Researchers work to improve mechanized weeding

By Rob Johnson

It would be a little premature to throw away the hoe, but agricultural engineers have figured out how to use camera technology to remove all but just the last one-third of the weeds within a narrow vegetable seed line.

Some growers in California and Arizona are already using camera-based applicators to thin lettuce, and to also eliminate some of the weeds in the row, and engineers are improving these precision tools.

"The machines are controlling about two-thirds of our in-row weeds," said Mark Siemens, University of Arizona crop mechanization specialist based at the Yuma Agricultural Center. "How do we get rid of the remaining one-third? One of the problems is there is no machine that can really differentiate between crops and weeds; they are differentiating based on size and location."

Siemens came to California earlier this month to join other researchers at the 2016 Salinas Valley Weed School as they discussed the challenge of developing vegetable cultivators that can replace hand labor and herbicides in keeping the seed line clean.

"Our role in this is to develop a spray system that is accurate to within one centimeter at two miles an hour," Siemens said. "It works pretty well in the lab, but can we get centimeter-level accuracy out in the field? It's very difficult to do. The field is not perfectly flat, and the camera and sprayer move up and down."

The development of machines that can replace hand weeding has become an urgent issue in cool-season vegetables. University of California Cooperative Extension farm manager Laura Tourte estimates the state's new minimum wage law will increase the cost of hand weeding conventional romaine lettuce by $50 an acre, and organic sprays by $130 an acre.

"This year, because of the rising minimum wage and overtime, the cost of weed control has become a bigger issue," said Richard Smith, UCCE vegetable crop and weed science advisor based in Salinas.

Chemical companies are unlikely to take up much of the slack by introducing new vegetable weed control materials, said Steve Fennimore, UCCE weed specialist.

"After 2000, there's a real change in the number of herbicides launched," Fennimore said. "It's sobering when you think about developing new herbicides because it costs $50 million to $500 million. We deal with crops like lettuce that chemical companies do not make materials for. We're lucky to have Kerb, but it was developed in 1972."

The weed control issue is particularly vexing for organic vegetable growers, who have even fewer herbicide options.

"We've got this tremendous demand for organic produce," Fennimore said. "The demand is there, and this is something you can't really do with herbicides. Hot oil is something that I think has potential. When you heat up canola oil, you can kill stuff."
Weeds

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With the cost of labor set to rise significantly, and the options for chemical weed control stagnant, the future could be in machines that can identify weeds with tractor-mounted cameras, and kill them with blades or the targeted application of materials.

"We need smart systems to differentiate weeds from crops," Fennimore said. "It costs as little as around $5 million, to as much as $17 million, to develop a new cultivar."

Central Coast researchers are busy testing to learn which materials will be most effective for use in these smart machines as they evolve.

"The automated thinners are pretty widely used in this valley," Smith said. "We want all the tools we can get for this kind of work. We don't know what kinds of tools are going to come along, and we want to have all the materials we can get."

Smith found in trials this year that precisely targeted applications of small amounts of Shikak and Rely to extra lettuce seedlings had kill rates above 96 percent after eight days, and even organic materials gave substantial control.

"We tried some organic materials," Smith said. "We got 90 percent control when we applied Superspread at 9 percent at a pH of 6.3. Eight days after application, the control dropped to 80 percent. Some of these organic materials are not systemic."

Siemens has worked extensively on testing and adapting a European camera-based weed-killer-thinner, the Robover, to the conditions of lettuce production in California and Arizona.

"We were able to purchase a two-bed

CAWG elects new board members

The California Association of Winegrowers has announced the election and re-election of members to its board of directors. CAWG is governed by 9 members from seven districts who serve three-year terms.

The new directors are: John Balletto, owner and founder of Balletto Vineyards in Santa Rosa; Joel Madsen, general manager of Martin Farms Inc. and owner of J. Madsen Farms in Petaluma; and Brian Shepard, vice president and co-owner of Walsh Vineyard Management Inc.

Re-elected directors, who will serve their third and final terms, are: Michael Bero, Stipp Ranch, Udall; Diego Olaguey, Olaguey Brothers, Lod; and Bruce Phillips, Vine Hill Ranch, Yountville.

Board members who have term out after nine years are John Duarte, Duarte Vineyards, Hughson; Dennis Withrow, Lent-Burden Farming Inc., Oakdale; and Bill Paul, Paul Ranch, Porter Valley.

CAWG said it advocates for public policies, research and education programs, and sustainable farming practices to enhance the business of growing California wines. The organization represents the growers of more than 40 percent of the grape tonnage crushed for wine and concentrate in California.