46th Annual Short Course for the Food Industry

The International Citrus & Beverage Conference

September 19-22, 2006
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

Conference Web Site:
www.conference.ifas.ufl.edu/citrus

Project # 0614
Welcome to the 2006 International Citrus & Beverage Conference!

This year's program will focus on some key issues facing the citrus processing and related industries: globalization of the industry, the challenges facing the Florida citrus industry, technology in the processing plants, and new products and markets. The importance of product quality and acceptance has never been greater, and we will have an entire session on flavor and sensory analysis to complement this technical area. 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 Coordinator
University of Florida, IFAS, CREC
Lake Alfred, FL
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Program Committee

Liz Baldwin
USDA-ARS, Citrus & Subtropical Products Lab.
Winter Haven, FL

Richard Bogey
Florida’s Natural Growers
Lake Wales, FL

Robert J. Braddock
University of Florida-CREC
Lake Alfred, FL

Savy DiBenedetto, 2006 Chair
Coca-Cola North America
Houston, TX

Joe Gruber
Enerfab
Ormond Beach, FL

Donald L. Hendrix
Firmenich Inc.
Safety Harbor, FL

David Johnson
Peace River Citrus
Arcadia, FL

Gary Merritt
FMC FoodTech
Lakeland, FL

Howard Nivens
Cargill Juice N.A.
Frostproof, FL

Denise Roth
Southern Gardens, Inc.
Clewiston, FL

Keith Schneider
University of Florida, IFAS, FSHN Dept.
Gainesville, FL

Renée Schneider, Organizer
University of Florida, IFAS, CREC
Lake Alfred, FL

Phyllis Towns
USDA, AMS, FV, PPB
Winter Haven, FL

Douglas P. Van Strijp
Tropicana Products, Inc.
Ft. Pierce, FL

Roger D. Waters
Brown Citrus Systems
Winter Haven, FL

Barry Wilson
Safe Chem Inc.
Zellwood, FL

Alan Wyland
Coca-Cola North America
Apopka, FL

O. Boyd Wynne, III
M.G. Newell Corp.-Tampa Div.
Tampa, FL
Agenda

Wednesday, September 20, 2006
7:30 AM Registration (until 5:00PM)
7:30 AM Morning Refreshments
Sponsored by:
- Vincent Corporation
8:30 AM Welcome
Introductory Remarks
Renée Schneider, UF, IFAS, CREC
Charles Sims, UF, IFAS, FSHN
Mark McLellan, UF, IFAS, Office of the Dean for Research and the Florida Agricultural Experiment Station
Savy Dibenedetto, Program Chair, Coca-Cola North America

Session 1
Worldwide Juice & Beverage Industry

Moderator: Boyd Wynne III, M. G. Newell Corp
9:00AM The Spanish and European Juice Market – José Manuel Miranda, FMC FoodTech S.L.
9:35AM The Chinese Juice and Beverage Industry – Andrew Dixon, Canadean Limited
10:10AM Break
10:30AM International Citrus Pests and Diseases – What’s in Florida’s Future?
   – Harold Browning, UF, IFAS, CREC ................................................................. (p. 3)
11:05AM The Citrus Industry in México – Victor Onchi, Brown International Corporation, LLC ............................................................... (p. 4)

Session 2
Flavors & Sensory Analysis

Moderator: Keith Schneider, University of Florida, IFAS, FHHN
1:30PM Flavor Technology 101 – Doug West, Givaudan Flavors, Corp. ..................... (p. 6)
2:05PM Sensory Evaluation Overview – Charles Sims, UF, IFAS, FSHN ..................... (p. 7)
2:40PM Refreshment Break
Sponsored by:
- Givaudan Flavors, Corp.
3:00PM Identifying Orange Flavor Attributes that Drive Consumer Liking in Selected Global Markets – Carol Karahadian and David Smith, Firmenich ................................. (p. 8)
3:35PM Variability of Color Perception in Agricultural Products – Robert K. McMahan Sr., Electro Optics Inc. .......................................................... (p. 9)
Wednesday, September 20, 2006 (continued)

4:10PM  Awards Ceremony
6:00PM  Networking Social (until 7:00PM)

Sponsored by:
- Brown International Corporation, LLC
- Chemical Systems
- Danisco USA Inc.
- Firmenich
- Industrial Engineering Company
- M.G. Newell Corporation
- PROTEC Sorting Equipment

