

**RESEARCH ACTIVITIES
OF THE
FACULTY OF AGRICULTURAL AND FOOD SCIENCES
SZÉCHENYI ISTVÁN UNIVERSITY**

January 1, 2020

Faculty of Agricultural and Food Sciences



Vár Square 2, H-9200 Mosonmagyaróvár, Hungary



+36 96 566 637



+36 96 566 620



ovardekan@sze.hu



<https://mek.sze.hu>

Editor:

Dr. habil. Zoltán Molnár PhD
Deputy Dean for Research Affairs

HEAD OF DEPARTMENT: DR. JUDIT HEGYI PHD

CONTACT

Adress: Vár Sqr. 2, H-9200 Mosonmagyaróvár, Hungary

Phone: +36 96 566 701

E-mail: hegyi.judit@sze.hu

Web: <http://agrecorural.sze.hu>

DEPARTMENT STAFF

Dr. Rózsa Csatai CSc, associate professor, Dr. Nóra Gombkötő PhD, assistant professor, Dr. Judit Hegyi PhD, associate professor, Dr. Károly Kacz PhD, associate professor, Dr. Sándor Kalmár PhD, associate professor, Dr. Katalin Mezei PhD, associate professor, Dr. Éva Szalka PhD, associate professor, Dr. Imre Tell CSc, associate professor, Dr. Szabolcs Troján PhD, associate professor, Dr. Anita Miklósné Varga, assistant professor, Judit Tarró, PhD student.

DEPARTMENT RESEARCH CAPACITY

Number of full-time lecturers: 10

Qualified ones: 10

Number of students taking part in PhD study: 1

DEPARTMENT OVERVIEW (RESEARCH)

The Department of Agricultural Economics and Rural Development was named in October 2016. As a result of many reorganisation within the Faculty the Department functioned within the framework of several legal predecessors involving several constellation (these were as follows: Department of Farm Management (since 1954), Department of Business Economics (since 1987), Institute of Farm Economics (since 1996), Institute of Economic Sciences (since 2005), Institute of Business Economics and Management Sciences (since 2009), Institute of Economic Sciences (since 2011).

Main research areas:

- Community supported agriculture
- Human resources in food industry
- Support opportunities of getting employment in labour market

- Role of agricultural Universities/agricultural faculties in regional economic development (science lab)

Research services:

- Economic analysis, evaluation and research of agri-food industry (sectoral/business)
- Revealing of consumer and customer preferences with qualitative and quantitative market research methods
- Preparing and executional supporting of strategic decisions with market research methods
- Solving tasks of work organization, preparation of proposal for rationalization
- Economic calculations, efficiency studies, cost and income calculations

DEPARTMENT RESEARCH AREAS

1. short food supply chains (SFSCs), community supported agriculture
2. agricultural marketing, food marketing
3. economic analysis, efficiency studies
4. labor market research
5. role of agricultural faculties in rural development

RECENT RESEARCH PROJECTS OF THE DEPARTMENT

TÁMOP-4.1.1.C-12/1/KONV-2012-0012, GREEN ENERGY COOPERATION IN HIGHER EDUCATION, SUPPORT OF REGIONAL AND SECTORAL COOPERATION IN HIGHER EDUCATION, PROMOTION OF INTEGRATION IN RURAL HIGHER EDUCATION / SUBPROJECT: DEVELOPMENT OF MENTORING SERVICES BASED ON SECTORAL COOPERATION

Project Period: 2013 – 2014

Source: European Union and the Government of Hungary

Total Project Funding: 17,000,000 HUF

Project Leader: Prof. Dr. Béla Horváth, full professor, horvathb@emk.nyime.hu

Aim of the research is to reveal the developing opportunities of mentor system of socially disadvantaged students as well as to get to know the adapting problems of socially disadvantaged students in higher educational institutions in order to guarantee social equal opportunities.

As a result of researches the main specifications of involved students were surveyed in the interest of development of a mentor network. Information obtained as a result of the survey provide a good basis of a functional network of mentors.

TÁMOP-4.2.1.D-15/1/KONV-2015-0010, COOPERATIO FIDELISSIMA, INNOVATIVE COOPERATION OF SOCIAL AND ECONOMIC SCIENTIFIC RESEARCH NETWORKS AT UNIVERSITY OF WEST HUNGARY / SUBPROJECT: ELABORATION OF COMMUNITY SUPPORTED AGRICULTURAL MODEL

Project Period: 2015

Source: European Union and the Government of Hungary

Total Project Funding: 8,000,000 HUF

Project Leader: Prof. Dr. Csaba Székely, full professor, szekely@ktk.nyme.hu

Position of community supported farms was surveyed in the region and their problems were analyzed. The community supported system was propagated by means of different forum with the help of the involved higher educational persons. A special model of community supported agriculture was elaborated.

INTERREG V-A AUSTRIA-HUNGARY COOPERATION PROGRAM, SUPPORTING BUSINESS CREATION AND STRENGTHENING REGIONAL INNOVATION CAPACITIES WITH TRAINING, MENTORING AND BUILDING A CROSS-BORDER START-UP COMMUNITY

Project Period: 2018-2020

Source: European Union and the Government of Hungary

Total Project Funding: 61,752,692 HUF

Project Leader: Dr. Gergely Teschner, assistant professor, teschner.gergely@sze.hu

The aim of the project is to strengthen young entrepreneurs by mentoring and coaching services, to increase innovation capacity of young enterprises (<5 years) in border regions, and to establish a cross-border business start-up community in order to establish long-term innovation and business cooperation. Within the project, individual (mentoring, coaching, consulting) and group (workshops, company visits) counseling events are going to take place. At the group events the Austrian and Hungarian participants are going to discuss the raised issues together. In the border regions, the same methodology is used to assess the performance of the innovation, which makes it possible to compare the results.

