

# COMPASS

TO THE AGRICULTURAL  
RESEARCH INSTITUTES  
OF VISEGRAD 4

FOCUS ON THE BIOECONOMY



**Compass**  
**to the Agricultural Research**  
**Institutes of Visegrad 4**  
**Focus on the Bioeconomy**

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## Foreword



According to the estimates by the UN the world's population should stand at more than 9.5 billion people by 2050. In addition to population growth the life expectancy is rising as well, resulting a further increase in demand for food. The climate change and the limited availability of resources have a direct impact on the food supply as well on the production volume. These challenges can be answered with a broader interpretation of the agricultural economy moves towards a bio-based economy. Our goal is to develop in the Visegrad4 countries a well-functioning network among the scientists, public actors and farmers. We do our best to have a stronger cooperation between the actors. Our main research focus areas regarding the impact of the climate change are: freshwater fish production, exploiting the potential for protein crop production, pest and disease control, encourage cooperation among farmers, (increasing the value added use of agricultural and forestry biomass).

I am firmly convinced that environmental, social and economic processes can be reversed only with cooperation, for that reason our publication brings all research institutes of the Visegrad4 region together and as a result of our joint work provide available solutions for all concerning the future challenges.

For all the Visegrad4 countries the innovation both in agriculture and bio-based economy is a great opportunity which creates a real bridge between the practice and the research and development.

I believe that the performance of agricultural research is primarily based on the meaningful and measurable impact of innovation that means the research results to what extent and how effectively can contribute to market needs, standards of practical farming. In addition, I consider it important to develop agribusiness innovation networks in the member states.

The publication provides an opportunity for the research institutes, although in the future we must strive to ensure intertwining of the agribusiness networks in the Visegrad4 region and cross-border knowledge becomes available to all.

It is a pleasure to have this publication, which can help to put together a step towards the bioeconomy.

Budapest, 21 February 2017



Zsófia Kunya  
Innovation officer

Dr. Zsolt Feldman  
Deputy State Secretary for Agricultural Economy



## Global bioeconomy agenda

Globally, the bioeconomy has significantly gained in importance in recent years as a broad range of potential benefits has been detected by several countries. Amongst others, the EU and the OECD have emphasized the need for increased international cooperation to further facilitate the development of bioeconomic activities.

The bioeconomy requires new scientific knowledge, innovation and changing technologies to establish and develop biobased processes and to transfer natural resources into sustainable goods and services. Due to this fact, the bioeconomy and the traditional primary production in agriculture, forestry and fishery cannot be treated on an equal footing. The bioeconomy, encompassing both processing and services industries, is related also to the production of biological

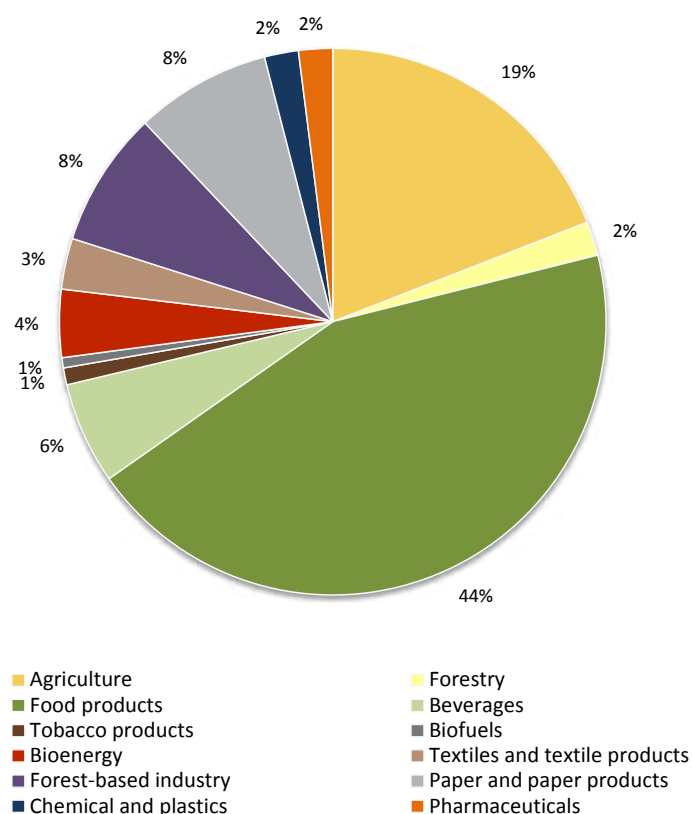
pharmaceuticals, bioplastics, composite materials, biofuels, biobased chemicals, cosmetics, high value foods coupled with the application of biological knowledge like bioinformatics or environmental engineering.

Global drivers, conducive to bioeconomy transitions are environmental pressure (e.g. climate change, biodiversity loss, land scarcity, safer water supply) and higher and volatile prices of fossil fuels, and growing population and life expectancy. Simultaneously with the drivers there are also constraints such as emerging environmental sustainability criteria, expansion of biobased feedstock use and ensuring global food security to be tackled.

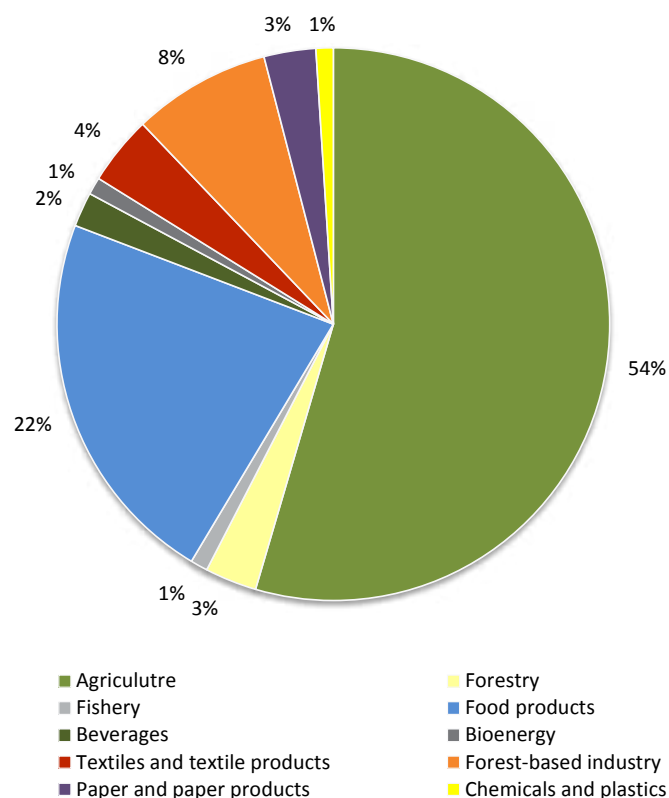
## Bioeconomy Policies around the World



Source: [http://gbs2015.com/fileadmin/gbs2015/Downloads/GBS2015\\_05\\_Bioeconomy\\_Around\\_World\\_Map.pdf](http://gbs2015.com/fileadmin/gbs2015/Downloads/GBS2015_05_Bioeconomy_Around_World_Map.pdf)



Turnover in the EU bioeconomy (EU28, 2013), Total 2.1 trillion EUR



Employment in the EU bioeconomy (EU28, 2013) Total: 18,3

Source: [http://biconsortium.eu/sites/biconsortium.eu/files/downloads/20160302\\_Bioeconomy\\_in\\_figures.pdf](http://biconsortium.eu/sites/biconsortium.eu/files/downloads/20160302_Bioeconomy_in_figures.pdf)

## Scope of bioeconomy in the EU

According to a definition provided by the European Commission, the bioeconomy encompasses the production of renewable biological resources and their conversion into food, feed, bio-based products and bioenergy independently of the processing technologies. It thus includes agriculture, forestry, fisheries, food and pulp and paper production, as well as parts of chemical, bio-technological and energy industries.

