International Citrus & Beverage Conference

September 13-16, 2011
Sheraton Sand Key Resort
Clearwater Beach, Florida

Hosted By:

www.conference.ifas.ufl.edu/citrus
Welcome to our 51st Annual Program for the Citrus and Beverage Industry!

This year’s conference will again focus on key issues facing the juice and beverage industries, including the citrus processing sector. Please join us for the next two and half days for discussions on the global nature of our business, advances in citrus and juice QC testing, technology in the processing plants, new markets (with a focus on health and wellness), and the research that supports those markets. The Friday morning “Hot Topics” session will cover some current challenges facing our industry, as well as potential solutions to those issues. We trust you will find the sessions educational and stimulating.

Appreciation goes to everyone who contributed to this year’s event. We would like to recognize our committee members, who facilitated the selection and invitation of our knowledgeable speakers, all of whom are active in academia, industry and government. We would also like to give a special thank you to our invited speakers, who enthusiastically agreed to share their insights and expertise. And last, 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 beneficial experience. Especially in this 51st year, we look forward to your participation!

Renée Goodrich Schneider
Program Organizer
University of Florida, IFAS, FSHN
Gainesville, FL
# Table of Contents

Welcome Letter ................................................................................................. i

Conference Committee .................................................................................. v

Agenda ............................................................................................................. vii

Abstracts ......................................................................................................... 1

Sponsor List ..................................................................................................... 23

Notes ................................................................................................................ 24
Conference Committee

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Barry Wilson
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Alan Wyland
Coca-Cola North America
Apopka, FL
Agenda

Tuesday, September 13, 2011
4:00PM  Registration (until 7:00 PM)

Wednesday, September 14, 2011
7:30AM  Registration (until 5:00 PM)
7:30AM  Morning Refreshments
     Sponsored by: Vincent Corporation
8:30 AM  Welcome and Introductory Remarks
     Renée Goodrich Schneider, Program Organizer, UF, IFAS, FSHN
     Charles Sims, Interim Department Chair, UF, IFAS, FSHN
     Jack Payne, University of Florida, Senior Vice President for Agriculture and Natural Resources
     Dave Johnson, Program Chair, Peace River Citrus

SESSION 1 — Global Citrus and Food Processing Industry

Moderator: Keith Schneider, UF, IFAS, FSHN
9:00AM  New Spanish Citrus Feedmill Installations, Bob Johnston, Vincent Corporation ............................................................. (p.3)
9:40 AM  Lemon Processing in Argentina – an Overview of Technology and Markets, Jorge Saravia, SA San Miguel
10:20AM  Break
10:40AM  The Citrus Industry in China, Yanxiang Gao, China Huiyuan Juice Group Limited .... (p.4)
11:20AM  State Juice Regulation in a Global Market, Kristen Gunter, Florida Citrus Processors Association ......................................................... (p.5)

SESSION 2 — Marketing Trends and Nutrition

Moderator: Alan Wyland, Coca-Cola North America
1:30 PM  Consumer Trends in Food and Health, David Schmidt, International Food Information Council (IFIC) ................................................................. (p.6)
2:05 PM  The 2010 Dietary Guidelines for Americans: How Does Citrus Fit? Gail Rampersaud, UF, IFAS, FSHN................................................................. (p.7)
2:40PM  Break
3:00 PM  Worldwide Orange Juice Consumption Forecast – Balancing Supply with Demand, Robert Norberg, Florida Department of Citrus ..................................................... (p.8)
3:35PM  Orange Juice Decreases Oxidative Stress, Diabetes and Cardiovascular Risks, Thais César, UNESP ................................................................. (p.9)
4:10PM  Beverage Flavor Trends: 2011 & Beyond, Kim Carson, Givaudan Flavors Corp. ................................................................. (p.10)
Wednesday, September 14, 2011 (continued)

6:00PM  **Networking Reception** *(until 7:00 PM, poolside)*

Sponsored by:
- Brown International Corporation, LLC.
- Chemical Systems
- Firmenich
- Florida Chemical Company, Inc
- Givaudan Flavors Corp
- Symrise, Inc.

