

Building blocks of the cell wall: Pectin drives reproductive development in rice

May 7 2020



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In a new genetic study of rice, Professor Hiroaki Iwai and his team from the University of Tsukuba have revealed that pectin plays a vital role in plant reproductive development, which could have major implications in the development of new crop varieties.

Pectin is a carbohydrate that acts as a vital building block in the cell

walls of land [plants](#). Plant cell walls have multiple important functions, such as providing shape and structure to plant organs, and participating in communication between cells. Previous studies have already shown the importance of [pectin](#) in plant development and growth and in the interactions between plants and stressors such as pathogens.

"It is clear that pectin has critical involvement in cell walls and thus plant development, but its importance in [reproductive development](#), especially of female reproductive tissues, was little known," explains Professor Iwai. "We focused on the gene OsPMT16, which has a specific function relating to the adhesiveness of pectin. By removing this gene from some rice plants, we were able to compare the structure of the female reproductive tissues in plants with and without the gene."

The study revealed that cell walls of vegetative tissues in general contained ~5% pectin, whereas the cell walls of the pistil (female reproductive tissue) contained ~43%. The OsPMT16 gene was strongly expressed in the pistil but barely at all in the root, stem, or leaf. Furthermore, there was delayed vegetative growth in the mutant rice without the gene compared with the intact rice, and its fertility had decreased by 12%.

"We found few differences in the specific morphogenesis, that is the biological process that governs the shape of tissues and organs, between the reproductive organs of the two types of rice," says Professor Iwai. "Nonetheless, it was clear that the pistil of the plants without the OsMPT16 gene exhibited some abnormal and disordered tissues. This shows that the modifications of the pectin provided by this gene are required for normal development of the pistil and therefore enhance rice fertility." The team's findings could also be applied to breed improvement that eliminates seeds in fruit by promoting female sterility, and could have other implications in preventing gene diffusion of genetically modified and genome-edited crops.

More information: Kazuya Hasegawa et al. Rice Putative Methyltransferase Gene OsPMT16 Is Required for Pistil Development Involving Pectin Modification, *Frontiers in Plant Science* (2020). [DOI: 10.3389/fpls.2020.00475](https://doi.org/10.3389/fpls.2020.00475)

Provided by University of Tsukuba

Citation: Building blocks of the cell wall: Pectin drives reproductive development in rice (2020, May 7) retrieved 26 April 2024 from <https://phys.org/news/2020-05-blocks-cell-wall-pectin-reproductive.html>

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