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Research Centre AgroBioTech

Slovak University of Agriculture in Nitra
Slovak republic



Research Centre AgroBioTech: New perspectives for agrofood industry

Basic information

Research Centre AgroBioTech (ABT RC) of the Slovak University of Agriculture in Nitra was established in 2015 under the project ITMS 26220220180 „Building AgroBioTech Research Centre“, the Operational Programme Research and Development, with the participation of three institutions:

- ❑ **Slovak University of Agriculture in Nitra**
- ❑ **Constantine the Philosopher University in Nitra**
- ❑ **Institute of Plant Genetics and Biotechnology, Slovak Academy of Sciences**

This new regional competence centre is equipped with top research infrastructure, which allows carrying out a research at international level in the fields of agrobiolology, biotechnologies, genetic technologies, food production, processing technologies for agricultural products, agroecology, bioenergy and bioeconomy.





<http://www.agrobiotech.sk/>



Research Centre AgroBioTech: Space for innovative research in different areas

Unique devices and equipment

AgroBioTech's workplaces and laboratories are equipped with the most advanced equipment. The only transmission electron microscope in Slovakia or second-generation sequencer for genetic analyses can be mentioned among a number of modern devices in the ABT RC. Within the laboratories of the ABT RC, scientists investigate e.g. biomass conversion into second-generation biofuels or technologies to be used for processing of the foods of both plant and animal origin. The ABT RC includes also laboratories of human nutrition, which allow verifying the health implications of consumption of certain foods through clinical trials.



Research Centre AgroBioTech: Departments, laboratories and other specialized workplaces

Department of Agrobiology

- ❑ *Laboratory of Production Physiology and Plant Ecophysiology*
- ❑ *Laboratory of Plant Nutrition and Ionomics*
- ❑ *Laboratory of Human Nutrition*
- ❑ *Laboratory of Explant Cultures*
- ❑ *Laboratory of Special Seed Production Techniques*
- ❑ *Laboratory of Agrobiodiversity and Genetic Technologies*
- ❑ *Laboratory of Experimental Botany*



Laboratories are oriented on basic and applied research of plant food sources and were created to provide a complete equipment cascade allowing that type of research. Their infrastructure allows detailed botanical, physiological and genetic characteristics of plants in relation to their production characteristics, as well as to quality of products for which they are planted. Specialized laboratory of human nutrition is focused on analysis of interaction of human body and food. Other laboratories provide physiological analysis, analysis of mineral elements in the soil, plants, water and other materials, genomic and transcriptomic analysis.

Department of Applied Ecology and Bioenergy

- ❑ *Laboratory of Applied Ecology*
- ❑ *Laboratory of Biomass Gasification*

The competence and professional activities of the Department of Applied Ecology and Bioenergy include know-how in the field of technology of cultivation of energy crops and herbs developed on ecophysiological characteristic basis. It is able to carry out production potential in specific soil and environmental growing conditions, to integrate results from different researches and to design models for wood processing and energy industry, based on quantitative experimental data. Results can be also used in a wide range of applied research in the field of biofuels research and energy use of agricultural biomass or food production waste.



Research Centre AgroBioTech: Departments, laboratories and other specialized workplaces

Department of Bioeconomy

- ❑ *Laboratory of Economic Studies*
- ❑ *Laboratory of Neuroeconomy and Consumer Decision-Making*

Professional activities of the Department of Bioeconomy and its specialized laboratories are as follows:

- analysis of prices, production, consumption and trade of energy crops;
- analysis of agricultural and energy policies;
- business plan and analysis (costs, revenues, return on investment, market position, market trends, competition, environmental impact and innovation);
- popularization of energy issues and mapping of public opinion;
- cost benefit analysis of bioenergy production in conjunction with environmental impact assessment;
- analysis of return on investment in bioenergy production;
- econometric modelling of agricultural markets and the effects of agricultural policies.



