



# Measurement of photosynthesis and fluorescence in mango trees

Ivana Tomášková



## Outline of the presentation

- Description of the instrument for gasometric measurements
- Measurement of fast fluorescence kinetics (OJIP curve)
- Preliminary results from photosynthetic and fluorescence measurement in mango orchard
- Other instruments used in ecophysiological research (plant canopy analyser, sap flow, spectrophotometer)





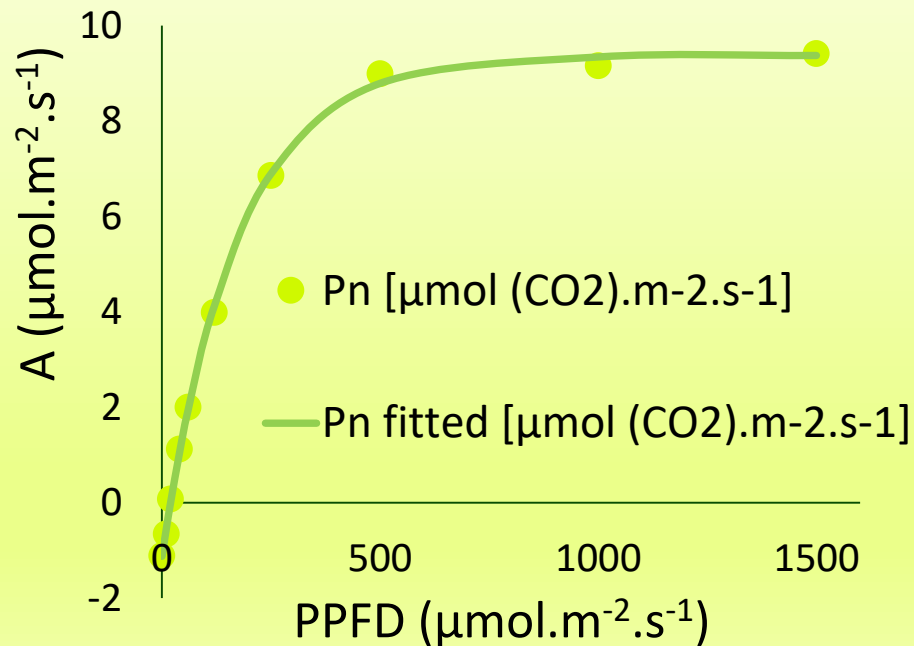
## LI-6400XT Portable Photosynthesis System



