



CENTER *for* PRODUCE SAFETY



**FUNDING SCIENCE
FINDING SOLUTIONS
CPS AT 10 YEARS**

2017 ANNUAL REPORT





CPS CENTER *for* **PRODUCE SAFETY**

WHO:

Center for Produce Safety (CPS) brings together leaders from industry, government, and the scientific and academic communities in a unique partnership, all working toward the common goal of produce safety.

WHAT:

CPS answers crucial produce-specific food safety questions, providing science-proven results that are ready to use in the real world.

WHY:

CPS's mission is to provide and share ready-to-use, science-based solutions that can prevent or minimize produce safety vulnerabilities.

HOW:

A 501(c)(3) tax-exempt nonprofit organization, CPS's funding comes from across the fresh produce supply chain and from grants from major specialty-crop producing states.

REPUTATION MATTERS



TIM YORK

CHAIR
CPS BOARD OF DIRECTORS

The Center for Produce Safety was founded in 2007 with the promise to answer unanswered questions.

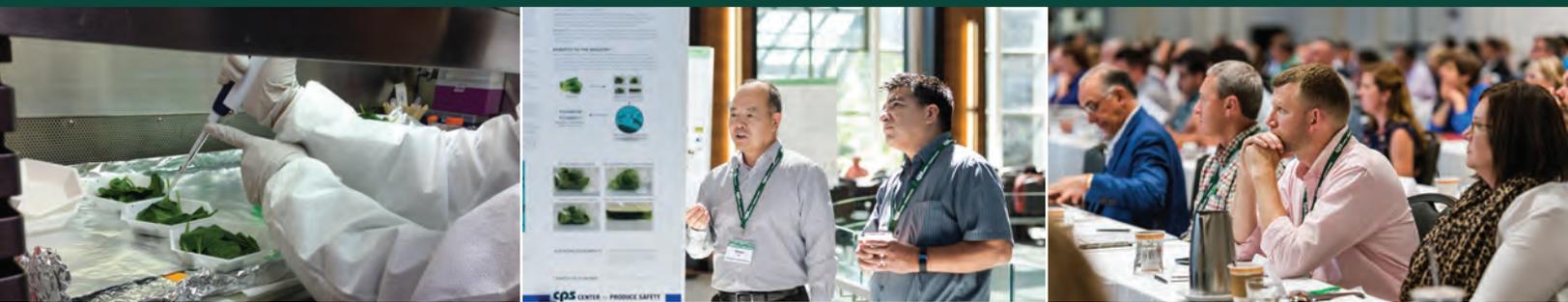
We'd just come off a deadly contamination of packaged spinach which had raised far more questions than answers about assuring the safety of fresh produce. CPS invited the smartest and most influential scientists, public health officials and NGOs into our tent. We have since raised \$22 million to fund science-driven solutions to our most pressing produce safety vulnerabilities – cross contamination, water quality and prevention, to name three.

Hundreds of deaths have been attributed to two incidents of listeria contamination earlier this year – one involving processed meats from South Africa and another involving rockmelon from Australia. Both foods had been exported to additional countries. It's a humble reminder of the life and death challenges to food safety, and that food safety is a global issue. Pathogens don't respect man-made boundaries. That's why we have invested our research funds in 28 states and five countries.

CPS is no stranger to tackling formidable challenges. The pages of this report chronicle our most recent accomplishments. What's more difficult to describe is the credibility CPS holds with stakeholders. Faced in spring 2017 with the U.S.'s fast-approaching and challenging Food Safety Modernization Act water testing requirement, CPS hosted a colloquium to investigate options. Following that colloquium, the Food and Drug Administration postponed compliance and announced it would revisit its water requirement. CPS' credibility is a powerful asset.

In spring 2018 the CPS Board of Directors will formally evaluate progress against our strategic plan. We will revisit our challenges and research priorities with a fresh set of eyes and, if needed, make adjustments to our game plan.

CPS works because it is a collaboration of the best and brightest who volunteer their time, expertise and financial support to make CPS a success. If you are one of the hundreds that support CPS, thank you for your contributions. And if you've yet to get involved, please ask any of our board members how you can be part of this industry changing, lifesaving work.



