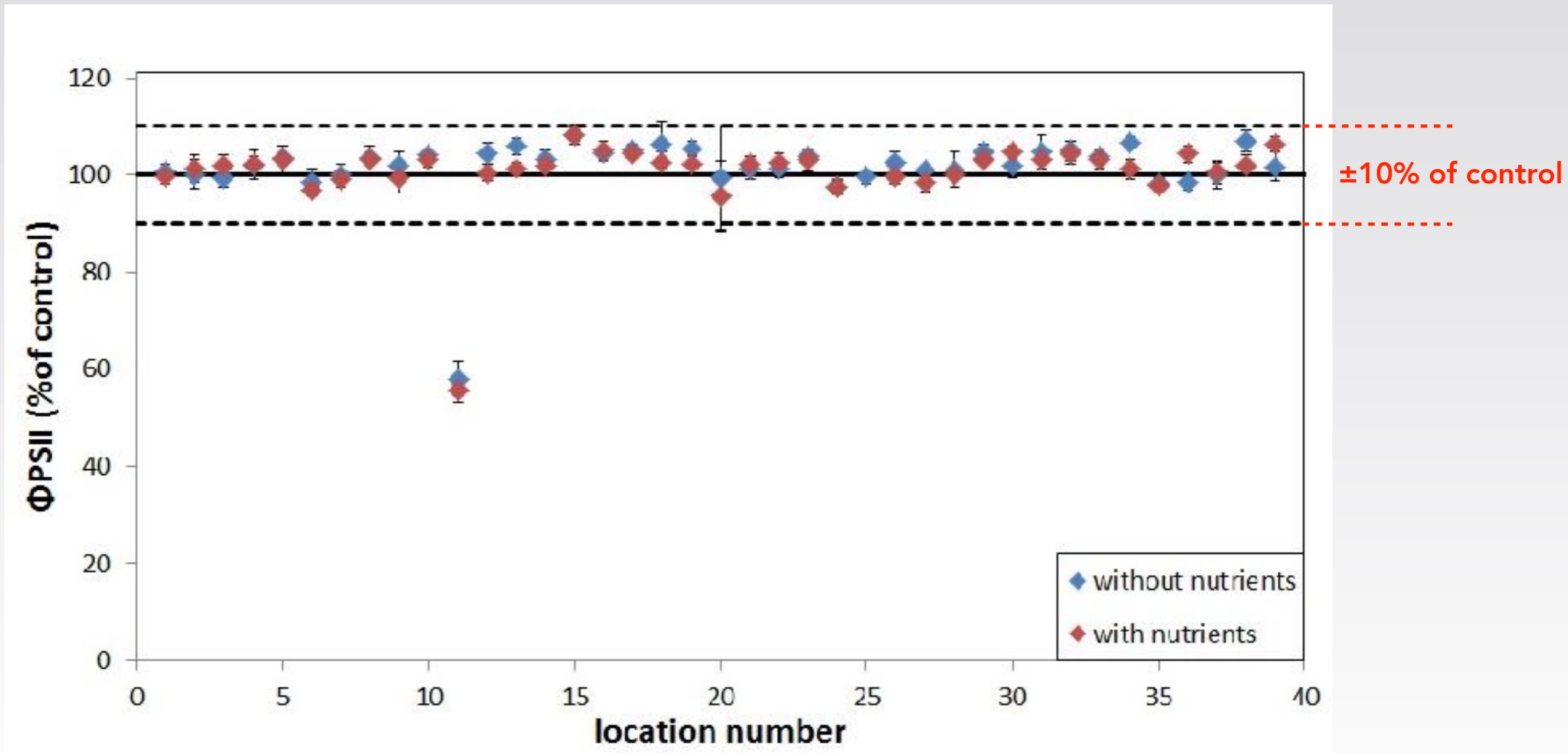
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Rapid high-throughput herbicide toxicity screening