DEPARTMENT OF ANIMAL SCIENCES

HEAD OF DEPARTMENT: DR. LÁSZLÓ GULYÁS PHD

CONTACT

Address: Vár Sqr. 2, H-9200 Mosonmagyaróvár, Hungary

Phone: +36 96 566 695

E-mail: animal.scinces@sze.hu

Web: <http://ansci.sze.hu>

DEPARTMENT STAFF

Prof. Dr. Ágnes Bali Papp PhD, full professor, Prof. Dr. Borisz Egri DSc, full professor, Dr. László Gulyás PhD, associate professor, Dr. Erika Lencsés-Varga PhD, associate professor, Dr. László Pongrácz PhD, associate professor, Dr. Klaudia Szalai PhD, assistant professor, Dr. Károly Tempfli PhD, associate professor, Dr. Eszter Zsédely PhD, associate professor, Kovácsné Prof. Dr. Katalin Gaál CSc, professor emerita, Prof. Dr. János Schmidt DSc, MHAS, professor emeritus, Prof. Dr. Ferenc Szabó DSc, professor emeritus, Attila Németh, research assistant, Gabriella Uram, managing expert, Béla Burkus, technical assistant, Katalin Némethné Wurm, administrator, Csaba László Farkas, PhD student, Emil Balázs Herceg, PhD student, Béla Húsvét, PhD student, Róbert Kádár, PhD student, Gustav Ingo Struck, PhD student, Andor Szabados, PhD student, Vivien Szabados, PhD student, Violetta Tóth, PhD student, Orsolya Vida, PhD student.

DEPARTMENT RESEARCH CAPACITY

Number of full-time lecturers: 10

Qualified ones: 8

Professor emerita / emeritus: 3

Number of students taking part in PhD study: 9

DEPARTMENT OVERVIEW (RESEARCH)

Applying up-to-date molecular genetic methods in animal husbandry: There are numerous methods to raise the efficiency of production. With the help of these methods the proportion of the desirable allele (which possesses a better productivity-rate) could be increased in the livestock. While examining DNA polymorphism in different farm animals (cattle, pig and poultry) we are enabled to construct a certain

feed mixture by which the genetically determined protein and fat metabolism genes of animal population could be influenced in order to meet the criteria of human nutrition.

To decrease the harmful effects of climate change, examinations were taken on the livestock, such as heat shock and stress protein genes. To enrich the appropriate alleles in the stocks hereby reduce the caducity and wrong quality animal number.

We examine behavioral candidate gene tests to breed new, less aggressive hybrids for international competitiveness. RNA expression assays are suitable for comparing different holding techniques with the effect of different holding systems on gene expression.

Healthy (bio) food production: The use of herbs and herbal medicines in conscious human nutrition is getting more and more significant. The use of herbal medicine in animal feeding could elevate the level of the livestock's health protection (stress decreasing and regeneration of the hepatic state) also that of the efficiency of production, nutritional value and taste of certain products (meat, milk and eggs), hence the agents of the herbs fed to the stock are selected in them. The presence of these agents can be proved by analytical methods. Examining the positive influence of herbal supplementation on the digestion system by the genetic examinations on the changes in the compound of bacteria of the intestinal flora.

Pork as a model animal of various human diseases: the similarity in human and porcine anatomy and especially that of the digestive system enables us to model the inflammatory organism, pathogen bacteria in intestinal flora, and these results could also be well adopted in human medicine.

Analysis of major production traits in ruminant species: Milk production, milk composition analysis in dairy cattle populations, improvement of milk yield and quality under various genetic, housing, and feeding conditions. Improvement of fertility and reproduction traits, analysis of reasons for culling in dairy and beef cattle populations. Analysis of production traits, fertility and reproductive performance, germ cell preservation, development and improvement of novel technologies for insemination in small ruminants (sheep, goat).

Occurrence and analysis of the potential effects of stress and compulsive behavior in sport horses: Methods of traditional stress analysis in sport horses, blood and salivary cortisol measurements, analysis of heart frequency. 2D and 3D technologies are currently applied for the behavioral, kinetic and kinematic analysis of horses; the afore-mentioned technologies are further applied in the analysis of stress-related effects and compulsive behavior.

Effect of glycerin supplementation on milk production and composition of lactating sows: Effect of different sources of glycerin supplementation on milk production performance and various blood parameters of lactating sows is analyzed.

Effects of ectoparasites on wild ruminants: Prevalence and quantitative parasitological characteristics of hair lice, deer louse flies, and botflies are analyzed in roe deer, red deer, chital, Père David's deer, sika deer, and Indian antelope populations.

DEPARTMENT RESEARCH AREAS

1. Application of molecular genetic methods in animal breeding
2. Application of herbs and glycerin supplements in animal nutrition
3. Improvement of fatty acid profile in animal products through nutrition
4. Analysis of milk quality and reasons for culling in dairy populations (cattle, sheep, goat)

5. Germ preservation, development and improvement of novel insemination technologies in small ruminants
6. Effects of ectoparasites on wild ruminants
7. Genetic preservation of the Yellow Hungarian chicken breed

RECENT RESEARCH PROJECTS OF THE DEPARTMENT

IMPROVEMENT OF INTERNATIONAL COMPETITIVENESS BY THE LOCAL DEVELOPMENT OF A LAYER CHICKEN HYBRID CONCERNING EUROPEAN PRIORITIES AND WITH THE APPLICATION OF INNOVATIVE SELECTION METHODS

Duration: 2019-2021

Financing: 2018-1.3.1-VKE-2018-00042 (NKFIH)

Total Project Funding: 150,000,000 HUF

Project Leader: Prof. Dr. Ágnes Bali Papp PhD, full professor, bali.papp.agnes@sze.hu. Dr. Eszter Zsedely PhD, associate professor, zsedely.eszter@sze.hu

In the framework of the project, we investigate the genotype of the candidate genes and behavioral properties associated with behavior in different crossings based on the SNP diagnosis and on the initial genotype. Investigating the production of new genotype groups for the development of new hybrids under different housing and feeding conditions. RNA expression assays are suitable for comparing different technologies to evaluate how different support systems affect gene expression.

