

Study of a bacterial community in the aquaponic closed-loop system of Gembloux Agro-Bio-Tech

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A large, dense crowd of people in an urban setting, with a green circular overlay containing text. The background shows a busy city street with many people walking, some holding umbrellas, and buildings with signs like 'Jico's' and 'LAE'.

2030

**8.3 billion
people**

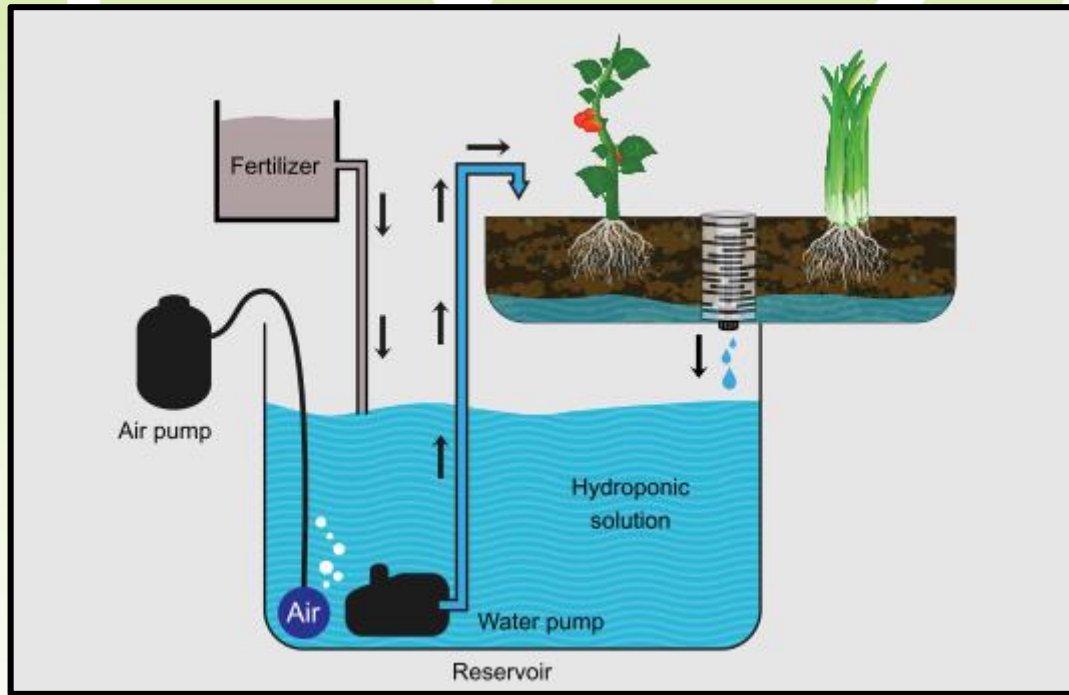
60% urbans



Current issues

