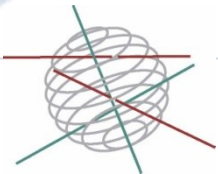


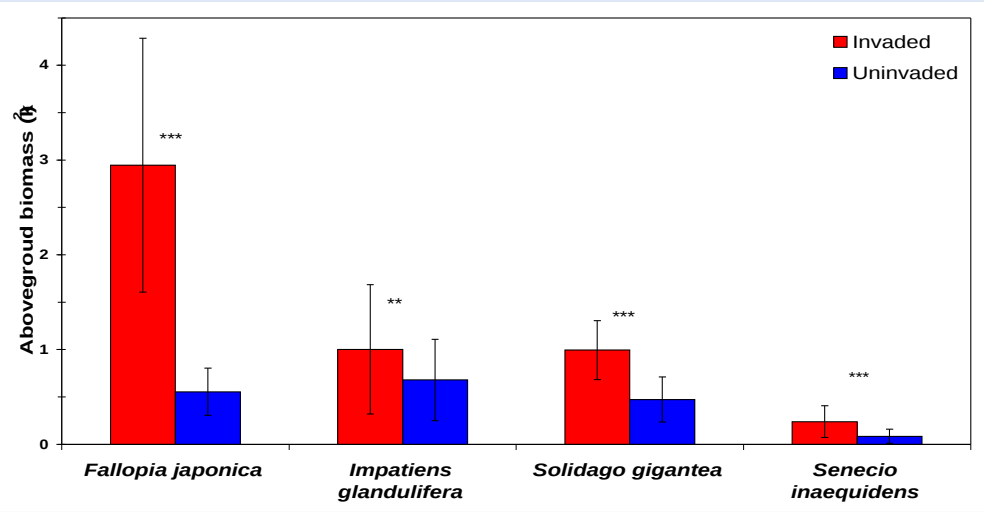
ALIEN IMPACT

4. Impact of *Fallopia spp.* on ecosystem functioning: Nitrogen and organic matter cycling and implicated soil biota

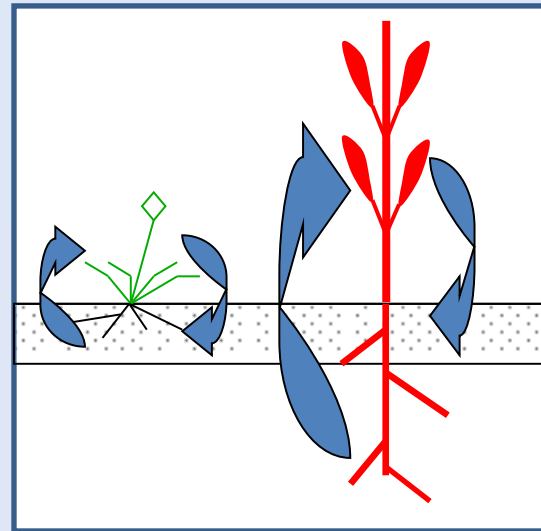
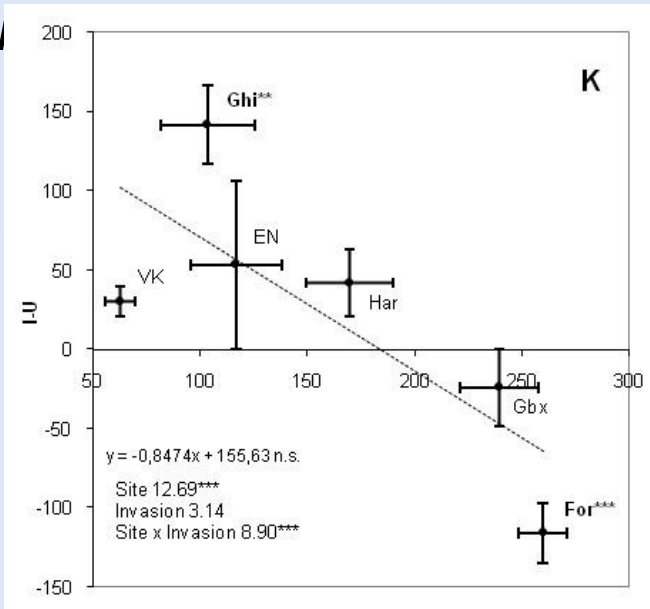
**N. Dassonville, B. Herpigny, S. Domken,
F. Poly, P. Meerts**



What we know (Results of INPLANBEL 2002-2006)



- Primary productivity increases considerably in sites invaded by *Fallopia japonica*



- *Fallopia* tends to increase nutrient availability in the topsoil by Nutrient uplift

- Nitrogen and soil organic matter ?