Thursday, September 21, 2006

7:30AM  Registration (until 5:00PM)
7:30AM  Morning Refreshments

Sponsored by:
- Endress + Hauser USA

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**Session 3**

*Marketing, Nutrition & New Products*

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

8:30AM  The Domestic Juice and Beverage Market – Philana Berry, Givaudan Flavors, Corp. ................................................................. (p. 10)
9:05AM  Programs of the Juice Products Association (JPA) – Patricia Faison, JPA ......................................................................................... (p. 11)
9:40AM  Not from Concentrate (NFC) Futures – Tim Barry, New York Board of Trade................................................................. (p. 13)
10:15AM  Break
10:35AM  Trending New Ingredients in the Marketplace – Diane Hnat, DSM Nutritional Products, Inc. ................................................................. (p. 14)
11:10AM  What’s Hot, What Resonates, What Scares – Dave Schmidt, IFIC ................ (p. 15)

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**Session 4**

*Technology & Information for Processors*

**Moderator:** Robert Braddock, University of Florida, IFAS, CREC

1:30PM  Advances in Aseptic Plastic Bottling – Chris Hoemeke, Sidel
2:05PM  Multi-test Instrumentation – Tom Swenson, Astoria-Pacific International....... (p. 16)
2:40PM  Break
**Thursday, September 21, 2006** (continued)

**Session 4 (continued)**  
*Technology & Information for Processors*

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<td>Automatic Defects Removal for Citrus – Giuseppe Triani, PROTEC Sorting Equipment........................... (p. 18)</td>
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<td>Slush Freezing of Juices and Concentrates – Neil Swift, Alfa Laval Inc. USA</td>
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Sponsored by:  
- ENERFAB, Inc.  
- FMC FoodTech  
- FMC FoodTech FranRica  

**Friday, September 22, 2006**

**Session 5**  
*Citrus Industry Challenges & Solutions*

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

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<td>7:45AM</td>
<td>Breakfast</td>
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Sponsored by:  
- Bell Chem Corp.  
- BioSun Flavors & Food Ingredients  
- Cargill Juice N. A.  
- HT/DCR Engineering, Inc.  
- Safe Chem Inc.  

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<td>A Future Look at the Industry from an Economic Perspective – Thomas Spreen, UF, IFAS, FRE .............................................................................................................................................. (p. 19)</td>
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<td>9:05AM</td>
<td>Long-range Weather Planning and Trends – John Winter, WFLA-TV</td>
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<td>Mechanical Harvesting: Advances and Setbacks – Fritz Roka, UF, IFAS, SWFREC ................................. (p. 20)</td>
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<td>10:15AM</td>
<td>The Detection of Huanglongbing (Citrus Greening) and the Potential Effects of the Disease on the Florida Industry – Michael Irey, United States Sugar Corporation .................................................................................................................. (p. 21)</td>
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The International Citrus & Beverage Conference
Presentation Summaries

Listed in order of presentation.
International Citrus Pests and Diseases – What’s in Florida’s Future?

Harold W. Browning
University of Florida, IFAS, Citrus Research & Education Center, Gainesville, FL, USA

Florida citrus has been host to a progression of exotic pest and disease organism introductions since the original citrus plants were brought to the state. It is postulated that much of the natural fauna associated with citrus was moved with early distribution of citrus trees across the world. Despite long-standing regulatory prohibition and layers of safeguards, exotic arthropods and pathogens affecting citrus appear to be streaming into Florida. Within the past 15 years, significant introductions include citrus leafminer, citrus canker, brown citrus aphid, Asian citrus psyllid, pink hibiscus mealybug, and most recently, Huanglongbing, or citrus greening and possibly stem-pitting tristeza virus. The status of these new pests and diseases is presented with reference to how they affect Florida citrus production and utilization.

Looking forward, we can anticipate that this trend will continue, and in fact, some predict with acceleration. Increased travel and commerce allow for greater opportunity for introduction of exotic pests and diseases, and magnify the logistical difficulties in detection of potential exotic pests at ports of entry.

Recent threat assessments have focused on those pests and pathogens that are known to affect citrus production in other regions of the world, and have organized information from which predicted impacts on Florida citrus can be derived. Among the diseases subjected to this threat assessment are citrus variegated chlorosis, citrus black spot, citrus leprosis, phaeoramularia leaf spot, citrus chlorotic dwarf, stubborn, and sweet orange scab. citrus canker and greening also were included in this threat assessment. Not all of these pathogens pose an equal hazard and a number of factors can affect the potential risk posed by each pathogen. One factor is the economic impact the disease could have in Florida and whether the effects would be on fresh fruit, fruit for processing or both. A second factor is the probability that the pathogen could be introduced and whether local conditions would favor establishment and spread. The range of cultivars affected is also important since some pathogens may affect only certain specific varieties while others have a broad host range. A fourth factor is the ability to rapidly detect and recognize the pathogen. Finally, a highly important factor is the potential to control the disease and the costs that would be involved. A thorough assessment of each disease may require inputs from pathologists, entomologists, horticulturists, epidemiologists and economists and some vital pieces of information may be lacking or hard to verify. Summary information from recent assessments is presented. Similar threat assessments can be made for citrus arthropods, and some information relating to those with greater potential to affect Florida is presented.

