

# FLD RESEARCH PROFILE



High-tech pavilion



Faculty of Forestry  
and Wood Sciences

[fld.czu.cz/en](http://fld.czu.cz/en)



# FLD Research profile

One of the main pillars of the Faculty of Forestry and Wood Sciences is international scientific research activity, which places great emphasis on the fact that research results can immediately help in forestry and wood science practice and reach recognized professional journals, conferences, congresses, and educational programmes in media. Scientific teams at our Faculty deal with unique topics across scientific disciplines. They are often part of international research project consortia. Last but not least, they focus on applied research and cooperation with practice, not only with Czech but also with foreign partners.





# Research topics

## **Genetics and forest tree breeding**

- quantitative genetics, genetic diversity of forest trees, high-throughput phenotyping

## **Physiology of forest tree species**

- ecophysiology of photosynthesis, transpiration and the effect of drought on forest trees

## **Forest protection and entomology**

- molecular ecology of insects, biological protection

## **Game management and forest zoology**

- spatial ecology, biologging technology, invasive species, African swine fever

## **Magnetoreception**

- influence on animal behaviour, spatial orientation of dogs

## **Forest ecology**

- forest management and biodiversity, climate change and dynamics of forest ecosystems, disturbance, dendroecology

## **Silviculture**

- semi-natural forestry, strategies for adaptation to climate change

## **Forest management**

- UAV and its use in forest monitoring, MLS, forest dynamics models



### **Forest planning**

- modelling forest growth and development

### **Economics and policies of the forest-based sector**

- environmental economics, forest certification systems

### **Valuation of forest and forest ecosystem services**

- valuation of natural resources, carbon footprint of enterprises

### **Forest bioeconomy**

- technical innovations, digitization and informatization of forest production, strategies, tools, policies

### **Forest operations**

- logging and transport technology, comprehensive use of biomass

### **Buildings to fulfil forest functions**

- forest roads, hydraulics of torrents and gullies, small water reservoirs

## **Material engineering**

- development of composite materials, wood modification, fire protection of wood

## **Wood processing**

- advanced scanning of logs, determining the degree of damage to infested wood

## **Special wooden structures**

- exterior wooden structures

## **Interior and furniture design**

- product design, furniture design and construction

## **Mechanisms of biological invasions and their management**

- macroecology of global invasions, interaction of plant and insect invasions

## **Assessment and management of forest risks under climate change**

- changes in biotic risks in forests, large-scale disturbances

## **Ecosystem modelling**

- the impact of management, disturbances and climate change on ecosystem services and biodiversity

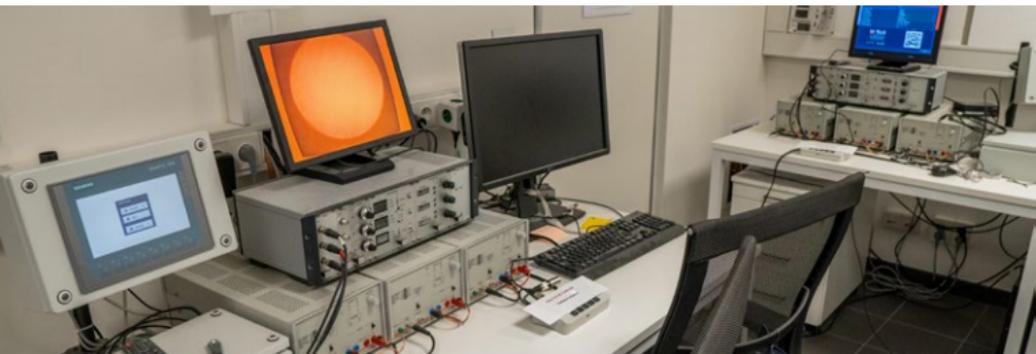
**A MORE DETAILED LIST OF RESEARCH TOPICS, INCLUDING CONTACTS OF THE RESEARCH TEAMS, CAN BE FOUND AT:**





# Laboratories

Almost forty state-of-the-art laboratories are used for teaching, science, research, and practice.



