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# Earthworms and microbial diversity under conventional and organic farms. Interaction with actual and inherited pesticides

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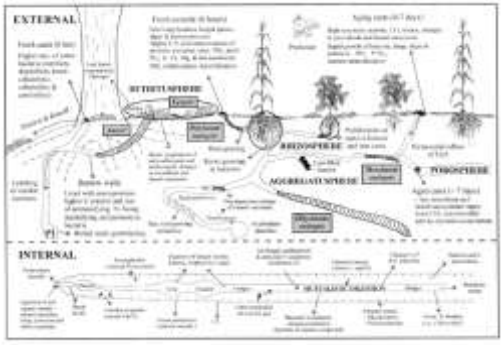
# Earthworms...

- Earthworms as indicators of soil quality (Bartz et al. 2013)
- promoters of several soil ecosystem services, (Blouin et al. 2013)
- impeccably reflect what occurs aboveground




Brown et al 2000

# Soil microorganisms

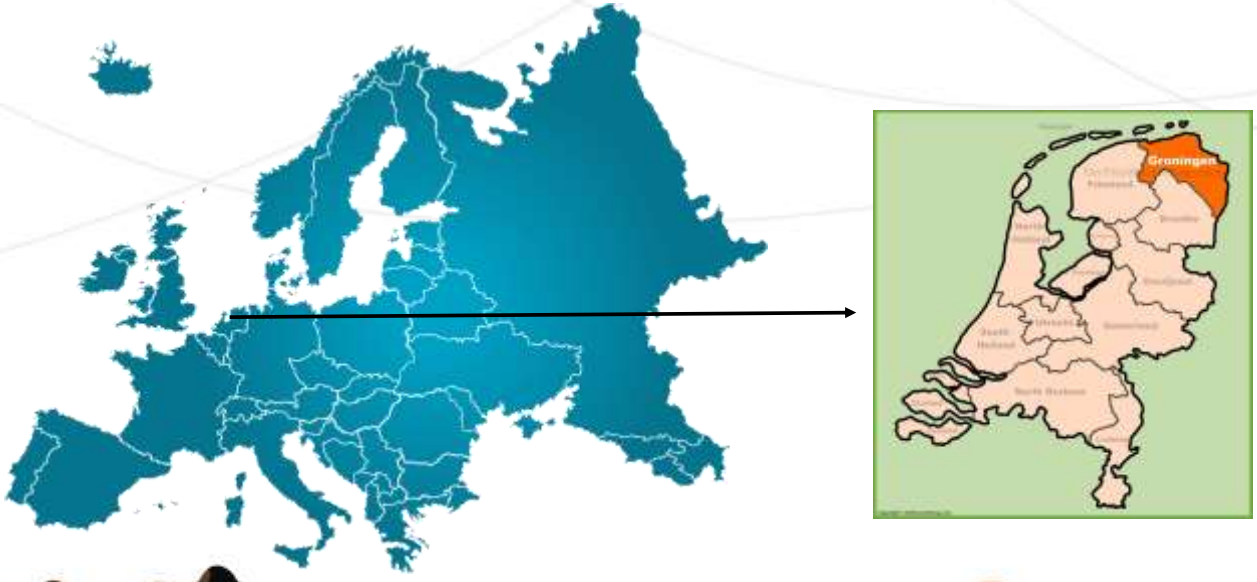
- responsible of different biogeochemical process
- interact as the earthworms with the actual and inherited soil conditions
- Among them pesticides

# Diverfarming & aim

- H2020 project
- enhances soil quality through plant diversification and rotation.
- Aim  at assessing earthworms and soil microbial diversity
- as soil pesticide residues
- in long term diverfarming farms

# Material and methods

- Sampling area Groningen, the Netherlands
- April 2018 before agrochemicals application



