

# Merelbeke

## Flanders(Brussels)

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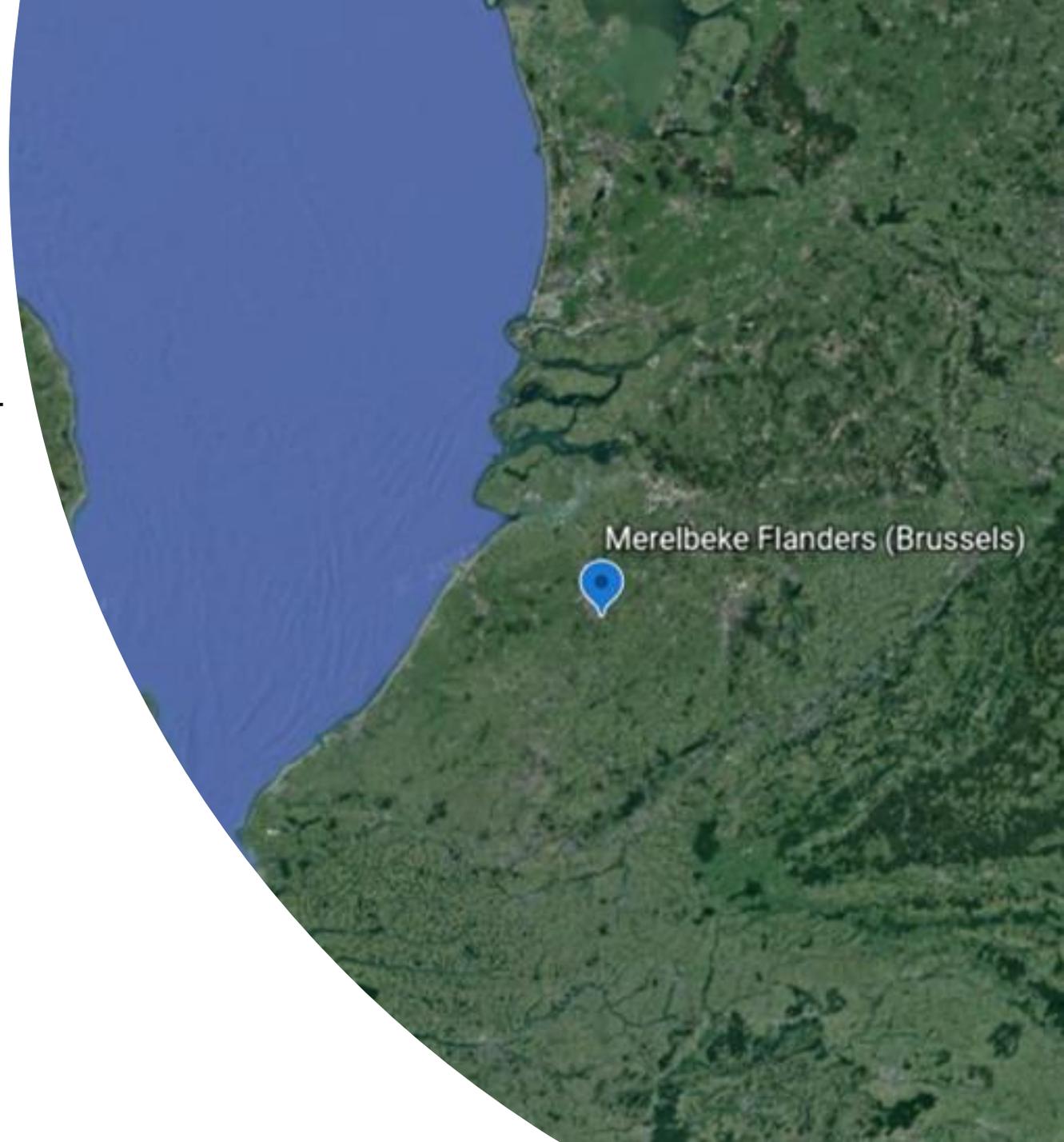
### **EXPERIMENT GOALS**

Agricultural application of biochar, compost, and a mixture of both materials (biochar-blended compost) to evaluate their potential for closing the cycle of nutrients in different agro-climatic regions across Europe.

Barley, leek , ryegrass.

pH, Soil water content, TOC, total N, extractable organic C, extractable N,  $\text{NO}_3^-$  and carbon dynamics.

