**Laboratory of metabolomic and isotopic analyses**

In the frame of the project we are able to perform or provide metabolomic analysis respectively (targeted and untargeted). Metabolomic analysis will be performed using tandem analytical techniques (GC / MS / MS-TSQ Quantum XLS Triple Quadrupole-, Thermo Fisher Scientific, USA) and (UHPLC/HRMS-3000 UltiMate Liquid Chromatography Systems with DAD detector (diode array detector with a wavelength range of 190-800nm) and hybrid LTQ Orbitrap XL HRMS combining a highly sensitive linear ion trap and FTMS (Fourier transform) Orbitrap analyzer with high resolution and accurate molecular weight measurement (Thermo Scientific, USA)). Of the targeted analysis, we are able to provide determination of sugars, fatty acids, volatile compounds, phenolic compounds and other primary and secondary metabolites (in our mass spectra library we currently have over 300 metabolites that we are able to determine). In addition, we also perform untargeted metabolomic analysis where we use information from MS and MS/MS analysis for the identification of metabolites, which are not included in our libraries of mass spectra.

For the identification of relevant metabolites and metabolic pathways we are using Metlin database and Kegg database:

* <http://metlin.scripps.edu/index.php>
* <http://www.genome.jp/kegg/pathway.html>).

Furthermore, we are able to provide C/N/S analysis using elemental analyzer Flash 2000 Elemental analyzer (ThermoFisher Scientific, USA) and determination of chlorophylls and carotenoids using spectrophotometers (Lumina -fluorescence spectrophotometer, SPECORD 250 plus UV/VIS spectrophotometers).

**Laboratory of isotopic analyses**

In the frame of the project we are able to measure the relative abundance of stable isotopes (13C/12C, 15N/14N, 34S/32S, D/H, 18O/16O) in soil–plant–atmosphere continuum. Analysis will be performed using an isotopic ratio mass spectrometer ISOPRIME100 (Isoprime, UK) at a precision of ± 0.02 ‰ for carbon and ± 0.3 ‰ for oxygen. Spectrometer is coupled with elemental analyser varioPYROCUBE (Elementar, DE), equipped by autosampler offering up to 119 possitions, and allows analyses of solid and liquid samples. Cryogenic preconcentration of gas samples allows detection of δ13C and δ15N in CO2, N2O, and CH4 at common atmospheric concentrations. Laboratory-prepared standards (saccharose, cellulose) and international standards (Vienna Pee Dee Belemnite pro δ13C and Vienna Standard Mean Ocean Water pro δ18O) are used for the system calibration. Laboratory is further equipped by mills MM400 and PM200 (Retsch, DE), ultrasonic homogenizer D-1 (MICCRA, DE) and automated microbalance XP6 (Metler-Toledo, USA) for sample preparation.

Furthermore, these analyses can be supported by target analyses of primary (saccharides, amino acids) and secondary (in particular fatty acids, volatile compounds, phenolic compounds) metabolites using tandem analytical techniques of gas (GC/MS/MS-TSQ Quantum XLS-Triple Quadrupole, Thermo Fisher Scientific, USA) and liquid chromatography (UHPLC/HRMS-3000 UltiMate Liquid Chromatography Systems with DAD detector and hybrid LTQ Orbitrap XL HRMS; Thermo Scientific, USA).