# Material and methods

| Mangement | Farm | Crop type |
|---|---|---|
| conventional | F1-C | potatoes |
| conventional | F2+M-C | potatoes |
| conventional | F2+NM-C | potatoes |
| organic | F3+10-O | potatoes |
| organic | F3+20-O | potatoes |
| conventional | F4-C | potatoes |
| conventional | F5-C | potatoes |
| organic | F6-O | fodder |
| conventional | F7-C | potatoes |
| conventional | F8-C | potatoes |
| conventional | F9-C | potatoes |
| conventional | F10-C | potatoes |
| conventional | F11-C | potatoes |
| conventional | F12-C | fodder |

12 farms

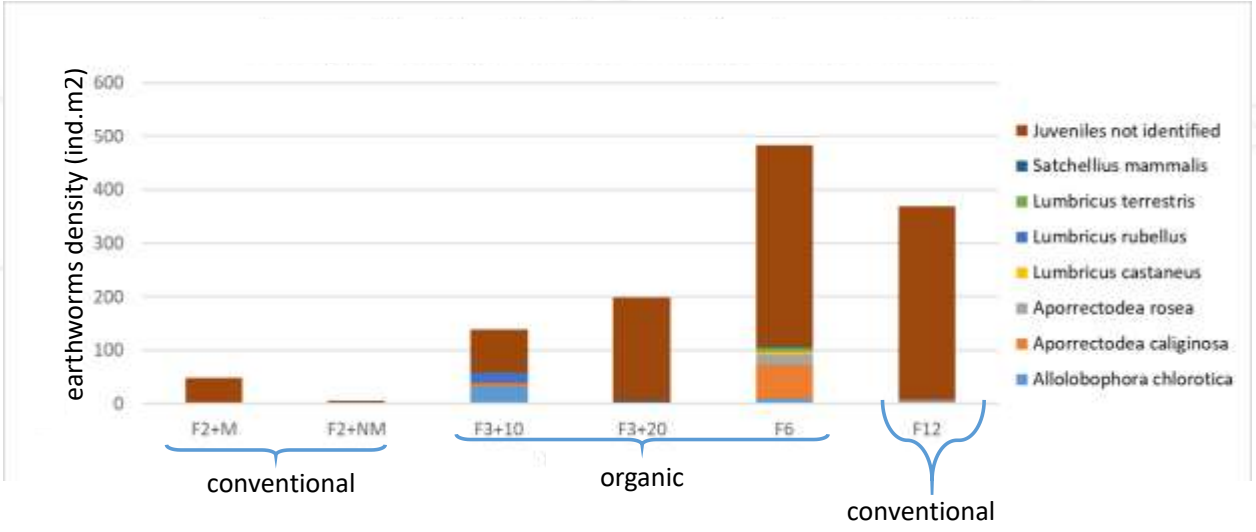
- 5 samples per farm for microorganisms analysis
- 3 samples per farm for pesticides analysis

  - Soil physicochemical characteristics, earthworms and soil microorganisms, quantified and identified by Diverfarming handbook

  - Pesticides determination by LC-MS/MS (Anastassiades et al. 2003, Mol et al. 2008 and Yang, 2016)

