



International Citrus & Beverage Conference

Program & Abstracts

September 20-23, 2022

Clearwater Beach, Florida, USA

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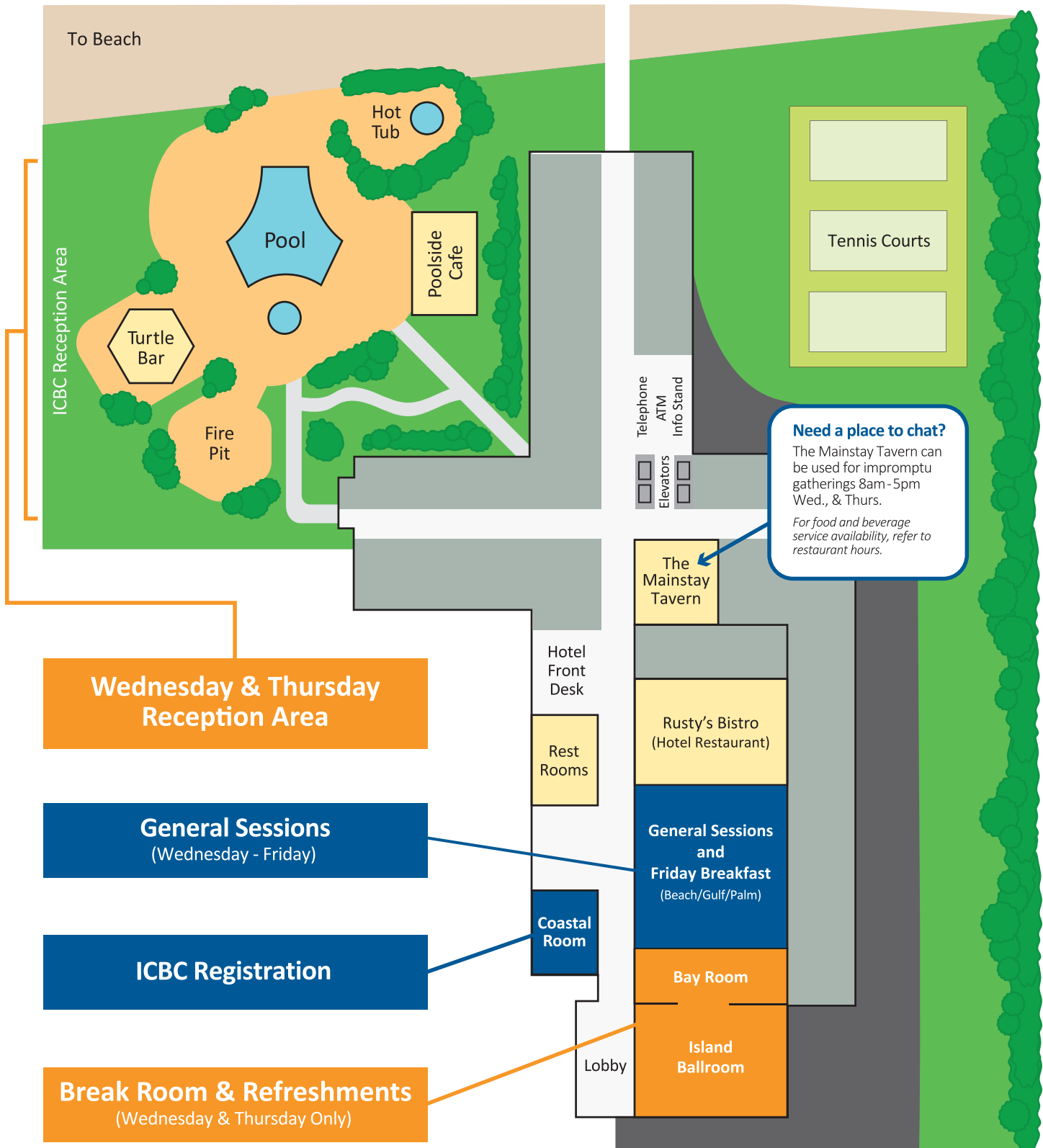
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ICBC Event Locations

at the Sheraton Sand Key Resort





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Wi-Fi Information

Wifi Network: SANDKEY MEETING
Password: CITRUS22

In Honor of

Robert “Bob” Braddock

December 24, 1940 – August 17, 2022



Dr. Robert “Bob” Braddock, Professor Emeritus at the University of Florida, passed away last month on August 17, 2022 at age 81. He was a valued member of the host department of this conference, a long-time member of the conference planning committee, and colleague and friend to many in this room.

Bob was a fifth generation Floridian from Port Orange, and a lifelong Florida Gator. He was a frequent moderator at this meeting, and relished the opportunity to flaunt his Gator tie, and comment in good fun on “those other schools.” He played in the Florida Gator band and earned his B.S. in Mathematics from the University of Florida in 1962. After graduation he taught chemistry and physics at Seabreeze High School in Daytona Beach and during this time he met his wife of 57 years, Mary Jo. Bob went back to the University of Florida, where he carried out his studies and was the caretaker of Marjorie Kinnan Rawling’s house. He received his M.S. in Food Chemistry from UF in 1967 and earned his Ph.D. in Food Chemistry at Michigan State in 1970.

He joined the Citrus Research and Education Center in Lake Alfred where he worked in the

field of citrus processing and essential oils and citrus by-products. As a faculty member of the Food Science & Human Nutrition department, he was a respected mentor to more than 20 graduate students until his retirement.

Bob published over 100 scientific papers and pieces, most notably the “Handbook of Citrus By-Products and Processing Technology” in 1999. He was a professional member of the Institute of Food Technologists, member of the American Chemical Society, former Associate Editor for the Journal of Food Science, and past Chairman of the Florida section of the IFT where he received the Distinguished Service Award. It is safe to say that his work significantly impacted many in the industry represented at this conference. He was an excellent scientist and generous with his time and knowledge.

