Colorado corn study gets to root of issue

Key Points

- Study of corn root architecture in Colorado has significance for producers everywhere.
- Major variations were found in hybrid root development.
- The information can help trigger more efficient irrigation decisions.

By **T.J. BURNHAM**

NEW research results on variations in corn root width, depth and density may have an impact on irrigation management decisions, say Mark Sponsler, CEO of the Colorado Corn Growers Association, which is funding the ongoing study.

"These findings can help growers more efficiently determine what kind of watering they should do," he says of the probe conducted at the Irrigation Research Foundation, or IRF, in Yuma, Colo., for the past two years.

The names and performances of individual varieties are not as important as the discovery of the wide variations in root development that exists for corn plants. The Colorado study offers more information to corn producers about fine-tuning their irrigation.

"More research is needed," Sponsler says, noting the results from the last two years reflect "new information in what is by far the most comprehensive study of its kind so far."

The eight varieties studied were hybrids known to be good performers in low-water conditions for northeast Colorado.

Farmers are being called on to tweak their irrigation inputs even further as new demands on limited water supplies continue to mount, Sponsler says. "In the environment into which we are headed, we anticipate the need to know exactly what plants need," he says. "This study can help determine just that."

In digs performed at 25, 55 and 100 days after planting, the IRF plots found differences among the varieties. Some roots were deep, some shallow and some illustrated a modified growth pattern.

Maximizing water use

"These varying characteristics definitely tell us that different rooting patterns warrant different management techniques in order to maximize water and nutrient uptake," says Sponsler. "There are 2- to 3-foot differences between the most shallow and the deepest roots on the different varieties," he says. "This suggests irrigation efficiency opportunities depending on the soil profile and water availability."

For one thing, he adds, deeper roots may be able to tap into greater amounts of existing water, while shallow-rooted corn would need more irrigation volume.

"We believe these differences are worth considering in variety selection, deficit-irrigation water conditions and breeding," he says.

While plant populations seem to matter, they varied by variety and flex vs. semi-determinant vs. fixed-ear characteristics, he explains. "In some instances, the lower populations outyielded the higher populations of the same variety. Differences in rooting architecture may be a key factor in predicting population responses," he says.

Results of the study include the following:

- Evidence indicates a portion of nitrogen escaped lower limits of root zones due to deep percolation, but heavy rains were a factor in the study.
- General shape and depth of the root architecture at 50 and 100 days after emergence provide information valuable to understanding varietal response to differences in water application placement methods.

More research needed

"While our study continues to raise more questions and begs of further investigation, the snapshot we already have of roots in corn plants should be an alert to folks that some significant differences are taking place below ground," says Sponsler.

The study looked at roots well below the 36-inch level most tensiometers can read, he adds.

The Colorado Corn Growers Association will continue the study at the IRF for at least one more year.

Mexico, Southwest join forces

AN increasing demand for water and the prospects of declining aquifers have prompted an international effort to research and manage two key irrigation water supplies — the Ogallala Aquifer in the U.S. Great Plains and the Calera Aquifer in Mexico.

Both underground reservoirs are in agricultural areas with little rainfall, limited recharge and unsustainable demands from development and agriculture.

Scientists from the Agricultural Research Service's Great Plains Agroclimate and Natural Resources Unit in El Reno, Okla., began focusing on the interactive effects of climate on water-management options. Texas AgriLife Research and the University of Georgia have also been key players.

Areas of focus are:

- A cooperative agreement between ARS scientists and university partners for climate analysis, working with Calera Basin stakeholders.
- Computer models of climate-management scenarios linked to satellite data. The scenarios will be evaluated using the ARS Soil and Water Assessment Tool model, which deals mainly with surface-water movement and is linked with the U.S. Geological Survey's Modular Finite-Difference Flow model for groundwater flow predictions.

"We will all benefit as we face the growing challenge of how to meet the world demand for food, most of which will have to come from irrigated lands," says Prasanna Gowda, an ARS agricultural engineer in Bushland, Texas.

Source: USDA-ARS