In 2012 a bioeconomy strategy was established at EU level with the aim of improving investments in research and innovation reinforcing policy interaction and stakeholder engagement, and enhancing the market and competitiveness in the bioeconomy sectors, however, due to the diversity of the different Member States the individual strategies adopted by them are far from identical but at the same time all of them set the goal to reach coherence in bioeconomy-related policies.

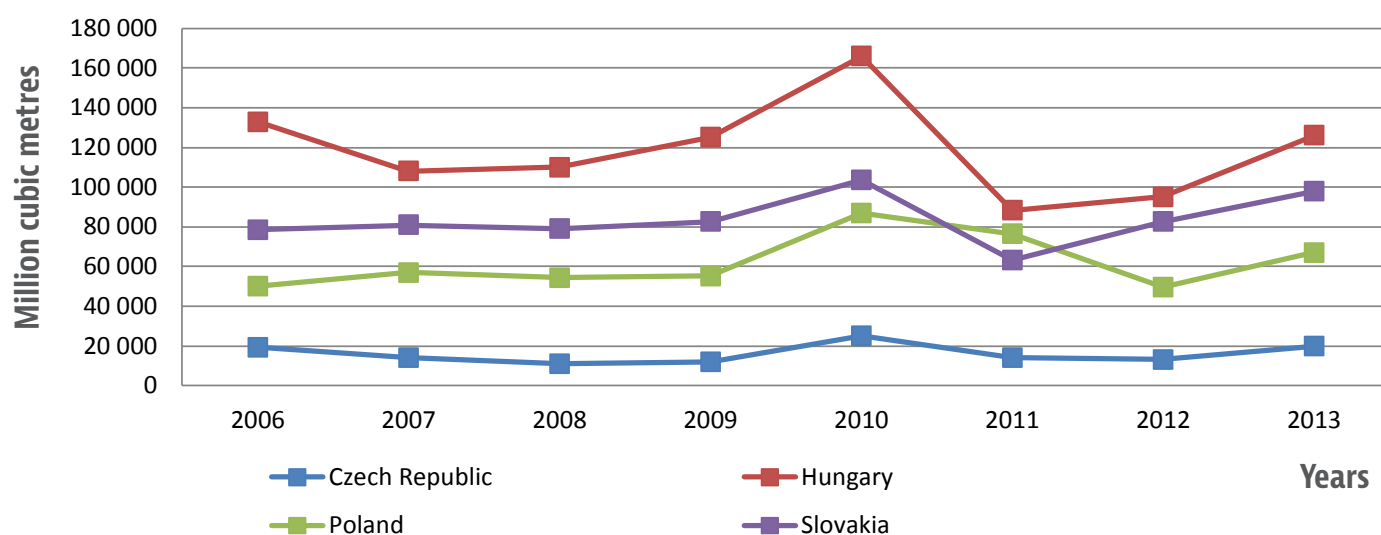
According to the authors of the European Bioeconomy in Figures the European bioeconomy generated an estimated turnover of app. €2.1 trillion and employed 18.3 million people in 2013. Almost half of the turnover and more than the half of the employed people came from the food and beverage sectors. More than 50% of the turnover was generated by agriculture, forestry and the bio-based industries. In terms of employment the strongest performing bio-based industries were the forest-based industry, paper and paper products and the textile industry.

In creating value by using resources more efficiently Europe can greatly benefit in areas such as the diversification and increase in farmers' incomes, building new value chains, meeting 25% of Europe's transport energy needs with advanced biofuels, the creation of a competitive biobased infrastructure, the replacement of oil-based chemicals and materials with bio-based and biodegradable ones to a greater extent than experienced today. Furthermore in the near future, biorefineries are expected to facilitate the conversion of biomass into higher-value every day products.

## Focusing on the Visegrad4

In order to achieve further progress in sustainable growth of agriculture, aquaculture and forestry in the bioeconomy we have to shift the emphasis to research, innovation and transnational cooperation for knowledge-based development. It is important to develop cooperative actions further and to establish a multi-stakeholder network on the basis of scientific excellence in order to find solutions to the specific challenges the macro-region faces. This booklet serves this purpose by aiming to increase the visibility of research capacity and potential in the field of agriculture, aquaculture and forestry in the bioeconomy in the Visegrad4 countries. The booklet is also an invitation to other countries to join the dialogue and discussion on the steps we have to take towards a more coordinated use of our regional resources.

## Renewable freshwater resources in the V4 countries



## General profile of the V4 countries

2015	Czech Republic	Hungary	Poland	Slovakia	Years
Area (1000 km <sup>2</sup> )	78,9	93,0	311,9	49,0	2015
Population (persons)	10 553 843,0	9 830 485,0	37 967 209,0	5 426 252,0	2016
Population density (inhabitants/km <sup>2</sup> )	134,0	106,0	122,0	111,0	2015
Life expectancy at birth (years)	78,9	76,0	77,8	77,0	2015
GDP (millions of EUR)	166 964,1	109 674,2	429 794,2	78 685,6	2015
GDP/capita (EUR)	15 800,0	11 100,0	11 200,0	14 500,0	2015
GDP growth (%)	4,5	3,1	3,9	3,8	2015
Inflation rate (%)	0,2	0,1	-0,7	-0,3	2015
Unemployment rate (%)	5,1	6,8	7,5	11,5	2015
Share of agriculture from Gross Value Added (%)	2,5	4,1	2,6	3,7	2015
Share of agriculture from employment (%)	2,9	4,9	11,5	3,2	2015
Share of population in predominantly urban regions (%)	24,4	17,8	25,5	11,5	2015
Share of population in intermediate regions (%)	54,3	63,1	39,5	50,9	2015
Share of population in predominantly rural regions (%)	21,2	19,0	35,1	37,5	2015
Total agricultural output (million euro)	4 674,2	8 414,0	22 712,6	2 178,0	2016
Crop output (million euro)	2 783,9	5 083,2	10 565,7	1 179,9	2016
Animal output (million euro)	1 692,8	2 745,3	11 505,9	732,5	2016
Others output	197,5	585,6	641,0	265,6	2016
Utilised agricultural area (1000 ha)	3 493,7	5 346,5	14 398,2	1 921,6	2016
Forest and other wooded land (1000 ha)	2 657,0	2 029,0	9 337,0	1 933,0	2010
Climate type	continental	continental	continental	continental	

