# Breeding, crop research help boost growth of successful chile pepper production

**By Susan McGinley**
**University of Arizona**

Red, hot chiles don't happen by accident — at least not in a commercial setting. Growers strive to achieve uniform flavor, heat, and overall quality in a chile crop, while canneries, dry processors, and groceries want consistency in the quality and amount of chiles they buy.

Until recently, farmers hoping for a perfect combination of growing factors had few resources to help predict crop results. Ed Curry has addressed this constant challenge through an aggressive breeding and crop management research program on his farm, Curry Chile & Seed Company, in the Sulphur Springs Valley near Pearce, Ariz., about 75 miles southeast of Tucson.

He has conducted numerous trials and projects with more than a dozen scientists from the University of Arizona (UA), New Mexico State University, and Texas A&M University. For the past five years, University of Arizona Agronomist and Soil Scientist Jeff Silvertooth has been testing and refining an integrated crop management program (ICM) that can build more consistency and predictability into the quality and quantity of the chile harvest on Curry's farm, and at three other locations. Based on a proven method Silvertooth helped develop nearly 20 years ago for monitoring and predicting distinct stages in cotton plants — which has now become a standard procedure for many cotton growers in Arizona and the desert Southwest — the plan focuses on measuring heat units accumulated after planting (HUAP) for specific growth stages of the plant. These stages include leaf and crown formation, peak bloom, early pod set, pod maturity, and the fruit's transition from green to red.

Silvertooth and his team are establishing baseline figures for the heat units accumulated at different chile growth stages, and correlating those measurements with the amounts of water consumed by the plant and with nutrient uptake requirements. "The dynamic nature of the chile plant is that it's indeterminate," says Silvertooth, who also heads the Department of Soil, Water, and Environmental Science in the UA College of Agriculture and Life Sciences. "It's very sensitive to environmental and management decisions. "For example, chiles will retain or abort fruit in response to current conditions. In particular, managing the vegetative and reproductive balance in a chile plant is critical.

"You need to know what is normal, how you measure it, and what you should do about it, which is usually an 'artistic' skill for growers. We are trying to quantify the process and develop a more systematic way of evaluating and managing a chile crop." In addition to monitoring practices, the system also emphasizes pest management factors and chile genetics — the traits different chiles inherit and exhibit, such as flavor, degree of hotness, pod structure, and other characteristics. Curry, whose breeding expertise is well-known in the chile industry, is combining his active chile breeding program with the ICM method on about 600 acres of irrigated chiles.

In partnership with renowned breeder Phil Villa, Curry has developed almost all of the standard varieties used for canned green chiles in the United States, including the famous Arizona 20. Because the ICM method is new in chile production, and information on water and nutrient uptake in chiles is limited, Silvertooth is generating a representative database that is regionally specific.

He has conducted regular sampling of plant growth and development to get data at four locations in Arizona, including Curry's farm, and one in New Mexico. During the growing season, he takes plant measurements at 14-day intervals, including crown formation, node number, plant height, branch lengths, number of fruiting branches formed, primary fork numbers, flower counts, and chile counts. So far, Silvertooth and his team have been able to map heat unit standards for first bloom, early bloom, peak bloom, fork and pod development, dry matter accumulation patterns, development of and production for green and red chiles, and a harvest index for several chile varieties. He has also been measuring the amount of water and nutrients, including nitrogen, phosphorus, and micronutrients the plant uses at each stage. That information will eventually give chile farmers a blueprint for predicting when each stage will take place. "The plant is basically revving up full blast right before it gets to peak pod set on chiles," Silvertooth says. "We've found that it uses the most water right before peak bloom and then begins to drop off at color change. "Once you know the system and the basic patterns, you can adapt and respond according to the results you get from the monitoring. The plant can tell you what to do; the challenge is learning how to read it." For Curry and other growers, the idea is to offer a crop production outline they can follow for timing irrigations, fertilizer applications, and other operations. "This research is very pertinent to the chile industry," Curry says. "As we understand how many heat units it takes to develop a pod, we'll know how much nitrogen to use and how much water to apply.

"And we can then speed up or slow down the plant's maturity, which is important in growing red chiles — at least that's our goal." The value of chile pepper production planted on 5,600 acres in Arizona totaled more than $9.7 million in 2004. Jalapeños are grown in the low desert (below an elevation of 1,000 feet) and red/green chiles are grown in the southeast savannah area where Curry's farm is located, commonly at about 3,500 to 4,500 feet elevation.

The Southwest Chile Belt spans southeastern Arizona, New Mexico, the Rio Grande Valley in Texas, and northern Chihuahua, Mexico. For more information, contact Silvertooth at (520) 621-7228 or silver@ag.arizona.edu.

**Pearce, Ariz. chile pepper grower Ed Curry is working closely with the University of Arizona to test an integrated crop management plan that helps build more consistency and predictability into the quality and quantity of the chile harvest. *Photo by Joanne Littlefield.***