An Experiment Continues

Farming is perhaps civilization's longest scientific experiment. Each growing season marks a new field test during which farmers deploy the practices and tools that *might* succeed. Final results must wait for the harvest; until then all the farmer can do is try. "To try" is the meaning of the Latin verb *experiri*, the source of our word *experiment*.

When a scientific experiment fails to meet a researcher's expectations, the failure can be beneficial if it opens an unexpected door to knowledge. But for a farmer or community of farmers or a society dependent on farmers, agricultural failure can pack a high, sometimes catastrophic cost. Avoiding this cost—and finding farming methods that can succeed despite adverse weather and other conditions—are primary reasons why farmers and scientists should often work in close partnerships.

This month's cover story tells of a productive though informal partnership begun in 1992 in the Lower Rio Grande Valley of south Texas. That's when researchers at ARS' Subtropical Agricultural Research Laboratory in Weslaco began developing and testing new conservation tillage systems. The systems' key components are tools and practices that save time, fuel, and labor by reducing tillage needs and maintaining a crop residue cover to conserve soil and water.

Something else arrived in the valley about 1992: the most recent of the severe droughts common to the area's semiarid climate. The drought has taken an increasing toll on crops and livelihoods in the valley on both sides of the international border. But with it has come some important, if costly, information.

By dramatizing the new tillage systems' relative advantages over conventional systems, the drought has persuaded more valley growers to switch to conservation tillage on cotton, sorghum, and corn.

When the researchers planned their experiments, they knew conservation tillage could work only if the systems were compatible with the climate and other unique factors and grower requirements. For example, they knew the systems must enable growers to prevent their harvested sorghum and cotton plants from resuming growth through the valley's mild winters. Otherwise, these plants could harbor pests and deplete nutrients and moisture needed by summer crops.

"At the time, the moldboard plow was the only available tool," says Weslaco agronomist Jim Smart. "We needed a substitute that would kill the plants without deeply tilling the soil and burying the residue." The researchers began investigating two commercially available tools as potential alternatives.

The tools, stalk pullers and row stalkers, serve as tweezers for plant stalks. Arizona Drip Systems, Inc., of Coolidge, Arizona, invented the stalk puller for quickly removing cotton plants after harvest in fields watered with subsurface drip irrigation. Using a plow to kill the plants would tear up the costly drip-irrigation lines buried beneath the surface. The stalk puller grabs each plant low on the stalk and pulls out the crown and firmly attached roots.

A similar tool, the row stalker, is manufactured by DL Industries, Inc., of Floydada, Texas.

"As far as I know, ARS brought the first stalk pullers and row stalkers to the Lower Rio Grande Valley," Smart says. The tools' sales have increased, signaling not only the rise of the new tillage systems but also the kind of economic benefits that often accompany the transfer of research technology. Barbee Neuhaus Implement Co. in Weslaco has sold several hundred of these tools. Interest is rising in other areas, such as central Texas and California.

By 1994, a couple of years of field tests showed the new tillage systems had potential. But a grower would have to learn why and how they could work—and what modifications they might need.

So ARS and Texas A&M University scientists began demonstrating the systems at field days. At Weslaco last March 26, about 300 Texan and Mexican growers attended the largest field day ever held at the ARS lab. "It used to be, if you got a couple dozen growers at a field day on any topic, it was a success," says Smart.

Education hasn't been a one-way flow. "Because of the marginal economic returns of many farmers, it's best for us to test cropping-system ideas first on research plots," says ARS soil scientist Joe Bradford. "Later on, through on-farm trials, growers can implement systems, improve them, and transfer the technology among themselves. If growers get together in a group and talk, everyone doesn't have to make the same mistakes.

"Identifying specific problems often has to come from the farmers themselves," Bradford adds. "As much as we can, we work with them to see how they can overcome serious problems. Since other growers are likely to have similar problems, this helps us develop better systems."

It's too soon to be certain, but the improved systems appear to be helping growers design more sustainable agricultural experiments for their valley.

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