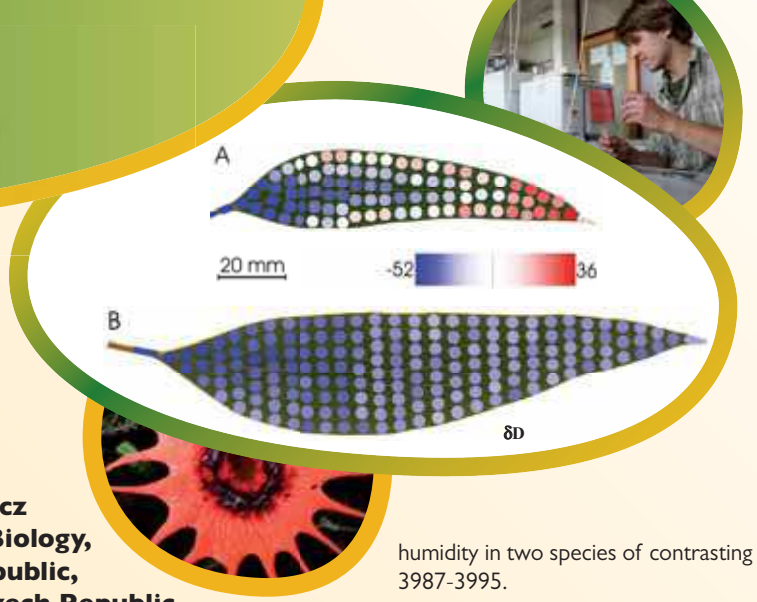
DEPARTMENT OF PLANT PHYSIOLOGY



Homepage: **http://kfr.prf.jcu.cz/**
Head of the Department: **Assoc. Prof. Jiří Šantrůček**
Email: **jsan@umbr.cas.cz**

PhD. study in Plant Physiology

Programme Director: **Assoc. Prof. Jiří Šantrůček**
Contact: **phone (420)-387772353, e-mail jsan@umbr.cas.cz**
Co-operating institutions: **Institute of Plant Molecular Biology, Biology Centre of Academy of Sciences of the Czech Republic, Institute of Microbiology, Academy of Sciences of the Czech Republic**

Research and education activities

The Department of Plant Physiology offers a study in Experimental Plant Biology (Master of Science degree) and in PhD. specialization Plant Physiology. The research covers environmental plant physiology, biochemistry and biophysics of photosynthesis and is focused to several dominant areas.

Photosynthesis of higher plants, algae and cyanobacteria

Photosynthesis is traditional research topic in institutes located in South Bohemia (Třeboň, České Budějovice, Nové Hrady). Regulation of photosynthesis in algae and cyanobacteria is studied on molecular level, with respect to environmentally important questions of natural variability of irradiance and nutrients. For example, recently we obtained important results on the regulation of photosynthesis in diazotrophic cyanobacteria under conditions of projected increased CO_2 levels.

Leaf internal limitations to CO_2 fixation (mesophyll transport conductance) are studied using gas exchange, chlorophyll fluorescence and stable isotopes mass spectrometry techniques.

Stomatal physiology, plant-atmosphere interactions

Environmental factors controlling stomatal development and patterning in leaf epidermis are studied using gas exchange, thermography, mass spectrometry and microscopy. In co-operations with crop research institutes, water use efficiency and other physiological and biochemical drought resistance traits are screened in barley, wheat and forage grass cultivars. Transport- and structural properties of cuticle as a leaf water transport barrier are studied in cooperation with Institute of Molecular and Cell Botany, University of Bonn.

Stable isotopes fractionation in biosphere.

Fractionation of water isotopes (^{18}O and D) in the soil-plant-atmosphere continuum and stable carbon isotopes ($^{13}C/^{12}C$) in leaves and stems (tree rings) is applied in assessment of plant growth conditions, hydraulic architecture and in tracing of geographical origin of plant products and herbivores (reptiles).

Example of results

Publications:

Vrábl D., Vašková M., Hronková M., Flexas J., Šantrůček J. 2009: Mesophyll conductance to CO2 transport estimated by two independent methods: effect of variable CO2 concentration and abscisic acid. Journal of Experimental Botany 60: 2315-2323.

Kana R., Prasil O., Komarek O., Papageorgiou G.C., Govindjee 2009: Spectral characteristic of fluorescence induction in a model cyanobacterium, Synechococcus sp (PCC 7942). Biochemica et Biophysica Acta-Bioenergetics 1787: 1170-1178.

Karbulková J, Schreiber L., Macek P., Šantrůček J. 2008: Differences between water permeability of astomatous and stomatous cuticular membranes: effects of air humidity in two species of contrasting drought-resistance strategy. Journal of Experimental Botany 59: 3987-3995.

Kupper H., Setlik I., Seibert S., Prasil O., Setlikova E., Strittmatter M., Levitan O., Lohscheider J., Adamska I., Berman-Frank I. 2008: Iron limitation in the marine cyanobacterium Trichodesmium reveals new insights into regulation of photosynthesis and nitrogen fixation. New Phytologist 179: 784-798.

Šantrůček J., Květoň J., Šetlík J., Bulíčková L. 2007: Spatial variation of deuterium enrichment in bulk water of *Eucalyptus pauciflora* leaves. Plant Physiology 143: 88-97.

Kubásek J., Šetlík J., Dwyer S., Šantrůček J. 2007: Light and growth temperature alter carbon isotope discrimination and estimated bundle sheath leakiness in C4 grasses and dicots. Photosynthesis Research 91: 47-58.

Komenda J., Tichy M., Prasil O., Knoppova J., Kuvikova S., de Vries R., Nixon P.J. 2007: The exposed N-terminal tail of the D1 subunit is required for rapid D1 degradation during photosystem II repair in Synechocystis sp PCC 6803. Plant Cell 19: 2839-2854.

Šantrůčková H., Šantrůček J., Šetlík J., Svoboda M., Kopáček J.: Carbon isotopes in tree rings of Norway spruce exposed to atmospheric pollution. Environmental Science & Technology 41: 5778-5782, 2007.

PhD. theses:

Bína D. (2009) The PsbH protein: A small membrane protein of the Photosystem II as a model for structural and functional studies.

Litvín R. (2009) Photochemistry of photosystem II reaction centre: Alternative electron pathways.

Halbhuber Z. (2007) Photosynthetic electron transport in purple bacteria: an *in vivo* spectroscopic study.

Ferimazova N. (2006) Heterogeneity of photosynthetic performance as a result of metabolic, physiological and genetic regulation of photosynthesis.