Research Centre AgroBioTech:

Departments, laboratories and other specialized workplaces

Department of Biosystems Engineering

- ❑ *Laboratory of Analysis of Biomass for Bioenergy*
- ❑ *Laboratory of Bioenergy Sources*
- ❑ *Laboratory of Innovative Technologies for Crop Production*
- ❑ *Laboratory of Raw Materials and Foodstuffs Physical Properties*

Department of Biosystems Engineering deals with wide spectrum of research areas. Among all, following research topics may be mentioned: possibilities to utilise crop biomass for pellets and bricks production, assessment of quality parameters of input material used for solid bio fuels production, assessment of technological parameters of solid bio fuels which are based on biomass, assessment of physical and mechanical properties of obtained products, design of production lines for solid bio fuels production. Laboratory of innovative technologies in crop production is aimed at precision farming technologies. Laboratory of physical properties of materials and food products is aimed at: measuring the effect of heat stress during the drying process on macro/micro damage of grain, research of material heat behaviour, effect of temperature on physical properties as well as research of rheologic and strength properties of materials.



Research Centre AgroBioTech: Departments, laboratories and other specialized workplaces

Department of Biotechnics and Landscape Modelling

- ❑ *Laboratory of Modelling of Urban Environment and Landscape*
- ❑ *Laboratory of Beverages “A”*



Research activities of the Department of Biotechnics and Landscape Modelling correspond with concept of the Healthy landscape. The long term goal is to promote awareness of environmental quality in the settlements, the development of sound management of the country and the effective use of biological value of horticultural crops. The research is focused on stabilization of urban ecosystem, landscape structures and landscape elements, as well as innovative technologies supporting the content of health beneficial substances in fruit, vegetables and grapes.

Research Centre AgroBioTech:

Departments, laboratories and other specialized workplaces

Department of Food Technology and Biotechnology

- ❑ *Laboratory of Cereals Technologies*
- ❑ *Sensory Laboratory*
- ❑ *Laboratory of Fats and Oil*
- ❑ *Experimental Brewery*
- ❑ *Laboratory of Beverages“B”*
- ❑ *Laboratory of Animal Origin Food*
- ❑ *Laboratory for Biologically Valuable Substances Analysis*
- ❑ *Laboratory of Animal Biotechnology*
- ❑ *Laboratory of Plant Biotechnology*
- ❑ *Laboratory of Experimental Biology*
- ❑ *Laboratory of Experimental Microbiology*



Department of Food Technology and Biotechnology is divided into 11 laboratories in which the research activities are focused on current experimental food processing technologies with emphasis on their effectiveness, utilization of raw materials and ecological approach. The individual laboratories are specialized in analyses of primary and secondary metabolites; analyses of less-known plant species; oil production using novel extraction technologies; evaluation of barley and malt quality to determine high quality malt cultivars; analyses of embryos and embryonic stem cells; identification, differentiation and characterization of cereals, pseudocereals and legumes using molecular and protein markers etc.

Integral Laboratories

- ❑ *Laboratory of Spectroscopic Analysis*
- ❑ *Laboratory of Genetic Analysis*
- ❑ *Laboratory of Microscopic Analysis*

The main research activities of integral laboratories:

- identification of point mutations associated with functional characteristics of plants and animals;
- genotyping of different microorganism species;
- study of cell processes causing increased production of antioxidants against oxidative stress;
- assessment of the impact of particular factors on cell processes;
- isolation and purification of DNA and RNA for the use in gene chip technology and sequencing;
- preparation of gene libraries for sequencing;
- manipulation with embryos and sperm of livestock (freezing – cryopreservation, genetic modifications);
- embryotechnologies focusing on assessment of embryos and sperm quality;
- isolation and utilization of embryonic and somatic stem cells in agricultural and biomedicine, one of the most perspective area in animal biotechnologies.



Research Centre AgroBioTech: Linking universities, research and practice

Transfer Centre

Along with the creation of the ABT RC, also the specialised workplace titled Transfer Centre was established. It offers a space for creating closer linkages among universities, research and economic practice. Main task of the ABT RC is to promote the transfer of knowledge, technologies and innovations from research and development area into commercial sector and to evaluate and actively use the results in practice. Transfer Centre is also aimed at cooperation with small and medium enterprises; popularisation of the results of science and research; protection of intellectual property; demand-driven research and expertises and, of course, international cooperation. ABT RC also created a platform for cooperation of foreign experts with Slovak scientists. This is the place where experts from both partner and cooperating institutions can implement their projects and researches.





Thank you for your attention

www.agrobiotech.sk

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