Research, research, research

Adapting an adage from the real estate industry, Center for Produce Safety's most important focus is research, research, research. That clarity of focus is evident in CPS's key accomplishments in 2017:

- ▶ In CPS's 10th year, its research program continues to evolve to meet today's challenges
- ▶ The 8th annual CPS Research Symposium put that research focus on display
- ▶ A CPS water testing colloquium harnessed science to make the case for Food Safety Modernization Act (FSMA) policy change

RESEARCH FOCUS REFLECTS THE TIMES

The wealth of knowledge that comes out of Center for Produce Safety's research program is a direct result of the forethought and planning that goes into it.

Prioritized: Each year, CPS's Technical Committee surveys stakeholders to identify research needs, then invites researchers to address those priorities.

2017 priorities are listeria prevalence and persistence, FSMA Produce Rule-related metrics, co-management practices and commodity-specific needs.

Collaborative: CPS works with interested researchers to ensure their research projects are optimally designed.

Fast: Most of the research CPS funds has direct application to industry practices, and will be completed within 1-2 years.

THE NUMBERS:

2017 projects funded: 14

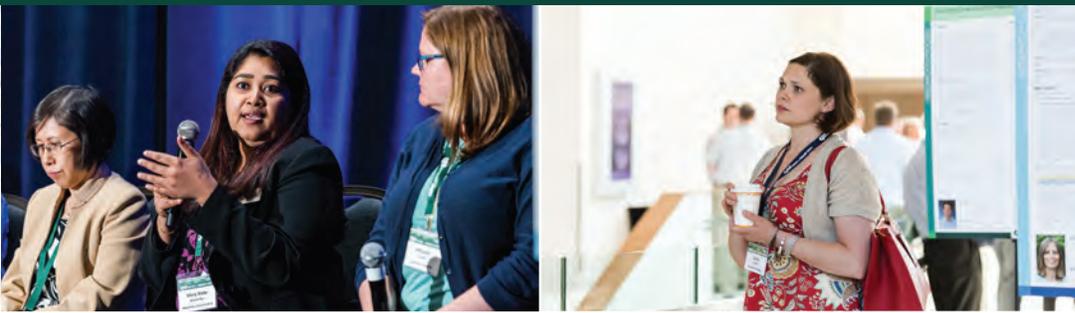
2017 value: \$2.5 million

Projects funded to date: 138

Total funded to date: \$23.6 million

Institutions: 40

Countries: 5



SYMPOSIUM FOSTERS FRANK DISCUSSION

In June 2017, CPS celebrated its 10th anniversary at the eighth Produce Research Symposium in Denver.

Engaging: CPS's Research Symposium brings produce safety researchers together with other stakeholders including industry, policy makers and regulators.

Illuminating: The symposium is the original, most interactive way that CPS conveys its research findings. CPS recently added email subscriptions and videos to its communications toolbox.

Candid: To promote attendees' understanding, the symposium is designed to encourage frank discussion about research findings and their real-world implications.

THE NUMBERS:

Attendees: 330

Countries: 5

Research presentations: 29

WATER COLLOQUIUM INFORMS FSMA

As currently written, it will be very difficult for some in the industry to meet the FSMA Produce Rule's prescriptive water testing requirements. In April 2017, CPS organized a colloquium on agricultural water testing methods to look at options.

Timely: With the water regulation compliance date right around the corner, the colloquium was urgently needed.

Credible: The strong reputation that CPS has built in its first 10 years helped make the colloquium possible and impactful.

Inclusive: CPS brought together scientists, industry and federal regulators.

Science-based: Three science-driven recommendations emerged from the colloquium. FDA subsequently announced it will revisit FSMA's ag water requirements, and postponed compliance.

CPS recognizes Western Growers for hosting the colloquium, and UC-Davis Postharvest Technology Center for serving as technical agenda lead.

THE NUMBERS:

Researcher participants: 8

Industry participants: 6

Regulatory technical advisors: 6

Download the colloquium's "Report on Agricultural Water Testing Methods" from the CPS website Resources page

KNOW THY WATER

The challenge: Irrigation water is a potential contamination hazard for fresh produce while that produce is still in the field. While much has been learned in CPS's 10 years, industry still has many questions awaiting scientific answers. Meanwhile, Food Safety Modernization Act-mandated water testing requirements have raised more questions.