DEVELOPING COMPLEX TECHNOLOGY TO PREVENT OR CURE ARTERIES-CATASTROPHY, WHICH OCCUR DURING TURKEY KEEPING (PROJECT NUMBER: GINOP-2.1.1-15-2016-00886) – OUR DEPARTMENT WAS ENTRUSTED WITH CARRYING FEEDING TRIALS OUT IN THIS PROJECT

Project Period: 2017 – 2018

Source: Ministry of National Development

Total Project Funding: 37,505,919 HUF

Project Leader: Prof. Dr. János Schmidt DSc, MHAS, professor emeritus, schmidt.janos@sze.hu

The aim of the trials is to develop feeding technology, which can reduce or prevent the occurrence of arteries-catastrophes. This disease cause remarkable economic damage for turkey feeding farms. The effect of different feed supplements has been investigated during three feeding experiments

VKSZ-12-1-2013-0034, AGRÁRKLÍMA 2. ADAPTING TO CLIMATE CHANGE IN PASTURE PRODUCTION AND PASTURE-BASED ANIMAL PRODUCTION

Project Period: 01.10.2014. – 30.09.2018.

Source: Ministry of National Development

Total Project Funding: 3,500,000 HUF

Project Leader: sub-project at the Department Prof. Dr. Ferenc Szabó DSc, full professor, szabo.ferenc@sze.hu

The aim of the project is to identify factors affecting pasture production and quality, determine the extent of risks related to climate change, and to evaluate pasture yields using different climate scenarios. We aim to develop strategic recommendations for grassland management and pasture-

based animal production, and to elaborate technological mitigation proposals for different types of Hungarian grasslands, and for their utilization with different breeds and age groups of cattle and sheep.

DEPARTMENT OF BIOSYSTEMS ENGINEERING

HEAD OF DEPARTMENT: DR. ATTILA KOVÁCS PHD

CONTACT

Address: Vár sqr. 2, H-9200 Mosonmagyaróvár, Hungary

Phone: +36 96 566 654

E-mail: bioeng@sze.hu

Department homepage: <http://bioeng.sze.hu>

DEPARTMENT STAFF

Dr. Attila Kovács PhD, associate professor, Dr. Enzsöl Erzsébet PhD, associate professor, Dr. Gábor Milics PhD, associate professor, Dr. Anikó Nyéki PhD, assistant professor, Gergely Teschner PhD, assistant professor, Imre Tolner, lecturer, László Ásványi, technician, Edina N. Kálmán, secretary, Henrietta Buzás, technician, István Kulmány, PhD student, Tibor Horváth, PhD student, Attila Pörnecezi, corr. PhD student., Viktória Vona, PhD student, Henrietta Buzás, PhD student, Bence Horváth, PhD student, Bálint Ambrus, PhD student, Jakab Kauser, PhD student, Prof. Dr. Miklós Neményi DSc, professor emeritus, MHAS, Dr. Károly Kacz CSc, professor emeritus.

DEPARTMENT RESEARCH CAPACITY

Number of full-time lecturers: 6

Professor emeritus: 2

Qualified ones: 6

Number of students taking part in PhD study: 8

DEPARTMENT OVERVIEW (RESEARCH)

The research activity of our department is diverse. It includes data collection, sensor techniques and sampling methods needed for precision agriculture and site-specific plant production activities. These complemented with UAV (unmanned aerial vehicles or drones) techniques and remote sensing. These results contribute to the examination of the effects of climate change in connection to the development of decision support models (e.g.: DSSAT). Examinations were carried on utilization of bio-based materials. The usability of oil-seeds and cereals (starch) as raw-materials for biofuels (bio-diesel and bio-ethanol respectively) production are compared and tested. Research activities were carried

out on development of algae bioreactors and the conditions and parameters of algae production. Examinations of starch-based plastics were also carried out. Food technological and food unit operational related researches include drying test of different commodities (such as apple chips) and heat and mass transfer (FE) modeling of the processes. In addition to the optimization of alcoholic fermentation (e.g. the effect of microwave pre-treatment) were also in the focus of our interests. Geostatistical analysis using the software ArcGIS. Comparing different interpolation methods. Developing of software using Visual Basic. Data analysis applying multivariate statistical methods using the software Statistica.

DEPARTMENT RESEARCH AREAS

1. technical background and sensors in precision plant production
2. food unit operation in food engineering (drying, fermentation)
3. climate change research
4. processing and testing of bio-based materials (bio-plastics, bio-fuel)
5. development of photo-bioreactors (algae projects)
6. comparing different calculation methods of the evapotranspiration
7. evaluation of the crop yield using a successive approximation method

RESEARCH PROJECTS OF THE DEPARTMENT

THEMATIC EXCELLENCE PROGRAM - 2019

Project Period: 03. 06. 2019. – 31. 05. 2020.

Source: National Research, Development and Innovation Office (NRDIO)

Project Funding: 44 M HUF

Project Leader: Dr. Attila Kovács PhD, associate professor, Deputy Dean (International Affairs), Head of Department, kovacs.attila@sze.hu

The purpose of this project is to set up an efficient, sustainable research team capable of carrying out research, development and innovation activities in all areas of precision crop production to meet the future challenges of agriculture. To achieve this goal, the human resources of the Precision Crop Production Research Group must be effectively co-ordinated and modern R&D equipment is procured. As a result of this development, the specific research innovation system will be able to take advantage of the benefits of remote sensing and wireless data transfer to carry out countless field research and development activities autonomously. Our goal is to create one of the most modern agricultural high-tech research centers in Hungary.