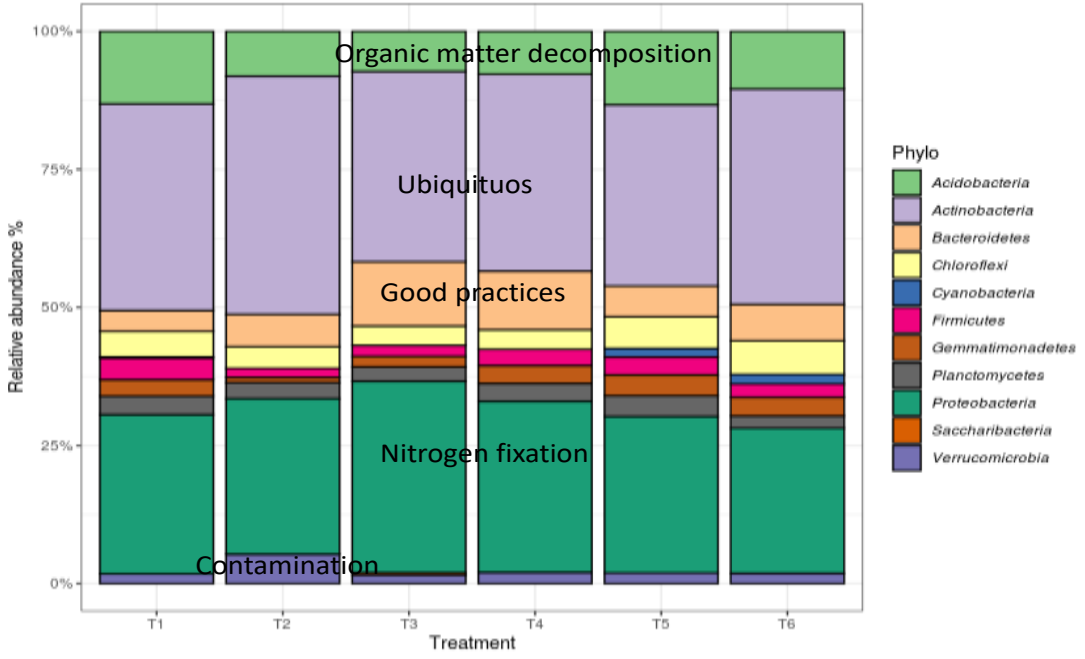
# Results

- Organic farms had significantly the highest earthworm's diversity



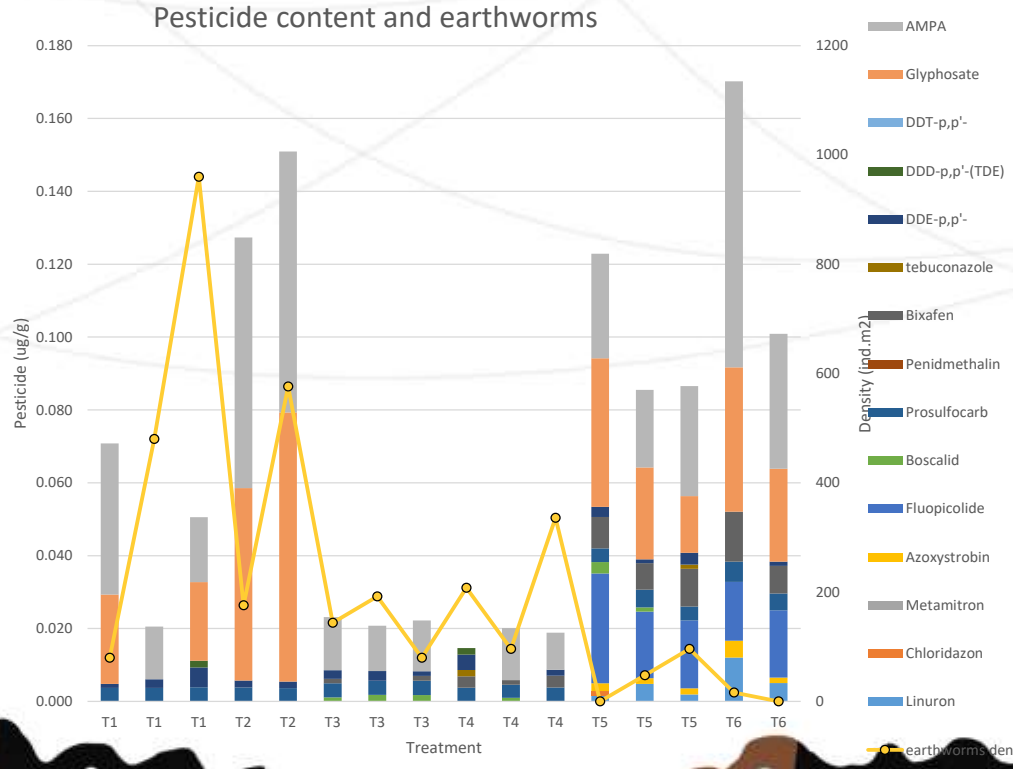
# Results

- Organic farms had the highest