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Soil management effects on soil organic matter properties and carbon sequestration

Project realised in EJP SOIL programme 2022 - 2025

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Objectives

- to identify the stability of SOM depending on the management under different climatic conditions;
- to disclose management practices enriching soil with the organic matter pools that are most resistant to microbial decomposition;
- to specify these practices for various soil and climate conditions throughout Europe and the USA.

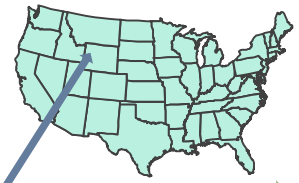
Material and methods

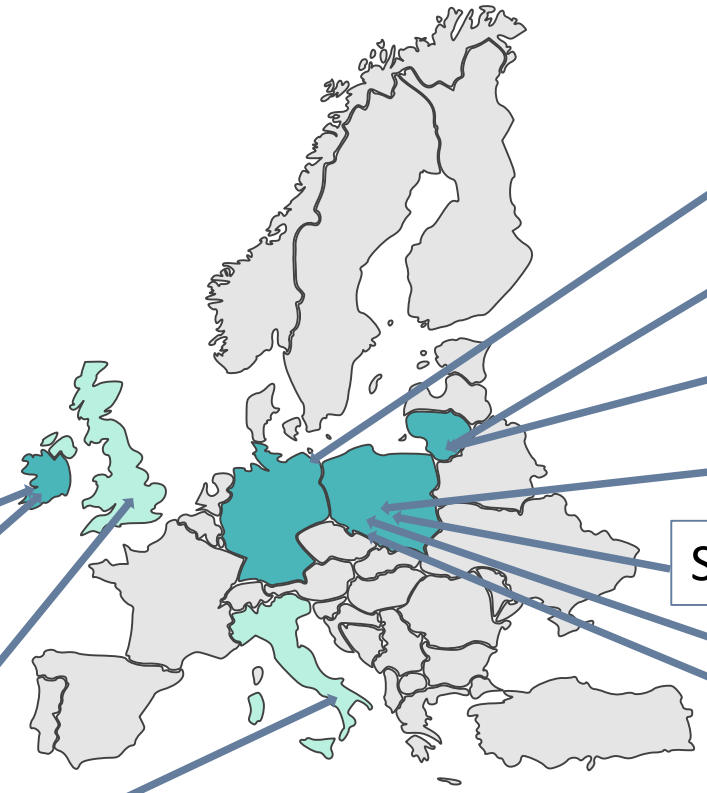
Investigation of the soil material and isolated the most resistant SOM fraction (humin) in long-term field experiments with different soil management and cultivation systems:

- conventional tillage vs. no-tillage;
- mineral vs. organic fertilization;
- management with and without catch crop;
- arable land vs. grassland;
- cultivated vs. non-cultivated soils.

Material and methods

Long-term field experiments





Western Wyoming management systems

Knockber 40-yers field experiment

Old Park 30-years field experiment

Broadbalk 178-years field experiment

Castelvolturno 26-years field experiment

Rostock 2 ha field experiment

Noreikiškės 22-years field experiment

Noreikiškės 54-years field experiment

Chylice 46-years field experiment

Skierniewice 100-years field experiment

Wrocław 30-years field experiment

Sichów 5 ha field experiment

Soil material investigations:

SOM composition and stability by Py-GC-MS; aggregate size classes and C pools of increasing physico-chemical protection; analysis of $\delta^{13}C$ and $\delta^{15}N$ of the separated SOM pools; soil water retention and soil water repellency; mineral composition of clay fraction; soil structure stability; enzymatic activity; microbiological properties (community-level physiological profiling, microbiome and mycobiome analyzes, etc.); CO_2 emissions from the soil.

Isolated humin fraction investigations:

Eelemental composition and spectroscopic properties (mass spectrometry, NMR, FTIR, EPR, UV-Vis-NIR, fluorescence).