

47th Annual Short Course for the Food Industry

The International Citrus & Beverage Conference



September 18-21, 2007

**Sheraton Sand Key Resort
Clearwater Beach, FL**

Hosted by:

- University of Florida/IFAS,
Food Science and Human Nutrition Department
- University of Florida, Juice and Beverage Center
- Institute of Food Technologists,
Florida Section & Citrus Products Division

www.conference.ifas.ufl.edu/citrus

Project # 0709

Welcome to the 2007 International Citrus & Beverage Conference!

This year's program will focus on key issues facing the citrus processing and related industries: new industry standards and practices, challenges facing the Florida citrus industry, technology in the processing plants, and new markets and the research to support them. The importance of food safety and defense programs has never been greater, and we have an entire session devoted to this topic. New this year is a session on biotechnology and industrial uses of enzymes, topics that are increasingly important in food and agriculture. Our invited speakers, active in academia, industry and government, were selected because of their depth of knowledge in these pertinent topics, and their enthusiasm in sharing their insights. We look forward to your participation!

Renée Schneider

Program Organizer

University of Florida, IFAS, FSHN
Gainesville, FL

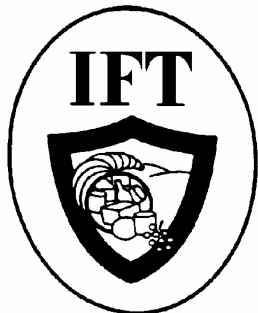


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Program Committee

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Citrus & Subtropical Products Lab.
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Florida's Natural Growers
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Tampa, FL

Agenda

Tuesday, September 18, 2007

4:00PM Registration (*until 7:00PM*)

Wednesday, September 19, 2007

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

7:30AM Morning Refreshments
Sponsored by: Vincent Corporation

8:30AM **Welcome and Introductory Remarks**

Renée Schneider, UF, IFAS, FSHN

Charles Sims, UF, IFAS, FSHN

Larry Arrington, UF, IFAS, Office of Dean for Extension and Florida Cooperative Extension Service

Savy DiBenedetto, Program Chair, Coca-Cola North America

Session 1 ***Food Safety & Agrosecurity***

Moderator: *Keith Schneider*, University of Florida, IFAS, FSHN

9:00AM **Utilizing Partnerships to Enhance the Supply Chain** – *James Garris*,
The Coca-Cola Company..... (p. 3)

9:35AM **ISO 22000 – The International Food Safety Standard** – *Debby Newslow*,
D.L. Newslow & Associates, Inc..... (p. 4)

10:10AM Break

10:30AM **Food Defense: Keeping America’s Food Safe and Secure** – *Art Johnstone*,
Florida Department of Agriculture and Consumer Services..... (p. 5)

11:05AM **Media Coverage of Foodborne Illness Events** – *Benjamin Chapman*, University
of Guelph (p. 6)

Session 2 ***Enzymes, Biotechnology, and the Organic Program***

Moderator: *Howard Nivens*, Cargill Juice N.A.

1:30PM **Issues in Consumer Acceptance of Biotechnology and Food** – *Dave Schmidt*,
IFIC (p. 7)

2:05PM **Organic Processing, Organic Packaging, and Sustainability** – *Wade Groetsch*,
Blue Lake Citrus Products LLC..... (p. 8)

2:40PM Refreshment Break
Sponsored by: Givaudan Flavors Corp.

Wednesday, September 19, 2007 (continued)

- 3:00PM **Traditional and Novel Uses of Enzymes for Citrus By-Product Applications** –
Mark Messersmith, Biosun Flavors & Food Ingredients (p. 9)
- 3:45PM **Biofuels from Citrus Processing By-products and Waste Streams – Technical
Perspective** – *Pratap Pullammanappallil*, UF, IFAS, ABE(p. 10)
- 4:20PM **United States National Organics Program (NOP)** – *Terry Bane*,
USDA-AMS.....(p. 11)
- 6:00PM Networking Social (*until 7:00PM*)
Sponsored by:
- *ABC Research Corporation*
- *Brown International Corporation, LLC*
- *Chemical Systems*
- *Firmenich*
- *Givaudan Flavors Corp.*
- *M.G. Newell Corporation*
- *Sensus Flavors*

Thursday, September 20, 2007

Session 3
Marketing, Nutrition & Research

Moderator: *Alan Wyland*, Coca-Cola North America

- 7:30AM Registration (*until 5:00PM*)
- 7:30AM Morning Refreshments
- 8:30AM **Nutraceuticals and Marketing** – *Lynda Doyle*, DSM Nutritional Products, Inc.
- 9:05AM **Orange Juice Price Reaction: Spatial Consumer Insights** – *Robert Norberg*,
Florida Department of Citrus.....(p. 12)
- 9:40AM **Health & Nutritional Benefit Research for Citrus** – *Dan King*, Florida
Department of Citrus.....(p. 13)
- 10:15AM Break
- 10:35AM **FCIRCC – Roadmap for Research** – *John Jackson*, FCIRCC.....(p. 14)
- 11:10AM **Regulatory & Legislative Issues Affecting the Industry** – *Patricia Faison*, Juice
Products Association.....(p. 15)

Thursday, September 20, 2007 (continued)