content of beneficial microorganisms

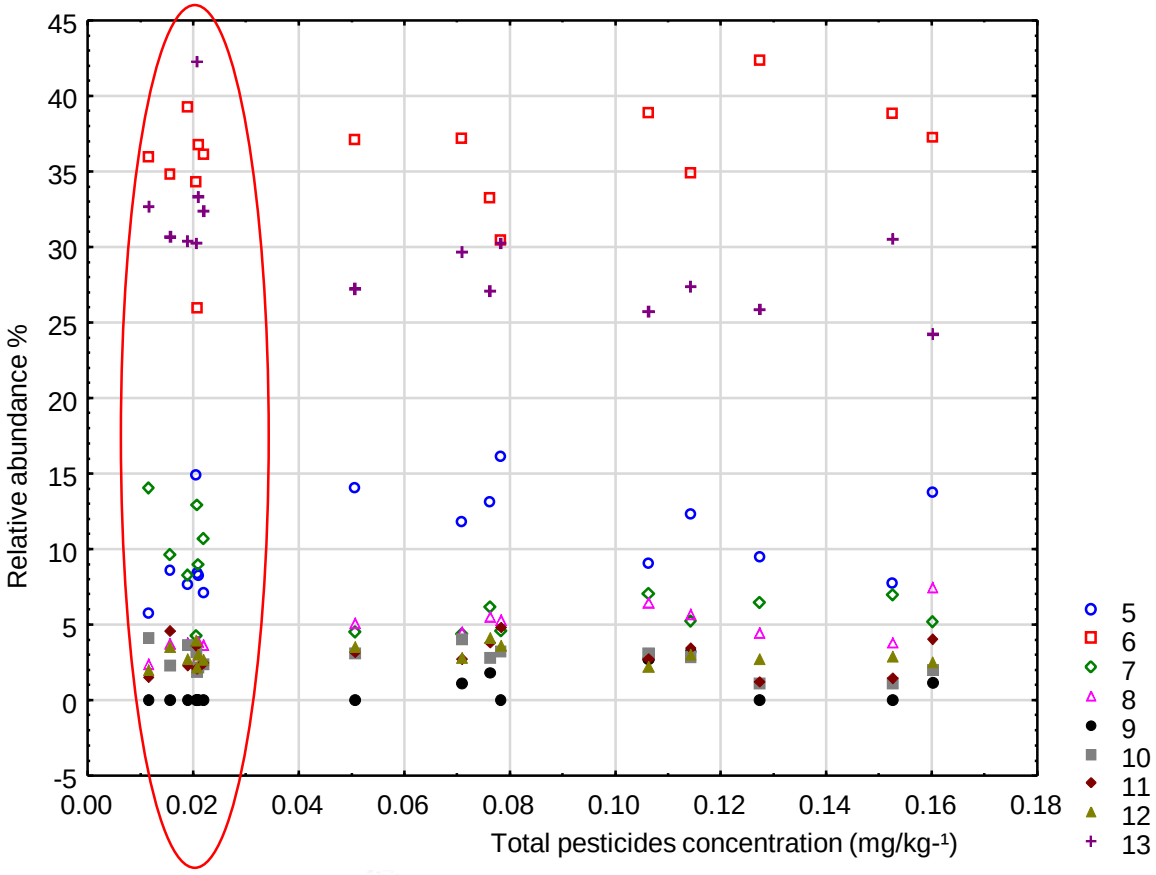


# Results

- Seventeen pesticides residues
- DDT, Prosulfocarb and AMPA (first metabolite of glyphosate) present in all farms