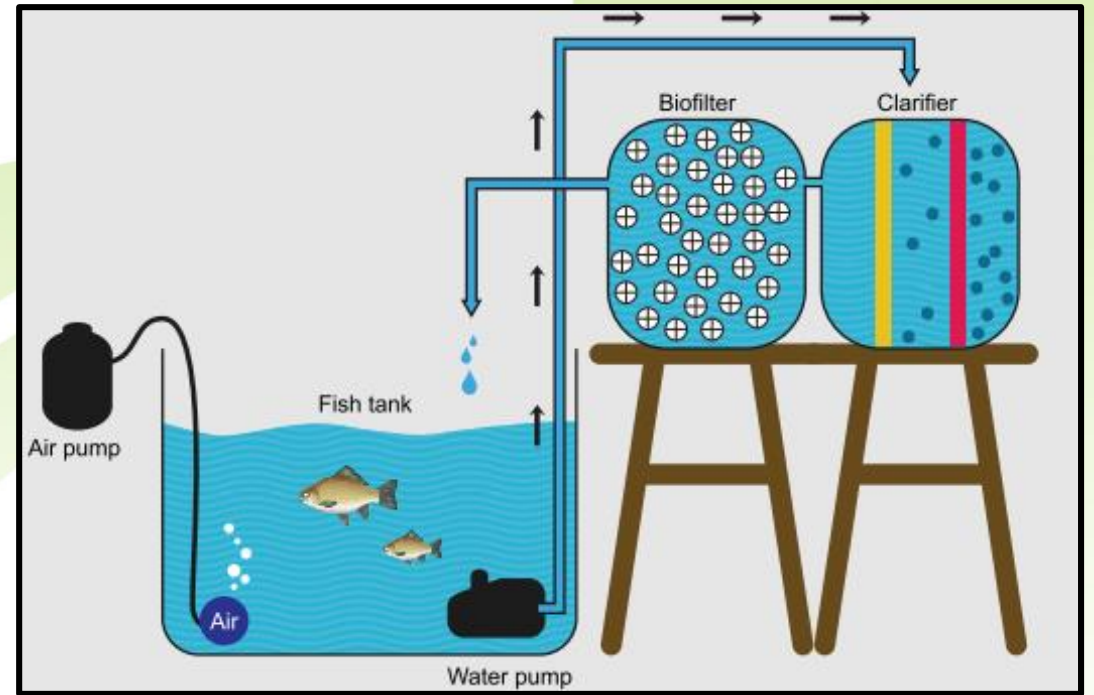


An innovative solution: aquaponics



Hydroponics

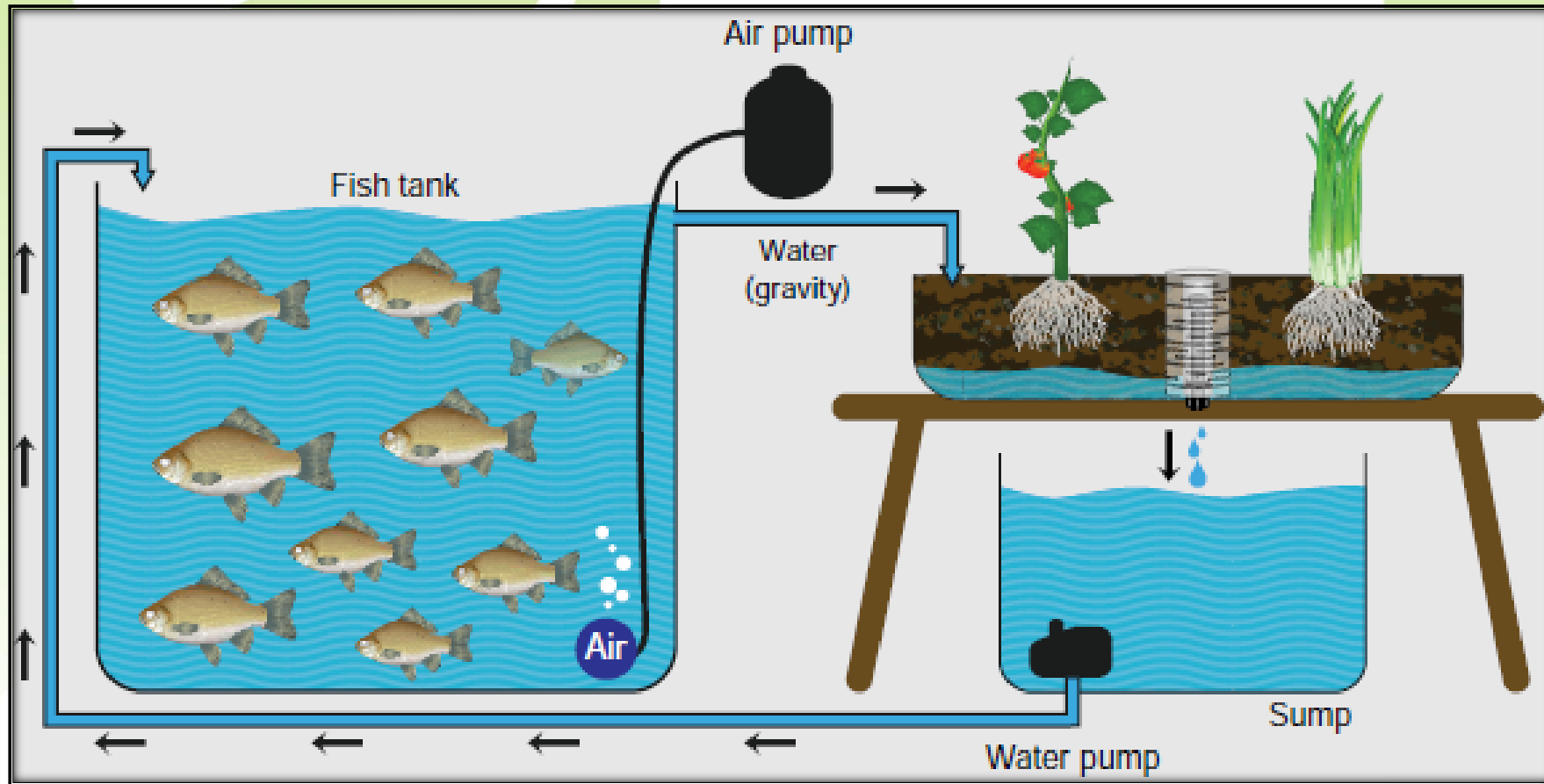
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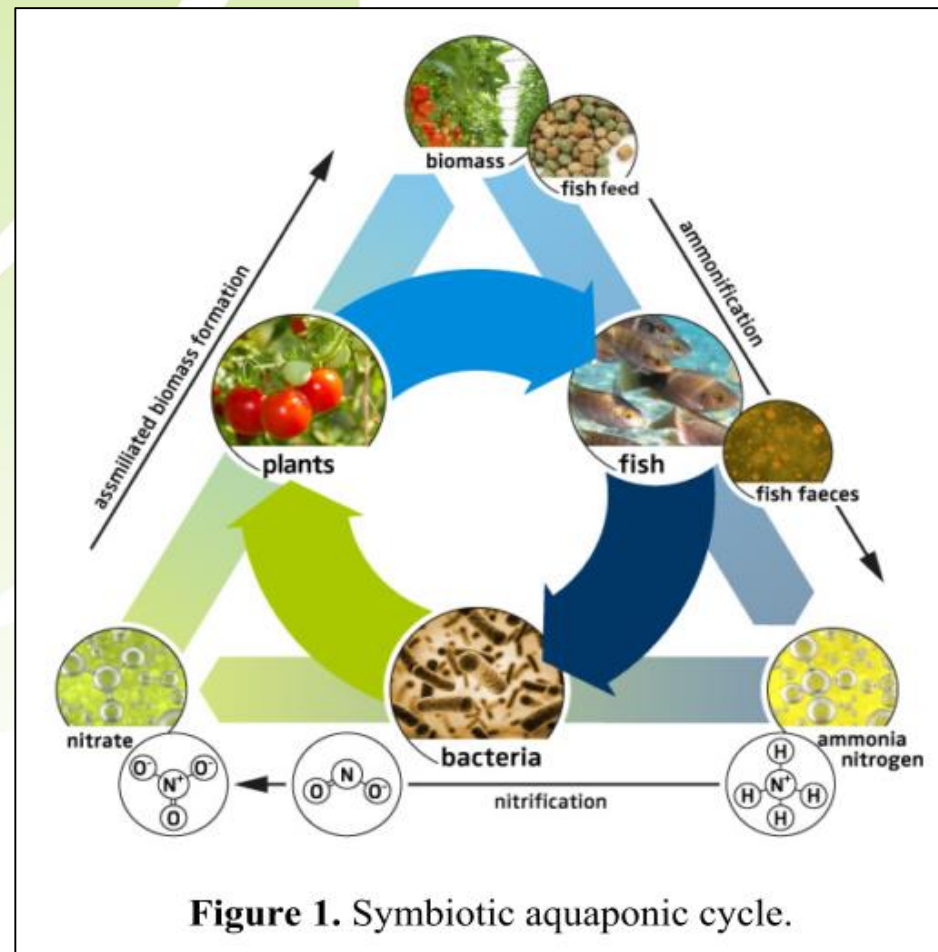
Aquaculture