Source: Eurostat

## Icons used in the booklet



agricultural engineering and machinery



mountain agriculture



pharmacology



crop and seed production, breeding



vegetable production and breeding



agro-forestry



agro-environment



dairy, milk industry



wetlands



crop protection



green energy



food safety



forestry



freshwater fish production / aquaculture



laboratory



viticulture



food processing and food security



agro-chemical industry



animal husbandry and breeding



apiculture



umbrella institution



nanotechnology



biomass for energy



network



fruit production and breeding



water management



biotechnology, genetics



rural development



soil management and irrigation



game management



ICT, GIS, robotics



veterinary



textile industry



economics



**Czech Republic**





CZ

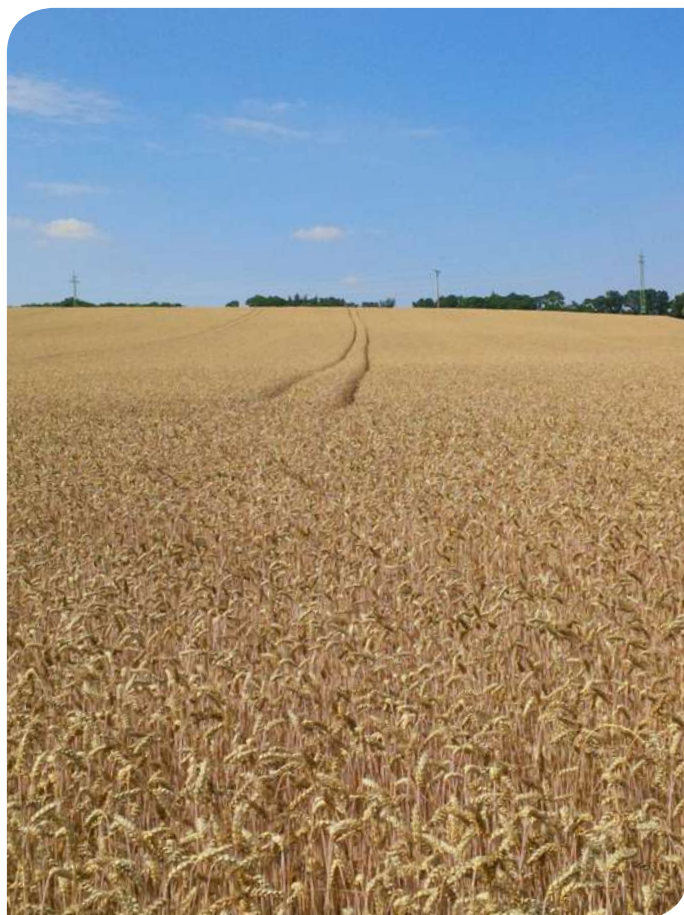
The Chamber is a public-law body dedicated to representing and defending the interests of agriculture and related sectors. It associates the majority of the entrepreneurs in agriculture, forestry and food processing industry. It provides advisory, consultation and legal services for its members.

- Sustainable agriculture
- Environmentally-friendly agriculture
- Bioenergy potential of the farming sector
- Water management
- Plant breeding
- Collaboration among farmers
- Shortening of long agri-food chains



Sustainable agriculture with an emphasis on agricultural water management and prevention of soil erosion and mitigation of drought effects. Drought can be usually divided into four categories, meteorological, hydrological, socio-economic and agricultural. Our research project covers aspects of all four but focuses primarily on the latter. Agricultural

drought is manifested by lack of water for plant growth and lasts from several weeks to 6-9 months. It can have severe impacts on soil precipitation, soil erosion, crop yields, and farmers' ability to produce sufficient food and, thus, on society as a whole.



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# Crop Research Institute

CZ



CRI has four research and experimental divisions, and 300 employees including 160 researchers working in agricultural and environmental sciences, focusing on sustainable crop production systems.

- Sustainable arable land management and cropping systems
- Genetics, plant breeding and plant product quality
- Environmentally-balanced systems of crop protection and plant health



The Crop Research Institute's mission is to conduct research leading to the development of sustainable systems and technologies of crop production. The objectives are to improve plant production potentials and to enhance the quality of food-, feed- and crop-based raw materials in a changing climate. The main research priority project is "Sustainable

systems and technologies, improving crop production for higher quality of production of food, feed, and raw materials, under conditions of changing climate" (coordinated by Dr. Kumar-Kundu).



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CULS was founded in 1906 and is now the third largest university in Prague. In addition to classical agricultural and forestry studies, CULS offers programmes in bioeconomy and environmental sciences.

- Food production
- Biotechnology
- Bioeconomy
- Environmental protection
- Specific aspects of sociology
- Economics
- Technical engineering
- Forestry sciences



At CULS we focus on research in food production, biotechnology, the bioeconomy, environmental protection, specific aspects of sociology and economics, as well in technical engineering and forestry sciences. Research outcomes often lead to important discoveries, for example in the ethology of domestic and wild animals, in biotechnology and biomedicine, as well

as strategic studies in social adaptability to situations caused by changes in the natural and socio-economic environment.



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The Institute is mainly engaged in chemistry, biochemistry and food analysis, the technology of functional foods and food supplements, and friendly manufacturing and storage processes.

- Food chemistry
- Biochemistry and microbiology
- Food technology
- Biotechnology and engineering



Research and development of special nutrition products and food supplements; vegetable homogenates (hop, ginger etc.); problematics of falsification of food, especially fish products. The Institute cooperates also with celiac support organisations, for which it compiles and updates the database of gluten-free raw materials and products. It also cooperates

with industrial subjects active in food production, with other research institutes active in food and agriculture as well as universities in the Czech Republic.



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CZ

The Institute has eight departments and more than 60 expert and scientific employees working in forestry research and development and providing expert advice to forest owners and state administration.

- Forest ecology
- Forest health monitoring
- Forest hydrology
- Monitoring of pest/pathogen activity
- Biology
- Breeding and seed management of forest tree species
- Afforestation and silviculture
- Game management



Mitigation and adaptation of climate change is one of leading topics in forestry. Productive Norway spruce stands are declining in several regions. New protective measures against biotic pests and pathogens are being proposed. Optimal forest species composition and appropriate forest management are modelled according the climatic scenarios

to maintain productive, environmental and social function of forest ecosystems. Growth and ecological adaptation of introductory tree species are intensively studied within both national projects and international cooperation.



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A public research institute, IAS undertakes fundamental and applied research as well as extension services, consultancy and education in the field of animal husbandry science and related areas.

- Biology of reproduction
- Genetics
- Physiology of nutrition
- Nutrition and feeding
- Product quality
- Farm technologies
- Ethology
- Farm management and economics



Projects are focused on R&D&I and practical use of knowledge in animal husbandry. The priority project of the IAS "Farm animal production on multifunctional agriculture" covers animal genetics, reproduction, physiology, nutrition, ethology, farm technology and management of farm animals. Its main aim is to increase profitability, competitiveness and

sustainability of the agri-food sector in the Czech Republic through research and transferring the latest research results to industry. The IAS also implements the national programme for Farm Animal Genetic Resources.



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Mendel University in Brno is the oldest independent specialised university in the Czech Republic. Carrying the name of the famous geneticist G.J. Mendel, it is composed of 5 faculties and 1 institute.

- Agriculture
- Forestry
- Horticulture
- Economics
- Regional development



The basic feature of research at Mendel University in Brno is the joint application of knowledge of biological, technical and socio-scientific disciplines in agriculture, horticulture, forestry, landscaping and timber, as well as the development of artistic disciplines in garden and landscape architecture and furniture. These are the basic level, but especially for applied research.

The research centres, grant-funded research, specific research (especially of the Ph.D. and Master's students) and participation in international research programs are some of the priority activities in the internationalization of the university.



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## Research Institute for Soil and Water Conservation

CZ



RISWC is a public research institute that undertakes research on soil use and protection, hydrology and water protection, soil and water contamination and land engineering.

- Soil use and protection
- Soil degradation
- Water supply
- Water protection
- Land engineering



The projects are focused on sustainable use of natural resources, soil, water and landscape. The projects deal with the topics of soil use and protection against degradation, water resources and their protection, water management and tools of landscape engineering.

The possible methodological proposals of agricultural husbandry on the soil are assessed for agricultural practice.



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Thirty research and development staff work in the agricultural engineering, technology, energy and building disciplines, and also problem solving in agriculture, rural areas and the municipal sphere.

- Biomass utilisation for fuel production
- Biogas production
- Animal breeding systems
- Soil water and erosion management
- Control of ammonia and greenhouse gas emissions
- Biologically degradable waste processing



Research activities deal with the following topics:

- Farming on Land with Reduced Soil Compaction: practical utilisation of the Controlled Traffic Farming System.
- Effect of Organic Matter on Water Holding Capacity in Dry Periods: utilisation of compost incorporated into soil to increase water retention and eliminate water erosion.