DEPARTMENT OF FOOD SCIENCE

HEAD OF DEPARTMENT: DR. ERIKA HANCZNÉ LAKATOS PHD

CONTACT

Address: Lucsony Str. 15-17, H-9200 Mosonmagyaróvár, Hungary

Phone: +36 96 566 633

E-mail: lakatos.erika@sze.hu

Department homepage: <http://food.sze.hu>

DEPARTMENT STAFF

Prof. Dr. László Varga PhD, full professor, Prof. Dr. Szigeti Jenő professor emeritus, Dr. Erika Hanczné Lakatos PhD, associate professor, Dr. Zolt Ajtony PhD, associate professor, Dr. Balázs Ásványi PhD, associate professor, Dr. László Farkas PhD, associate professor, Dr. Anett Németh-Torkos PhD, associate professor, Dr. Ádám Krász honorary associate professor, Dr. András Vér PhD, research fellow, Dr. Viktória Kapcsándi PhD, assistant professor, Dr. Ágnes Varga PhD, assistant professor, Zolt Giczi, assistant lecturer, Renáta Tihanyi-Kovács, assistant research fellow, Márta Varga Némethné, department engineer Gabriella Jankó-Knapp department engineer, Krisztina Réder department engineer, Krisztina Takács department engineer, Petra Tóth department engineer, Miklos Posgay department engineer, Andrea Andi department engineer Judit Molnár, department engineer, Rita Székelyhidi, department engineer, Zoltán Tudós, PhD student, Mihály Zakar, PhD student, Beatrix Sik, Phd student, Babett Greff, PhD student, Kármén Kiss PhD student, Istvánné Ankhelyi, laboratory technician Tihaménné Csete, assistant, Blanka Bolfán department engineer, Zsolt Szabó, department engineer

DEPARTMENT RESEARCH CAPACITY

The number of full-time teacher-researcher: 22

Qualified ones: 8

The number of doctoral students participating department: 9

DEPARTMENT OVERVIEW (RESEARCH)

The direct predecessor of the Department of Food Sciences, i.e. the Institute of Food Sciences, was founded in 1994, comprising three departments as follows: Department of Food Technology and Microbiology, Department of Dairy Science, and Department of Food Quality Assurance. For almost

two decades, an EU-accredited Food and Water Testing Laboratory was also operating in the Institute, which was the first such laboratory in Eastern and Central Europe at the time of its establishment. Our major research areas include the development and production of (1) health-promoting (a.k.a. functional) foods such as probiotic products and (2) preserved foods manufactured with mild preservation methods.

DEPARTMENT RESEARCH AREAS

1. development of functional fermented milks containing various biologically active substances
2. comparative evaluation of conventional plating methods used for selective enumeration of lactic acid bacteria and bifidobacteria and their application in microbiological quality control of fermented milks
3. food products manufactured by sous-vid technology
4. stimulating the growth rate and fermentation activity of yeast strains
5. microbiological examination and physicochemical analysis of food raw materials and technology development
6. exploring the potential applications of medicinal plants in the food industry

RESEARCH PROJECTS OF THE DEPARTMENT

GINOP-2.2.1-15-2016-00022, COMBINED UTILIZATION OF VINERY BYPRODUCTS AND HORTICULTURAL PRODUCTS

Project Period: 01.10.2016. – 31.09.2020.

Source: Ministry for National Economy Hungary

Project Funding: 178,540,000 HUF (total: 856,571,000 HUF)

Project Leader: sub-project at the Department Dr. Erika Hanczné Lakatos, associate professor, lakatos.erika@sze.hu

The research and development work aims to create a new kind, including herbal dietary supplement product line. In case of regular use of products designed for basic also the main component of the active ingredients of grape seed oil provide emergency brain, respectively.

EFOP-3.6.1-16-2016-00024, INTELLIGENT SPECIALIZATION DEVELOPMENTS IN COOPERATION OF UNIVERSITY OF VETERINARY AND UNIVERSITY OF SZÉCHENYI ISTVÁN FACULTY OF AGRICULTURAL AND FOOD SCIENCES

Period: 01.05.2017. – 30.04.2021.

Source: Ministry of Human Capacities Hungary, European Union

Project Funding: 400,000,000 HUF (full amount); 75,000,000 HUF (departmental part)

Project Leader: Dr. Kapcsánci Viktória PhD, assistant professor, kapcsandi.viktoria@sze.hu

The National Intelligent Specialization Strategy aims in accordance with the most important objectives of the construction are the following: Increasing research and research capacity to increase the number of professionals who are actively involved in research on animal health, food chain safety, epidemiological and animal protection, food hygiene and animal husbandry, contributing to the

management of social / health / economic problems. Institutions involved in the implementation of the project continue to play a leading role in the field of Hungarian scientific education and training, and through their research in the field of veterinary science, veterinary science and food science, the University of Veterinary and the University of Széchenyi István Faculty of Agricultural and Food Sciences are Europe's internationally recognized, leading higher education institutions, with the strengthening of the current position.

EFOP-3.6.2-16-2017-00012, DEVELOPMENT OF MODEL THE FUNCTIONAL, HEALTH AND SAFETY FOOD PRODUCT LINE BASED ON "FROM FIELD TO THE TABLE" PRINCIPLE IN THEMATIC RESEARCH NETWORK

Period: 31.07.2017. – 31.05.2020.

Source: Ministry of Human Capacities Hungary, European Union

Project Funding: 1,450,000,000 HUF (full amount); 300,000,000 HUF (departmental part)

Project Leader: Hanczné Dr. Lakatos Erika PhD, associate professor, lakatose.erika@sze.hu

The aim of the thematic research network construction is to make higher education institutions more active and more proactive in the process of accelerating the deployment of the knowledge-based economy and building on institutional cooperation with the actors of international research and development programs to increase the potential of Hungarian higher education in research and development. The main objective of the construction is to improve the conditions of research and development in higher education with the human resources and service development necessary for research. The direct goal of the construction is to build complex research projects with the help of teams of researchers working together in structured capacities by building up the capacities present in higher education institutions, creating and expanding the human resources of research and developing related research management capacities. With the cooperation of the 4 universities, the creation of research networks will be realized.

