Impact of intercropping on soil microbial structure and functional potential of soil fungi in wheat-clover system

Priyal Sisodia[1], Agata Gryta[1], Jacek Panek[1], Dominika Siegieda[1], Karolina Oszust[1] , Mateusz Mącik[1], Michał Pylak[1], Beata Feledyn-Szewczyk[2] , Shamina Imran Pathan[3], Giacomo Pietramellara[3], Magdalena Frąc[1*]

[1] *Institute of Agrophysics, Polish Academy of Sciences, Lublin, Poland, *m.frac@ipan.lublin.pl*

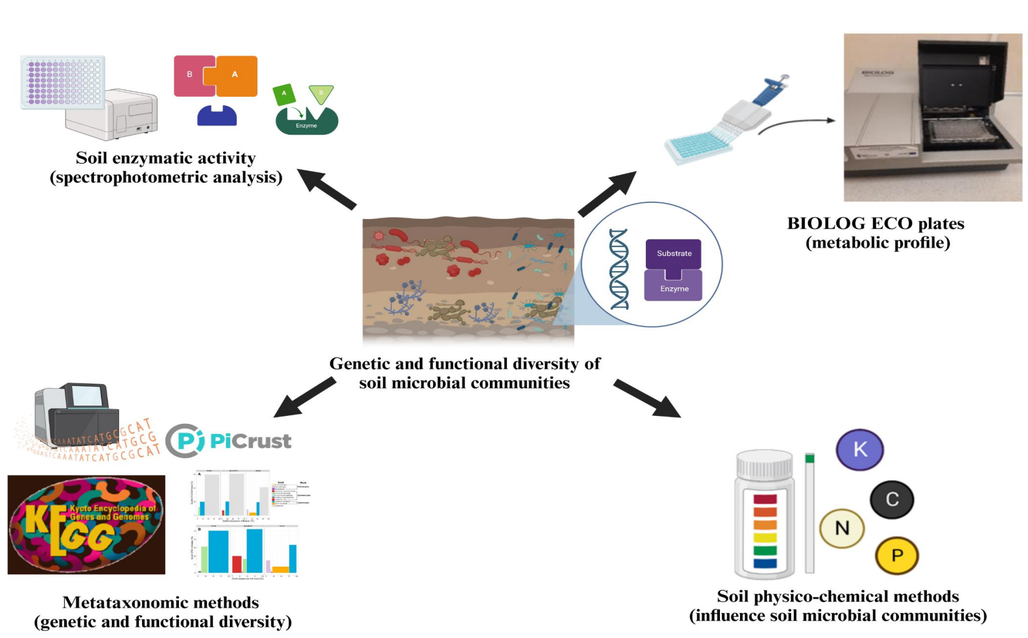
[2] Institute of Cultivation, Fertilization and Soil Science – State Research Institute, Pulawy, Poland

[3] *Department of Agriculture, Food, Environment and Forestry, University of Florence, Florence, Italy*