# Results



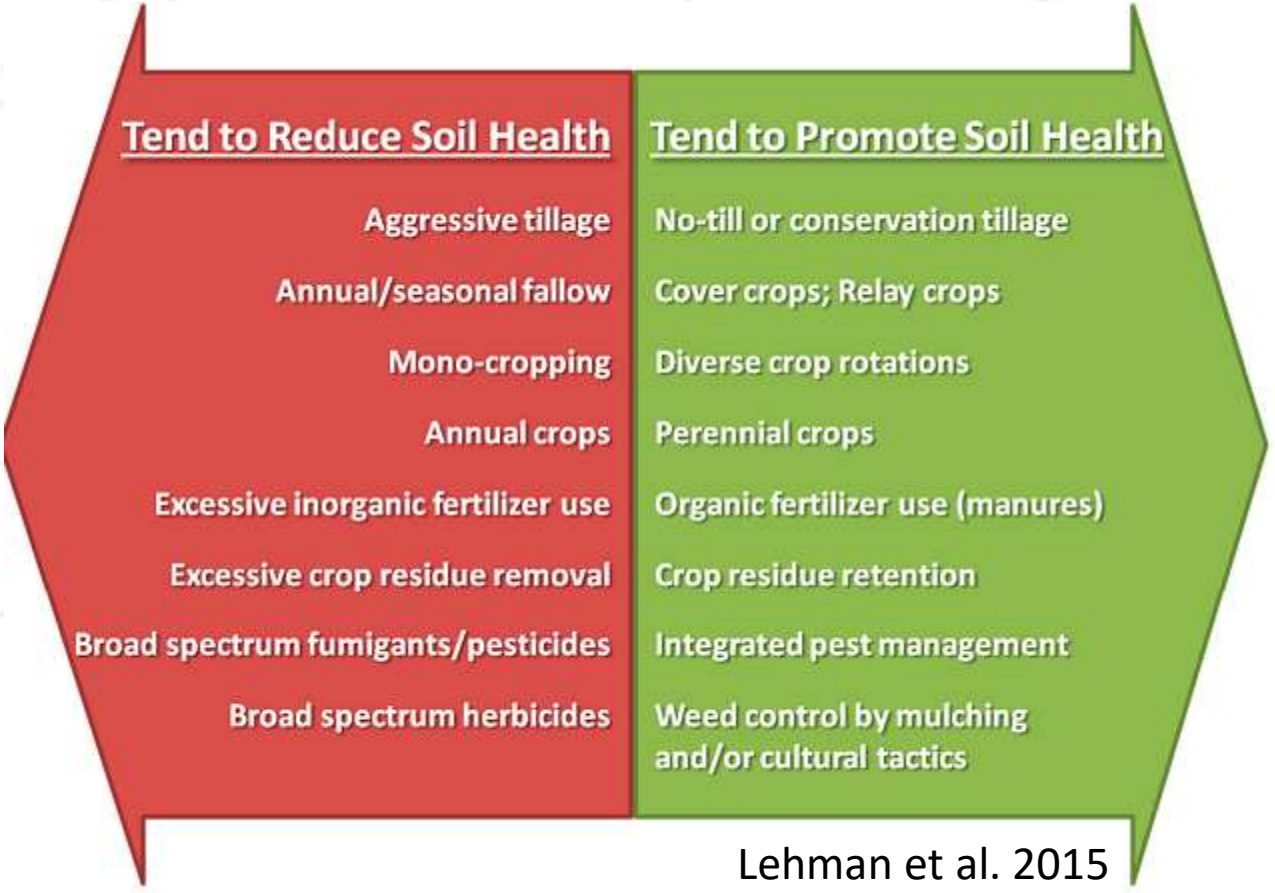

5.Acidobacteria, 6.Actinobacteria, 7.Bacteroidetes, 8. Chloroflexi, 9.Cyanobacteria, 10. Firmicutes 11.Gemmatimonadetes, 12. Planctomycetes, 13. Proteobacteria

# Discussion

- Earthworms and microorganisms diversity are clearly influenced by actual and inherited pesticides.

- when stress factors are present, their biomass, abundance and diversity may decrease (Kammenga et al. 2001)

# Discussion




Lehman et al. 2015

# Thank you for your attention