From soil biological fertility to potato health

How to assess soil biological quality?

Puech C.¹, Bouchek K.¹, **Kröner A.**¹, Béduneau F.¹, Maestrali M.¹, Andrivon D.², Pasco C.² ¹ FN3PT/inov3PT; ² INRAE UMR IGEPP; ³ INRAE UE La Motte





Soil community

- All organisms spending a part or their entire life in the soil
- Biodiversity reservoir: high biomass, high diversity, complex interactions
- Biological groups (classified by size, fauna only):

Macrofauna 2mm-50mm



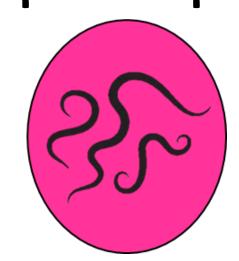
earthworms, carabid beetles, wireworms, etc.

Mesofauna 200μm-2mm



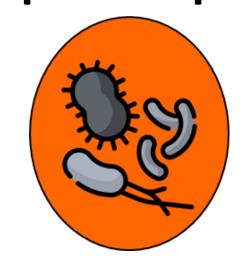
mites, springtails, etc.

Microfauna 5μm-200μm



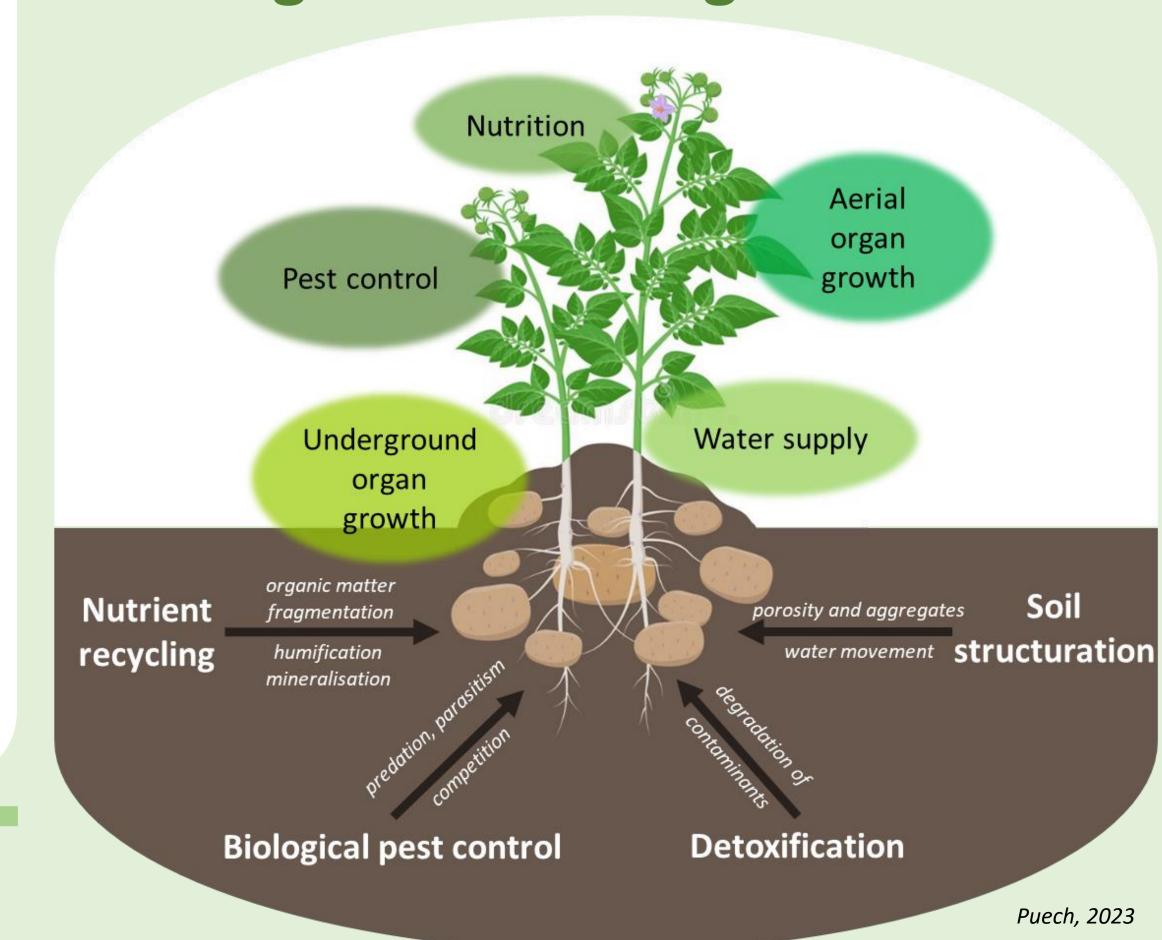
nematodes, protozoa, etc.

Micro-organisms 1μm-100μm



bacteria and fungi

→ A large set of ecological functions



Goals of this work

- To measure the effects of tillage on soil biological quality in a long-term experiment
- To identify unexpensive and simple methods for routine use in field trials and by producers

Which methods are used to assess soil biological quality

The underpants method



- To measure biological activity
- Cotton underpants are
- Organic matter degradation is estimated



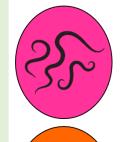
burried for 2 months



The tea bag & the bait lamina test

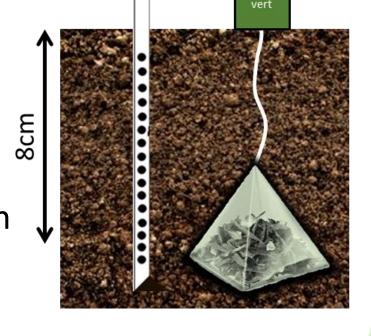


 To measure biological activity Tea bags and bait lamina



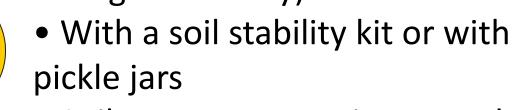
months Organic matter degradation is estimated at different depths

are burried for 3 weeks or 3



The slake test

• To measure soil structural stability (indirectly related to biological fertility)





• Soil aggregates are immersed in water and soil stability can be estimated



The earthworms spade test



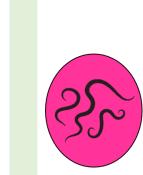
- To measure abundance, biomass and diversity of earthworms
- A 20*20*25cm soil sample is extracted and crumbled
- Earthworms are counted and identified



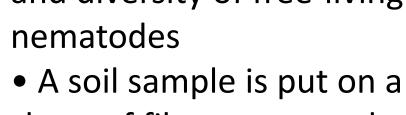
The pitfall trap

- To measure abundance and diversity of grounddwelling organisms
- A plastic pot is burried to capture organisms
- moving accross the soil Organisms are

identified with a binocular magnifier



• To measure abundance and diversity of free-living





 Nematodes swim through the filter paper and are extracted and counted

The Oostenbrink dish



+ Microbial analyses (made by a private laboratory): microbial biomass, carbon and nitrogen mineralisation potential, organic matter fractionation

When is soil biological quality assessed?

