



DIVERFARMING

Soil microbial diversity and functional groups under pesticides in conventional and organic farms. Past and present traces.

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Inside the framework of the EU 2020 Diverfarming project



**Crop diversification and low-input farming across Europe:
from practitioners' engagement and ecosystems services
to increased revenues and value chain organisation**



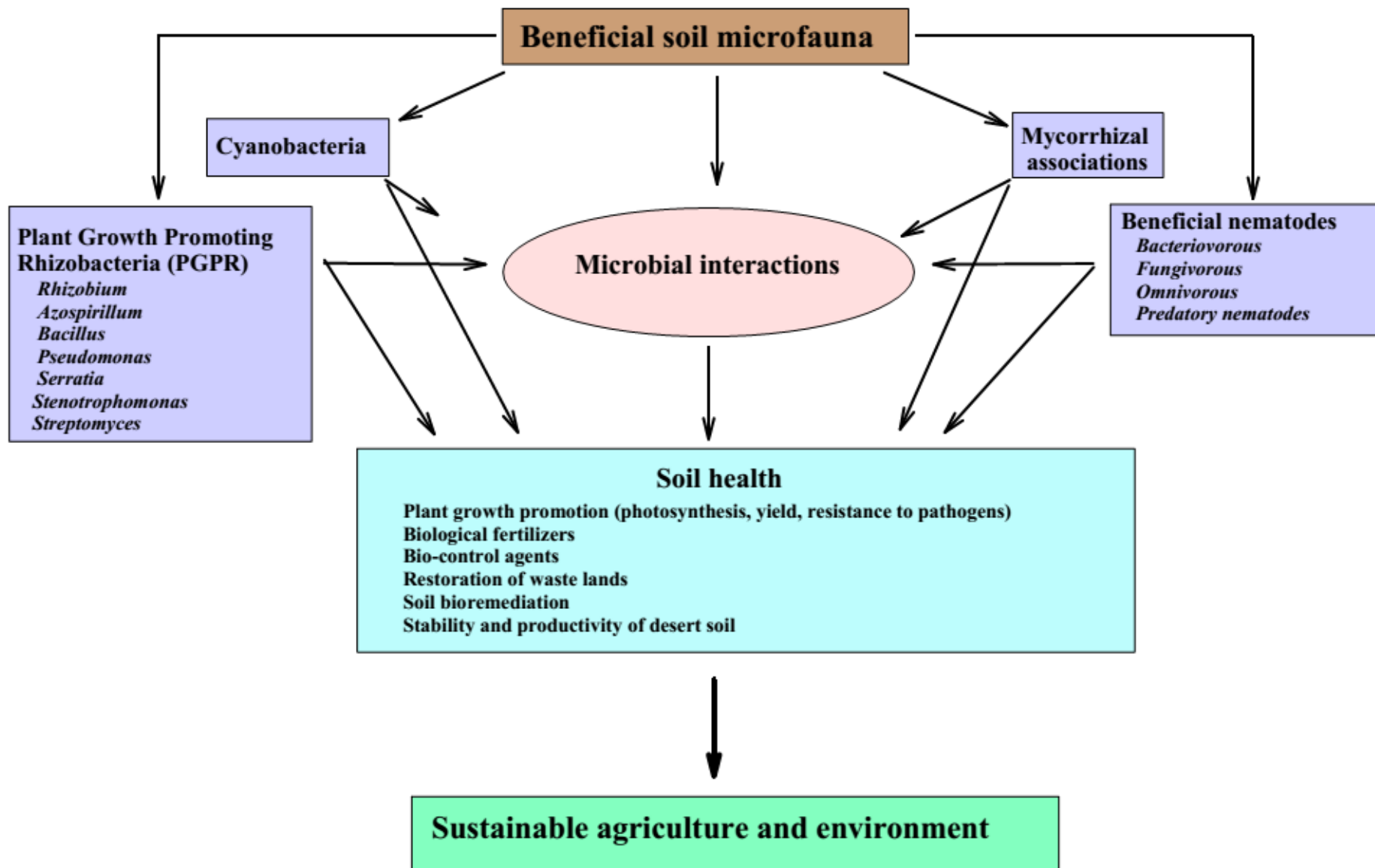
In the Netherlands...

Main Farmers concerns

- Plant diseases (Potato crops)
- Unknown pesticide residues in soils



Soil health?



According to Singh et al. 2011, and modified by Tahat et al. 2020

Objectives

- i) assesing soil pesticide residues content
- ii) identifying relationships between pesticide residues/ microbiome abundance/diversity, pathogenes/benefitials

The study was done at...



The Netherlands

oil samples for pesticides and microorganisms analysis were taken
from 12 farms

Sampling time: April 2018 before the application of agrochemicals



Experimental design

Mangement	Farm	Crop type
conventional	F1-C	potatoes
conventional	F2+M-C _(T5)	potatoes
conventional	F2+NM-C _(T6)	potatoes
organic	F3+10-O _(T3)	potatoes
organic	F3+20-O _(T4)	potatoes
conventional	F4-C	potatoes
conventional	F5-C	potatoes
organic	F6-O _(T1)	fodder
conventional	F7-C	potatoes
conventional	F8-C	potatoes
conventional	F9-C	potatoes
conventional	F10-C	potatoes
conventional	F11-C	potatoes
conventional	F12-C _(T2)	fodder

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farms



samples per farm for microorganisms analysis
samples per farm for pesticides analysis



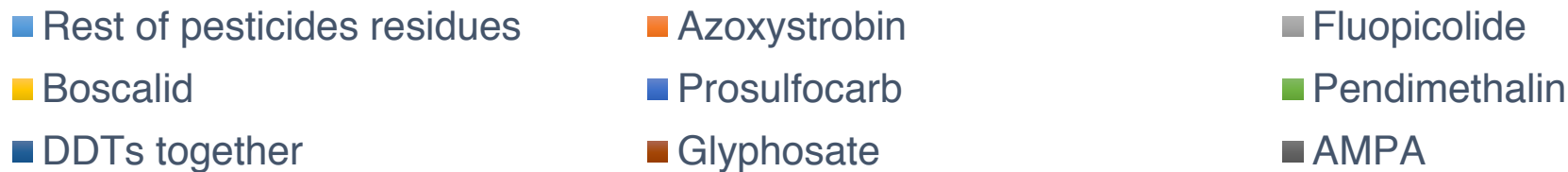
Results...

