

Test-tube wheat speeds new variety

BELTSVILLE, Md. — Tomorrow's amber waves of grain have already 'taken root' in the confines of brightly-lit growth chambers here. The chambers contain experiments in another culture, a laboratory system to breed new crop varieties.

Research geneticist Stephen Baenziger of the USDA's Agricultural Research Service reports that the system could change and speed up the way plant breeders improve wheat, the world's most important crop.

Anther culture is the generation of new plants in test tubes from

bits of anthers, the male parts of flowers (also called pollen sacs). After tiny plantlets develop, they are transplanted to soil and evaluated for possible improvements, Baenziger says.

Breeders routinely look for new plant features that could make crops more productive, more nutritious, disease-resistant, or stress-tolerant. Baenziger says new wheat features, "unmasked by genetic changes from anther culturing, can be captured in pure breeding lines", or genetically-stable breeding stock.

He and colleague Gideon

Schaeffer, an ARS biochemist, have made rapid progress in applying "the advantages of anther culture to standard breeding practices that directly affect the over 80 million acres of wheat planted each year in the U.S."

Since 1978, Baenziger and Schaeffer have identified wheat varieties well-suited to anther culturing, defined complicated artificial media for test-tube growth, and regenerated numerous types of wheat plants from anthers. They have collected over a pound of seed from some anther-cultured wheat. Recently,

cooperators in Idaho and elsewhere have begun field-evaluating plants grown from the seed.

In greenhouse tests, the scientists have already found unexpected variations in anther-generated wheat, such as height differences and changes in seed

head structure, that may affect future wheat varieties.

Anther culture also saves plant breeders precious time, said Baenziger. "In a 10-year wheat breeding program, for example, inbreeding to obtain pure lines takes the first five to six years. With anther culture, we get pure breeding lines in one to two years."



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Broiler handling process

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designed to stay safely closed when the cage is handled by the lift and truck during transportation.

The boom clamp telescopes horizontally and vertically for positioning over the cage, controlled by the lift operator who regulates the rate of emptying broilers. The cycle time of the tilting platform for rotating the cage, emptying the broilers, and returning is about 10 seconds.

Hoppers mounted to the support frame of the unloader provide a smooth, slippery surface or sliding the broilers from the cage to the belt conveyors.

This is how the process looks to an observer.

The transport truck loaded with empty cages arrives at the poultry farm and the truck is positioned near the broiler house.

The lift truck operator positions the cage inside the house near the broilers, rotates it about 20° and lowers it onto a 20-inch-high portable stand in the center and under the door side of the cage. A six-person catching crew picks up the broilers, and after the cages are loaded one attendant secures the door and counts the broilers.

The broilers slide down the inclined floor toward the rear of the compartment and easily regain their balance. There is no "pile up."

At the receiving dock of the processing plant, the loaded transport truck is driven onto the unloading apron near the receiving dock conveyor. When the lift truck puts the cage on the conveyor, the operator releases the clamp and returns to the truck for another cage.

The cages are conveyed onto the tilting platform of the unloader for automatic broiler removal. As the cage is tilted about 48° from horizontal, the birds gradually slide toward the side and their weight opens the spring-loaded cage door. The broilers then slide out slowly onto the hoppers and onto the belt conveyors without injury.

The top two layers of broilers are emptied onto the top belt and the lower three layers are deposited onto the bottom belt. The top belt travels in a direction counter to the bottom belt, maintaining a constant flow of broilers to the bottom belt and providing added broiler storage when the cage is emptied.

Inside the hanging area the workers remove the broilers from the conveyor and place them in the picking line—another advantage over manual removal from coops that contributes to the safety of the chickens.

Broiler companies report a reduction of 10 to 20 workers, says Shackelford.

"There is a significant improvement in grade and higher yields. Maintenance costs of the cages are also lower compared with coop systems."