- Production of Solid Particles by Combustion Engines with Biofuels: utilisation of biofuels such as HVO, RME, N-Butanol, rapeseed oil, Jatropha curcas L. to reduce harmful substances from combustion engines of agricultural machinery.



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The present portfolio of the faculty reflects recent European trends – to complement the primary productive function of agriculture with its non-productive ones.

- Cattle, pig and horse breeding
- Protection of genetic resources
- Plant production
- Organic farming and food production
- Food quality control
- Landscape protection
- Water management in the landscape



Research at the Faculty of Agriculture has a strong applied character and cover a whole area of science and research at the Faculty including the preparation of projects, the solution of specific problems and use of results in practice. As examples, we can mention the application of knowledge in cattle and pig breeding, protection of genetic resources and

food quality control. Landscape is a significant research area, particularly water systems, remediation of areas devastated by mining and monitoring of the environmental impacts of nuclear power plants.



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UVPS Brno is the only university in the Czech Republic that specialises in veterinary medicine and veterinary hygiene and ecology. The Faculty of Veterinary Medicine meets EAEVE and FVE requirements.

- Veterinary public health
- Animal protection and welfare
- Animal diseases
- Veterinary ecology
- Animal and plant production
- Foods of animal origin



The Faculty of Veterinary Medicine is one of the key partners in the CEITEC project, the aim of which is to create a centre of scientific excellence in the field of biomedicine and material research. The project outcomes will contribute to the improvement of the quality of life and human health. The research activities of the Faculty of Veterinary Hygiene and

Ecology are focused on the health and hygiene of foodstuffs and raw materials of animal and vegetable origin from the perspective of organic production, safety and quality.



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VRI is the public research institute dealing with basic and applied research in the area of veterinary medicine and other fields of agriculture and biomedicine.

- Virology
- Bacteriology
- Immunology
- Food and feed safety
- Genetics and reproduction
- Chemistry and toxicology
- Pharmacology and immunotherapy
- Animal facility



Centre for Advanced Microbiology and Immunology in Veterinary Medicine (AdmireVet), which can be divided into two programmes - Veterinary epidemiology and diagnosis and Vaccines and prevention of infectious diseases; project Healthy animals as a source of wholesome food (OneHealth); CEITEC; XMAP multiplexing technology for comprehensive

detection of pathogenic agents important in terms of ensuring the protection of human and animal health; Centre study of the toxic properties of nanoparticles.



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**Hungary**



## Bay Zoltán Nonprofit Ltd. for Applied Research

HU



Bay Zoltán Ltd. is a network of institutions in Hungary. Having more than 150 employees and more than 200 industrial partners (mostly SMEs), it is the largest applied research company in the country working on the field of biotechnology, IT and engineering.

- Bioeconomy R&D in SEE
- Biotechnology in agriculture sector
- Biology based fertiliser production
- Biotechnology process quality control
- Technology and product development
- R&D in feed sector
- R&D in environmental sector
- Waste management and logistics



The priority research projects always focus on the needs of the SME or enterprise partners in the field of environmental protection and biomass production. Several nationally or EU financed, completed (ALGADISK, INTELLIREMED) and on-going (VEGAALGA, AGRIFORVALOR) projects serve as good practices in the long-term investment strategy of the Bay Zoltán

Nonprofit Ltd. These ensure the gradual and continuous, tailor-made developments for the partners in the case of prototype construction as well as technology or product development processes.



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The HCA was founded in 2013 as a public body performing governmental and public functions. It provides interest representation for all actors in Hungarian rural areas, precisely to its 400 thousand members (farmers, food industrial companies, retailers - the membership is compulsory for them).

- Collaboration among farmers
- Bioenergy potential of farming sector
- Water demand in agriculture
- Advisors' efficiency in simulating innovation
- Vertical coordination in agri-food chains
- Market potential of quality schemes
- Psycho-social factors of food choices



The HCA is looking for the opportunity to take part any projects which will produce results of potential value for the actors of the whole food supply chain, and so to its members. In these projects, the HCA focuses mainly on primary data collection and dissemination activities, thanks to its country-wide network and infrastructural capacity. Currently its main

goal is to explore and draw attention to the main challenges facing the agri-food sector, by stimulating relevant R&D&I actors to develop solutions as well as via the practical testing of the research activities and giving feedback. Thus the HCA can be a relevant partner in any kind of applied research and innovation project.



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MINISTRY OF  
AGRICULTURE

## Ministry of Agriculture, Department of Agriculture

HU



The Department of Agriculture is responsible for the operation of the research, development and innovation (R&D&I) area. The Department carries out its activities under the direction of the Deputy Secretary of State for Agricultural Economy.

- Establishment of strategic cooperation
- Providing professional support to the formation of EIP-AGRI Operational groups
- Compilation of white papers
- Compilation of analyzes
- Assessment of R&D&I sectoral needs and focus areas
- Preparation of government and ministerial-level management decisions



The tasks of the Department include the professional supervision of the Ministry's research institutes and the development and management of the national and international contact systems in the agricultural R&D&I area. Moreover, the task is to identify and analyze strategic focus areas for Hungarian agricultural R&D&I in the context

of the bioeconomy. Further aim of the Department is to strengthen transnational scientific and political cooperation in the Central and Eastern European macro-region, in order to increase the macro region's competitiveness of agriculture in the bioeconomy and to increase the regional and international visibility of the organisations operating in this field.



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**HU**

The Centre was established on 1 January 2014 by aligning the activities of twelve research institutes in the fields of agriculture and food science, while four institutes joined as companies. The entire Centre has around 800 researchers or closely research-related staff out of 1200 employees.

- Biotechnology
- Agricultural engineering
- Agro-environment
- Animal breeding and nutrition
- Forestry
- Food science
- Freshwater fisheries
- Irrigation
- Plant production and breeding
- Vegetable production and breeding
- Fruit production and breeding
- Viticulture



The NARIC Institute of Agricultural Engineering submitted a cross-border Interreg project plan in cooperation with the Slovakian Technical and Testing Institute in October 2016. The two institutions focus on biomass utilisation, other renewable energy sources, waste management and agroforestry, including R&D&I and knowledge dissemination activity. Based

on expertise and state-of-the-art laboratories, the objective is to strengthen professional cross-border partnerships and know-how transfer within the region.



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## Hungarian Horticultural Propagating Material Nonprofit LLC.



HU



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## ZKI Vegetable Crops Research Institute Company



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NFCO, as a central competent authority in Hungary, has significant knowledge in the fields related to soil and plant protection, plant and animal health and food and feed safety.

- Traceability research
- Developing risk analysis methods
- Effective laboratory diagnostic tools
- Effective risk communication methods



Our core R&D activities are connected to the new types of assessments, analysis and evaluation of food chain data (or other relevant e.g. climate datasets), including complex systems analysis, network science, data mining and other relevant applications of computational science (e.g. animal movement, business connection etc.). The other important

direction of our research activities is the seeking of new risk management and process control methods, exploring the possibilities of different ICT applications and traceability techniques.



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HU

The most significant centre of agricultural economics expertise in Hungary, AKI's activities include database- and policy analysis-driven research on farming, the agrifood supply chain, environmental management and rural development, plus data management and policy support to decision makers.

- Bioeconomy and policy evaluation
- Resource management in agriculture
- Agri-food value chains
- Rural development
- Freshwater aquaculture
- Agricultural decision-making tools
- Farm Accountancy Data Network
- Market Price Information System



AKI's project activities include national and international collaborative research (including EU Framework projects) on farming, aquaculture, the agrifood chain and rural development, capacity building (such as Twinning projects) in non-EU countries, expert technical support (for example to the Ministry of Agriculture) and consultancy. The Institute

coordinates BioEast, a Central Eastern European Initiative for Knowledge-based Agriculture, Aquaculture and Forestry in the Bioeconomy. It undertakes 17 statistical data collections in the frame of the Hungarian National Statistical Data Collection Programme and regularly produces cost, price, support and income data for products and sectors.