Pesticides number per farm

Mangement	Farm	No. compounds	No. pesticides
conventional	F1-C	11	10
conventional	F2+M-C	10	9
conventional	F2+NM-C	7	6
organic	F3+10-O	5	5
organic	F3+20-O	7	7
conventional	F4-C	12	11
conventional	F5-C	12	11
organic	F6-G	5	3
conventional	F7-C	11	9
conventional	F8-C	8	7
conventional	F9-C	5	4
conventional	F10-C	12	10
conventional	F11-C	12	10
conventional	F12-C	4	3



Pesticides concentration per farm

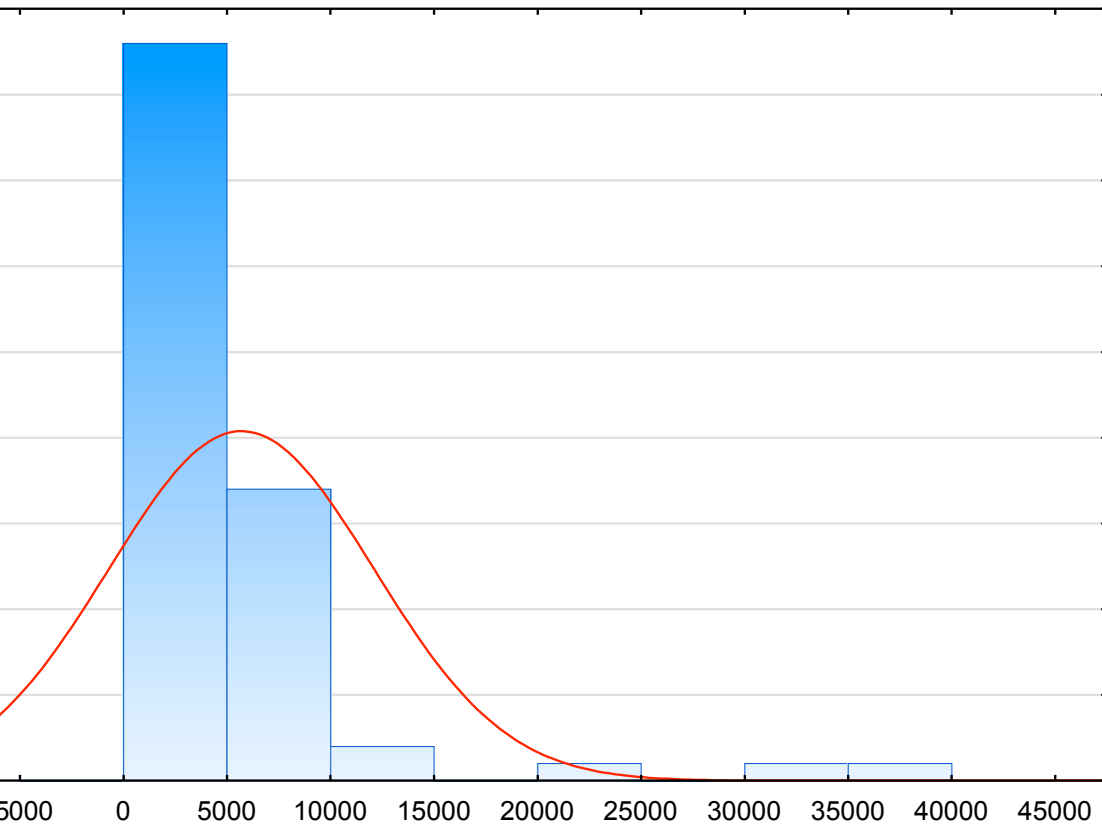




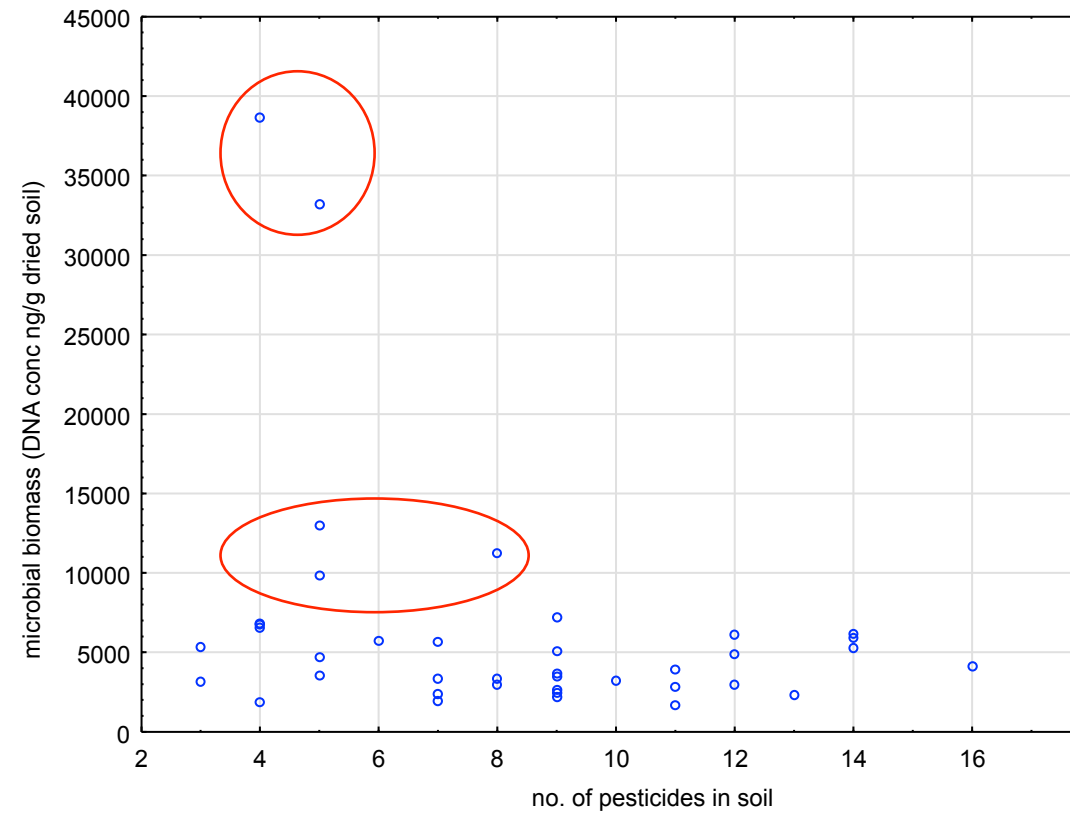
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Results...