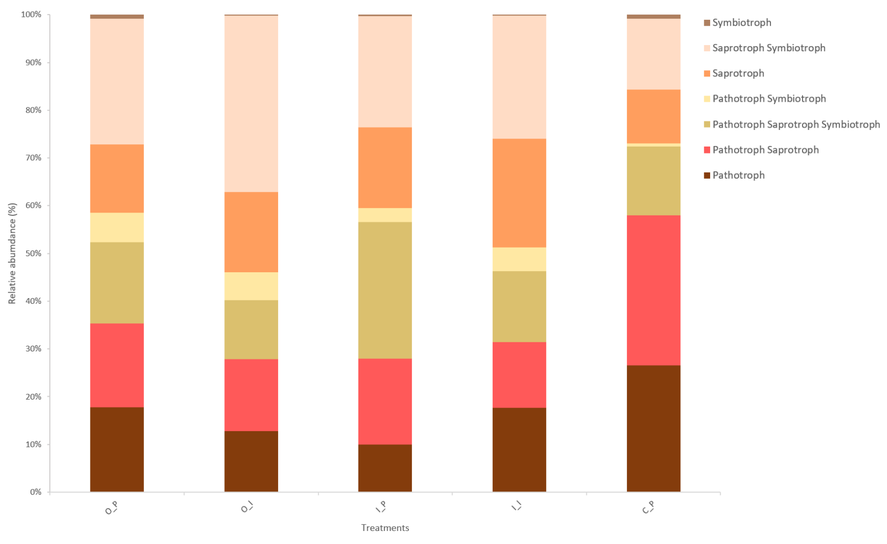
INTRODUCTION

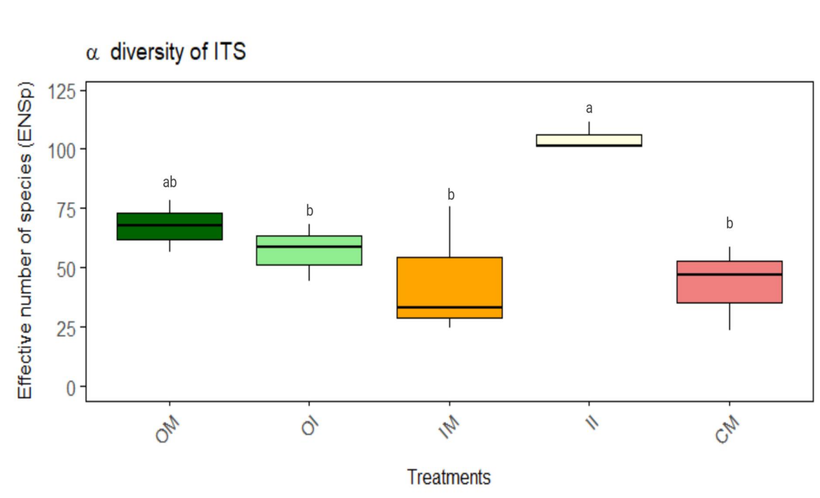
- Modern agriculture is facing scrutiny due to its adverse impacts on public health and the environment.
- Need to shift towards a more sustainable model incorporating ecological principles and ecosystem services.
- Intercropping presents a promising strategy for sustainable agricultural intensification.
- A significant knowledge gap persists concerning the effects of different intercropping patterns on soil microbial communities, as existing studies have largely focused on a narrow set of systems.

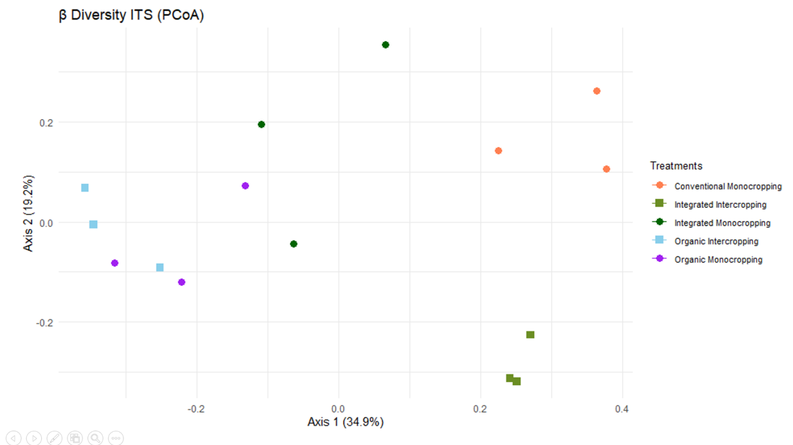
METHODS



RESULTS







- **Intercropping treatments** showed lower relative abundance of **pathotrophs and pathotroph-saprotrophs**, suggesting that **plant diversification suppresses potential fungal pathogens**.
- **II (Integrated Intercropping)** consistently promotes both **higher fungal diversity (α) and distinct community composition (β)**.
- **Monocropping systems (CM)** are associated with lower diversity and potentially **less beneficial fungal communities.**

CONCLUSION

- Results demonstrate that **diversification practices** and **reduced chemical inputs improve soil health** and **enhance fungal biodiversity.**
- **Organic farming** and **intercropping** boost **microbial diversity** and foster more efficient nutrient cycling.
- As further research continues, the goal is to **optimize farming practices**, improving **soil health** and **agricultural productivity** sustainably.

LEGUMINOSE
the way to a green transition
Funded by
the European Union
INSTYTUT AGROFIZYKI PAN

This study was supported in the frame of Horizon Europe Programme Grant agreement No. Project 101082289 — LEGUMINOSE