Volume 118, number 2, 2016



Farm sustainability  
Research papers • Econometrics  
Marketing • Rural sociology • Abstracts  
Environmental resource management  
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**Agricultural** policy analyses  
Review papers • **Economics**  
Agri-food supply chain management  
Knowledge based society • Reports  
Book reviews • Economic geography  
Rural development



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ÖMKi fosters international standard scientific research of organic agriculture in Hungary. In cooperation with many actors of the organic movement we implement R&D projects that have a high novelty level and practical applications, and thus support the further development of the sector.

- Organic arable cropping
- Organic horticulture
- Organic viticulture
- Organic apiculture
- Precision farming for organic production
- SMART sustainability assessment tools
- FP7 and Horizon 2020 projects (DIVERSIFOOD, DiverIMPACTS, OK-Net Arable, Healthy Minor Cereals, SolACE, LIVESEED)



The ÖMKi on-farm research network includes a variety of field trials implemented in a participatory manner on Hungarian organic farms. Experiments under real-life conditions are carried out within the original production goals set by the farmers. We test how types, varieties, preparations, methods and seed mixes perform under the diversity of everyday

practice. Participating farmers gain feedback directly from their own production experiences, land and technology. At the same time, the results give a broader picture of Hungarian organic production practices and applicable solutions. The results from all trials are published online with open access.



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SzIU has eight Faculties for education and research work in the automotive industry, IT, architecture, pedagogy, economics, law and administration, healthcare, musical arts, agriculture and the food industry. Several vocational, BSc, MSc, postgraduate courses and Ph.D. training are organised at the Faculty.

- Agricultural economics
- Agricultural biotechnology
- Animal husbandry
- Bio-based materials
- Bio-systems engineering
- Climate change
- Crop production
- Crop nutrients
- Food processing
- Functional foods
- Microalgae biotechnology
- Molecular genetics
- Probiotic products
- Rural development
- Waste recycling
- Weed management



One of our research projects entitled 'Microalgae biotechnology for sustainable agriculture' was co-financed by the European Union's European Social Fund. The research activities (three sub-projects and ten tasks) were carried out by a national consortium (Faculty of Agricultural and Food Sciences and Centre for Agricultural Research, Hungarian Academy of Sciences). Our

aim was to enhance the results from research into bio-pesticides and bio-fuels to bring them up to an international level and then make the research innovative by developing molecular biological techniques and applications. The production of valuable agricultural compounds from microalgae depends on the culture and biomass extraction methods used.



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SzIE consists of eight different faculties for life science studies and research with more than 1000 academic staff. Programmes are available at every level: vocational training, BSc, MSc courses. Degree programmes are offered in wide variety of subjects and there are ten PhD Schools.

- Organic farming
- Sustainability
- Environmental protection
- Food safety
- Nature conservation
- Water-saving irrigation
- Animal ecology
- Plant ecology
- Biodiversity
- Alternative energy
- Rural development



The priority research projects include the sustainable economic development of rural areas with special focus on the potentials of organic farming, the use of alternative energy sources, as well as environmental-friendly tourism activities, especially in the cross-border cooperation of rural and underdeveloped areas. Other research priority areas include ecotoxicology,

heavy metal and nanometal effects, soil monitoring, plant and animal biodiversity, population genetics, sustainable food systems, sustainable rural development, and water quality monitoring.



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HU

The profile of the predecessor of our faculty was clearly agro-economy, now general economics is included. We offer 2 BSc-, 3 MSc programs and a Ph.D. school in the field of agro- and bio-economy. Cca. 80 researchers work in this field for six institutes of the present faculty.

- Rural development
- Biofuels vs. food debate
- Animal breeding
- Agrar innovation
- Marketing
- Bioenergy methods
- Energy plants (e.g. algae)
- Sectoral economics
- Tourism
- Sport and agricultural management



One of our innovative bioenergy projects was implemented in the framework of the Baros Gábor Programme in cooperation with the University of Debrecen and Monergo Ltd. We studied an economical method of algae production on pig sludge that can be operated on animal farms with a modest level of investment. We analysed four algae species in the laboratory

and one of them, *C. vulgaris*, in outdoor conditions. The pot size, illumination, temperature, filtered versus unfiltered pig manure, water depth, aeration, CO<sub>2</sub> enrichment, fertilisation level and length of rotation period were tested. We studied biogas and feed use of algae and remain open for international cooperation.



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# University of Pannonia, Georgikon Faculty

HU



The first agricultural higher education institution in Europe. Education: BSc, MSc, higher educational training, dual study programme. Research: Ph.D. training, innovation, agricultural consulting service.

- Aquaculture
- Animal husbandry - feeding, biotechnology, plant breeding - production
- Plant physiology
- Agrochemistry
- Horticulture
- Viticulture
- Water management
- Plant protection
- Potato research



Plant science knowledge and service centre development at the UP Bio-innovation Research Centre. Development of fish farming technology. Research activities in the pig sector. Gene conservation. Interactive soil quality assessment. Establishment of the Centre for Poultry Innovation. Soil care for profitable and sustainable crop production. Multifunctional

field crop production for sustainable agriculture. Natural boundaries of economic balance.



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The Faculty is organised into three institutes. The 33 lecturers are involved in the BSc programmes in Hungarian and in English language, in the engineering assistant and postgraduate courses, and are also active in various fields of agricultural research.

- Sustainable crop production
- Plant and animal biotechnology
- Population dynamics of game species
- Forage conservation
- Market of local products
- Vegetable farming
- Rural development
- Gene conservation of old Hungarian breeds
- Optimisation of agricultural enterprises



Improvement of the dairy sector through higher nutrition efficiency, reduced waste production and optimised labour costs is currently being studied, the overall goal being to optimise profitability by using mathematical and operation research models. Reduced medicine usage and higher rates of safe milk resulting from the prevention of veterinary diseases

have management aspects. Optimisation of fertility traits aim at sustainable production. Studies on the improvement of forage conservation, feeding of by-products, manure treatment and processing, and on green energy production are in progress. New techniques lead to improved animal welfare, product quality and reduced ecological footprint.



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# University of Veterinary Medicine, Department of Animal Hygiene, Herd Health and Veterinary Ethology

HU



Our University was founded in 1787 and it has been in existence since then. Now the University deals with all aspects of veterinary research and education. Our Department research and teaching activity focuses on food producing animals, their multifactorial and management related disorders.

- Dairy cattle
- Poultry production
- Swine production
- Applied ethology
- Animal welfare
- Environmental hygiene
- Production disorders
- Preventive veterinary medicine
- Barn microclimate
- Heat stress
- Waste management
- Animal nutrition
- Mycotoxins
- Heavy metal pollution
- Herd health programmes



The Department focuses on two main research and teaching areas. Applied ethology studies

- the innate behaviour of farm animals,
- the behavioural patterns of animals kept in intensive farming systems or kept in close connection with humans,
- the effects of housing, nutrition and attendants' care on the behavioural patterns and welfare of animals.

Animal hygiene

- describes the preconditions of health preservation and investigates the pathophysiological changes brought about by adverse environmental effects,
- studies the aetiology and pathomechanism of multifactorial diseases,
- systematises the preventive veterinary measures with special reference to their economic consequences.



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## Poland

This booklet presents research institutes supervised by the Polish Minister of Agriculture and Rural Development. Polish science and research facilities acting for the benefit of the agri-food sector and rural areas, consist as well of other institutions, that could be found on the internet website: [www.minrol.gov.pl/eng](http://www.minrol.gov.pl/eng)





## Centre for Agricultural Advisory Services in Brwinów

PL



The Centre, with its three Branch Offices in Poznań, Kraków and Radom, is responsible for improvement of knowledge and skills of managers and specialist staff employed by Polish agricultural advisory services throughout the country. Coordination of standardised operations of 16 regional units.

