

2023 Center for Produce Safety Research Symposium Executive Summary

Part 1 – Research that calls for immediate action.

The 2023 CPS Symposium [[Agenda](#)] featured produce safety research presentations and industry discussions on a wide range of critically important produce safety challenges. In Part 1 of our three-part Executive Summary, we highlight new research results that your company should be aware of and vetting against your current produce safety program. Details for these research programs can be found on the [CPS website](#).

Can't find *Listeria*? Maybe you are not looking hard enough. Three European fresh-cut facilities collaborated with a research team to explore the distribution of *Listeria* in their facilities [[Allende 2023 final report](#)]. The data show that *Listeria* spp. and *Listeria monocytogenes* (Lm) can be found across zones 1, 2, and 3. Indeed, using an enhanced sampling and detection strategy that relied on the use of sponges in place of swabs to sample surfaces, the frequency of positive samples in zone 3 was surprisingly high indicating that zone 3 areas should be a high priority target for cleaning and sanitation efforts. The project also pointed out that by performing swabbing before cleaning and sanitation, i.e., when the surfaces being tested are most likely to have detectable levels of *Listeria*, optimizes the chance of finding *Listeria* permitting an opportunity to identify the source of the contamination and to develop control measures to prevent recurrence. This project is a reminder to processing and packing operators to aggressively employ “seek and destroy” strategies to control *Listeria*. *Listeria* is ubiquitous in our production environments, so if your team does not detect positive *Listeria* or samples Lm periodically, perhaps your environmental monitoring program is not as effective as you need it to be. You cannot manage the problem if you do not know you have a problem to begin with.

Let them know you care. The Symposium featured two projects where the efficacy of cleaning and sanitation in harvest equipment [[Chen final report 2023](#)] and in processing facilities [[Allende final report 2023](#)] lead to a common observation; if the cleaning and sanitation crew understands their job is important and management is watching, they do a better job. In both projects, the two research teams visited cooperating industry partners, talked about their cleaning and sanitation practices, and took samples to measure the efficacy of their current cleaning and sanitation efforts. When the researchers returned a second time and repeated the process, they found that the cleaning and sanitation efforts had improved measurably. Additional training, closer adherence to protocols and support for aggressively pursuing a seek and destroy approach essentially motivates employees to work more effectively.

Not so fast – Timing is everything. Lm and *Salmonella* can survive on surfaces found in dry stone fruit packinghouse environments and persist after the season [[Dawson final 2023 report](#)]. It has been shown that *Listeria* survives in wet conditions and this research demonstrates that *Listeria* also persists in dry conditions, even better than *Salmonella*. In packinghouses closed after a season, the aerobic plate count was shown to increase over time in the dry, idle facilities. Therefore, at the end of a packing season, it is best to rigorously clean the equipment and the production environment with detergents and agitation to eliminate organic residues and sanitize surfaces properly to ensure Lm and other bacteria are killed immediately and biofilm formation is prevented. Importantly, repeat the process immediately before start up the next season.

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Filling data gaps – Building more robust risk assessments. Waxes are commonly applied to the surface of lemons and other types of fruits to preserve quality and extend shelf life. This project found that *Salmonella* and *Listeria* survive in storage and finishing waxes [Wang 2023 final report] but did not grow during storage. Both pathogens undergo greater reductions on stored waxed fruit than unwaxed fruit. It is important for fruit packers to understand their wax supplier’s practices and controls to prevent microbial contamination during wax manufacture and subsequent handling. It is equally important for the packer to store and handle source and finishing waxes so as to prevent cross contamination. Care also must be taken to clean and sanitize wax application equipment to ensure they do not become vectors for cross contamination.

From a flooding disaster comes knowledge. The 2023 floods in California caused billions of dollars in damage and uprooted the lives of many residents. It also presented an opportunity to study the potential produce safety risks brought on by flooding [Rock 2023 final report]. Four ranches spread throughout flood impacted areas in the Salinas Valley were opened to the research team for sampling and study. Three key learnings have emerged: (1) There is no silver bullet. Flood water is a hazard, and it is important for each grower to determine if that hazard represents a pathogen contamination risk to their fields and irrigation water sources and what measures they need to put in place to mitigate those risks. (2) Not all flood waters are the same (or represent the same risks). Fields flooded by tributaries or creeks yielded soil samples positive for STECs (though not *E. coli* O157:H7) while those flooded by the river did not. It is likely that the degree of contamination emanating from different waters reflects the surrounding or adjacent lands the tributary runs through and the operations and animals that inhabit those spaces. (3) Unexpectedly, the research team found low levels of indicator organisms in previously flooded fields, e.g., generic *E. coli* and fecal coliforms (generally <100 MPN/g soil), and die-off was observed over time. Using heat maps, the research team demonstrated that fecal indicators were highest where the flood water entered the field and declined at its farthest reach. However, die off of fecal coliforms was inconsistent across fields and they were not correlated with the presence of STECs and *Salmonella* suggesting that fecal coliforms might not be a good indicator for soil pathogens in soil. Generic *E. coli* may be a more consistent indicator for potential pathogen presence in flooded fields.

Acknowledgements: CPS thanks all the dedicated researchers that presented their project results, the session moderators, breakout discussion leaders and the students who helped in various capacities to make event logistics efficient. More detail on the research projects can be found at www.centerforproducesafety.org. This Executive Summary is meant to inform and provoke thought with an eye towards inspiring industry senior executives to examine their own company’s produce safety programs and to use this research to generate discussions with their own produce safety team to meet the objective of driving science and risk-based improvements. It is not meant as a directive on what must be done to produce safe food. If you have additional questions, please feel free to contact Bonnie Fernandez-Fenaroli [Bonnie@centerforproducesafety.org]. Thank you.