

Wheat anther research explained

COLLEGE PARK, Md. — Anther culture, the process by which male sex organs in plants are prodded to produce adult plants, may help wheat researchers develop new varieties of wheat that promise increased yields and

survival in a range of environments.

"If we can find out how to improve the frequencies of anther culture response, it will significantly reduce the labor required to produce some lines of

crop plants," say agronomists Joy Marburger and David Sammons.

Anthers, the male sex organ of plants, normally produce pollen cells that carry sperm to fertilize the plant's egg cells. And in normal plant development, the end

product of this fertilization process is seeds.

But pollen can be guided into another developmental pathway, using anther culture, according to Marburger and Sammons. Immature anthers are removed from the plant and cultured on a nutrient medium in test tubes. Instead of forming sex cells or sperm, the pollen produced by the cultured anthers develops into a mass of cream colored tissue called callus.

"In some crops, like tobacco, small plants develop from these pollen cells," says Marburger. "But with wheat, the callus must be removed from the test tube culture and placed on another medium to get plants to form."

Getting the cultures to form a callus has proven to be a difficult first but necessary step for researchers. Their best success to date comes from a culture medium consisting of sucrose, plant growth hormones, iron and an extract from boiled potatoes.

But not just any potatoes, according to Marburger. Although they do not know exactly what it is in potatoes that causes a callus to develop, they do know that peeled potatoes produce a 67 percent increase in the number of anthers with callus over potatoes with skins.

"The potato skin apparently

contains some retarding substances," says Marburger.

One of the best environmental conditions for callus formation, according to a study by Marburger is to subject anthers to a cold treatment of 4 degrees Centigrade for approximately 1 week.

"Warmer or colder temperatures, or shorter or longer incubation periods provides variable frequencies of callus formation, depending upon the cereal species studied," Marburger says.

Chemical treatments offer some promise of success, according to the two scientists. Barley researchers have tried what they call conditioned media—growth media inoculated with anthers which are subsequently removed after 7 days. New anthers are cultured in this same media. "It proved effective in barley, but seems to inhibit callus formation in wheat," says Marburger.

"Hormone solutions applied to plants before culture seem to have no effect," she adds. "It might prove useful in future research to determine the constituents of the anther culture medium that induce pollen formation in wheat. We should then look more closely at environmental conditions affecting anther culture," Marburger says.

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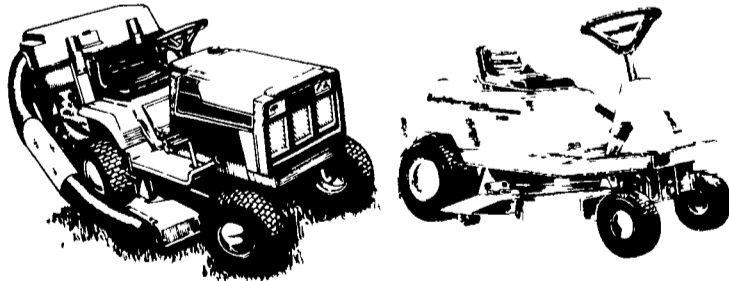
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