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What's new in Plant-Soil-Microbe Interactions

GRR VASI Végétal - Agronomie - Sols - Innovation

Do you know ...

... that the cell wall pectin-modifying enzymes are important for pollen grain germination and plant reproduction?



Germination of pollen grains is a crucial step in plant reproduction. However, the molecular mechanisms involved remain unclear. We investigated the role of PECTIN

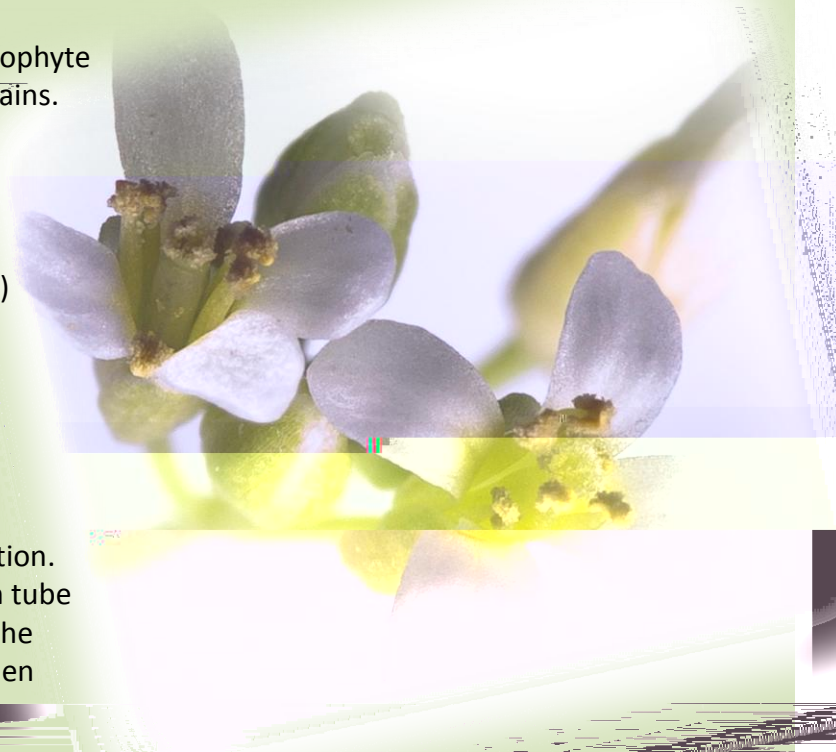
METHYLESTERASE48 (PME48), an enzyme implicated in the remodeling of pectins in *Arabidopsis thaliana* pollen. A combination of functional genomics, gene expression, in vivo and in vitro pollen germination, immunolabeling and biochemical analyses was used on wild-type and *Atpme48* mutant plants.

We showed that *AtPME48* is specifically expressed in the male gametophyte and is the second most expressed PME in dry and imbibed pollen grains. Pollen grains from homozygous mutant lines displayed a significant delay in imbibition and germination in vitro and in vivo.

Moreover, numerous pollen grains showed two tips emerging instead of one in the wild-type. Immunolabeling and FT-IR analyses showed that the degree of methylesterification of the homogalacturonan (HG) was higher in *pme48*^{-/-} pollen grains.

In contrast, the PME activity was lower in *pme48*^{-/-} partly due to a reduction of PME48 activity revealed by zymogram.

Interestingly, the wild-type phenotype was restored in *pme48*^{-/-} with the optimum germination medium supplemented with 2.5 mM calcium chloride suggesting that in the wild-type pollen, the weakly methylesterified HG is a source of Ca²⁺ necessary for pollen germination. Although pollen specific PMEs are traditionally associated with pollen tube elongation, this study provides strong evidence that PME48 impacts the mechanical properties of the intine wall during maturation of the pollen grain which, in turn, influence pollen grain germination.



See the paper by Leroux et al., in www.plantphysiol.org/content/167/2/367.full