



State Board of Food and Agriculture 2 October 2012

Trevor V. Suslow, Ph.D.
University of CA, Davis
Dept. of Plant Sciences
tvsuslow@ucdavis.edu

Establishment of Critical Operating Standards for Chlorine Dioxide in Disinfection of Dump Tank and Flume Water for Fresh Tomatoes

Do current fresh tomato wash water standards for chlorine dioxide dose management meet public health protection goals?



Mature Green



Vine-Ripe



Re-pack Operation

Project Concept was Direct Result of New Industry-Regulator Guidance

- Standards for wash water imbedded in Audit Protocol
- Shippers and Retail buyers desired chlorine alternatives
- Specific 'metrics' for chlorine dioxide added
- No objective validation data
- Severe consequences if wrong
 - Consumers
 - Tomato handlers

Food Safety Programs and
Auditing Protocol for the
Fresh Tomato Supply Chain



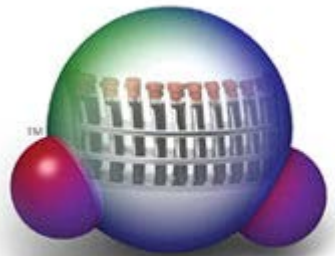
*Packinghouse
Checklist*

2009

United Fresh
MARKET ASSOCIATION

Chlorine Dioxide Generating Pouches are used by Small Farm Operations

- Concerns about chlorine disinfection-by-products on human health and environmental discharge
- ClO_2 produces essentially no DBPs
- Approved for organic use

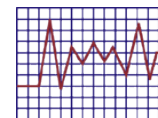


Project Involved CA Industry from Start to Finish

- Initiated with two CTF grower/shippers
- Lab models for baseline data
- Multiple, full day on-site research studies
- Affiliated ClO₂ supplier



> 85% of
CA fresh tomato



AQUAPULSE
SYSTEMS

Key Project Accomplishments

Outcome

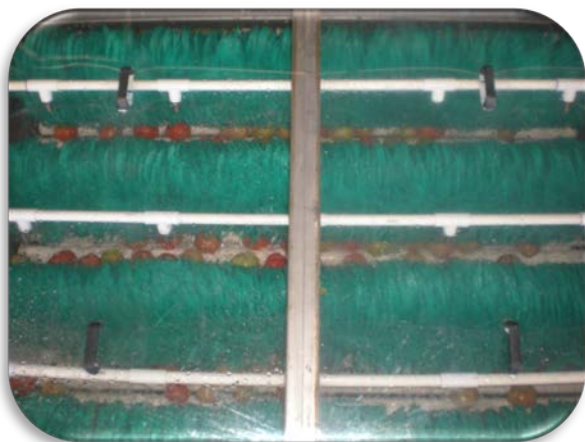
- ClO_2 cannot be used in dump tanks
- ClO_2 can be used in flumes and spray-brush beds
- Different *Salmonella* resist chlorine and ClO_2 at different levels
- Current standards won't work

Impact/Action

- Packers modified dump-flume practices
- More handlers installed brush-beds with ClO_2
- Minimum dose standards and water quality (turbidity) better defined
- Modified audit criteria

Project outcomes disseminated broadly

- Data relevant to any produce wash system
- Any scale of production
- Provides BMPs for measuring ClO_2 dose in any wash water system



- UCCE meetings
- UCD Shortcourses
- United Fresh
 - Food Safety council
 - National Convention
 - Webinar
- CA Small Farm Conf.
- AgSAFE
 - English and Spanish
- CPS Symposium
- Two journal publications

Comparative assessment of field survival of *Salmonella enterica* and *E. coli* O157:H7 on cilantro (*Coriandrum sativum*) in relation to sequential cutting and re-growth

- *What preventive controls and Best Practices will minimize the contamination and survival of human pathogens on cilantro and other key fresh culinary herbs?*
 - *First need is better understanding of field biology*



Research Need Arose from Industry Association Leaders and Suppliers

- Project goals defined specifically for CPS RFA
- FDA March 2011 -*Guidance for Industry: Letter to Firms that Grow, Harvest, Sort, Pack, or Ship Fresh Cilantro*
 - Serious concerns and expected industry actions
 - Since 2004, FDA has confirmed the presence of *Salmonella* species (*Salmonella* spp.) in **28 samples of fresh cilantro** that was in, or entering into, commerce.

Research Objectives Tied-in to Industry Response

- **COMMODITY SPECIFIC FOOD SAFETY GUIDELINES FOR THE PRODUCTION, HARVEST, POST-HARVEST, AND PROCESSING UNIT OPERATIONS OF FRESH CULINARY HERBS**
 - Cilantro main focus due to wide use as ingredient in many cuisines
 - Often referred to as ‘stealth vehicle’ for illness and outbreaks



Research In Progress

- Industry intimately involved in execution of deliverables
 - Several rounds of Pilot Plant studies on wash water cross-contamination
 - Relevant to wash water standards for all scales
 - Key outcome; redefining minimum dose for *Salmonella* control



SmartWashSolutions
the science of food safety

Conducting Food Safety Research under Relevant Regional Environments

- Highly problematic and limiting
 - Cooperators rare
 - Logistics challenging
 - On-farm research always has uncontrolled variables
- Permitting/Authorization issues
 - Institutional obstacles
 - Industry concerns
- Relevance of surrogate strains questioned