

**List of contract research services**

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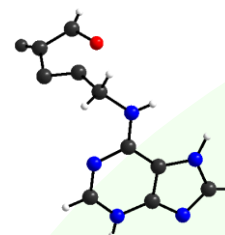
## Development of biospecific molecules for chemical biology of growth regulators

Department of growth regulators

### Service description

Service could be customized after mutual discussion

Our laboratory is fully equipped for organic synthesis. We are therefore able to develop biologically active molecules for plant growth regulation according to client specific requirements. We offer the assistance in chemical design, synthesis of a specific substance or a library of substances for use in the field of plant growth regulation. Maximum amount of the prepared substance is 10 g but we offer the transfer to commercial scale via spin off companies.



### Basic equipment relevant to the service

The synthesis could be performed on classical way (in flask) or in hydrogenation autoclave. For characterization of prepared substances can be used elemental analysis, melting point measurement,  $^1\text{H}$  a  $^{13}\text{C}$  NMR spectra, MS spectra, HPLC and TLC for determination of final product purity.

#### Note:

Other equipment could be used if needed.



### Contact for expert and technical issues

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### Price and other terms

Individual – according to scale and specification of the service.  
Feel free to ask for preliminary consultation.

**Qualitative and quantitative characterization of organic compounds by selected methods**

Department of growth regulators

● **Service description**

**Service could be customized after mutual discussion**

Our department keeps a long tradition in the field of new organic substances development. The laboratory is equipped with devices for characterization of organic substances including all available methods which we routinely use.

● **Basic equipment relevant to the service**

Elemental analysis, melting point measurement, HPLC-UV, HPLC-LSD, HPLC-MS/MS, NMR.

**Note:**

Other equipment could be used if needed.

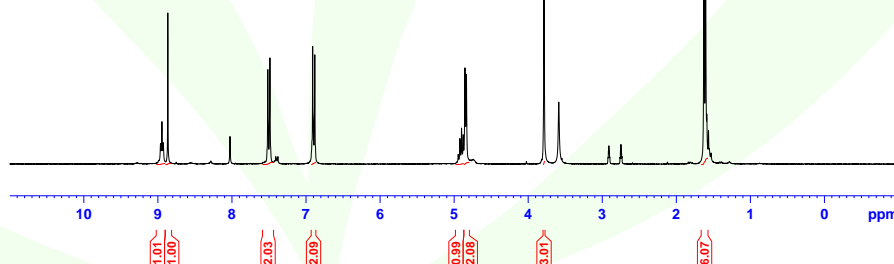
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● **Price and other terms**

Individual – according to scale and specification of the service.  
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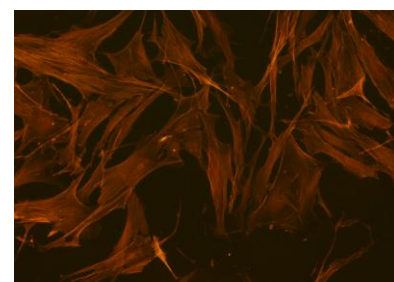
**Determination of active substance stability in cosmetic product at specific temperature and pH**

Department of growth regulators

● **Service description**

**Service could be customized after mutual discussion**

Fully equipped analytical laboratory and laboratory of organic synthesis are available for determination of content and stability of active substance in cosmetic product. We offer determination of substance homogenization ratio within the product, its stability at different temperature and pH, as well as substance stability timeline. We are experienced in similar tasks.



● **Basic equipment relevant to the service**

Small, fully equipped laboratory of organic synthesis (including polarizing microscope for optical observation of crystal nuclei). HPLC techniques and mass spectrometry are available for stability determination.



**Note:**

Other equipment could be used if needed.

