



# DEVELOPMENT OF THE BIOECONOMY RESEARCH EXCELLENCE IN LITHUANIA

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## About BioTEC

Lithuania is constantly striving to improve the research and study environment. Therefore, in 2023, the **Ministry of Education, Science and Sports of the Republic of Lithuania** prepared the "**University Excellence Initiative**" program to strengthen the quality of research and development (R&D) at Lithuanian universities in selected fields by attracting and developing researchers, increasing the number of high-level scientific (artistic) outputs of national and international importance, and attracting external R&D funding. To help universities **achieve the highest international level of scientific results**, the Lithuanian state allocated by 2027 a total of approximately 60 million euros for this purpose. Universities were invited to prepare project implementation plans for the establishment of centers of excellence in advanced research fields in order to achieve the foreseen goals. **Vytautas Magnus University (VMU)** has chosen bioeconomy research as a strategic research area. Therefore, a plan to establish the **Bioeconomy Research Center of Excellence (BioTEC)** was prepared. The aim of **BioTEC** is to strengthen the quality of R&D in areas of Agronomy and Environmental Engineering by developing advanced, high-quality research. Research topics of the project include healthy soil and plants, sustainable agriculture and food systems, digitization and robotization of agriculture, climate change and the importance of sustainable use of resources.

## BioTEC Mission and Vision

BioTEC creates added value for the state, Vytautas Magnus University and Agriculture Academy. Scientists are provided with conditions to strengthen their competences, conduct research, create innovations, publish open access scientific articles in prestigious scientific publications with a high citation index, and participate in high level conferences. Innovations created by scientists are further adopted and commercialized by business.

Moreover, the mission of the Center is to attract more foreign experts working in strategic research fields of BioTEC and find young talents. For the effective operation of BioTEC, it was necessary to create a modern infrastructure, purchase equipment, and provide funds necessary for scientific research activities. BioTEC scientists prepare proposals and carry out national and international projects that translate innovative solutions into practice, actively involving stakeholders, including farmers, agricultural specialists, agribusiness companies, and policymakers.

## Main Scientific Equipment



"SimaPro" is a software tool for Life Cycle Assessment (LCA) and Environmental Footprinting. "SimaPro" enables agricultural engineers to perform comprehensive LCAs of agricultural systems, allowing them to analyse environmental impacts, compare different approaches, optimise resource use and more.



**LI-COR** portable soil gas analyzers are designed for advanced research by agronomic and environmental engineering scientists. Trace gas analyzers provide highly accurate measurements of carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), and methane (CH<sub>4</sub>) and can be easily integrated into soil gas flux studies in a variety of agroecosystems.



The **N-Sensor** calculates the actual uptake of nitrogen (N) by the crop. Optimum fertilization rates are calculated based on N absorption data and transmitted to the variable rate control panel of the spreader or sprayer, which adjusts the fertilizer rate accordingly.



**FIFISH V6 EXPERT underwater drone** is intended for comprehensive surveys of surface water bodies. It allows to take water and substrate samples of various surface water bodies, to inspect hydraulic structures, evaluate their condition and accurately measure any occurring damages. Innovative Virtual Reality (VR) and Augmented Reality (AR) technologies are implemented with these devices, which makes them immersive for educational purposes. 2-Finger robotic arm – small but powerful robotic arm delivers a clamping and towing force of 100N, is capable of retrieving large and heavy objects.



**Research stand for aerobic and anaerobic processing of plant biomass and organic waste.** The stand is designed to study, model and demonstrate the processes of aerobic and anaerobic processing of plant biomass and organic waste. Research on the biodegradation of biomass and organic waste is necessary for evaluating the potential of biogas and biomethane production, the efficiency of composting processes and the quality of the resulting products.

## International scientific projects

- **Holistic assessment of agro-ecological measures (HEAL).** AGROECOLOGY, 2025 – 2028 m. Project leader: Dr Daniel Neuhoﬀ (Germany). Implementers of the project: Prof. dr. Vaclovas Bogužas (Chief researcher of BioTEC), Prof. Dr. Kęstutis Romanekas, Dr. Lina Skinulienė, Assoc. Prof. Dr. Juraė Aleinikovienė, PhD student Austėja Švereikaitė. Other project partners' research teams will be led by Dr. Kirsi Järvenranta (Finland), Prof. Fátima Gonçalves (Portugal), Dr Ciaran Hearn (Ireland), Prof. Evelin Loit-Harro (Estonia).
- **Safe wheat agriculture towards sustainable health: innovative sensing techniques, and holistic spectroscopy traceability for improved soil, plant health and safe wheat grain (WHEATWATCHER).** HORIZON EUROPE, 2024-2028 m. Coordinator of the project: prof. dr. Abdul Mouazen (Gent university, Belgium). Project leader (Vytautas Magnus University part): prof. dr. Egidijus Šarauskis (Chief researcher of the BioTEC). Project implementers: prof. dr. Zita Kriaučiūnienė (Scientific head of the BioTEC), junior researcher dr. Marius Kazlauskas.

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