Somerville *et al.*, 2014

An innovative solution: aquaponics

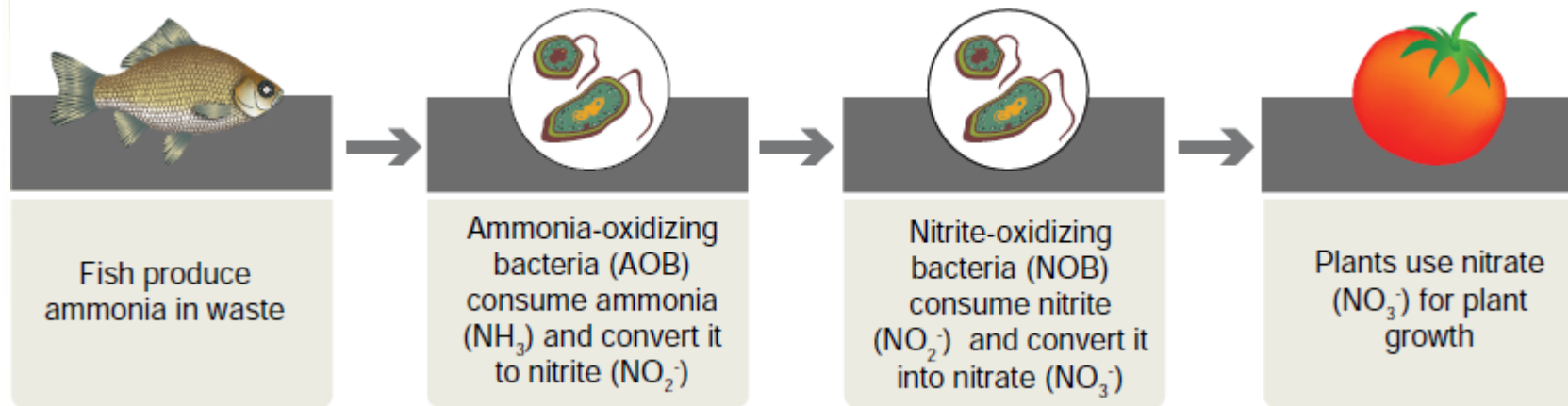


An innovative solution: aquaponics



Microorganisms in aquaponics

Nitrifying bacteria



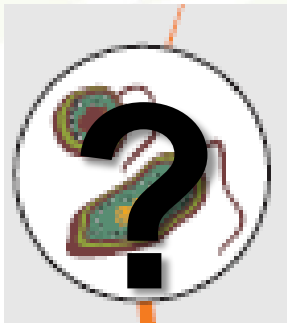
AOB

Nitrosomonas,
Nitrosococcus,
Nitrospira

NOB

Nitrobacter,
Nitrococcus,
Nitrospina,
Nitrospira

Non nitrifying bacteria

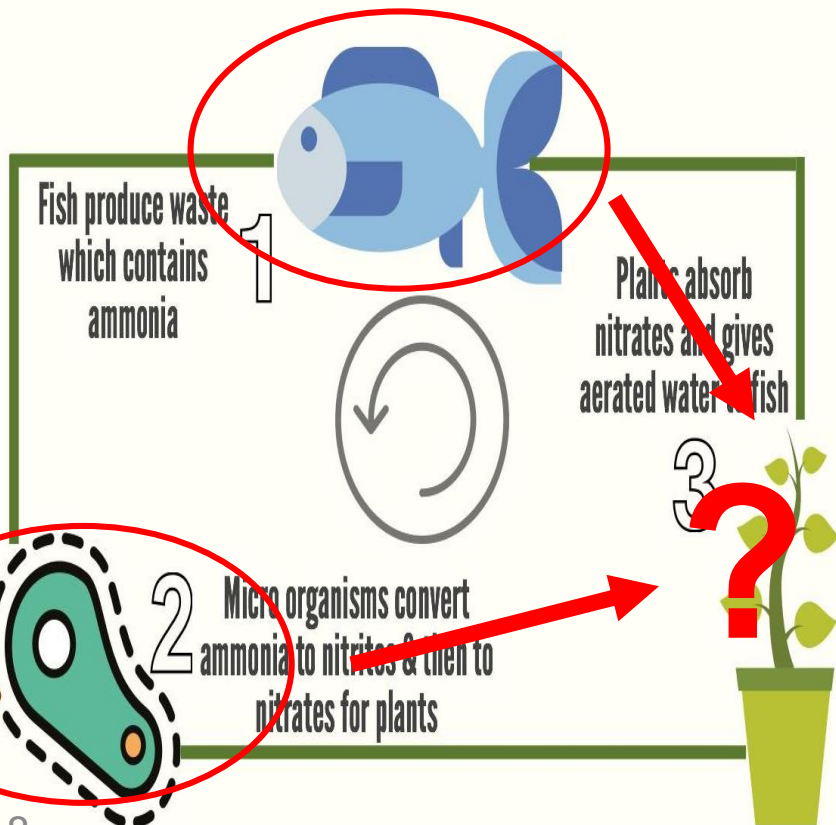


Fungi ?

Somerville et al., 2014

Why studying microorganisms in aquaponics?