Thursday, September 15, 2011

7:30AM  Registration *(until 5:00 PM)*

7:30AM  Morning Refreshments

**SESSION 3 — Juice and Beverage Processing Safety and Quality Control**

**Moderator:** Jessica Browe, USDA, AMS, FV, PPB

8:30 AM  **Use of UV Reactors for Water and Sucrose Disinfection in the Juice and Beverage Industry,** Doug Yedwabnick, Atlantium Technologies Ltd .......................... (p.11)

9:05AM  **Access Control in the Plant and Biometrics,** William Covert, Siemens .......... (p.12)

9:40 AM  **The Food Safety Modernization Act,** C. Stewart Watson, REHS, US Food and Drug Administration ................................................................................................................... (p.13)

10:15AM  Break

10:35AM  **Plant Sanitation, Quality and Profitability,** Paul Winniczuk, Sun Orchard........ (p.14)

11:10AM  **In-field Debris Removal and Fruit Quantity and Quality Sensing in Citrus,** Amanda Valentine, UF, IFAS, CREC ................................................................. (p.15)

**SESSION 4 — Juice and Food Processing Equipment and Technologies**

**Moderator:** Joe Gruber, Enerfab

1:30 PM  **Fuel Costs and the Effect on Consumer Prices,** Michael Gunderson, UF, IFAS, FRE ................................................................................................................................. (p.16)

2:15 PM  **Optimizing Industrial Thermal Energy Management via Modular On-Demand Steam Systems,** Jason Smith, Miura North America, Inc. ................................................................. (p.17)

2:55PM  Break

3:30 PM  **Using Twin Screw Pump Technology in the Citrus Processing Industry,** George Doan, Process Technologies, Inc. ................................................................. (p.18)

4:10PM  **Oxygen Sensing Systems for Processing Plant Applications,** Roy Johnson, Haffmans North America, Inc. ................................................................. (p.19)

4:45PM  **Awards Ceremony**

5:30PM  **Reception** *(until 7:00PM, poolside)*

Sponsored by:
- Enerfab, Inc
- JBT FoodTech
Friday, September 16, 2011

7:30AM  Registration (until 10:00 AM)

7:45AM  Breakfast

Sponsored by:
- Bell Chem Corp.
- BioSun Flavors & Food Ingredients
- D L Newslow & Associates, Inc.
- Safe Chem Inc

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Session 5 — Hot Topics in the Industry

**Moderator:** Richard Bogey, Florida’s Natural Growers

8:45AM  **An Update from the Florida Department of Agriculture and Consumer Services**, Shannon Shepp, FDACS................................................................. (p.20)

9:15AM  **Low-cost Aerial Imaging Platform and its Applications to Citrus**, Reza Ehsani, UF, IFAS, CREC ................................................................. (p.21)

10:00AM **Overview of Citrus Grower Nutritional Spray Compositions**, Tim Spann, UF, IFAS, CREC

10:45AM **Effect of Nutritional Sprays on Orange Juice Flavor – Preliminary Information**, Elizabeth Baldwin, USDA, ARS................................................................. (p.22)

11:30AM Adjourn
Speaker Abstracts

Listed in order of presentation
New Spanish Citrus Feedmill Installations

Bob Johnston
Vincent Corporation, Tampa, FL

Two greenfield citrus feedmills have recently been commissioned in the Valencia area of eastern Spain. Both turnkey projects were designed and constructed by FOMESA AGROINDUSTRIAL, a firm long based in Valencia.

The CITROTECNO project is rated for 25-30 MTPH of citrus waste. The waste comes from several citrus processors in the area as well as packing houses. There is an ethanol plant at the site, using de-oiled and pasteurized press liquor.

The ZUVAMESA project is rated for 50 MTPH. The waste comes from a juice extraction plant at the same site. The company is owned by several hundred citrus growers in the area.

The two feedmills are quite similar. Both feature the use of a Waste Heat Evaporator (WHE) to achieve high thermal efficiency. These WHE’s are a three effect, vertical tube, falling fill design. In the construction 304 stainless is used for vapor and water components while product contact is in 316L. Durco pumps, imported from the States, were selected for their known reliability.

Single pass rotary drum dryers, standard of the citrus industry, are employed. The CITROTECNO unit, rated at 30,000 pph of water evaporation, is paired with a 40,000 pph WHE. At ZUVAMESA at 40,000 pph dryer is paired with a 50,000 pph WHE.

The dryers and WHE’s were designed and constructed by FOMESA.

Both feedmills feature double pressing with Vincent screw presses with 24” diameter screws. First pressing is done with a low torque Series KP press, while second pressing is done with a high torque Series VP press. All presses use 50 hp motors. The flexibility offered by double pressing has been advantageous where spoiled fruit needs disposition.

During start up a great deal of difficulty was encountered with the high viscosity and insoluble fiber content of the press liquor. This was corrected with the addition of centrifuges to remove fiber from the press liquor. Only after this was done was satisfactory WHE performance achieved.

The shredders feature hammers made of Duplex stainless steel, which is proving exceptionally durable. The inlet housings are square, an innovation first introduced by Tegreene in Florida. The blades are 180 degrees apart, and innovation introduced by CORENCO. The discharge screens are exceptionally thick, 5/8”, with square round holes.