Session 4
Technology & Information for the Processor

Moderator: *David Johnson*, Peace River Citrus

- 1:30PM **Long Term Weather Prediction and Effect on Agriculture** – *Edward O’Lenic*, NOAA, NCEP(p. 16)
- 2:05PM **Better Profits through Loss Elimination in Citrus Plants** – *Joe DeMarco*, Tropicana Products, Inc.(p. 17)
- 2:40PM Break
- 3:00PM **The Importance of Insulation in the Processing Plant** – *Ronald King*, National Insulation Association (Consultant)(p. 18)
- 3:35PM **Chlorine Dioxide Sterilization of Aseptic Tanks – An Update** – *Jeffery Raasch*, Enerfab, Inc.(p. 19)
- 4:10PM **The Florida Solution for a Trained Manufacturing Workforce** – *Eric Roe*, FL-ATE and *Don Gugliuzza*, Tropicana Products, Inc.(p. 20)
- 6:00PM Networking Hour
- 7:00PM Dinner & Entertainment (*until 9:00PM*)
- Sponsored by:
- *ENERFAB, Inc.*
 - *FMC FoodTech*
 - *FMC FoodTech FranRica*

Friday, September 21, 2007

Session 5
Citrus Industry Challenges & Solutions

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

- 7:30AM Registration (*until 10:00AM*)
- 7:45AM Breakfast
Sponsored by:
- *Bell Chem Corp*
- *BioSun Flavors & Food Ingredients*
- *HT/DCR Engineering, Inc.*
- *Safe Chem Inc.*
- 8:30AM **Best Practices for Canker and Citrus Disease Management** – *Jim Snively*,
Southern Gardens Citrus Groves
- 9:05AM **New Citrus Varieties – What's on the Horizon?** – *Fred Gmitter*, UF, IFAS,
CREC(p. 21)
- 9:40AM **An Update on Florida Citrus Nursery and Budwood Programs** – *Michael*
Kesinger, Florida Department of Agriculture and Consumer Services(p. 22)
- 10:15AM **Preliminary Information on Effect of Greening on Juice Flavor and Chemistry**
– *Anne Plotto*, USDA-ARS Citrus and Sub-tropical Research Laboratory(p. 23)
- 11:00 AM Adjourn

Speaker Abstracts

Listed in order of presentation

Utilizing Partnerships to Enhance the Supply Chain

James Garris

The Coca-Cola Company, Atlanta, GA

Competitive advantage, the lever great companies aspire to have and relentlessly seek is under pressure from many forces. Unless effective programs and superior execution are part of a company's culture, market leadership is usually lost.

Today's supply chains have to be aggressive in finding ways to not only manage rising costs and dealing global complexity and nuances, but they also have to prepare for increasing threats of terrorism and ensuring business continuity. The amount of goods arriving at U.S. Ports is increasing every year. What if a major port disruption occurred? What impact would it have on your flow of goods? To your bottom line? Can you afford not to strengthen supply chain security? These are questions we have to deal with in today's reality and to which finding answers are vital.

Companies have managed supply chain security in the past, but today's risk and threats are greater than ever. With global trade becoming more of a factor, companies have to seek better ways to deal with the complexity.

At the Coca-Cola Company, one way we manage this is through partnerships. We have always worked closely with our supply partners to ensure quality, safety, and security, but today we are forging even tighter relationships. The Coca-Cola Company is a member of the voluntary Customs Border Protection C-TPAT program. Partnering with Customs and business partners is rewarding not only from a security perspective, but relationships improve and paves the roads for more effective supply chain collaboration which drives efficiency improvements.

The C-TPAT program requires for companies to assess their supply chain partners' security programs and submit an application via an on-line site. Upon receipt and vetting of the application, companies are either rejected or become Tier 1 members. Each Tier, highest 3, comes with increasing benefits for the member, namely reduced inspections. Next, a Security Specialist for U.S. Customs conducts a validation exercise at a local distribution center and then at a supplier abroad. Tier 2 and 3 levels are obtained based on the results of the validation.

Security Specialists are validating business partners to ensure practices are in place that will decrease the likelihood of danger entering a U.S. port through a container shipment. Assessing the supply base should not be considered a one time exercise. Building a sustainable system is more appropriate. Frequent auditing is a practical means of receiving feedback, but other initiatives should exist. These include, but are not limited to: purchase order language that stipulates compliance to C-TPAT minimum security criteria, contractual language outlining expectations, etc..

Given the tragedy of 9/11 in the U.S., most of the focus has been with United State's commerce protection, however, terrorism has proven to have no boundaries and notwithstanding, such initiatives will continue to be offered in other countries. Programs that encourage relationships and program and process rigor are highly recommended. Besides, who else knows your supply chain and can manage it more effectively that you and your supply chain partners?

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ISO 22000 – The International Food Safety Standard

Debby Newslow

D.L. Newslow & Associates, Inc., Orlando, FL

ISO 22000, one of the newest ISO standards, specifically focuses on a food safety management system. This is one of the first auditable standards focusing on food safety requiring an organization in the food chain to demonstrate its ability to control food safety hazards in order to ensure that food is safe at the time of human consumption. ISO 22000 uses the Codex Alimentarius guideline for Food Safety as its basis applying the structure and discipline of an ISO management system. Organizations that have a HACCP Program compliant with the requirements of the Codex guidelines are interested in its advantages. Learn more about the requirements and how application within your organization may add value to your current programs.

