

### Pot experiment

The greenhouse experiment was established at IUNG, Puławy, Poland in May 2013.

Plant: Spring wheat

Design: randomized blocks

Treatments (doses incl. control): 3

Replicates: 4

Tested EOMs: 3 (meat bone meal, compost Rabio, digestate)

Tested soils: 3

Sampling per year: 2, the first: 24 – 25.06.2013, the second: 26 – 27.08.2013



Pot experiment in IUNG - PIB

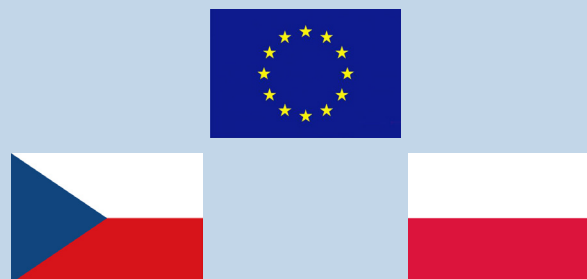
### Web page

The Project web page has been established at:

<http://eagri.cz/public/web/en/ukzuz/portal/projects-eu/programme-of-cross-border-co-operation/risk-and-benefits/>

### Forthcoming events

1. Second sampling in Braszowice and Puste Jakartice – first week of November 2013
2. Seminar in Opava – 21 November 2013



## Risks and benefits of application of exogenous organic matter into soil

### NEWSLETTER No.1

#### Story behind the project

Soil organic matter (SOM) decline was defined by the EU Strategy for Soil Protection as the major threat to soil quality. Regional assessments indicate that SOM levels might be decreasing. SOM is essential to many soil functions: production potential, retention, biodiversity provision, buffering and filtering contaminants. Simplification of crop rotations and specialisation in agriculture (crop production without animal sector) have led to limited input of organic matter to soil.

The use of exogenous organic matter (EOM) might be potentially a substantial alternative to conventional organic fertilizers such as manure. We can assume that the volume of biodegradable wastes will be increasing. Some of them, usually after treatment, can be utilized in agriculture for soil fertilization or conditioning (composts, biosolids, digestates, biochar, food processing wastes, etc.) but only if their application is safe to soil and environment.

#### Main objective and timeframe

The aim of the project is to evaluate the effects of EOM on a wide range of soil properties and prepare guidelines for their safe and efficient use in agriculture.

The project starts in April 2013 and will be finalized in June 2015.

#### Description of work

The project focuses on safe application of EOM into soil with respect to the local conditions in the Czech-Polish borderland. The ecosystem services (e.g. transformation of OM, gas exchanges and carbon sequestration, regulation of nutrient cycling, water retention), most of which are tightly linked to SOM, are in the centre of the project. Because soil functioning depends on the direction and the rate of OM transformation which are in turn influenced by soil properties and site conditions, the experimental part of the project will be based on field and laboratory experiments covering soil physics, chemistry and biology. Two field trials has been established in Braszowice (PL) and in Puste Jakartice (CZ) and three soils with different properties have been selected for the pot experiment.

The evaluation of the current status of SOM and available EOM in the project area is the base of the project. SOM functions depend on the structure of SOM, therefore labile and total fractions of SOM will be measured. Thorough analyses of the tested EOM types will provide information on nutrient and contaminant levels - their fate in soil will be followed during the project. Since soil microorganisms are responsible for transformation of organic matter in soil, both indigenous and external, the changes in their activities (e.g. respiration or enzyme activities) will be determined. The impact of added materials on soil biota might be contradictory: they can enhance their activity at the price of decreased biodiversity, thus these relationships will be studied using soil ammonia-oxidizing bacteria as model



organisms. Because functioning of soil depends also on higher levels of the trophic chain, the response of soil fauna (edaphon, epigeon) will be evaluated. The release of GHGs from soil after EOM application will be measured to ensure that undesirable decomposition of OM resulting in greenhouse gasses emissions (N<sub>2</sub>O, CO<sub>2</sub>) will not limit sequestration of the added EOM in soil.

All obtained data will be evaluated together which will enable a complex picture of changes in soil properties and processes following application of EOM. This holistic approach makes the project unique within the studies evaluating the impact of EOM addition on soil functioning.

Literature and experimental data will be used for preparation of the guideline for the sustainable application of EOM to soil along with a detailed manual for performance of required laboratory analyses. Information on the project progress will be disseminated through seminars and the newsletter. The project outputs will be delivered to authorities in soil protection, farmers and biowaste producers.

#### Project consortium

##### Leading partner

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Institute of Soil Science and Plant Cultivation – State Research Institute (IUNG-PIB)

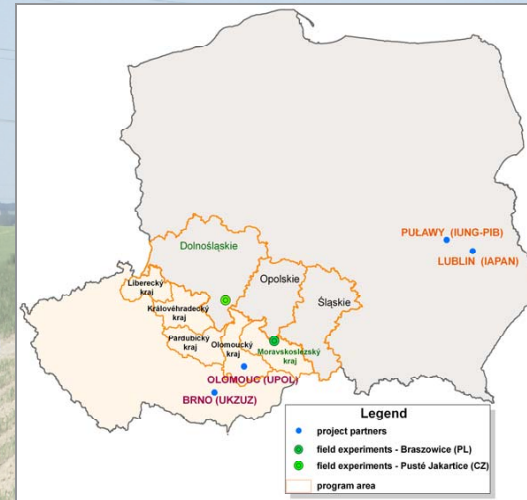


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Location of Project partners and the field experiments

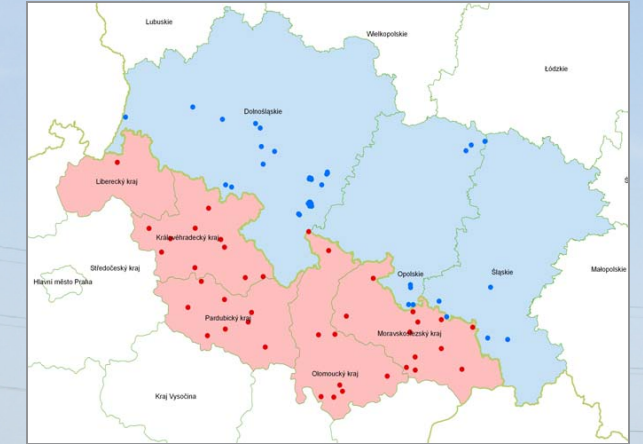
#### What has been done?

##### Kick off meeting

The first meeting of the project consortium was organized in Opava, March 12, 2013. The detailed distribution of work between Partners and methodology of EOM testing was discussed.

##### Assessment of SOM changes in the borderland

The total number of 80 representative soil samples (40 locations on both sides of the Polish-Czech borderland) was collected in historical soil monitoring locations in order to evaluate the changes of SOM content as a result of climatic conditions and characteristics of the agriculture.



Locations of georeferenced soil sampling points for the assessment of SOM changes

#### Field experiments

The experimental fields were established in Braszowice (Poland) and Pusté Jakartice (Czech Republic).

Plant: maize, cultivar: N K Terada FAO 260

Design: randomized blocks

Treatments (doses incl. control): 4

Replicates: 4

Tested EOMs: 3 at each site (Braszowice – meat bone meal, compost Rabio, digestate; Pusté Jakartice - meat bone meal, compost Rabio, organic fertilizer based on mixed wastes)

Soil sampling per year: 2, the first: 18.06.2013, the second at the end of vegetation season



Establishment of the the field trial (left) and first sampling (right) in Braszowice