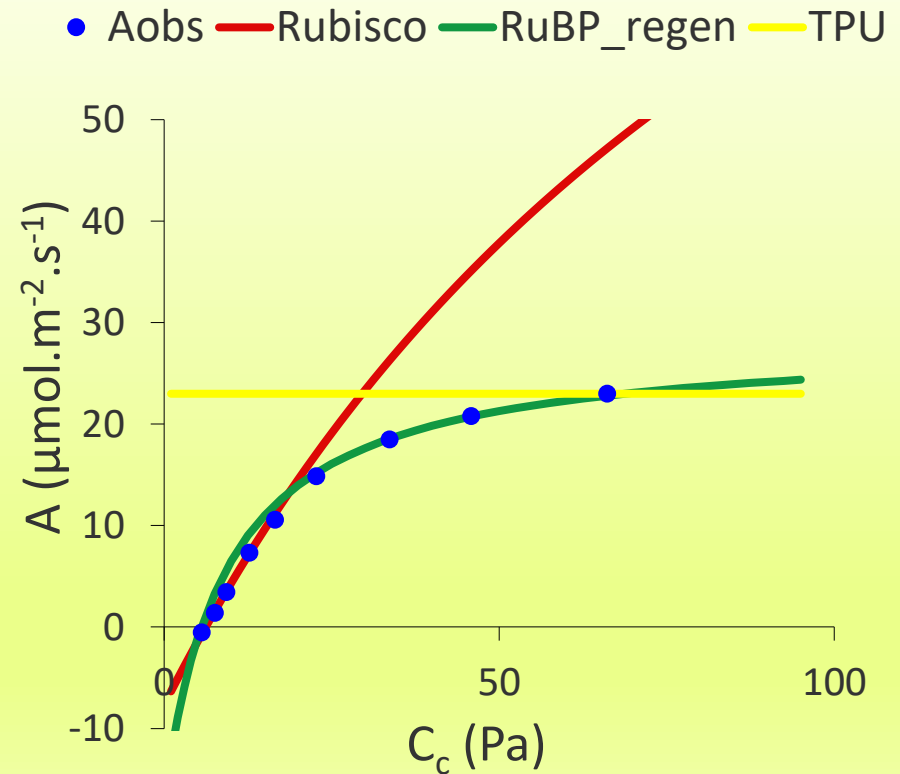


## Light curve and A/Ci curve

Mango "Cogshall", position K17



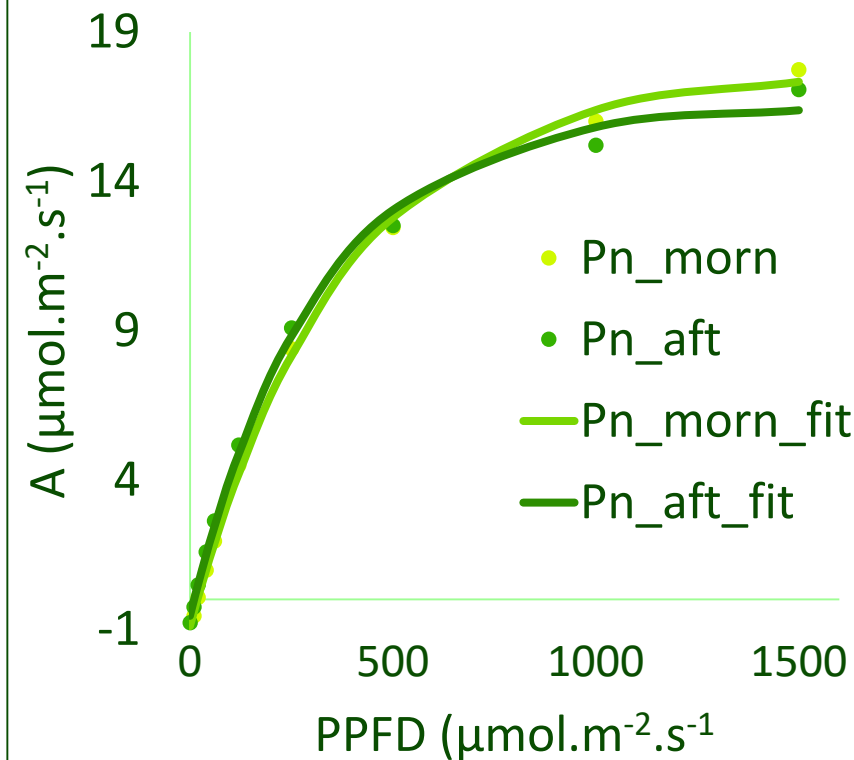
Mango „Sensation“, position H4



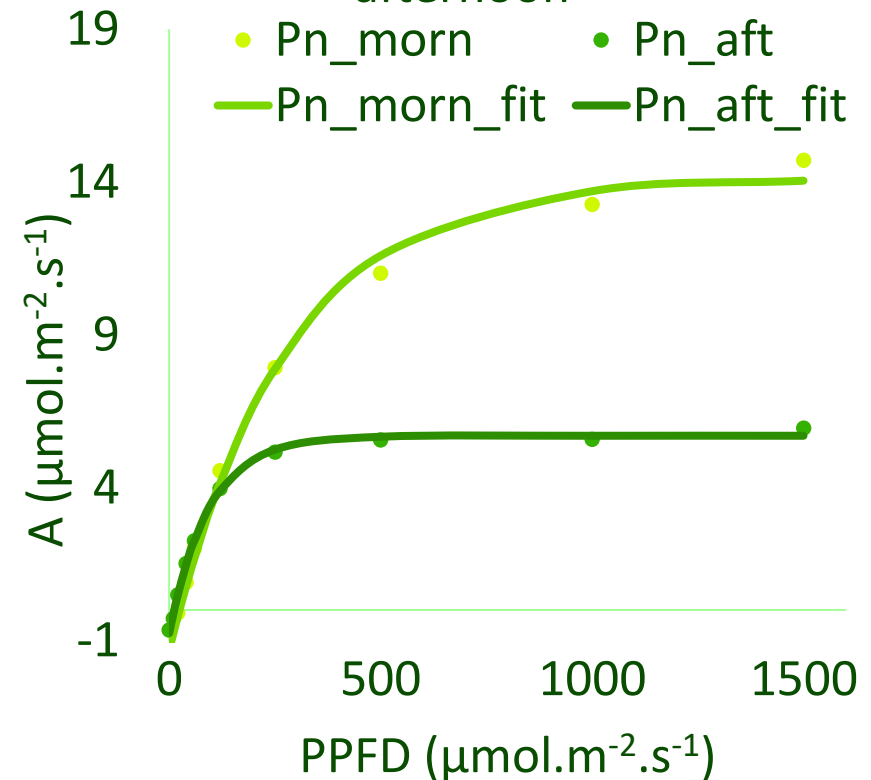


## Explanation of differences in $A_{max}$ in two selected mango extremes?

caro\_morning and afternoon



coghshall\_morning and afternoon







## Main message of the planned article

- strong dependance of LC on the time of the measurement in mango trees
- Not linear relationship between fruits harvest and  $P_n$