Herbicide toxicity screening

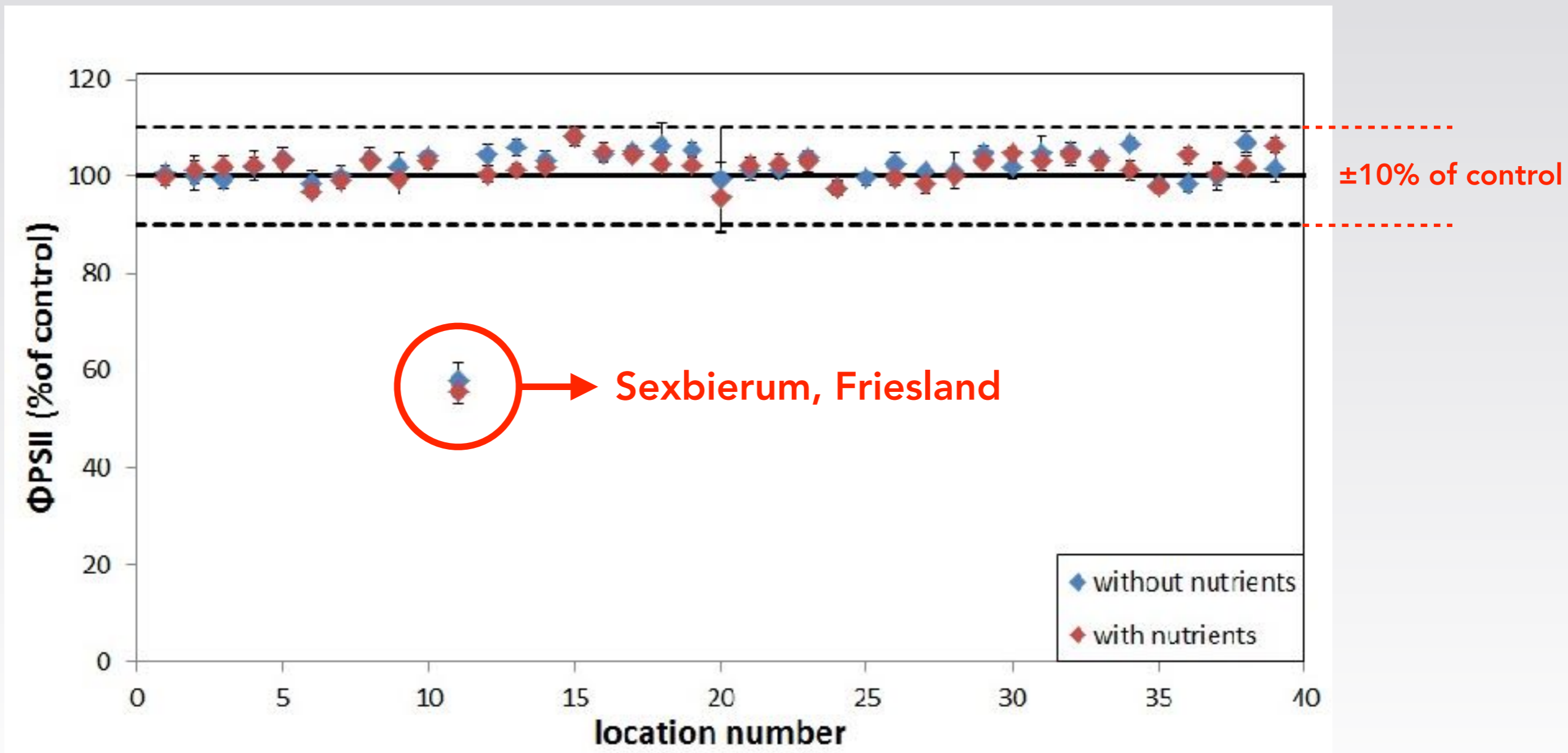


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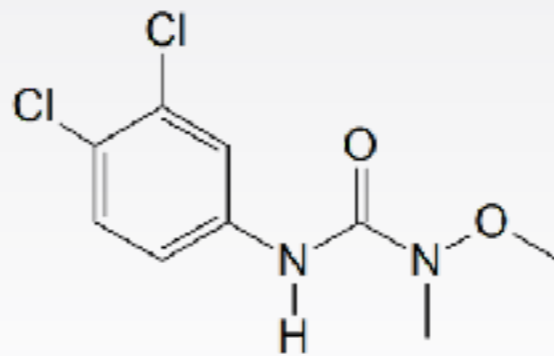