Methods

- Alien impact

- **Litter decomposition dynamics**

 - Litterbags (invasive and native litter in invaded and uninvaded environments)

- **Nitrogen fluxes** in the invaded ecosystem

 - Biomass harvest and N content analysis at key periods of the plant life cycle

- **Impact on soil fauna**

 - Berlese Tullgren

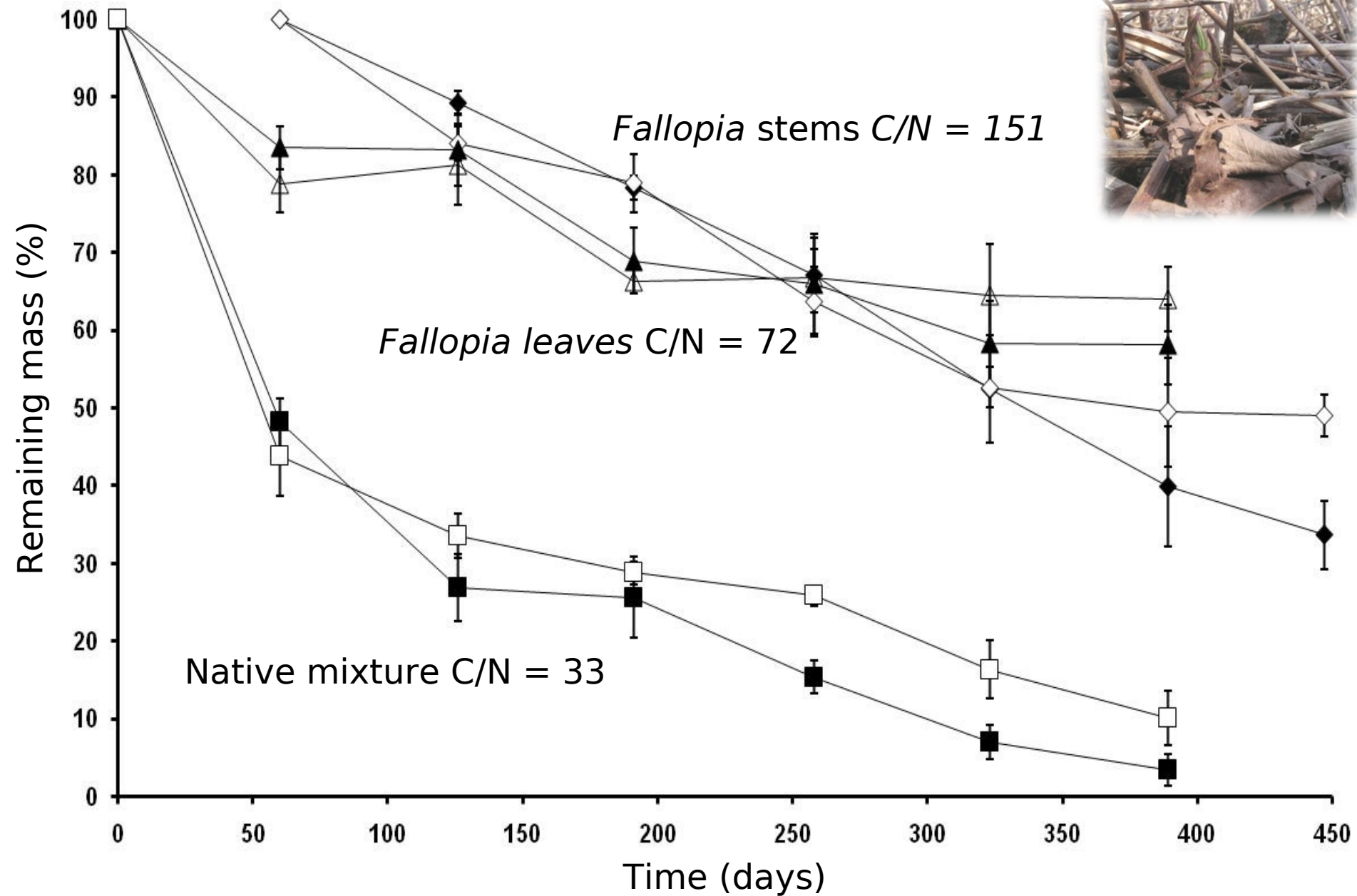
 - Pitfall traps

 - Earthworms extraction

- Collaboration with Lyon (Microbial ecology)

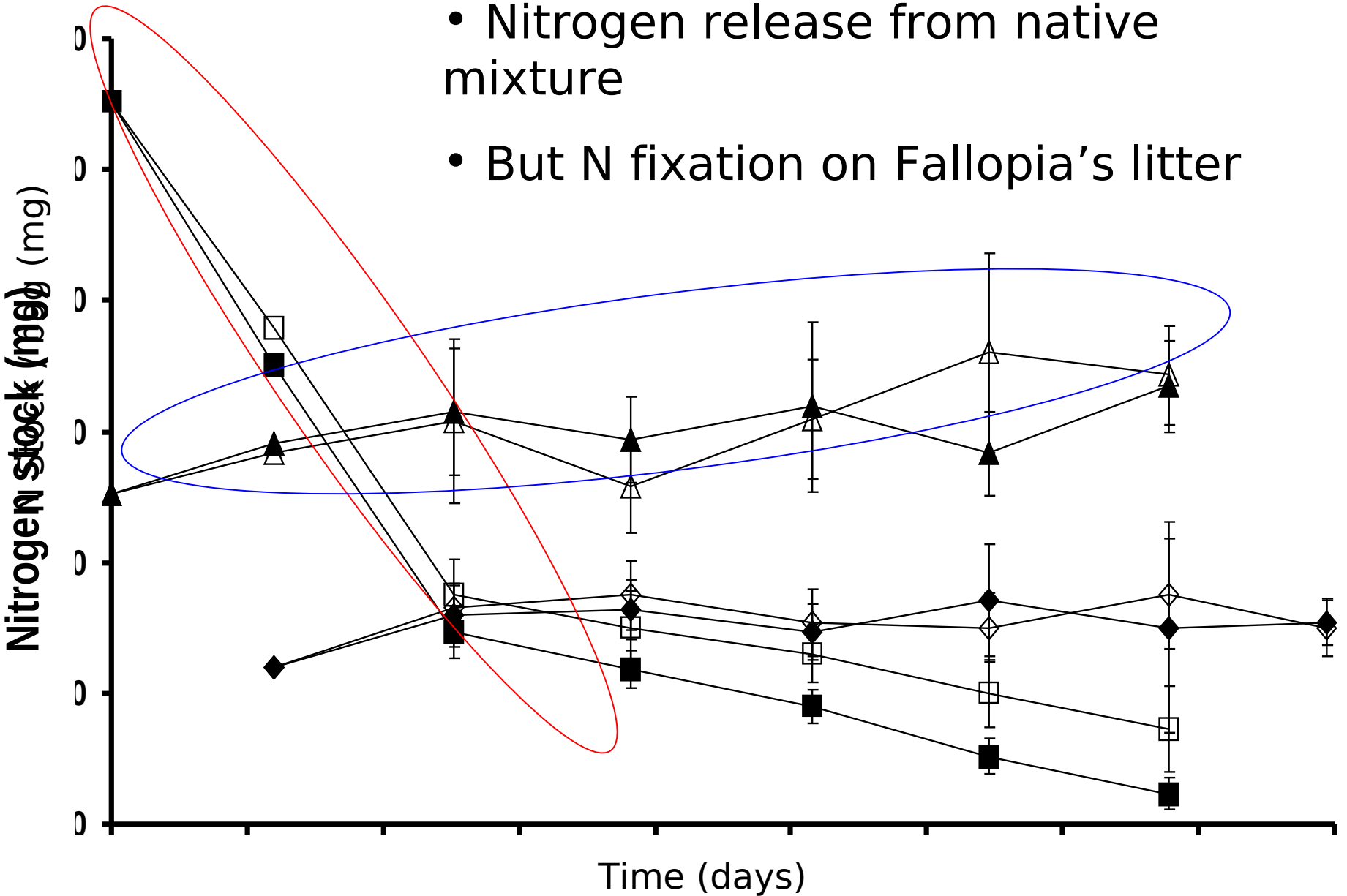
- Impact of *Fallopia* on potential **nitrification and denitrification** and on implicated **microbial communities structure**. → activity measures, quantitative PCR and DGGE