Outside of work, Bob enjoyed gardening, fishing, racquetball, and playing the saxophone and the clarinet. He had a deep love for Florida’s wildlife and its unique environment. Bob will be greatly missed by not only the Florida citrus industry, but the industry and colleagues worldwide.

We will remember him fondly.

Welcome Letter

Welcome back to Clearwater Beach and the 2022 International Citrus and Beverage Conference! This year's conference will focus on key issues facing our industry, and will span the topics of global juice and beverage operations to the marketing of new and emerging products and ingredients. Please join us for discussions on recent research and consumer insights regarding the beverage category, especially orange juice, the impact of new regulations and technology innovations on our industry, as well as an exciting session post-COVID industry consideration. The Friday morning "Hot Topics" will again focus on research and new approaches to issues facing our industry, including HLB control strategies, both short- and long-term.

For those that participated in the 2021 virtual event, thank you for your support during a challenging time. Appreciation also goes to everyone who has contributed to this year's event. We would like to recognize our committee members, whose expertise within academia, industry and government led to the selection and invitation of our knowledgeable speakers. We would also like to give a special thank you to our invited speakers, who enthusiastically agreed to share their insights and knowledge. Lastly, we would like to express a very heartfelt thank you to our sponsors, whose generosity enhances the value, affordability, and uniqueness of this event each year.

We look forward to the next few days of talks and interaction, with opportunities to meet old friends and business contacts and the chance to make new ones. Once again, we hope you will find this conference a rewarding and valuable experience.

Renée Goodrich Schneider

Program Organizer and Professor
UF/IFAS Food Science & Human Nutrition

"Providing Solutions for the Citrus and Beverage Industries Since 1960"

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Planning Committee

Clarissa Albarran, Brown International, Winter Haven, FL

Beto Amador, Firmenich Inc. (*Retired*), Lakeland, FL

Richard Bogey, *Program Chair*, Florida's Natural Growers, Lake Wales, FL

Jennifer Davis, Firmenich Inc., Lakeland, FL

Savy DiBenedetto, Savy Quality Review Inc., Daytona Beach, FL

Brandy Geiger, Florachem, Jacksonville, FL

Renée Goodrich Schneider, *Program Organizer*, UF/IFAS FSHN, Gainesville, FL

Stephen Heding, USDA, AMS, Winter Haven, FL

Donald Hendrix, ADM Nutrition, Winter Haven, FL

Michael Mas, JBT Corporation, Lakeland, FL

Anne Plotto, USDA-ARS, Ft. Pierce, FL

Keith Schneider, UF/IFAS FSHN, Gainesville, FL

Nick Shuman, The Coca-Cola Company, Apopka, FL

Linda Staten, USDA-AMS, Winter Haven, FL

Yu Wang, UF/IFAS CREC, Lake Alfred, FL

Elizabeth Webb, Peace River Citrus, Arcadia, FL

Detailed Agenda

Tuesday, September 20, 2022 Registration	
4:00pm–7:00pm	Registration Open Registered attendees may pick up name tag and program [Coastal Room]

Wednesday, September 21, 2022 First Day of Sessions	
7:30am–5:00pm	Registration Open [Coastal Room]
7:30am–8:25am	Light Morning Refreshments [Island Ballroom]
General Session [Beach/Gulf/Palm Rooms]	
Welcome and Introductory Remarks	
8:30am–9:00am	<ul style="list-style-type: none"> - Renée Goodrich Schneider UF/IFAS Food Science & Human Nutrition, <i>Program Organizer</i> - Susan Percival UF/IFAS Food Science & Human Nutrition, <i>Department Chair</i> - Saqib Mukhtar UF/IFAS, <i>Associate Dean for Extension, Agriculture and Natural Resources</i> - Richard Bogey Florida's Natural Growers, <i>Program Chair</i>
Session 1: The World of Citrus – A Global Perspective	
Moderator: Clarissa Albarran, Brown International	
9:00am	The Mexican Citrus Industry and Market - Ricardo Martinez, <i>Citrofrut</i> (pg. 17)
9:40am	Prospects of the Spanish Citrus Industry - Erich Faber, <i>Riverbend</i> (pg. 18)
10:20am	Coffee Break [Island Ballroom] Sponsored by: • Vincent Corporation
10:40am	The Texas Citrus Industry - Jud Flowers, <i>Lone Star Citrus</i> (pg. 19)
11:20am	Citrus in Argentina - Kurt Nordman, <i>Citromax</i> (pg. 20)
12:00pm	Lunch Break (on your own)

Wednesday, September 21, 2022 First Day of Sessions (continued)	
General Session [Beach/Gulf/Palm Rooms]	
Session 2: The Industry Looking Forward	
Moderator: Brandy Geiger, Florachem	
1:30pm	The South African Citrus Industry and Market - Anthony Alexander, <i>Cape Fruit Processors</i> (pg. 21)
2:05pm	Sustainability in Agricultural Enterprises - Juan Andrade, <i>UF/IFAS</i> (pg. 22)
2:40pm	Coffee Break [Island Ballroom]
3:10pm	Citrus Consumer Insights - Hélène Moeller, <i>ADM</i> (pg. 23)
3:45pm	Upcycling of Alternative Citrus Side Streams - Sjors Peters, <i>IFF</i> (pg. 24)
4:20pm	Paths to the Future Citrus Varieties in Florida - Fred Gmitter, <i>UF/IFAS</i> (pg. 25)
4:55pm	Announcements
5:00pm	Session Concludes
6:00pm–7:00pm	Networking Reception [Poolside] Sponsored by: <ul style="list-style-type: none"> • ADM • Advanced Logistics • Brown International • Chemical Systems • Cvista • F.G.F Trapani • Firmenich Inc. • Flavor Materials International • Florachem Corporation • FlowTrans LLC • Givaudan Flavors Corp. • Quattro Citrus Products • Riverbend España S.A. • S.A. Veracruz • Separator Technology Solutions • Treatt • Trisun • Vicente Trapani S.A.

