


CPS CENTER *for* PRODUCE SAFETY

How well do you understand water risk management?

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March 19, 2019 - As we all know, food safety outbreaks have a massive effect not only on growers, but on all stakeholders throughout the fresh produce supply chain. Irrigation water has been identified over the years as a likely cause of fresh produce contamination, so it's critical that our industry fully understands the potential risk involved and how these risks are being managed by growers.

The Center for Produce Safety has numerous research projects involving irrigation water. One 2015 project titled "Evaluation of risk-based water quality sampling strategies for the fresh produce industry," led by PI Channah Rock, Ph.D., University of Arizona, concluded that "localized environmental conditions play a large role in water quality."

Further, that "growers must get a better understanding of their water sources through collection of water quality data and historical analysis." Another outcome from this project was developing a computer app to provide guidance on the frequency of sampling based on risk factors (e.g. after rainfall).

Several other CPS research projects focus on predictive models for irrigation water quality, exploring the relationship between product testing and risk, reuse of tail water and evaluating alternative irrigation water quality indicators.

Let me introduce Natalie Dyenson, head of food safety and quality assurance at Dole. As you can imagine, she has a huge responsibility covering several product lines (fruits, vegetables, leafy greens and packaged salads) sourced from hundreds of growers throughout the Americas and other countries. She's been involved with CPS for several years and takes a keen interest in new research findings.

With leafy greens as her top priority, she is still very concerned about the three romaine lettuce outbreaks during 2018. With all Dole crops, water quality risk assessment and testing are very important. Dole reviews water source (wells, reservoir, canals, etc.) and type of irrigation (foliar spray, furrow irrigation, flooding farms).

All water sources including deep wells are tested monthly, and after weather events such as wind and frost. Enhanced testing of product is done prior to harvest depending on their environmental risk assessments — for example, after an excessive rain event where potential contaminated water run-off could be introduced to the field.

Natalie said, "there is a huge potential to leverage historical water quality test data to help mitigate risk." She's also very interested in predictive models and is looking forward to the results of a CPS research project starting in 2019, "Development of a model to predict the impact of sediments on microbial irrigation water quality," led by Charles P. Gerba, Ph.D, from the University of Arizona.

Previous CPS research has shown that sediments at the bottom of waterways can harbor 10 to 10,000 more fecal bacteria than surface waters. This new project will investigate the conditions where




where pathogens could be re-suspended in surface water and will design sampling strategies to minimize contamination to crops.

While discussing sediment in irrigation canals Natalie mentioned that it's been observed that some non-Dole farmers are still laying irrigation intake hoses directly on the bottom of water sources (canals, ponds, etc.). A simple solution is to use a flotation device positioned so that the hose end extracts water just below the surface where there are fewer potential contaminants. While not a complete remedy to eliminate all organic matter and pathogens in the water supply, it is a simple tool to help reduce risk.

We need "active engagement" from all industry stakeholders to understand and better manage the risks involved with irrigation water. Natalie cited a recent example where in October 2018, a notice was send out from the Wellton-Mohawk Irrigation District advising growers that 154 sheep ran straight into an irrigation canal (100 sheep were saved). They advised that water was tested at and around the incident site and results were shared with growers in the area. They also advised growers that had downstream generic E. coli samples to share them. This is the type of industry collaboration we need!

Natalie commented that "we need to shift the paradigm from why we can't do it, to what should we be doing." It comes down to keeping abreast of CPS research, looking at risk factors and developing the best practices. For example, changing from an overhead irrigation spray to non-foliar irrigation reduces the risk of potentially contaminated water from touching the fresh produce.

However, even with non-foliar irrigation, studies in the lab have shown there can be pathogen uptake from plant roots. Risk is reduced but not eliminated. With furrow irrigation, it is important to manage water levels to ensure there is no contact with the product, and to monitor the length of time water is present on the field.

In discussing federal regulations on water quality, Natalie pointed out that our industry (and FDA) originally adopted the EPA recreational water quality standard, which uses a tolerance threshold for low levels of generic E. coli.

Since then, advances in science have shown that generic E. coli is not an effective indicator for potential pathogens affecting human health. Clearly, our industry needs to work closely with government to ensure practical and effective regulations are implemented. Natalie is part of a new work group (supported by Western Growers Association) to take the science research from CPS and other sources to develop new, more meaningful water quality risk metrics in collaboration with FDA.

The big picture is that our industry needs to "step it up" when it comes to water quality and risk management. CPS research projects have numerous key findings that can help. One example is the project Optimal strategies for monitoring irrigation water quality and the development of guidelines for the irrigation of food crops (2014) Marc P. Verhougstraete, Ph.D. U of Arizona. Key recommendations include the following; for all open canal irrigation water sampling:

- Explore up to 600 m upstream to ensure no major contamination or outfalls exist
- Sample before noon
- Collect samples at any point across the canal where safe access is available
- Collect samples at the surface of the water
- Composite five samples and perform a single E. coli assay

How many growers can say they're following or even know about these recommendations?

The fact is that if we continue to have major outbreaks our industry will suffer from lack of consumer confidence and over-regulation. The last thing we need is a requirement to chemically treat 100% of all agricultural water. That would be untenable.

Our best path forward is to use the science from CPS to create a more robust risk assessment process and mitigation around water quality, because not all water sources, conveyance and dispersal methods entail equal risk. The solution is education and tools that growers can use to understand how and when to use water sources available.

As an industry we need to have a better understanding of the risks around water quality, and then create new water metrics and tools to better manage risk.

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