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Food Defense: Keeping America's Food Safe and Secure

Art Johnstone

FL Department of Agriculture and Consumer Services, Office of Agricultural Emergency Preparedness,
Tallahassee, FL

The devastating terrorist attacks of September 11, 2001 served as a wake-up call to many leaders in the public and private sectors of our nation. The killing of innocent civilians, which we had grown accustomed to watching on our television screens, suddenly became a reality on our own soil. The economic fallout from this event was profound and persistent, touching nearly every American household over the following months and years. Consensus was immediate and unified: more must be done to protect the citizens and industries of our great country. The growing unrest and intensity generating around anti-globalization and anti-free trade movements only underlines the need to do more to prepare for and prevent terrorist or other attacks.

Agriculture is one of Florida's largest industries, second only to tourism, with a total economic impact estimated at more than \$97 billion per year. Because of the value of this industry to the state's economy, The Florida Department of Agriculture and Consumer Services has played an increasingly critical role in the State's domestic security strategy. The effects of animal and plant diseases, such as the Foot and Mouth Disease outbreak in Great Britain or the Citrus Canker outbreak in our own State, can be devastating and hard to contain. Florida must do all it can to prevent the introduction and establishment of such agents in our state, whether intentional or inadvertent.

Topics covered in this presentation will include 1) actions that have been taken by the United States Government, Florida, and industry to keep the food supply safe and secure; 2) vulnerabilities that still exist more than six years after the terrorist attacks of 2001; and 3) strategies that can be pursued to continue to increase the safety and security of the United States food supply.

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Media Coverage of Foodborne Illness Events

Benjamin Chapman

University of Guelph, International Food Safety Network, Guelph, Ontario, CANADA

The public discussion of food safety has increased, impacting belief formation with respect to safe food consumption. Those responsible for food safety risk management must be seen to be reducing, mitigating, or minimizing a particular risk. Risk managers addressing food safety must monitor and understand media trends to adjust programs and communication strategy relevance. Risk managers must communicate their efforts effectively through a variety of media. Based on a series of case studies culled from research and media, lessons learned from recent food safety-related outbreaks and recalls will be explored. Factors leading to the media coverage of foodborne illnesses include: number of cases resulting from an outbreak; geographical footprint of an outbreak; implication of imported products; information available to media; and the stigma of vehicles and pathogens. Knowing target audiences, using new communication technology while being rapid with messages can enhance risk management awareness and enhance trust with stakeholders. The current climate of distrust in regulatory agencies and industry makes effectively communicating about risks through media not only more challenging but also more important. Attendees will be provided with a template to be used in communication activities when developing proactive and reactive messages to support food safety activities.

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Issues in Consumer Acceptance of Biotechnology and Food

David B. Schmidt

International Food Information Council (IFIC), Washington, DC

Consumers have been bombarded with a seemingly endless array of food safety and nutrition issues over the last year. Continued focus on the increasing rate of obesity was nearly matched by a series of recalls involving fresh produce, meats, imported foods from Asia adulterated with unfamiliar ingredients, and other foods that have shaken consumer confidence in our food supply.

The International Food Information Council and IFIC Foundation have fielded major on-line surveys to gauge consumer trends in nutrition as well as attitudes toward food and animal biotechnology. Fresh data from a July 2007 IFIC survey on attitudes toward food biotechnology will be highlighted to examine the effect of global food safety challenges on US consumer attitudes toward food safety and biotechnology. Highlights from the second IFIC Foundation *Food and Health* survey, fielded in early 2007, will also be summarized to focus on emerging trends.

IFIC effectively communicates science based information on food safety and nutrition to health and nutrition professionals, educators, government officials, journalists and others who provide information to consumers.

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Organic Processing, Organic Packaging, and Sustainability

Wade J. Groetsch

Blue Lake Citrus Products, LLC, Winter Haven, FL

The organic industry is one of the fastest growing segments in the food industry at a rate of 15% or more over the last 10 years to reach \$14 billion today with 13.8% being Organic Beverages. Blue Lake Citrus Products, LLC is meeting the need of the organic consumer with the retail brand Noble Organics featuring a line of organic citrus juices and organic lemonades sweetened naturally with agave.

Organic growers, production facilities, and products must meet strict organic standards and be certified by an organic agency. The National Organic Program (NOP) began in October 2002 to monitor the organic process from approved pesticides, tracking organic fruit, separating organic fruit, organic cleaning, and reporting requirements.

Noble Organics is the first juice to be packaged in a bottle made from an all natural renewable resource derived from plants & vegetables. Noble and Natureworks partner together to create the first juice bottle from the resin NatureworksPLA. Noble's new bottle impacts the environment by: reducing dependency on oil, fewer greenhouse gasses emitted, and increasing energy efficiency during production.

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Traditional and Novel Uses of Enzymes for Citrus By-Product Applications

Mark Messersmith

Biosun Flavors & Food Ingredients, Tampa, FL

A preliminary discussion on the definition and biochemical makeup of enzymes, their origin of manufacture, the types of enzymes used in commercial formulas is offered. An overview of both traditional and novel uses of enzymes in citrus-related processing follows.