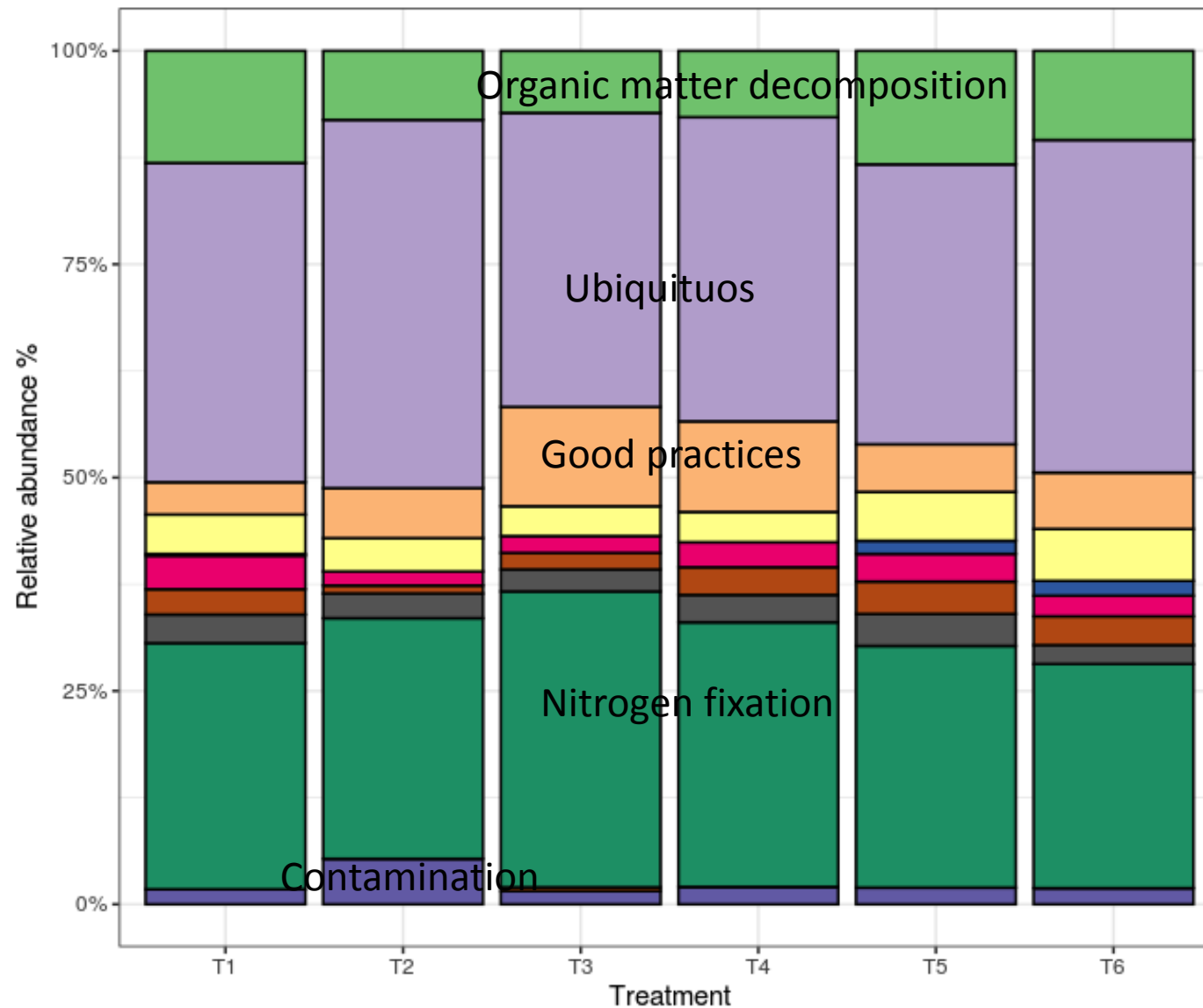
pesticides and microorganisms interactions...



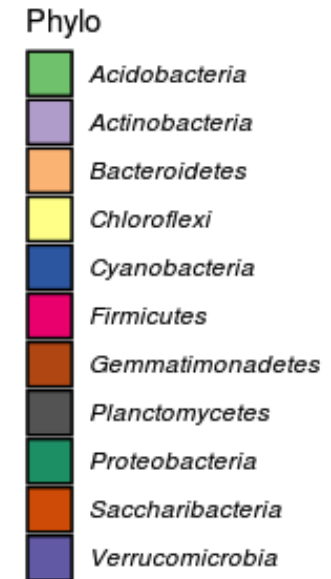
Microbial biomass (DNA Conc ng/g dried soil)



Results...