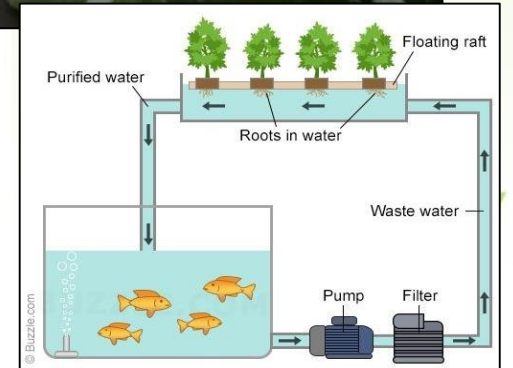
AQUAPONICS CYCLE



Similar yields in aquaponics and hydroponics despite an aquaponic solution containing lower nutrients concentrations

Delaide et al., 2016
Goddek et al., 2015
Rakocy et al., 2004
Seawright et al., 1998

Plant and Fish Farming Box



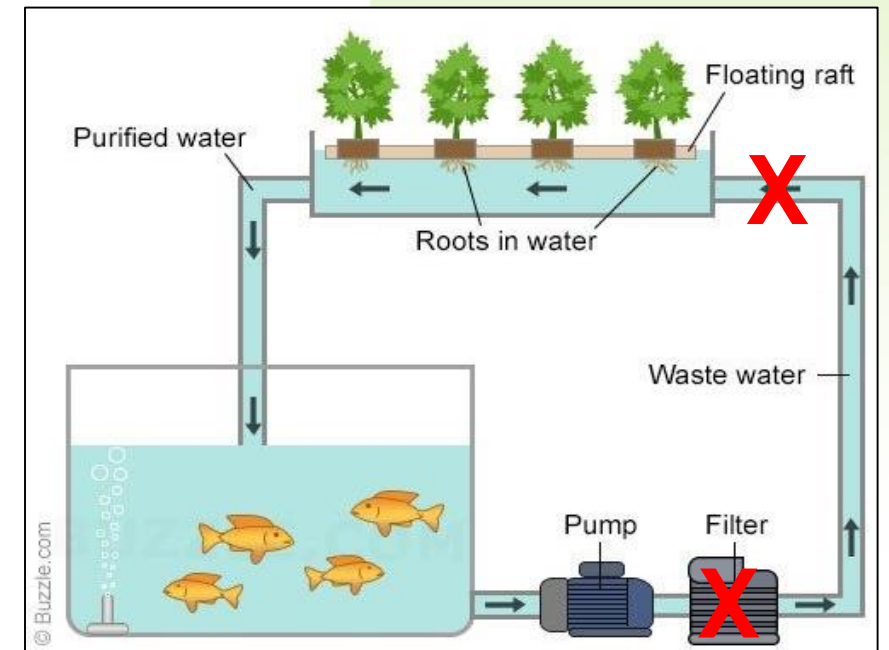
Goals

- **First idea of the composition of the community?**
- **One or several communities? Comparison?**
- **Does it evolve or is it static?**

