Scientists develop high-yield deep water rice

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(AP) -- A team of Japanese scientists has discovered genes that enable rice to survive high water, providing hope for better rice production in lowland areas that are affected by flooding.

The team, primarily from the University of Nagoya, reported their findings in Thursday's issue of Nature, the science magazine.

The genes, called SNORKEL genes, help rice grow longer stems to deal with higher water levels. Deep-water rice generally produces lower-yield rice plants. But the researchers report they have succeeded in introducing the genes to rice varieties that are higher-yield.

According to the report, as water levels rise, accumulation of the plant hormone ethylene activates the SNORKEL genes, making stem growth more rapid. When the researchers introduced the genes into rice that does not normally survive in deep water, they were able to rescue the plants from drowning.

Motoyuki Ashikari, who headed the project, said his team is hoping to use the gene on long grain rice widely used in Southeast Asia to help stabilize production in flood-prone areas where rice with the flood-resistant gene is low in production - about one-third to one-quarter that of regular rice.

"Scientifically, the gene that we found is rare but clear proof of a biological ability to adapt to a harsh environment," he said. "It's a genetic strategy specifically to survive flooding."

Ashikari said his team already successfully tested the gene on a Japanese "Japonica" rice, and his team now plans to create a flood-resistant long grain rice in three to four years for use in countries such as Vietnam, Thailand, Myanmar, Bangladesh and Cambodia.

High water levels in paddies can be a serious problem. In some areas, rains can cause water levels to rise dangerously high during the growing season and flash flooding can fully submerge plants for days or even weeks.

Rice is a staple food for billions, and while productivity has increased dramatically since the 1960s, yields must be doubled to meet projected requirements by 2050. More than 30 percent of Asian and 40 percent of African rice acreage is cultivated in either lowland paddies or deepwater paddies.

Laurentius A. C. J. Voesenek, at the Institute of Environmental Biology, Utrecht University, who was not part of the research team, said the study is significant because high-yield rice varieties cannot survive extremes of inundation.

"The introduction of (these genes) into high-yielding varieties, using advanced breeding strategies, promises to improve the quality and quantity of rice produced in marginal farmlands," he said in a review of the paper, also published in Nature.