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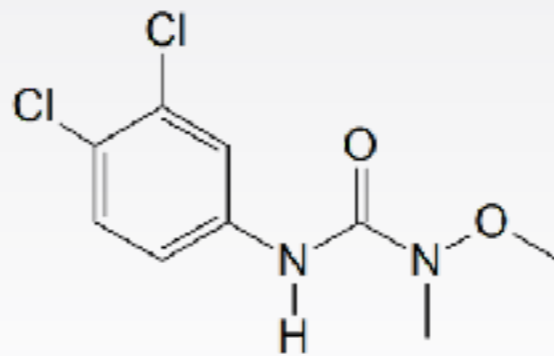
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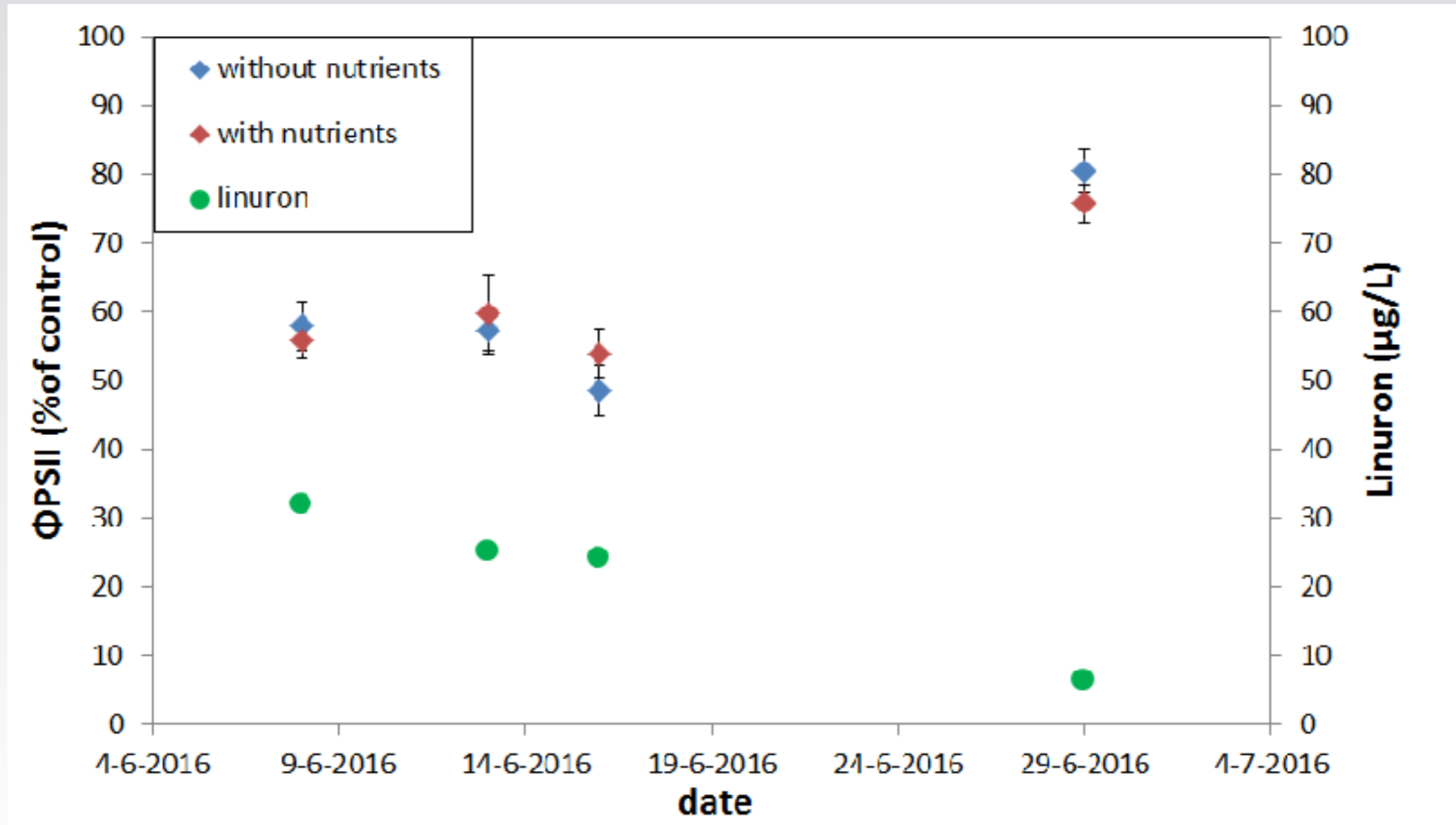
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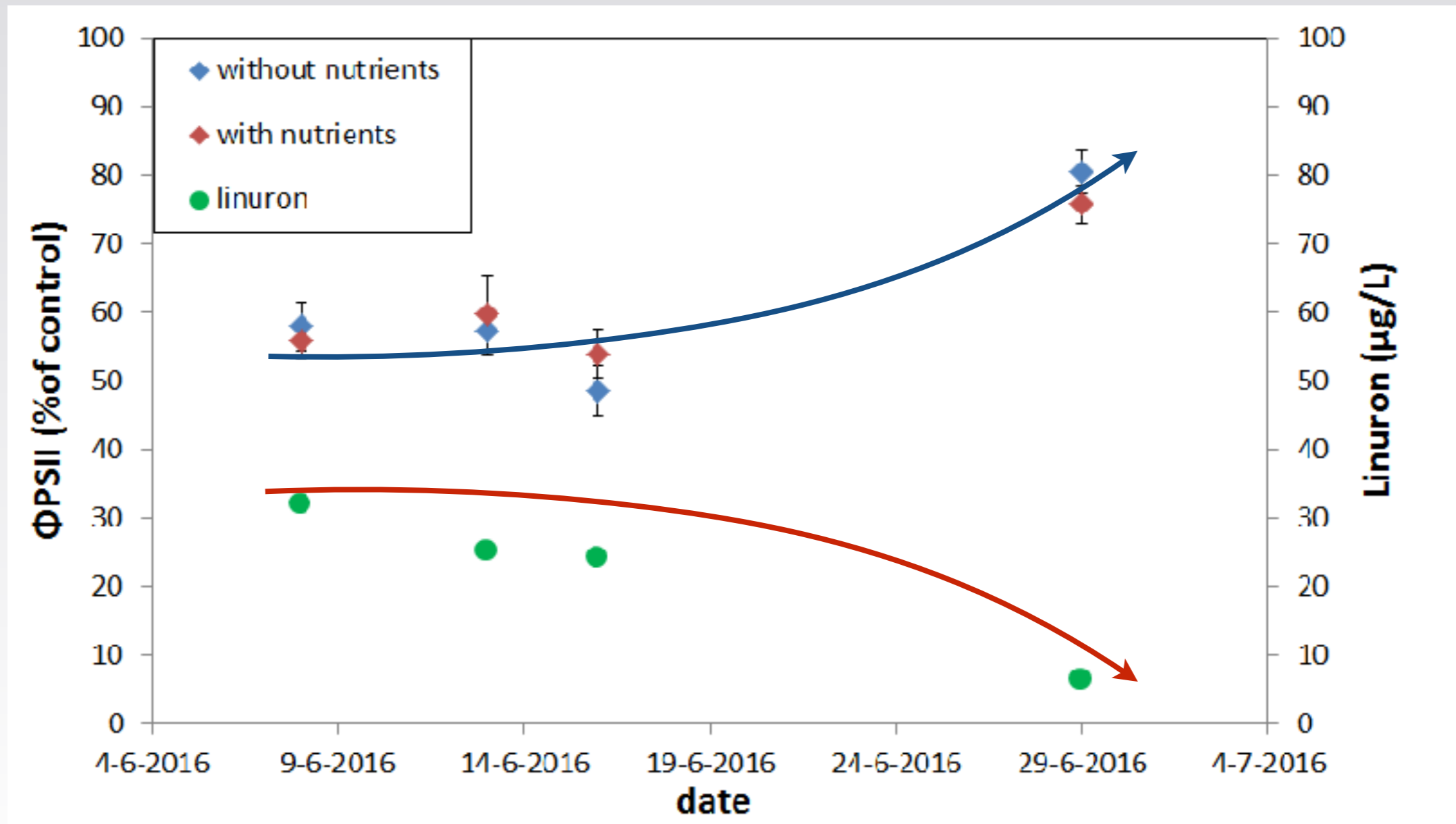


