



LEA polypeptide profiling of recalcitrant and orthodox legume seeds reveals ABI3-regulated LEA protein abundance linked to desiccation tolerance

Submitted by Emmanuel Lemoine on Thu, 02/12/2015 - 13:13

| | |
|---------------------|--|
| Titre | LEA polypeptide profiling of recalcitrant and orthodox legume seeds reveals ABI3-regulated LEA protein abundance linked to desiccation tolerance |
| Type de publication | Article de revue |
| Auteur | Delahaie, Julien [1], Hundertmark, Michaela [2], Bove, Jérôme [3], Leprince, Olivier [4], Rogniaux, Hélène [5], Buitink, Julia [6] |
| Editeur | Oxford University Press (OUP) |
| Type | Article scientifique dans une revue à comité de lecture |
| Année | 2013 |
| Langue | Anglais |
| Date | 2013/01/11 |
| Numéro | 14 |
| Pagination | 4559 - 4573 |
| Volume | 64 |
| Titre de la revue | Journal of Experimental Botany |
| ISSN | 0022-0957 |
| Mots-clés | abi3 [7], Castanospermum australe [8], desiccation tolerance [9], late embryogenesis abundant proteins [10], Medicago truncatula [11], Proteomics [12], recalcitrant seed [13], RNAseq. [14] |

Résumé en
anglais

In contrast to orthodox seeds that acquire desiccation tolerance during maturation, recalcitrant seeds are unable to survive drying. These desiccation-sensitive seeds constitute an interesting model for comparative analysis with phylogenetically close species that are desiccation tolerant. Considering the importance of LEA (late embryogenesis abundant) proteins as protective molecules both in drought and in desiccation tolerance, the heat-stable proteome was characterized in cotyledons of the legume *Castanospermum australe* and it was compared with that of the orthodox model legume *Medicago truncatula*. RNA sequencing identified transcripts of 16 homologues out of 17 LEA genes for which polypeptides are detected in *M. truncatula* seeds. It is shown that for 12 LEA genes, polypeptides were either absent or strongly reduced in *C. australe* cotyledons compared with *M. truncatula* seeds. Instead, osmotically responsive, non-seed-specific dehydrins accumulated to high levels in the recalcitrant cotyledons compared with orthodox seeds. Next, *M. truncatula* mutants of the ABSCISIC ACID INSENSITIVE3 (ABI3) gene were characterized. Mature Mtabi3 seeds were found to be desiccation sensitive when dried below a critical water content of 0.4g H₂O g DW⁻¹. Characterization of the LEA proteome of the Mtabi3 seeds revealed a subset of LEA proteins with severely reduced abundance that were also found to be reduced or absent in *C. australe* cotyledons. Transcripts of these genes were indeed shown to be ABI3 responsive. The results highlight those LEA proteins that are critical to desiccation tolerance and suggest that comparable regulatory pathways responsible for their accumulation are missing in both desiccation-sensitive genotypes, revealing new insights into the mechanistic basis of the recalcitrant trait in seeds.

URL de la
notice

<http://okina.univ-angers.fr/publications/ua7872> [15]

DOI

[10.1093/jxb/ert274](https://doi.org/10.1093/jxb/ert274) [16]

Lien vers le
document

<http://dx.doi.org/10.1093/jxb/ert274> [16]

Liens

- [1] [http://okina.univ-angers.fr/publications?f\[author\]=12697](http://okina.univ-angers.fr/publications?f[author]=12697)
- [2] [http://okina.univ-angers.fr/publications?f\[author\]=11837](http://okina.univ-angers.fr/publications?f[author]=11837)
- [3] <http://okina.univ-angers.fr/jerome.bove/publications>
- [4] [http://okina.univ-angers.fr/publications?f\[author\]=11839](http://okina.univ-angers.fr/publications?f[author]=11839)
- [5] [http://okina.univ-angers.fr/publications?f\[author\]=12213](http://okina.univ-angers.fr/publications?f[author]=12213)
- [6] <http://okina.univ-angers.fr/j.buitink/publications>
- [7] [http://okina.univ-angers.fr/publications?f\[keyword\]=12240](http://okina.univ-angers.fr/publications?f[keyword]=12240)
- [8] [http://okina.univ-angers.fr/publications?f\[keyword\]=12241](http://okina.univ-angers.fr/publications?f[keyword]=12241)
- [9] [http://okina.univ-angers.fr/publications?f\[keyword\]=11840](http://okina.univ-angers.fr/publications?f[keyword]=11840)
- [10] [http://okina.univ-angers.fr/publications?f\[keyword\]=12242](http://okina.univ-angers.fr/publications?f[keyword]=12242)
- [11] [http://okina.univ-angers.fr/publications?f\[keyword\]=10235](http://okina.univ-angers.fr/publications?f[keyword]=10235)
- [12] [http://okina.univ-angers.fr/publications?f\[keyword\]=8337](http://okina.univ-angers.fr/publications?f[keyword]=8337)
- [13] [http://okina.univ-angers.fr/publications?f\[keyword\]=12243](http://okina.univ-angers.fr/publications?f[keyword]=12243)
- [14] [http://okina.univ-angers.fr/publications?f\[keyword\]=12244](http://okina.univ-angers.fr/publications?f[keyword]=12244)
- [15] <http://okina.univ-angers.fr/publications/ua7872>
- [16] <http://dx.doi.org/10.1093/jxb/ert274>

Publié sur *Okina* (<http://okina.univ-angers.fr>)