JOINT AMBROSIA ACTION INTERREG ATHU51

Project Period: 01.01.2017 – 31.12.2019

Source: European Regional Development Fund (85%) + National Research Agency (15%)

Project Funding: 274 000€ (total: 840,445 EUR)

Project Leader: HU project leader Dr. András Vér PhD, research fellow, ver.andras@sze.hu

The project has set the objective of establishing a sustainable institutional cooperation on the issue of ragweed control between the Austrian and Hungarian administrative systems and research institutions. This enables a know-how transfer that benefits both sides and improves the quality of public service and thereby also life quality of the population.

In the framework of the survey and research, fundamental data will be collected on the base of which coordinated recommendations can be made in order to control and to prevent the spread. A cross-border data exchange is first made possible by establishing a common ragweed reporting system. The establishment of a bilateral ragweed task force with experts of both countries lays the foundations for a long-lasting institutional cooperation.

H2020-RUR-2017-1 NEFERTITI NETWORKING EUROPEAN FARMS TO ENHANCE CROSS FERTILISATION AND INNOVATION UPTAKE THROUGH DEMONSTRATION

Project Period: 2017 – 2021

Source: European Commission

Project Funding: 96,866.25 EUR (total: 6,999,992.50 EUR)

Project Leader: HU project leader Dr. András Vér PhD, research fellow, ver.andras@sze.hu

NEFERTITI is a unique project that establishes 10 interactive thematic networks and bring together 45 regional clusters (hubs) of demo-farmers and the involved actors (advisors, NGOs, industry, education, researchers and policy makers) in 17 countries. NEFERTITI focuses on creating added value from the exchange of knowledge, actors, farmers and technical content over the networks in order to boost innovation uptake, to improve peer to peer learning and network connectivity between farms actors across Europe, thus contributing to a more competitive, sustainable and climate-smart agriculture. NEFERTITI address 10 themes that have been chosen based on key concerns of the farming communities of the regional hubs in the project, covering together a balanced range of themes over three main agricultural sectors: animal production, arable farming and horticultural production. The themes have also been chosen regarding their innovation potential, their demonstration potential and the cross fertilisation potential among the themes, the sectors and the actors. Themes are closely linked to the H2020 Thematic Networks and will connect with other organisational structures at grass root level, like EIP operational groups and study clubs that will confer to the project a key role of accelerator and empowerment of the dissemination and of the uptake of the practical-oriented knowledge delivered by all EIP related projects. A monitoring and learning program support the systematic extraction of lessons learnt, lessons to be shared with wide audiences including AKIS actors and public authorities. A web-based platform unlocks the experience, actors, demo details and the related content for wide-spread sharing, enhanced by dedicated production of relevant material (including high-quality professional videos) in each language of the partners. NEFERTITI will engage a policy dialogue with EU Regions to match farmers and policy makers' interests in view of the networks sustainability.

AGRINATUR – BENEFITS OF ANTHROPOGENIC USAGES FOR NATURE PROTECTION AREAS

Project Period: 01.01.2019 – 28.02.2022.

Source: European Regional Development Fund (85%) + National Research Agency (15%)

Project Funding: EUR 412.129,8 (total: EUR 1.379.151,45)

Project Leader: HU project leader Dr. András Vér PhD, research fellow, ver.andras@sze.hu

The nature region Vienna-Győr is characterised by the water bodies of Danube, Lake Neusiedl and their surrounding floodplain forests, protected as Natura 2000 areas and National Parks. They are bordered by agricultural areas, settlements, agglomerations and linked traffic areas. Natural (waters, woods, reeds) and cultivated areas form a patchwork habitat. It is recognized that mowing and extensive grazing are measures to maintain habitats and species protected by Habitats (Fauna and Flora)- or Birds Directive. In the course of the project the ecological relevance of further anthropogenic use for species protection should be set. E.g. some orchids colonize pioneer sites on dams, resulting from flood protection or railway constructions. Solid data about ground beetles show the species conservation value of organic cultivation. The importance of their interconnectedness with FFH-Habitats lies in the project focus. Through combination of common conservation measures with crop farming actions innovative landscaping activities will be developed to improve the protection of Habitats- or Birds Directive species.

Using the example of the Viennese Danube Floodplains the results shall serve to increase natural areas in conformity with the national park whilst improving biodiversity and resilience. The optimization of both is also the focal point of the Hungarian example.

Public gardens, being implemented in Mosonmagyaróvár and Vienna, will reveal the complex information in an attractive way. Essential is the joining of internationally recognised research by SZE in cutting-edge crop production on alluvial soils with the specific BFA-expertise in the field of species protection by organic farming and the experience of the ground area manager MA 49.

The outcome of the project will be transferable to other European lowland protection areas.

H2020-RUR-16-2019 CONNECTING ADVISERS TO BOOST INTERACTIVE INNOVATION IN AGRICULTURE AND FORESTRY (PROJECT ACRONYM: I2CONNECT)

Project Period: 2019 – 2024

Source: European Commission

Project Funding: EUR 106.533,29 (total: EUR 4.999.943,00)

Project Leader: HU project leader Dr. András Vér PhD, research fellow, ver.andras@sze.hu

The core concept of the I2connect project, developing consultancy capacity, is to support an interactive innovation process to facilitate knowledge flow within national and regional AKIS, allowing farmers to switch to more sustainable, productive and climate-friendly agriculture. Its main purpose is to encourage consultants and consultancy organizations to involve farmers / foresters in interactive innovation processes. Dissemination, communication and exploitation of project results. Other specific objectives include the development of common concepts, systems, methods; identification and analysis of best practices; developing appropriate training strategies to enhance the consultancy capacity; and activating a network of innovation consultants.

