



Newsletter 1

October 1st, 2021

ABOUT

The European continent will experience higher levels of warming than the global average, as confirmed by climatic projections.

Whilst this does present a large amount of consequences across a wide variety of sectors, industries, locations, and people, it is particularly worrisome for agroecosystems. Indeed, in combination with unsustainable land management (amongst other interacting factors), accelerated and more intense climate change directly threatens food production in Europe. This is even more worrisome considering the growing population within the continent, highlighting the need to produce more food in a sustainable manner.

Within agroecosystems, below ground soil biodiversity plays a crucial role in maintaining ecosystem functioning, seeing as dynamic shifts in biodiversity affect ecosystem multifunctionality, thus food production, both directly and indirectly. However, there has been a serious lack of research done to harness the great potential of microbial functions, with the goal of improving and maximising sustainable agricultural production.

A crucial characteristic of microorganisms is their ability to increase the resistance and resilience of crop systems, especially in terms of climate change effects.

In order to study the effects of climate change as well as the dynamic crop-soil-microbiome system,

a combination of natural climate gradients and in-situ field manipulations are very accurate research pathways. MICROSERVICES will adopt both these frameworks in a dual-framework strategy.

GOAL

With this dual approach in mind, the main goal of the MICROSERVICES project is to improve the forecasting capacity of the cascading effects of climate change on:

- Crop-associated microbial diversity,
- Crop-microbe interactions,
- Agricultural ecosystem services delivered by the microbiome.

This is done in the hopes of actively contributing to a sustainable agricultural sector:

- Fostering widespread benefits across the agricultural economy, society, and environment,
- Positively impacting conservation,
- Developing sustainable policy briefs for decision-makers,
- Raising public awareness of the importance of soil biodiversity both on local level as well as across the world.

The MICROSERVICES project will reach this goal through multiple pathways and research endeavors:

- Using earth observation based on regional climate models,
- Surveying wheat rhizosphere microbial diversity, crop-microbiome interactions, and ecosystem multifunctionality,



MICROSERVICES

- Simulating drought conditions by establishing in-situ field experiments,
- Employing machine learning algorithms to determine correlations and develop a predictive regression model,
- Promoting strong collaboration amongst and between research entities, agricultural stakeholders, and policymakers.

Within the European agrofood and agricultural sector as a whole, MICROSERVICES will for the large part focus on wheat cropping systems.

This is due to the fact that Europe is the largest wheat producer in the world, accounting for nearly one third of the world's wheat production, as well as the combined fact that wheat cultivation is based across the continent and across multiple bioclimatic regions. This makes wheat one of the most suitable candidates for this study.

Research shows that the climate resilience of a vast amount of wheat cultivars is declining, with wheat cultivation as a whole projected to face multiple challenges under future climatic conditions.

As such, MICROSERVICES sees the need to assess, monitor, and report how both biodiversity and ecosystem multifunctionality will be affected by climate change across Europe. This is especially amplified by the fact that different bioclimatic regions across the continent will be affected in different ways.

Thus, MICROSERVICES seizes the opportunity to use wheat production as a stepping stone towards a better understanding of microbiome diversity and related ecosystem-service, with the hope of building a more sustainable and resilient future for Europe.

CURRENT STATUS

The MICROSERVICES project is already in full swing. The first part of the project involves sampling soil in wheat fields across the European Union. As such, the project has been coordinating with partners and their members to determine which fields will be selected across the continent. Due to COVID-19 related difficulties, the project was not able to access fields for the 2021 growing season, so will instead sample during the 2022 season, beginning in February.

While this decreases the sampling time, it comes with some notable benefits, specifically giving the project partners a chance to coordinate more accurately and efficiently, with more detailed and precise sampling as now more time can be dedicated to picking the sampling locations .

A lot of planning and effort has already been undertaken in the site selection process within the criteria of the project . The National Observatory of Athens (NOA), for example, has projected the shifts in geo-climatic zones across the continent in the forms of maps. Combining these climate change projection maps as well as the maps of the wheat producers across the continent,

the European Landowners' Organization (ELO) will narrow down which are the most suitable areas for sampling by using their extensive contacts with both farmers and landowners across Europe.

Various Work Packages within the project have already begun their efforts, specifically on how the sampling will take place across the various fields. At the same time, partners within Work Packages 3 and 4 are currently setting up the physical infrastructure for the project: all the roofs have been built, and the test areas are prepared for drought treatment in the Autumn. The planting of Winter Wheat currently is beginning and will continue through October this year, and once they are sown, the roofs will be put over the planting to protect them from rain (thus simulating drought conditions). Sampling is expected to take place at the site next season. Optimistically, the project is hoping to have two years' worth of data!

By using this two-prong approach (field sampling and in-situ experiments), the project can obtain both a greater data set and more accurate readings within this allocated project timeframe.

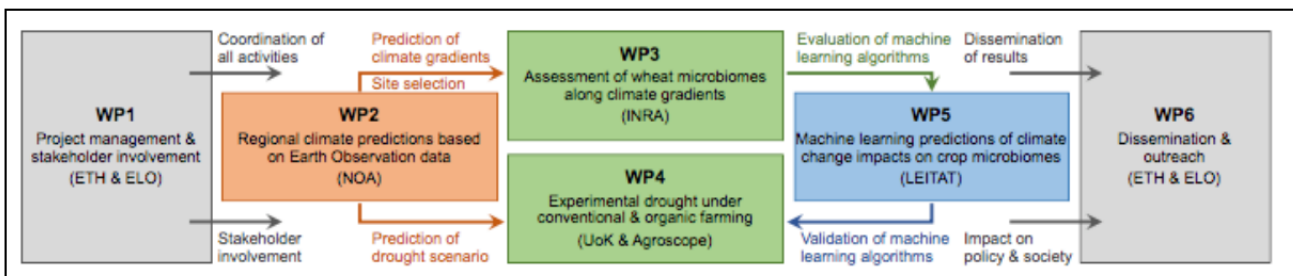
TIMELINE

- Over the course of the three years of the project, project work will cover:
 - **First year:** preparation of field-selection, in-situ experimentation, and how to reach interested stakeholders regarding the field sampling;
 - **Second year:** field sampling as well as in-situ experiments (and completion of Work Packages 3 and 4)
 - **Third year:** data analysis and writing-up of project results.



FUTURE NEWSLETTERS

Make sure to stay tuned on our social media accounts for the release of more information and upcoming newsletters. Our project newsletters are expected to be released every six months and will focus on project updates, interesting aspects of the project, as well as further input from the partners!



Work Package (WP) structure of the MICROSERVICES project. Colours depict methodologically similar WPs, whereas arrows represent major flows of information. WP leading partners are added in brackets.