

Doubling A Gene In Corn Results In Giant Biomass

URBANA, ILL.

University of Illinois plant geneticist Stephen Moose has developed a corn plant with enormous potential for biomass, literally. It yields corn that would make good silage, Moose said, due to a greater number of leaves and larger stalk, which could also make it a good energy crop.

The gene known as Glossy 15 was originally described for its role in giving corn seedlings a waxy coating that acts like a sun screen for the young plant. Without Glossy 15, seedling leaves instead appear shiny and glossy in sunlight. Further studies have shown that the main function of Glossy15 is to slow down shoot maturation. Moose wondered what would happen if they turned up the action of this gene. "What happens is that you get bigger plants, possibly because they're more sensitive to the longer days of summer. We put a corn gene back in the corn and increased its activity. So, it makes the plant slow down and gets much bigger at the end of the season."

The ears of corn have fewer seeds compared to the normal corn plant and could be a good feed for livestock. "Although there is less grain there is more sugar in the stalks, so we know the animal can eat it and they'll probably like it." This type of corn plant may fit the grass-fed beef standard, Moose said.

"The first time I did this, I thought, well, maybe the seeds just didn't get pollinated very well, so I hand pollinated these ears to make sure. I found that just like the shoot, seed development is also slower and they just don't make it all the way to the end with a plump kernel," Moose said.

He explained that the energy to make the seed goes instead into the stalk and leaves. "We had been working with this gene for awhile. We thought there would be more wax on the leaves and there was. But we also got this other benefit, that it's a lot bigger."

Moose tested his hypothesis with other corn lines and the effect was the same. "We essentially can make any corn variety bigger with this gene. And it can be done in one cross and we know exactly which gene does it."

He noted that if you put too much of the Glossy 15 gene in, it slows down the growth too much and the frost kills the plant before it can grow.

One advantage to growing sugar corn for biomass rather than switchgrass or miscanthus is that sugar corn is an annual. Moose said that if it would attract a pest or develop a disease, farmers could rotate a different crop the next year.

Moose said that sugar corn might make a good transition crop.

"We think it might take off as a livestock feed, because it's immediate," Moose said. "This would be most useful for on-farm feeding. So a farmer who has 50 steers, could grow this and use the corn as feed and sell the stalks and sugar. It could be an alternative silage, because it has a longer harvest window than regular silage."

For this sugar corn plant to become commercialized, it would have to get government approval, but Moose said that this is about as safe a gene as you can get. "It's a gene that's already in the corn — all we did was to put an extra copy in that amps it up."

Findings from this research were published in the Proceedings of the National Academy of Sciences of the United States of America. Δ



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