

Research Institute for Fodder Crops (RIFC), Ltd. Troubsko, the Czech Republic

KBBE.2011.1.1-02: Integrated approach to studying effects of combined biotic and abiotic stress in crop plants

Herbology

Weed control in fodder crops: exchange of experiences with weeds and weed control in:

- traditional and nontraditional leguminous crops (alfalfa, red and white clover, sainfoin, lotus, kidney vetch, crimson clover, Trifolium alexandrinum, resupinatum, fenugreek, melilot) - annual and perennial weeds, dodder
- maize - classical and GMO technology
- nontraditional fodder crops: safflower, forage mallow, canary grass
- pulse crops - chickpea, sweetpea, pea
- some medicinal, aromatic and spice plants (fennel, coriander, mentha, borage, salvia)
- weeds in other common agricultural crops

Virology

Research institute for fodder crops can offer certified virological laboratory. Our interest is in detection of plant viruses of fodder crops, winter wheat, spring barley, maize.

Entomology

In entomology problematic we monitored new pests in fodder crops (conventional and ecological method of cultivation). We monitored entomological biodiversity in alfalfa in location of South Moravia by emergence traps (conventional and ecological method of cultivation). In last six years we monitored a occurrence of *Diabrotica virgifera virgifera* in South Moravia. In this time we will make some research project in focusing on the monitoring methods and thresholds of harmfulness for selected field crops.

KBBE.2011.1.2-01: Sustainable management of agricultural soils in Europe for enhancing food and feed production and contributing to climate change mitigation

Following of sustainable management of agricultural soils is by the crop rotation with fodder crops cultivation which increases production of food and feed and at the same time decreases need of nitrogen fertilizers influencing climate changes. Further we follow suitable agricultural technologies through soil tillage system (conventional system, minimal system, minimal mulch system, direct sowing), through fertilization system (organic fertilization, mineral fertilization, foliar fertilization, green fertilizers), through the elements of crop integrated protection system (agrotechnics methods, chemical methods – toxicity and remanence, biological methods) and also through applied crop rotation, influence the quality of the soil and the amplitude interval of physical, chemical, thermal and biological soil features, and also several changes induced to accomplish energetically, hydrological and respiratory soil functions. Microbial activity we can follow by methods for determination of microbial biomass with measurements of metabolic processes. As global warming proceeds, it is expected to increase microbial activity, at least where water is not limiting, and therefore lead to an enhanced breakdown of organic matter in the soil, producing a large respiratory flux of CO₂ back to the atmosphere. Our department can examine the effects of elevated atmospheric temperature on the development of the soil microbial community.

KBBE.2011.1.2-02: Reducing mineral fertilisers and chemicals use in agriculture by recycling treated organic waste as compost and bio-char products

Reduction of mineral fertilizers used in agriculture means improvement of processes degradation in soil just through chemicals. On the contrary are decreased crop yields, which is possible increase by using of natural fertilizers (Ca, K, Mg) as well as enlistment of fabaceous plants in the crop rotation. Fabaceous herbage provides purposely plants nitrogen nutrition that is needed for high - quality growth and higher crop yield.

Infiltration capacity of soil is studied under different conditions - on the arable land and in the permanent grassland. On both sites three variants were established to study the effect of a range of compost rates on some soil characteristics. Further we study the problems of biodegradation of petroleum products in contaminated soils by composting. We follow technology of two-phase remediation of soil contaminated with diesel soil. This technology is tested *in situ* by using the action of organic matter with high microbial activity (compost) incorporated into soil and the rhizosphere of subsequently sown non-traditional crops.

Soil microbial biomass (SMB) is an active component of the terrestrial ecosystem that regulates many critical functions and properties related to soil and environmental qualities.

Methods for determination of microbial biomass are based on measurements of metabolic processes. Currently one of the most frequently used methods that we can offer are fumigation-extraction and incubation methods. Their advantage is that they allow determining the amount of carbon, nitrogen, but also phosphorus and sulphur in the microbial biomass.

KBBE.2011.1.2-03: Development of cover crop and mulch systems for sustainable crop production

To determine soil protection effects of intercrops in the erosion control system, erosive washing away of soil we monitor. The most suitable intercrop for soil surface protection against soil erosion is watched. The nontraditional intercrops are sowed after the harvest of the main crop. In erosion control effects we follow evident changes to soil structure, aggregate stability and soil permeability. Soil erodibility depends on a number of soil properties of physical, chemical and mineralogical character which can easily be measured. A major factor is the level of soil aggregate stability under the impact of falling raindrops, therefore erosion-prone soil should not remain long without any vegetation cover. As vegetation cover as mulch we make us nontraditional intercrops non-winter-hardy and winter-hardy, crop residues, straw and biomass plough down. Also we determine quantity of humus (oxidimetric determination of soil organic matter) content and quality interpreted as $C_{HA} : C_{FA}$ ratio. Amount of soil organic matter and its decomposition in the soil are dependent on soil tillage, therefore we study different tillage practices in region with different soil and climatic characteristics and consequently crop yields for sustainable crop production. We follow differences between deep loosening, shallow loosening, ploughing, mulch system, minimization and direct sowing.

KBBE.2011.1.2-04: Translating knowledge on flowering time to improve breeding efficiency

We are traditional partner in crop trials for many purposes under different climate conditions (4 locations) in Czech Republic. Our company has safflower, medicago and minority clovers breeding programs too. Bumble-bee lab produces pollinators for indoor pollination purposes.

We are able to make parental hybridization, lead segregation population and material testing under different Czech condition in large scale.

KBBE.2011.2.2-01: Development of functional foods and ingredients

We are traditional partner in crop trials for many purposes under different climate conditions (4 locations) in Czech Republic. Our company is owner of legally protected recipes for food with higher consumer quality (bread enriched by chickpea, kidney bean and lathyrus seed; mixtures for bread-making; sweet and salt cottage spreads fortified by safflower oil). We are able to produce wide crop spectrum (legumes, cereals, oil crops, medicinal plant) in small trial as well as large scale trial. Differ type and time of processing is obviousness (green mass harvest, hay production, grain harvest etc.).

KBBE.2011.3.5-01: GM crops in the EU – systematically assessing environmental and economic impacts

RIFC has long experiences with field trials for testing of GM maize and evaluation of impact on environmental, quality and economic impact. For farmers are important questions about plant protection strategies, about quality of final product, about total economic background in comparison with non-GM materials. RIFC has certificate of Czech state authority for field trials testing.