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Agricultural Research Division of IANR

12-1-2009

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Stephen L. Young
University of Nebraska - Lincoln, syoung4@unl.edu

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Robots for weed control in Eden?

By Stephen Young, Ph.D.
Washington State University
Center for Precision Agricultural Systems
Prosser, Washington
steve_young@wsu.edu

In the Biblical account, weeds were the result of the curse for Adam's sin. In the 21st century, we are still toiling by the sweat of our brow to control weeds. What Adam and the rest of mankind have endured for thousands of years, may soon be controlled by a robot, similar to the ones that vacuum your floor, protect your car and entertain your kids.

Using computers to guide a machine, give it vision and allow it to make a direct application sounds like something being developed by the U.S. military. While the military is close to perfecting the art of seeking and destroying, scientists in the agricultural arena have only just begun to understand how this technology can be used to seek and destroy weeds.

High speed cameras and expert software with laser sensing capabilities have made computer applications a reality to a biological field that is governed by the unpredictable interaction of nature and the environment. Previously, these quick and precise applications were isolated to video games for teenagers (e.g., X-Box) and vehicle security systems for the family car (e.g., OnStar). Nowadays, computer technologies for sensing plants (e.g., WeedSeeker) and positioning equipment in the field (e.g., *Ag*GPS) have begun to make the impossible a reality in agricultural cropping systems.

But how soon will this technology be available to the home gardener? It maybe a while, but probably not another thousand years. Currently, research on knowledge based machine vision systems (i.e., automation) is being conducted around the world in agronomic and horticultural cropping systems, which include dryland wheat, irrigated corn and high-value fruits and vegetables. For example, scientists in the U.K. have developed a weeding robot that uses hot steam to control weeds in organic sugar beet and carrot resulting in a significant reduction in the cost of hand labor. In Illinois and California, university professors have developed 'smart sprayers' that use video or hyperspectral cameras to detect the size and density of weeds, which are then either controlled immediately or spot treated later using a spatial GIS map. In addition to knowledge based machine vision systems, technologies are also being used to measure environmental factors to predict the occurrence of weeds and administer preventative control measures. For example, scientists in Denmark using sensors to measure soil properties (e.g., organic matter, texture, fertility) are working to correlate these abiotic properties with the location of dense weed populations.

Machine vision and RTK GPS guidance systems are the latest technologies being researched for use in weed detection and identification. Other technologies include guidance, precision in-row weed control, and mapping. A symposium at the upcoming annual meetings of the Weed Science Society of America will encompass these topics, as experts from around the country will gather to present the latest research and discuss future developments in this rapidly advancing area of technology that is being applied to weed control in cropping systems.

The actuality of a robot loading the dishwasher, walking the dog and pulling weeds in the garden may be several decades away, but then whoever thought the automobile or airplane were possible, just two centuries ago? One thing is for sure, though, weeds will always be a problem thanks to Adam.