

Sustainable farming at ICOS site Westmalle

1

MICROBIAL COMMUNITY STRUCTURE

This thesis investigates how sustainable farming practices affect soil microbial diversity and community composition.



01

Goal

Compare microbial diversity under sustainable vs. conventional farming

02

Fieldwork

Collect soil samples from ICOS Westmalle field

03

Labwork

Analyze samples and use DNA-based methods to identify microbial groups

04

Requirements

Interest in soil microbes.

Nice to have: drivers permit

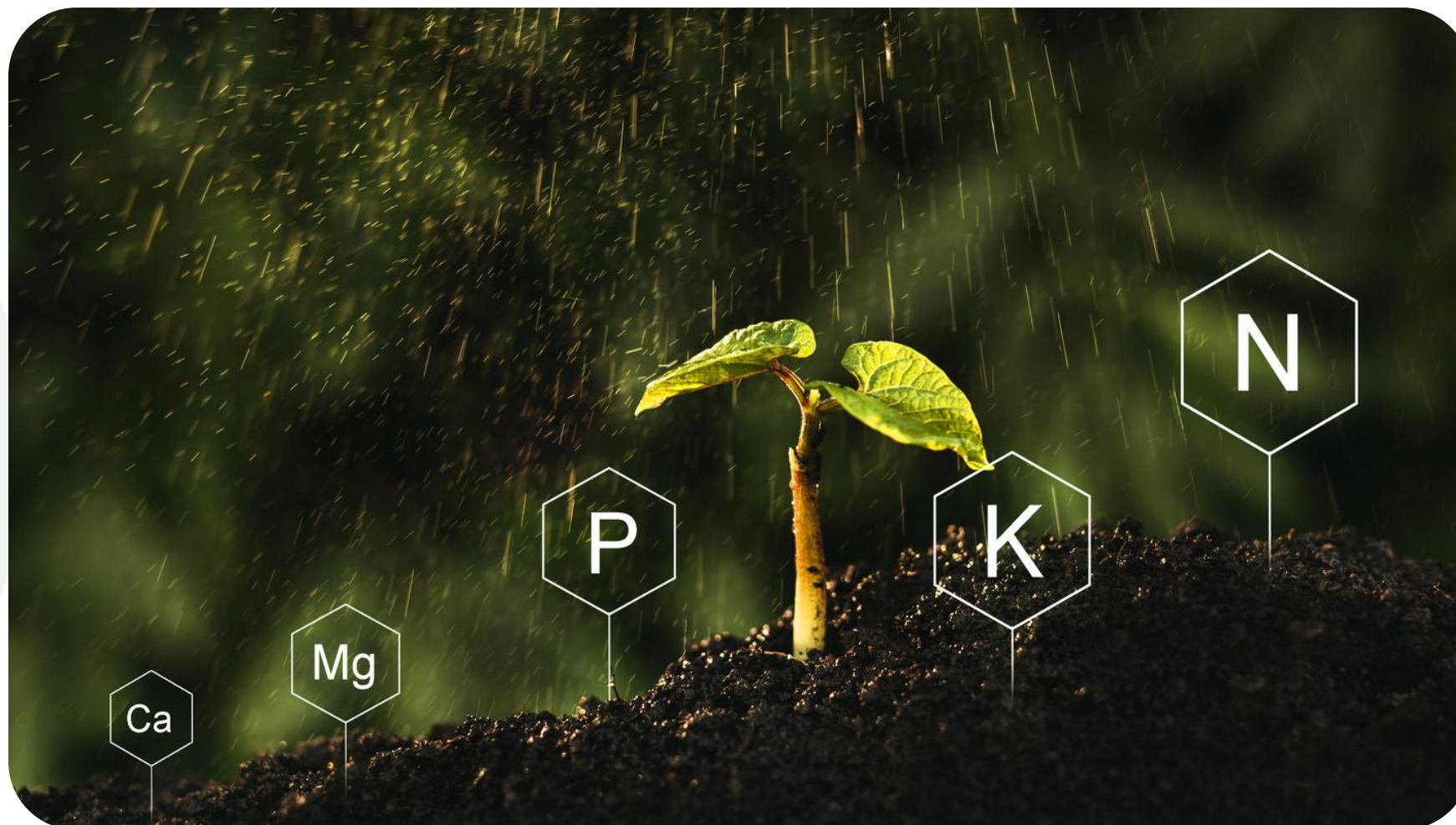
More information? Contact ivan.janssens@uantwerpen.be

Sustainable farming at ICOS site Westmalle

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WATER BALANCE AND NUTRIENT LEACHING

This thesis investigates how sustainable farming practices affect the soil water balance (drainage) and nitrate and phosphate leaching.