Bacteria diversity per farm

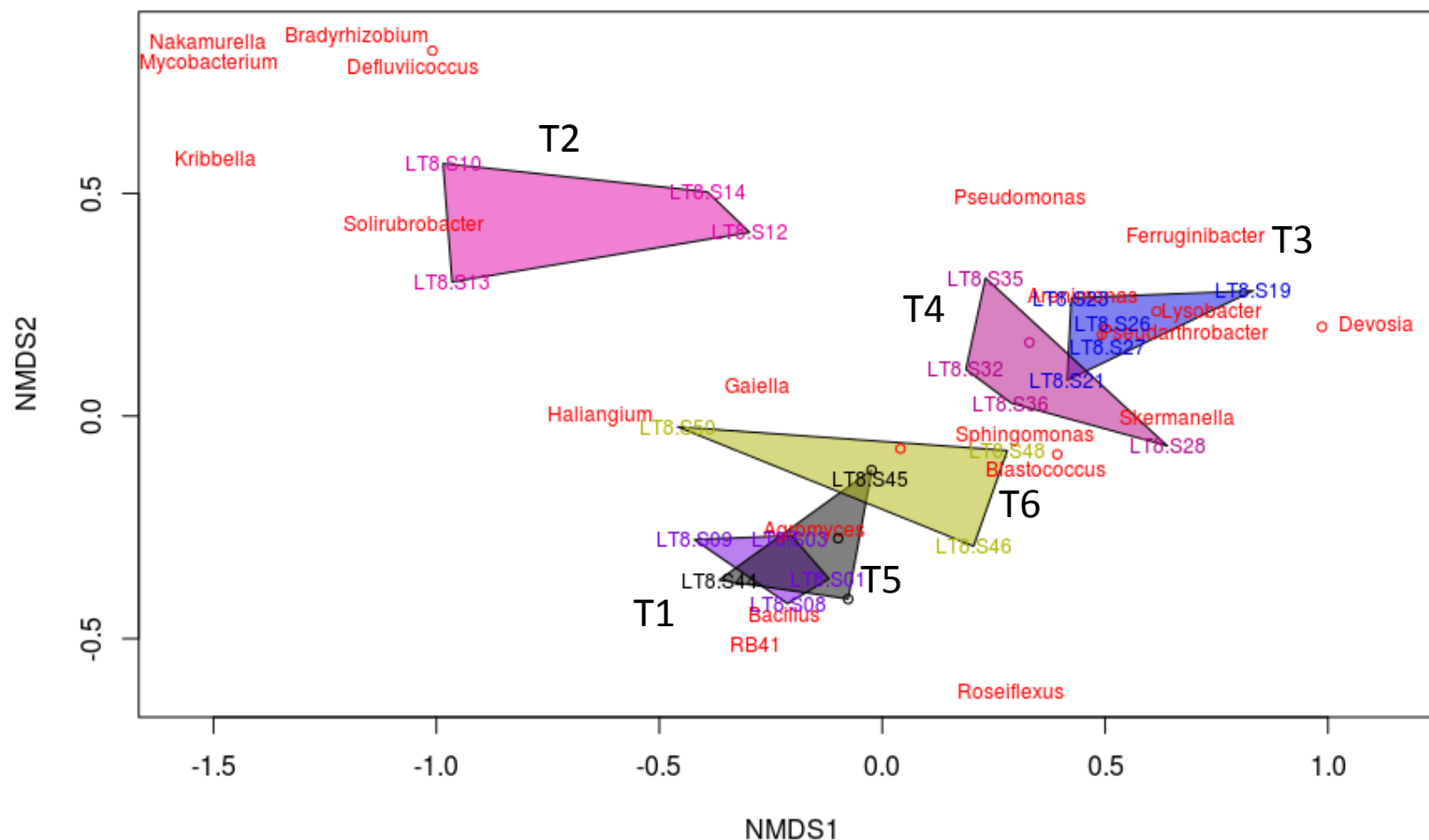


T3 & T4 organic farms with high diversification.



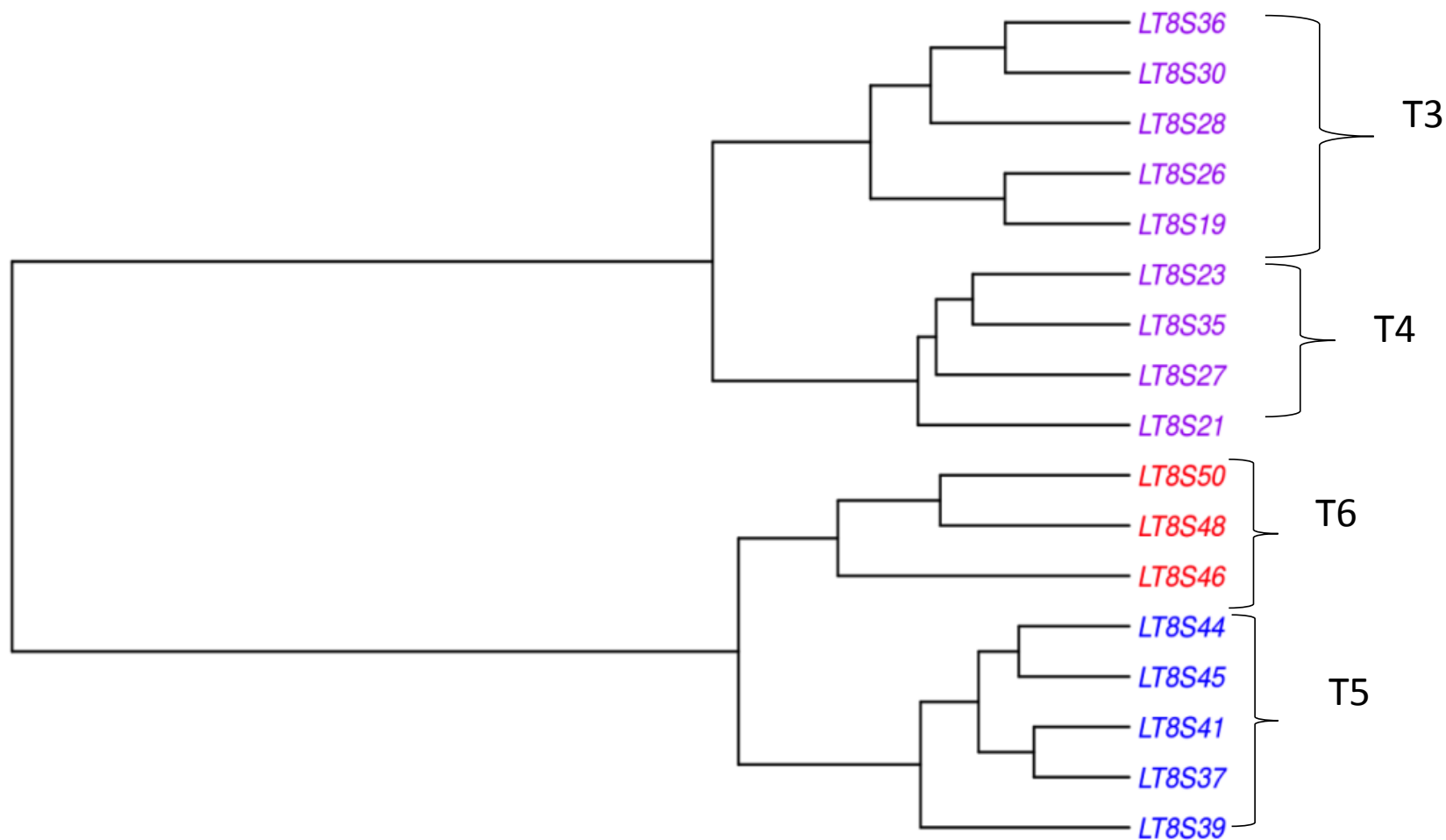
Results...