2019-1-HU01-KA204-061083 WISEFARMER: CONNECTING FARM GENERATIONS IN THE DIGITAL AGE

Project Period: 2019 – 2021

Source: European Commission

Project Funding: EUR 39.403,00 (total: EUR 264.316,00)

Project Leader: HU project leader Dr. András Vér PhD, research fellow, ver.andras@sze.hu

The project aims to bring together older and younger age group farmers through a joint program through knowledge sharing, access to high quality learning and mentoring opportunities and competence development. The target group is small and family farms, where the digital literacy of older generations and the appropriate basic competences and farming practices are generally lacking in younger generations. During the implementation, the needs and abilities of the target group and the mentors will be assessed, and the curriculum and content of the training will be developed based on the results, adapted to the local context. The results of the project are documented and disseminated by WiseFarmer Handbook.

The main task of the SZE is to design and implement peer-learning and pilot training in the project and to participate in all other activities.

DEPARTMENT OF PLANT SCIENCES

HEAD OF DEPARTMENT: DR. HABIL. ZOLTÁN MOLNÁR PHD

CONTACT

Address: Vár Sqr. 2, H-9200 Mosonmagyaróvár, Hungary

Phone: +36 96 566 686, +36 96 566 664

E-mail: molnar.zoltan@sze.hu

Department homepage: <http://plant.sze.hu>

DEPARTMENT STAFF

Soil Management Unit: Prof. Dr. Rezső Schmidt CSc, full professor, Dr. Dóra Beke PhD, associate professor, Genetics and Plant Breeding Unit: Dr. Péter Szabó PhD, associate professor, Péter Póthe, assistant researcher, Horticultural Unit: Dr. József Iváncsics PhD, associate professor, Pólyáné Dr. Borbála Pólyáné-Hanusz PhD, associate professor, Crop Production Unit: Dr. István Gergely PhD, associate professor, Dr. Ferenc Petróczki PhD, associate professor, Dr. János Pap, assistant professor, Prof. Dr. István Késmárki, professor emeritus, Plant Biology Unit: Prof. Dr. Vince Ördög DSc, full professor, Dr. Zoltán Molnár PhD, associate professor, Plant Protection Unit: Dr. Anikó Farkas PhD, associate professor, Dr. Gábor Kukorelli PhD, assistant professor, Dr. Rita Ledóné-Ábrahám PhD, associate professor, Prof. Dr. Péter Reisinger DSc, professor emeritus, Péter Bálint, research assistant, Ildikó Lobik, technician, Damjáné István Miksó, assistant, Anita Sülyné-Máté, assistant, Georgina Takács, research assistant, Péterné Takács, assistant, Ákos Bíró, PhD student, Zoltán Csapó, PhD student, László Juhász, PhD student, Rita Kolejanisz, PhD student, Arnold Magyar, PhD student, Tibor Molnár, PhD student, Lamnganbi Mutum (India), PhD student, Krisztina Pereszlényi, PhD student, Sándor Puss, PhD student, Zoltán Szántó, PhD student.

DEPARTMENT RESEARCH CAPACITY

The number of full-time teacher-researcher: 14

Qualified ones: 11

The number of doctoral students participating department: 10

Soil isolated microalgae and cyanobacteria have been examined for more than two decades mainly for agricultural purposes. For the experiments, studies and measurements the Department has chemical and microbiological laboratories as well as special laboratories for maintenance and cultivation of microalgae strains. The special strain culture collection (Mosonmagyaróvár Algal Culture Collection, MACC) contains about one thousand strains which is unique in Hungary. All together 432 different strains can be cultivated under controlled temperature and light conditions in 3 algal culture rooms at the same time. Using these rooms, numerous comparative bioassays and algal experiment can be performed simultaneously.

The Department has been dealing with plant cell and tissue cultures since 1986. Several strains of the MACC proved to have significant plant hormone (auxin, cytokinin) production thus they may be suitable to influence the growth and development of tissue cultured plants. Our goal in this field is the additional analysis of further strains of our algae collection on cell and tissue cultures of plant species which are difficult to be cultivated.

The 400 ha-s educational farm of the Faculty is supervised by the Department of Plant Sciences where we first of all carry out research with special regard to the development of the production technology of cereals covering the testing of varieties, investigation of plant protection and soil management methods and fertilization experiments. The field experiments focus also on improvement of soil management methods and determination of optimum sowing time. Hormone producing microalgae, and cyanobacteria from the MACC are applied for different plant treatments under arable farming conditions. Our main research goal is to further expand the practical applications of microalgae to arable farming and cultivated plant treatments.

Within plant protection research we put a special emphasis on the field of herbology. Regarding the changing in climate, plant production, herbicides, resistance and tolerance, we pay attention on weed ecology, with special regard on *Ambrosia artemisiifolia* L. (common ragweed) and others in agriculture as hazardous IAS (invasive alien species). Recently the most promising methods are related to precision agriculture that exploit possibilities offered by geoinformatics and sensor technology resulting in the elaboration of environmentally friendly technologies using low rate of chemicals. Insect research is being conducted within the framework of PhD training. We are primarily looking for non-chemical crop protection solutions that can be used in organic farming. One of our topics is the investigation of the predatory mite fauna of apple orchards in integrated and biological system apples, and the search for non-chemical control methods for apple moth pests in relation to the apple varieties.

Horticultural research carried out at the Department mostly deals with the pear production of the country covering the study of varieties and the management of orchards. Experimentation was started in a hydro-cultivated cherry tomato. The experiment mainly investigates the insect pests of some different tomato varieties and will be examined the beneficial parasitoid species, which were introduced during the vegetation period.

Due to the depletion of plant nutrient sources and the need of efficient recycling the inclusion of wastes and secondary raw materials will become more and more important element of plant nutrition technologies. At the same time, it has to be done with special care to the environment safeguarding the interests of nature and the priority of environmental aspects. Recently, soil erosion investigations were added to the research area of the Soil Management Unit.