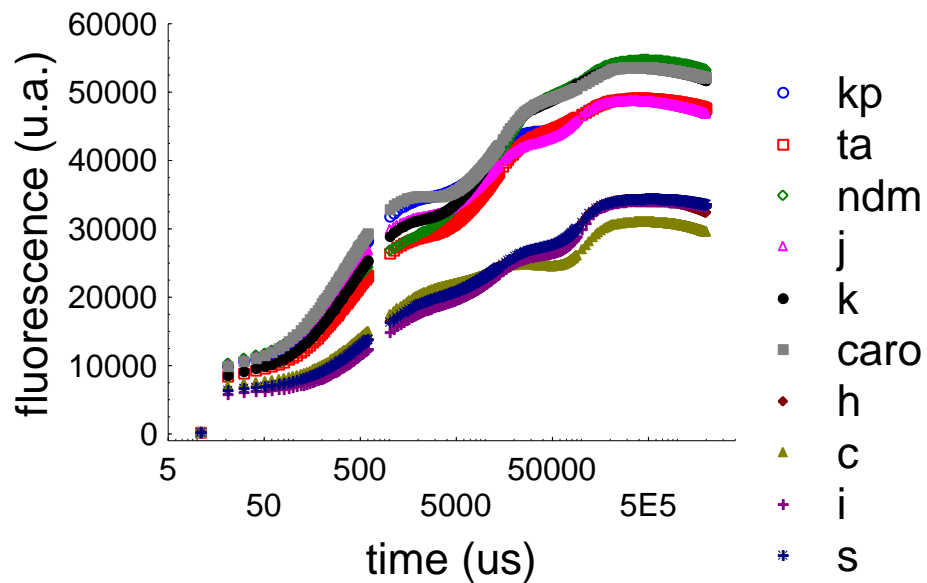
## Fluorescence measurement



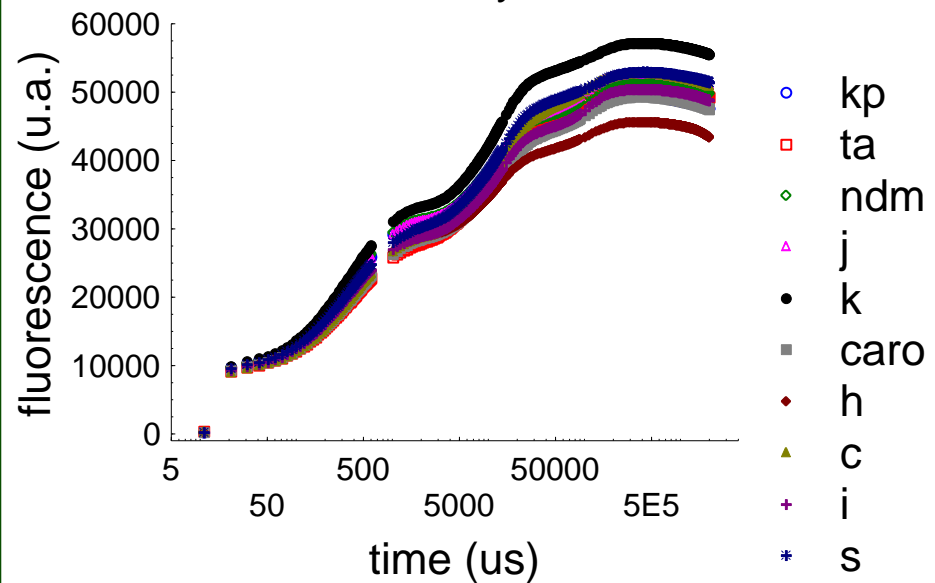