Thursday, September 22, 2022	
7:30am–5:00pm	Registration Open [Coastal Room]
7:30am–8:25am	Light Morning Refreshments [Island Ballroom]
General Session [Beach/Gulf/Palm Rooms]	
Session 3: Industry, Consumers, and Employees – What’s Important Now?	
Moderator: Linda Staten, USDA-AMS	
8:30am	Food and Social Media Habits of Gen Z - Mari Schroeder, <i>UF/IFAS CREC</i> (pg. 26)
9:05am	Navigating the Multi-generational Workforce - Tonia Morris, <i>Simply HR</i> (pg. 27)
9:40am	Diet Transformation of the Emerging Consumer - Ed Koza, <i>Firmenich</i> (pg. 28)
10:15am	Coffee Break [Island Ballroom] Sponsored by: • Givaudan Flavors Corp.
10:45am	Florida Orange Juice Outlook, Research, and Marketing - Marisa Zansler, <i>FDOC</i> (pg. 29)
11:20am	Citrus & Beverage Market Research Trends - Lisa House, <i>UF/IFAS</i> (pg. 30)
11:55am	Lunch Break (on your own)

Notes

Thursday, September 22, 2022	
Session 4: Technology and Innovation – Tools and Ideas for Industry	
Moderator: Anne Plotto, USDA-ARS	
1:30pm	Economic Adulteration in Citrus Juice - Kristen Jeffries, <i>USDA-ARS</i> & Demeseh Cobb, <i>USDA-AMS</i> (pg.31)
2:05pm	New Innovations in Orange Pulp Defect Determination - Michael McCroan, <i>The Coca-Cola Company</i> (pg. 32)
2:40pm	Coffee Break [Island Ballroom]
3:10pm	Processing Factors for Pesticide Residues in Cold Pressed Lemon Oil - José-Antonio Garcia, <i>AILIMPO - Lemon from Spain®</i> (pg. 33)
3:45pm	Goodbye Citrus sinensis and Hello Biodiversity – Implications for FDA Orange Juice Standards - Kristen Carlson, <i>Florida Citrus Processors Association</i> (pg. 34)
4:20pm	When an Orange is not a Citrus sinensis, is it a Sweet Orange-like Hybrid? – an International Perspective - David Hammond, <i>IFU</i> (pg. 35)
4:55pm	Announcements
5:00pm	Session Concludes
5:30pm–7:00pm	Networking Reception [Poolside] Sponsored by: <ul style="list-style-type: none"> • AILIMPO - Lemon from Spain® • Citromax Group • International Flavors & Fragrances Inc. (IFF) • JBT Corporation

Notes

Friday, September 23, 2022	
7:30am–10:00am	Registration Open [Coastal Room]
7:45am–8:30am	Morning Breakfast [Grand Ballroom] Sponsored by: <ul style="list-style-type: none"> • BioSun Flavors & Food Ingredients • Safe Chem Inc.
General Session [Beach/Gulf/Palm Rooms]	
Session 5: Hot Topics in the Citrus Industry	
Moderator: Keith Schneider, UF/IFAS FSHN	
8:30am	MRL Regulations with a Focus on Chlorpyrifos - Joanna Drake, <i>FEMA</i> (pg. 36)
9:10am	Photonic Fence Technology to Detect, Track, and Intercept Flying ACPs - Joseph Patt, <i>USDA-ARS</i> (pg. 37)
9:45am	Harnessing Biotechnology to Manage Greening - Lukasz Stelinski, <i>UF/IFAS</i> (pg. 38)
10:20am	Increase Fruit Production and Fruit Quality of HLB Infected Trees Organically from the Roots and Foliage - Vasilios Fotopoulos, <i>Savory Sun VA LLC</i> (pg. 39)
10:55am	Mandarin or Orange? They Both Taste so Good! - Anne Plotto, <i>USDA/ARS</i> and Yu Wang, <i>UF/IFAS</i> (pg. 40)
11:30am	Conference Concludes

Notes

Speaker Abstracts

Listed in order of presentation.

Presenting author names appear in **bold**.

We sincerely thank all speakers for agreeing to share their expertise and work. Our speakers have graciously prepared abstracts and we hope these will be useful to you as a possible source of industry practices. While informative, opinions and recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of UF/IFAS.

OVERVIEW OF THE CITRUS PRODUCTION IN MEXICO

Ricardo Martinez

Citrofrut SA de SV, Monterrey, Nuevo Leon, Mexico

Mexico plays an important role in the world's citrus industry, both as a producer and processor of a wide range of citrus fruits. Mexico is the leading producer of lime and is gaining a prominent relevance within lemon, grapefruit, and orange. Our conversation will provide a historical perspective and analyze the challenges and upsides to Mexico's future citrus production growth. I hope to provide a clear picture of where we are coming from, where we are today, and what you can expect from Mexico in the future.

