







ECO-SERVE:

Sustainable provisioning of multiple ecosystem services in agricultural landscapes

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+ SE, FR, CH, ES, PT









Eco-serve general hypothesis:

Trait-based understanding of the influence of the vegetation and the soil biota on soil organic matter quantity and quality will

allow farmers to manage ecosystem services for

adaptation to climate-induced changes in drought and rainfall frequencies and intensities











Water- and nutrient-exploitative (conventional- intensive agriculture): Sown grassland (leys); Modern cultivars; Annuals only; Short rotation crops Bacterial MICI

Water- and nutrient-conservative (ecological-intensive agriculture): Permanent grassland; Landraces, old cultivars; Perennials included; Long rotation crops

Bacterial MICROBIAL Fungal dominance ABUNDANCE dominance

PLANTS

Fast Biological processes (e.g. litter decomposition)

Fungal (mycorrhizal) control

Plant control

Macrofauna control

Microfauna control

Bacterial control

Mesofauna control

Slow

itter and soil organic matter traits









Central stage to

- Crop choice and crop and residue management.
- Combination of experimentations and on-farm field observations
- (1) Select key traits of crops, plant litter (biota), rhizosphere biota and soil fauna
- (2) Discriminate between **soils** that are **similar** in terms of texture and mineralogy and hydrological position in the landscape, but **different in soil carbon status due to historic land management**
- (3) Identify farmers who already practice ecological-intensive adaptation strategies
- (4) Interface with stakeholders to identify possible synergies and trade-offs with other ecosystem services, hence: which and to what extent are adaptation strategies under climate change feasible?



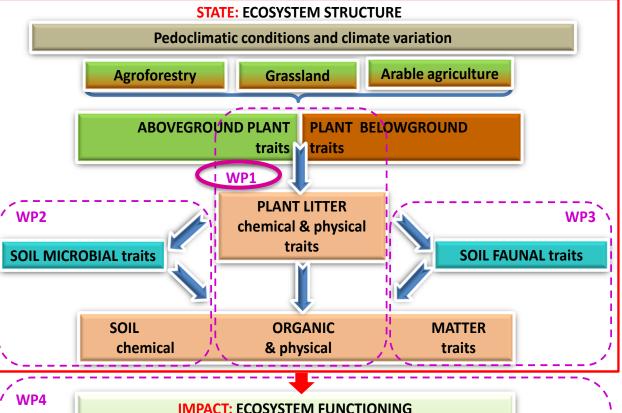






DRIVER: CLIMATE CHANGE

PRESSURE: RAINFALL VARIABILITY



Rain water Infiltration (Ksat); Soil water retention/release (WHC); Soil nutrient retention/release capacity (ECEC)

IMPACT: MULTIPLE ECOSYSTEM SERVICES
Resource conservation (Biodiversity use and conservation;
Water drainage/storage (WD/S); Water use efficiency (WUE);
Nutrient use efficiency (NUE))
Biomass production/ Yield stability/variability

G D MANAGEMENT; POLICIES

and chair of

Milla (WP1)

Clément

De Deyn (WP2) Sousa (WP3)

Gattinger (WP4)

D'Hertefeldt (WP5)

steering committee:

RESPONSES: LAND











Work packages

WP1:

Objective: Investigate how different management options and choices of plant species and genotypes impact on plant and litter traits, and how variation in those traits cascades down to affect the accumulation and quality of soil organic matter (SOM).

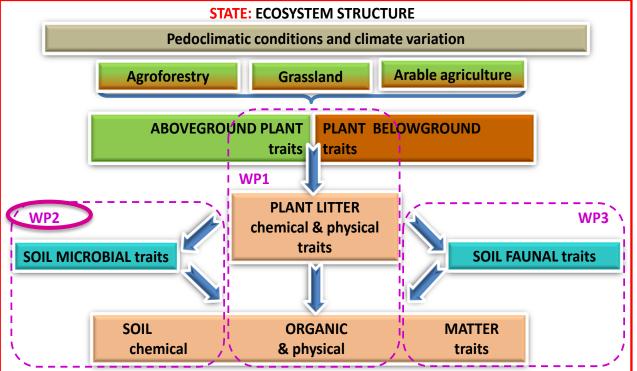












WP4 IMPACT: ECOSYSTEM FUNCTIONING

Rain water Infiltration (Ksat); Soil water retention/release (WHC); Soil nutrient retention/release capacity (ECEC)

IMPACT: MULTIPLE ECOSYSTEM SERVICES

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Biomass production/ Yield stability/variability

G MANAGEMENT; POLICIES

WP5



PONSES: LAND











WP2:

<u>Objective</u>: Investigate how litter traits and water availability impact on soil microbial community traits in conventional-intensive and ecological-intensive managed soils across Europe and its implications for ecosystem responses to rainfall variability under climate change.

