

JACQUELINE FLETCHER, OKLAHOMA STATE UNIVERSITY

Imagine biting into a fresh, juicy slice of cantaloupe. Just the thought of tasting it is enough to bring up memories of summer in Oklahoma. But with increasing outbreaks of food poisoning in fresh produce, the small melon may also be associated with life-threatening bacteria.

As recently as 2011, contaminated cantaloupes from a Colorado farm were blamed for the deaths of 29 people, including one Oklahoman, and the illness of nearly 140 others. The produce was infected with the deadly bacteria *Listeria*, which is not visible or taste-altering in the fruit. The Centers for Disease Control and Prevention (CDC) declared it the deadliest outbreak of a food borne disease in more than a decade. Near the same time, another deadly outbreak of food borne illness in Europe was finally attributed to *E. coli* contamination of fenugreek sprouts.

Since *Listeria* and *E. coli* are bacteria typically associated with animals and humans, plant pathologist Jacqueline Fletcher began to wonder how the bacteria survived on fresh produce.



“Scientists know little about why human pathogens are infecting certain foods,” said Fletcher, a regents professor at Oklahoma State University, “but we are seeing food borne illness increase on a global scale.”

As director of OSU’s National Institute for Microbial Forensics & Food and Agricultural Biosecurity (NIMFFAB), Fletcher’s work primarily focuses on plant diseases and bacteria detrimental to plant growth. But with food borne illness becoming an increasing threat, she decided to apply her understanding of plant behavior to understanding the interaction between human pathogens and plants.

“What happened in Colorado and Germany could happen anywhere,” said Fletcher. “Not only do these illnesses have a devastating impact on human health, but they pose a threat to the nation’s agriculture industry, including local farmers and Oklahoma’s economy. Oklahoma has a strong agricultural base, including cantaloupe, and is also at risk for infected crops. The key is to understand why and to develop better approaches to reduce these risks as the food market becomes more global.”

Fletcher wanted Oklahoma be involved in that research.

To help fund research in this new area, Fletcher applied to OCAST because “the organization focuses on issues important in our state and provides funding for our own state’s talented researchers to address those issues,” she said.

She and OSU collaborator Maria Ma, a NIMFFAB food microbiologist, and their doctoral student Dhiraj Gautam, used the grant to examine cantaloupe-Salmonella interactions and how the bacteria can enter and survive inside the melon.

“Researchers know certain human pathogens such as *Salmonella* have been associated with cantaloupe, but the recent *Listeria* outbreak shows other human pathogens can also contaminate the fruit,” said Fletcher.

Her work has generated several significant findings new to the scientific community.

The researchers found *Salmonella* can enter through the flower of the cantaloupe with the help of common plant-associated bacteria. The results were the first report of *Salmonella* thriving in the edible portion of cantaloupe. Further research discovered the bacteria developed a protective film that reduced the effectiveness of pre-washing the melon rind. Fletcher and her research team are now investigating more effective ways to disinfect the fruit.

Fletcher and her breakthrough research have been recognized in the global food safety arena. She chairs the American Phytopathological Society's Food Safety Interest Group, and recently was invited to lead a multi-national research project funded by the European Union's Seventh Framework Networks of Excellence to assess food safety preparedness and response capabilities in the EU.

"OCAST was instrumental in launching us in this particular discipline," said Fletcher. "The funding provided opportunities for me to branch out and apply knowledge and experience in plant pathology into timely new research areas related to human pathogens on plants."

It also helped her research become more competitive for federal funds. Fletcher has since received grants from the U.S. Department of Agriculture and the Department of Defense to further investigate food safety.

"The people evaluating the grants were food safety experts," said Fletcher. "It was critical for us to demonstrate previous experience working on human pathogens on plants, and the funding from OCAST made that possible."

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