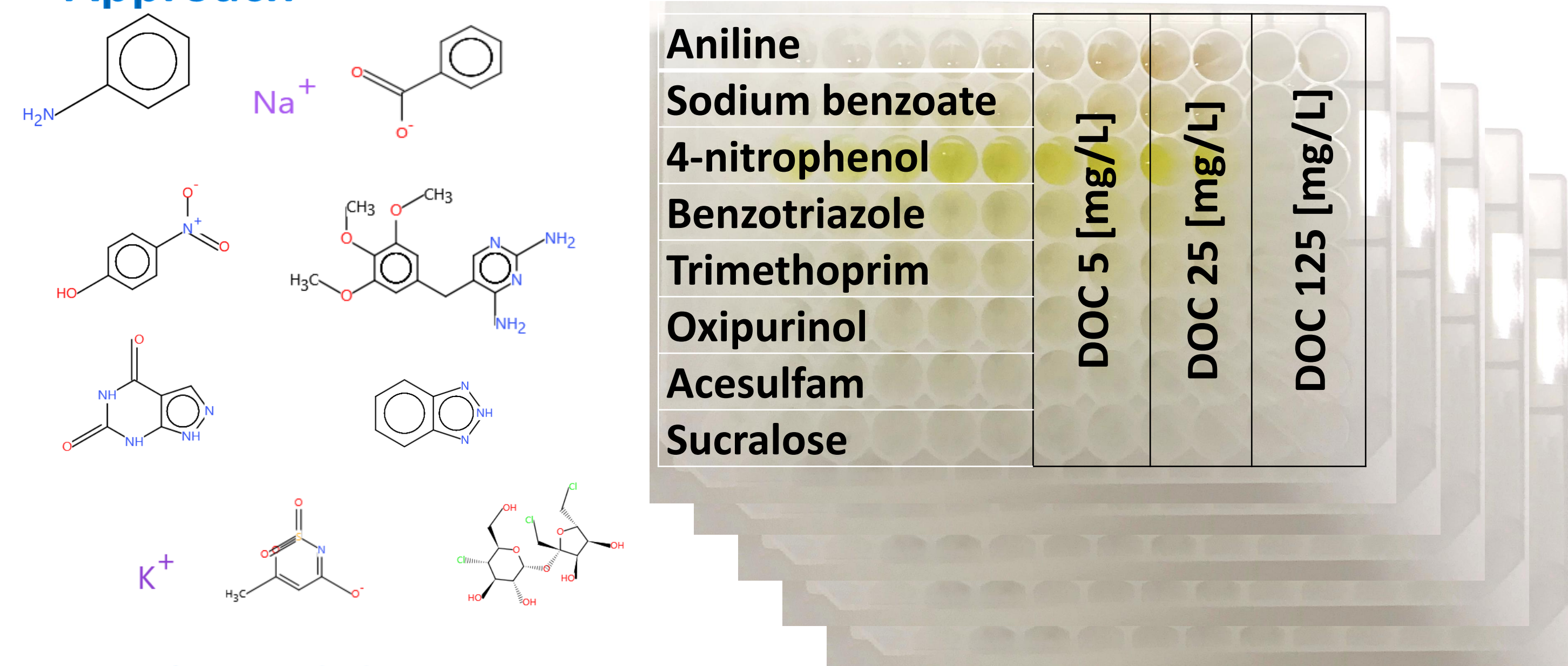


# Can Bacterial Growth be used as an Indicator for Biodegradation of Chemicals in a High Throughput Screening Test for Readily Biodegradability?

## Background

- High throughput method universal for **down the drain substances**
- Screening for **indication** for readily biodegradable
- **Representative** and **reproducible** inoculum
- Increase understanding of **microbial dynamics**
- Relevant **reference compounds**
- Activate **biodegradation potential** of microbial community

## Approach



Inoculum source	Non-Treated	Co-substrate	Pre-cultured
Daphnia culture water	Undiluted, 10x and 100x diluted	5mg/L yeast extract. Inoculum 10x and 100x diluted	7 days with 100 mg/L yeast extract. Inoculum 10x and 100x diluted
Frozen activated sludge			
Urban river			
Seawater			

## Results and discussion

### Daphnia magna culture water

- ☺ Not exposed to chemicals
- ☺ Readily available in ecotox laboratories
- ☺ Adapted to laboratory conditions
- ☹ Environmental relevance?
- ☹ Limited diversity?