The reaction conveyors are sized for 15 minutes reaction time, with 0.5% hydrated lime addition. Inclined units are used to elevate the peel from the peel bin up to above the screw presses. These use slow turning 24” diameter screw conveyors with half pitch flighting.

Pellet mills supplied by Van Aarsen are used at both feedmills. These produce excellent pellets with a minimum of difficulty.

Vincent Corporation is proud to have played an important role in the success of these feedmills. Bob Johnston, senior engineer at Vincent, will do the presentation. He can be contacted at 813-248-2650, bob@vincentcorp.com.

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The Citrus Industry in China

Yanxiang Gao
China Huiyuan Juice Group Limited and China Agricultural University Beijing, PR China

The citrus groves and its fruit production in China are ranked in top one around the world, whilst the citrus industry in China is still on its primary stage. The profiles of citrus fruit growing, processing, production in China is presented. The outlook for citrus industry in China is predicted.

Among citrus fruit varieties in China, mandarins are the most popular materials for the production of canned fruit products. Nearly all the products from oranges could be manufactured from Chinese domestic companies, but there is a gap of quality and cost between domestic and oversea products. In addition, the large-scale industrialized processing could not be related to the other citrus varieties, such as lemons, pomelos, clementines etc. The key machinery of citrus processing and beverage production, such as fillers, extractors and high-efficiency concentrators, is almost imported. The disorderly competition and unstable supply, especially in upstream industry, are worsening the citrus fruit processing industry in China. The lack of raw materials emerged every now and then in the past ten years.

In the future, the integrated planning, the yield improving of citrus groves, the cultivar improving, the utilizing and intensive processing of existing citrus varieties, and the comprehensive usage of by-products should be emphasized.

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State Juice Regulation in a Global Market

Kristen C. Gunter
Florida Citrus Processors Assn., Lakeland, FL

This presentation will explain how the Florida citrus industry adopted numerous state standards for citrus juices in order to protect consumers and nurture and encourage the economic welfare of its juice industry. The agency head of the Florida Department of Citrus is the Florida Citrus Commission. Because every citrus commissioner has been required to be a citrus grower, often the genesis of agency rules and statutes was the perceived economic gain for the growers. Florida’s standards have also played a role in marketing and FDOC licensed certification marks, such as the Florida Sunshine Tree, entail quality standards.

With the evolution of modern food law in the United States, the driving forces of a global economy, a political climate favoring de-regulation of business, national uniformity for food labeling demanded by the food industry, industry consolidation, increased importance of national brands, and market driven quality programs -- the need for separate state regulation of the citrus industry in the form of Florida citrus juice standards, and need for control over the processed sector by citrus growers has changed.

The regulatory role of the Florida Citrus Commission has arguably been reduced over the years and indeed, with passage of the Nutrition Labeling and Education Act of 1990, state standards have been expressly preempted by federal standards of identity for orange and grapefruit juices.

The NLEA of 1990 provides that where FDA standards of identity exist for foods, states are prohibited from enforcing different or contradictory standards. The legal effect of a federally preempted state standard is that the state standard is null and void.

Florida has maintained void laws on the books for over twenty years. Initially FDOC considered seeking an exemption from federal preemption but this effort was abandoned. As a consequence, the Citrus Code and many FDOC Rules are in serious need of updating. The Florida Citrus Processors Association (FCPA) is seeking rule and statute repeals to update state laws and bring them into line with federal law. FCPA has also petitioned USDA to repeal sinking pulp requirements in the USDA Grade Standard for Grapefruit Juice. The view is that the parameter is not a quality predictor and managing processing to accommodate the parameter is an unnecessary expense the industry can ill afford. The request was published in the Federal Register for comment on August 17, 2011.

Though in evolution, Florida’s quality and citrus inspection scheme continues to position the industry well for global trade benefitting citrus growers and consumers.

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Consumer Trends in Food and Health

David B. Schmidt  
President & CEO, International Food Information Council, Washington, DC

Two comprehensive surveys of American consumers in 2011 show their strong interest in foods that provide health benefits, even in a tough economy. IFIC’s 2011 Functional Foods/Food for Health survey captures the latest awareness of how certain food components, including citrus, can promote health.

The International Food Information Council Foundation’s 2011 Food & Health Survey takes an extensive look at Americans’ eating, health and physical activity habits, and sheds light on what types of changes Americans are making in an effort to improve their overall health.

Summaries of the trends research will be supported with “on the street” video interviews.

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The 2010 Dietary Guidelines for Americans: How Does Citrus Fit?

