Cornell Researchers Use Seneca Army Depot to Improve Agricultural Sprayers and Reduce Pesticide Drift

December 19, 2000

CONTACT: Linda McCandless, llm3@cornell.edu, 315-787-2417

by Linda McCandless

ROMULUS, NY: The machine shop at the Seneca Army Depot in Romulus, NY, is 280' long, 54' wide, and 60' high-large enough to hold a football game, a missile, or a Ford New Holland tractor hooked to an airblast sprayer. During the Cold War, the facility was surrounded by chain-link fence and razor wire, heavily guarded and off-limits to the local community. Army engineers used the shop to work on munitions and tanks. Their goal was political: to fight Communism. Post-Cold-War, agricultural engineers at Cornell University are using the space to test airblast sprayers that fight insects and diseases. Their goal is an environmentally friendly one: reduce pesticide drift.

Suggested caption: Cornell University agricultural engineer Andrew Landers uses a simple piece of metal to demonstrate to growers during the Cornell Fruit Field Days how introducing a deflector and adjusting its angle on an airblast sprayer could improve the deposition of pesticides. Inefficient spray technologies result in an over-use of pesticides and/or a reduction in pest control and cost growers large amounts of money, says plant pathologist Wayne Wilcox, fruit disease specialist at Cornell's New York State Agricultural Experiment Station. CREDIT: NYSAES/Cornell

Download 300 DPI tif photo

"Inefficient spray technologies result in an over-use of pesticides and/or a reduction in pest control, both of which cost growers significant amounts of money," says Wayne Wilcox, Cornell University professor of fruit diseases in the department of plant pathology at the New York State Agricultural Experiment Station in Geneva,

NY. "They can also result in unnecessary and avoidable levels of environmental pollution and spray applicator exposure to pesticides."Wilcox evaluates spray deposition and its effect on pest control for several new spray technologies with Andrew Landers, an agricultural engineer and pesticide application technology specialist from Cornell's Ithaca campus. The standard airblast sprayer costs

$5,000-$35,000. They are used by 99 percent of apple and grape growers worldwide to apply pesticides.

Landers, a Brit who is long on humor and short on patience with technological inefficiencies, has worked with sprayers in Europe and the U.S. for 30 years. He came to Cornell three years ago from Cranfield University. He manages cooperative projects with grape, apple, vegetable and turfgrass growers in Riverhead, Plattsburg, Fredonia, Ithaca, and Geneva.

Suggested caption: Cornell University agricultural engineer Andrew Landers demonstrated a prototype of the 'Jean Machine' during the Cornell Fruit Field Days this summer in Geneva. Landers used a more advanced iteration of the machine to conduct air flow tests at the Seneca Army Depot in Romulus this fall. His research is designed to reduce pesticide drift from agricultural sprayers. CREDIT: NYSAES/Cornell

Download 300 DPI tif photo

At the cavernous machine shop at the army depot in Romulus, Landers set up the 'Jean Machine' developed in his lab. The machine, which provides a visual and measurable demonstration of air flow, was designed to fit in the back of a Plymouth minivan so it could be used for demonstration purposes at grower meetings. It is made of PVC pipe, placed vertically at 4 1/2' intervals, strung netlike with 20 lb. test fishing line, on which is hung 8" seam binding at regular intervals. Wind patterns are also shown via neutrally buoyant helium bubbles. A hot wire anemometer measures wind speed data. Data is used to construct contour graphs to compare modifications to the sprayer. "When we turn on the airblast sprayer and run it without liquid, we can see the airflow characteristics via the 'Jean Machine' and the helium bubbles and measure it with the hot wire anemometer," said Landers.

In the grape industry, for instance, grape canopies are 6'6" high, in rows that are generally 9' apart. "We have measured the deposition of some sprayers that are shooting pesticides 20' into the air-clearly beyond the usable range. Our goal is to

control drift by developing better deflection technology and then educate grower to use the 'fix' we develop," said Landers.

Generating and testing data was much more complicated than the solution which is not expensive. Landers and his colleagues at Cornell developed deflectors made from readily-available sheet metal. "They are six to eight times longer than the ones that come with the sprayers from the factory," said Landers. "Then, we adjusted deflector length, the angle of deflection, and added a metal plate to the front of the deflector to prevent spray from shooting forward."

Using the new improved model, Landers estimates growers can increase spray efficiency by 50 percent. That, and the fact that the 'fix' can be made for less than $100 are the two messages he will deliver to growers throughout the Northeast in winter meetings.

"Growers in the Finger Lakes may spend from $100-$300/acre on fungicide and insecticide sprays," says Tim Martinson, who is the extension educator at the Finger Lakes Grape Program in Penn Yan. "The majority are fungicide sprays to control four major diseases of grapes. With improved deposition, growers might be able to reduce rates and save on their spray bill. More importantly, this simple deflector will improve disease control, while preventing these expensive fungicides from being blown off into the air and landing where they aren't wanted. It's hard to imagine another simple fix that would offer as many benefits to the grower."

THE SPIRIT OF COOPERATION

Cooperation between specialists in pest management biology and agricultural engineering is surprisingly rare.

"Engineers and biologists come from somewhat different cultures, and often work within their own professional universes," says Wilcox. "I have not seen anything remotely approaching this level of cooperation between these two 'groups' in my nearly 17 years here at Cornell."

He explains how the interaction between engineers and biologists works. "A considerable portion of my program is devoted to devising spray programs of maximum efficiency, i.e., with respect to the choice of materials, rates, and timings that will provide commercial levels of control with a minimum input of spray material and labor," says Wilcox. "However, these programs will not perform as they are designed to if the materials are not delivered adequately and safely to the fruit and foliage of the crops. Thus, I work on the 'what' and 'when' of spray programs, whereas Andrew works on the 'how'. A weak link in any part of this 'chain' will defeat our common objective of providing safe and efficient pest control programs."

On his part, Landers is enthused about the level of cooperation with the company that has bought the Depot. To test the technology, he needed indoor space large enough so the turbulence generated by sprayers would not 'bounce back' and compromise the testing limits of his equipment. "I would really like to thank the Advantage Group out of Bethesda, MD, for making this testing space available to us," said Landers. "They bought this abandoned depot intending to develop it as a leading distribution center for the Finger Lakes. Their director, Pete Gorski, was willing to give me this space for our spray tests. This project is a good example of developers working with the local community."

Post Cold War cooperation? It's a reality in the Finger Lakes.

/

# # # #