- Training agricultural advisory staff
- Coordinating the Polish Network for innovation in agricultural and rural areas
- Promoting science achievements in agricultural and rural areas
- Creating databases and information systems
- Organizing educational events: courses, conferences, seminars, study visits



Improvement and standardisation of services provided by field advisors for farmers and rural communities. Supporting development of innovation through coordination activities of the Polish Network for innovation in agricultural and rural areas operating across Poland. A partner in Horizon 2020 projects and other development activities.



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PL

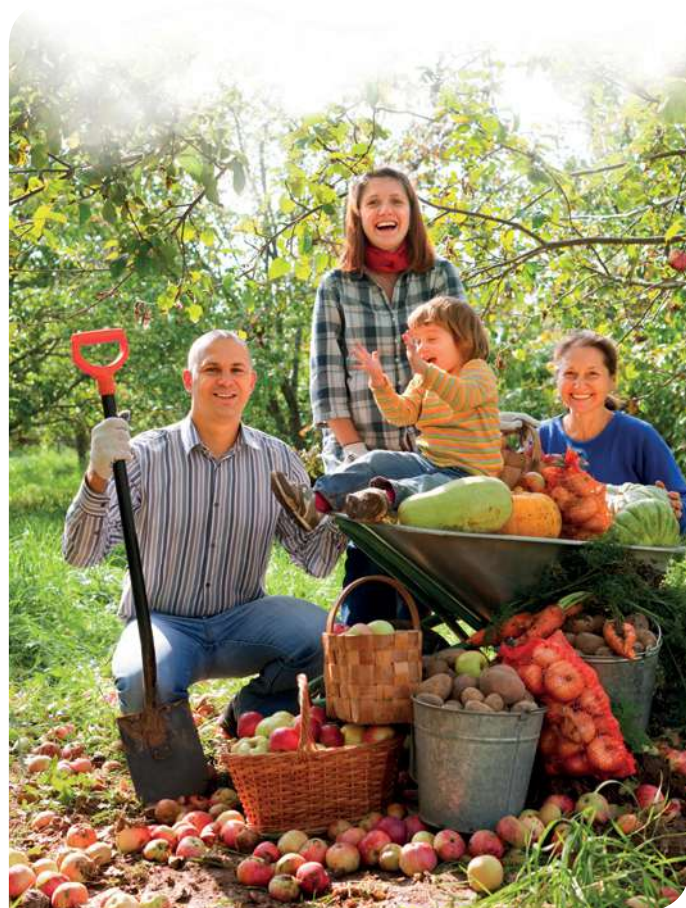
The Institute, set up in 1950, is the leading research centre in agricultural economics in Poland and Polish FADN Liaison Agency since 2004. It carries out research, organises conferences, grants academic titles and publishes research papers. Its key research areas include:

- Food industry economics and agri-food markets
- Economic modelling, farm statistics
- Farm efficiency, viability and organisation
- Rural development and entrepreneurship
- Knowledge transfer and innovation
- National and EU agricultural policies



Research projects: FP7 FLINT: Farm Level Indicators for New Topics in Policy Evaluation, PROLOCAL: strengthening cooperation and building knowledge on local food market formation in the Baltic Sea Region; International Visegrad Fund: The central-eastern EU model for competitive and sustainable agriculture and rural development; H2020

PERCEIVE: Perception and Evaluation of Regional and Cohesion Policies by Europeans and Identification with the Values of Europe. CERGE-EI 12th GDN RRC: Urban-rural connections: local policy and livelihood strategies. Since 2002 Institute has co-organised the scientific network in CEECs: European Rural Development Network: [www.erdn.eu](http://www.erdn.eu).



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## Institute of Natural Fibres and Medicinal Plants

PL



Established in 1930, INF&MP has 180 staff and is an interdisciplinary research centre of international standing, involved in research on obtaining and processing of fibrous and herbal raw materials.

- Breeding and cultivating fibrous and medicinal plants
- Product primary and secondary processing
- New product development
- Textile testing, functionalisation, flame and biodeterioration protection



The Institute conducts basic and applied studies in: molecular biology, genetic engineering, biotechnology and nanotechnology, breeding and agronomy of fibrous and medicinal plants, multifunctional material engineering and application in natural lignocellulosic and protein fibres, herbal plants, herbal products, plant medicines, dietetic and

functional food. The studies lead to innovative technological solutions in agricultural production, chemical and textile industry, human and veterinary medicine, and the pulp and paper, cosmetics, pharmacy and energy sectors.



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PL

IPP-NRI, established in 1951, is the main crop protection R&D centre in Poland. It has ten research departments, four regional stations and employs 301 staff including 97 scientific researchers.

- Integrated plant protection
- Pesticide resistance
- Decision support systems
- Pesticides residues
- Biological methods for crop protection
- Host-pathogen-environment interactions
- Tools for plant health



Projects include: PURE Pesticide Use-and-risk Reduction in European farming systems with Integrated Pest Management (FP7), CO-FREE Strategy to replace copper-based products as plant protection products in low input and organic farming systems (FP7), SENSAGRI Sentinels Synergy for Agriculture (H2020), Integrated Management of Phytoplazma Epidemics in

Different Crop Systems, EUPHRESKO II European Phytosanitary Research Coordination (Era-Net), DSS HERBICIDE Joint use of Danish Decision Support System for minimising outflows of herbicides (South Baltic CBC Programme).



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IUNG-PIB has 11 research departments and 11 agricultural experimental stations where 320 employees are involved in research on plant production and the impact of agriculture on the environment.

- Bioeconomy and innovation
- Agriculture and climate change
- Agriculture and the environment
- CAP/RDP and plant production
- Low-carbon agriculture
- Evaluation of farming systems
- Biotechnology and plant quality



IUNG-PIB coordinates the H2020 project "New Strategies on Bio-Economy in Poland", the aim which is to develop, extend and unlock the research potential of IUNG-PIB in accordance with the new global strategies trends and changes in national needs through the creation of a department of excellence on bio-economy and systems analysis. The

project focuses on improvement of research organisation and management, including administrative and policy structural changes, updating the R&I strategy, and a new approach to interdisciplinary research on the bioeconomy.



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ITP employs 340 persons and conducts R&D in natural sciences and technology. It has branches in Warszawa, Poznan, and Kludzienko, four regional centres, 10 scientific departments and three experimental farms.

- Protection of the environment and nature, agro-ecosystems, water resources, grasslands, landscape
- Plant and animal production technologies, rural infrastructure, renewable energy
- Machinery safety



Research projects cover agro-energy; conservation of rural nature, biodiversity and landscape; water and water-related resources; pollution and protection of water quality; sewage management. Examples of current projects: Wetlands conservation and restoration in "Puszcza Kampinowska" Natura 2000 site; Reducing nitrogen loss from livestock production

by promoting the use of slurry acidification techniques in the Baltic Sea Region; Research on improving energy efficiency and increasing the share of renewable energy sources in the energy balance of Polish agriculture.



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# National Council of Agricultural Chambers

PL



The main and basic task of the agricultural self-government is to act in order to solve problems of agriculture and represent the interests of its associated members. The agricultural chambers influence the shape of the agricultural policy and participate in its execution.

- Collaboration among farmers
- Water demand in agriculture
- Advisors' efficiency in simulating innovation
- Vertical coordination in agri-food chains
- Cost and profitability of agricultural production
- Improving the quality of agricultural products



We strive to improve the economic situation of farmers by providing specialist consultancy services, training programmes and legal advice in the area of financial support from national and EU funds. We petition government administration bodies for analyses of the problems the agricultural sector currently faces, opinion draft legal acts and highlight the current

needs for changes. We work intensively to continue the implementation of the actions that are already underway and to form new initiatives resulting from the changing position of agriculture in Europe and globally.



