Seeds are supposed to be protected against aging by cellular defenses and by structures such as the seed coat. However, blind genetic screens to identify the crucial genes for seed longevity have never been made. We have screened an activation-tagging mutant collection of Arabidopsis thaliana and selected four dominant mutants with improved seed longevity (isl1 to 4-1D) under both natural and accelerated aging conditions. In the isl1-1D mutant the longevity is caused by over-expression of the transcription factor ARABIDOPSIS THALIANA HOMEOBOX 25 (ATHB25; At5g65410), that increases the expression of gibberellic acid 3-oxidase 2 (GA3OX2), encoding a gibberellins (GA) biosynthetic enzyme, and the levels of GA1 and GA4 are higher (3.2- and 1.4-fold, respectively) in the mutant than in wild type. Seeds from wild type plants treated with GA and from a quintuple DELLA mutant (with constitutive GA signaling) are more tolerant to aging, providing additional evidence for a role of GA in seed longevity. In the isl2-1D mutant the longevity is caused by over-expression of the RING-finger of seed longevity (RSL1; At2g26130) and morphological alterations suggest increased GA responses despite unaltered GA levels. In both mutants reciprocal crosses demonstrated a maternal effect and, together with the altered morphology of the seed coat, this suggests that our novel determinants of seed longevity reinforce the seed coat and probably reduce oxygen permeability.

Biography

Eduardo Bueso is Agricultural Engineer and Researcher at the Institute of Plant Molecular and Cellular Biology of the Polytechnic University of Valencia, Spain. He works on the molecular mechanisms of seed longevity and has recently published two crucial articles on a novel approach to improve this crucial parameter in agriculture and bioconservation.

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