Litter decomposition

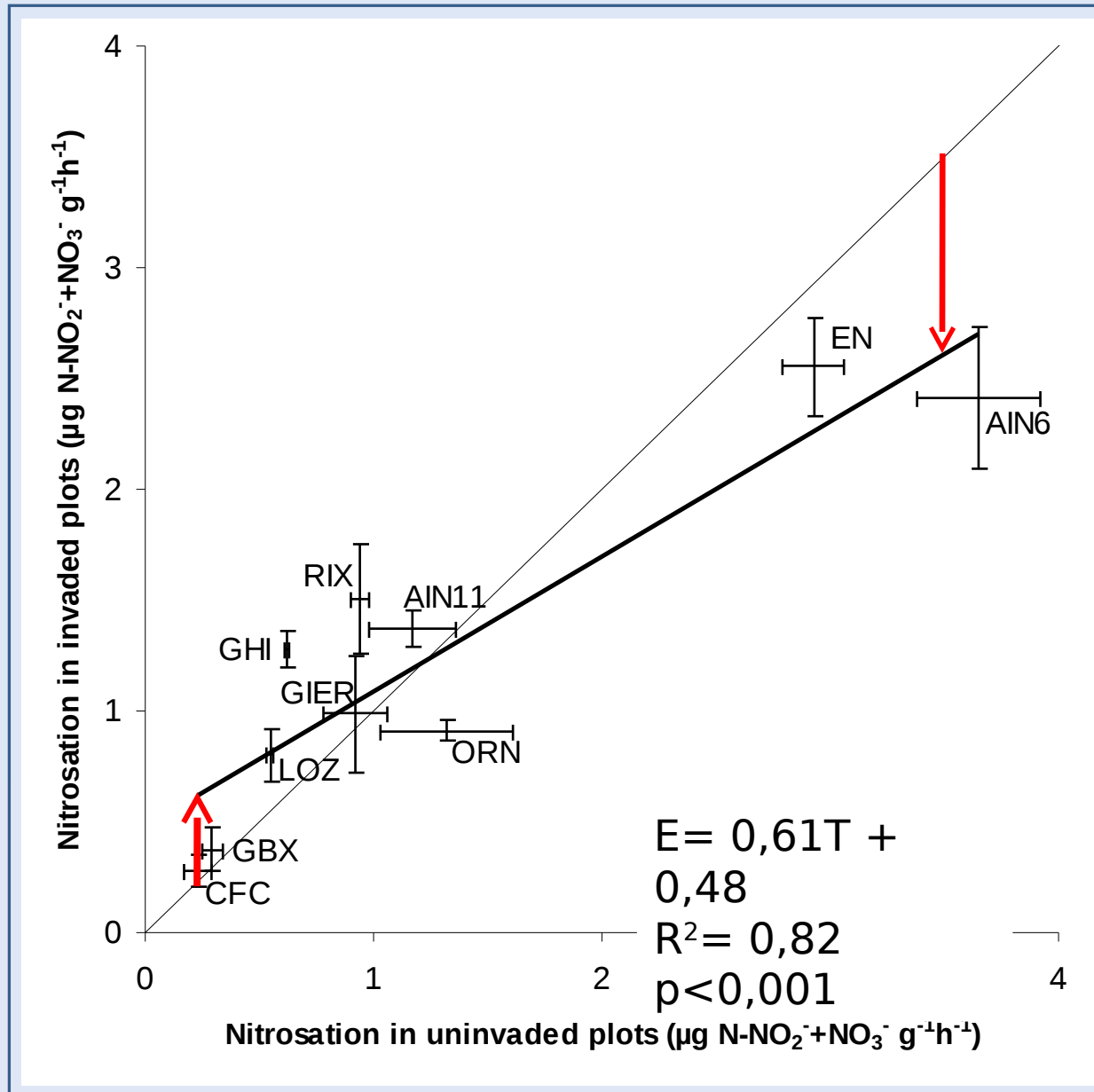


N dynamic during litter decomposition

- Nitrogen release from native mixture
- But N fixation on Fallopiia's litter

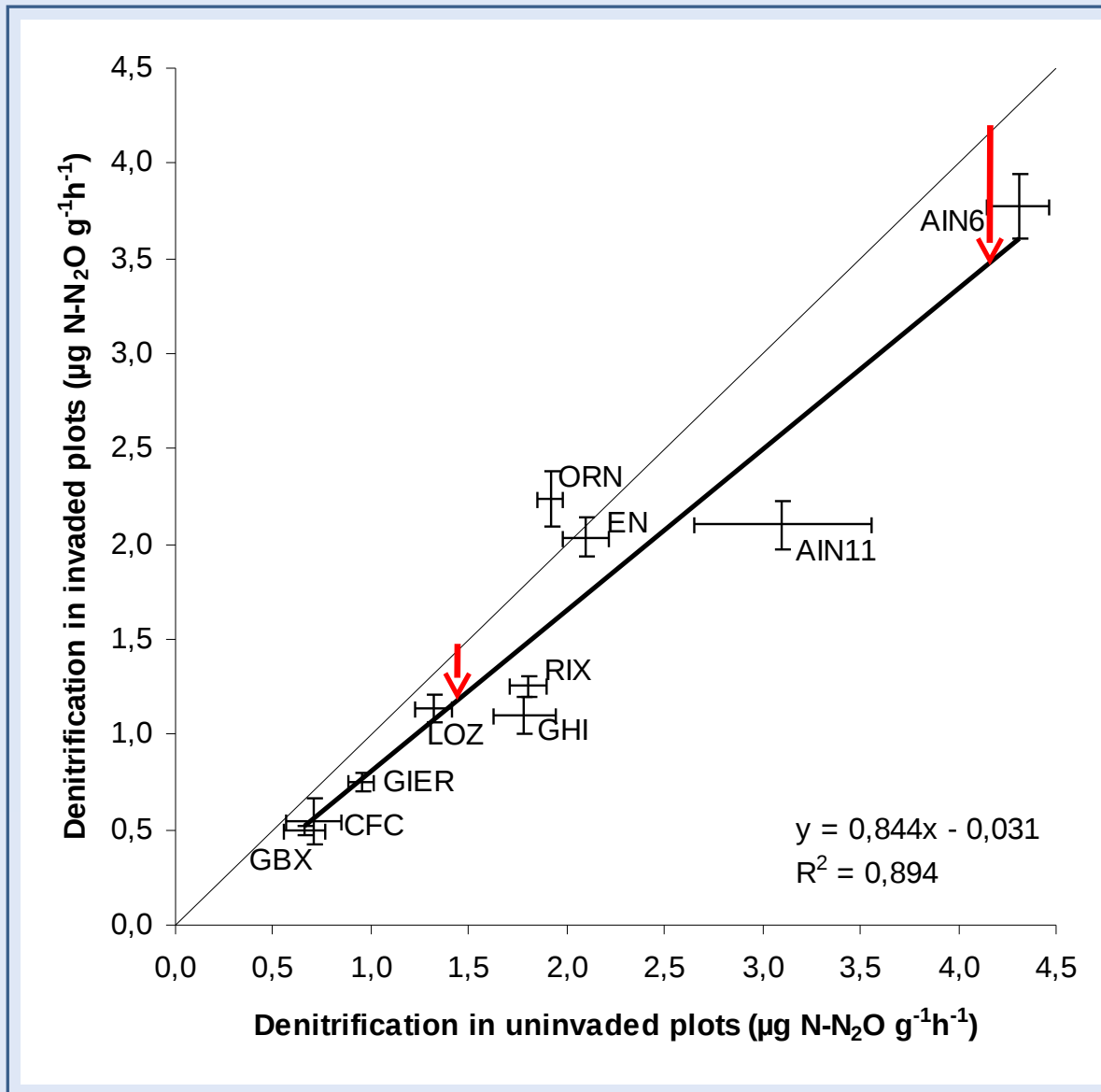


Potential nitrification