Contact Information

Ricardo Martinez Zambrano, Citrus Business Unit Director, CITROFRUT, Av. Constitucion 405, Citrus Business Unit, Monterrey, Nuevo Leon 64000, Mexico, Phone: 5281838942004214;
Email: ricardo.martinez@citrofrut.com

THE PROSPECT OF THE SPANISH CITRUS INDUSTRY

Erich Faber

Riverbend España S.A., Santomera, Murcia, Spain

The aim of the speech is to frame the Spanish citrus segment, including the citrus fruits varieties and the volumes for fresh market and industry. We will put our focus in lemon, and more especially in the organic quality covering its evolution from 2017 until the current days. Finally, the future of the lemon will be portrayed, again stressing the organic quality as a potential advantageous product in consonance with the upcoming market trends.

Contact Information

Erich Faber Ganser, Sales Manager, Riverbend España S.A. Ctra. Abanilla KM 1,5 Sales, Santomera, Murcia 30140, Spain, Phone: 34612419876; Email: erichfaber@riverbend.es

THE TEXAS CITRUS INDUSTRY

Jud Flowers

Lone Star Citrus, Mission, TX, USA

Citrus fruit was introduced in Texas by Spanish Missionaries in the mid 1700's. The commercial citrus industry has operated from the Rio Grande Valley for over 100 years and is generally recognized in the fresh produce world as the premium grapefruit produced in the world. The planted acreage reached its peak just after World War II at 120,000 acres. Through weather challenges of freeze, drought, and hurricane the planted acreage had stabilized at 30,000 acres as of 2021. The industry is based entirely on fresh fruit production and through the incorporation of improved varieties, high density plantings and irrigation technology. The volume of fruit production has remained relatively constant over the years at around 10 million cartons. Although the seasons of 19/20 through 21/22 have been back-to-back hurricanes, freeze and drought catastrophes, a determined and dedicated corps of producers hold fast to the dream of maintaining the Texas reputation of the finest citrus grown in the world.

Contact Information

Jud Flowers, President, Lonestar Citrus Growers, 9625 Moorefield Road, Mission, TX 78574, United States;
Phone: 956-424-3334; Email: judf@lonestarcitrus.com

CITRUS IN ARGENTINA

Kurt Nordman

Citromax, Carlstadt, NJ, USA

The citrus industry in Argentina is significant, particularly that of lemons and oranges. Both fresh and processed products are exported to a number of countries. This talk will review the citrus production and processing outlook in Argentina with a deeper focus on lemons and lemon products.

Contact Information

Kurt Nordman, Director, Citrus Ingredients and Specialties, Citromax, 444 Washington Ave., Carlstadt, NJ 07072, United States; Phone: 551-246-5852; Email: knordman48@gmail.com

THE SOUTH AFRICAN CITRUS INDUSTRY AND MARKET

Anthony Alexander

Cape Fruit Processors, Paarl, South Africa

Fruit production and processing is an important part of South Africa's domestic and export economy. This presentation reviews the production, export, and processing landscape with a deeper focus on citrus. Additionally, unique and common challenges facing the industry are presented, along with discussion regarding the domestic fruit juice market.

Contact Information

Anthony Alexander, Operations Executive, Cape Fruit Processors (Pty) Ltd, New Eskdale Road, Cnr R 45 & R 101, Suider Paarl, Western Cape 7624, South Africa; Phone: 0829014997; Email: anthony@capefruits.co.za

SUSTAINABILITY IN AGRICULTURAL ENTERPRISES

Juan Andrade

University of Florida, Gainesville, FL, USA

As we are now only eight years away from 2030, the gap to reaching many of the Sustainable Development Goals targets is growing wider each year, especially for SDG 2 Zero Hunger. Efforts abound to make progress towards SDG 2, yet they are proving insufficient in the wake of more challenging and uncertain contexts. Between 700 and 830 million people faced hunger in 2021 – 150 million more people since 2019, before the COVID-19 pandemic. Our lack of preparedness and resiliency along with our current inflation might have brought thousands more into hunger. Close to 3 billion people are unable to afford a healthy diet and poor-quality diets are linked to 11 million deaths per year. If we are to deliver sustainable, healthy diets for all, food systems must be fundamentally transformed. They remain overwhelmingly dysfunctional. There is a tortuous path ahead of us, including shifting dietary patterns globally to curtail gas emissions and unwavering impacts on biodiversity. Regardless of which path we decide to take, our food transformation industry must face our grand challenges armed with the data tools of the new millennium. Embraced by Generation Z and Millennials, sustainability is no more an edgy word describing proper procurement of raw materials or waste management, but the structural underpinning of successful and thriving food industries. In this presentation, global statistics on health and nutrition will be presented as well as some of the key challenges and drivers of our dynamic food system.

Contact Information

Juan Andrade, Associate Professor of Global Nutrition, Food Science and Human Nutrition Department, University of Florida, 572 Newell Dr., Gainesville, FL 32611, United States; Phone: 352-294-3706; Email: jandrade2@ufl.edu

UNCOVERING MOTIVATIONS OF THE GLOBAL CITRUS CONSUMER

Hélène Moeller

ADM, Winter Haven, FL, USA

What opportunities for your brand would you discover if you had the input of 7,400 citrus beverage consumers around the globe? ADM looked deep into their psychology and inherent value systems to create stable consumer segmentation that endures beyond the trends and fads of today. Going beyond just classic percentages of preference, our research unlocks the ability to execute specific descriptive sensory cues in citrus to deliver on these consumer needs. From a global view of overarching themes to zooming in on specific executions per country and beverage segment, the research uncovers flavor narratives to inspire both citrus flavor and citrus product development. ADM's citrus flavorists around the world responded to these insights with masterful creations, leveraging differentiated citrus flavor technologies into profiles for every consumer. During this session we'll explore consumer personas from around the world and dive into how their citrus motivations compare and contrast.