Traditional applications include pulp-washing for viscosity reduction and higher concentration, oils processing for yield improvement and clarification and assistance to beverage alcohol fermentation and its feed by-products. Process flow charts are presented along with practical advice for the most beneficial results in processing. Typical usage rates, residence time and dosage rates are indicated within the data.

Novel applications which utilize enzymes and which have been either proven to produce a viable commercial end product or which are currently proposed for production are: clouding agents, the debittering of bioflavanoids and the production of fuel ethanol from citrus peel. An in depth critical analysis of a model fuel alcohol plant is presented.

Cost analysis and implications of using GMO-based organisms to produce enzymes are also addressed.

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Biofuels from Citrus Processing By-products and Waste Streams – Technical Perspective

Pratap Pullammanappallil

UF, IFAS, Department of Agricultural and Biological Engineering, Gainesville, FL

Citrus juice processing produces a variety of by-products, co-products and waste streams. These include peels, molasses and wastewater. Currently, wet peels are size reduced, passed through presses, dried and pelletized for use as cattle feed. The press liquid is concentrated to produce a molasses co-product. The wastewater stream is usually treated in aerobic activated sludge process and lagoons before disposal. With the increasing cost of fossil fuels it may be no longer economical to process the wet peel stream to produce animal feeds. Alternatively, due to the increasing demand for biofuels, the wet peel stream (along with wastewater) may be used as a renewable feedstock for producing gaseous and liquid fuels.

This presentation will highlight two options for biochemical conversion of the organic residues from citrus processing facilities to a gaseous (methane) and liquid (ethanol) fuel. Anaerobic digestion (also referred to as biogasification or biomethanation) is a biochemical process in which organic substrates like carbohydrates, protein and fats are mineralized to methane and carbon dioxide through a concerted action of several groups of microorganisms under oxygen free (or anaerobic) conditions. The mixture of methane and carbon dioxide is called biogas and can be used with very little clean up as a fuel for direct heating or electrical power generation. The potential for biogasification of the combined stream of wet peels and wastewater using a technology developed at the University of Florida will be discussed. Methane producing potential, process design and operation, scenarios for biogas utilization and economics of biogasification will also be presented.

Previous studies have investigated the fermentation of the molasses co-product to ethanol using yeast. The technology employed is the conventional fermentation process used for ethanol production from sugarcane juice or starch based feedstocks like corn. However, recent developments in cellulosic ethanol fermentation allows the conversion of the wet peel stream directly to ethanol. Citrus peels consist of macromolecules like pectins, hemicellulose and cellulose which are made up of pentose and hexose sugar monomers. These sugars can be released by enzymatic or acid hydrolysis and can subsequently be fermented to ethanol. The second part of the presentation will outline the application of a cellulosic ethanol fermentation technology developed at the University of Florida for the production of ethanol from citrus peels. The presentation will highlight process design and operation for the conversion of both pentose and hexose sugars to ethanol, process considerations, economics of the process, bottlenecks in commercialization of technology and ongoing research to overcome these.

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United States National Organics Program (NOP)

Mark Bradley; Presented by: Terry Bane
USDA-AMS, Washington, DC

The U.S. National Organic Program (NOP) is a part of the U.S. Department of Agriculture (USDA), Marketing and Regulatory Programs, Agricultural Marketing Service (AMS), Transportation and Marketing Programs. The NOP is authorized by the Organic Foods Production Act of 1990.

The AMS recognizes accrediting bodies to carry out the NOP regulations for accrediting certifiers. Accredited certifiers certify farms and handling operations. Certified operations are allowed to produce and label certified organic products. Certification occurs through a process defined by the NOP regulations. Certification bodies review organic systems plans and conduct onsite inspections to ensure that all regulatory requirements are met.

There are three levels of regulated labeling that include the term “organic” available for use by certified operations: “100% Organic,” “Organic,” and “Made with Organic [Ingredients]. Certification is based on a written process that is approved and then verified on site. This written plan is called an organic system plan.

There are four categories of NOP organic certification; crops, livestock, wild crop harvesting, and handling. Certified organic production under the NOP generally allows all non-synthetic substances and prohibits the use of synthetic substances. Any allowed synthetics or prohibited non-synthetic substances are codified in the List of Allowed and Prohibited Substances in the NOP regulations.

To produce organic crops, the land must be free from prohibited substances for at least 3 years prior to the harvest of an organic crop. The quality of the soil must be maintained or improved and nutrients must be managed to protect the quality of the soil, water, and other natural resources. Producers must prevent the contact with prohibited substances by establishing buffer zones where necessary. With a few exceptions, organic seeds and planting stock must be used.

NOP certified livestock must be managed organically from the last third of gestation or in the case of poultry, from the second day of life. Dairy cattle may be managed organically for one year and then the milk sold or labeled as organic. During this time, animals must be fed organic feed and supplements allowed by the regulations. At no time may hormones or antibiotics be used in NOP certified livestock.

Wild crops may be harvested from land that is protected from prohibited substances as long as harvesting is done in a sustainable manner that prevents damage to the environment.

Handling, also commonly referred to as “processing” is also regulated by the NOP for certified products and must be conducted by NOP certified operations. Producers must avoid contact with prohibited substances and maintain the integrity of the product with respect to conventional products.

