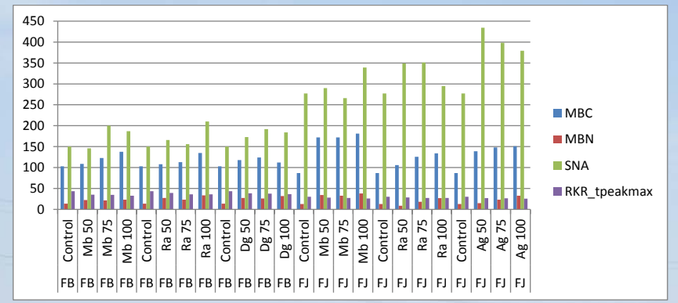

Microbial properties - spring sampling

Legend: FB – field experiment in Braszowice (Poland), FJ – field experiment in Puste Jakartice (Czech Rep.); EOMs doses (50, 75, 100 [%] of total N fertilization): Ag – Agrohum, Dg – digestate, Mb – meat bone, Ra – Rabio ; soil properties: C_{org} – organic carbon content [%],OM lab – content of labile fractions of organic matter [%], OM stab – content of stable fractions of organic matter [%], Ca - exch. Ca^{2+} [%], Mg - exch. Mg^{2+} [%], K – exch. K^{+} [%], Na – exch. Na^{+} [%], MBC - C biomass [ug g^{-1}], MBN - N biomass [ug g^{-1}], SNA - Short-term nitrification [ng N/g/h], RKR tpeakmax - time to the maximal respiration rate after the addition of substrate [h].

Field experiments

- Harvest in both Braszowice and Puste Jakartice fields
- Second sampling in Braszowice and Puste Jakartice

Harvest in Puste Jakartice 22nd October 2013

Second sampling in Puste Jakartice 6th November 2013

- The field trials continue in Braszowice (Poland) and Puste Jakartice (Czech Republic).

  Plant: maize, cultivar: Ułan FAO 270
  Design: randomized blocks
  Treatments (doses incl. control): 4
  Replicates: 4

  Tested EOMs: 2 in Braszowice – compost Rabio, digestate from potato industry; 3 in Puste Jakartice - meat bone meal, compost Rabio, organic fertilizer based on mixed wastes)
  Soil sampling per year: 2, the first: 06.05.2014, the second at the end of vegetation season

Work on field experiment in Braszowice, 8th April 2014

Pot experiment

- The greenhouse experiment will continue at IUNG, Puławy, Poland from May 2014.
  Plant: Spring wheat
  Design: randomized blocks
  Treatments (doses incl. control): 3
  Replicates: 4
  Tested EOMs: 3 – digestate from the biogas plant using pulp from sugar factory as a substrate, digestate from the biogas plant using corn ensilage as a substrate, industrial compost made of separated biodegradable wastes from households such as kitchen wastes (food, vegetable and fruit wastes), garden wastes (grass, leaves, weeds, soil) and other biodegradable wastes (wood ash, sawdust etc.), wood wastes and sewage sludge from communal sewage disposal plant.
  Tested soils: 3
  Sampling per year: 2, the first: one month after the setting up of the experiment, the second: at the end of vegetation season

Forthcoming events

1. Setting up of the pot experiment – May 2014
2. Completion of laboratory analyses – end of May 2014
3. First sampling – pots and fields – May – June 2014

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Risks and benefits of application of exogenous organic matter into soil

NEWSLETTER No.2

Background

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

The project focuses on safe application of EOM into soil with respect to the local conditions in the Czech-Polish borderland.

All obtained data will be evaluated together which will enable a complex picture of changes in soil properties and processes following application of EOM. 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 is being disseminated through seminars and the newsletters. The project outputs will be delivered to authorities in soil protection, farmers and biowaste producers.

Location of Project partners and the field experiments

What has been done since September 2013?

Meetings

- Expert Meeting was organized in Kravare, November 20, 2013 – the progress of the project was discussed. Project partners reported the advancement of laboratory analyses, the status of the preparation of the report on SOM in PL-CZ borderland, field and pot trials were discussed. Partners also agreed on the collection and format of the data obtained during the project and harmonization of statistical methods.
- Opening Seminar, Kravare, November 21, 2013 – seminar gathered about 50 participants originating from soil science scientific community interested in the output of the Project. Partners presented the general and detailed aims of the project and planned work. Also the progress of the project was presented to the audience.

