

04-04: Quantitative FTIR imaging displays the sucrose landscape within and along its allocation pathway

André Guendel, Hardy Rolletschek, Steffen Wagner, Aleksandra Muszynska, Ljudmilla Borisjuk

Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Corrensstr. 3, 06466 Gatersleben, Germany
E-mail: guendel@ipk-gatersleben.de

Sucrose as the major transport sugar in plants is an essential target of a wide range of research projects on plant development. It plays an important role as an energy source for all plant organs after carbon fixation through photosynthesis and as a signal in adaptive and stress responses. We developed a novel micro spectroscopic infrared based imaging approach [1], which overcomes current tissue specific limitations in technologies for quantitative sucrose mapping. The new FTIR based imaging platform is easily applied to various agricultural important crops such as barley (*Hordeum vulgare*) [1], wheat (*Triticum aestivum*) or oilseed rape (*Brassica napus*) [2] as well as the model plant *Arabidopsis thaliana* [3]. It can successfully image sucrose distribution within the range of 20 to 1000 mM with a spatial resolution enabling the investigation of single vascular bundles in leaf and stem. Moreover, it enables to target multiple components together as demonstrated by sucrose and starch imaging within the developing seed of cereals. Our data shows the high relevance of FTIR imaging within the scope of carbon allocation and storage within the context of crop improvement.

References

- [1] GUENDEL, A., ROLLETSCHEK, H., WAGNER, S., MUSZYNSKA, A., and L. BORISJUK, 2018: *Plant Physiology*, pp.00947.2018, DOI: 10.1104/pp.18.00947.
- [2] MUNZ, E., ROLLETSCHEK, H., OELTZE-JAFFRA, S., FUCHS, J., GUENDEL, A., NEUBERGER, T., ORTLEB, S., JAKOB, P.M., and L. BORISJUK, 2017: *New Phytologist*, **216**, 1181-1190, DOI: 10.1111/nph.14736.
- [3] WALEROWSKI, P., GÜNDEL, A., YAHAYA, N., TRUMAN, W., SOB CZAK, M., OLSZAK, M., ROLFE, S.A., BORISJUK, L., and R. MALINOWSKI, 2018: *The Plant Cell*, tpc.00283.2018, DOI: 10.1105/tpc.18.00283.