More information on the National Organic Program is available on the USDA website at: www.ams.usda.gov/nop .

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Orange Juice Price Reaction: Spatial Consumer Insights

Robert Norberg

Florida Department of Citrus, Lakeland, FL

The world Orange Juice market has seen a dramatic shift in supply availability since September 2004. Prior to that time, world inventories of juice and prospects of larger crops from both Florida and Brazil were weighing heavily on pricing. The consequences were that prices would continue at all-time low levels as supplies in excess of demand continued to build.

However, the Florida hurricanes of 2004 and 2005 served to reduce Florida's annual crop by as much as 30% for both years. At the same time eradication of productive trees due to the spread of canker (estimated at 13% of the tree base) and conversion of citrus acreage to commercial development effectively reduced the bearing acreage of Florida orange trees by 20% between 2002 and 2005. In the southern hemisphere, Brazil was facing its own production issues with disease and conversion of citrus properties to more profitable sugar cane production. Consequently, world juice inventories have declined rapidly and prices, both wholesale and retail, have increased to record high levels.

Obviously, consumers normally react negatively when faced with a price increase. Orange juice is no different. However, orange juice is exhibiting low price elasticity. Today, retail prices in the US are up 22% versus last year, but consumption is only down 12%. Will consumers continue to spend more on orange juice in the future?

Orange Juice Price Reaction: Spatial Consumer Insights will examine one significant aspect of this situation. Specifically, the geographic distribution of consumer response to higher prices will be studied. It is well known that upwards of 75% of all US households purchase orange juice. Market saturation can cause an inefficient allocation of marketing resources. There are three ways to allocate resources; demographically, periodically, or programmatically. This presentation will explore the use and implications of a relatively new methodology, spatial consumer insights.

New tools have emerged that allow researchers to analyze data more quickly and efficiently than ever before. Researchers can 'read' data up to 65,000 times faster when displayed in spatial format versus tabular format. Tools are now available to link databases with a location indicator. Now consumer insights and consumption behaviors can be displayed in a map. The use of 'consumer insight maps' will revolutionize the ability of marketers to differentiate their marketing programs and achieve greater efficiencies and effectiveness.

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Health & Nutritional Benefit Research for Citrus

Dan King

Florida Department of Citrus, Lake Alfred, FL

Most would agree that citrus fruit/juices, including orange and grapefruit, are “good for you”. Most consumers are also aware of their motivations for consuming fruit juices, including a self-awareness of their diet, the choices they may make (or intend to make) with respect to trying to improve the healthfulness of their diet, and their perceptions of which foods may provide benefit(s) for their specific health concerns. Consumers are also constantly bombarded with ‘health news’ – and that ‘news’ may or may not be derived from a solid scientific basis. And ‘news’ is often contradictory over time --- first a food is good (bad) for you, only later to be claimed as bad (good) for you! Further, ‘news’ is often misleading and ‘facts’ may be much more a ‘news media event’ interpretation than a scientifically based, evidence-supported presentation of conclusions drawn from reputable scientific publications.

The Scientific Research Department of the Florida Department of Citrus is strongly engaged in supporting the ‘health and wellness’ message associated with Florida citrus fruit and juices. The current focus is the extension and verification of *in vitro* and animal studies, with clinical (*in vivo*) studies. Emphasis is on the support of solid, scientifically valid studies supporting citrus as healthy, nutrient dense foods that provide multiple health benefits via a ‘whole food’ delivery system.

The scientific study of nutrition, phytochemicals, and the interrelationships of citrus phytochemical components with various diseases are highly complex, and many important questions remain unanswered. It is not presently clear how single nutrients, combination of nutrients, excessive nutrition, energy imbalance, or the combinations of these factors at particular stages of life, affect one’s risk for a specific disease. This complexity is a driver for FDOC research to gain a better understanding of the biological and chemical mechanisms involved in the activities of citrus phytochemicals. Citrus contains significant levels of phytochemicals commonly referred to as ‘flavonoids’ (flavonoids, caretenoids, and limonoids). The major flavonoids in citrus are hesperidin, naringin and tangeretin, which are found in orange, grapefruit and tangerine juices, respectively, and only these fruit/fruit juices contain significant amounts of these components. Citrus phytochemical components provided by whole citrus fruits and 100% juices need to be investigated as factors in the beneficial and preventative influences on human health and wellness.

Research reveals that these easily obtainable juices provide nutrients and other phytochemicals that are associated with both health promoting and disease preventive properties. In addition to known benefits of vitamin C, folate, and antioxidants in citrus fruit, there is emerging data on the beneficial aspects of nutrient density, specific antioxidant activities, inflammatory responses, cardiovascular health, weight loss, bone health, and cognitive functions. Much of that data is now being gathered from clinical studies, as opposed to earlier, *in vitro* and animal studies. FDOC is now focusing on supporting human clinical studies that may provide more direct evidence of the beneficial contributions of citrus to health and wellness.

This presentation will review some of the recent history, emerging news, and future research by the FDOC on the [Health Benefits of Citrus](#).

