

Biochemical Traits of Plant Cells Measured by FTIR Spectroscopy

Heiko Wagner, Zhixin Liu, Jennifer Albrand and Christian Wilhelm

University of Leipzig, Institute of Biology, Department of Plant Physiology,
Johannisallee 21-23, 04103 Leipzig, Germany

In plant ecology research the focus of plant traits shifting more and more towards chemical and biochemical cell composition. Since, the analysis of elemental cell quota or cellular content in proteins, major storage compounds like lipids and carbohydrates or structural components like lignin by means of biochemical methods is time consuming and needs relative high amounts of cell material, alternative measurements are recently under development [1-3]. Fourier transformed infrared spectroscopy (FTIR) in the mid infrared as well as near infrared region can overcome some of these limitations due to its high reliability, sensitivity, and the potential for high throughput analysis. We show that FTIR spectroscopy coupled to several statistic based data interpretation is a useful tool for determining biochemical traits of different plant material, ranging from small single cell phytoplankton up to higher plant samples. We further show the application of the method in different fields of plant ecology and biotechnology with respect to statistical data interpretation.

References:

- [1] H. Wagner, Z. Liu, U. Langner, K. Stehfest, C. Wilhelm, *Journal of biophotonics* 3(8-9), 557-566 (2010).
- [2] C. Jebsen, A. Norici, H. Wagner, M. Palmucci, M. Giordano, C. Wilhelm, *Physiologia Plantarum* 146(4), 427-438 (2012).
- [3] A. Jungandreas, H. Wagner, C. Wilhelm, *Plant Cell Physiol* 53, 2153–2162 (2012).