

Publication

Demethylesterification of Cell Wall Pectins in Arabidopsis Plays a Role in Seed Germination

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The methylesterification status of cell wall homogalacturonans, mediated through the action of pectin methylesterases (**PMEs**), influences the biophysical properties of plant cell walls such as elasticity and porosity, important parameters for cell elongation and water uptake. The completion of seed germination requires cell wall extensibility changes in both the radicle itself and in the micropylar tissues surrounding the radicle. In wild-type seeds of Arabidopsis (*Arabidopsis thaliana*), **PME** activities peaked around the time of testa rupture but declined just before the completion of germination (endosperm weakening and rupture). We overexpressed an Arabidopsis **PME** inhibitor to investigate **PME** involvement in seed germination. Seeds of the resultant lines showed a denser methylesterification status of their cell wall homogalacturonans, but there were no changes in the neutral sugar and uronic acid composition of the cell walls. As compared with wild-type seeds, the **PME** activities of the overexpressing lines were greatly reduced throughout germination, and the low steady-state levels neither increased nor decreased. The most striking phenotype was a significantly faster rate of germination, which was not connected to altered testa rupture morphology but to alterations of the micropylar endosperm cells, evident by environmental scanning electron microscopy. The transgenic seeds also exhibited an apparent reduced sensitivity to abscisic acid with respect to its inhibitory effects on germination. We speculate that **PME** activity contributes to the temporal regulation of radicle emergence in endospermic seeds by altering the mechanical properties of the cell walls and thereby the balance between the two opposing forces of radicle elongation and mechanical resistance of the endosperm.

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