01

Goal

Quantify drainage, nitrate and phosphate leaching under different farming practices

02

Fieldwork

Install lysimeters and collect samples at Westmalle field sites.

03

Labwork

Analyze nitrate and phosphate concentrations and relate to management practices

04

Requirements

Interest in soil water and processes.

Nice to have: drivers permit

More information? Contact ivan.janssens@uantwerpen.be

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3 ESTIMATING BIOMASS PRODUCTION

Quantify crop biomass using field measurements, UAV imagery, and satellite-based remote sensing.

- In collaboration with VITO -



01

Goal

Estimate crop biomass under sustainable vs. conventional farming

02

Fieldwork

Perform UAV flights at ICOS Westmalle

03

Labwork

Process UAV and satellite data (in collaboration with VITO)

04

Requirements

Interest in UAV's, remote sensing and data analysis.

Nice to have: drivers permit

More information? Contact ivan.janssens@uantwerpen.be

Sustainable farming at ICOS site Westmalle

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FEED QUALITY AND CROP COMPOSITION

Examine how sustainable farming influences crop nutritional quality and feed value

- In collaboration with ILVO -



01

Goal

Compare the nutritional quality of conventional maize crop versus a climate-resilient herb-grass mix

02

Fieldwork

Collect crop samples from ICOS Westmalle

03

Labwork

Analyze samples for protein, fiber, and nutrient content in collaboration with ILVO

04

Requirements

Interest in sustainable agriculture.

Nice to have: drivers permit

More information? Contact ivan.janssens@uantwerpen.be

Thirsty forests

at ICOS site Brasschaat

TRACKING TREE WATER USE IN A CHANGING CLIMATE

Unravel the connections between tree-level water use, forest water balance, and drought resilience.



01

Goal

Explore how individual tree water use and drought responses shape forest water dynamics

02

Fieldwork

Install sap flow sensors and determine sapwood area in the Brasschaat forest

03

Data-analysis

Calculations and data analysis in Rstudio

04

Requirements

Interest in ecophysiology.

Nice to have: drivers permit

More information? Contact ivan.janssens@uantwerpen.be

Hungry forests

at ICOS site Brasschaat

ESTIMATING FOREST CARBON UPTAKE

Improve estimates of forest carbon uptake by combining in-situ photosynthetic measurements with machine-learning and mechanistic models.



01

Goal

Improve machine-learning and mechanistic models of forest carbon uptake using field data

02

Fieldwork

Conduct leaf-level gas exchange measurements at the Brasschaat forest

03

Data-analysis

Integrate obtained photosynthetic parameters model training and validation datasets.

04

Requirements

Interest in ecophysiology, modelling (R, python).

More information? Contact ivan.janssens@uantwerpen.be

What tree is this?

