CPS Research Symposium 2018
Project Summaries

Tuesday, June 19, 2018 10:15 am – 11:45 am

Research Session - Agricultural water - The safety of agricultural water has long been a produce safety priority. This session will focus on four CPS-funded research programs to help stakeholders better understand the various risk factors associated with open water sources and management practices that can be leveraged to minimize those risks. **Moderator: Suresh DeCosta**, Lipman Produce **Panelists:** Samir Assar, U.S. Food and Drug Administration • Sharan Lanini, Pacific International Marketing • Bob Ziel, J&J Family of Farms

Establishment of operating standards for produce wash systems through the identification of specific metrics and test methods. Ana Allende, CEBAS-CSIS Spain

Summary - The main objective of this proposal is helping producers to maintain the quality of the process water in commercial washing systems through control of water quality variables and the selection of adequate test methods for monitoring the process. Water disinfection is one of the most critical processing steps in fruit and vegetable production aimed at preventing cross-contamination. In packinghouses and processing facilities, it is difficult to properly treat and maintain the quality of the process water because of the variability in the demand of disinfectant, the lack of operational limits and test methods to monitor the process, and the different commercial operations. This project will investigate the most common disinfection agents used in packinghouses and processing facilities. Four scenarios have been selected based on different water characteristics, including fresh-cut onions (excessive cell exudates, very high organic matter and turbidity), chopped lettuce (high organic matter and low turbidity), baby leaves (low organic matter and low turbidity), and peppers and tomatoes (low organic matter and high turbidity). Operational limits will be established in commercial facilities and lab-scale experiments using inoculated foodborne pathogens. Results obtained should inform producers about the realistic expectations for controlling selected water quality variables in produce washing systems.

Microbial food safety risks of reusing tail water for leafy green production. Michael Cahn, University of California, Davis

Summary - The use of sprinklers and furrow irrigation frequently results in significant volumes of run-off, also referred to as tail water. Although vegetable growers have made much progress in reducing irrigation run-off by using drip lines, overhead sprinklers are needed for germinating and establishing crops, and for watering high-density leafy greens such as spinach and baby greens. Also, a significant number of acres of lettuce and other vegetables are irrigated by furrow after crop establishment. Many Central Coast ranches have infrastructure for reusing tail water for irrigating crops, including sediment basins, reservoirs, and pumping systems. Currently, growers are reluctant to irrigate crops with tail water due to a lack of information on microbial food safety risks. Several options exist for reusing run-off water, which may minimize microbial food safety risks for produce. Tail water could be used for irrigation practices that do not result in direct contact with the crop, such as pre-irrigation and germination, as well as for dust control of unpaved roads. Reuse of tail water also would help growers conserve ground water. Other options include treating run-off by chlorination or other means to kill microbial pathogens and blending tail water with a clean water source so that microbial levels meet industry or regulatory target levels for surface water. This project will monitor, characterize and quantify microbial populations in run-off water from Central Coast vegetable fields, and evaluate the risk of using this water source for the production of lettuce and other

leafy green crops by quantifying survival of microorganisms during reuse applications. The food safety risk of reusing run-off water needs to be evaluated in commercial vegetable fields under conventional irrigation practices. Our project would address this need, and develop information on the food safety risks associated with reusing run-off water for leafy green production.

Cyclospora: Potential Reservoirs and Occurrence in Irrigation Waters. Gerardo Lopez, University of Arizona

Summary - *Cyclospora* has recently been implicated in outbreaks associated with U.S. produce imported from Mexico. Outbreaks of *Cyclospora* infections also have been linked to drinking water. Information on the sources and occurrence of this organism are very limited. Currently, only humans and possibly primates are believed to be infected by this parasite. Our goal is to determine if produce grown in the United States is at risk of contamination from irrigation waters contaminated with human sewage (e.g., from faulty/leaky septic systems or compromised sewer pipes) and treated wastewater effluents that could potentially be discharged into surface waters used for the irrigation of food crops. Our specific objectives are to determine the occurrence of *Cyclospora cayetanensis* (a) in irrigation waters in Arizona and Texas, which will allow a determination of any risk from *C. cayetanensis* and to identify areas of potential risk; and b) in raw sewage and treated wastewater effluents in produce growing areas (Yuma, AZ and El Paso, TX), which will allow for an assessment of the incidence of *C. cayetanensis* infection among these communities. In addition, treated wastewater effluents are sometimes released into watersheds and could potentially impact irrigation waters. This study will determine if any risks exist from *Cyclospora* in irrigation waters from these two regions.

Remotely-sensed and field-collected hydrological, landscape and weather data can predict the quality of surface water used for produce production. Martin Wiedmann, Cornell University

Summary - There is a clear need for the development of improved, science-based tools to help reduce preharvest introduction of microbial produce safety risks through surface water use. The purpose of this project is (i) to identify and prioritize spatial and temporal risk factors for microbial contamination of surface water, and (ii) to develop geospatial models that predict surface water microbial quality, which will be assessed by quantifying generic *E. coli* and testing for key pathogens (e.g., *Salmonella*). Spatial and temporal variation in water quality will be assessed by repeatedly testing multiple water sources over two years. Publicly available remotely sensed data (e.g., predominant upstream land use) will be used to identify factors that are associated with elevated *E. coli* levels, and an increased risk of pathogen detection. Data collection will be performed in two produce growing regions (AZ and NY) to assess the robustness of our models and their translatability to other regions. These data and models will allow growers to identify times and locations where surface water sources are more likely to be microbially contaminated. This information will enable growers to better time water use, testing, and treatment to minimize produce safety risks associated with microbially contaminated surface water.