➔ Opposite effects at the two extremity of the fertility gradient

Potential denitrification



Denitrification decreases in invaded plots

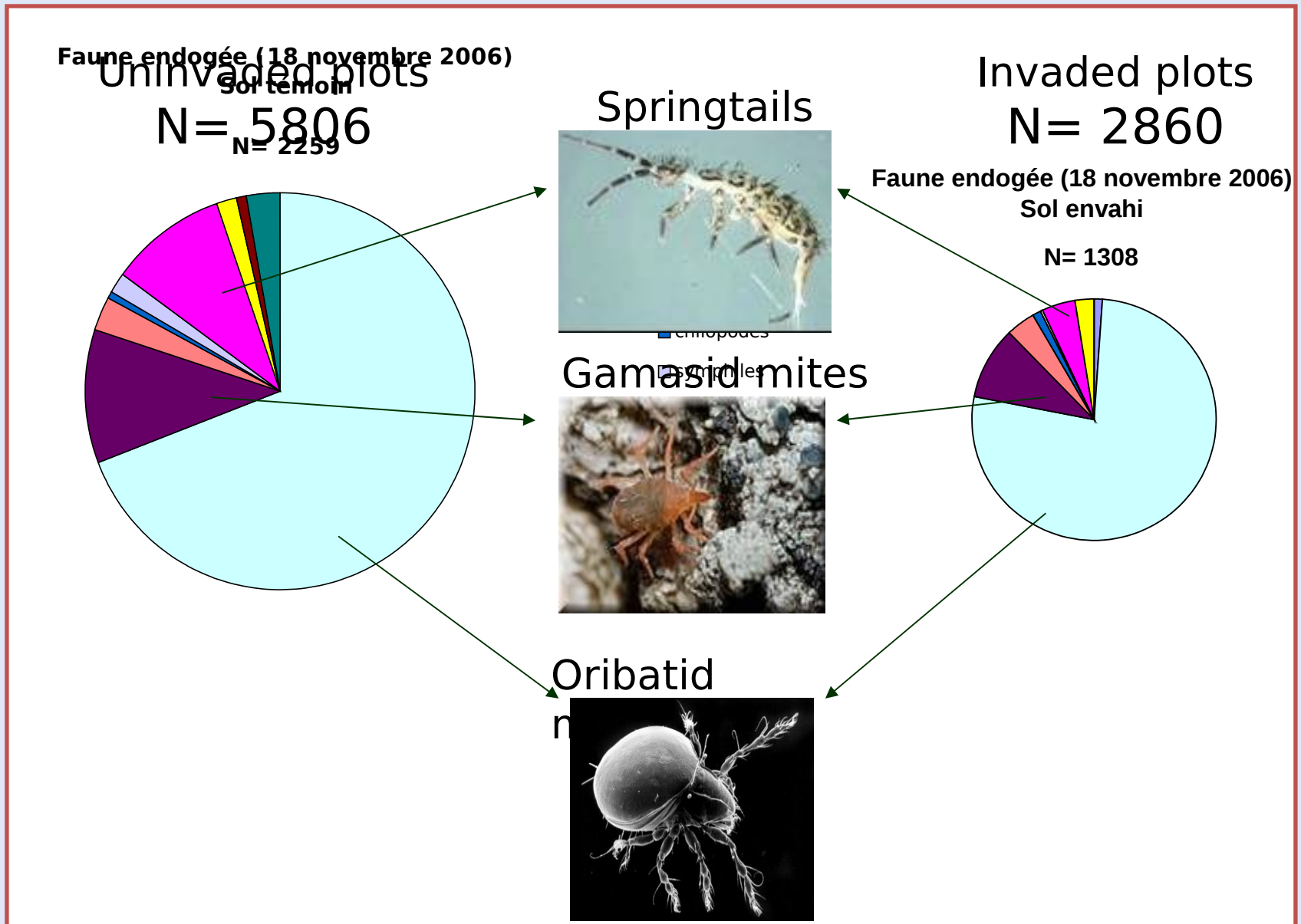


Increasing effect along the initial denitrification

Nitrification and denitrification

- Modification of nitrification and denitrification activity are partially explained by the modification of the number of implicated bacteria.
 - No clear impact of *Fallopia* on the microbial community structure (partial results)
- Potential allelopathic effect of *Fallopia* on nitrifying and denitrifying bacteria

