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3D-Plant2cells project: Spatial metabolomic, spatial metagenomic, and 3D mass spectrometry imaging, to explore the impact of pesticides on plant metabolome and microbiota

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Abstracts

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3D-Plant2cells project: Spatial metabolomic, spatial metagenomic, and 3D mass spectrometry imaging, to explore the impact of pesticides on plant metabolome and microbiota

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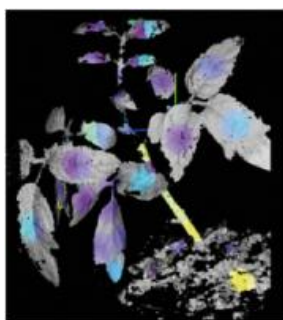
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Further Information

Congress Abstract

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The "3D-Plant2Cells" project investigates the impact of the agricultural mode on crops grown for human consumption. We are developing an innovative interdisciplinary approach to study the metabolome and the microbiota of plants in three-dimension (3D) at three different scales: the whole plant, the fruit, and the cellular scales. The objective of this study is to get a new insight on the metabolome and microbiota response to pesticide treatment. The hypothesis is that the chemistry and microbiome could change upon the use of conventional cultivation managements. To explore this hypothesis, two groups of plants are cultivated in growth chamber and one receives pesticide treatments. The metabolome and the plant-associated microbiota are explored on the whole plant surface (plant scale) by using an innovative interdisciplinary approach [1,2]. Samples are collected on the whole plant and their metabolite content profiled by high-resolution tandem-mass spectrometry (HR-MS/MS) and plant-associated microorganism communities by amplicon sequence analysis (metagenomics) [1]. Results of these both inputs are compiled into a bioinformatic model representing a 3D topological map of the metabolome/microbiome over the entire organism surface [1]. Mass spectrometry data will be further interpreted using MS/MS molecular networking [1]. In the meantime, we are studying fruits of the cultivated specimens by 3D mass spectrometry imaging³ to study the metabolome/microbiota response to pesticide treatments along with the pesticide distribution in 3D. The fruit and cell scale are explored by analyzing serial sections using MALDI, nanoDESI, 3D-TOF-SIMS coupled to HR-MS/MS. The presentation will aim at introducing the project, and to highlight some methodological approaches used to study the microbiota-chemistry relationships in species or ecosystem.



(<https://www.thieme-connect.de/media/plantamedica/2016S01/10-1055-s-0036-1596119-i011.jpg>).



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Keywords: spatial metabolomic, spatial metagenomic, 3D mass spectrometry imaging, molecular networking, plant-associated microbiota, pesticide.

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