DEPARTMENT RESEARCH AREAS

1. effect of micro-organisms (occurring naturally or dispersed artificially in plant/soil-systems) on soil fertility and their impact on plant growth and development
2. efficacy of microalgae biomass against plant pathogenic fungi
3. volatile organic compounds from microalgae and cyanobacteria biomass against pests
4. study of *in vitro* micro-propagation of recalcitrant plants
5. development of plant production technologies, sowing time experiments
6. plant protection solutions that can be used in organic farming
7. weed ecology, with special regard on common ragweed and others in agriculture as hazardous invasive alien species
8. development of plant protection technologies (plant pathology, entomology, herbology)
9. horticultural research with special regard to fruit production, green house vegetable production
10. utilization of secondary raw materials in crop production
11. soil erosion investigations
12. effects of physical mutagens on plants

RESEARCH PROJECTS OF THE DEPARTMENT

SABANA – SUSTAINABLE ALGAE BIOREFINERY FOR AGRICULTURE AND AQUACULTURE, NO.: 727874

Project Period: 01.12.2016. – 30.11.2020.

Source: European Union H2020-BG-2016-2017

Project Funding: 540,875 EUR (total: 8,848,523.75 EUR)

Project Leader: sub-project at the Department Prof. Dr. Vince Ördög DSc, full professor, ordog.vince@sze.hu

SABANA aims at developing a large-scale integrated microalgae-based biorefinery for the production of bio-stimulants, biopesticides and feed additives, in addition to biofertilizers and aquafeed, using only marine water and nutrients from wastewaters (sewage, centrate and pig manure). The objective is to achieve a zero-waste process at a demonstration scales up to 5 ha sustainable both environmentally and economically. A Demonstration Centre of this biorefinery will be operated to demonstrate the technology, assess the operating characteristics of the system, evaluate environment impacts and collaborate with potential customers for use.

PROECOWINE – DEVELOPMENT OF A PROCESS TO GENERATE A NOVEL PLANT PROTECTION PRODUCT ENRICHED WITH MICRONUTRIENTS TO REPLACE COPPER IN ORGANIC FARMING, NO.: 315546

Project Period: 01.11.2012. – 31.10.2014

Source: European Union FP7-SME-2012

Project Funding: 273,040 EUR (total: 1,042,055 EUR)

Project Leader: sub-project at the Department Prof. Dr. Vince Ördög DSc, full professor, ordog.vince@sze.hu

Our aim was to develop an organic bio-fungicide enriched with micronutrients to replace copper and chemical fungicide in organic farming. In order to achieve this objective, there were a number of limitations that we must overcome, this required new depths of scientific understanding which themselves led to the need for new technological developments.

TÁMOP-4.2.2.A-11/1/KONV-2012-0003, MICROALGAL BIOTECHNOLOGY IN SUSTAINABLE AGRICULTURE

(together with the *Department of Biosystems Engineering*)

Project Period: 01.12.2012. – 30.06.2015

Source: European Union and the Government of Hungary

Project Funding: 181,539,321 HUF (total: 492,826,142 HUF)

Project Leader: sub-project at the Department Prof. Dr. Vince Ördög DSc, full professor, ordog.vince@sze.hu

In this project our aim was to increase the results – achieved by the research of biopesticides and biofuels – to an international level and then make it innovative by developing molecular biological techniques and applications. We aimed to improve the energy balance of microalgae cultures by appropriate measurements. We also investigated whether microalgae for the production of valuable agricultural materials depends on the extent to which culture and biomass extraction methods were used.

DEPARTMENT OF WATER AND ENVIRONMENTAL SCIENCES

HEAD OF DEPARTMENT: DR. HABIL. RENÁTÓ KALOCSAI PHD

CONTACT

Address: Lucsony Str. 15-17, H-9200 Mosonmagyaróvár, Hungary

Phone: +36 96 566 669

E-mail: kalocsai.renato@sze.hu; vasas.david@sze.hu

Department homepage: <http://wes.sze.hu>

DEPARTMENT STAFF

Dr. habil. Renátó Kalocsai PhD, associate professor, head of department, Dr. Flórián Bakcsa CSc, associate professor, Dr. Gábor Koltai PhD, senior research fellow, Prof. Dr. Gyula Pinke PhD, full professor, Ottília Vámos, lecturer, Prof. Dr. Pál Szakál CSc, full professor, Dr. Gyula Tóásó PhD, associate professor, Dr. Zoltán Varga PhD, associate professor, Prof. Dr. Zoltán Varga-Haszonits DSc, professor emeritus, Dávid Vasas, laboratory technician, Károly Tatárvári, predoctor, Attila Péntek, PhD student, Péter Puss, predoctor, Boglárka Lipótvá, PhD student, Tamás Kolejanisz, PhD student, Viktória Vona, PhD student, Andor Endre Tóth, PhD student, Zsolt Giczi, predictor, Bakos István PhD student and dr. Szakál Tamás predoctor.

DEPARTMENT RESEARCH CAPACITY

Number of full-time lecturers: 8

Qualified ones: 7

Number of students taking part in PhD study: 10

DEPARTMENT OVERVIEW (RESEARCH)

The research of the Department of Water and Environmental Sciences include analysis of many abiotic (physical and chemical properties of the soil, meteorological factors, hydrological conditions) and biotic (weeds, crops, pests) components of the complex environment systems. Due to the diverse scientific skills and interests of department staff it is possible to examine the arising problems in multidisciplinary approach. Another main research activity of the department is the agricultural utilization of industrial waste. The goal is to extract - as complex compounds - the copper and zinc-containing waste which is resulted in many areas of industry and utilize those as nutrients for plants.

The objective is the production of high quality, functional food. Animal manure from waste water sludge is composted and its composition is optimized. Production of selenium-enriched mushroom for nutritional purposes is carried out as well.