## OJIP curve of mango leaves

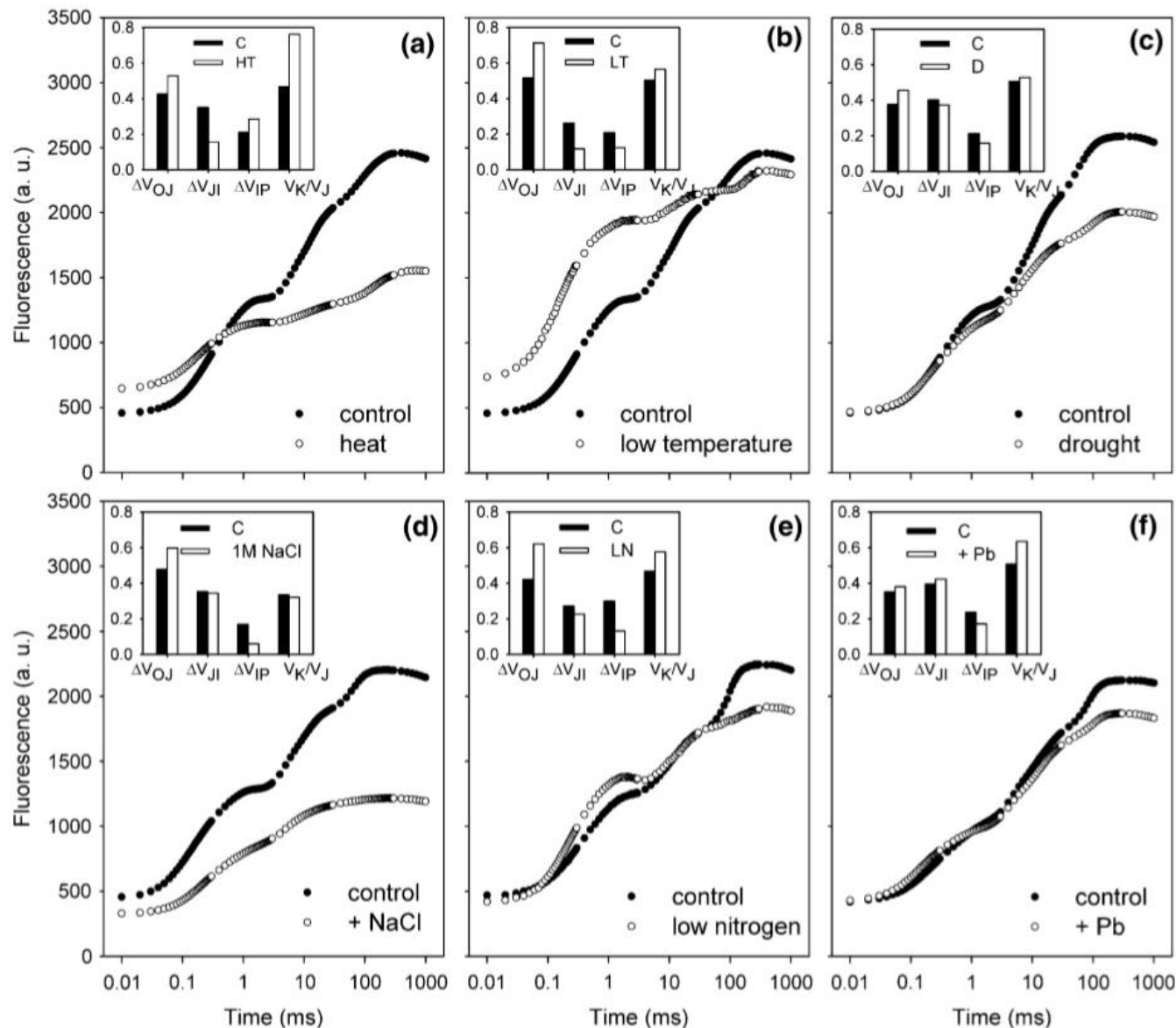
OJIP curves of mango with excess of soil moisture