Bacteria diversity: similarity between the treatments



T3 & T4, organic farms with the highest diversification management

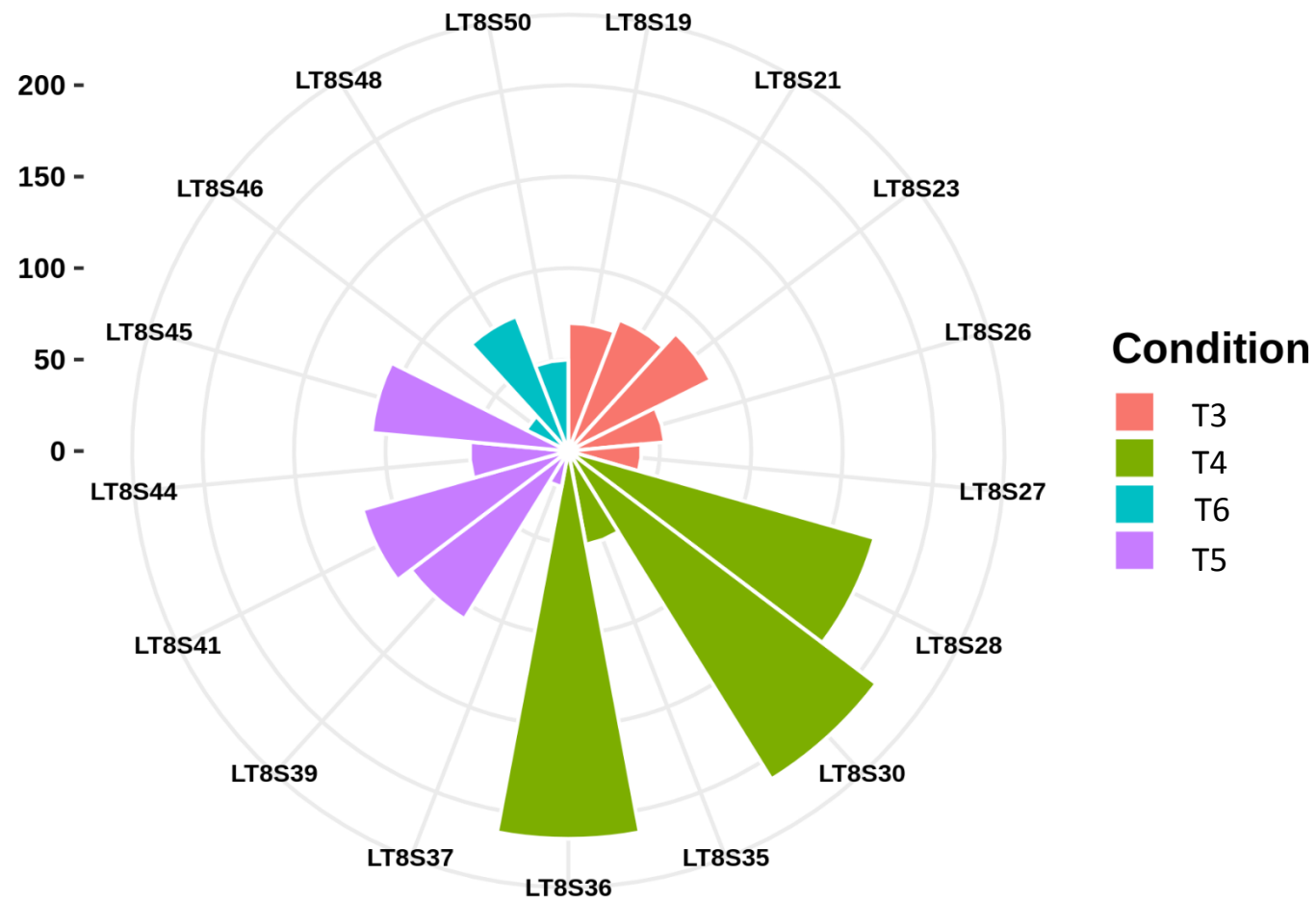
Results...



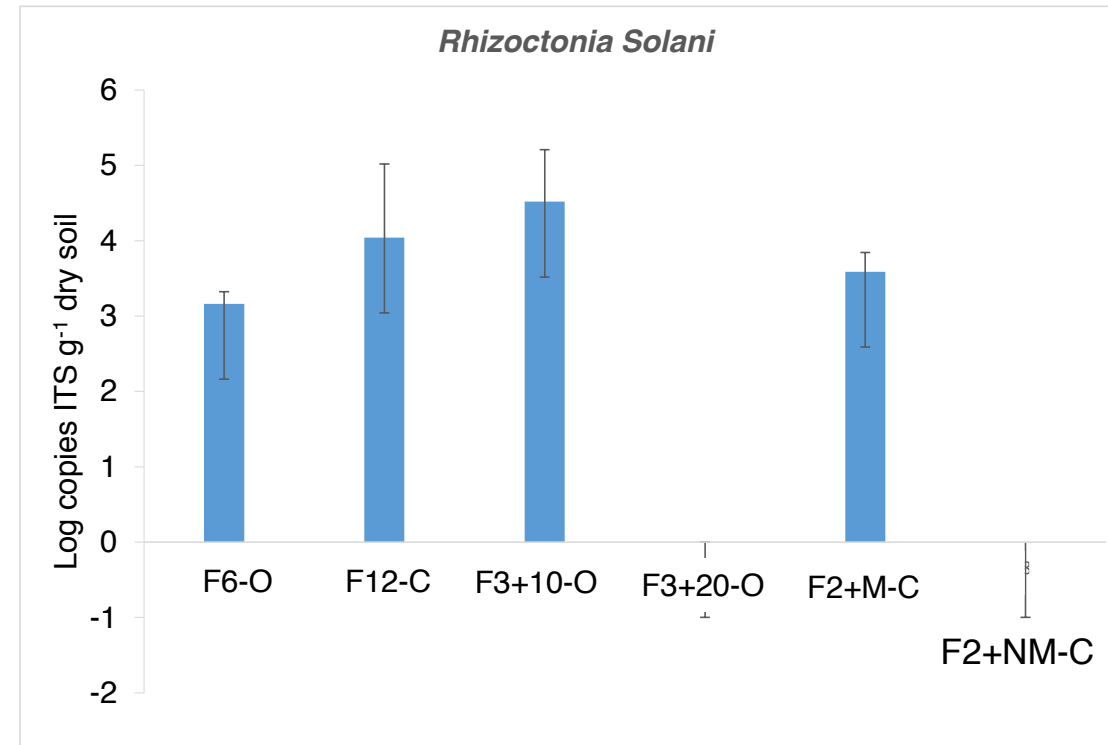
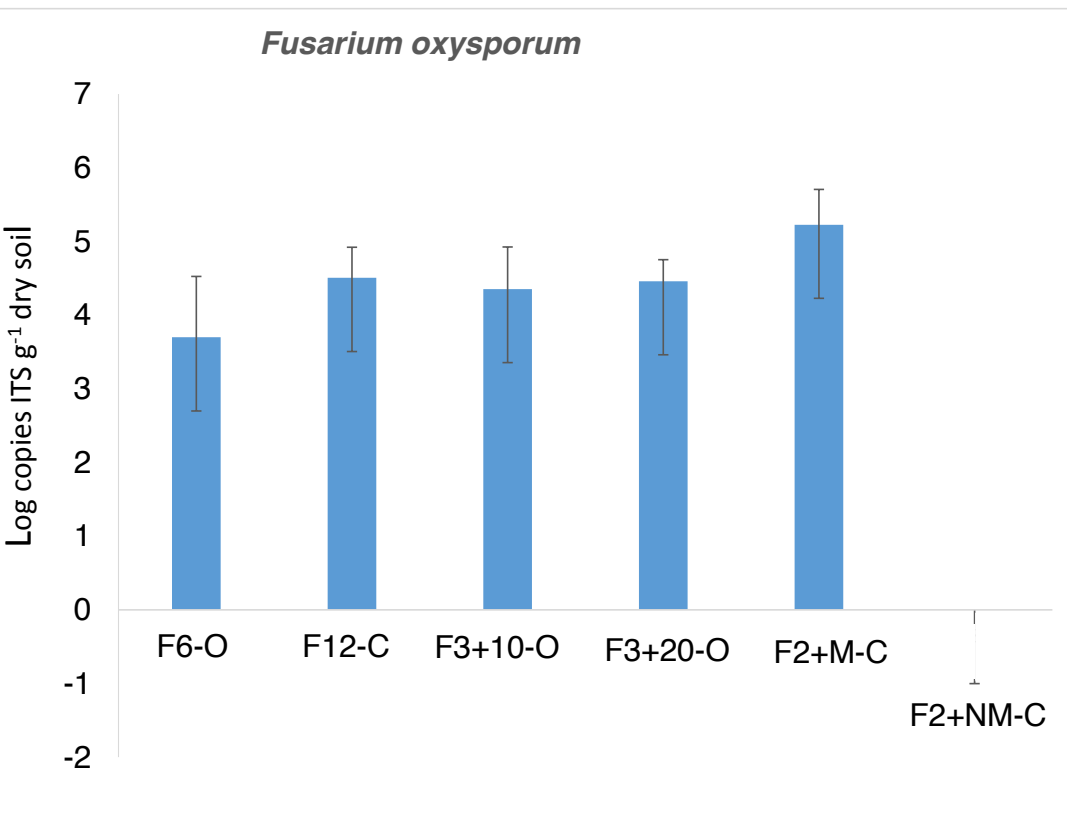
Fungi structure. Organic and more diversified crops (T3, & T4)
vs conventional and less diversified crops (T5 & T6)

