Is There a Bigger Role for Precision Agriculture in Vegetable Crops?

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Integrated weed management in vegetable crops requires the use of hand weeding and cultivation for the economical control of weeds. Precision cultivation, the use of robotics/machine vision technology, can improve the efficiency of cultivation and reduce the use of expensive hand weeding. In 2007 and 2008, four trials were conducted on romaine lettuce and two trials were conducted on celery to test if RoboCrop©, a computerized vision-guided precision cultivation machine, could reduce hand weeding times and increase herbicide application efficiency.

In the four lettuce trials conducted, three different cultivation tools and two directed post-emergent herbicides were tested with the RoboCrop©, both with and without pronamide applied pre-emergent at 1.2 lb ai/A. The trials were arranged in a split plot design, with pronamide as the main plot and cultivator tool or directed herbicide application as the subplot. The cultivator tools included in the comparison were: sweep knives, bezzerides (torsion weeders), and coulters with sweep knives. The post-emergent directed herbicides included pelargonic acid (Scythe) 4.2EC at 3, 6 and 9% v/v and carfentrazone (Shark) 2E applied at 0.032 lb ai/A in the 2007 trials and 0.01 lb ai/A in the 2008 trials. Data gathered were the number of marketable heads, total weed densities and hand-weeding times. Yields were not affected by any treatments; with the exception that significantly lower yields occurred in the carfentrazone treatments in 2007 due to crop injury. Pelargonic acid applied at 9% v/v consistently provided the best weed control; up to 98%. The treatments that resulted in significantly lower hand-weeding times all included pronamide.

The two celery trials (one each in 2007 and 2008) compared mechanical cultivation with sweep knives to a directed application of pelargonic acid at 3% v/v (2007) and 6 & 9% v/v (2008). Data gathered were the number of marketable bunches, total weed densities and hand-weeding times. None of the celery treatments in either trial were found to be significantly different from each other in terms of weed control, hand weeding times, or yield. This means that mechanical cultivation and directed herbicide applications have the same success rates when used with the RoboCrop© in celery.