Expert Meeting, Kravare 20th November 2013

Opening Seminar, Kravare 21st November 2013

- Expert meeting was organized in UKZUZ Brno (laboratories), Olomouc (hotel Hesperia), March 13-14, 2014 – during the meeting, project partners presented their institutions and research activities and visited the laboratories of UKZUZ. The meeting was then continued in Olomouc, where Partners reported the current progress of the analyses and preliminary results and discussed the continuation of field and pot trials. Partners also agreed on other activities like data storage, reports, and management matters.

Visit to UKZUZ Laboratories, Brno 13 March 2014

Expert Meeting, Olomuc 13 – 14 March 2014

Assessment of SOM changes in the borderland

The report on "Assessment of the current content of SOM in the CZ-PL borderland" has been elaborated and published.

The changes in agriculture such as specialization and simplification of crop rotation lead to reduction of organic carbon input to soil, which in consequence can result in soil organic carbon decline. The study was aimed at evaluating status and trends in soil organic carbon (SOC) in agricultural soils of Polish – Czech borderland. The work involved two sources of historical SOC data: Czech "Basal Soil Monitoring System (BSM)" containing SOC data from 1992 and Polish soil survey containing soil reference profiles sampled in 1960 - 1984. Eighty locations, 40 in each country, were resampled in 2013 and samples were analyzed for SOC with the same methods as in the past.

The analysis revealed that current SOC content in agricultural soils of the borderland is generally medium or low, therefore there is a threat to proper soil functioning due to depletion of SOC. A significant correlation was observed only for relationships between SOC content and soil texture in both Polish and Czech soils. No statistically significant relationships between modelled carbon input from agriculture and SOC content were recorded.

Soils with initial low content of SOC exhibited accumulation of carbon within the assessment period whereas in the group of soils with initial SOC content between 1 and 2 %, an equal number of soils showed loss and accumulation of SOC. Decline of SOC was measured in most of soils with initial high content of carbon. Such phenomenon can be likely attributed to impact of agriculture: increased mineralization in intensively used soils rich in SOC and increased input of crop residues to soils with initial low SOC level. Initial SOC content and mean annual temperature had most significant impact on the SOC change trends in the region.

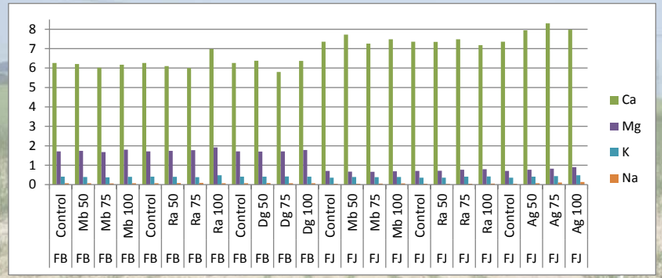
Results

Soil from pot in IUNG-PIB, Pulawy, Poland, and field experiments in Puste Jakartice (Czech Republic) and Braszowice (Poland), were used for laboratory analyzes. Samples from two samplings were used. First term, a month after the application of the EOM and the second term after harvest. Number of chemical (exchangeable cations, electric conductivity, hydrolytic acidity, pH_{H2O}, pH_{KCl}, salinity, extractable metals (1M HCl), organic carbon, total carbon, total nitrogen, labile fractions of OM, stable fractions of OM, nutrients, organic polutants), microbiological (acid phosphomonoesterase activity, alkaline phosphomonoesterase activity, basal respiration, CM-cellulase activity, denitrifying enzyme activity, C biomass, N biomass, N_2O production, N_2 production, time to the maximal respiration rate after the addition of substrate (glucose), specific growth rate (using glc), relative N_2O production, substrate-induced respiration, short-term nitrification, urease activity) and ecotoxicological analyses were performed.

The EOMs used in experiments were analyzed using chemical and ecotoxicological methods (microbial analyses, tests with plants and soil invertebrates) .

The plots below show some of the results of the laboratory analyses.

pH results - spring sampling



Selected chemical properties - autumn sampling

Organic matter– spring sampling