

**NEW TOOLS FOR THE ANALYSIS OF MASS SPECTROMETRY BASED METABOLIC IMAGES OF PLANT TISSUES**

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The investigation of the spatial distribution of metabolites and bioactive compounds in tissues is an asset to increase our understanding of metabolic and biological processes occurring in plants. In the specific case of fruits this can have important technological, nutritional and economical implications.

Mass spectrometric techniques can be used to investigate the distribution of small molecules in tissue sections with high sensitivity, allowing the reconstruction of compound specific images. High resolution full scan mass spectra are acquired over the sample surface, generating datasets of higher complexity and difficult automatic interpretation. Among the different critical aspects, metabolite identification is particularly challenging because with direct ionization techniques it has to be based only on (high resolution) mass-to-charge ratios. Single mass-to-charge values are not sufficient for chemical identification, but the co-localization of characteristic molecular fragments can be used to overcome such limitation.

In this communication we will present some recent results [1] where we have used advanced imaging analysis tools to perform chemical identification in a series of MS imaging experiments, aimed at the study of the distribution of relevant metabolites in Golden Delicious apples. The proposed imaging analysis pipeline relies on the extension and the validation of co-localization analysis to the different mass specific images constituting MS imaging datasets.

Preliminary results on biostatistical approaches for MS images segmentation will be also discussed.

References:

- [1] P. Franceschi, Y. Dong, K. Strupat, U. Vrhovsek, F. Mattivi, *J. Exp. Bot.* (2011) doi: 10.1093/jxb/err327.