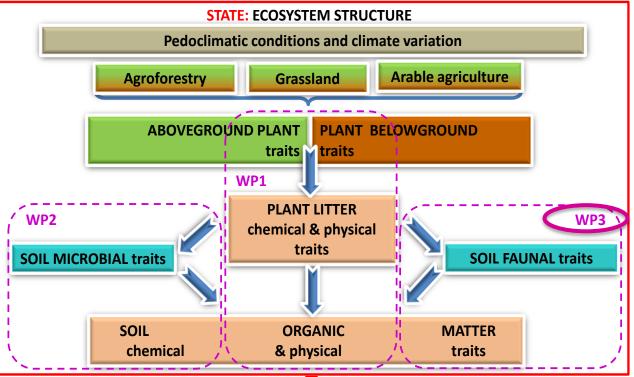












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LAND MANAGEMENT; POLICIES





SPONSES: L











WP3:

Objectives:

- Investigate how different plant litter traits (physical and chemical) affect soil faunal functional diversity (FD) and the consequent decomposition rate, under different land management;
- 2) test the effect of extreme rainfall/drought on the 'litter-soil fauna' interactions and how it influences the decomposition process and the SOM status in soil under different land management.



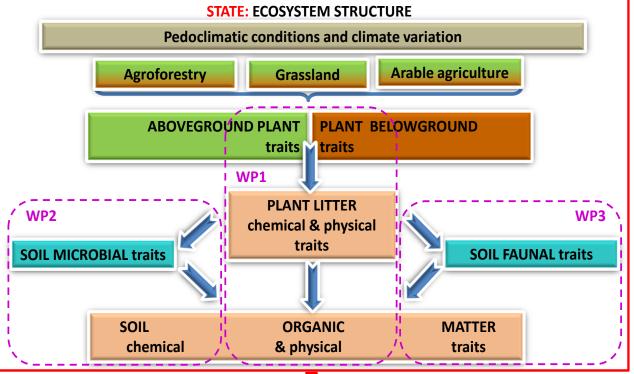








WP4



S: LAND MANAGEMENT; POLICIES



IMPACT: ECOSYSTEM FUNCTIONING

Rain water Infiltration (Ksat); Soil water retention/release (WHC); Soil nutrient retention/release capacity (ECEC)

IMPACT: MULTIPLE ECOSYSTEM SERVICES

Resource conservation (Biodiversity use and conservation; Water drainage/storage (WD/S); Water use efficiency (WUE);

Nutrient use efficiency (NUE))

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WP4:

Objectives:

- 1) Investigate the response of soil water dynamics, tree/crop/grassland growth and plant WUE to rainfall variability;
- 2) investigate the response of soil nitrogen dynamics, tree/crop/grassland growth and plant NUE to rainfall variability;
- **3)** investigate trade-offs and synergies between ecosystem services: WD/S, WUE and NUE.



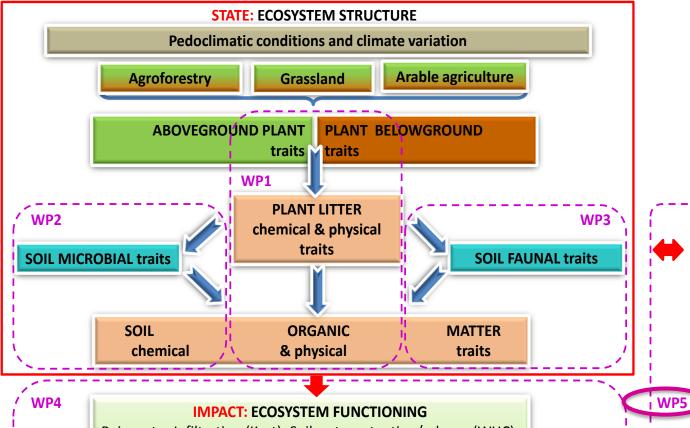






NAGEMENT; POLICIES





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IMPACT: MULTIPLE ECOSYSTEM SERVICES

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Biomass production/ Yield stability/variability









WP 5

Objective: The WP will serve as a communication platform between stakeholders and the research in the project, resulting in

- i) improved understanding of the ecosystem services provided by plant and soil biodiversity, and
- ii) the uptake of the new results by stakeholders towards more ecologically-intensive farming systems.









- Task 5.1: Regional stakeholder initiatives
- Task 5.2: Farmer interviews and field day demonstration of the ongoing research, embedded in existing national networks
- Task 5.3: Data provision for policy decision on sustainable agricultural management
- Task 5.4 Feedback to seed providers
- Task 5.5 Economic aspects of sustainable farming
- Task 5.6. Interactive communication activities with stakeholders
- Task 5.7 Evaluation of feasible sustainable management options with stakeholders