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## UNRAVELLING THE ROLE OF FLORAL REGULATORS IN PLANT RESPONSE TO ENVIRONMENTAL STRESSORS

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The transition from vegetative to reproductive development is a critical decision in the life of flowering plants, which have evolved complex mechanisms to optimise seed production by integrating endogenous and environmental cues. Dissecting the genetic basis of flowering time and flower development has been a hot topic in plant science in the last decades but understanding how floral regulators mediate stress signals to ensure reproductive success in a fluctuating environment is an emerging field of research.

Our investigation focuses on members of the plant specific RAV family of transcription factors – named TEMPRANILLOs (TEMs) – that regulate the onset of reproductive growth by integrating multiple floral pathways in the model species Arabidopsis thaliana. Interestingly, TEM-like factors also play crucial roles in the development of reproductive structures in staple cereal crops such as rice and wheat.

Besides their known function in plant development, a transcriptomics analysis of Arabidopsis plants overexpressing *TEM1* revealed a surprising overrepresentation of GO categories related to abiotic stress response. To decipher the biological relevance of these changes, we analysed the behaviour of plants mis-expressing TEM genes challenged with different environmental stressors (e.g., increasing soil salinity, decreasing water

availability, warmer ambient temperatures), and functionally characterized *TEM* developmental genes in abiotic stresses response through a combination of molecular, phenotypic, physiologic, and metabolic analyses. Results of our research indicate that defective *TEM* alleles confer tolerance to salinity and drought due to increased accumulation of antioxidants and reduced water loss, respectively. Moreover, plants with impaired TEM activity better adapt their growth to environmental stresses that mimic climate change, thanks to a shorter life cycle and altered patterning of leaf epidermal structures - stomata on the abaxial side and trichomes on the adaxial side.

We are currently elucidating the multiple activities of RAV factors in different species, including agronomically important plants. Exploratory analyses of the green lineage revealed the presence of *RAV* genes in bryophytes and lycophytes, which lack floral structures. Therefore, we speculate that during plant evolution these regulators could have played an ancestral role in the adaptation to terrestrial habitats and then acquired a novel function in the regulation of flowering when angiosperms emerged. Given the functional conservation of RAV genes in modern crops, these regulators represent good candidates for breeding programs aimed at obtaining novel varieties that better adapt their growth to a broad range of environmental limitations while maintaining fertility in a climate change scenario.