Method: sampling



- 4 technical replicates
- once a week
- 3 weeks



Method: preparation, sequencing and data analysis



Composition

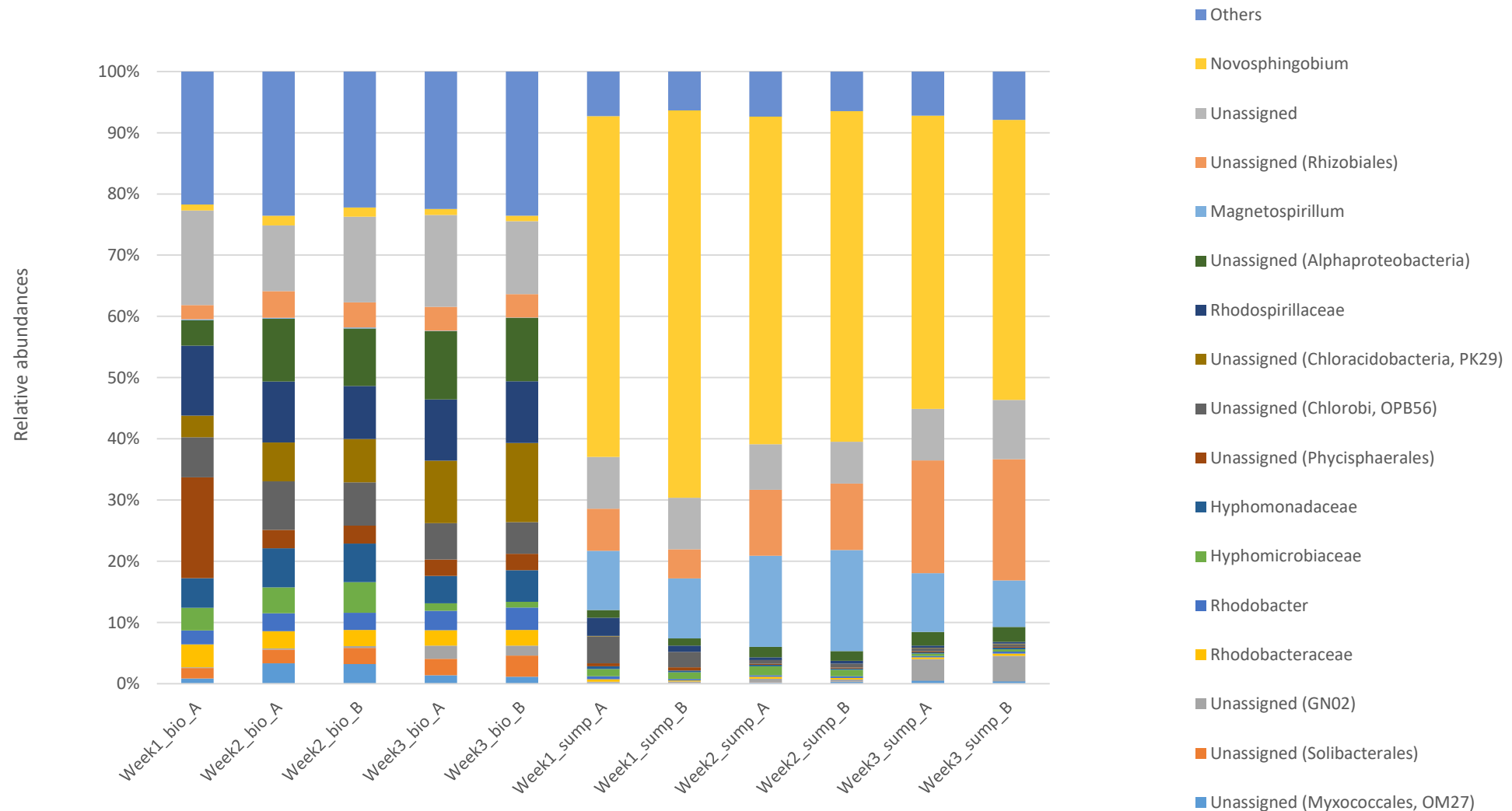


