

Can Artificial Intelligence Help Growers Win the Weed Wars?

Weed Science Society of America (WSSA)

Weed control in vegetables, flowers, and herbs can be incredibly labor intensive, experts with the Weed Science Society of America (WSSA) say. There are few herbicides available for these specialty crops, making hand weeding the “go to” process. Now, though, labor shortages are creating tough challenges for growers and driving food prices higher for consumers. Could intelligent weeding machines be the answer? Based on technology advances made to date, experts say the answer is likely yes. In fact, artificial intelligence-driven machines are already being used in vegetable crops and in other areas of specialty farming. Automated lettuce thinners, for example, have become widely adopted and can thin an entire acre of lettuce in minutes. These machines use precisely targeted spot-spraying to reduce the crop to the desired spacing for optimum growth. Distinguishing crops from weeds, though, is a significantly more difficult task, experts say. Weeds come in a wide variety of colors, shapes and sizes. In addition, crop foliage can grow in an overlapping pattern or can be hidden by surrounding weeds. Some companies and public research teams have successfully used computer vision, artificial intelligence and very powerful computers to distinguish crops from weeds on a small scale. One example: First-generation, vision-based “intelligent cultivators” are now available for use by specialty crop growers. These hoeing machines use pattern recognition to determine the spacing of crops and the width of planting rows – using the information to guide knives in and out of the crop row to remove weeds. Similar technology is powering new intelligent sprayers that can precisely apply herbicides to weeds only without having to spray the entire field. Such automated tools hold important advantages over both broadcast herbicides and hand weeding, experts say. Intelligent devices are less costly to develop than herbicides and can be adapted to dozens of crops – whether conventionally or organically grown. They eliminate the need for backbreaking manual labor and allow any herbicides used to be applied more selectively.

Addressing the remaining challenges

Though automated weed control solutions are now available, they have yet to be broadly adopted. Current systems are simply unable to differentiate weeds from crops at a sufficient ground speed to support wide-

scale adoption.

A team at the University of California, Davis is actively working on a solution that can help machines quickly and reliably distinguish friend from foe. They propose using smart marking techniques to make crops “machine readable” and easy to distinguish from weeds. In field experiments, they have trained robots to detect and distinguish 99.7 percent of crop plants, even in fields with high weed densities. Experts say that despite this important progress, further research is needed before artificial intelligence-driven weed management is ready for prime time. And that requires educating broader numbers of weed scientists in the specialized technology and engineering skills needed to drive artificial intelligence innovation.

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