Gail Rampersaud  
Food Science and Human Nutrition Department, IFAS, UF, Gainesville, FL

The 2010 Dietary Guidelines for Americans (DGA) were released in January 2011. This release concluded a more than 2-year process that included a comprehensive review by DGA committee members of the science related to key questions regarding diet, health and disease. The new Guidelines were prepared through the lens of the growing problem of overweight and obesity in the United States, which represents a departure from previous Guidelines. This presentation will review the history and developmental process of the DGAs, how they are used and by whom, and key differences between the 2005 and 2010 versions of the Guidelines. Key messages in the Guidelines and how they relate to citrus fruit and juices will be discussed. As in previous Guidelines, one hundred percent fruit juices are considered part of the fruit group and can help consumers meet fruit intake recommendations. The DGAs call for Americans to reduce the amount of solid fats and added sugars in the diet, especially beverages that contain added sugar. This is good news for citrus juices, although a challenge to the industry and nutrition educators is to ensure that consumers are not confused about which beverage products contain added sugars. The controversial role of fruit juice and weight in children and adolescents will be discussed, along with the DGA conclusions and recommendations regarding 100% juice intake for children. The discussion will also include the new MyPlate food guidance system, which replaces the food guide pyramid (MyPyramid), as well as identifying the challenges facing the industry regarding 100% juices and dietary guidance. The presentation will conclude with a brief discussion of recent front-of-pack nutrition labeling efforts and other initiatives and their potential impact on the consumption of citrus fruit and juice.

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World Orange Juice Consumption Forecast – Balancing Supplies with Demand

Bob Norberg
Deputy Executive Director, Florida Department of Citrus, Bartow, FL

The world orange juice situation, particularly in Florida, has undergone substantial change in recent years. Supplies have been reduced by mandatory tree eradication, residential development, hurricane and other weather damage, and disease pressures. Demand has also been negatively impacted by global recession, new product innovations, reduced marketing budgets, and changes in consumer attitudes and preferences. It is not surprising that industry participants have been reluctant to make any new investments in the citrus business.

However, there are three important and easily understood facts that should give Florida citrus industry participants enough confidence to reverse the investment stagnation trend and get prepared to take advantage of future opportunities. The investment game-changers are: 1) There will be 2 billion more mouths to feed in 20 years, 2) Florida continues to be one of the best places in the world to grow citrus, and 3) No one else is spending the resources Florida is to counter disease pressures to create a sustainable citrus industry. This presentation focuses on the opportunity to feed more people with naturally nutritious orange juice.

The presentation provides recent background statistics for both global supply and global demand. Projections for world population growth and economic recovery are then analyzed to help forecast future global orange juice requirements. A conservative estimate of 1% annual per capita consumption growth is extrapolated against world population to forecast a future orange juice requirement of 5 billion single strength gallons, up 2 billion from current levels.

The rest of the presentation allocates this consumption requirement to Florida, Brazil and all other suppliers, based on historical market shares and supply distribution assumptions. The results indicate that Florida needs to increase its annual planting rate and decrease the tree mortality rate in order to take advantage of the future opportunity. The solution is economically feasible given current grower economics and reasonable projections of production efficiency gains generated by current research initiatives.

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Orange Juice Decreases Oxidative Stress, Diabetes and Cardiovascular Risks

Thais Borges César  
Sao Paulo State University, UNESP, Araraquara, São Paulo, Brazil

Previous studies have associated orange juice consumption with prevention of oxidative and inflammatory stress, which may improve insulin sensitivity and reduce the risk of diabetes and cardiovascular disease. These effects are attributed to the bioactive compounds in orange juice, such as flavonoids, carotenoids and vitamin C, which protect the body against oxidative stress and reduce serum lipid levels. Other studies have consistently shown that regular orange juice consumption reduces the serum levels of total cholesterol and LDL-cholesterol (LDL-C) and improves the endothelial function, reducing the risk of atherosclerosis.

We have conducted several studies to evaluate the effect of regular orange juice consumption on the risk factors for metabolic syndrome and cardiovascular diseases. In all these studies the participants have consumed orange juice daily for a two-month period. Anthropometric, hemodynamic, biochemical, inflammatory and oxidative statuses were assessed at baseline and at the end of the intervention period.

The regular consumption of orange juice (750 mL/day for 8 weeks) did not change the patient’s body weight, percentage of fat mass, and waist circumference suggesting that orange juice did not contribute to weight or fat mass gain. The consumption of orange juice improved the diet quality by adding important nutrients as folate, vitamin C, and calcium. The results also showed that orange juice significantly reduced serum total cholesterol, LDL-C, insulin resistance, C-reactive protein, blood pressure and increased serum antioxidant activity by more than a hundred percent. On another transversal study we also verified that long term orange juice consumption (at least one year) was associated with low LDL-C and apolipoprotein B in normal and moderately hypercholesterolemic subjects.

