DBEM Seminar Talk

Monday 26 November

11:00-12:00

Aula Gialla (5203) CTT

Speaker

Dr. Gianpiero Vigani is Senior Researcher in the Plant Physiology Unit, Department of Life Sciences and System Biology at the University of Turin, Italy.

For more information see: https://www.researchgate.net/profile/Gianpiero_Vigani

Title

Iron metabolism: crops vs wild plants

Abstract

Low iron (Fe) availability in soil represents one of the most important limiting factors of agricultural production. In order to investigate the physiological and biochemical adaptation mechanisms occurring in plants under Fe deficiency, it is of central importance to acquire a detailed knowledge of the metabolic changes taking place under such conditions. In plant cells, highest demand for iron occurs in chloroplasts and mitochondria. Fe deficiency strongly impairs respiratory chain activity as well as mitochondrial ultrastructure Such mitochondrial alterations might be a source of signals that might able to regulate the expression of nuclear encoded genes.

Our goal is to understand plant metabolic responses to Fe deficiency and the relative contribution of cellular compartments to the Fe sensing and signaling pathways. Here, I will present novel findings on Fe metabolism in plants that we obtained as follows:

i) by investigating the iron-interacting partners in plants. A detailed investigation about Fe-S and Fe-Mo interactions revealed that subcellular compartments (e.g. mitochondria) represent important cellular sites where nutrients networking take place. While, understanding the Fe-O_2 relationship allowed us to revisit the whole Fe metabolism by grouping the Fe-requiring enzymes (FeRE) into six different categories;

ii) by comparing the Fe deficiency-induced metabolic adaptation of crop plants with those of *calcicole* plants. We characterized the adaptive responses to Fe deficiency of *Parietaria judaica*, a spontaneous plant well adapted to calcareous environments. Morphological, biochemical and metabolic characterization revealed that Parietaria evolved efficient mechanisms to cope with low Fe availability.

Such approaches allowed us to identify important regulatory points of Fe metabolism in plants. These findings are useful to improve our understanding of the plant adaptation mechanisms to the surrounding environment.

Relevant publications

Vigani G, Murgia I. (2018). Iron-Requiring Enzymes in the Spotlight of Oxygen. Trends Plant Sci. 23(10):874-882.

Vigani G, Bohic S, Faoro F, Vekemans B, Vincze L, Terzano R. (2018). Cellular Fractionation and Nanoscopic X-Ray Fluorescence Imaging Analyses Reveal Changes of Zinc Distribution in Leaf Cells of Iron-Deficient Plants. Front Plant Sci. 3;9:1112.

Vigani G, Pii Y, Celletti S, Maver M, Mimmo T, Cesco S, Astolfi S. (2018). Mitochondria dysfunctions under Fe and S deficiency: is citric acid involved in the regulation of adaptive responses? Plant Physiol Biochem. 126:86-96.