### Frozen activated sludge

- ☺ “Standardized inoculum”
- ☺ Reproducible for comparing chemicals
- ☺ Relevant for WWTP
- ☹ Lost some activity during storing.
- ☹ Filamentous bacteria not suitable for FCM counts.

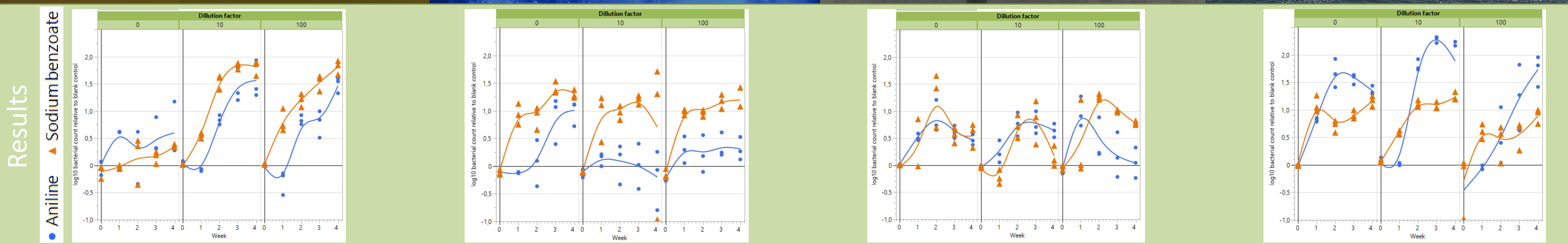
### Inoculums

### Urban river

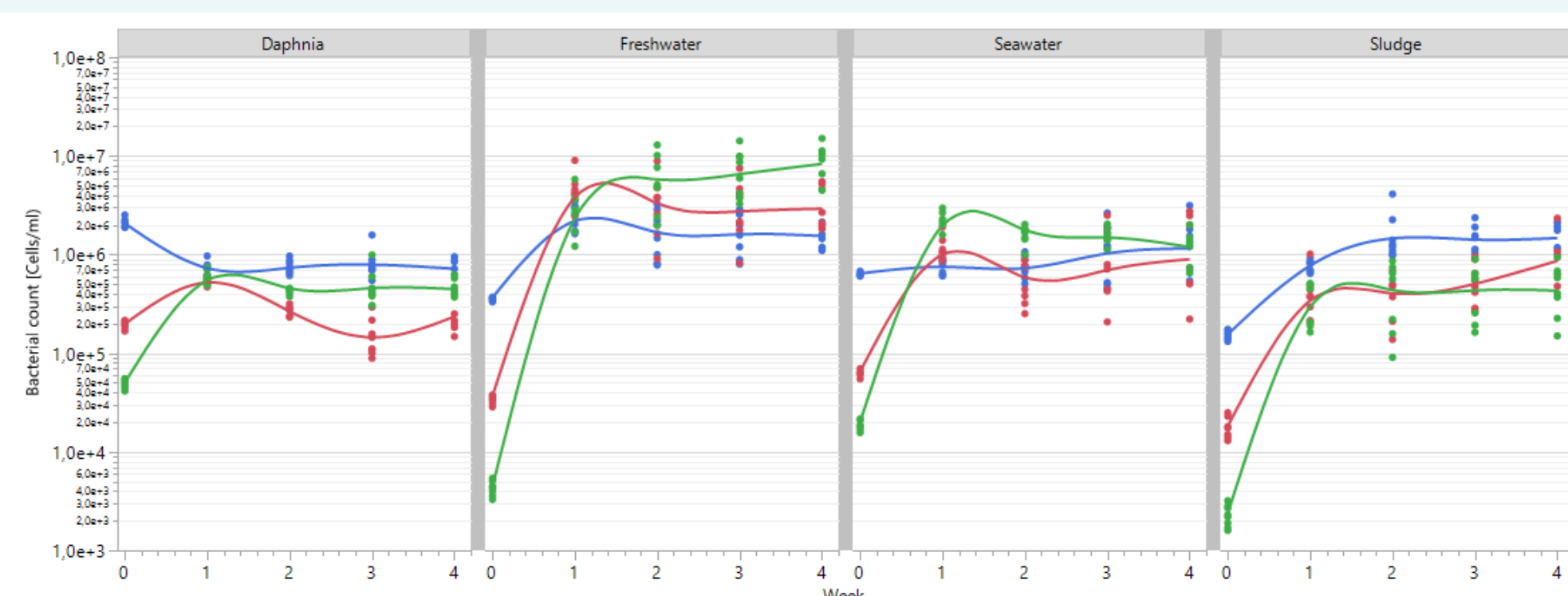
- ☺ Sewage and traffic run off pollution → likely biodegraders
- ☺ Representative and environmental relevant
- ☹ Not reproducible because of changing conditions?
- ☹ Season and temperature variation
- ☹ Ice cover when sampled

