

# Evaluation of Sanitizing Treatments for Sizer Carriers in Stone Fruit Packinghouses

## SUMMARY

Ensuring safety is a top priority of fresh produce packing operations. This one-year project aims to evaluate and improve sanitizing treatments for sizer carriers in stone fruit packinghouses. The project will not only describe the potential for sizer carriers to harbor pathogens and allow for their growth under different environmental conditions, but will also define a set of sanitizers and application methods that represent the greatest promise for evaluation at the commercial level. Environmental sampling will be performed in active commercial packinghouses to determine natural microbial loads on sizer carriers. Laboratory inoculation studies will be conducted to determine the growth potentials of *Salmonella* and *Listeria* on sizer carriers under varied environmental conditions. The potential of clean-in-place (CIP) sanitization by treating the sizer carriers with no-rinse sanitizers will be investigated. Results from this study potentially will be applicable to diverse fruit packinghouses for preventing pathogen cross-contamination in packing operations.

## OBJECTIVES

The project aims to evaluate and develop practical sanitizing methods for controlling microbial contamination on fruit contact surfaces of sizer carriers in stone fruit packinghouses. Specific project objectives include: Objective-1) Evaluating natural microbial loads on fruit contact surfaces of sizer carriers in eight commercial packinghouses based on total microbial, psychrotrophic, yeast and mold, and total coliform counts; Objective-2) Evaluating the growth potentials of *Salmonella* and *Listeria* on artificially inoculated sizer carriers under varied humidity and temperature conditions; and Objective-3) Evaluating potential CIP sanitizing treatments with antimicrobial aerosols for fruit sizer carriers. In addition, the project will generate background data to further develop and validate selected protocols for packinghouse sanitation.

## METHODS

For Objective-1, contact surfaces of 12 randomly selected sizer-carrier cups in eight peach and nectarine packing facilities will be tested by sterile swab and microbial enumeration before and after clean-out-of-place (COP) sanitization. Microbial testing will include total microbial, psychrotrophic, yeast and mold, and total coliform counts using standard plate count methods or AOAC-approved Petrifilm methods. For Objective-2, the potential growth of inoculated pathogens (100 CFU/ml) on both sanitized and non-sanitized sizer carrier at different temperatures (22, 28, 34 and 40°C) and different relative humidities (95, 85, 75 and 65%) after incubation for 1, 3 and 7 days will be evaluated. For Objective-3, a CIP sanitizing approach using five selected sanitizers for eliminating pathogens on sizer carriers will be developed and evaluated using laboratory pathogen inoculation studies. Statistical methods (T-test, ANOVA, etc.) will be utilized for analyzing microbial log reductions.



Northwest nectarines.



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## RESULTS TO DATE

For Objective-1, a list of commercial packinghouses for participation in the environmental sampling of sizer carriers has been generated. Figure 1 shows our recent research activity at a local peach packing facility. Standard laboratory procedures have been developed and communicated with participating staff. For Objective-2, two environmental chambers with temperature and humidity control were purchased and set up for the project. Four strains of *Listeria monocytogenes* (ATCC7644, ATCC19115, ATCC43256 and ATCC51772) and 4 strains of *Salmonella enterica* (*S. Typhimurium* ATCC14028, *S. Newport* ATCC6962, *S. Montevideo* ATCC8387 and *S. Enteritidis* ATCC13076) have been cultured for the inoculation study. A preliminary study on the attachment of *Salmonella* and *Listeria* on sizer carriers is ongoing to determine the appropriate inoculum concentrations to achieve desired pathogen inoculation of the fruit contact surfaces of sizer carriers. Figure 2 shows sizer carriers immersed in pathogen inoculum and being air-dried before incubation at various humidity and temperature conditions.

## BENEFITS TO THE INDUSTRY

We anticipate that the packinghouse sampling results will help to establish baseline information on potential microbial loads on sizer carriers and will verify that the existing COP sanitizing approach for sizer carriers in fruit packinghouses is effective. The laboratory inoculation results will aid in determining the relative risk of pathogen growth on fruit sizer carriers in between routine sanitization treatments at varied packinghouse temperature and humidity conditions. This finding will help the produce industry to better focus their microbial control efforts on the identified vulnerable ambient conditions in packing operations. Furthermore, the sanitization study results will determine the potential for using CIP as an effective approach for sanitizing fruit sizer carriers in between routine COP sanitations. This will help to increase the overall frequency of sizer carrier sanitizations (by incorporating CIP practices) and may reduce the dependency on COP.



Figure 1. Researchers taking samples from a commercial packinghouse.

Figure 2. Preparing sizer carriers for inoculation study.



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## LENGTH OF FUNDING

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