

UC research shows ways to reduce water use in tomato fields



By Bob Johnson

Future systems of growing processing tomatoes could produce higher yields, using less water and even require less irrigation tape per acre.

Reducing water by up to 40 percent as early as seven weeks before the standard pre-harvest

cutoff improved tomato quality and did not reduce yields in a University of California trial on a commercial farm in the Five Points area of Fresno County.

That promising trial will be continued to see how long pronounced deficit irrigation can be practiced using poor quality well water before too much salt builds up in the soil.

Some San Joaquin Valley processing tomato growers have already increased efficiency by switching from 66-inch beds to two rows of processing tomatoes on 80-inch beds with a single line of buried drip tape running down the center, and a handful of Sacramento Valley growers are trying the wider beds for the first time this season.

The efficiency of growing processing tomatoes on the wider beds was confirmed

again in the second year of a UC trial at the West Side Research and Extension Center near Five Points.

“As in 2009, the 80-inch bed configuration had greater yield than the standard 66-inch bed, while maintaining similar fruit quality characteristics. Also like 2009, yields in the 80-inch system peaked at slightly higher plant populations than the 66-inch bed system, though at lower numbers,” said Scott Stoddard, UC Cooperative Extension farm advisor in Merced and Madera counties.

Stoddard and other UC researchers presented research information to growers and pest control ad-



Joe Richter, a farm manager for Lucero Farms, which is a sister company of Morning Star, checks on a single buried drip line that is used to irrigate an 80-inch tomato bed.

visors at processing tomato production meetings in Woodland and Modesto.

The yields in the standard 66-inch-bed plots were a little over 22 tons per acre, as tomato spotted wilt virus and gopher damage to the irrigation tape hurt yields throughout the trial in 2010. Yields on the wider beds ranged from 25 tons to 34 tons per acre, with that highest yield coming in plots that had been left fallow. For two years running, the trials have shown that yields actually decrease when density exceeds a limit of around 10,000 plants per acre.

“You end up with 25 percent less furrow with 80-inch beds compared to 60-inch beds. You end up with less wasted space. You also use about 25 percent less drip tape,” said Joe Richter, a farm manager for Lucero Farms, which is a sister company of Morning Star, the tomato processor.

The 66-inch bed is the standard in the San Joaquin Valley and the 60-inch bed is standard in the Sacramento Valley.

Lucero Farms has put in about 800 acres of the wider beds in the Sacramento Valley this year. The savings in drip tape and the reduced number of tractor passes are one reason Lucero decided to try the wide beds this year for the first time. But the major reason is that the reduction in wasted space should translate into increased yields.

“By far the biggest advantage would be in the yield. In the San Joaquin Valley, there were some fields that got 80 tons on 80-inch beds, while other fields did about as well as the 60-inch beds,” Richter said.

The yield bonus from the more efficient use of land with the wider beds does not come with any reduction in crop quality.

“Fruit samples were also taken at harvest to determine the amount of red, green, rot, sunburn, and average fruit weight in each plot. Significantly more green fruit were measured in the standard 66-inch bed

treatment, but no other significant differences were observed,” Stoddard said.

In the San Joaquin Valley, the major incentive for switching to 80-inch beds was the desire to keep the buried drip lines in place when rotating to melons, which are usually grown on 80-inch beds.

There is very little melon acreage in the Sacramento Valley, but a handful of growers there are hoping to use the wider beds to get higher tomato yields with less drip tape per acre.

“The first wave of folks on the west side of the San Joaquin Valley were melon and tomato growers. The push in this area has come from yield increases and the need for less plastic in the field, the savings in the amount of drip tape,” said Gene Miyao, UCCE farm advisor in Yolo, Sacramento and Solano counties.

He estimated that a half dozen or fewer Sacramento Valley growers will be experimenting with processing tomatoes in the wider beds on a couple thousand acres for the first time this year.

“There are several growers who will be going to the wide beds for the first time. Associated with it will be a single line of buried drip tape down the center of the bed; the driver now is the reduced drip tape per acre,” Miyao said.

One challenge in switching to the wider bed will be replacing or retrofitting equipment designed for 60-inch beds.

Lucero has custom-made equipment that can shape, fertilize, plant, cultivate and trim five of the wide beds in a single pass.

Another challenge for Sacramento Valley growers will be finding ways to grow rotation crops, because the market would probably not sustain a large increase in melon production.

“Most rotation crops up here are grown on 60-inch beds, so we have to figure out how to grow them on 80-inch beds. Wheat is easy, but we need to learn how

to grow corn, sunflowers and other crops on the wider beds," Richter said.

As the wider beds hold out the promise that more tomato tonnage can be produced on an acre, deficit irrigation studies hold out the promise that it can be done with less water.

In the irrigation and salinity management trial on a commercial farm outside Five Points, yields remained steady and crop quality improved when irrigation was reduced more than 30 percent from the standard.

"This year's results demonstrate that under carefully controlled field-scale conditions, irrigation and salinity management can play a significant role in generating high yields and product quality can be controlled through judicious irrigation scheduling," said Tom Turini, UCCE farm advisor in Fresno County.

The standard treatment in the trial was to irrigate at crop ET until a cutoff a week before harvest. In the most extreme deficit irrigation treatment, irrigation was cut back to 60 percent of ET two months before harvest, reduced again to 40 percent of ET a month before harvest, and then cut off a week before harvest. This treatment slashed water use from 28.5 inches to just 20.1 inches, and produced higher quality tomatoes with no significant yield loss.

"By decreasing the volume of applied water mid- and late-season, we were able to encourage the plant to rely on soil moisture reserves to meet crop water demand. And while this may have had some impact on crop growth, it was not severe enough to impact yield. Quality on the other hand was benefited by hav-

ing the plant mine additional soil moisture reserves deeper in the soil," Turini said.

While yields were statistically the same, the all-important soluble solids went from 4.95 in the standard treatment up to 5.14 in the most extreme deficit irrigation treatment.

The burning question, however, is how long a grower can practice this level of deficit irrigation using saline well water before too much salt builds up in the soil for the crop to tolerate.

"We're trying to find out how long we can do this, and whether there are management techniques that can help. The thought is we're not going to be seeing differences in salinity the first year. Our hypothesis is that it will take around three years to see significant differences," Turini said.

The 2010 trial began with well water that had 800 parts per million salts, but the grower was able to switch to blended water after he got some clean district water.

Deficit irrigation can be practiced longer with clean district water, or even with blended water that cuts the high salts of most well water.

And tomatoes are a candidate to do well even when salts have reached levels that would damage some other crops.

"Tomatoes tend to be more tolerant of salinity than melons, which are more tolerant than lettuce, which is more tolerant than strawberries," Turini said.

(Bob Johnson is a reporter in Magalia. He may be contacted at bjohn11135@aol.com.)