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D14 is necessary for stomatal memory of drought in Arabidopsis thaliana

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Title: D14 is necessary for stomatal memory of drought in *Arabidopsis thaliana*

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Strigolactones (SL) are a class of hormones involved in a number of developmental and stress-related processes. In recent years, the study of mutants/transgenic plants impaired in SL synthesis or perception has allowed to study their role in early plant responses to dehydration, showing that they are required for full acclimation via abscisic acid (ABA)-dependent and independent pathways. However, no study has been conducted yet to understand the role of SL specifically during recovery from water deprivation in any plant species. Recovery is characterised by the so called “stomatal memory” of drought – also called “after-effect” - whereby stomatal conductance does not recover fully even when water potential already has, possibly due to the action of non-hydraulic signal(s) such as ABA.

Using a physiological approach, we developed a method to assess stomatal water loss during a drought time-course and recovery in *Arabidopsis thaliana*. In this three-day procedure, water levels in peat pellets are monitored in order to progressively increase stress severity, thus allowing for subsequent recovery by re-watering. Stomatal regulation is investigated daily through the quantification of stomatal conductance, and confirmed through infrared thermography. With this procedure, we contrasted wild-type Col-0 plants with *d14*, a mutant impaired in SL perception*,* showing that SL perception is needed to control stomatal conductance rates during recovery processes. In fact, no stomatal memory is apparent in the *d14* mutants.

Since physiological processes often rely on the fine tuning of gene expression, a molecular approach is being used to screen for possible mediators of this effect. Physiological and molecular effects of exogenous SL application are being investigated. Specific miRNAs and transcripts of genes related to stomatal functioning, ABA and SL are being quantified throughout the time-course, in the quest for master regulators of SL-driven stomatal memory.