CPS at work: As drought stricken areas look for water options, new CPS research illustrates the risks of irrigating with "tail water" from runoff collection ponds. Differences among pond sites – e.g., water source, climate and ag management practices – can strongly influence the chemistry and microbiology of the water they hold. This research also finds it is not unlikely that human pathogens could be present, and water pH can challenge treatment. (Cahn)

Should irrigation water be contaminated, CPS research finds that chlorine dioxide can effectively treat that water while also protecting the environment. (Allende)

Research continues to reveal the importance of water-testing methodology. New work confirms what seems common sense: collecting larger water sample volumes and with ultrafiltration



allows for better detection of low pathogen levels. Indeed, testing larger samples may even allow correlation between indicator organisms and target pathogens. (Mattioli)

Meanwhile, the search continues for better water quality indicators and indexing organisms. CPS research is looking at harnessing next-generation DNA sequencing to identify location- or water source-specific indicators; results are due in 2018. (Bright)

Key learning: Bottom line, it is vital to know your irrigation water – its source, and the impacts that environmental and other factors can have on its quality – before you can accurately assess cross-contamination risk. Take a systems approach: understand and control the entire water system to help achieve produce safety.

Long term, this may mean changing how we grow, pack and process crops to address risk. And it might be time to admit that our efforts would be best spent developing water clean-up solutions.

Meanwhile, CPS will continue to study water quality – both to answer industry questions, and to advise federal regulators as they revisit FSMA's contested water-quality requirements.

CROSS-CONTAMINATION CAN HAPPEN ACROSS THE SUPPLY CHAIN



The challenge: While conceptually and anecdotally we know that food safety is a supply chain responsibility, we need research that looks at the role of the entire supply chain – from field to fork – to keep fresh produce clean and safe.

CPS at work: At the 2017 CPS Research Symposium, research reports began to focus past the field to farther along the supply chain, from packinghouses all the way to retail displays.

In the packinghouse, CPS-funded research finds that wash systems can effectively control cross-contamination on fruit – *when* proper system practices are implemented, including managing sanitizer concentrations and times, agitation and organic loads. (Amaradjou)

Post-wash, CPS research also finds that maintaining the cold chain is critical to controlling pathogen populations. Pathogens increased over time on fresh-cut mango samples subjected to temperature abuse. (Danyluk)

Across the cantaloupe supply chain, CPS studies show food contact surfaces are potential points of cross contamination. In tests, minimizing contact

time and using smooth contact surfaces resulted in less transfer of pathogens. Soiled rubber gloves facilitate pathogen transfer. At retail, a majority of surfaces tested positive for *Listeria spp.* (not *L. monocytogenes*), and foam padding was frequently contaminated. (Strawn)

Key learnings: These new studies demonstrate what we have intuited all along: food safety is a supply chain responsibility. That message must be internalized from growers and packers to transporters, storages and retailers to commercial, institutional and home kitchens.

While translating this research into reality will present engineering and operational challenges, our new understanding of produce safety demands it. Continued use of legacy equipment that is difficult to clean and sanitize risks product safety and public health.

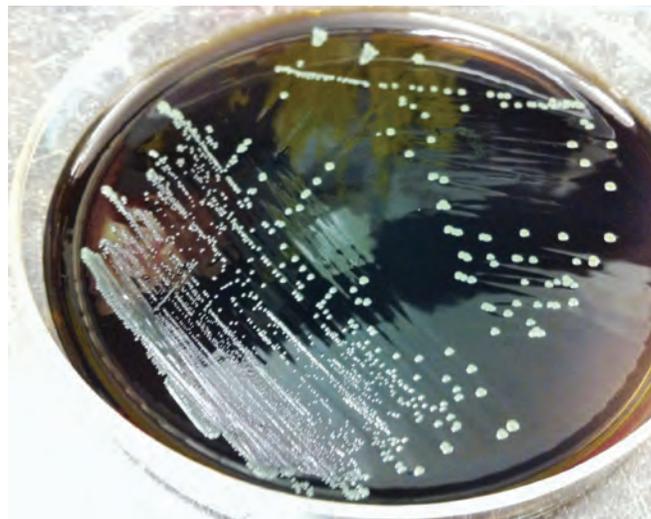
Sources: 2017 CPS Research Symposium Key Learnings. Download this and other annual Key Learnings reports from the CPS website > Resources > Key Learnings page.