at ICOS site Brasschaat

IDENTIFYING TREE SPECIES FROM HYPERSPECTRAL DRONE IMAGES



01

Goal

Find hyperspectral indices to identify different tree species in a forest

02

Fieldwork

Tree determination and mapping

03

Lab work

Process UAV data, possibly implementing AI techniques

04

Requirements

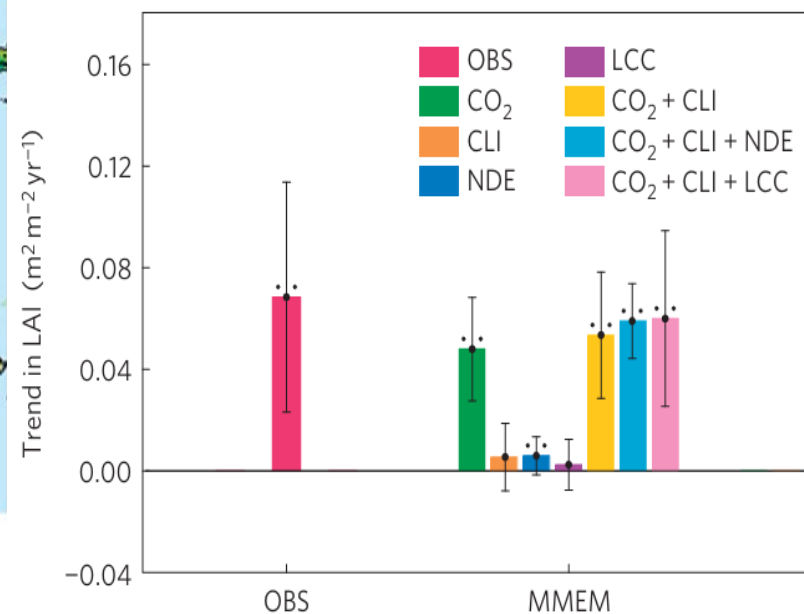
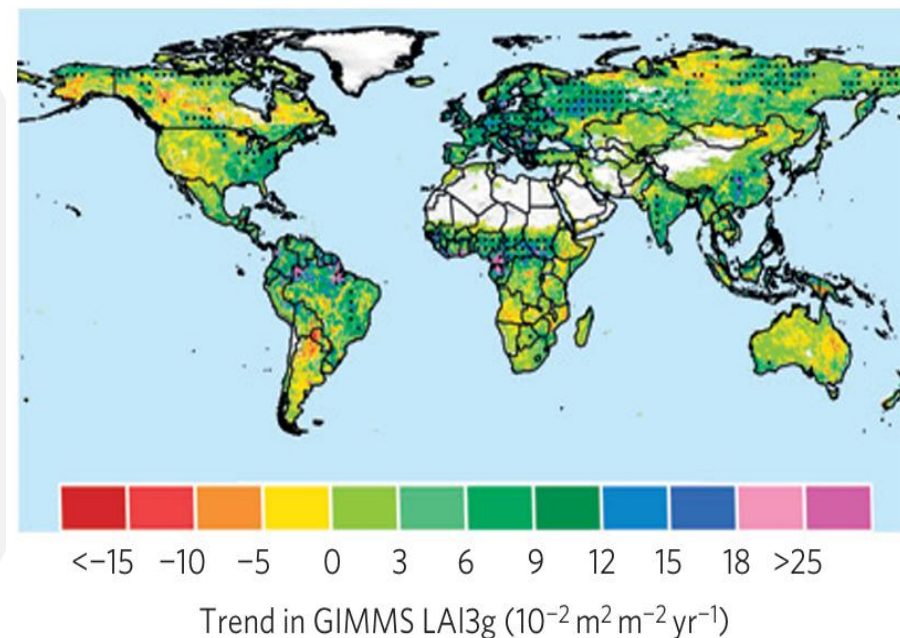
Interest in UAVs and data analysis.

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Earth Observations

EXPLORING EARTH OBSERVATION PRODUCTS

Using remote sensing and proximal sensing (ICOS, ...) to study ongoing changes in the state of the Earth's ecosystems.



01

Potential Research Foci:

Which global regions are switching from greening to browning?

02

Is the CO₂ fertilization effect further weakening?

03

Is the rate of change in northern ecosystems following the rate of warming or has the temperature control weakened?

04

Requirements

Not afraid of big data/machine learning.
Knowledge of/willing to work with python.

More information? Contact ivan.janssens@uantwerpen.be

Disease suppressive soils: influence of carbon farming practices

- Plant pathogens like Pythium, Fusarium, etc. have devastating effects on agriculture
- Resistance formation to pesticides, as well as environmental concerns, require novel approaches to disease management
- Disease suppressive soils can protect our crops against these pathogens, yet much of their formation and processes is still unknown.
- Carbon farming in agriculture often has positive effects on soil biodiversity and thus perhaps also on disease suppressiveness
- Thesis entails fieldwork, coffee with West-Flemish farmers, DNA-analysis, screening for pathogens and their predators, and/or pot-plant survival experiments

Contact me at lowie.vanryckeghem@uantwerpen.be if you want to know more!