Soil fauna



- Reduced fauna density but high similarity in dominant taxonomic groups assemblage

Unchanged

Actinids



Gamasids Springtails



Chilopods



Proportions higher under *Fallopia*

Oribatids



Isopods



Opiliones



Diplopods



L. terrestris



Absent under *Fallopia*

Ants



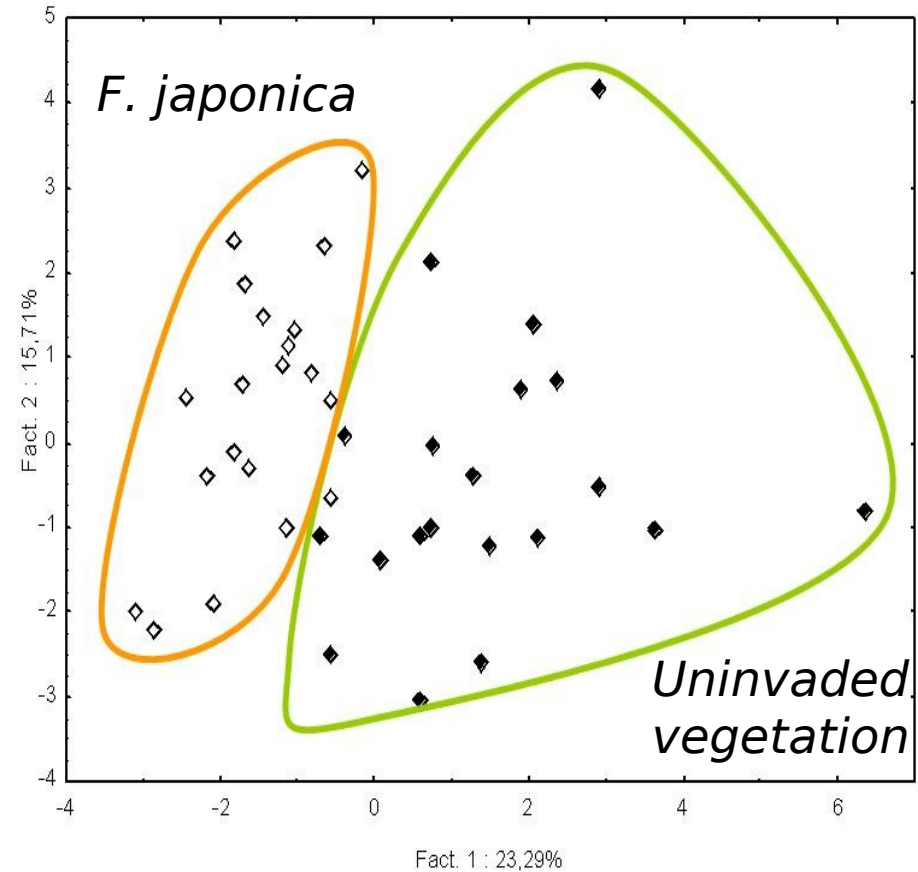
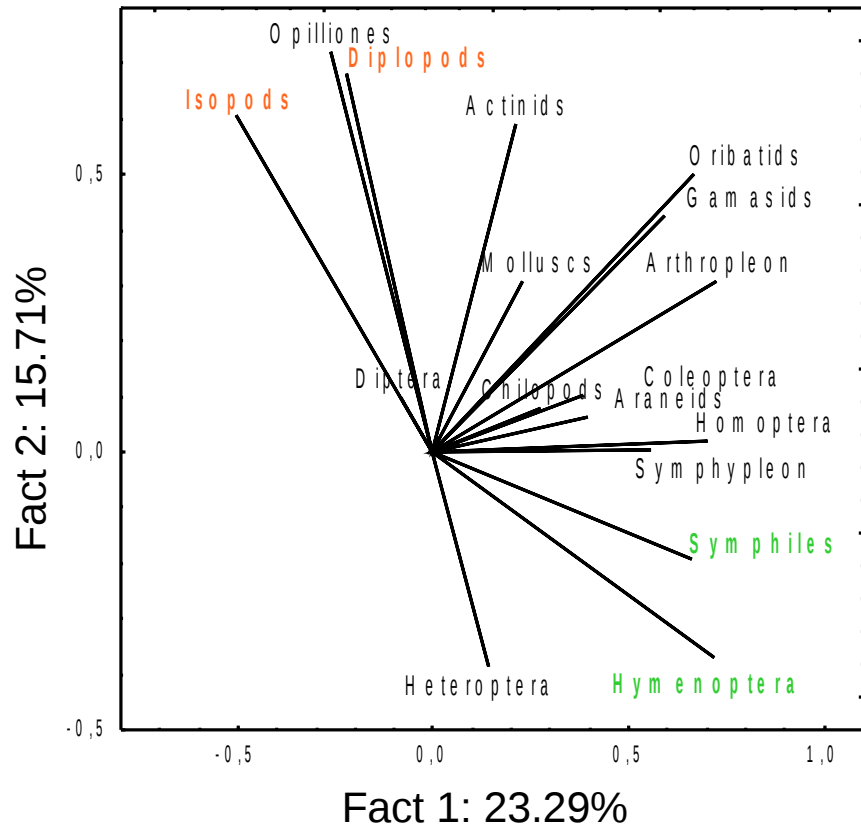
Aphids