● **Contact for expert and technical issues**

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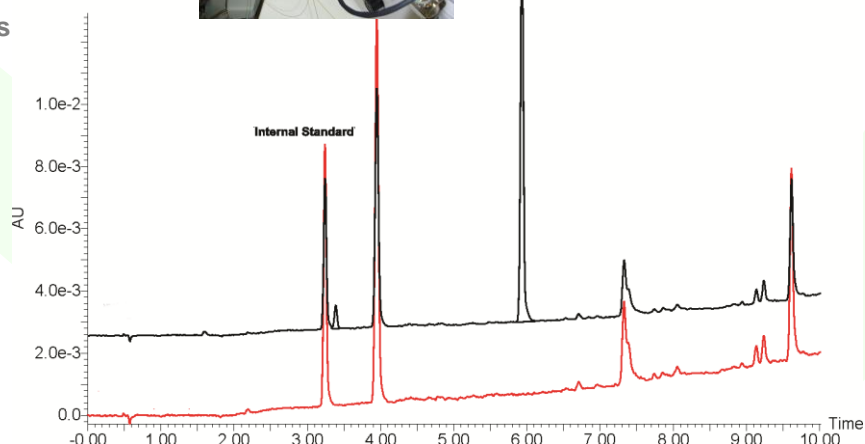
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● **Price and other terms**

Individual – according to scale and specification of the service.  
Feel free to ask for preliminary consultation



**Seed production technology for heterogamous vegetable species, medicinal and special plants**

Department of Genetic Resources for Vegetables, Medicinal and Special Plants  
Crop Research Institute, Olomouc

● **Service description**

**Service could be customized after mutual discussion**

We offer production of high-quality seeds with high germination capacity and 1000-seed weight provided through our pollination service.

Our know-how:

Longlasting experience and professional care of genetic resources for vegetables, medicinal, aromatic and culinary plants (MAPs).

Certification methodology for using insect pollinators in heterogamous vegetable species, medicinal, aromatic and culinary plants grown in technical isolation.

Validated seed technologies for heterogamous vegetable species and MAPs



● **Basic facilities relevant to the service**

Technical equipment:

Stationary glassed-in isolation cages (dimension 5150 mm x 2850 mm x height 1800 mm);  
Stationary isolation cages with the net hood (dimension 5150 mm x 2850 mm x height 1800 mm);  
Mobile isolation cages (dimension 2000 mm x 3000 mm x height 1700 mm);  
Field vacuum dryer;  
Complete machine facilities for field cultivation and treatment.

Pollination service:

Honey-bee colonies with pheromone honey-bee queens (*Apis mellifera* L.);  
Bumble-bee nests (*Bombus terrestris* L.);  
Own apiary with 18 beehives.

● **Contact for expert and technical issues**

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● **Price and other terms**

Individual – according to scale and specification of the service.  
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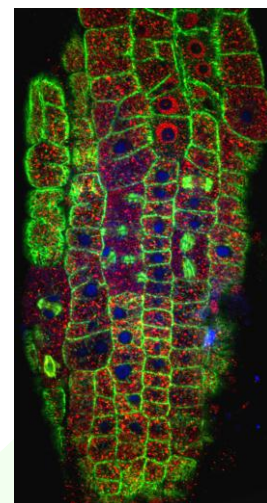
## Advanced bioimaging

### Department of cell biology

#### Service description

##### Service could be customized after mutual discussion

Our laboratory is fully equipped for advanced bioimaging of biological samples and we are able to visualize and to analyze wide spectrum of fluorochromes and fluorescent proteins. We also offer co-localization of two or more fluorochromes at the same time, microscopic spectral analysis, fast live cell bioimaging and advanced microscopic analyses such as FRAP, FRET and multitracking. Contracted amount of samples is limited according to capacity reasons and it depends on necessary instrument time and actual load of microscopes.

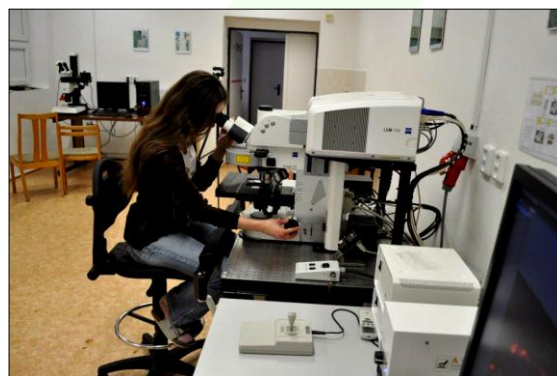


#### Basic equipment relevant to the service

Laboratory is equipped with modern confocal laser scanning microscope Zeiss LSM710 with auxiliary piezostage which accelerates scanning in 3-D mode. Fluorescent binocular microscope with documentation module is also available.

##### Note:

Other equipment of CRH could be used if needed.



