

A new monthly series reporting to the produce industry on CPS research projects.

Treatments may speed vegetable replanting of *Salmonella*-contaminated soil

Simultaneous field trials are being conducted half way around the world to determine whether cover crops, soil or bed solarization, or a combination of both can help remediate *Salmonella enterica*-contaminated soil.

The research is being led by Trevor Suslow, University of California Extension Research Specialist in the Department of Plant Sciences, Davis, California; along with co-investigator Robyn McConchie, Associate Professor in the Department of Plant and Food Science and department head, University of Sydney, Australia.

International collaborations of this type benefit both countries as well as speed the research since two sets of trials are conducted in tandem, McConchie said. "We can come to recommendations a lot faster by leveraging off of each other and sharing information," she said of the research, now in its second year." Also, Trevor has had a long experience in fresh produce safety research, and we're benefiting from sharing his information to fast-track our research in Australia as well."

Suslow said he sees advantages when projects -- such as this one, which arose directly from a natural on-farm contamination incident -- present opportunities to work together internationally.

"Certainly in my mind, these are among global issues that the produce industry faces. And to the extent that you can have trials that complement each other on more of an international scale, it helps support the overall usefulness of the data coming out," Suslow said.

Ultimately, McConchie said she hopes their work will yield data on which they can make science-based recommendations for growers with *Salmonella* contamination in their fields. "If you detect persistent *Salmonella* in your soils or on your crop, you have to plow (your crop) under, and that's very costly," she said." There is a lot of uncertainty about how long to withhold replanting without the risk of contamination of that new crop as well. "From a scientific point of view, it's important to also know what's happening to the microbial diversity of the soil so we can get a handle on what's responsible for any die-off."

McConchie stated they also plan to publish the results in a peer-reviewed journal so quality assurance agencies can potentially develop guidelines for using cover crops to ameliorate *Salmonella*-contaminated soils. Currently, a dearth of practical scientific data exists on survival of *Salmonella* on vegetable farms using chicken manure.

Both McConchie and Suslow are following the same research protocol and conducting the same analyses. The main difference is in cover crop varieties. McConchie is using Fumig8tor sorghum, an Egyptian mustard and a radish, all commonly used by Australian growers for their soil pathogen- or nematode-suppression biofumigation traits. Suslow is using two mustards and a buckwheat, all of which are used by Northern California growers.

"These fit into something that growers are familiar with, that growers are doing already," Suslow said. "They're relatively low cost and our studies are focused on a quick turn-around rather than the typical growth phase for cover crops."

The trials involve 5-by-5-meter plots treated with a chicken manure-chicken litter amendment. A crop of baby lettuce or spinach is then planted, and the "contaminated" crop plowed under.

Then the treatments are applied. They involve individual cover crops, solarization alone or solarization combined with a cover crop. The solarization treatments also involve two different moisture regimes -- fluctuating and continuous -- and two different durations -- 30 days or 45 days. One plot will be left untreated as the control.

During the treatments, Suslow and McConchie will collect several sets of soil samples to measure levels of glucosinolates and phenolics -- natural plant compounds produced by the cover crops that have antimicrobial activity. They also are using next-generation sequencing technologies to assess changes in the soil microbial communities. The final step involves disking under the cover crops or removing the solarization plastic, replanting with baby lettuce and spinach, and testing for contamination at typical commercial maturity.

Although the project focuses on *Salmonella*, the researchers also are measuring *Listeria monocytogenes* populations to determine what effects the crop residue treatments have on build-up of this potential soil-borne foodborne pathogen.

McConchie will present their findings at the Center for Produce Safety Symposium, June 23-24, in Atlanta.

[View the research abstract proposal: "Remediation and recovery measures to expedite planting or replanting of vegetables following soil contamination by *Salmonella enterica*".](#)

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