Patients with hepatitis C presented a systemic oxidative stress caused by a combination of chronic inflammation, liver damage, and proteins encoded by the virus. The increased generation of reactive oxygen species, with the decreased antioxidant defense, promotes the progression of hepatic complications characteristic of this disease. We verified a significant decrease of lipid peroxidation and an increase of antioxidant capacity in the serum of patients with chronic hepatitis C after orange juice consumption (500 mL/day for 8 weeks).

In conclusion, our studies showed that orange juice consumption promoted lipid-lowering, anti-inflammatory and antioxidant activities, which contribute to the prevention of the oxidative stress and the risk factors for diabetes and cardiovascular diseases.

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The International Citrus & Beverage Conference

Beverage Flavor Trends: 2011 & Beyond

*Kim Carson*
Givaudan, Cincinnati, OH

What's new in the world of beverage flavors? With consumer needs multiplying and changing at a rapid speed, it can be challenging to deliver a great tasting beverage that can have staying power in the marketplace. To deliver against this challenge Givaudan utilizes our global trend program, FlavorVision™, to gain an understanding of the marketplace and consumers to determine "what's next" in the beverage flavor world. A key learning, from years of flavor research is the importance of Citrus flavors in existing market products and their potential in new beverage introductions. Join us to hear first-hand how Citrus flavors are integral to the major beverage trends for 2011 and beyond.

During this presentation:

- Gain insight into beverage mega-trends and consumer drivers
- Based on the trend continuum, learn what beverage flavors are emerging and which are now considered mainstream.
- Explore current flavor trends and how they are expected to evolve in the coming years.

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Use of UV Reactors for Water and Sucrose Disinfection in the Juice and Beverage Industry

Doug Yedwabnick  
Director of Sales, Atlantium Technologies Ltd

UV technology can be utilized in several applications for the food and beverage industry for the purpose of process and ingredient water treatment, as well as for other bulk ingredients such as sugar. Depending on the process details, UV treatment can replace chlorination, help preserve expensive membranes by enhancing feed water quality, and can serve as a replacement for ozone and carbon treatments. This presentation will focus on the spectrum of applications of newer UV reactors.

Factors affecting UV disinfection will be discussed, including the following key parameters:

- Type of UV lamps: LP Vs. MP
- Level and type of microbiological contamination
- Dose Distribution and real delivered RED
- Lamp Output & Water UVT
- Flow Rate

The successful operation and outcome of installation of UV disinfection technology will be discussed, using several case studies as examples. In particular, power usage and other economic comparisons to existing technology will be discussed in the context of plant operations, performance and equipment expenditures.

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Access Control in the Plant and Biometrics

William Covert  
Siemens Industry Inc, Winter Park, FL

Because of ongoing concerns’ that involve the protection of our nation’s food supply, the entire Food & Beverage community – from producers to consumers must be, and remain vigilant in ensuring our safety at all times. Food Safety and Food Defense will continue to be a concern for the entire industry, and measure must be implemented to secure the nations production and processing facilities from bioterrorism, natural and intentional contamination, and secure our distribution and storage facilities as well.

At the same time, the food and beverage industry must meet and comply with FDA – FSMA regulations, and develop HACCP plans.

By starting with the implementation of security measures that include access control, a layered approach with technology available today will help prepare the industry to meet current and future FDA requirements. Currently, the FDA’s FSMA regulations are broad, and there some awareness to the act as it stands today. However – the actual implications still remain to be seen.

The FDA is still developing the rules and plans – leading to a comment period from the industry once completed. The Food & Beverage Industry must proactively be prepared to meet the pending requirements, and prepare now to be compliant for when these regulations’ are mandated. But as a part of being proactive prior to the implementation of new rules and requirements, each facility should consider what a security lapse would mean to the brand name, their respective products, and the industry as a whole.

Goal-based security and risk assessments will be included, and the expectations are such that the demand for greater security will require the latest security - technology solutions across the board. These assessments will require the registrations of each production facility, and a hazard analysis will have to be conducted. A written plan that implements preventive controls will include maintaining access control to your facilities, access into critical areas in and around your facilities, and control of information and documentation.

The systems and sub-systems that can be used will offer the precise type of technology that will meet these requirements will be comprised of typical access control hardware, and biometric devices. Integration between health and safety databases (HACCP) and the security measures of access control platforms will be used to maintain control on all cleared/non-cleared personnel to enforce the rules of sterilization and decontamination requirements.

With the use of Biometric Devices – the industry can ensure against attempts for facility breaches, and unauthorized activity in special environmentally-controlled areas.

