



Laboratory of Molecular Plant Physiology



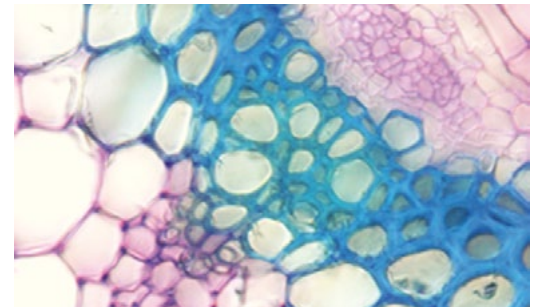
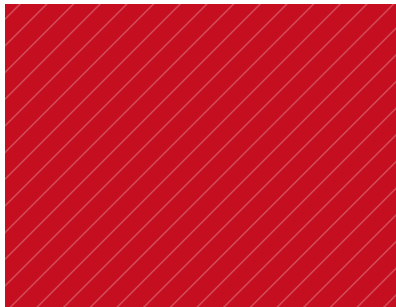
/ Department of Functional Genomics and Proteomics

/ Institute of Experimental Biology / Faculty of Science / Masaryk University

RESEARCH GROUP CONTACT >>

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THEMATIC RESEARCH FOCUS >

RESEARCH AREA

Genetics and protein research in the plant science field

EXCELLENCE

Plant functional genomics, plant hormone signalling and action

MISSION

Our mission is to create a top-quality fundamental research workplace, which would be considered as a member of the wider world leadership in the field and the results of which are capitalized through functional technology transfer.

DEVELOPED TECHNOLOGIES >

CONTENT OF RESEARCH

- » The role of plant hormones cytokinins in the regulation of plant development and interaction of cytokinins with other plant growth regulators, e.g. auxin
- » Identification of molecular mechanisms driving hormonal regulations of plant development. Use of this knowledge in the development of methods allowing directed regulation of the plant growth rate and improvement of economically important crop traits
- » Mechanisms of plant tissue and entire plant body regeneration, deciphering of molecular mechanisms of cell division and differentiation
- » Hormonal signal transduction and action
- » Identification and molecular analysis of proteins regulating plant growth
- » Elucidating the molecular mechanisms of interaction of two major phytohormones, auxin and cytokinins

- » Identification of the roles of the sensor histidine kinases in the regulation of plant development in specific developmental processes, e.g. vascular tissue development

MAIN CAPABILITIES

- » Effective regulation of plant growth, molecular plant breeding
- » Production of biologically active substances with potential of their therapeutic use (e.g. monoclonal antibodies or alkaloids) by plants
- » Participation in projects with potential impact in the application sphere, e.g. projects aimed at the use of hormonal regulations in the directed improvement of economically important crop traits (e.g. EPO patent "Method of regulation of biomass production in plants, DNA sequences and method of preparation thereof,")

FIELDS OF RESEARCH RESULTS APPLICATION

- » Biotechnology
- » Wood industry
- » Paper industry
- » Agriculture
- » Stock Farming
- » Forestry and Wood

ALUMNI PROFILE

Alumni are skilled in the use of basic bioinformatics tools, DNA manipulation, gene expression analysis including quantitative real-time PCR, preparation of both transcriptional and translational fusions of gene-specific promoters and/or gene coding sequences with the reporter genes, transgenesis, advanced histological techniques, e.g. in situ mRNA and immunolocalization, advanced microscopy techniques including confocal microscopy, transient gene expression in plant homologous systems, recombinant protein production in E.coli and protein purification, both in vitro and in vivo protein-protein interaction techniques, crystallography and protein structure analysis using X-ray diffraction.



NUMBER OF RESEARCH POSITIONS ↘

SENIOR RESEARCH STAFF

4

JUNIOR RESEARCH POSITIONS (INCL. PH.D. STUDENTS)

17

KEY RESEARCH EQUIPMENT ↘

LIST OF DEVICES

- » Automated, computer controlled greenhouse
- » Phytotrons and growing chambers, allowing plant cultivation under tightly regulated cultivation conditions and precise phenotypic studies
- » Unique microscopy systems, e.g. the system for automated microscopy (.slide), fully motorized and software-driven fluorescence and DIC microscope and horizontally-oriented confocal microscope, allowing in vivo imaging of growing plants on Petri dishes under native conditions in a wet chamber, equipment for basic and advanced techniques of molecular biology (e.g., epMotion for automatic DNA isolation and pipetting, RealTime cycler, etc.)

BUDGET ↘

TOTAL (MIL. CZK/ MIL. EUR)

13 / 0.52

PART OF THE TOTAL BUDGET FROM PRIVATE RESOURCES (%)

0

PART OF THE TOTAL BUDGET FROM FOREIGN RESOURCES (%)

0

MAIN PROJECTS ↘

2005–2011: Molecular basis of cell and tissue regulations (Institutional research plan MSM0021622415, Ministry of Education, Youth and Sports; PI Jiří Fajkus, co-PI Jan Hejátko; 280.000 €/year)

2006–2010: Regulations of morphogenesis of plant cells and organs (project LC06034, Basic Research Centres programme, Ministry of Education, Youth and Sports; PI Eva Zažímalová, co-PI Jan Hejátko; 240.000 €/year)

ACHIEVEMENTS ↘

- » Publications in distinguished international journals with a high impact factor (e.g. Plant Cell, IF2008= 9.296; Proceedings of the National Academy of Sciences of the U.S.A., IF2008= 9.380; Development, IF2008 = 6.812; Nature Protocols, IF2008= 4.170)
- » Czech national patent # 300145 "Method of regulation of biomass production in plants, DNA sequences and method of preparation thereof"

MAIN COLLABORATING PARTNERS ↘

COLLABORATION WITH ACADEMIC PARTNERS

- » VIB Department of Plant Systems Biology, Ghent University (Gent, BE)
- » Leibniz Institute of Plant Genetics and Crop Plant Research (Gatersleben, DE)
- » University of Helsinki (Helsinki, FI)
- » Pohang University of Science and Technology (Pohang, KR)

COLLABORATION WITH COMPANIES

- » Oseva Research and Development (Opava, CZ)
- » Crop Research Institute (Prague, CZ)

EXPECTATIONS ↘

REQUIREMENTS

Collaboration with industrial partners in common projects dedicated to applied science. The potential industrial partner should be able to provide financial support and functional market access strategy, allowing the use of our expertise in new product development and market placement.

OFFERS

- » Know-how in the field of plant molecular biology
- » Highly qualified human resources and share of lab space
- » Development of advanced plant biotechnology applications
- » Molecular breeding, DNA analysis and manipulation services
- » Teaching and educational services in the field of the molecular biology of plants