### **Three-year experiment**



## SITE DESCRIPTION

The field experiment was conducted in Merelbeke (Belgium), focused on an arable crop rotation that includes spring barley (*Hordeum vulgare L.*), leek (*Allium porrum L.*) and Italian ryegrass (*Lolium multiflorum L.*).

Agro-climatic conditions were characterized by fully humid temperate climate, 879 mm annual rainfall and 10.7 °C mean annual temperature.

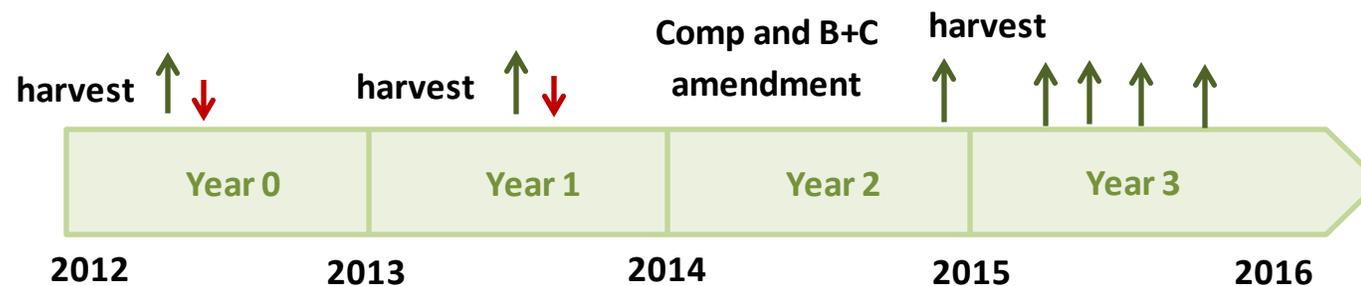
The soil at the experimental site is a Haplic Luvisol, 59.9% sand, 34.7% silt and 5.4% clay, pH of 5.94, 0.85% TOC. The experimental design of the trial was completely randomized with four replicates.

## BIOCHAR AND ITS APPLICATION IN THE FIELD

The biochar used in the field experiment was produced by PROININSO (Málaga, Spain) from the pyrolysis of oak (650 °C pyrolysis temperature, 12–18 h residence time in kiln, 0% Oxygen content).

The treatments were: biochar (10.9 t C ha<sup>-1</sup>), biowaste and green waste compost (10.9 t C ha<sup>-1</sup>), biochar-blended compost, 10:90 w:w (10.9 t C ha<sup>-1</sup>) and a control where only mineral N and K fertilizers were applied.

The biochar was applied in year 1, while the compost and the biochar-blended compost were applied in year 2. All plots received an equal dose of mineral N and K fertilizer according to crop requirements (no mineral P fertilizer was applied). The organic amendments were incorporated to a depth of 20–25 cm at time of application.



## Measured parameters

**Field conditions:** rainfall, meteorological data

**Soil analysis and interactions with biochar:** soil analysis, periodic soil analysis, pH, Soil water content, TOC, total N, extractable organic C, extractable N,  $\text{NO}_3^-$

**Biochar dynamics and matrices:** degradation of biochar, soil carbon contribution, soil fertility

**Carbon dynamics:** soil respiration with and without biochar

**Production data:** crop production, crop nutritional status

**Other production parameters:** Total concentrations of macro- micro-nutrients, total soil microbial biomass

## Key findings

- The single application of biochar, compost and biochar-blended compost clearly increased soil TOC and pH.
- Composts application significantly increased  $\text{NO}_3^-$  and available K content.
- Total soil microbial biomass remained unchanged after the addition of all three amendments.
- Biochar showed no negative effect on crop yield, while composts increased yield and N content in white mustard.

## Planned activities or potential experimental activities

Production and agricultural application of biochar, compost, and a mixture of both materials (biochar-blended compost) to evaluate their potential for closing the cycle of nutrients in different climatic regions and crops across Europe

## **PRESENTATION OF THE WORKING GROUP**

This study was performed under the framework of the EU project FP7 KBBE.2011.1.2–02 FERTIPLUS (Grant Agreement N° 28985), co-funded by the European Commission, Directorate General for Research & Innovation, within the 7th Framework Programme of RTD.

## **Bibliography and publications of the experiment**

Miguel A. Sánchez-Monedero, María L. Cayuela, María Sánchez-García et al., 2019. Agronomic Evaluation of Biochar, Compost and Biochar-Blended Compost across Different Cropping Systems: Perspective from the European Project FERTIPLUS