## Biophysical behavioural laboratory

The biophysical behavioural laboratory houses two electromagnetic (EMG) coils, signal amplifiers, and recording equipment for conducting magnetoreception experiments in a highly controlled environment. It is possible to set all important variables here, including the colour and intensity of light, as well as the strength, direction, and density of EMG fields.



## Insect chemical ecology laboratories

These laboratories include an entire set of several highly specialized laboratories, including the Analytical-physiological laboratory of insects, focused on so-called electroantennography, a special technique used in olfactometric research of insects. It also houses devices for the separation and identification of chemical substances from complex mixtures collected in the field. This also includes the Insect chemical communication laboratory, the Laboratory for behavioural tests on insects, and the Laboratory for work with GMO organisms. The laboratory is used for research on insects, specifically beetles and Diptera.



## Ecophysiological laboratory – Growth chambers

The laboratory enables the cultivation of plants under precisely adjustable and measurable abiotic conditions, i.e. excluding the influence of the external environment. For this, growth chambers are used in which the temperature, relative air humidity, CO<sub>2</sub> concentration, as well as the intensity and spectral composition of light (blue, red, far-red) can be set independently.



## Computed tomography laboratory

The CT laboratory has a wide range of uses in the areas of teaching, science, and research across departments and scientific fields. The laboratory has a Siemens Somatom Scope Power CT system, which is a 16 slice multi-detector device with a powerful PC and software. The tomograph is not only for experimental use, but there are well-known applications helping to carry out research as part of final theses. A specific use is found in the display of specimens/cadavers of vertebrates of various sizes from duck to deer. However, CT is capable of imaging any object of a biological nature – antlers, the root system of plants, the structure of wood and its products, or individual organs, e.g. hearts. It is also possible to use it for forensic purposes in the field of terminal ballistics either directly on shot game or ballistic gel, thus evaluating the effects of a bullet.



## Laboratories for comprehensive testing of wood-based composite materials

Laboratories for comprehensive testing of wood-based composite materials are equipped with instrumentation for testing all physical and mechanical properties of wood-based composite materials, e.g. determination of vertical density profile, thermal insulation characteristics, surface properties, hardness and tensile strength perpendicular to the plane of the board. In addition to determining these basic characteristics, the laboratories are equipped with high-quality microscopes and spectrometers, with which we are able to perform structural analysis of wood-based composite materials (e.g. WITEC alpha300 RA Raman microscope and Mira3 Tescan scanning electron microscope).

**OTHER LABORATORIES, INCLUDING  
DETAILED INFORMATION, CAN BE FOUND  
AT:**





# Equipment and facilities

FLD has state-of-the-art equipment.



## Agilent 7890B 2D gas chromatograph with a special mass spectrometer LECO Pegasus 4D-C

A gas chromatograph enabling complete two-dimensional separation, equipped with a mass spectrometric detector with a time-of-flight analyser.



## Siemens Scope Power CT scanner

16 slice multi-detector device with a powerful PC and software. CT is capable of imaging any object of a biological nature.



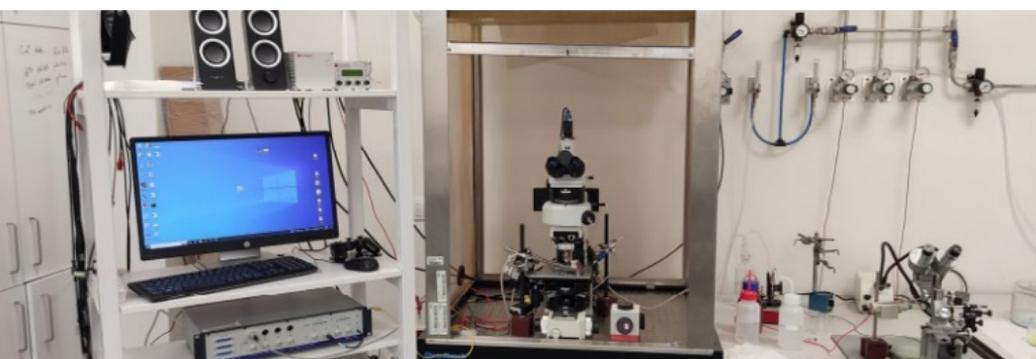
## **Spectrometer DELTA V Series / MAT 253, Thermofisher Scientific (IRMS)**

A system is used for the analysis of stable isotopes of elements important in the physiology of plants and animals.



