

Steps Toward Drought-Resistant Crops, 'Designer' Rice



Reuters

Soybean plants at a drought-affected farm northwest of Buenos Aires. A La Nina condition in the Pacific Ocean has been causing a lack of rain in Argentina, one of the largest exporters of food products.

This is the VOA Special English Agriculture Report.

A discovery in a laboratory could help lead to new generation of drought-resistant crops. Drought conditions cause plants to produce a stress hormone called abscisic acid. This chemical activates a set of protein molecules called receptors. These receptors then activate a series of changes to help the plant survive.

The natural reaction of the receptors is to close so-called guard cells on and inside the leaves. That closure decreases water loss and stops the plant from growing to save water during a drought.

Researchers say they have discovered a way to "supercharge," or increase, this reaction. Sean Cutler at the University of California, Riverside, led the team. The scientists engineered abscisic acid receptors that can be turned on at will and stay on. They tested hundreds of versions of engineered receptor genes until they found ones that worked right together.

The team worked with *Arabidopsis*, a plant often used in experiments. The results recently appeared in the Proceedings of the National Academy of Sciences.

Professor Cutler says testing the new receptors in the field may take several years. He also points out that drought is not the only cause of plant stress.

SEAN CUTLER: "If a plant grows in the deserts normally, like a cactus, what would be stressful for a crop plant is not stressful for a cactus because it has evolved to live in that ecological niche where the water is very rare. So it would really mean, you know, any significant deviation from the normal or ideal growth conditions for an organism."

In another development, scientists have produced a new system for analyzing genetic markers in rice plants. A genetic marker is a DNA sequence with a known location. It can help scientists identify nearby genes linked to individual qualities, or traits.

Anna McClung and Georgia Eizenga are genetic scientists with the United States Department of Agriculture. Their new system will let researchers genetically "fingerprint" rice varieties and gain a better understanding of the markers.

Until now, breeders have been limited to using perhaps two hundred markers. But modern technology lets scientists identify differences throughout the plant's genome, its genetic map. Ms. McClung says that means the ability to identify new genes that control biological pathways.

ANNA McCLUNG: "You know, biological pathways in the plant that may control yield, disease resistance, nutritional quality ... "

The finding could make it easier in the future for farmers to grow "designer rice," rice bred to meet their specific needs.

Level: intermediate - advanced

Time: 30-40 minutes

This worksheet will help you learn new vocabulary about crops. You will answer questions about current research, and write a short paragraph about the advantages and disadvantages of modifying crops.

1. What does *drought* mean?
 a long period of time when there is little or no rain
 a long period of time when there is too much rain
2. What is the meaning of *crop* in this article?
 to cut very short or small
 a plant or plant product that is grown by farmers
3. What does *resistant* mean?
 not affected or harmed by something
 affected or harmed by something
4. What is this article about?
 a new scientific discovery
 bad news for farmers
 farmers will lose money
5. When does a plant product abscisic acid?

6. How does abscisic acid help the plant?

7. Scientists found a way to increase the reaction. Describe the research.

8. What is a genetic marker? How is it helpful?

9. Where do Anna McClung and Georgia Eizenga work as scientists?

10. What is "designer rice"?

OVER TO YOU

What are the advantages to modifying crops? Are there any disadvantages?

Write 5-8 sentences explaining your answer.

ANSWER KEY

1. a long period of time when there is little or no rain
2. a plant or plant product that is grown by farmers
3. not affected or harmed by something
4. a new discovery to help farmers
5. when there is a drought
6. This chemical helps the plant survive. The natural reaction of the receptors is to close so-called guard cells on and inside the leaves. That closure decreases water loss and stops the plant from growing to save water during a drought.
7. students' own answers [The scientists engineered abscisic acid receptors that can be turned on at will and stay on. They tested hundreds of versions of engineered receptor genes until they found ones that worked right together.]
8. a DNA sequence with a known location; It can help scientists identify nearby genes linked to individual qualities, or traits.
9. the United States Department of Agriculture
10. rice bred to meet a specific need