From seed longevity to passive defense against pathogens: co-evolution of two traits to remain alive in the dry state?

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Résumé en anglais	In orthodox seeds, longevity is gradually acquired at the later stages of seed maturation. In our laboratory, we use seeds of Medicago truncatula, a model species for legumes, to unravel the mechanisms and regulatory pathways implicated in the acquisition of longevity. In this species, longevity increases progressively over 30-fold after seed filling is terminated and desiccation tolerance is acquired, allowing the separation of genes related to the different developmental processes. In order to further discriminate other developmental programs from those related to longevity, an extensive physiological and molecular analysis was undertaken in developing seeds from plants that were grown under different environmental conditions after seed set. This way, the timing and extent to which longevity is acquired was modulated. Using 104 transcriptomes acquired at different time points during seed maturation for five different parental environments, a network-based approach was applied to isolate a co-expression module related to longevity. Functional analysis in Arabidopsis confirmed the predictability and the conserved nature of this module. Interestingly, the longevity module is enriched with genes playing a crucial role in defense against biotic stress. Here, we will present evidence supporting a link between mechanisms implicated in defense against pathogens and survival in the dry state. We will discuss how seeds activate a developmentally regulated defense response during maturation that is also beneficial to long-term survival in the dry state.
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