L. castaneus



Principal component analysis for soil fauna



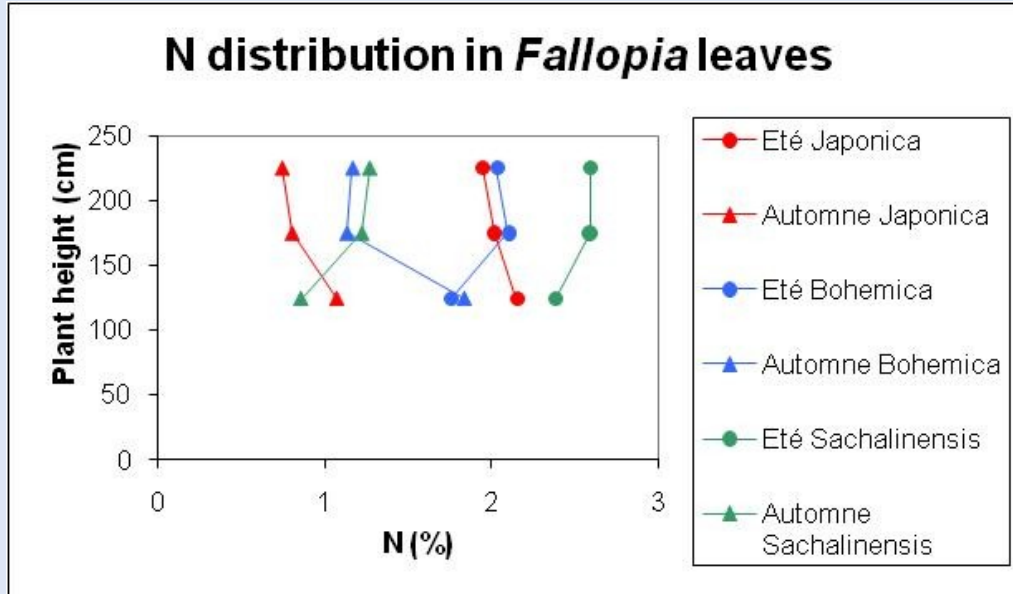
➔ Separation of invaded and uninvaded plots along a moisture and light gradient

Conclusions

- *Fallopia* has a very **economic N management** and tends to conserve N in the ecosystem by different mechanisms:
 - Exceptionally efficient internal N recycling
 - Mineral N fixation by microorganisms during litter decomposition
 - Reduced N loss by reducing nitrification and denitrification activity in the most fertile sites (regulated allelopathic effect?)
- *Fallopia* impacts soil fauna principally through **microclimate modification**

Perspectives

- Comparison of the three taxa of *Fallopia* for functional traits and implications for ecosystem functioning
 - Architecture
 - N translocation dynamic



- Metabolomic and allelopathic effects on soil microbes