#### Contact for expert and technical issues

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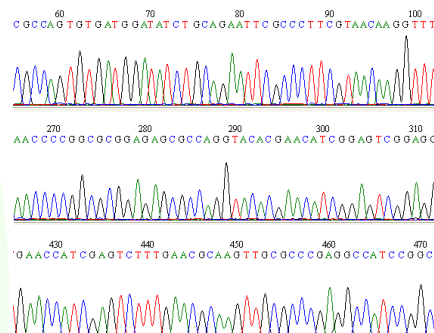
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**DNA sequencing by ABI BigDye chemistry**

Centre of plant structural and functional genomics, IEB AS CR

• **Service description**

We offer a fast DNA sequencing service with a turnaround time of 10 working days. Our laboratory has a long-term experience in dideoxy method of DNA sequencing (Sanger sequencing). Standard protocols based on 3.1. BigDye chemistry (ABI) are used for sequencing reactions. For detailed information about the service, please visit our web site (<http://lmcc.ieb.cz/dna-sequencing-service>). If needed, please feel free to discuss individual steps of sample preparation and purification with our staff.



• **Basic equipment related to the service**

Our laboratory is fully equipped to perform Sanger sequencing. The equipment includes PCR cyclers in 96-well plate format, BioMEK robotic liquid handling station (Beckman Coulter) for purification of sequencing products using magnetic beads (96-well format). Vital equipment includes 3730xl DNA analyzer (96-capillary sequencer, Applied Biosystems) for the analysis of sequencing products and sequencing analysis software (ABI) for basic data analysis.



Biomek NXP (Beckman Coulter)

We offer two types of sequencing service:

I. Preparation of sequencing reaction (using 3.1 BigDye chemistry, ABI), post-reaction cleanup, capillary electrophoresis (3730xl DNA analyzer) and basic data processing

II. Electrophoretic separation (3730xl DNA analyzer) of samples prepared by a customer using ABI BigDye chemistry



3730xl DNA analyzer (Applied Biosystems)

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• **Price and other terms**

ad I) DNA sequencing and basic data analysis of 1 sample: 200 CZK + VAT

ad II) Capillary electrophoresis and basic data analysis of 1 sample: 30 CZK + VAT

Detail information is available on website: <http://lmcc.ieb.cz/dna-sequencing-service>

**Development of method for determination of phytohormones and related substances  
in plant material**

Department of growth regulators

● **Service description**

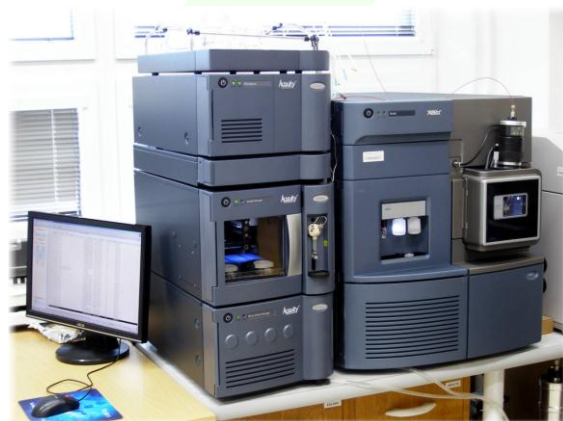
**Service could be customized after mutual discussion**

Our department keeps a long tradition in the field of new method development for isolation, identification and quantification of various groups of endogenous plant hormones. We offer collaboration in optimization and application of these methods for specific plant material. Minimum sample quantity for standard analysis is 200 mg but we are able to design transformation of the analysis to microscale.



● **Basic equipment related to the service**

For plant hormone isolation combination of SPE at various stationary phases and immunoaffinity chromatography through immobilized polyspecific antibodies prepared against individual phytohormones groups is used. Substances are identified and quantified by UPLC-MS/MS technology.



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● **Price and other terms**

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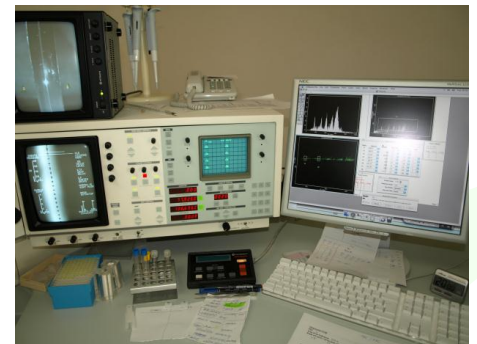
**Construction of genomic and chromosome-specific BAC DNA libraries**

