Proceedings of the LXV SIGA Annual Congress
Piacenza, 6/9 September, 2022
ISBN: **978-88-944843-3-5**

Oral Communication Abstract – 3.04

THE ATMYB60 TRANSCRIPTION FACTOR INTEGRATES ABA AND OXYLIPIN SIGNALLING IN GUARD CELLS

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Stomata, water stress, ABA, 12-OPDA

Several of the manifold interactions between plants and their surrounding environment are modulated by stomatal guard cells. Tuning of stomatal aperture relies on the coordination of a complex network of signaling pathways, mostly activated by plant hormones. Despite the well-established role of abscisic acid (ABA) and jasmonates (JAs) in mediating stomatal closure in response to water stress, other molecules are emerging as additional components of stomatal regulation. Increasing evidence indicates that the oxylipin 12-oxo-phytodienoic acid (12-OPDA) is an active signalling molecule, besides being a JA metabolic intermediate.

We investigated the role of the AtMYB60 transcription factor in regulating oxylipin synthesis in stomata. *AtMYB60* is expressed in guard cells under optimal growth conditions, whereas its transcript abundance rapidly declines following exposure to drought or ABA. Loss of *AtMYB60* function in the *atmyb60-1* allele, results in constitutively reduced stomatal opening and increased drought resistance.

We uncovered increased levels of 12-OPDA, JA and Arabidopsides in guard cells purified from the *atmyb60-1* mutant compared with the wild type. Genetic and physiological analyses indicated that 12-OPDA triggered stomatal closure independently of JA and cooperatively with ABA in *atmyb60-1*
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As a whole, our study indicated: (i) the occurrence of an autonomous oxylipin biosynthetic pathway in guard cells, (ii) the function of AtMYB60 as a transcriptional negative regulator of 12-OPDA and JAs synthesis in stomata, (iii) the involvement of 12-OPDA in triggering stomatal closure under water stress and, (iv) the role of AtMYB60 as a transcriptional node in the crosstalk between oxylipins and ABA in guard cells.

Considering the strong conservation of the AtMYB60 regulatory network between Arabidopsis and distantly related species, including tobacco, tomato and grape, engineering of the AtMYB60-dependent oxylipin biosynthetic pathway could provide an attractive strategy to enhancing crop survival and productivity under stress.