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National Research Initiative (NRI)

Scientists Unlock the Key to Rice Nutrition

by Stacy Kish, CSREES

Rice is the primary food for more than 3 billion people around the world. >>

With funding from the USDA Cooperative State Research, Education, and Extension Service (CSREES), scientists work to improve the nutritional value of rice. This work could affect the health of more than 70 million of the world's poorest people in developing countries.

Researcher Zhaohua Peng and colleagues at Mississippi State University and Ohio State University determined that chromatin plays an essential role in the control of endosperm sizes and grain quality. The results obtained in this study are applicable not only to rice, but other cereal crops as well in improving grain yield and nutritional quality.

The endosperm portion of grain provides growing plant nutrition, such as starch, oils and protein. This makes endosperm an important source of nutrition in the human diet as well.

Chromatin structures store genetic information and control gene expression in cells. In chromatin, a piece of DNA wraps around a group of basic proteins called histones forming a structure similar to the coil in a telephone cord. When proteins interact with the chromatin, it adjusts the tightness of the DNA and histone interaction. Genes positioned in loosely packaged chromatin regions are usually active and genes within the tightly package chromatin regions are often silenced.

The scientists used a new approach called proteomics, which examines proteins in a large scale, to gain new insight into the chromatin structure and function in rice. They identified 344 unique proteins associated with chromatin and found a large number of histone variants in rice.

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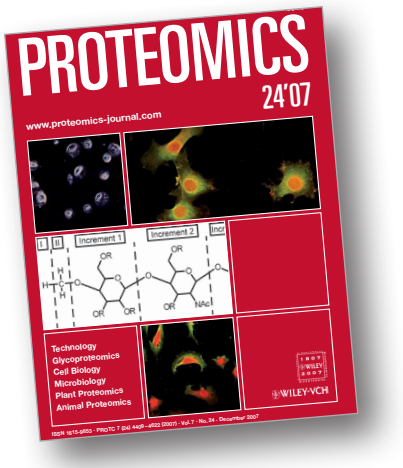

Above: This research was featured on the cover of the December 2007 issue of the journal *Proteomics*.

Credit: Cover reprinted with permission by Wiley Publishing.

Above: Observation of rice growth in green house.

Credit: Zhaohua Peng

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The researchers also determined that chromatin modification genes control the endosperm sizes and grain quality in rice. These findings suggest that manipulating chromatin modification genes may be an effective approach for the improvement of crop yield and quality. Future studies may also clarify how genes are expressed and how these genes control plant functions.

The USDA's Cooperative State Research, Education, and Extension Service (CSREES) funded this research project through the National Research Initiative Plant Genome program. Through federal funding and leadership for research, education and extension programs, CSREES focuses on investing in science and solving critical issues impacting people's daily lives and the nation's future. For more information, visit www.csrees.usda.gov. ■

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