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The Food Safety Modernization Act

C. Stewart Watson,
U.S. Public Health Service, U.S. Food and Drug Administration, Maitland, FL

On January 4, 2011, President Obama signed the Food Safety Modernization Act (FSMA) into law. The FSMA amends the Federal Food, Drug, and Cosmetic Act (FFDCA) to expand the authority of the Food and Drug Administration (FDA) to regulate certain food products. The Food Safety Modernization Act imposes a number of mandates on individuals and entities that manufacture, process, pack, transport, distribute, receive, or hold articles of food. It broadens the FDA’s authority to regulate food facilities and establishes new requirements for those facilities. It provides FDA with mandatory recall authority (Section 206); requires food companies to enhance due diligence on imported foods (Section 301), provide food testing results to FDA (Section 202), enact Hazard Analysis and Critical Control Point (HACCP) programs (Section 103), and supplement food tracking recordkeeping; and provides employees at food industry employers with whistle-blower protection (Section 402). It exempts some farms and small business from some of the new regulatory requirements, and imposes fees on a limited number of FDA services/functions such as recalls, re-inspections, and export certifications (Section 207).

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Sanitation many times is an afterthought of production. How sanitation is performed, is sometimes not well thought out and many times is haphazardly thrown together. This can be costly to a plant. This presentation will review the factors affecting the cleaning performance and their costs.

A simple approach to cleaning uses the following factors: Time of cleaning contact, Action of cleaning, Concentration of cleaning chemicals, and Temperature of cleaning chemicals. A more robust cleaning scheme is composed of the following factors: Time of cleaning contact, Action of cleaning, Concentration of cleaning chemicals, and Temperature of cleaning chemicals, Water quality for cleaning, Individual worker performance, Nature of the soil, and Surface to be cleaned.

By knowing the soil type, water quality, and the surface to be cleaned, the other factors (time, action, concentration, temperature, worker ability) can be adjusted to maximize cleaning performance and reduce cost. Research to determine what is the expected outcome of cleaning is critical along with establishing performance criteria which are realistic and realistically measurable. Cleaning time and thermal and chemical requirements can be costly but can be reduced by fully understanding what needs to be accomplished. Use of quick cleaning performance testing is ideal as long as you have an understanding of what is being measured and the associated drawbacks to the system.

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In-field Debris Removal and Fruit Quantity and Quality Sensing in Citrus

Amanda Valentine  
UF, IFAS, CREC, Lake Alfred, FL

Both manually (hand) and mechanically harvested citrus have various percentages of plant material (debris) within their harvested loads that are transported to processing facilities. Most debris consists of leaves, wood, small and bad fruit (e.g. rotten and damaged), but on occasion people’s trash and animal related items are included. Also, plant materials can be infected with diseases such as citrus canker, black spot and other potential fungal diseases (e.g. Citrus Scab, Phytophthora, Alternaria Brown Spot, etc.). The infected materials can blow out of the trailers, increasing the risk of spreading disease to other citrus growing areas.

A mobile in-field debris removal and fruit quality sensing research platform was developed to quantify the amount of non-fruit debris in a harvested citrus load. The mobile research platform is a mechanized citrus fruit and debris separating system, along with the capability of fruit quantity and quality establishment via means of non-contact machine vision and laser based technologies. It is a pull-behind implement that utilizes a tractor’s power take off (PTO) to run the hydraulic system. The system consists of five major sections: (i). Input hopper, (ii). Large branch conditioning and small fruit removal, (iii). Small branch and leaf removal, (iv). Fruit quality sensing and (v). Output conveyor.

Growers’ payment is generally related to the fruit’s weight and associated juice content and maturity. Preliminary in-field tests indicate the possibility of a 45,000 pound trailer of fruit containing an associated 2,083.5 pounds of debris during transportation. Lab-based testing on an automated fruit non-destructive sensor could prove useful as an in-field application on the mobile research platform, in order to further establish fruit load quality.

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Increasing volatility has impacted the food commodity markets, but is also impacting the energy commodity markets. International citrus and beverage firms undoubtedly have noticed how difficult it is to pass increased energy and food costs along to consumers. Thus, margins are squeezed and profitability suffers. The goal of this session is to help firms understand the future of energy prices, the relationship of food and energy prices, and how firms might deal with a new normal of higher energy prices.

Supply and demand issues are impacting the prices for energy. A rapidly expanding Chinese middle-class has an appetite for energy and energy intensive foods. There is also a growing demand for biofuels and it is not completely clear how this demand impacts food prices. The US energy policy is contributing to the growth in ethanol use and its impact on prices.

From the supply side, there is less energy available, OPEC is restricting production, and the new sources of energy are more expensive to extract. In addition, agricultural supply is relatively unresponsive to price changes because the supply of arable land is fixed. Any dramatic weather events will also have heightened impact on the markets because stocks of commodities have dwindled.