Contact Information

Hélène Moeller, Vice President Global Product Marketing Flavors, ADM, 351 Bert Schulz Blvd NE, Human Nutrition, Winter Haven, FL 33881, United States; Phone: 863-307-8274; Email: helene.moeller@adm.com

UPCYCLING OF ALTERNATIVE CITRUS SIDE STREAMS

Sjors Peters

IFF, Hilversum, Netherlands

With a global food system that accounts for one quarter of the total greenhouse gas emissions and with approximately one third of the global food supply going to waste each year, what role does the citrus industry need to play to become part of the solution?

More than ever, today's consumers are driven by an increased awareness of overconsumption, acts of 'ecocide' and the disastrous impact of climate change. We can see consumers taking clear steps, both in large and small acts, rethinking their ways of living and behaving. They are more committed to preserving our planet – and are investing more time and money to find new ways to live more sustainably, limit their carbon footprint and create a regenerative future.

As a company that is driven to #DoMoreGood, IFF's RE-IMAGINE WASTE™ innovation program focuses on solutions that are based on Upcycled Food and Food Waste Prevention. A recent outcome of this program is a new Upcycled Orange Oil. This innovative product is derived from a side stream generated by supermarkets and hospitality industries in The Netherlands and was developed in collaboration with the Dutch start-up PeelPioneers. These types of partnerships accelerate innovation and create next-generation, more sustainable ingredients and technologies – nourishing both people and planet. Let's build this collaborative future together in the citrus industry.

Contact Information

Sjors Peters, Global Innovation Marketing Leader RE-MASTER CITRUS™ and Beverages, IFF, Liebergerweg 72-98, Nourish, Hilversum 1221JT, Netherlands; Phone: 0031683112865; Email: sjors.peters@iff.com

PATHS TO THE FUTURE CITRUS VARIETIES IN FLORIDA

Fred G. Gmitter Jr.

UF/IFAS Citrus REC, Lake Alfred, FL, USA

Huanglongbing (HLB, citrus greening disease) has decimated the Florida citrus industry, with production decreased by ~80% since the disease was first seen in Florida. Fifteen years of multidisciplinary research has provided tools to enable affected trees to retain some level of productivity, but there is no single approach that adequately addresses the challenges this devastating disease poses. Genetic resistance or elevated levels of tolerance can provide a sustainable path forward to future viability. Although such efforts are long-term by nature, there currently exist glimmers of hope and opportunity as a consequence of the several years of breeding efforts previously undertaken. Certain new scion and rootstock cultivars are emerging that can outperform existing ones under HLB pressure, and information will be presented on these new options. But genetic progress is possible to achieve even greater levels of performance in the future, particularly as new breeding technologies are employed. An overview of these innovative approaches, already being implemented collaboratively with industry and academic partners, will be provided, along with perspective on how this work may lead to a sustainable industry not only in Florida, but globally as well.

Contact Information

Fred Gmitter, Professor, UF/IFAS Citrus REC, 700 Experiment Station Rd, Lake Alfred, FL 33850, United States; Phone: 863-956-8878; Email: fgmitter@ufl.edu

FOOD AND SOCIAL MEDIA HABITS OF GEN Z

Mari Schroeder

UF/IFAS Citrus REC, Lake Alfred, FL, USA

Generation Z is the largest generation and first to be born into the digital era. Their innate ability to navigate technology allows them to easily search, receive, and share information through social media about topics that are of interest to them. Food is one of the most popular topics amongst this generation, and they are more likely to spend the largest portion of their budget on groceries, take-out, and restaurants compared to other demographic groups. Studies have shown that social media content has a large influence on Generation Z's choice for how they shop for food and what and why they buy certain types of products. Food related content posted on social media includes, but is not limited to, sustainable food products, food safety, and recipes. Information accompanying these social media posts varies and users may struggle with its validity. The purpose of this presentation is to explore social media's influence on Generation Z's thoughts about food and how it affects the food industry and consumer behavior.

Contact Information

Mari Schroeder, PhD Student, University of Florida, Food Science, 700 Experiment Station Rd, Lake Alfred, FL 33850, United States; Phone: 863-956-1151; Email: mari.schroeder@ufl.edu

NAVIGATING THE MULTI-GENERATIONAL WORKFORCE

Tonia Morris

The Founder & CEO of Simply HR, Inc. Grayson, GA, USA

The workplace has evolved, and your employees have followed suit. For the first time, employees and leaders work alongside multiple generations. What can we learn from each generation as the workforce ages and many younger generations assume leadership roles?

Navigating the different generation is a critical aspect of today's workplace, so why can't we get along? It is time for a workplace conversation about working in a multi-generation. Participants will learn the following during this session:

- The five generations' distinct characteristics.
- How stereotyping divides us.
- How to maximize the value of each generation.
- Strategies for succeeding in a multi-generational workplace.

Contact Information

Tonia Morris, Founder & CEO, Simply HR, Inc., 892 Windsor Creek Trail, Grayson, GA 30017, United States;
Phone: 404-663-4049; Email: tonia@simplyhrinc.com

DIET TRANSFORMATION OF THE EMERGING CONSUMER

Ed Koza

Consumer Insights & Sensory, Firmenich, Plainsboro, NJ, USA

The consumer has evolved, and many are now looking to transform their diet in pursuit of both physical and mental wellness. Today's consumer is seeking healthier, great-tasting, affordable food & beverages with more natural and sustainable ingredients to enhance their own wellbeing and the wellbeing of the planet and its people.

More than ever, they understand the power of food & beverage and that what they eat has an impact on their overall wellness. Join us to understand consumers' expectations and priorities as they embrace the power of food.