Centre of plant structural and functional genomics, IEB AS CR

● **Service description**

**Service could be customized after mutual agreement**

Our laboratory offers preparation of genomic and chromosome-specific DNA libraries cloned in BAC vector with average insert size 130kb. We have developed unique procedures allowing preparation of high-molecular weight DNA from nuclei and chromosomes of various plants using flow cytometry. The laboratory is fully equipped for successful realization of these projects. In addition to preparation of DNA libraries we offer also preparation of high-density filters and PCR pools for library screening. Moreover, we offer storage of these valuable materials in deep freezers (-80°C). List of libraries we have prepared so far is available on the laboratory website (<http://olomouc.ueb.cas.cz/genomic-resources>).



● **Basic equipment relevant to the service**

Standard method is used for nuclei isolation. In case of plants with high content of saccharides and polyphenolic compounds, flow sorting is used for nuclei isolation and purification. Flow cytometry are also used for plant chromosome sorting. The laboratory is equipped with two FACSVantage dual laser flow cytometers and one FACSaria SORP flow cytometer (Becton Dickinson). For construction of DNA libraries, pulse-field gel electrophoresis (Bio-RAD), electroelution system (Bio-RAD), cell porator (Life Technologies), two robotic work stations GeneTAC G3 (Genomic Solutions) and Q-BOT (Genetix) are used. A complete list of laboratory equipment is available on the laboratory website (<http://olomouc.ueb.cas.cz/facilities>).



**Note:**

Other laboratory equipment of the Centre could be used, if needed.

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● **Price and other terms**

Detail terms and prices are available on website <http://olomouc.ueb.cas.cz/pricing-information>. Please, note that the final cost of our services depends on many factors (DNA isolation method, genome/chromosome size, number of requested clones etc.). Feel free to contact us for preliminary consultation.

## **Validation of growth regulators biological effect**

Department of growth regulators, Department of molecular biology

### ● Service description

#### **Service could be customized after mutual discussion**

In our laboratories we are able to test biological effects of substances with growth-regulative potential in a set of routine biotests enabling description of basic biological activity *in vitro*. We also offer verification of the effect mechanism through studies of a substance interaction with key enzymes of metabolism, transport and perception of plant hormones. The substance can be applied to model plants in laboratory and glasshouse conditions and its effect on plant growth and development can be described, e.g. effect on germination, seedling development, root development (main root development and number of side roots), effect on photomorphogenesis, stem development and growth, generative organs development, yield and senescence. We also offer field testing on basic panel of economically important crops. We can also test effect of the substance application on expression of key genes of photosynthesis, degradation, plant hormones transport and perception and of other genes affecting important parameters of plant development thus providing additional data complementing the general view to the mode of action of the tested substance.



### ● Basic equipment related to the service

We have two fully equipped biochemical and molecular biological laboratories for testing of the biological effects. For gene expression analysis pipetting robots (Beckmann Coulter, Agilent) and high-capacity real-time array system (Applied Biosystems) are used. For plant cultivation cultivating chambers and boxes (Percival, Conviron), glasshouses with temperature and illumination control, hydroponic cultivation, automatic phenotyping machine with continuous data collection and 4,5 ha field are available.



**Note:** Other equipment of CRH could be used if needed.

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Individual – according to scale and specification of the service.  
Feel free to ask for preliminary consultation.

## **Production of recombinant proteins**

**Department of molecular biology**

### ● **Service description**

#### **Service could be customized after mutual discussion**

Our laboratory offers preparation of recombinant proteins in larger quantity. Bacterial and yeast expression systems are designed to ensure proper folding of expressed protein with possible post-translational modifications. Protein could be expressed with a fusion domain to enable easier purification. Site-directed mutagenesis could be done on demand to modify protein structure or activity.

### ● **Basic equipment related to the service**

Fully equipped laboratory of molecular biology is available for recombinant proteins preparation. Protein expression is carried in laboratory fermenter in vessels up to 30 liters. Protein purification is done by means of low-pressure chromatograph with UV and conductivity detector.

**Note:** Other equipment of CRH could be used if needed.



### ● **Contact for expert and technical issues**

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### ● **Price and other terms**

Individual – according to scale and specification of the service.  
Feel free to ask for preliminary consultation.

