

Case Study 1:

Emilia-Romagna region, Italy

REGENERATIVE FORAGE FARMING AND SLURRY USE

Context and background



Emilia-Romagna is a region in Northern Italy, located in the Po Valley, covering an area of 22,453 km² with approximately 4.4 million inhabitants. The region's agriculture is among the most advanced in Italy, contributing over €6.5 billion, which is around 12% of the national agricultural value. The region produces a wide variety of products, including milk, pork, poultry meat, cereals, fruits, and wine. The climate is continental with increasing occurrences of extreme weather events such as prolonged dry periods and intense rainfall due to climate change. The prevalent use of conventional agricultural practices has led to a decrease in soil carbon content, higher greenhouse gas emissions, and elevated nitrate levels in groundwater.

Objectives

The main objectives of this case study are to explore the potential benefits of regenerative agricultural practices combined with the use of novel microbial biostimulants and conservation practices. Specifically, the study aims to:

1. Enhance soil quality and carbon sequestration.
2. Improve nitrogen-use efficiency and minimize nitrogen losses, including nitrous oxide emissions, by using livestock manure effectively as a fertilizer.

Experimental design

The research is conducted at the CERZOO research farm in Piacenza, which is characterized by a temperate climate with an average annual temperature of 13.2°C and annual rainfall of 839 mm. The soil type is fine, mixed, mesic Udertic Haplustalfs with a silty-clay texture.

1) Soil quality and carbon sequestration: The study tests the combined effect of novel microbial biostimulants and conservation practices on soil quality and carbon sequestration.

2) Fertilization strategies: The study assesses the effect of vermicompost applied as a co-formulant for the delivery of beneficial microorganisms on nitrogen-use efficiency and nitrogen losses into the environment. Field experiments are conducted to observe the impact on nutrient cycling and soil fertility.



Key innovations

Preliminary results

The experimental field began on May 14th, 2024, with maize seeding, so results will be available only by Autumn 2024. In the field experiment in particular these conditions will be tested:

- no tillage vs tillage effects on yield and nitrogen use
- use of vermicompost as alternative strategy in fertilization
- applications of a *Trichoderma* sp isolated from corn rhizosphere to enhance yield, crop nutrition and soil quality



These conditions were chosen following results obtained in a preliminary pot experiment conducted in May-June 2023. In the pot experiment in particular it was observed

- the efficiency of vermicompost vs conventional fertilization (urea) in corn growth and yield
- the effect of three consortia of microorganisms isolated from corn rhizosphere
- the application of microorganisms through seed coating or with vermicompost

Microorganisms applied are those screened as the best for plant growth promoting properties in in vitro phenotypic tests. Their genomes have been published on NCBI, as described in deliverable 3.3. The pot experiment showed that the vermicompost inoculum (with *Trichoderma* sp.) led to higher biomass and greater height growth in maize after one month, that is why in the field experiment only *Trichoderma* sp. inoculated on vermicompost was applied.