Contact Information

Edmund Koza, Senior Director, Marketing, Consumer Insights & Sensory, Firmenich, 250 Plainsboro Road, Taste & Beyond, Plainsboro, NJ 33850, United States; Phone: 215-266-4527; Email: ed.koza@firmenich.com

FLORIDA ORANGE JUICE OUTLOOK, RESEARCH AND MARKETING

Marisa Zansler

Florida Department of Citrus, Gainesville, FL, USA

The US orange juice industry has experienced dramatic changes and pressure from both the supply and demand side in the past decade. It is critical for the industry to understand and enhance consumer's demand to sustain the higher prices associated with decreased production and maintain demand for the point in time where production can recover. The Florida citrus industry has experienced a precipitous decline in production over the past decade due to a combination of factors, chiefly those associated with HLB and weather-related events. Despite the challenges faced by the industry, the Florida citrus industry remains a significant contributor to the State and local economies and is a notable supplier of processed orange juice to the domestic market. The Florida orange juice outlook, research, and marketing information is presented in three parts based on the 2021-22 citrus season: (1) An analysis of trends in Florida processor utilization of Florida oranges, imports/exports, orange juice movement, and ending inventories; (2) an overview of U.S. OJ demand and current retail sales trends of orange juice; and (3) an overview of consumer responsiveness to increased prices at grocery and how the FDOC markets OJ to consumers to sustain demand.

Contact Information

Marisa Zansler, Director, Economic and Market Research, Florida Department of Citrus, P.O. Box 110249, Gainesville, FL 32611, United States; Phone: 352-294-7691; Email: mzansler@ufl.edu

CITRUS & BEVERAGE MARKET RESEARCH TRENDS

Lisa House, Lijun (Angelia) Chen, Sungeun Yoon, and Yan Heng

UF/IFAS Food and Resource Economics Department, Florida Agricultural Market Research Center,
Gainesville, FL, USA

Increasing prices have impacted consumer decision making across industries, including at the grocery store. Faced with rising prices, consumers can turn to price-saving strategies such as looking for deals, switching to store brands, changing shopping locations, and changing their basket of purchases, among other strategies. The orange juice industry has faced many challenges, including decreased production due to greening (especially in the State of Florida) and a trend of decreased per capita consumption for many years. The COVID-19 pandemic brought many challenges to supply chains, including orange juice. However, the pandemic also spurred changes in consumer behavior, likely reminding consumers that 100% orange juice is good for you and increasing consumption, erasing about four years of decreases immediately. Though per capita consumption has started to decline again, it still remains above pre-COVID levels. Increasing prices now put more pressure on consumers who, based on economic theory, decrease purchases as price increases for normal goods such as orange juice. This presentation will use data from the Florida Agricultural Market Research Center's (FAMRC) monthly consumer tracker for the orange juice consumption. This tracker is used to collect consumer responses monthly, starting in July 2016, and allows us to see how changes to prices have impacted the industry over time. Using this data, along with grocery scanner data, we can view changes in expected prices, the impact of overall price increases at the grocery store, and consumer responses to increased prices.

Contact Information

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FLORIDA ORANGE JUICE OUTLOOK, RESEARCH AND MARKETING

Kristen A. Jeffries¹, Demeseh Cobb², and Roger Simonds²

¹USDA-ARS, U.S. Horticultural Research Laboratory, Fort Pierce, FL, USA

²USDA-AMS, National Science Laboratories, Gastonia, NC, USA

Citrus juices are targets of economically motivated adulteration, which is the intentional adulteration of food for financial advantage. For citrus juices, this food fraud could be as simple as dilution with water or more complex with the undeclared addition of inexpensive sugars or acids. In order to protect manufacturers buying bulk product, adulteration can be tested in-house or via a service laboratory. Over the years, adulteration efforts have become more sophisticated so the methodologies developed for their detection must also evolve. In this presentation, current analytical techniques used to detect adulteration in citrus juice at the USDA-AMS/NSL laboratory are discussed.

Contact Information

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Demeseh Cobb, Chemistry Supervisor, USDA - AMS - Science and Technology Programs, 801 Summit Crossing Pl Ste B, Gastonia, NC 28054, United States; Phone: 704-833-1538;

Email: demeseh.cobb@usda.gov

NEW INNOVATIONS IN ORANGE PULP DEFECT DETERMINATION

Michael McCroan

The Coca-Cola Company, Apopka, FL, USA

Over the past decade, the demand for orange pulp cells as a food ingredient have skyrocketed. The result of this demand in consumer beverages has increased the expectation for higher quality in what used to be considered a by-product in orange processing. This increased need for quality in color, texture, and appearance has required citrus processors to improve the quality of pulp in terms of reduced defects. Maintaining quality in pulp through defects analysis is a necessity. This innovative system will take defect quality inspection from a technician-driven visual inspection and transform it to the use of an optical inspection system that captures and analyzes images to grade orange pulp for defects.

Contact Information

Michael McCroan, Senior Scientist, The Coca-Cola Company, 2501 W. Orange Avenue, Apopka, FL, USA;
Phone: 407-358-6848; Email: mmccroan@coca-cola.com

PROCESSING FACTORS FOR PESTICIDE RESIDUES IN COLD PRESSED LEMON OIL

José-Antonio García

AILIMPO, Murcia, Spain

Spain is the leading country in Europe and second worldwide producing cold pressed lemon oil (CPLO). The Spanish lemon industry is strongly committed to environmental sustainability and the reduction of pesticide use and development of biological alternatives, although their use still remains essential to fight pests and diseases.

Considering that CPLO is obtained from the oil glands located in the very external peel of fresh lemons, a higher concentration of pesticide residues is generally expected in the final product.

CPLO is not consumed directly as it is an ingredient used in a very low quantities in the composition of other food products. For this reason, in pesticide presence terms, the impact on the final product for consumer is largely limited.