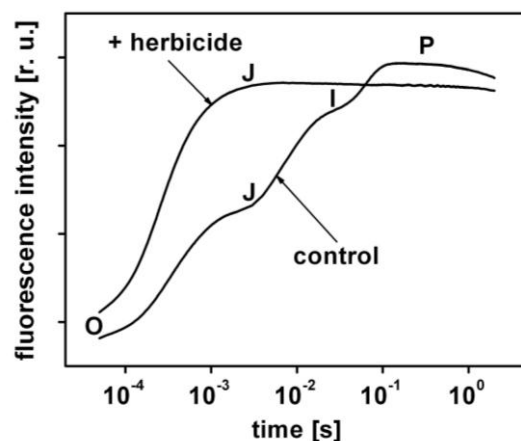


**Dosage optimization of selected herbicides and monitoring of their degradation in plants**

Department of Biophysics

● **Service description**

An important number of herbicides used in practice kill the weeds by changing the electron transport in chloroplast thylakoids. These include herbicide groups C1, C2, C3 and D, according to the classification of HRAC (Herbicide Resistance Action Committee). Binding of these herbicides to photosystems can be monitored noninvasively by the measurement of chlorophyll fluorescence kinetics (fluorescence induction), which lasts approximately one second. This method is applicable also for the monitoring of the degradation of herbicides in plants. The measurement of fluorescence induction with plants treated with herbicides of different concentration for different time can be used for the determination of optimal dosage of herbicides.



● **Basic equipment related to the service**

Our laboratory is equipped by a great number of instruments suitable for the measurement of fluorescence induction, e.g. PEA fluorometer (Hansatech, Great Britain) or portable FL-100 fluorometer (Photon Systems Instruments, Czech Republic).

● **Price and other terms**

The particular price depends on the type and arrangement of the service. Based on mutual agreement, it is also possible to use more sophisticated fluorometers and evaluate various additional parameters that reflect the function of photosynthesis and that in principle can be used for the monitoring of the action of any herbicide. Feel free to contact the scientist listed below for preliminary consultation.

● **Contact**

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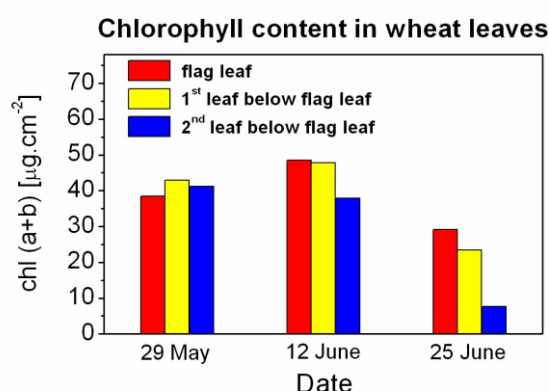


## Fast non-destructive determination of chlorophyll content in plant leaves

Department of Biophysics

### • Service description

The chlorophyll content in leaves (i.e. leaf greenness) is an important parameter of the physiological status of plants. The greenness of leaves changes during the plant growth and development, depends on the leaf position and is affected by nutrition (namely by nitrogen), canopy density, water availability and also by stress factors. Analytical methods that are widely used for the determination of chlorophyll content are destructive, time-consuming and expensive. What we offer is the determination of chlorophyll content based on the measurement of transmittance and reflectance of leaves in spectral regions typical for chlorophyll absorption. The measurement is performed using small portable instruments, is non-destructive and takes only a few seconds. In a short time it is possible to get a huge amount of data, which can be used for statistical analysis of chlorophyll content in particular plant leaves, for the determination of plant chlorophyll profile or canopy greenness map etc. In addition, it is possible to perform the calibration of the instruments for a particular plant species, which then allows the presentation of chlorophyll content in  $\text{mg m}^{-2}$ .



### • Basic equipment related to the service

Our laboratory is equipped with two portable chlorophyll meters - SPAD 502 (Konica Minolta Sensing, Japan), based on the measurement of transmittance, and PlantPen NDVI 300 (P.S.I., Brno, Czech Republic), based on the measurement of reflectance. The possibility to combine both instruments allows us to measure thin as well as thick leaves, to monitor leaf polarity (difference in greenness of upper and lower leaf surface), etc. The measurement can be performed anywhere – in growth chambers, greenhouses or in the field.

### • Price and other terms

The particular price depends on the arrangement of the service, on the need for the calibration or data correction. For preliminary consultation, please contact the scientist listed below.

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