

Scientists develop drought-tolerant alfalfa

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With much of the Southwest struggling with drought, many ranchers and dairy farmers are having difficulty finding enough hay for their livestock and making tough choices: pay up to twice as much as last year and ship it in from hundreds of miles away or do without and sell off some of their herd.

Farmers, ranchers and scientists say a perfect storm has turned hay into gold this year. The [drought](#) reduced forage on the range and led to an increase in demand for hay, including alfalfa and other grass mixes. At the same time, the drought and lower water allotments for agriculture reduced the supply and prices skyrocketed. Farmers as far as North Dakota and Minnesota have been feeling the effects.

Scientists at New Mexico State University are trying to help by using [genetic analysis](#) and traditional plant breeding practices to come up with more drought-tolerant varieties of alfalfa. The research is important because two-thirds of hay produced in the U.S. is grown in drought-prone areas of the Great Plains or the western U.S., said Ian Ray, the professor who runs NMSU's alfalfa breeding and genetics program.

Hay is the fourth most valuable crop grown in the United States with sales generating more than \$7.5 billion. It's essential to everything from the billion-dollar dairy and beef industries to the wool market and even horse racing.

NMSU has been working on developing tougher alfalfa plants for more than three decades. Ray and his team, with help from the Samuel

Roberts Noble Foundation in Oklahoma, have identified a series of DNA markers on alfalfa chromosomes that they believe play a key role in producing more alfalfa with less water.

It took several years to map the alfalfa genome and identify the markers that influence development of the plant's shoots and roots during drought. Then a couple of years of breeding were needed to incorporate those characteristics into alfalfa cultivars typically grown by farmers in New Mexico.

The work is more precise than classical plant breeding because the scientists were able to introduce only the drought tolerance characteristics they were after.

"DNA markers just help us do a much better job of uncovering, tracking and selecting for natural genetic variation for drought tolerance," Ray said.

The team just wrapped up its harvest of the first test crops grown with less water and the results are promising. All the plants had smaller yields because of the lack of water, but those with drought-tolerant [DNA markers](#) produced 9 percent to 15 percent more than those without the markers.

One of the most promising cultivars being tested has a leafy canopy. More leaves means more nutritional value, Ray said.

"If what we're seeing is real, and it can be demonstrated that we see a yield advantage in multiple environments, then we've got a high forage quality population with enhanced drought resistance. That's the best of both worlds," he said.

Other universities, the federal government and large corporations like

Monsanto Co. have been trying to develop alfalfa varieties that can withstand cold weather, salt-laden irrigation water and various insects and disease. But experts say the NMSU team is at the cutting edge when it comes to research on drought tolerance.

Mark McCaslin, president of Forage Genetics International in Nampa, Idaho, and a board member of the National Alfalfa and Forage Alliance, said while drought is common in alfalfa country, this year's has been particularly devastating.

"What happened this year was really a tragedy, so that puts a lot more energy behind this kind of work," he said.

Leon Porter, a rancher from central New Mexico, said he had to sell about 140 head because the tufts of grass on his ranch failed to green up this year. Even the native yucca plants wilted and turned brown.

Porter and other ranchers are paying more than \$300 a ton for hay and alfalfa grass mixes to get their herds through the winter. Last year, it cost about \$165 a ton.

"The more producers that produce hay and the more efficiently they can produce it, the more affordable it makes it for us," he said.

Alfalfa farmers across New Mexico have been turning away customers since early fall. Arizona is about out, and a number of dairies in southeastern New Mexico have had to go to the Dakotas to get orders filled.

"Basically anywhere in the western United States, there's no hay to be found right now," said Justin Boswell, a crop consultant and executive director of the New Mexico Hay Association. Any scientific breakthrough would be welcome, he said.

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