CENTER for PRODUCE SAFETY

Researchers tap GIS to help predict on-farm foodborne pathogen risks

Growers may soon be able to log onto a website, note their farm's location and view the relative risks from foodborne pathogens as different color gradients on a map. They could then make more informed planting and management decisions that would help minimize potential contamination. That scenario isn't too far off and is one of the next steps in research that melds geographic information system (GIS) mapping with mathematical equations to create foodborne pathogen risk-prediction models.

"People want guidelines in terms of high risk areas and how far to stay away in terms of planting," Wiedmann said. "How many meters is that magic cutoff? Risk is never yes or no. It's a gradient."

Martin Wiedmann, Ph.D. and professor of microbiology, along with co-investigator Randy Worobo, Ph.D. and professor of food microbiology, are midway through the second year of the research project. Both are with Cornell University's Department of Food Science in Ithaca, N.Y. Also, part of the project was Laura Strawn, Ph.D., who recently moved to Virginia Tech as an assistant professor and Extension specialist.

Titled "Validation of geospatial algorithms to predict the prevalence and persistence of pathogens in produce fields to improve GAPs ."

Wiedmann and Worobo are working with several cooperating vegetable growers in New York State. Eventually, the model could be used by growers elsewhere. But the researchers wanted to start with a smaller geographical scope. "The first step is to get enough data from one location to see if it even works," Wiedmann said.

During the first year, he and Worobo developed GIS, or geographic information system, maps that included participating farms and nearby landscape features, such as pastures, livestock operations, waterways, hills and riparian areas. They also incorporated previous research results that tied pathogen risk to precipitation, temperature and soil types. All that data and more were incorporated into predictive algorithms. This year, they plan to validate the model.

"It's very easy to take data from the past and develop some mathematical algorithms," Wiedmann said. "We can model the past, but that doesn't mean going forward that it will work."

He envisions developing pathogen risk maps similar to heat maps. White, for example, would mean close to zero percent risk from foodborne pathogens. Red, on the other hand, would carry a 25 percent risk. In between would be shades of pink that would carry various relative risks.

The map would provide growers a simple visual tool on which to base decisions. For example, a grower with 100 acres may want to know where would be the lowest-risk place on his or her farm to plant 10 acres of baby greens. And just because a map shows a higher foodborne pathogen risk doesn't mean growers should fallow that ground, Wiedmann said. Instead, they could use the results to make management choices, such as modifying irrigation, increasing pathogen testing or delaying harvest.

Wiedmann will present findings from the project's first year during the Center for Produce Safety Symposium, June 23-24, in Atlanta, Georgia.

View the research abstract proposal: "Validation of geospatial algorithms to predict the prevalence and persistence of pathogens in produce fields to improve GAPs ."

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