Macroeconomic factors are also having an impact on the price of energy and food commodities. A global recession has already led to a decrease in energy prices. That might be of little comfort to citrus and beverage firms if the volatility of energy prices continues to increase.

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Optimizing Industrial Thermal Energy Management via Modular On-Demand Steam Systems

Jason P. Smith  
Director, Sustainability & Strategic Development, Miura North America, Inc., Atlanta, GA

Both recent economic and environmental conditions in the U.S. have converged to bring about unprecedented attention to energy efficiency and sustainability in the country’s industrial sector.

Historically, energy costs in the U.S. have been low in comparison to global averages in some measure do to an extended tolerance for externalized costs related to environmental degradation. Consequently, awareness, innovation & implementation of technologies focused on energy efficiency and reduced environmental impact have not kept pace with other industrialized nations.

A recent survey conducted by Energy & Environmental Analysis, Inc. for Oak Ridge National Laboratory indicates that the current U.S. inventory of commercial / industrial boilers stands at around 163,000 units and 2.7 million MMBtu / hr. total fuel input capacity. These boilers consume nearly 8,100 Tbtu per year, representing about 40% of all energy consumed in the commercial / industrial sectors. Moreover, this same survey indicates that nearly 50% of all commercial / industrial boilers in the U.S. are 40+ years old while as many as 80% are 30+ years old.

Boilers account for nearly half of industrial energy consumption and represent one of the most energy intensive systems involved in the citrus/beverage industries. Innovation in conventional boiler technology has stagnated for many decades and the vast majority of those in operation today employ 19th-century technology. Given the preponderance of aged, obsolete boiler technology currently in service in this industry, it is critical to raise awareness and examine the role of emerging new technologies (combined with sound energy management BEST PRACTICES) will play in addressing the energy and environmental challenges inherent with process steam/heat generation.

In the same way that tank-less / instantaneous water heating systems are eschewing a new era in energy efficiency in the residential sector, compact modular on-demand steam generation systems are poised to support the same kind of transformation in the industrial sector. Moreover, given the large amount of energy consumed and the sharp minute-to-minute load variations in process steam demands in the citrus/beverage industry, on-demand steam generation has the potential to play a significant role in reducing energy consumption and equivalent emissions in this sector.

This presentation will illustrate how emerging modular, on-demand process steam boiler technologies will play a part in addressing the energy and environmental challenges facing the citrus & beverage industries showcasing how to leverage energy efficiency to realize sustainability with a pay-back.

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Using Twin Screw Pump Technology in the Citrus Processing Industry

George W. Doan
Product Manager, Process Technologies, Inc., Monroe, NC

This presentation is to review the relevance of using twin screw pumping technology in lieu of the traditional positive displacement pump technologies. Currently there are many sanitary applications in and out of the citrus and food industries that utilized twin screw pumping technology.

We will be addressing the following key questions: What are the differences between twin screw pump technology and the traditionally used positive displacement pump technologies? What benefits do using twin screw pumps present to the citrus processing industry? Twin screw pump technology can solve many of the sanitary and processing problems that face the citrus industry. With the ability to perform the operating process as well as the cleaning process, implementing twin screw technology can reduce the amount of equipment, piping and controls required in a system. Due to the axial flow of the products through the twin screw pump and the varying sizes in screw pitches, the protection and integrity of soft solids is ensured during the pumping process. Bi-directional operation of the twin screw pumps allows the end user to reverse direction of the flow as necessary for processing and cleaning operations saving product and time for cleaning procedures.

By reviewing existing and prospective operations, we can exemplify how twin screw pumping technology has revolutionized the approach of engineers and processors in the citrus and food processing industries.

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Oxygen Sensing Systems for Processing Plant Applications

Roy Johnson  
Pentair Haffmans NA Inc., Rockford, IL

In the beverage industry it has become increasingly important to be able to monitor O2 accurately and fast throughout the production process. High levels of oxygen can be detrimental to more natural beverage products as their contents can easily degrade with higher O2 levels. The ability to monitor and control the oxygen levels early in the process to the final packaged product will allow for great stability of these products reaching the consumer. Also the ability to have minimal oxygen levels in the process and final packaged product will allow for great stability and prolonged shelf life and flavor stability for greater customer satisfaction.

Companies will also be able to reduce product losses and improve overall efficiencies with the ability to monitor and control oxygen levels to an acceptable level. Having the confidence of known oxygen levels throughout the process will allow for continued production with minimal downtime.

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An Update from the Florida Department of Agriculture and Consumer Services

Shannon Shepp
Florida Department of Agriculture & Consumer Services, Tallahassee, FL

Shannon Shepp is Deputy Commissioner at the Florida Department of Agriculture and Consumer Services (DACS). DACS supports the development of the agriculture industry in Florida and promotes Florida’s nearly 300 commodities.

