Contribution ID : **75** Type : **Poster**

Light sheet fluorescence microscopy in plant developmental imaging

Plant growth and development is a complex process evolving through continuous qualitative and quantitative changes in four (x-, y-, z- and t-) dimensions. Classical microscopy methods pose some serious limitations for long-term live cell and developmental plant imaging. Out-of-focus fluorescence, phototoxicity, photobleaching, restricted temporal resolution and limitations in imaging depth are compromises of widefield epifluorescence, confocal laser scanning and spinning disk modalities. The recent emergence of mesoscopic imaging methods and especially of light sheet fluorescence microscopy (LSFM) provided a new tool for fast and long-term imaging of animal and plant development. Importantly, plants growing in culture medium are positioned vertically in the microscope. All these parameters favour LSFM for long-term developmental plant imaging at the subcellular, cellular, tissue, organ, and whole-organism levels in a natural orientation maintaining undisturbed plant growth in near-environmental conditions. Using currently developed protocols for preparation of living plants for long-term LSFM, plant imaging is possible at diverse scales, ranging from subcellular compartments up to whole seedlings. We will present examples from LSFM imaging of individual plant organs such as roots, hypocotyls and cotyledons, different tissues and cell types as well as observation and tracking of different subcellular organelles

This work was supported by grant no. LO1204 (Sustainable development of research in the Centre of the Region Haná) from the National Program of Sustainability I, Ministry of Education, Youth and Sports, Czech Republic.

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Terms and Conditions

Yes

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Session Classification : Posters