## **Biodur plastination equipment**

This unique equipment is used to preserve the soft tissues of higher vertebrates without storing them in fixation solutions whilst preserving all the details and, simultaneously, with minimal maintenance costs.



## **Single-Cell electroantennograph**

The device enables electrophysiological sensing of the activity of olfactory receptor neurons, which are located on the surface of the antennae of insects.



## Mira3 Tescan scanning electron microscope

The scanning electron microscope is used for imaging the structure of materials using SE and BSE detectors. An EDX detector is also implemented in our device for detecting elements on the surface of a sample.



## Electromagnetic coils (1x Merritt, 2x Helmholtz)

The Merritt coil is the largest electromagnetic (EMG) coil for biological research in Europe.

**YOU CAN FIND OTHER UNIQUE EQUIPMENT AT:**





# Research areas

A large number of research areas are used for basic and applied research. A considerable amount of this is also located abroad. Scientists often carry out continuous measurements and monitoring on them, focused, for example, on adaptation of the species composition of forests to climate change, the structure and dynamics of stands, and mapping of forest health condition with the help of innovative approaches and technologies.

**YOU CAN FIND DETAILED DESCRIPTION  
OF THE INDIVIDUAL RESEARCH AREAS AT:**





# Projects

The Faculty intensively focuses on obtaining grants from both Czech and foreign programmes. Thanks to large projects from structural funds, it has acquired new infrastructure and made it possible to prepare attractive conditions for excellent researchers from abroad. Currently, the emphasis is mainly on investments in the development of human resources, the creation and deepening of international networks, and in the linking of science and the commercial sphere. The Faculty has a Department for Development that provides comprehensive support in the preparation of new and the implementation of existing projects, within

- structural funds, especially OP VVV, OP PIK, OP JAK, and NPO programmes (Structural Funds section),
- international programmes Horizon 2020, Horizon Europe, Life, Interreg CENTRAL EUROPE, COST, and ERASMUS+ (International Projects section),
- national subsidy programmes of agencies, especially NAZV, TA CR, and GA CR (National Scientific Projects section).

## PROJECTS



## DEPARTMENT FOR DEVELOPMENT





# Data

The Faculty of Forestry and Wood Sciences has a variety of data and measurements across many disciplines. Very often these are long-term measurements with a long time series.

**YOU CAN FIND DETAILED DATA  
SPECIFICATIONS AT:**



# TOP publication

One of the Faculty goals is to publish articles in the highest quality scientific journals. Every year, the Faculty publishes more than 230 articles in journals registered on the Web of Science (WoS), while approximately 90% of FLD outputs are published in journals in the first or second quartile according to the „Article Influence Score“ in individual FORDs, i.e. in the better half of scientific journals on WoS (of which more than 50% of articles are published in the first quartile). The Faculty also regularly publishes its results in journals from the Nature index database, i.e. in the most prestigious journals, such as NATURE and SCIENCE.

**YOU CAN FIND SELECTED EXCELLENT  
OUTPUTS HERE:**



# Applied outputs

In addition to publication outputs, the Faculty of Forestry and Wood Sciences CZU in Prague (FLD) also creates so-called non-publication outputs as part of scientific research activities, which include certified methodologies and maps, software, results with legal protection (e.g. patents, utility models), research reports, and other applied outputs. These outputs are focused on the use and application of knowledge acquired in practice. In most cases, these are the outputs of NAZV projects, TA CR projects, and contract research.



## NEWSLETTER FOR PRACTICE

Any university or its part fulfils several roles for society. It is primarily a scientific-research and educational role. At FLD, however, we can see that there are other, no less important tasks. Our employees regularly publish popularization articles or appear in the media and thus participate in public discussion regarding contemporary forestry, wood science, and related fields. We also regularly comment on important legislative and forestry policy documents. To ensure the transfer of applied outputs into practice, we issue a Newsletter for practice once a year. Our goal is to gradually present to the professional public selected project results which, we believe, will find application in the entire breadth of the forestry and wood science sector. We publish the Newsletter for practice as an appendix to the professional journal *Lesnická práce* and distribute it to entities from forestry and wood-related practice.







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