

Complete Sequence of Rice Genome Announced

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The World's Most Important Food Crop Yields Its Genetic Secrets

The journal Nature in a featured article today proclaimed the completion of the rice genome by the Plant Genome Initiative at Rutgers (PGIR) and other members of an international consortium.

“This is a breakthrough of inestimable significance not only for science and agriculture, but also for all those people who depend on rice as their primary dietary staple – more than half the world’s population,” said Joachim Messing, director of Rutgers’ Waksman Institute of Microbiology, home to the PGIR.

The publicly available finished sequence is anchored to the genetic map, providing both the linear order of the 37,544 genes and their positions on the 12 rice chromosomes. This highly accurate, map-based characterization of the rice genome already has led to the identification of important genes, such as those which may increase yield and productivity. Draft sequences of rice published previously lacked the coverage and accuracy to permit such discovery.

The revelations implicit in the rice genome may enable agricultural breeders to also address other critical issues in rice cultivation. Messing noted that rice cultivation today creates an enormous environmental burden in terms of the quantities of water and fertilizer required to produce a successful crop. Genomic information offers a genetic toolkit to the breeder who can use this new knowledge in developing novel

strains that are highly productive and disease resistant as well as more environmentally friendly.

“On a theoretical level, having the complete genome provides a superb reference for making comparisons with other grasses, leading to a clearer understanding of how they evolved,” Messing said. “The rice genome is the Rosetta Stone of all the bigger grass genomes. Knowing its sequence will provide instantaneous access to the same genes in the same relative physical position in other grasses and accelerate plant gene discovery in many important crops such as corn and wheat.”

Research groups in 10 countries – Rutgers, The State University of New Jersey, University of Arizona, Cold Spring Harbor Laboratory and The Institute for Genomic Research in the United States – coordinated their efforts through the consortium known as the International Rice Genome Sequencing Project. Rutgers was the only participant in the project that was supported solely by its own institution.

“We met regularly in the past eight years, every year at first and then semiannually,” said Messing. “Initially things went slowly because of the involvement of so many people, but then it accelerated because everyone felt the urgency of completing the genome.”

While the size of the group presented some organizational challenges, it afforded many of the participants the opportunity to critique each others’ work in progress, ultimately resulting in a higher quality final product, Messing noted.

Rutgers participation in the International Rice Genome Sequencing Project was funded through Reinvest in Rutgers, a comprehensive program that helps build academic and research programs identified in the university’s strategic plan.

Source: Rutgers University

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