Ms. Shepp will provide an update on the status of the citrus industry in Florida and outline the challenges that face Florida’s signature crop. Though the industry survived last winter’s freezes and other hurdles in recent months, there are many more challenges to overcome. Changes in consumer preference will have a great impact on the future of the industry. Pests and diseases that threaten the health of our fruits and trees are introduced to Florida on a daily basis and have the potential to spread quickly. In addition, we do not have an adequate supply of fresh water to meet Florida’s current and future needs.

Agriculture Commissioner Adam Putnam is committed to addressing these challenges. DACS is partnering with industry leaders, academics and the federal government to explore new opportunities and develop innovative solutions.

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Low-cost Aerial Imaging Platform and its Applications to Citrus

Reza Ehsani
Citrus Research and Education Center, IFAS, UF, Lake Alfred, FL

Remote sensing and aerial imagery can be used for many different applications in horticultural crops such as tree counts, yield estimation, and disease and stress detection. In spite of all the potential applications, this technology has not been widely adopted by growers. Cost of the aerial imaging probably is the most important factor for lack of adoption of this technology. To address this issue, a new low-cost flying platform was utilized and equipped with a regular camera and a multi-band camera to take cost effective high-resolution, multi-band images. The platform has several unique features that make it ideal for applications in horticultural crops. It can take off and land vertically like a helicopter which allows it to be launched and land in any environment or terrain. The camera mount installed on this system can automatically correct for yaw and pitch angle and will keep the camera parallel to the ground. This will eliminate the need for post geometric correction of the images. It can be flown using a normal RC transmitter. It can lift a payload of up to 5 lbs and can fly between 10-40 minutes depending on the payload, wind and type of batteries. The system has the capability of flying to a GPS waypoint or to fly according to a pre-assigned flight path. This feature is important for flying the same flight path over and over again for comparison with previously collected data. Since the system is fully automated, it is extremely easy to learn how to fly, which makes it very attractive for potential users that don’t want to spend a large amount of time to learn how to fly a remote sensing platform.

The applications of this platform were investigated for different horticultural crops. An optical multispectral imaging sensor incorporated on the platform which measures the reflectance from the orchard in the visible and infrared regions of the spectra in two dimensions. Vegetation indices computed based on visible and near-infrared wavebands provide additional information on the health of the plants. This platform provides a higher resolution image than satellite and aerial images. This presentation provides information about this system and examples of its applications for citrus and other crops.

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Effect on Nutritional Sprays on Orange Juice Flavor – Preliminary Information

Sharon Dea¹, Anne Plotto², Jinhe Bai², Mike Irey³ and Elizabeth Baldwin²

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Nutritional spray programs applied directly on the foliage of orange trees for management of the Huanglongbing (HLB) disease have been investigated in the last few years to maintain tree health and yield. The impact of these programs on HLB infected fruit flavor and aroma is unknown. This study looked at the effects of 3 different foliage nutritional spray programs (Maury Boyd, Keyplex and Wettable Powder) applied to healthy and HLB infected trees on the flavor and composition of their fruit, and compared them with the fruit treated with a conventional spray program. Three types of fruit samples were selected: healthy orange fruit from non-infected trees (healthy), asymptomatic fruit from HLB infected trees (HLB), and symptomatic fruit from HLB infected trees (HLBs). Four harvest times and two cultivars (‘Hamlin’ harvested in December 2009, December 2010 and January 2011, and ‘Valencia’ harvested in April 2011) were investigated. For all three harvests of ‘Hamlin’ fruit, HLB and HLBs juice samples for all treatments were significantly different by smell and by taste from the conventionally treated healthy juice, with the exceptions of conventionally treated HLB (harvested in December 2009) and the HLB Maury Boyd treated juice (Harvested in January 2011) which were not significantly different by smell from the healthy control. Generally, the panelists described the differences as being bitter, grapefruit like, more sour, astringent, and metallic. The limonin content was usually higher in the HLB and HLBs juice, regardless of the nutritional programs, while the nomilin content was found higher or at similar levels compared to the conventionally treated healthy juice. For the December 2009 harvest, the sugar content in HLB and HLBs juice samples of all treatments were the same as the levels as those found in conventionally treated healthy juice, while lower sugar content in all HLB and HLBs juice samples (regardless of the treatment) compared with healthy fruit were measured in the December 2010 and January 2011 harvests. The Valencia harvest in April, 2011, exhibited differences between healthy, HLB and HLBs for the conventional spray group, but less and inconsistent differences were observed between healthy, HLB and HLBs for Valencia juice from the nutritional spray groups.

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