CAN YOU COUNT ON YOUR PREVENTIVE CONTROLS?

Challenge: When it comes to produce safety, trust is not an option – we must verify that our preventive controls are in fact effective. That said, validation can be tricky.

CPS at work: Numerous scientists presented research at the 2017 CPS Research Symposium that validates various preventive controls, from heat treating poultry litter (Jiang) to pasteurizing pistachios (Marks) to validating chlorine levels in wash water systems (Wang). Jiang and Marks effectively used non-pathogenic bacteria as a surrogate in their validation studies, while Meyer is working to develop an avirulent salmonella surrogate. Wang used actual *E. coli* O157:H7, albeit in a laboratory, in that validation work.

Other CPS research demonstrates that the physiological state of a pathogen or surrogate is critically important to validation studies. For example, the pathogen reduction capability of peracetic acid differed by a whopping 4 logs when those pathogens were grown in salt-stressed conditions that changed their genetic expression. (Wiedmann)



Key learnings: If validation research doesn't mimic the real world, we are fooling ourselves about whether our food safety processes work. And the consequences are real – for example, if not composted properly, salmonella can actually become heat resistant.

When designing and conducting validation studies, it is important to understand that the effectiveness of a preventive control can be impacted by the condition in which a pathogen grows. CPS research raises the point that those growth conditions are themselves a valid consideration in research design.

Meanwhile, suitable surrogates have been identified for some applications, while the search continues for many others. And so, validation will continue to be an important research focus for CPS and our industry.

Thanks to the CPS Technical Committee's Drew McDonald and Bob Whitaker for their roles in ensuring the accuracy and quality of these Key Learnings descriptions. They and other committee members routinely deliver above and beyond their volunteer job descriptions.

Thanks also to the organizations whose contributions make CPS's research program possible, from organizations across the fresh produce supply chain, and from major specialty-crop block grants from states across the country.

FRANK INTERCHANGE FUELS KNOWLEDGE FASTER

The challenge: CPS was founded in 2007 because produce industry leaders recognized that we did not have the science we needed to understand how pathogens find their way into our foods, and what could be done to eliminate them.

CPS at work: In 10 years, CPS has become the epicenter for developing the knowledge base needed to fuel more-informed produce safety programs. That knowledge now informs policy, regulations and trade relationships.

The 2017 symposium included panel discussions across the supply chain that would have been impossible 10 years ago. Today's industry more fully understands our food safety responsibility, and best practices once based on intuition are now evolving based on science.

Much of the research presented at the symposium were collaborations among researchers and industry all along the supply chain, and facilitated by CPS. CPS also drives value by helping researchers to define learning objectives, which in turn drives better research design and more useful results.



Source: Dr. Trevor Suslow

CPS is also fostering the next generation of scientists. Students who once held microphones for symposium speakers have gone on to careers as CPS-funded researchers themselves.

Key learnings: We have come a long way in 10 years. CPS's inclusion of diverse food safety stakeholders – industry, academia, policy makers and regulators – combined with impressive research results have led to a more knowledgeable community. CPS's bridge building between industry and researchers is improving the quality of our knowledge, while its bridge building with government is informing better policy and regulations. Meanwhile, the next generation of scientists is poised to change our industry.

The roster of research projects completed in the last decade is impressive. We have indeed come a long way, and yet we have a long way to go. While admittedly research often begets more research, as produce safety stakeholders learn more, we can better address the ever-evolving food safety challenges we face. And the fresh produce industry can sustain and grow their businesses for consumers' better health.

Sources: 2017 CPS Research Symposium Key Learnings. Download this and other annual Key Learnings reports from the CPS website > Resources > Key Learnings page.

HOW ARE YOU USING CPS LEARNINGS?



DREW MCDONALD

CHAIR
CPS TECHNICAL COMMITTEE

I am often asked by industry executives, “So now what? What do I do with this information?”