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FCIRCC – Roadmap for Research

John Jackson

Florida Citrus Industry Research Coordinating Council, Eustis, FL

The Florida Citrus Industry Research Coordinating Council was established in 2001 through the cooperative effort of many organizations including Florida Citrus Mutual, Florida Citrus Packers, Florida Citrus Processors, Citrus Grower Associates, Florida Citrus Production Managers Association, Florida Citrus Commission and others. FCIRCC was created to assure that the most pressing research needs facing the INDUSTRY were addressed. It was recognized that all segments of the industry needed to be involved in the process of prioritizing research needs, determining research projects and identifying research gaps.

The FCIRCC exists to focus research efforts on those critical issues that have the most dramatic impact on the entire citrus industry. The council is the one body that represents all segments of the industry and is able to concentrate resources on critical concerns. The council is able to function in an independent environment and speak in one voice. It provides the roadmap for research.

On a periodic basis FCIRCC establishes industry wide research priorities. Input is provided by growers, processors, packers and harvesters. The council also maintains a data base of research projects conducted in Florida and is working on expanding to a world wide base. Gaps in research are determined from the needs identified and the projects conducted.

The council does not administer funds, but works hard to secure dollars for the various research agencies. A close interaction exists between the council and lobbying efforts, research agencies, funding sources, industry associations and regulatory infrastructure.

FCIRCC works hard to bridge the existing gaps in research and assure that there is no duplication of effort; this is the primary reason for the council.

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Regulatory & Legislative Issues Affecting the Industry

Patricia Faison

Juice Products Association, Atlanta, GA

This presentation includes a discussion of current regulatory activities undertaken by the Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) that are relevant to the juice products industry. The presentation also provides an overview of bills recently introduced in Congress that would impact the food industry, if passed. Some of the topics to be discussed include the declaration of cochineal extract and carmine on food labels, labeling of irradiated foods, modernization of the current good manufacturing practice (CGMP) regulation and the USDA's National Organic Program.

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Long Term Weather Prediction and Effect on Agriculture

Edward O'Lenic

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The Climate Prediction Center of the National Weather Service forecasts weather hazards for days 3-14, and average temperature conditions for 8-14-day, 1-month, and 3-month periods on a regular basis. This presentation discusses the latest of these forecasts. The presentation also gives some general suggestions for interpreting and applying these forecasts. It also discusses the implications for the private sector of the new National Digital Forecast Database, which makes the underlying data for some of these forecasts available in XML and html format to the public.

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Better Profits through Loss Elimination in Citrus Plants

Joseph N. DeMarco

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In recent years the citrus industry has been hard pressed to maintain a profitable status in the midst of hurricanes, short crops and ever increasing costs of all kinds. In an effort to offset negative market factors, processing plants have been trying all angles, short of mining for gold, to improve their business situation. In reality, your own gold mine may very well be waiting to be found, right on your plant floor.

All plants have losses, understanding, finding, evaluating and eliminating these losses may be the key to long term sustainability of a plant operation. In the past few years Tropicana along with PepsiCo has placed an emphasis on resource conservation and loss elimination of all kinds. The intent is to manufacture products with the least possible drain on natural resources as well as with a high degree of conversion efficiency. Said simply, this elimination of waste has turned into a tremendous opportunity for cost savings and improved bottom line performance. The steps to accomplish this are seemingly simple but amazingly powerful.

1. Have a clear vision for your products and your future.
2. Adopt a “Zero Loss” mentality for the organization.
3. Fully evaluate every input to your manufacturing process.
4. Look at all resources needed to produce your product and set goals to reach the absolute minimum possible.
5. Engage every member of your work team to find and eliminate losses. Conservation and waste elimination are part of everyone’s job.
6. Track progress and reward great performance.

The results can be millions of gallons of water saved, major savings of fuel, power, chemicals, raw materials operating supplies and, of course, major cost savings. Building a conservation culture within your organization will empower your entire work force toward the goal of optimum performance, while giving individuals a sense of great satisfaction and personal responsibility. In addition, as resources become scarcer and more expensive, highly efficient, minimum waste plants will be the survivors of these challenging times.

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The Importance of Insulation in the Processing Plant

Ronald King

Consultant, National Insulation Association, Williamsburg, VA

Mechanical insulation is the “Rodney Dangerfield” in the new construction, renovation and maintenance arenas. This proven, but forgotten technology is good for your business, the environment and the economy. However, insulation gets no respect, is taken for granted, and is often not considered as a viable initiative by which to increase profitability in the processing plant.

Can insulation improve your bottom line performance, reduce energy consumption and greenhouse gas emissions; be part an integral part of your safety program; improve the environment in which you work; increase productivity; eliminate or at minimum reduce corrosion under insulation, control condensation and mold growth and provide a unrivaled return on your investment? Usually what sounds too good to be true, isn't. That's not true here. The Citrus and Beverage Industry is not immune to having forgotten about the value of this proven technology.

Why is insulation, called the forgotten technology? Over the last 10-15 years the knowledge base of insulation for a variety of reasons as eroded. Insulation is not sexy, has no gauges, no monitoring devices or computer chips and in many circles is not considered as a standalone technology. This has lead to the underutilization and under evaluation of properly designing and maintaining an insulation system. Was your plant's insulation system designed for 1957, 1977, 1997 or 2007?

This presentation provides evidence as to the power of insulation when designed, installed and maintained properly and provides educational tools and resource information that will allow you to qualify and quantify the benefits and the return on your investment with this forgotten technology, simply known as insulation.