Fig.1. Bacterial composition of samples



Different communities in one system

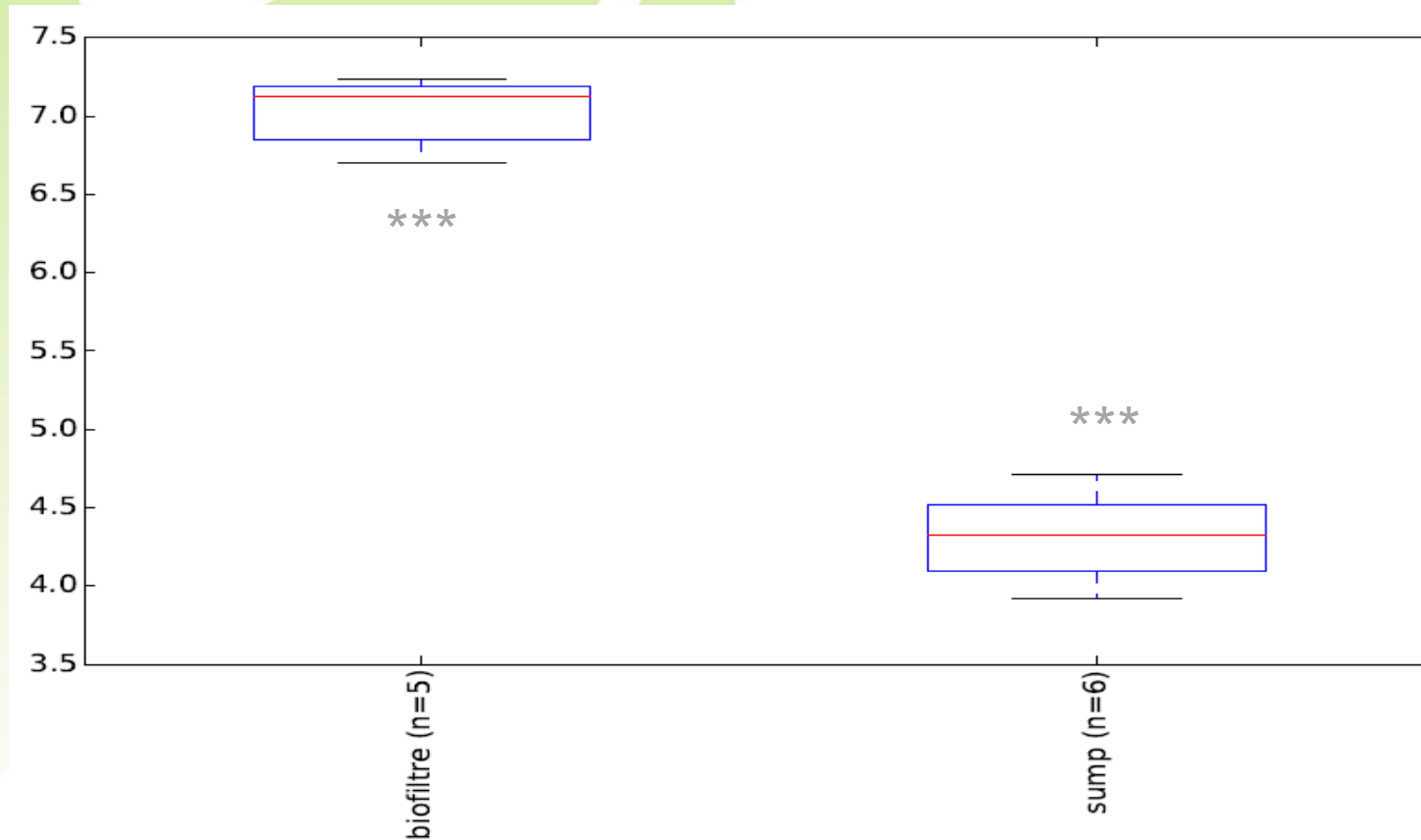


Fig.2. Box plots comparing the Shannon indices of the biofilter samples and sump samples