The answer depends on what your specific food safety questions are. Don’t just ask your food safety staff, poll your entire operation – your ag operations and sanitation team leads may have different questions.

What changes in your operation have been influenced by CPS research? If you aren’t implementing CPS learnings, why not?

CPS’s work has expanded industry’s knowledge in some areas, and has challenged what we thought we knew in others. One outcome, of course, has been the need for more research – but along this journey you should be incorporating some of what’s been learned into your daily practices now.

If your food safety questions are not being answered by CPS, let us know. Your insight and comments may be the most important of all.

Thank you – for your donations, for your feedback, for the volunteers you loan to us. We invite you to get more involved as CPS begins our next 10 years. Ask us how.



Ten years ago, our industry intuitively recognized that food safety was important, but over the last decade CPS has provided evidence that has underscored the need to prioritize and invest in it. Today our industry is more open to making changes to improve food safety preventive controls because we have acknowledged that food safety is a critical industry mission.

HANK GICLAS

WESTERN GROWERS SENIOR VICE PRESIDENT, STRATEGIC PLANNING, SCIENCE & TECHNOLOGY



CPS is our “go to” organization for fact-based research on all aspects of food safety. The center’s research on the risk assessment of fruit packinghouses has been helpful to focus our company’s food safety efforts. Those findings have clarified the areas we needed to concentrate on, and have helped shape our sanitation program.

STEVE KENFIELD

HMC FARMS VICE PRESIDENT



CPS research has changed our food safety programs in different ways. On the practical side, CPS research got us to look at all our cutting tools – we phased out the welded knives and went with a one-piece knife that is easier to sanitize. Larger picture, we now know much more than we ever have about measuring water quality and methods of water sanitation. CPS has also changed the base of industry knowledge, allowing us to move from adapting best practices and information from other industries and sources, to being able to refine produce-specific ones.

JOE PEZZINI

OCEAN MIST PRESIDENT AND CEO



CPS research has changed our food safety program over the years, as well as affirmed what we are already doing. Its findings on pathogen internalization have been good news for those of us who use drip irrigation. CPS also provides value to a company like ours by providing a forum for dialog with other industry members, and to have contact with researchers.

SURESH DECOSTA

LIPMAN FAMILY FARMS DIRECTOR OF FOOD SAFETY



Center for Produce Safety has become integral to informing food safety policy. Its reach and affiliations have expanded throughout the United States and with other countries. The center has built a collaborative relationship with the Food and Drug Administration, and its research is providing the information needed to make science-based policy decisions as that agency implements the Food Safety Modernization Act. To our members, that is value.

MIKE STUART

FLORIDA FRUIT & VEGETABLE ASSOCIATION PRESIDENT



Good science doesn’t need incomprehensible words. It needs getting to know our research audience, not just R&D but getting onto farms and into plants, to understand whole food processes and systems and to test ideas. CPS is fabulous about getting researchers, including research students, involved and making connections. And no other group does research symposia with industry as successfully.

MARTIN WIEDMANN, DR.MED.VET., PH.D.

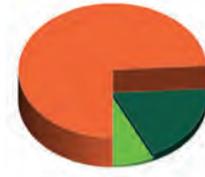
CORNELL UNIVERSITY GELLERT FAMILY PROFESSOR IN FOOD SAFETY

2016 & 2017 FINANCIALS

Funds in: Center for Produce Safety is funded by diverse public and private sources. Industry funds come from across the fresh produce supply chain, from farm to grocer to foodservice. Public funds come from grants made by major specialty crop-producing states.

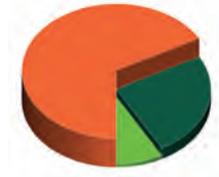
Funds out: The vast majority of CPS's funds are spent to sponsor produce safety research, and to transmit key learnings to the many and varied stakeholders of produce safety.