There has never been a more important time to think about insulation differently. It is a “low hanging fruit” opportunity that should not be overlooked – it is an investment that may have few rivals from a return on investment opportunity.

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Chlorine Dioxide Sterilization of Aseptic Tanks – An Update

Jeffery Raasch

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Enerfab has been sponsoring research efforts on ClO_2 since 1996 with various customers and universities. ClO_2 is a strong oxidizing agent reported to effectively inactivate bacteria, including pathogens, viruses, bacterial spores and algae. An aseptic tank model system was developed to study the efficiency of ClO_2 gas as a potential sanitizing agent for commercial epoxy lined juice storage tanks, aseptic process systems and downstream piping.

This paper will review the development and evaluation of the new methods and equipment developed to sterilize aseptic processing and storage equipment. It will also report on the significant operational and financial benefits over current methods.

Data will be reviewed which establishes efficacy and residual chemical levels. This data will provide fundamental knowledge facilitating the petition of regulatory approval for the use of chlorine dioxide gas for commercial sterilization of aseptic bulk storage tanks and equipment.

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The Florida Solution for a Trained Manufacturing Workforce

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According to the Manufacturers Association of Florida, “With thousands of jobs available, but a lack of skilled and appropriately educated and trained workers, one of the critical impediments to greater manufacturing success in Florida is an industry-ready workforce.” At Tropicana, workforce demographics reveal a future workforce predicament due to four primary factors: an aging work force; technology outpacing employee skills; a small existing labor pool for new employees; and incorrect perceptions of manufacturing.

Historically, educational programs to support this essential sector are distributed throughout the State, and are offered through both public and private providers at the secondary and post-secondary level. These programs are most often “homegrown” and do not align with a unified educational pathway that supports manufacturers needs beyond the program’s backyard. Through the efforts of the Florida Advanced Technological Education Center for Manufacturing Education (FLATE), Employ Florida Banner Center for Manufacturing, Manufacturers Association of Florida (MAF), Florida Department of Education, and individual manufacturers, Florida is well on its way to creating a unified educational system to support its manufacturing community. This allows Florida to become the first state in the nation to create such a system, to prepare the high-skill workforce needed to sustain and grow manufacturing. The system we are building incorporates secondary Career Academies, post-secondary programs at Technical Schools and Community Colleges, industry certification, easy to use articulation pathways, and incumbent worker training.

A key component of this system is industry certification. This piece of the puzzle facilitates the creation of ready-to-work employees with a nationally portable credential that also serves as an articulation pathway within the academic system. The national certification identified to fill this need is the Manufacturing Skill Standards Council (MSSC) Production Technician certification.

MSSC is a national industry-led organization built upon the U.S. Department of Labor’s efforts to identify the foundational knowledge/skill competencies required for developing and sustaining the nation’s high-performance manufacturing production workforce. These competencies form the backbone of the certification, which is awarded to those workers who pass the certification’s four test areas: Manufacturing Processes and Production, Maintenance Awareness, Quality and Continuous Improvement, and Safety.

These core competencies are essential to all of Florida’s diverse manufacturers, whether they’re building components for the global automotive market, or supplying Florida orange juice to the world. With the unified system now being implemented, manufacturers should start to look for candidates with the certification to arrive at their H.R. departments and plan to reduce the training needed to onboard these prepared employees.

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New Citrus Varieties – What’s on the Horizon?

Fred Gmitter

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Changing the varieties of citrus fruit grown for processing or for the fresh market typically has not been a part of the Florida citrus industry mentality. Changes in the varieties being grown have occurred over time of course, but they have been generally gradual and incremental. However, changing consumer desires and markets, alternative sources of product, and changes to the Florida citrus industry outlook imposed by recently increased disease pressures have made it absolutely essential for the industry to look carefully and aggressively to new varieties to be able to remain competitive and to ensure survival into the future. Competition from an ever-increasing number of product options facing consumers in the marketplace has diluted the amount of their purchasing power that is devoted to citrus fruit and products. The growth of the NFC market has highlighted the importance of having sweet orange varieties available that produce juice consistently across an extended season with better color and flavor attributes. The decline of the grapefruit market, because of adverse publicity and an aging consumer profile, coupled with its great sensitivity to citrus canker, has brought serious consideration to the idea that growing this most important fresh citrus fruit product from Florida may no longer be an economically viable enterprise. The production of seedless and easy to peel Clementine mandarins in Spain and their introduction to the North American market, and recently from California and several other countries as well, has dramatically decreased both financial returns and industry interest in producing the seeded mandarin and tangerine varieties previously grown in Florida. Finally, the recent spread of introduced diseases, citrus canker and especially Huanglongbing (greening), most seriously threatens all segments of the Florida citrus industry, and the need for research and development of disease resistant varieties has never been greater.