Results...

Total mycorrhiza



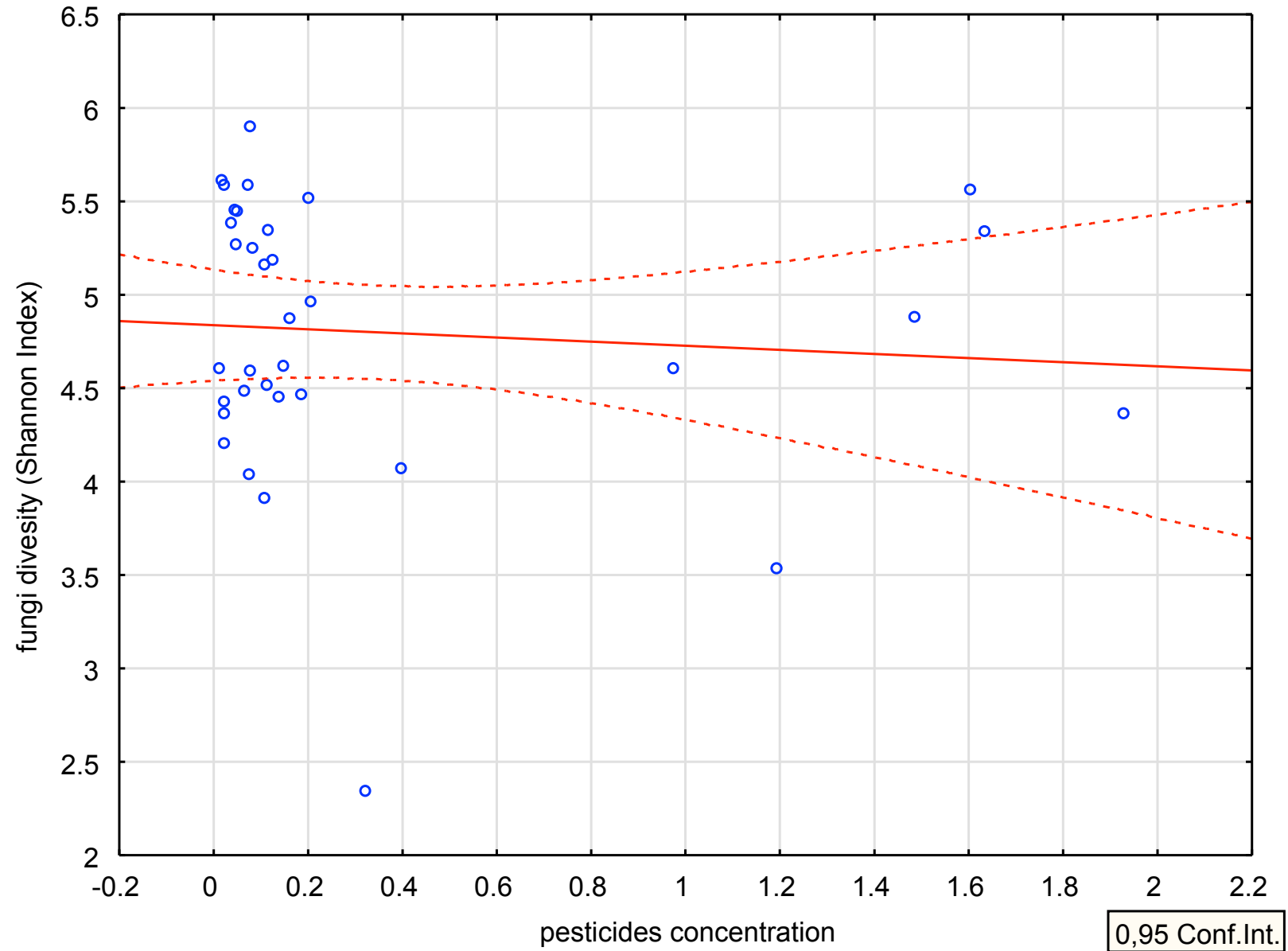
Results...



Fusarium oxysporum & *Rhizoctonia solani* (**pathogen fungi**)
distribution along organic (F6-O, F3+10-O, F3+20-O)
and conventional (F12-C, F2+NM-C, F2+NM-C) LT8 case studies