2017 INCOME



74% Research:	\$2,039,413
19% Operational:	\$526,915
7% Symposium:	\$204,296
Total income:	\$2,770,624

2016 INCOME



67% Research:	\$1,774,074
25% Operational:	\$677,162
8% Symposium:	\$209,961
Total income:	\$2,661,197

2017 EXPENSES



81% Research:	\$2,228,606
11% Operational:	\$300,278
8% Symposium:	\$234,064
Total expense:	\$2,762,948

2016 EXPENSES



77% Research:	\$1,903,420
13% Operational:	\$329,158
9% Symposium:	\$232,818
Total expense:	\$2,465,396

NET INCOME/LOSS: \$7,676

NET INCOME/LOSS: \$195,801

The 2016 and 2017 Year End Financial Statements, Independent Auditor's Report and accompanying Federal Reports and Schedules in accordance with the requirements of OMB Circular A-133, *Audits of States, Local Governments, and Non-Profit Organizations* are available on CPS's website, www.centerforproducesafety.org.

As of Dec. 31, 2017

CONTRIBUTION OF \$1,000,000+

Produce Marketing Association
Taylor Farms
Western Growers

CONTRIBUTION OF \$500,000 – \$999,999

Washington State Tree Fruit Association
California Citrus Quality Council
California Fresh Fruit Association
Dole
Fresh Express, Incorporated
United Fresh Produce Association

CONTRIBUTION OF \$250,000 – \$499,999

Georgia Pacific
Promotora Agrícola El Toro
Sysco
Tanimura & Antle
The Wonderful Company

CONTRIBUTION OF \$100,000 – \$249,999

GreenGate Fresh
JV Smith Companies
Lipman Produce
Melissa's
Pacific International Marketing
Target Corporation
The Wegman Family Charitable Foundation
Western Precooling Systems
California Cantaloupe Advisory Board
Bolthouse Farms
California Melon Research Board
Church Brothers/True Leaf Farms
Florida Fruit & Vegetable Association
International Paper
Andrew & Williamson Fresh Produce
Castellini Group of Companies
Driscoll's
Florida Tomato Committee
Freshway Foods
Markon Cooperative, Inc.

McEntire Produce, Inc.
Ocean Mist Farms
Organicgirl
Ready Pac Foods, Inc.
The Oppenheimer Group
Wish Farms

CONTRIBUTION UP TO \$99,999

Sunview Marketing International
4Earth Farms
Amigo Farms
Coastline Family Farms, Inc.
Food Marketing Institute
H-E-B
LM Companies
Martori Farms
Mission Produce, Inc.
National Watermelon Association
New York Apple Association, Inc.
Tree Top, Inc.
Loblaw Companies Limited
Michigan Apple Committee
Monsanto Company
California Avocado Commission
California Tomato Farmers
California Pear Advisory Board
Georgia Fruit & Vegetable Growers Association
J&D Produce, Inc.
Texas International Produce Association
Pennsylvania Apple Marketing Program
Giant Eagle
Knouse Foods Cooperative, Inc.
Monterey Mushrooms Inc.
Pasquinelli Produce Company
Procacci Brothers Sales Corp.
Duda Farm Fresh Foods, Inc.
Diversified Restaurant Systems, Inc.
New York Apple Sales, Inc.
Santa Rosa Produce
Rice Fruit Company
California Pepper Association



“At Oppy, aside from all other food safety best practices, we believe there is no better way to minimize the risk of pathogens entering our supply chain than to invest in CPS research projects.”

— **JOHN ANDERSON** THE OPPENHEIMER GROUP, CHAIRMAN, PRESIDENT & CEO

BOARD OF DIRECTORS

Timothy York, Chair*

Markon Cooperative

Michael Stuart, Secretary*

Florida Fruit and Vegetable Association

Edward Kershaw, Treasurer*

Domex Superfresh Growers

Jimmy Bassetti

J & D Produce

Mark Borman

Taylor Fresh Foods

Dave Corsi*

Wegmans Food Markets, Inc.

Tony DiMare

DiMare Fresh

Natalie Dyenson

Dole Food Company

Jeff Farrar

U.S. Food and Drug Administration

Paul Fleming

Fleming Industry Consulting

Hank Giclas

Western Growers

Doug Grant

The Oppenheimer Group

Art Liang

Centers for Disease Control and Prevention

Jim Lugg

Consultant

Steve Martori III

Martori Farms

Harold McClarty

HMC Farms

Drew McDonald,

Technical Committee Chair

Taylor Fresh Foods, Inc.

