University of Maine researcher awarded $4.9 million to study novel food safety technologies

Alan Bennett

Originally published April 20, 2015

A University of Maine researcher has received a $4.9 million grant from the U.S. Department of Agriculture and the National Institute of Food and Agriculture to develop the novel approach of using non-thermal technologies to control microbial contamination of low-moisture foods.

Dr. Vivian Wu, a professor of food science at UMaine, will be working as lead researcher on a five-year project that will explore new technologies to better control microbial contamination of low-moisture foods, such as cereals, nuts and spices, without using heat.

“Heat is a very effective way to control microbial contamination, but there are food products that heat just doesn’t work that well,” Wu said, discussing such foods as produce and grains. “We want to develop nonthermal processing techniques to eliminate, to maintain the safety of produce and low-moisture food.”

According to Wu, USDA has been emphasizing produce safety for years, and low-moisture foods are becoming an increasing concern as it comes to food safety and bacterial contamination.

Methods Wu will be examining include the use of cold plasma (ionized atmospheric air), gaseous antimicrobial treatment and multicolored decontaminating lights to sanitize low-moisture foods.

Wu will receive $900,000 of the $4.9 million for her first year of the five-year, integrated, interdisciplinary project, which will be a joint-research collaboration between UMaine and the USDA Agricultural Research Service Eastern Regional Research Center (ARS ERRC), Virginia Tech, University of Delaware and Ohio State University. UMaine is one of 36 universities to receive food safety grants amounting to more than $19 million, with $6.7 million awarded for research in antimicrobial resistance alone.

Wu’s project will be focused on three facets: research, education and extension. In addition to laboratory testing, researchers plan to develop two online courses for university students and others who wish to learn about this kind of approach. Wu also hopes to utilize educational resources to train university extension workers in the states where her research will take place.

Wu says her research will ultimately benefit the consumers.

“We will focus on the education of general consumers, what’s a safety issue and how nonthermal processing can help you to reduce or eliminate microbial content on the surface of food products,” she said. “The microorganisms we are targeting are not just the common pathogenic bacteria. We will also cover virus[es] and parasites.”

Her research approach will all be waterless, according to Wu. Through using less water, Wu believes industrial processors can save money, which will save consumers money at their supermarket registers.

“We are hoping that we will be able to develop an integrated system that can eventually be utilized by the industry, can be commercialized, can be truly applied on an industrial scale to control microorganisms,” Wu said. “All of this is waterless … we want to target energy-saving issues,” she said.

This kind of research comes at a time when the state of California — where 40 percent of all water goes toward agricultural use, amounting to 80 percent of all human water use — faces a crippling drought that has prompted emergency water use restrictions.

“Water is so precious in California,” Wu said. “I think any technology that reduces energy, reduces need of water will be something probably appreciable for the long-term.”

The $4.9 million grant comes as Wu continues to celebrate a recent $150,000 grant to study the internalization of foodborne pathogens in fresh produce using magnetic resonance imaging (MRI) technology, another novel approach and the first of its kind.

“We have started the development of ionized nanoparticles. We want to utilize that as a labeling tool that we can eventually apply to cells with ionized nanoparticles, and then preserve the internalization using MRI,” Wu said of the two-year program, which has made headway since its beginning stages this past February.

Wu has already employed UMaine graduate students to work with her on the latest project focusing on low-moisture foods, and will undergo the process of hiring postdoctoral students, graduate students and few undergraduates from across the five institutions to work in her laboratory.

Because of the enormity of Wu’s grant, she says there is a lot of pressure for success.

“We need to make sure that by the five-year time, we are going to deliver something that is applicable in the industry,” Wu said.

“It’s not just about research or communication,” she said. “It’s about technology that will be able to transfer to the industrial scale, so industrial can utilize those technologies we develop and apply it to their processes and be able to reduce the food safety issues.”