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Effect of Seed Treatments on the Bacterial and Fungal Communities of Wheat Rhizosphere

Introduction

Seed treatment remains a widely used crop protection method.

Nevertheless, the negative impacts of these treatments on the ecosystem are well-documented.

We conduct an on-farm wheat field study comparing different organic and synthetic seed treatments to untreated seeds and assess results in terms of:

- Agronomic parameters
- Microbial diversity

Only certified seeds were used in this study.

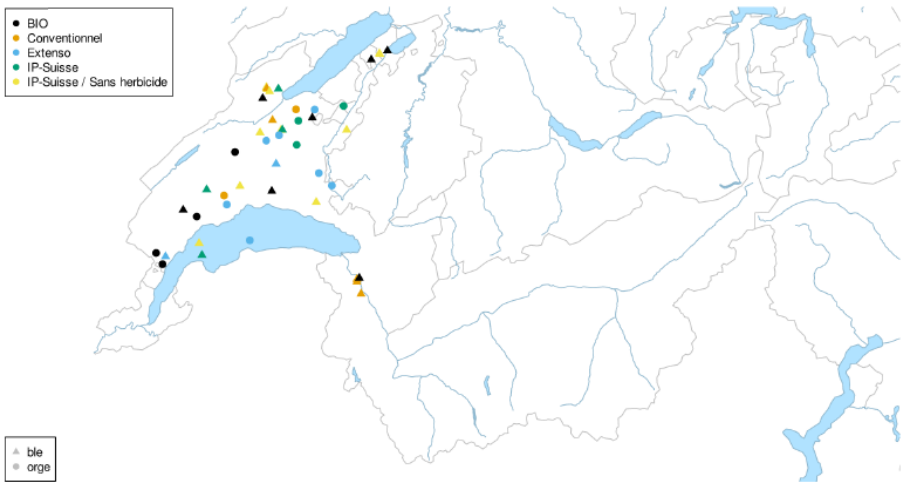

Fig.1: Map showing the distribution of the different wheat fields of the study

Methods

- Agronomic data were assessed for the three years 2021-2023
- Rhizosphere microbial communities of 5-10 cm plants were profiled through amplicon sequencing
- A sample of treatments was analysed for microbial diversity due to financial limitations

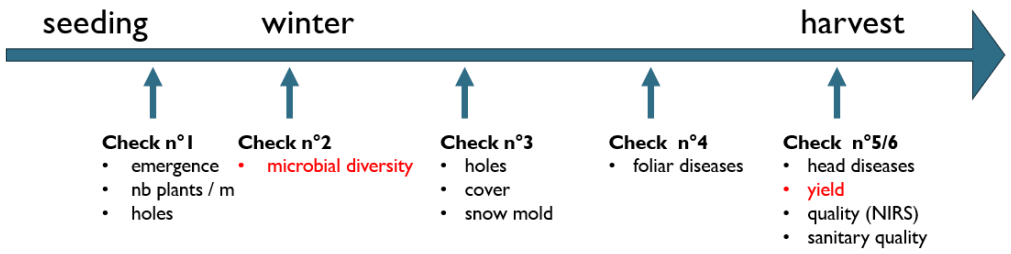

Fig. 2: Sampling methodology

Results

Results of the microbial analysis of 2022 are shown below.

- All tested treatments led to a significant decrease in bacterial diversity, and no effect on fungal diversity (Fig.3).
- Soil properties and not seed treatments were the major drivers of both microbial communities (Fig.4).
- Bacterial community was shaped by soil pH, sand, and silt, while the fungal community was additionally driven by corg (Fig.4).

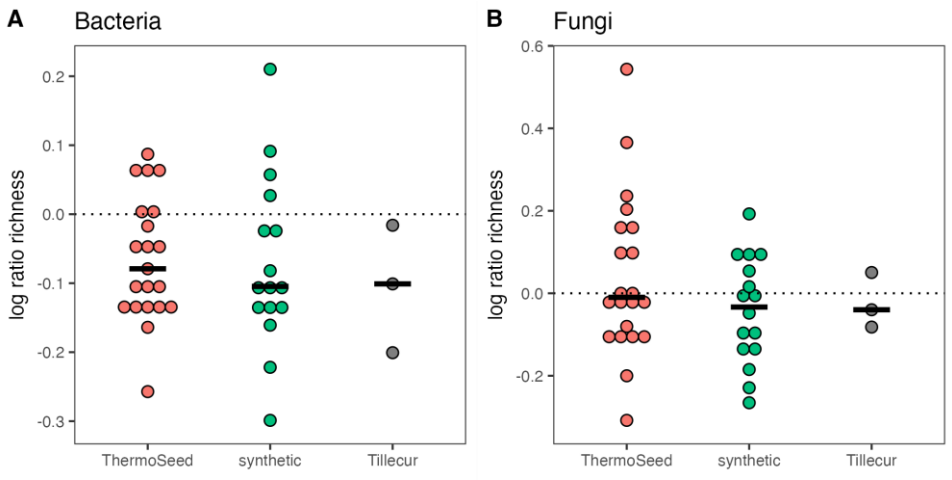

Fig.3: Within-sample diversity (alpha diversity) of bacterial and fungal wheat plants

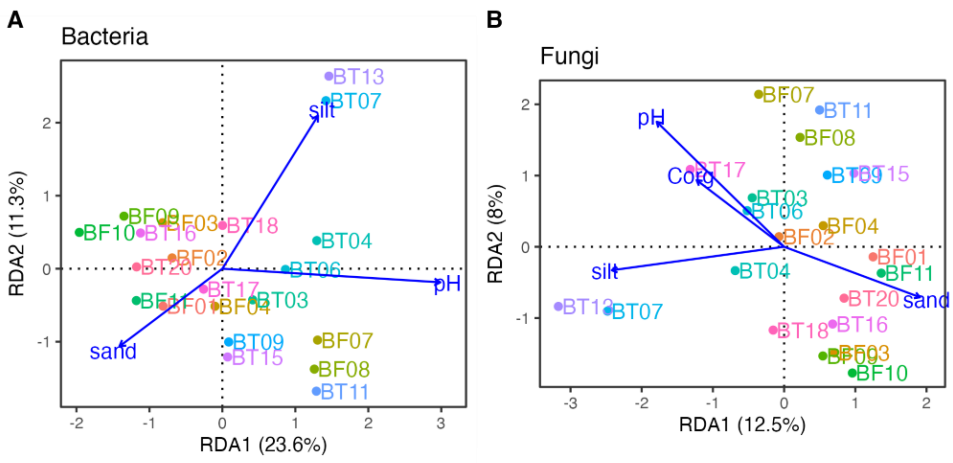

Fig. 4: Redundancy Analysis

Conclusion

- All treatments decreased bacterial richness, whereas fungal richness was less sensitive to this effect.
- Soil chemistry was the major driver of both microbial communities.
- The analysis of the agronomic data of the three years would follow, leading to a more comprehensive picture of the effects of different treatments.

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