OJIP curves of mango at the end of January without any stress







Kalaji, H. M. *et al.*  
Chlorophyll a  
fluorescence as a  
tool to monitor  
physiological status  
of plants under  
abiotic stress  
conditions. *Acta  
Physiol. Plant.* **38**,  
102 (2016).



## Main message of the article

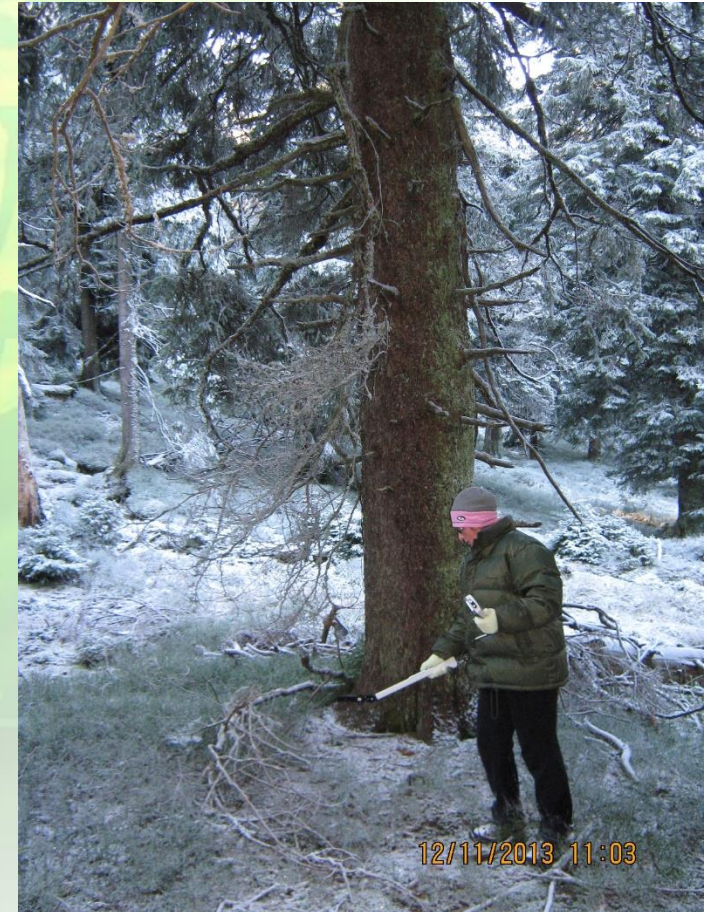
- The widely used parameter  $F_v/F_m$  as sign of plant stress did not reveal slightly changes in electron kinetics within thylakoid membrane
- To compare the different variants (trees) on the basis of  $F_v/F_m$  or  $\Phi_{i\_abs}$  can lead to misinterpretation of the results

cultivar	$F_v/F_m$	$\Phi_{i\_abs}$
kp	0,78	1,17
ndm	0,79	2,40
ta	0,82	2,23
j	0,77	1,36
kp	0,83	2,30
caro	0,80	1,39
h	0,81	3,47
c	0,76	1,81
i	0,82	5,14
s	0,81	3,61



