JPUR
JOURNAL OF PURDUE UNDERGRADUATE RESEARCH

SCIENCE

Mapping Genomes: A Novel Gene Family in Plants may Encode Pectin-modifying Proteins

Student Researcher: Rachelle Buuck, Senior

The cell wall constrains the sizes and shapes of plant cells where cellulose is essential for structure and plant growth. In this study, evidence was obtained that another cell wall polysaccharide, rhamnogalacturonan-I (RG-I), also performs a crucial function in plant and organ growth. RG-I is a cell wall pectin composed of a backbone of alternating rhamnose and galacturonic acid sugars with varying sugar side chains. It is currently unknown which proteins are responsible for the making of RG-I, but this study has discovered genes possibly involved in the processing of RG-I, the *MYST* gene family of unknown function. Seven genes make up the *MYST* gene family in *Arabidopsis*, which is commonly used as a plant model. The *MYST* gene family has a DNA sequence similarity to bacterial RG-lyases, secreted proteins that cleave RG-I in plant cell walls, as demonstrated by Oomen and his colleagues in 2002. One gene family member, *AtMYST4*, is present in all tissues of the plant throughout development. Another gene family member, *AtMYST6*, is present during flower and seed formation. A loss-of-function mutation in *AtMYST4* causes a change in the morphology of leaf hairs (trichomes), which become "droopy" or bent, suggesting some possible changes in the overall stability and structure of the cell wall.

These two genes are the most prominent *MYST* genes in *Arabidopsis* and their functions as well as the functions of the other *MYST* genes are being investigated using genetically engineered mutants to determine their role in the modification of RG-I in the plant cell wall.

Research advisor Dr. Maureen McCann explains, "Understanding how cell wall-related genes function to modify the molecular architecture of the wall and to impact plant cell growth is critical knowledge for us to use in designing high-yield biomass crops for food, feed, fiber, and fuel."

Caring for *Arabidopsis MYST* gene family mutants in the greenhouse.

Buuck, R. (2012). Mapping genomes: A novel gene family in plants may encode pectin-modifying proteins. *Journal of Purdue Undergraduate Research,* 2, 93. doi:10.5703/1288284314713