DEPARTMENT RESEARCH AREAS

1. weed surveys
2. study of the correlations between soil testing results and the composition of cultivated plants
3. monitoring type fauna studies and ecological condition survey of macroinvertebrates in different types of habitats, and plant protection studies concerning on pests
4. study of the relationship between groundwater, soil moisture, weather and land use
5. research on the effect of climatic variability on cultivated crops and farm animals
6. development of environmental information system for agricultural decisions
7. waste recycling, composting
8. investigation of unwanted chemical element and trace element content of fish sticks, feeding stuffs, feed materials and fish feed
9. comparative analysis of the content of basidium fungi from different production sites

RESEARCH PROJECTS OF THE DEPARTMENT

TASKS RELATED TO THE ENVIRONMENTAL MONITORING OF THE SZIGETKÖZ REGION

Project Period: 1989 – 2014

Source: Ministry of Rural Development

Project Funding: 19,500,000, HUF

Project Leader: Dr. Gábor Koltai PhD, senior research fellow, koltai.gabor@sze.hu

The project contained the following parts: measuring of soil moisture in order to determine the relationship between groundwater and soil moisture; evaluation of the measured data; participation in the Hungarian-Slovak joint monitoring which was regulated in an intergovernmental agreement.

EFFECTS OF MANAGEMENT AND ENVIRONMENTAL FACTORS ON WEED SPECIES COMPOSITION OF SOYBEAN AND OIL PUMPKIN FIELDS IN HUNGARY

Project Period: 2016 – 2017

Source: NKFI-6

Project Funding: 6,326,000 HUF

Project Leader: Prof. Dr. Gyula Pinke PhD, full professor, pinke.gyula@sze.hu

The key goal of this research is to assess and rank the role of several management and environmental factors in determining the weed species composition of soybean and oil pumpkin fields. In this study the abundance of late-summer weed flora and approximately 40 management and environmental factors will be measured in about 150 soybean and 150 oil pumpkin fields within two years in the total area of Hungary.

TASKS RELATED TO THE ENVIRONMENTAL MONITORING OF THE SZIGETKÖZ REGION

Project Period: 1989 – 2014

Source: Ministry of Rural Development

Project Funding: 1,400,000 HUF (in the last year)

Project Leader: Dr. Gábor Koltai PhD, senior research fellow, koltai.gabor@sze.hu

The project contained the following parts: measuring of soil moisture in order to determine the relationship between groundwater and soil moisture; evaluation of the measured data; participation in the Hungarian-Slovak joint monitoring which was regulated in an intergovernmental agreement.

HUSK/09/01/1.2.1/0010, HEALTHY DIET AND FUNCTIONAL FOODS FROM REGIONAL SOURCES

(together with the *Department of Plant Sciences*)

Project period: 01.10.2010. – 30.09.2012.

Source: European Regional Development Fund, Cross Border Cooperation between Hungary and Slovakia Program, 2007-2013

Project Funding, total: 1,347,861 EUR

Project Leader: sub-project at the Department Prof. Dr. Pál Szakál CSc, full professor, szakal.pal@sze.hu

The aim of the project was to develop foods of healthy chemical composition suitable to maintain health preserving nutrition based on locally grown plants on both sides of the border. First we surveyed the suitable traditional locally grown plants and plants promising from that point of view. Using these plants, we developed reform foods including bakery products, dairy products and drinks.

RESEARCH PROJECTS RELATED TO THE FACULTY

EFOP-3.4.3-16-2016-00016 INSTITUTIONAL DEVELOPMENTS FOR THE IMPROVEMENT OF QUALITY AND ACCESSIBILITY OF HIGHER EDUCATION AT SZÉCHENYI ISTVÁN UNIVERSITY

(a project of *Széchenyi István University*)

Project Period: 01.03.2017. – 28.02.2021.

Source: Ministry of Human Capacities Hungary, European Union

Project Funding: 33,033,000 HUF

Project Leader: at the Faculty of Agricultural and Food Sciences, Széchenyi István University, Dr. Éva Szalka PhD, associate professor, szalka.eva@sze.hu

The aim of the sub-project: agricultural training content development, higher education development of curriculum used for agricultural training networks.

EFOP-3.6.1-16-2017-00017 CREATING OF EDUCATIONAL, RESEARCH AND STUDENTS SUBSTITUTION, THE DEVELOPMENT OF KNOWLEDGES AND TECHNOLOGY TRANSFER

(a project of *Széchenyi István University*)

Project Period: 15.10.2016. – 15.10.2020.

Source: Ministry of Human Capacities Hungary, European Union

Project Funding: 23,000,000 HUF (total: 1,198,000,000 HUF)

Project Leader: at the Faculty of Agricultural and Food Sciences, Széchenyi István University, Dr. habil. Zoltán Molnár PhD, associate professor, molnar.zoltan@sze.hu

EFOP-3.6.3-VEKOP-16-2017-00008 INNOVATIVE SCIENTIFIC INSTITUTIONS IN DOMESTIC AGRICULTURAL HIGHER EDUCATION

(a project of *University of Debrecen*)

Project Period: 01.07.2017. – 30.04.2022.

Source: Ministry of Human Capacities Hungary, European Union

Project Funding: 349,269,797 HUF (total: 1,783,844,690 HUF)

Project Leader: at the Faculty of Agricultural and Food Sciences, Széchenyi István University, Prof. Dr. Vince Ördög DSc, full professor, ordog.vince@sze.hu, Hanczné Dr. Erika Lakatos, associate professor, lakatos.erika@sze.hu, Dr. habil. Zoltán Molnár PhD, associate professor, molnar.zoltan@sze.hu

The aim of the project is creating a university cooperation in domestic agricultural higher education, which is essentially a qualitative way to renew the supply system of scientific training and opportunities for scientific workshops as well as significantly expands its conditions.