

## P58 – *VviAGL11* molecular mechanism in seed development

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### Abstract

*VviAGL11*, the Arabidopsis SEEDSTICK homolog, has been proposed to have a causative role in grapevine stenospermocarpy. An association between a mutation in the coding sequence (CDS) and the seedless phenotype was reported, however, no working mechanisms have been demonstrated yet. Previous studies have demonstrated that *VviAGL11* has a causative role in stenospermocarpy in grape. Indeed, a full correlation was shown of a missense mutation Arg197Leu in exon 7 of *VviAGL11* with seedlessness in cultivated grapevine. The mutated seedless version has a partial dominance over seeded alleles, allowing breeding for seedlessness based in heterozygous seedlings. Moreover, sequence data on the regulative region of *VviAGL11* showed low recombination rates between the promoter and the CDS regions, thus suggesting the existence of a Linkage disequilibrium in that region. The existence of incomplete dominance of some alleles in the promoter region has been also observed. Besides this genetic and transcriptional data confirming a major role of *VviAGL11* in grape stenospermocarpy, no functional evidence nor a working mechanism has yet been defined.

To this aim, we sequenced and analyzed the complete *VviAGL11* gene in grapevine varieties representing different seedlessness classes. We demonstrated the existence of specific promoter-coding sequence (CDS) combinations self-activation that directly affect the expression level demonstrating a dominant-negative effect of the mutated CDS (Arg197Leu). Transcriptomic analyses on ovule and developing seeds in seeded and seedless varieties highlighted the role of *VviAGL11* in hormone signaling and phenylpropanoid metabolism. In this regard, we identified and further functionally validated through luciferase assay and in situ hybridization a Methyl jasmonate esterase, an Indole-3-acetate beta-glucosyltransferase, and an Isoflavone reductase, as direct targets of *VviAGL11*. The dominant-negative effect of the mutated CDS was also functionally validated in target induction. All our findings allowed us to define a regulatory mechanism correlating the haplotype assortment, the *VviAGL11* expression level, and seedlessness class in grapevine.

**Keywords:** grapevine, hormone signaling, secondary metabolism, seed coat, self-activation, stenospermocarpy, *VviAGL11*, SEEDSTICK