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PL

The Institute, the largest in the agricultural sector in Poland, works on animal breeding and animal production issues. It has 6 scientific departments, 9 experimental stations and 74 researchers.

- Genetics, breeding of farm animals
- Biotechnology of reproduction
- Conservation of genetic resources
- Cytogenetics, molecular genetics
- Nutrition, feed science
- Technology, ecology, economics of production



The Institute's projects involve: evaluation of feed raw materials for animal production, innovative technology of feed material production based on insect biomass, recycling strategies for livestock feeding, innovative technology of transgenic pig tissues application for biomedical aims, mesenchymal pig stem cells, their use in in vitro retrieval of

bovine embryos and pig somatic cloning, improving animal health and welfare in organic cattle milk production, and the analysis of the transcriptome of mesenchymal pig stem cells subjected to epigenetic modulation.



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The NVRI, established in 1945, is a scientific unit of the Ministry of Agriculture and Rural Development and has the status of a State Research Institute. It has 19 scientific units and 584 staff.

- Diagnostic methods for animal infectious diseases and zoonoses
- Analytical methods for testing of drugs residues, hormones, pesticides and environmental contaminants in food and feedstuffs



NVRI conducts applied research in veterinary medicine with an emphasis on the diagnosis and control of animal infectious diseases and the hygiene and toxicology of food of animal origin and feedstuffs. The Institute evaluates the quality of biological and diagnostic kits, provides expertise and consultancy for veterinary inspection and runs postgraduate

training for specialists in different fields of veterinary medicine. The NVRI's involvement in the bioeconomy is shown by the project "Development of a vector vaccine against Newcastle disease in poultry".



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IHAR-PIB employs 129 researchers and consists of 10 research departments, 6 research branch divisions, 6 experimental stations and 5 plant breeding companies operating in different parts of Poland.

- Biotechnology, biometrics
- Functional genomics, genetic engineering
- Host-pathogen-environment interactions
- Plant genetic resource conservation
- Seed standards and quality
- Sustainable agroecosystems



Research, education and dissemination of knowledge related to the problems of crop improvement, biotechnology and production technology. The Institute performs fundamental research in plant breeding, germplasm development and conservation of plant genetic resources for innovation and sustainability of Polish agriculture and food security. About

240 projects are carried out at the Institute, four EU projects and ten bilateral agreements. The research, development and innovative work of IHAR-PIB is carried out in close co-operation with practical plant breeders.



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The main profile of the Institute is to carry out research on food biotechnology, safe food production and storage, to support the development and innovation in agro-food industry and improve the quality of people life. IBPRS consists of 12 research departments with over than 200 employees, modern laboratories and above 600 accredited test methods.

- R&D for agro-food industry
- Food biotechnology
- Food safety and methods of analysis
- Agricultural waste reduction
- Packaging and storage



IBPRS carry out research in agro-food industry, including application of high-efficient microbial cultures in food and feed production, development of innovative technologies in food production and storage, technologies and recipes of innovative food products, food preservation and packaging technologies, design of control systems dedicated to

monitoring of food production, technological advisory for food industry, development of analytical methods for evaluation of food quality and safety. IBPRS takes part in the H2020 projects connected with the assessment of pig meat quality.



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PL

The Institute employs 450 people. Its research covers all areas related to fruit, vegetable, ornamental plant and bee sciences. Commercial activities include food, soil and plant analyses.

- Creative breeding
- Pest and disease control
- Integrated and organic fruit
- Vegetable production
- Horticultural engineering
- Bee science



The Institute is involved H2020, FP7 and other projects within Central European, LIFE and COST programmes and in bilateral projects within cooperation agreements in science and technology. It is an active member of the European Fruit Research Institutes Network. In Poland, the Institute coordinates the Centre of Advanced Technologies "AgroTech",

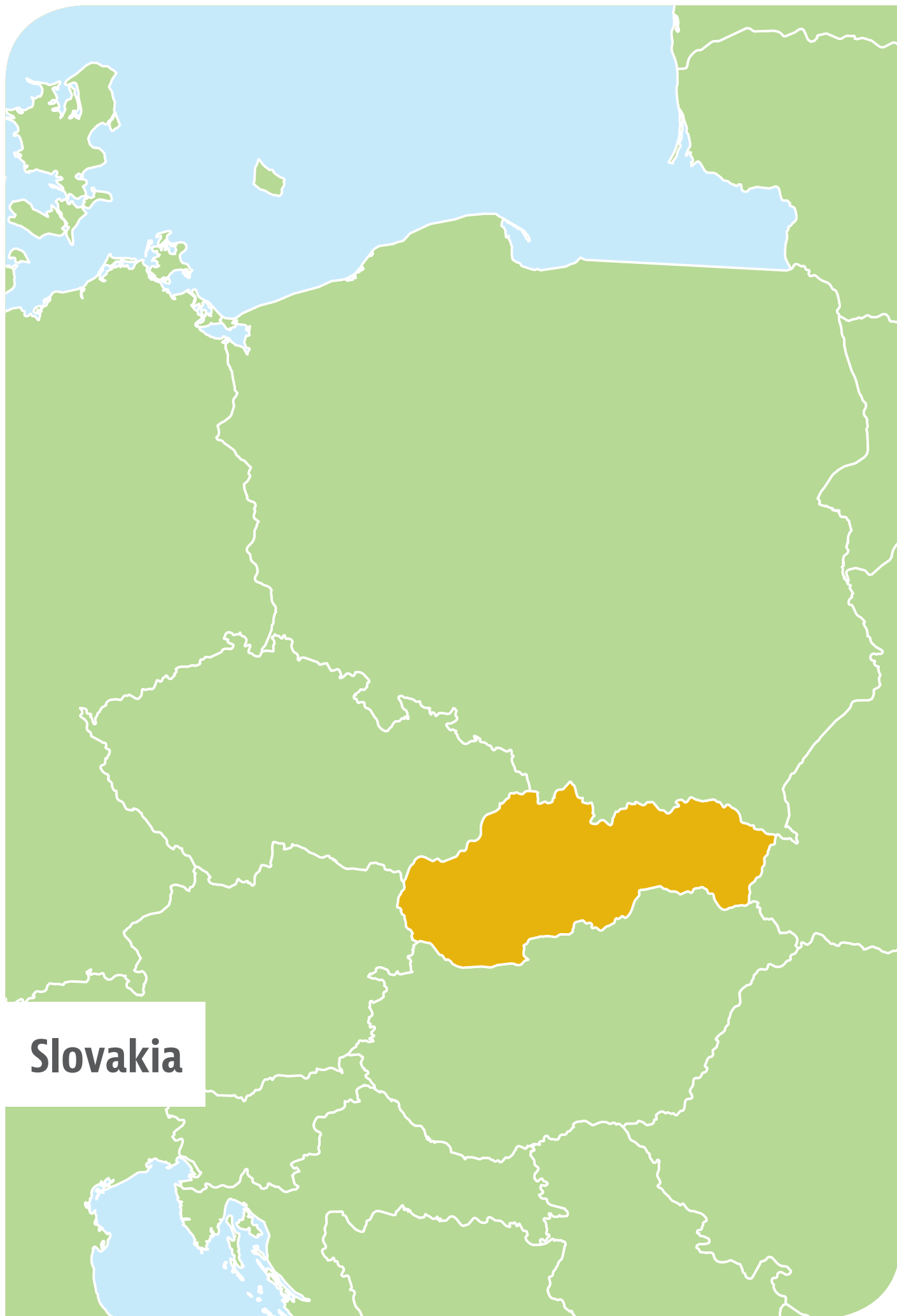
which is a cluster aiming at developing and implementing innovative technologies in the Polish agri-food industry, and the network "Agroengineering for sustainable development of agri-food industry and rural areas".