MRL's are generally set up for fresh fruit and not specifically for CPLO, leaving the industry with considerable uncertainty as to the quality and consumer safety of the lemon oil product, even if legal compliance can be shown for pesticide residues in the raw commodity.

Since 2015, AILIMPO has been conducting a study and research program in order to assess the concentrations of active substances residues in lemon oil obtaining a good collection of data. Based on this output, a chronic and acute consumer risk assessment has been done, concluding that residue intake from the consumption of lemon oil via soft drinks for the 14 active substances under investigation poses no unacceptable chronic or acute consumer risk to adults and children. All these data have been officially validated by the EU Authorities and have also been informed to clients all over the world.

These processing factors for lemon oil are needed to ensure harmonized interpretation of safety of product avoiding distortions in the market and supporting international trade to eliminate uncertainty and B2B disputes.

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GOODBYE CITRUS SINENSIS AND HELLO BIODIVERSITY – IMPLICATIONS FOR FDA ORANGE JUICE STANDARDS

Kristen Carlson

Florida Citrus Processors Association, Tampa, FL, USA

It has been established through molecular and genomic work that “C. sinensis” is not a true species, but a hybrid. Most regulatory standards around the world will require updated nomenclature for the sweet orange. With the commercial dominance of the sweet orange, the world has created a near monoculture with a very narrow genetic base. A solution to HLB may only come in the form of new HLB tolerant interspecific hybrid trees, but orange juice standards limit the fruit that can be used in orange juice to the sweet orange and 10% mandarin. Work to expand standards and allow plant materials have orange-like fruit suitable for orange juice is underway. Further, expansion of the limitations for mandarin are under consideration. For growers to have confidence to plant any new inter-specific hybrid plant materials that may be developed and for processors to buy this fruit and use it without restriction, necessary regulatory changes should be in place by the time any commercial plantings begin. New petitions to FDA to amend standards to address these issues will be discussed

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WHEN IS AN ORANGE NOT *CITRUS SINENSIS*, AN INTERNATIONAL PERSPECTIVE?

David Hammond

International Fruit and Vegetable Juice Association, United Kingdom

Taxonomists have decided that the present nomenclature used to name a number of citrus fruits do not reflect their true nature. Many DNA studies have shown that oranges, grapefruits, and many fruits presently considered mandarins are not a true citrus species, but are actually complex hybrids between pummelos and mandarins. This hybrid nature is not reflected in their names and the taxonomists consider that these would be better if they reflected the fruits true hybrid nature.

These proposed name changes have implications to the regulation of fruit juices around the world, as many regulatory instruments lists the Latin names for the fruits that can be used in the production of that particular fruit juice. These regulatory standards are important as they control the production and sale of fruit juices and nectars around the world. For instance, these names (*Cirus sinensis* and *Citrus paradisi*) are listed in the Codex Standard 247 (2005) and other related national or regional standards such as those given in US code of federal regulations (21CFR146.135) and the EU fruit juice directive 2012, 12.

The Codex Standard 247 defines the processes that may be used in the production of fruit juices, the processing aids and additives that are also permitted for use. This standard will be briefly reviewed during the presentation.

As many may know there are significant issues in Florida due to citrus greening which in association with other issues has reduced the orange crop from over 200 million boxes in the late 90s to just 38 million for the 21/22 season (estimated). Due to this short fall the juice industry is looking to determine if these changes in nomenclature can be used to expand the fruit varieties that could be used to prepare orange juice. The steps that the International Fruit and Vegetable Juice Association are taking with its industry partners in this area will be highlighted during the talk.

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EPA'S REVOCATION OF CHLORPYRIFOS TOLERANCES FOR FOODS AND IMPACTS ON THE FLAVOR INDUSTRY

Joanna Drake

The Flavor and Extract Manufacturers Association of the United States, Washington, DC, USA

The final EPA rule to revoke all tolerances for foods, including the tolerances for citrus oils, spearmint oil and peppermint oil, for the pesticide chlorpyrifos became effective in early 2022. The tolerance revocations affected a broad section of the food sector, including the flavor industry. Given the harvest, production and potentially long shelf life for foods that are or contain foods for which the chlorpyrifos tolerance was revoked, how FDA would enforce the chlorpyrifos tolerance revocations has been of intense interest to the flavor industry. During this session we will explore the FDA's specific enforcement guidance, what companies in the flavor industry should expect and how industry can remain prepared during and after FDA's period of enforcement discretion.

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PHOTONIC FENCE TECHNOLOGY TO DETECT, TRACK, AND INTERCEPT FLYING ACPs

Joseph Patt

U.S. Horticultural Research Laboratory, USDA Agricultural Research Service, Fort Pierce, FL, USA

The 'Photonic Fence' (PF) is a device that can detect, interrogate, and monitor targeted insect species as they fly across a plane of infrared light. The device can also be configured to intercept and kill targeted individual insects with a low energy laser. It does so via an integrated system of infrared lamps, lasers, reflectors, telescopic cameras, and sophisticated software. As an individual insect flies across the IR light plane, it produces a silhouette that the system can interrogate and then use to generate a profile based on insect's size, velocity, and wingbeat frequency. All profiles are evaluated and immediately discarded if they don't match the targeted species' profile. This allows the system to effectively track and collect data only on targeted individuals. A prototype PF was tested in a screenhouse at the USDA-ARS laboratory in Fort Pierce, FL. The system consisted of two towers placed 30 m apart which generated a rectangular illuminated area (3 m high x 30 m long) along the centerline of the screenhouse. At the beginning of each test, hundreds- to thousands of insects were released on one side of the PF and the number of individuals that survived crossing it was determined at specified post-release time periods. The PF system was designed and optimized to intercept mosquitoes, and 99.9% of individual tiger mosquitoes (*Aedes aegypti*), vector of yellow fever and other human pathogens, were killed following their release into the screenhouse. Asian citrus psyllids (ACP) were also released but only ca. 90% were killed. Because ACP is smaller than mosquitoes, further modifications to the telescopic cameras and other components are needed to optimize the system for psyllids. However, the tests generated useful data about ACP flight parameters and the system could be used to monitor ACP entry into citrus growing and production areas.

