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Poster Communication Abstract – 1.11

LIVING IN HARSH ENVIRONMENTS: WHAT WE HAVE LEARNT FROM COMPARING PLANT ACCLIMATION VERSUS SHOCK RESPONSE TO OSMO-STRESS

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Drought and salinity, which share a component of osmo-stress, impact significantly plant development and productivity, thus causing serious agricultural yield losses.

The molecular mechanisms underlying the response of plants to severe osmo-stress have been studied extensively and, often, are associated to a drastic yield penalty. The current trend in improving crop resistance to osmo-stress is focused on understanding how plants adapt their growth under prolonged and progressive osmo-stress conditions, with the final aim to identify regulatory and structural gene network associated to restoration of a new cellular homeostasis and, ultimately, to resumption of plant growth under limiting environmental conditions.

After 25 years of studies on plant's response to osmo-stress, we reported here our experimental evidences supporting the notion that glycophyte plants, such as potato, when acclimated gradually to osmo-stress, activate regulatory gene networks distinct from those induced upon acute stress.

Potato cells gradually acclimated to PEG-induced osmo-stress sustain an active growth, due to a set of metabolic changes, including high proline content, *de novo* protein synthesis, changes in membrane lipid composition and ethylene accumulation, not induced in cells exposed abruptly to the same stress conditions (Leone et al., 1994, *Plant Physiol.* 106: 703-712); Leone et al., *Plant, Cell & Environ.*, 1996,19: 1103-1109; Scaramagli et al., 2000, *Plant Physiol. Biochem.* 38, 345–351).

Extensive remodelling of gene expression depends strictly on duration and intensity of osmo-stress (Ambrosone et al., 2011, *Acta Physiol. Plant*. 33, 1157–1171; Ambrosone et al., 2017, Gene 15; 597:30-39). Overall, adaptation requires a major effort in terms of transcriptional regulation and distinct transcription factors promote the differential response to short- or long-term stress. Interestingly, modulation of ethylene signalling network appear to be a distinctive trait of gradual adaptation to osmo-stress. Gene expression patterns and functional analyses for adaptive mechanisms were confirmed *in planta* (Ambrosone et al, 2011; Ambrosone et al., 2017; Ambrosone, Batelli et al., 2015; *Plant Physiol. 168:292-306*) and may be part of an environmentally-driven epigenetic program, which is under investigation.