- Herbicide dimethenamid and herbicide metabolite desethylterbutylazine were also present above EQS

Linuron toxicity over time

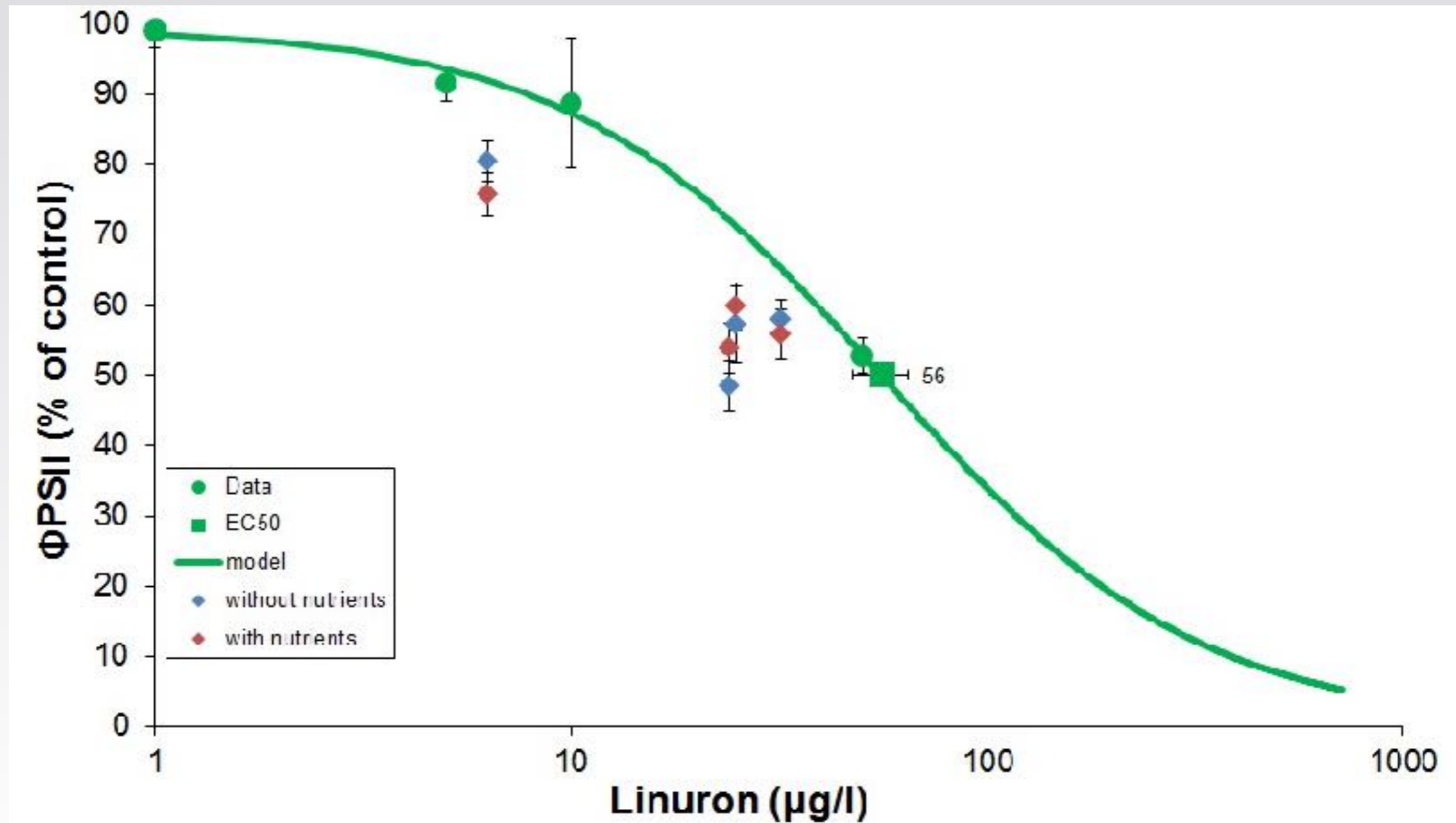


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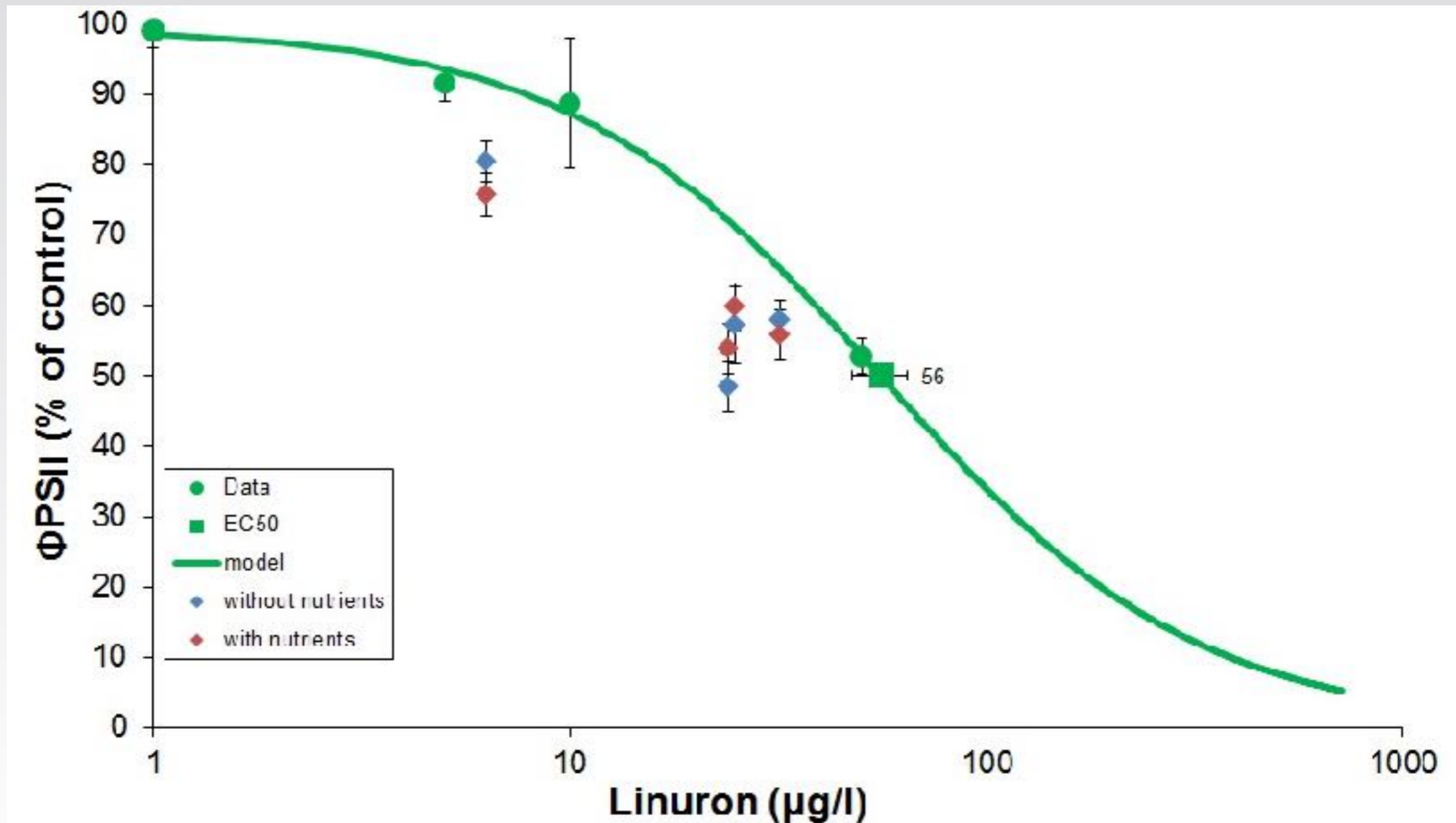


Decreasing toxicity with decreasing linuron concentration in surface water over time

Linuron toxicity in the laboratory



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Toxic effect observed at Sexbierum largely explained by linuron concentration in the water

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