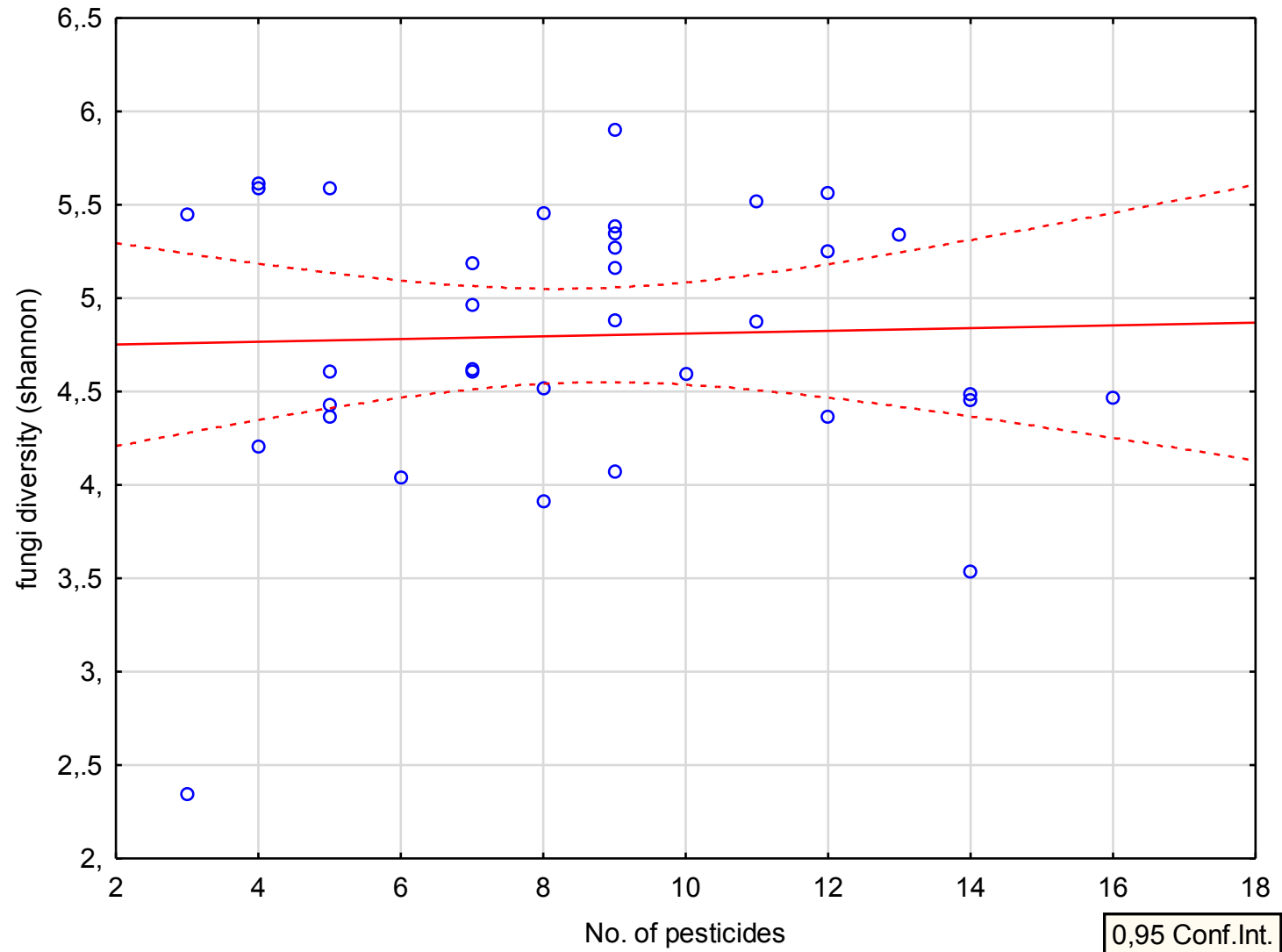
Results...

Pesticides and fungi interactions...



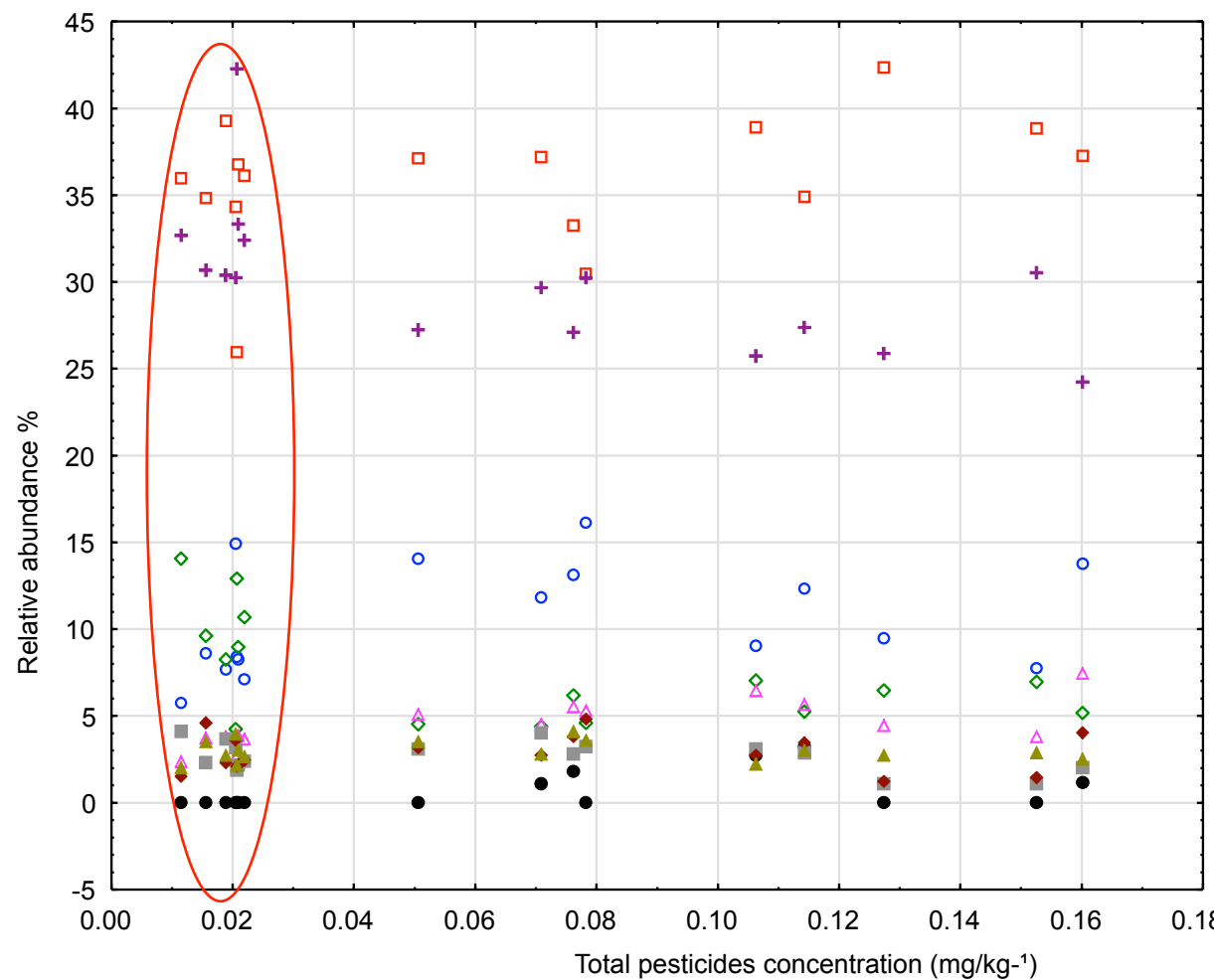
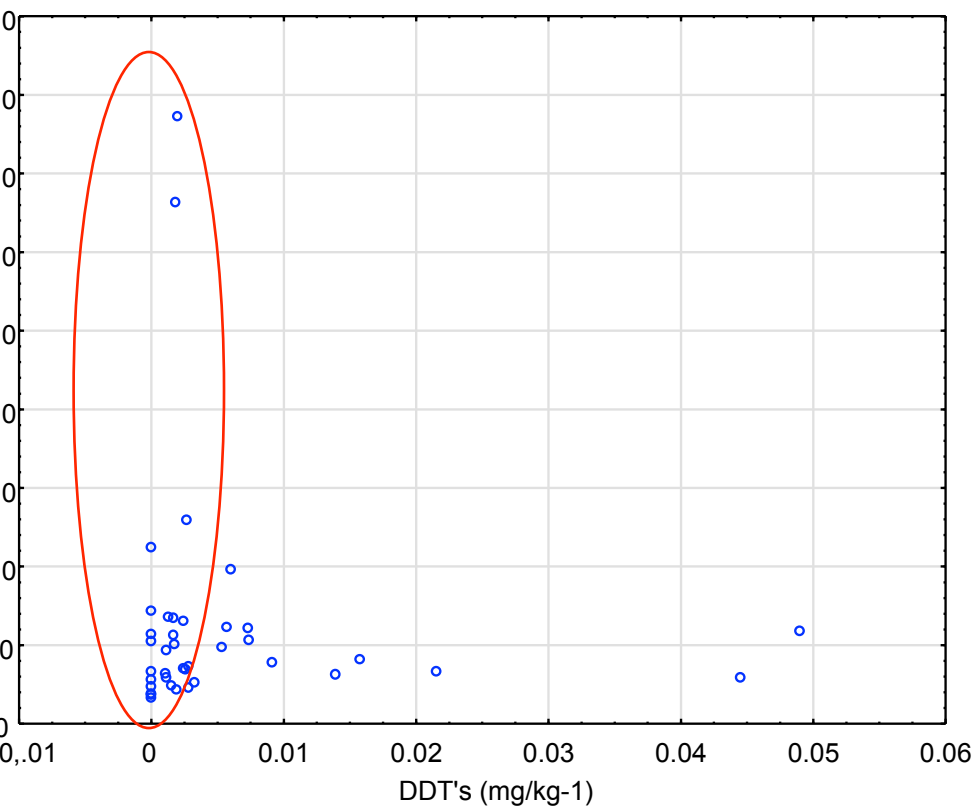
Results...

