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ARE STRIGOLACTONES IMPORTANT SYSTEMIC SIGNALS OF ABIOTIC STRESS IN TOMATO PLANTS?

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Strigolactones (SLs) were identified in 2008 as a new class of plant hormones; since then, they were shown to influence various aspects of development and communication with the soil (micro)flora, and were proposed as mediators of environmental stimuli in resource allocation processes. Data collected in *Arabidopsis thaliana* and *Lotus japonicus* suggest that SLs play a positive role in adaptive adjustments to drought in shoots, but not in roots. Namely, SL-depleted Arabidopsis and Lotus plants are hypersensitive to osmotic stress at the shoot level (van Ha et al, 2014; Liu et al., 2015). Accordingly, the transcript of biosynthetic genes is increased by drought in Arabidopsis leaves. However, transcription of biosynthetic and SL transporter-encoding genes is repressed along with the accumulation of SLs in Lotus roots under drought, suggesting that SL metabolism may differ in roots and shoots under stress.

In this work, we confirmed in tomato (*Solanum lycopersicum*) that SL depletion confers hypersensitivity to drought at the shoot level, and tested and confirmed the hypothesis that the biosynthesis of SLs is modulated oppositely in roots and shoots, under normal and stress conditions. This was done by quantifying the transcripts of two key SL biosynthetic genes (*SlCCD7* and *8*), which decrease in roots and increase in shoots of tomato plants under drought reversing the situation observed under normal conditions (abundant *vs*. undetectable transcripts in roots and shoots, respectively). The quantification of the SL metabolites (solanacol, orobanchol and didehydroorobanchol 1 and 2) is well underway, and collected data on roots so far follow transcript trends; the metabolites are instead below the detection threshold in shoot extracts, for which indirect quantification based on biological activity assays is foreseen.

We also tested the importance of root-borne SLs in the cross-talk with ABA and in the performances of shoots under drought, by quantifying the transcript of the same two genes and of the main drought-responsive ABA-biosynthetic gene (*SlNCED1*) in WT scions grafted over SL-depleted (*CCD7*-silenced) tomato rootstocks, compared to self-grafted WT and SL-depleted genotypes. The same grafts were water stressed and their water potential and stomatal conductance followed all along the kinetics, together with root SLs. Preliminary results are consistent with the hypothesis that under osmotic stress, the drop of the SL levels flowing upwards from roots to shoots may act as a long-distance, circuit-breaking signal conveying the root-generated stress signal to the stem, as supported by the physiological performances of grafted plants under stress. Quantification of ABA is in progress and needed to discriminate between direct *vs*. ABA-mediated effects of SLs on drought resilience.