Mark Mignogna

Sysco

Warren Morgan

Double Diamond Fruit

Stephen Patricio*

Westside Produce

Mark Powers

Northwest Horticultural Council

Toby Purse

Lipman Produce

Tim Riley

The Giumarra Companies

Martha Roberts

University of Florida

Victor Smith

J.V. Farms

Michael Spinazzola

DRS Int'l

Thomas Stenzel

United Fresh Produce Association

Tammy Switucha

Canadian Food Inspection Agency

Bob Whitaker*

Produce Marketing Association

Craig Wilson

Costco Wholesale

** denotes Executive Committee members*

TECHNICAL COMMITTEE

Drew McDonald, Chair

Taylor Fresh Foods, Inc.

Mark Baker

Cherry Central

Monica Bazan

Dole Food Company, Inc.

Jim Brennan

Smartwash Solutions

Donna Lynn Browne

Naturipe Farms LLC

Suresh DeCosta

Lipman Family Farms

Pascal Delaquis

Agriculture and Agri-Food Canada

Bryan DiMenna

BASF

Sammy Duda

Duda Farm Fresh

Jill Dunlop

Florida Fruit and Vegetable Association

Barry Eisenberg

Miles Chemical Company

Hank Giclas

Western Growers

James Gorny

Produce Marketing Association

Robert Gravani

Cornell University

Laura Grunenfelder

U.S. Food and Drug Administration

John Headrick

Monsanto

Lianna Kelly

Markon

Sharan Lanini

Pacific International Marketing

Michael Leggett

AXIALL

Jim Lugg

Consultant

Robert Mandrell

Research Scientist - Consultant

Johnny Massa

Comgro

Jennifer McEntire

United Fresh Produce Association

Saul Morales

SYSCO

Gurmail Mudahar

Tanimura & Antle

George Nikolich

Gerawan Farming

Elis Owens

BIRKO

Mickey Parish

U.S. Food and Drug Administration

Courtney Parker

E J Gallo

Walter Ram

Giumarra Companies

Keith Refsnider

Driscoll's

Joan Rosen

JC Rosen Resources

Gurjit Shergill

Food and Beverage Consultant

Rusbelina Silva

4Earth Farms

Stacy Stoltenberg

Hygiena

Trevor Suslow

University of California, Davis

Mike Villaneva

California Leafy Greens Marketing Agreement

Bob Whitaker

Produce Marketing Association

Devon Zagory

Devon Zagory & Associates, LLC

Mary Zischke

California Leafy Greens Research Program

“THIS IS OUR CPS”



BONNIE FERNANDEZ-FENAROLI
EXECUTIVE DIRECTOR

The scene has replayed itself many times: Someone I am talking to will refer to Center for Produce Safety using “our CPS”, “ours” or “we”. They state their ownership, loud and clear.

For many of our contributors, their corporate culture goes beyond investing their money. They also commit the human and other resources to ensure CPS gets it right.

Repeat contributor Wegmans participates actively on our board and Technical Committee. Founder PMA’s Bob Whitaker shapes our annual symposium findings into Key Learnings to share far and wide. Western Growers stepped up to help make our colloquium happen to inform FSMA’s ag water rule. Markon and Tim York have been constant stewards since CPS’s start.

This extraordinary corporate culture is a significant reason why CPS succeeds. And it translates into our science culture. The researchers we fund not only have the skills to do the work we need, they take the time to understand why we need it, and how their findings will impact our industry.

There are dozens more who don’t get the publicity they deserve. Thank you, all.

CPS STAFF

Bonnie Fernandez-Fenaroli
Executive Director

Silvia Ortiz
Administrative Assistant

Daniela Yuschenkoff
CPS Global Database



“Since food safety practices need to be based on sound science, United Fresh supports the Center for Produce Safety as the mechanism that connects researchers with the produce industry to address current challenges for the betterment of public health.”

— **TOM STENZEL** UNITED FRESH PRODUCE ASSOCIATION, PRESIDENT AND CEO



cps **CENTER** *for* **PRODUCE SAFETY**

1100 Main Street, Suite 210

Woodland, CA 95695

tel. +1 (530) 554-9706

www.centerforproducesafety.org

Like us on Facebook

Follow us on Twitter: @CPSNewsUpdates