### Seawater

- Much sewage is released untreated to Norwegian fjords
- ☺ Representative and environmentally relevant
- ☹ Variable microbial community
- ☹ Temperature significantly colder than lab
- ☹ Seasonal variation

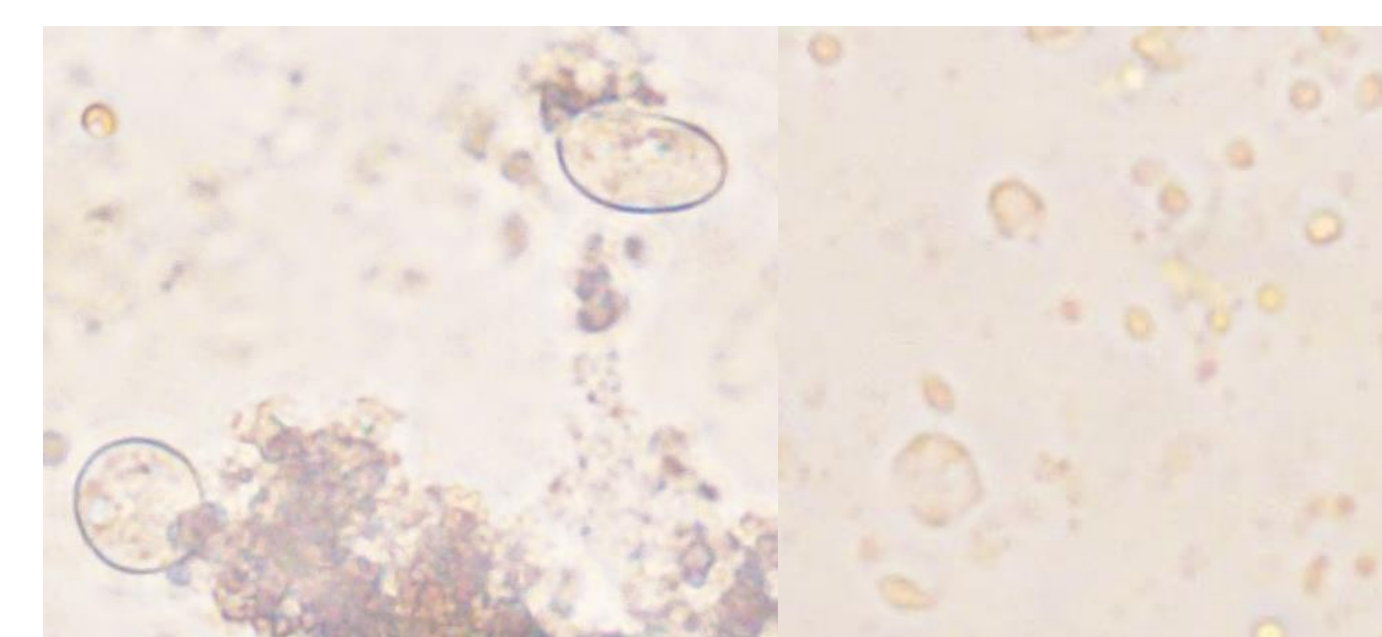


## How important is the Quantity of bacteria in the inoculum?

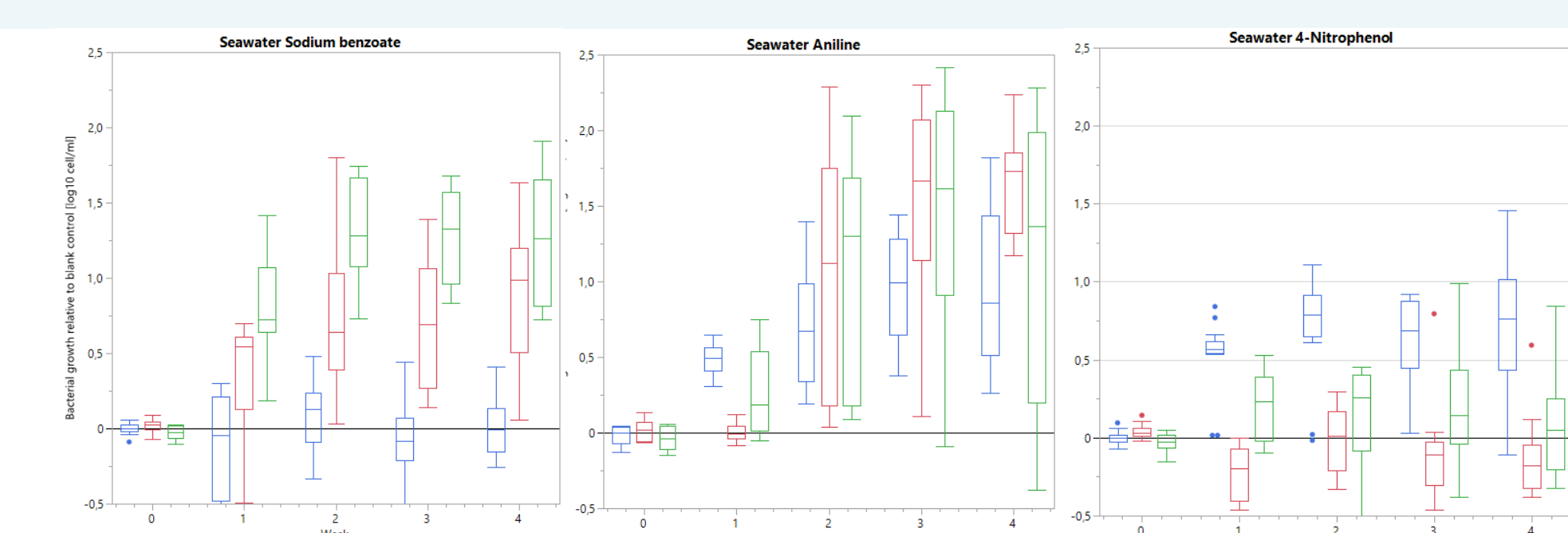


Blank Controls of diluted samples had regrowth the first days and stabilized at the same or higher quantity than non-diluted samples

Protozoa that eat bacteria such as amoebae, ciliates and heterotrophic flagellates were observed



## Can the Quality of the microbial inoculum be improved by either pre-culture for adaption to lab conditions or adding co-factors?



Pre-culturing or addition of yeast extract as co-factor had variable results.

### Example seawater:

Pre-culture: faster growth from aniline, no growth from sodium benzoate (SB), higher probability of growth from 4-nitrophenol.

Co-substrate: increased growth of SB while no effect on aniline.

## Future perspectives

- Biodegradation will be verified by chemical analysis
- Results will be compared with calculated Gibbs Energy Dynamic Yield
- The role of protozoa will be studied further

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Further reading: Wennberg et al., 2022 <https://doi.org/10.1016/j.chemosphere.2022.134476>

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