Book of Abstracts
INTERM 2024

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11th INTERNATIONAL CONGRESS ON MICROSCOPY & SPECTROSCOPY (INTERM 2024)

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APRIL 18-24, 2024

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POSTER PRESENTATION

Id-739

How Does The Health-Promoting Apple Phenolic Phloretin Affect The Cell Ultrastructure in Arabidopsis Shoots?

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Abstract: Phloretin is a phenolic compound from the apple that belongs to the group of dihydrochalcones. The genus *Malus* is a uniquely rich source of dihydrochalcones, accounting for about 97% of the total phenolic compounds in apple leaves and 10-20% of the dry weight of the leaf tissue. Due to its typical dihydrochalcone structure, phloretin is a highly reactive molecule that interacts efficiently with many biological macromolecules. Its reactivity leads to remarkable antioxidant and medicinal properties that have been extensively studied in mammals and humans. However, knowledge about the effects of phloretin on plant organisms is rather scarce. The phytotoxicity of phloretin in plants was first documented by our research group when phloretin was recognised as a potent allelochemical of the apple tree with deleterious effects in plant species outside the genus *Malus*. Research on the model plant Arabidopsis [*Arabidopsis thaliana* (L.) Heynh] named the disruption of auxin homeostasis in the roots as the main mechanism of the phytotoxic effect of phloretin. The present study complements previous research with new insights into the ultrastructural changes in leaf mesophyll cells that underlie the growth arrest and decay of the aerial parts of Arabidopsis seedlings exposed to phloretin. The effects of phloretin are closely linked to the ultrastructural damage in the leaf mesophyll cells and range from mild effects with short-term treatment to severe effects with long-term treatment. Transmission electron microscopy revealed changes in the morphology of the cell wall, changes in thylakoid organisation, swelling and displacement of chloroplasts after short-term treatment. A significant decrease in the number of starch granules and chlorophyll content in the leaves reflected impaired chloroplast function leading to depletion of starch reserves, starvation of cells and recruitment of micro- and macroautophagic processes for self-maintenance leading to programmed cell death after long-term treatment with phloretin. These results confirm that the sites of action of phloretin in plant and animal cells do not coincide, confirming the safety of its potential application as a new bioherbicidal agent for humans and animals.

Keywords: bioherbicides, phloretin, autophagy, programmed cell death