



Caption: VARIABLE RATE technology presenters Carl Hobbs, Kenneth Hood and James Mahan confer following a seminar at the Beltwide Cotton Conferences.

Variable rate tech may improve farm efficiency

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Variable rate irrigation technology offers cotton farmers an opportunity to get more drop for the crop but has a way to go to get more crop for the drop.

"We have the technology" says James Mahan, USDA-ARS, Lubbock, Texas. "But we're lagging in (plant physiology) theory."

Mahan discussed work on variable rate irrigation during a panel discussion at the Beltwide Cotton Conferences recently in San Antonio.

Kenneth Hood, a Mississippi farmer, and Carl Hobbs, a Georgia crop consultant, also discussed variable rate technology applications during the seminar.

"We're exploring variable rate technology versus variable rate theory. We know the technology works," Mahan says. "We can deliver irrigation water efficiently across an entire field. The delivery," he says, "is the easy part. It's engineering and equipment and that is ahead of theory for efficient crop use. It's like hardware ahead of software in computer terms."

The next step is to develop application techniques that apply the right amount of water at the right time for most efficient use by the plant. "Available hardware makes it relatively easy to avoid application where or when it's not wanted." That's more drop for the crop.

Getting more crop from each drop of water, however, requires new management parameters. Mahan says more study is needed to determine the optimum plant temperature at which irrigation is most efficient.

"We need to monitor crop temperature and know how hot it gets and how long it stays hot," Mahan says. "We need to determine when the crop needs water and when to use variable rate technology. We have to learn how to adjust application timing over a season to manage irrigation more efficiently."

Mahan says variable rate technology has its greatest success when a relationship with yield is easy to determine.

"With limited water and deficit irrigation, we don't see that clear relationship. We don't worry as much about avoiding over-watering as we do with avoiding under-watering by too much."

Carl Hobbs, a crop consultant from Ashburn, Ga., says variable rate irrigation may save water in some cases. He's working on a system that maps out field inconsistencies and then programs center pivot irrigation units to apply water based on those differences. "We can program a system to shut off certain nozzles when they pass over a pond," he says. "We can decrease the amount of water applied through certain nozzles as they pass over a wet-natured area and increase water when passing over sandy soils. We also can cut off water to the end gun when it reaches a non-crop area."

Hobbs says in 19 systems under his program last year growers saved 127 million gallons of water, a 12 percent savings.

"This program allows farmers to use water more efficiently," he says. "We try to design systems to meet water needs for variable soil conditions."

The system doesn't just alter the pivot speed to adjust application amounts but controls the amount of water applied through specific nozzles.

Hobbs says the need for variable rate irrigation has grown rapidly. "In 1970, we had 87 center pivot irrigation units in Georgia. Today, we have 10,500. Many of those are irregularly shaped, have more than one crop underneath, or overlap other pivots. Fields have variable soil types or inconsistencies such as drainage ditches or wet areas. Each of those areas has a unique water need.

"Variable rate irrigation helps put the proper amount of water on a specific crop in a specific part of a field."

Hood says variable rate technology helps manage all aspects of production and improves efficiency. He says proper use of variable rate technology may allow growers to reduce or optimize seeding rate, irrigation, plant growth regulator applications, pest management, fertility and harvest aid management.

He says with variable rate technology and aerial imagery he can, "Write a prescription for seeding rates and see a 2 percent to 10 percent yield advantage."

With variable rate fertilization, he estimates \$7 per acre savings. Imaging and variable rate technology may lower pest management costs and improve control.

He figures he can save significantly on chemical costs. "Variable rate application allows us to save beneficials in some areas," he says. He estimates savings of \$8 per acre on plant growth regulators. "We don't want to over apply or under apply PGRs," he says.

Hood says he saved 16 percent of harvest aid chemical cost on one of his farms with variable rate technology.

"And we have significant environmental benefits," he says.