There are a number of different efforts underway to address the critical need for all types of new citrus varieties; this presentation will highlight these efforts and the opportunities that may develop. One approach is to look throughout the world for new varieties already developed that may be well-adapted to Florida’s environments, and to import and commercialize these quickly; the exploration of such opportunities is underway, and progress and challenges through this effort will be discussed. The second approach is to look to research programs in citrus breeding and genetics within Florida for the development of new varieties selected for their adaptation to local environmental conditions. Much of the presentation will be focused upon the research being conducted in-state to meet the industry’s needs for new and competitive varieties of orange, grapefruit, and mandarin; examples of the developmental approaches being taken and the impending releases of new varieties will be given. Finally, some examples of the fundamental and cutting-edge research underway (e.g. genomics and biotechnology) to address the most serious disease challenges, as well as other traits important for new variety development and their critical role to the future of the industry, will be presented and discussed.

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An Update on Florida Citrus Nursery and Budwood Programs

Michael Kesinger

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Citrus budwood and nursery production have undergone a quick and dramatic change in response to citrus greening. One year ago, very few nurseries or budwood sources were sufficiently protected against insects vectoring disease; but today nursery production had completely shifted to enclosed production with increased inspection. New nursery stock production regulations took effect January 1, 2007.

New citrus nurseries have to be located at least one mile away from commercial citrus groves to give a degree of separation from disease inoculum sources. Existing citrus nurseries were not required to relocate; however, total enclosure of stock was required along with other sanitary measures. Protective actions resulted in higher nursery production costs, thus resulting in higher nursery tree prices. Double entryways had to be attached to every greenhouse, with air being forced out of the first entry door.

All propagating material has to be protected in greenhouses that meet the same standard as the nursery production houses. Currently 4,386 scion trees are protected in enclosed greenhouses. Increase blocks likewise are required to be totally enclosed. Budwood supplies should be safer now than ever before: with the enclosures, increased inspection and appropriate chemical applications.

Foundation budwood sources are required to be at least 10 miles away from commercial citrus groves, and new budwood greenhouses are being constructed in Levy County at Chiefland, Florida. The new greenhouse ranges will be approximately 70,000 square feet, and are purposed to preserve germplasm, as well as provide a start for nurseries to establish their own scion source trees. A second foundation and germplasm introduction facility is slated for construction on another site in Alachua County. The goal is for nurseries to have enough scion trees so they can be self sufficient in supplying their own increase blocks without bringing outside sources into their nurseries.

Citrus Nurseries propagated over 2.5 million trees this fiscal year compared to 1.4 million trees the previous fiscal year. Hamlins and Valencias continue to be the two most widely produced trees in Florida. Midsweet was the third most popular variety propagated, followed by Rhode Red Valencia and Ray Ruby Red Grapefruit. Swingle Citrumelo continues to be the most popular rootstock for the 19th straight year. Carrizo and Kuharske citrange were the 2nd and 3rd most popular rootstocks utilized.

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Preliminary Information on Effect of Greening on Juice Flavor and Chemistry

Anne Plotto, Greg McCollum and Elizabeth Baldwin

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The delicate flavor of fresh-squeezed orange juice is due to a balance of sugars, acids and a complex mixture of many volatile constituents in the proper proportions. Recently, Huanglongbing (HLB) or citrus greening disease was discovered in Florida. This disease is thought to cause off-flavor in symptomatic fruit (oval and failure to degreen on the stylar end) from severely infected trees. It is of interest to the processing industry to determine what affect fruit from trees of various stages of infection would have on processed orange juice quality. The objective of our work was to determine the effects of HLB on orange juice quality. A preliminary experiment was conducted with Valencia oranges in 2006. Juice was prepared from fruit harvested from HLB-negative trees (non-HLB fruit) and from non-symptomatic fruit harvested from HLB-positive trees in the early stages of disease development (HLB fruit). In this experiment a consumer panel did not perceive differences for juice taste or smell between non-HLB and HLB fruit. An experienced panel, however, did perceive that juice from HLB fruit was sweeter than juice from non-HLB fruit. Since there was a perceived difference by taste, further tests were performed to measure the degree of difference by using the “difference-from-control” test. Difference-from-control tests were performed with filtered or unfiltered juice, to determine the effect of pulp on difference perception. When juice was filtered, panelists could perceive a difference by smell and by taste; when juice was served unfiltered they could only perceive a difference by taste. One of the descriptors that came up frequently for the HLB filtered juice for taste difference was again “sweeter”. Chemical analyses showed that the juice from HLB fruit was higher in Brix/acid ratio than from juice from non-HLB fruit which is in agreement with the “sweeter” perception. No consistent differences in aroma volatiles between juice of HLB and non-HLB fruit. The major difference was that removal of the pulp resulted in lowered aroma levels. The difference-from-control test was repeated in 2007, using juice from Hamlin, Mid-Sweet and Valencia non-symptomatic oranges from HLB-infected and non-infected trees. For each cultivar, fruit were harvested from 5 healthy and 5 HLB-infected trees (moderate infection) and juiced. Rind and juice color, Brix, titratable acidity, and Brix/acid ratio were measured. Few significant differences between HLB and non-HLB fruit were detected. Midsweet juice color score was slightly lower for HLB than non-HLB fruit and early harvest Valencia Brix/acid ratios were higher for HLB compared to non-HLB fruit. Sensory analysis for this study is still being conducted and further analyses of individual sugars, acids, phenolics, and aroma compounds are forthcoming. The importance of this data for commercial blended juice is not likely significant. Study of symptomatic fruit from more severely infected trees is planned to determine the identity and potential confirmation of the reported bitter component.

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