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BT PESTICIDAL PROTEIN-BASED STRATEGIES FOR SUPPRESSION OF ASIAN CITRUS PSYLLID FOR HLB MANAGEMENT: CHALLENGES AND OPPORTUNITIES

*Bryony Bonning, Nabil Killiny, Chooa El-Mohtar, Manjul Dutt, and **Lukasz Stelinski***

Entomology and Nematology Department and Citrus Research and Education Center, University of Florida, Lake Alfred, FL, USA

The Asian citrus psyllid inoculates citrus trees with the CLas bacterium that causes huanglongbing (HLB). Effective tools to reduce psyllid populations are important for management of this complex disease. Certain pesticidal proteins, produced by the soil-borne bacterium *Bacillus thuringiensis* (Bt), are toxic to the Asian citrus psyllid (ACP). A next step in developing effective strategies against ACP was to test the effects of these pesticidal proteins in combination with gene-silencing RNAs, small molecules that prevent expression of targeted ACP genes, essential for psyllid survival. Importantly, both the pesticidal proteins and the gene silencing RNAs are not harmful to nontarget organisms.

When the best combination of Bt pesticidal proteins and gene-silencing RNAs have been identified, an appropriate delivery system to ACP will be needed. To be effective, both control agents need to be in the plant sap so that they are ingested as the psyllid feeds. One option is to use a naturally occurring plant virus (Citrus tristeza virus), that is known to reside in plant sap, for delivery of these agents. A second option is to engineer the citrus plant to make these compounds or to put them in a trap plant such as Indian curry that is more attractive to psyllids than fruit-producing citrus. In that situation, psyllids attracted to trap plants are killed by the combined Bt pesticidal protein and gene-silencing RNAs before they are able to reach fruit-producing citrus trees. Also the engineered genes would not be present in those citrus trees.

A key challenge for this strategy is appropriate and effective delivery to ACP of both the pesticidal protein and gene-silencing RNAs. Delivery of both components has been achieved for another major insect pest, the corn rootworm, and should therefore be feasible for targeting Asian citrus psyllid, but optimization for adequate production of both components in plant sap will be required. An additional approach would be to increase the toxicity of the pesticidal proteins thereby reducing the amount of protein that needs to be produced by the plant. Bonning's lab is using an approach that creates an artificial anchor to increase the amount of protein that binds to the gut wall to increase its impact on ACP.

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FIELD TRIALS USING CITRUSAVER NATURAL FERTILIZER

Vasilios Fotopoulos

Savory Sun VA LLC, Clint, TX, USA

In third party field trials with Hamlin and Valencia oranges, Citusaver fertilizer has helped revitalize trees from root to leaf. The application process is simple, convenient, and *uses existing irrigation systems*. The formula provides plant growth stimulants and other necessary ingredients that promote citrus tree health and strengthen the natural immune system.

Field trials have demonstrated substantial improvements in vigor and fruit production. Tested trees showed less fruit drop, increased fruit weight and sweetness, increased tree vigor, and larger percentages of new foliage and branch growth.

Our team has concluded that instead of targeting a specific pathogen strain on a given plant species, a more effective approach is a unique combination of bio-stimulants to increase the plant's SAR (systemic acquired resistance) against a "broad pathogen spectrum" (including various strains of bacteria, viruses, and fungi). Our focus has been on practical field research using replicated field trials, drone technology, and field site diagnostic tools in addition to analytical diagnostic research in the laboratory.

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MANDARIN OR ORANGE? THEY BOTH TASTE SO GOOD!

Anne Plotto¹, Elizabeth Baldwin¹, Jinhe Bai¹, John Manthey¹, Xiuxiu Sun¹, Wei Zhao¹, Kristen Jeffries¹, Zhen Fan¹, Matthew Mattia¹, Ed Stover¹, **Yu Wang**², Shi Feng², Fred Gmitter², and Jude Grosser²

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²University of Florida, Institute of Food and Agricultural Sciences, Citrus Research & Education Center, Lake Alfred, FL, USA

As Huanglongbing (HLB) has decimated commercial orange groves, some hybrids have shown tolerance to this devastating disease. But can they be a replacement to the standard Hamlin or Valencia varieties used for orange juice production? Two breeding programs in Florida have placed special attention on citrus flavor. USDA, ARS has had a citrus breeding program dating back to the 1900s. Early observations revealed that some hybrids with *Poncirus trifoliata*, a relative of *Citrus* originally introduced for its cold tolerance, were tolerant to HLB. However, *P. trifoliata* can impart off-flavor to the fruit of those hybrids. Nevertheless, after crosses with *Citrus* for several generations, some of these hybrids, such as U.S. SunDragon, produce fruit with acceptable flavor. On the other hand, some mandarins (with no *Poncirus* in their background) are performing very well in spite of high HLB disease pressure, such as 'LB8-9' Sugar Belle®, a mandarin hybrid released by the University of Florida breeding program in 2006. Sugar Belle® can be consumed as fresh or juiced. The challenge in selecting new hybrids is to clearly differentiate and define the components of orange and mandarin flavor in the thousands of hybrids under observation. This presentation will focus on the flavor of new HLB-tolerant *Citrus* hybrids including chemical and sensory data with examples of released or new potential varieties.

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Notes

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Notes

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