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Weed control differs with cropping choices, irrigation systems

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Contributing Writer

Weed control in specialized cropping systems can get complicated in hurry. While different systems offer distinct advantages, understanding the dynamics of how weeds play into the scenario is imperative.

Two different approaches to lettuce production were highlighted at the recent California Weed Science Society conference in Monterey. One dealt with transplants while the other dealt with establishing a stand from seed.

There are numerous reasons to consider going to transplants as opposed to direct seeding in vegetable production. Transplants require less labor, less fuel, fewer herbicides and less water, according to Sergio Silva, president of Growers Transplanting Inc., Salinas. Transplants also give growers an advantage over weeds, according to him.

"You have fewer days in the ground with transplants so you already have a jump on weeds. The yields are no different, but the savings in labor, herbicides and other inputs are very worthwhile."

In some cases, savings in hoeing costs alone more than make up for the expense of transplants. "With tomatoes we've seen that using transplants allows a grower to go without irrigation for four to five weeks," he says. "Peppers are similar. With these crops it makes sense to use transplants rather than direct seed because you're getting such a head-start on the weeds."

Direct seeded crops also create the need for overhead sprinklers in many cases that can lead to increased weed pressure early in the season. Transplants also eliminate the need for thinning, cut down on early season pest issues, and reduce irrigation requirements, according to Silva.

"Transplants are an environmentally friendly option for growing crops. In 260 square feet of a greenhouse, we can produce the same amount of plants needed for one acre of a direct seeded broccoli crop. And we can do it with less fertilizer, less chemicals and less water."

A disappearing labor force is another reason to use transplants. "Not only are we losing labor, we're losing skilled labor," Silva says. "If a grower can eliminate some of those weeding operations and the training it takes to do them correctly, then he's ahead of the game."

However, establishing a lettuce stand from direct seeding can also offer advantages.

As growers move away from labor-intensive sprinkler irrigation in favor of more efficient systems such as drip, there are advantages to be realized. Salinas County UC Farm Advisors Michael Cahn and Richard Smith have been working with full season drip systems for lettuce production for several years.

"One of the advantages right off the bat is eliminating one irrigation system," Cahn told attendees at the California Weed Science Society annual conference. "Drip also has the potential to reduce the amount of water needed to grow the crop, and there are potential benefits in terms of food safety."

Improved water quality is a big benefit for drip systems. "Certainly if we can eliminate sprinklers, we can do a lot for water quality," Cahn says.

There's less runoff, less movement of sediment, less chemical and fertilizer displacement and less impact on the surrounding landscape. Drip irrigation also reduces problems with soil crusting.

In spite of the benefits, there are obstacles to be addressed when growing lettuce under a full season drip irrigation program, especially germinating lettuce seed with drip.

"The water has to move up and over," Cahn says. "We've found that simply applying more water is not the solution."

To make full season drip work in lettuce production, growers must learn how water moves laterally; how drip tape placement affects that movement, and how other factors such as flow rate and emitter spacing influence the overall dynamics of the system.

"The first requirement is to do very good placement of the drip tape in the soil," he says. "It's important to put the drip tape equidistant across the rows and have good depth control. A tape at a two-inch depth versus a three-inch depth gave us significantly higher moisture content at the seed line.

"I originally thought that high flow tape would be the way to go," Cahn says. "As it turns out, we were able to get a higher moisture content at the seed line using a low flow drip tape. If we put the emitters a little closer together, that also helps. The limitation for moving that moisture into the seed line is the soil itself."

Manipulating the soil can help move moisture into the seed line. Mulches and seedbed preparation can also help. Also, using a weighted roller on the soil can compress capillary space within the soil profile and facilitate the movement of moisture within the desired zone.

Weed control is altered in a full season drip system. While there is generally less initial weed pressure due to smaller areas of free moisture, the effectiveness of herbicides can be compromised. It's a "chicken and egg" scenario. While fewer weeds germinate due to less available moisture, herbicide activation is also decreased. Herbicides such as Kerb and Prefar (the most prevalent pre-emergent herbicides in the Salinas Valley) are activated by overhead sprinkler irrigation. In a drip irrigation scheme, the challenge is to move enough moisture over to the seed line to activate the herbicide.

"Water is moving a little differently in a drip irrigation configuration," Smith says. "We were concerned that Kerb could move down too far. However, we found that 63 percent of the Kerb was in the top 2 inches of the bed."

In the trials, both Kerb and Prefar were effectively activated by drip water used for germination. Additionally, drip showed a bit of an advantage over sprinkler irrigation in keeping a higher percentage of Kerb in the desired zone.

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