Stable communities

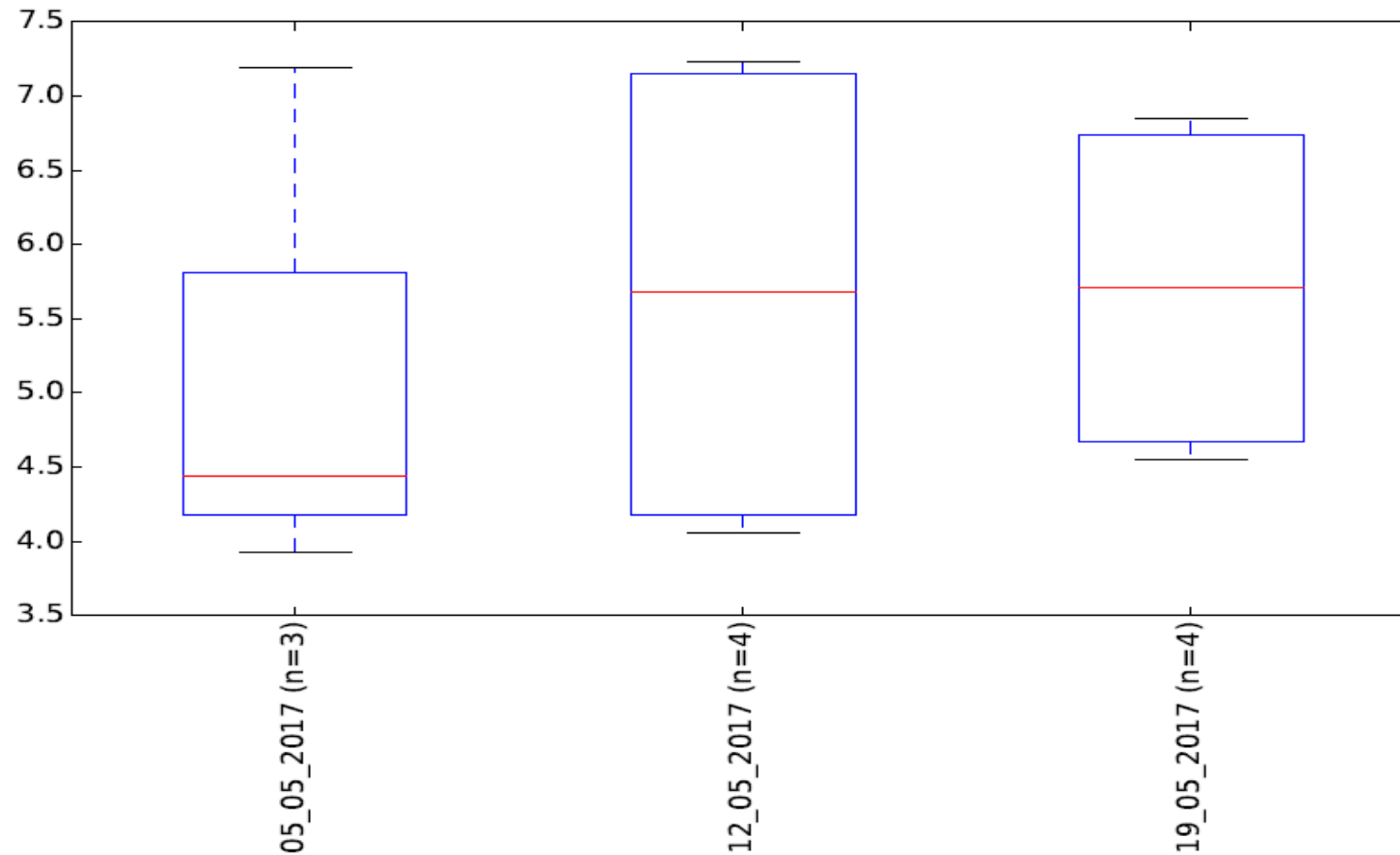


Fig.3. Box plots comparing the Shannon indices of the three sampling dates. No significant difference is observed in the diversity of the bacterial community over three weeks

Conclusions

- **Different communities in one system (sump and biofilter)**
- **Biofilter community is more diverse**
- **Communities look stable over time**

- **Perspectives**
 - **More thorough characterisation of communities**
 - **Comparison of communities in different systems**
 - **Understanding of the functions of microorganisms**



Thank you for your attention

All questions are now welcome

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Phytopathologie