## Other instruments used in ecophysiological research

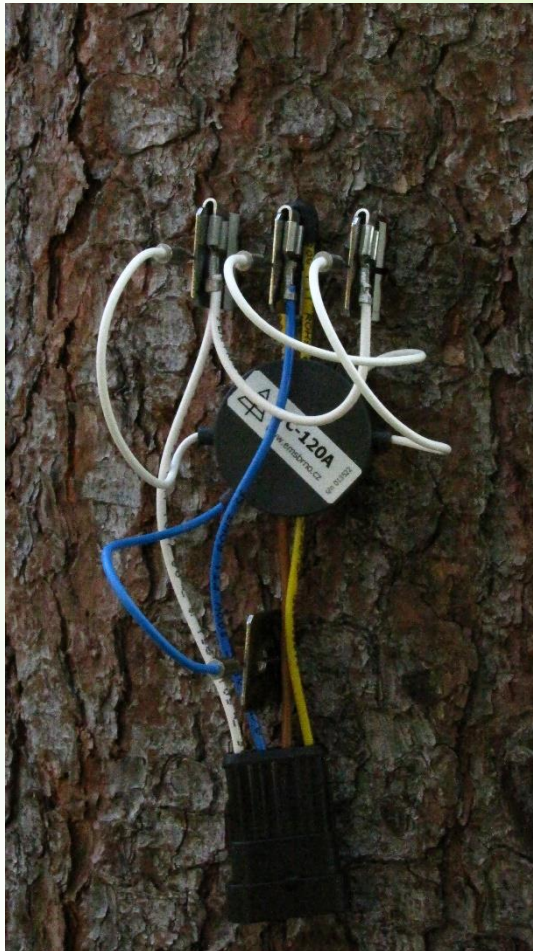
- PCA2250 - method of gap fraction – probability of radiation interception through the canopy
- Attenuation is measured at five zenith angles arranged in concentric rings simultaneously
- Measurements consist of a min. 10 numbers (above-50, below-5, transmittance is  $5/50 = 0,1$  at first ring with angle centred at  $7^\circ$ )







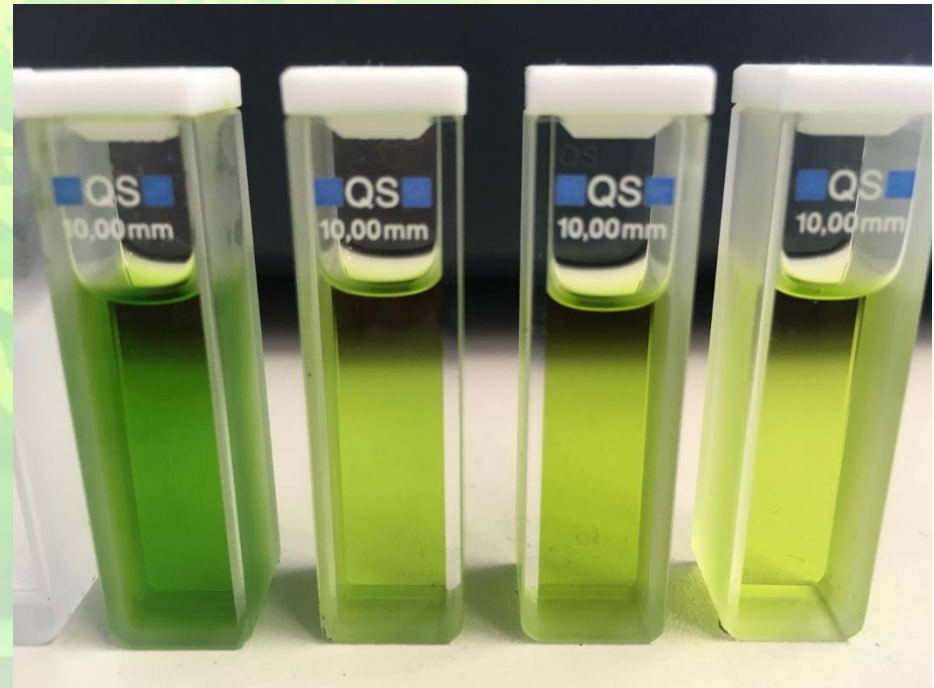
## Sap flow measurement



- EMS51 - stainless steel plate electrodes lead electric current to the stem
- xylem volume around electrodes is heated
- heating energy is carried away by sap flow
- calculation of sap flow is based on the amount of heat carried away and from the power needed to maintain temperature difference between heated and non heated part of the stem



## Spectrophotometer







## Additional chambers of LI-6400XT







# **Thank you for your attention**

[tomaskova@fld.czu.cz](mailto:tomaskova@fld.czu.cz)