Pesticides and fungi interactions...



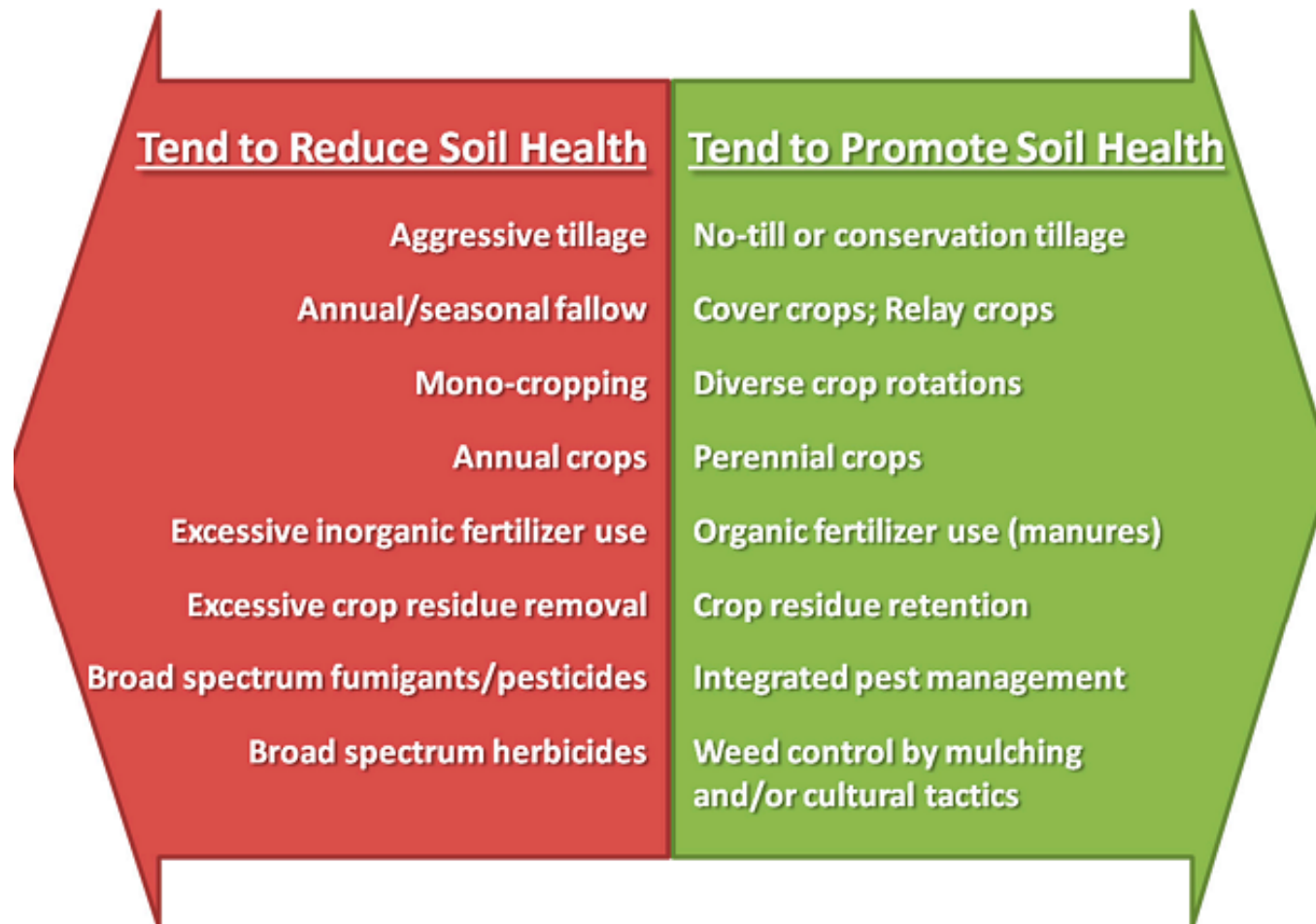
Results...

Pesticides and microbiology interactions...



5. Acidobacteria, 6. Actinobacteria, 7. Bacteroidetes, 8. Chloroflexi, 9. Cyanobacteria, 10. Firmicutes, 11. Gemmatimonadetes, 12. Planctomycetes, 13. Proteobacteria

Soil health and soil management



According to Lehman et al. 2015



Conclusions

Multiple pesticide residues detected in soils.

Organic farms with lower content than conventional.

Pesticides relation with microbiome needs more investigation.



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Thank you