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**Slovakia**



SK

A state contributory institution which consists of eight research institutes engaged in comprehensive research and gathering of knowledge on the sustainable use and protection of natural resources.

- Animal production
- Plant production
- Food research
- Agricultural and food economics
- Agricultural technology
- Soil science and conservation
- Grassland and mountain agriculture
- Agroecology



BIOSKOH's Innovation Stepping Stones for a novel European Second Generation BioEconomy: The project is aimed at unique utilisation of phytomass for production of bioethanol using second generation technology. In addition to the production of bioethanol, the biorefinery will create employment opportunities in the region. NPPC partners with the company

Energochemica SE as one of the seven parties involved in the project, which is conducted with emphasis on cooperation between research institutions and end-users.



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## National Forest Centre - Forest Research Institute

SK



NFC-FRI performs complex tasks of applied research within forestry and forest-based industry in a progressive, dynamic way involving innovation development towards the bioeconomy.

- innovation development
- sustainable wood production
- cascade wood processing
- bioenergy
- biomass quality and utilization
- forest resources
- forest protection
- forest technologies and technical infrastructure
- regional development
- FBS strategies



H2020 LignoSilva: Centre of Excellence of Forest Based Industry, FP7 BIOCLUS: Developing Research and Innovation Environment in five European Regions in the field of Sustainable Use of Biomass Resources, FP7 IN2WOOD: Forest Clusters Development and Implementation Measures of a 6-regions Strategic Joint Action Plan for Knowledge Based

Regional Innovation, FP7 ARANGE: Advanced Multifunctional Forest Management in European Mountain Ranges, SEE FOROPA: Sustainable Networks for the Energetic Use of Lignocellulosic Biomass in South East Europe.



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SPPK was founded in 1992 according to the Law no. 30/1992 Coll. and is a non-governmental, statutory and self-governing institution. Membership has been voluntary since 1 January 2005. The members are mostly natural and legal persons operating in agriculture, the food industry and services.

- Sustainable animal and plant production
- Exploiting the potential for protein crop production
- Generation change in the agri-food sector
- Supply chain efficiency and increasing its added value
- Coordination in the agri-food chain



SPPK welcomes all projects for agri-food industry development. SPPK can play a role in the dissemination of knowledge, collection of data and transmission of information, organise seminars and training, and operate in the regional field. SPPK is a suitable partner for different types of organisation. It deals with governmental organisations, state based, NGOs,

self-governing organisations, professional chambers and others, and can create networks and strong regional capacity. The main objective is strengthening the position of farmers and food producers to ensure rural development, increase the representation of domestic products and improve the business environment for agri-food sector.



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# Slovak University of Agriculture in Nitra

SK



SUA in Nitra provides research and education mostly in the field of agriculture, bachelor, master and doctoral study programmes, and cooperates with agricultural practice and foreign institutions.

- Agrobiology
- Food resources
- Sustainable agriculture
- Biotechnology
- Food technology
- Agricultural machinery
- Gardening
- Landscape engineering
- Economics
- Management
- Regional development
- EU policies



FP7 projects: Exploring the future of Global Food and Nutrition Security; Knowledge Transfer Community to bridge the gap between research, innovation and business creation; Assessing and Monitoring the Impacts of Genetically modified plants on Agro-ecosystems; Scientific technological Advancement in research on Bioenergy, Animal Welfare Research in an Enlarged

Europe, Transparency of Food Pricing; Comparative Analysis of Factor Markets for Agriculture across the Member States, New Issues in Agricultural, Food and Bioenergy Trade.



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**SK**

STU is a modern educational and scientific institution with 17000 students yearly and successful participation in scientific and research programmes of the European Union.

- Biomonitoring
- Health
- Nutrition
- Biochemistry and biomedical technologies
- Environmental technology
- Nanotechnology
- Materials science
- Robotics
- Biomass processing
- Soil management
- Urban planning



The aim of the FP7 RECARE project is to develop effective prevention, remediation and restoration measures covering a range of soil threats across Europe. GRAIL is a FP7 project for the Knowledge Based Bio-Economy aiming to prevent and valorise bio-waste in biorefineries. Other projects in the field of biotechnology: biodegradable plastics; increasing the

cetane number in biofuels; innovative methods of wastewater treatment (urban and agricultural area); new methods of lifestyle diseases treatment using nanotechnology; integrated spatial planning, land use and soil management.



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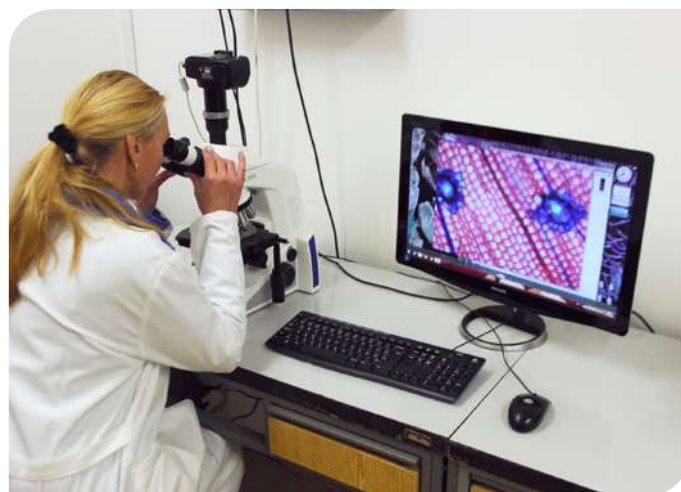
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The university mission is to develop creative scientific research and based on this to provide higher education at all three levels of study in the Slovak and European research and educational area.

- Forest management and protection
- Game management
- Forest phytology
- Wood properties
- Wood constructions
- Nature conservation
- Landscape ecology
- Forestry machinery
- Biomass
- Environmental engineering



Research areas: (I) adaptive forest management, (II) biodiversity, landscape architecture, (III) design and production of furniture, construction of wood structures, (IV) development of forestry and wood-processing machines. Partner in the FP7 projects "Future-oriented Integrated Management of European Forest Landscapes" (INTEGRAL)

and "Ecological Application of Nanosorbents on the Base of Natural and Synthetic Ionites and Carbons" (ECONANOSORB) and the H2020 project "Alternative models and robust decision making methods for future forest management" (ALTERFOR).



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# University of Veterinary Medicine and Pharmacy in Košice



SK

UVMP is a monofaculty university, internationally evaluated and accredited by EAEVE with educational and research activities. More than 200 researchers work in the fields of agricultural research.

- Food hygiene
- Internal, infectious, parasitic diseases of animals
- Veterinary surgery
- Gynaecology
- Nutrition of animals
- Zoohygiene and environment
- Microbiology
- Immunology
- Neuroscience
- Pharmacy



Research at UVMP in Košice focuses on the One Health concept. There is national and international cooperation in scientific programmes and grants in the field of animal health and morbidity, defining predisposition to internal diseases, infectious diseases and production of safe food, with a particular focus on zoonoses, quality of the environment for

ensuring the health of animals and people, with development of new drugs within pharmacogenetic and toxicological interactions with application of molecular biology methods and bioinformatics.



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**Published and funded by**

Ministry of Agriculture of Hungary

**Editors**

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Ministry of Agriculture and Rural Development of Poland

Ministry of Agriculture and Rural Development of the Slovak Republic

**ISBN**

978-615-5673-04-7

**Created by**

Gelbert Eco Print Ltd.