Contact Information: Harold W. Browning, Center Director and Professor, University of Florida, IFAS, Citrus Research & Education Center, 700 Experiment Station Road, Lake Alfred, FL 33850; Phone: 863 956-1151; Fax: 863 956-3579; Email: hwbr@ufl.edu
México has an interesting variety of citrus that develop under quite different geographical areas presenting unique fruit characteristics, from Semi-arid to Rain Forest going by Mountain and Coastal areas. Production of citrus puts our country in fourth place worldwide presenting interesting opportunities for growth and industry anxious to fulfill empty pockets that Mother Nature and diseases are creating through the most important production citrus areas in the world. With citrus exports exceeding a million MT last year, Mexico has become the fourth exporter of citrus worldwide. As the citrus from Florida in the US suffers from quarantine measures, the Mexican citrus exports in 2006 could even break the record exports of 2005.

Our citrus growing conditions are poorly developed and mostly free of any major disease problem. Orange yields per hectare are slightly above one third of what its being achieved on countries with more technology and investment to growing areas. Potential to emerge into a more reliable and solid citrus producing country is clear when our surface area dedicated to orange groves is the second largest in the world, just after Brazil. Key Limes are very important in México and puts the country as the global leader in the production and process of this variety. Persian Limes, Grapefruits and Tangerines are also important and create the citrus pallet of this productive citrus country.

Diseases such Greening, CVC, of Citrus Canker affecting other important citrus growing areas around the world have not landed in México on form that its presence is a factor currently affecting productivity. Tristeza has been reported in México without the presence of distribution vector, so at present time is in latent stage, while a program to change rootstocks has started to increase resistance to this threat. Fruit fly is one of the strongest problems affecting oranges aspect and pulp recovery in some areas.

Strong fresh consumption of citrus competes directly in fruit supply with the industry but also offers great growth potential for processed juice once that habits of México’s population are beginning to accept squeezed juices as oppose to fresh fruit or home made juice.

Industry shows two important and well defined areas, first one juice extraction oriented and the second essential oil extraction oriented, the first located on the Gulf of México area processing oranges, grapefruits, tangerines and Persian limes, second one is located on the West coast of México where Key Limes are grown and processed, only exception for this area are Lemons grown for oil extraction primarily and located on Northeast and Yucatan areas. In general industry has been susceptible of many factors out of our control creating an inconsistent production, domestic market is beginning to growth in lieu of better economy conditions, yet another opportunity for citrus processing plants. New safety and quality regulations have been taken seriously by industry improving its process practices to international standards.

Global context look into México as an area where rapid globalization is taking place by having access to several free trade agreements through the world with the most developed areas such North America, Europe Union and Japan, and its economic conditions favor industry development under a country working its way to become a developed partner. Dynamic markets
and consumption trends are observing very close to México as an area of opportunity in front of weather, disease and production problems in other parts of the world.

Contact Information: Víctor Francisco Onchi Navarro, Brown International Corporation, LLC, Frontera No. 114, Montemorelos, NL, 67520 Mexico; Phone: Phone + 52 (826) 263-2322; Email: victor.o@brown-intl.com
Flavor Technology 101

Doug West  
Givaudan, Cincinnati, OH, USA

The use of flavors in beverages is a dynamic process. The type of flavor required, the physical characteristics desired in the finished beverage, the packaging used, and other factors all affect the flavor formulation. This will be a brief look into how ingredients are chosen and how flavors are formulated in order to deliver finished beverages that are acceptable by consumers.

Contact Information: Douglas West, Givaudan, 1199 Edison Dr., Cincinnati, OH 45216; Phone: 513-948-3492; Email: doug.west@givaudan.com
Sensory Evaluation Overview

Charles Sims
University of Florida, Gainesville, FL, USA

The flavor of foods is arguably the most quality attribute overall and is typically measured by sensory tests. It is important to select the proper sensory test and panelists, and pay attention to the details involved in collecting and analyzing sensory data. There are several types of sensory tests that are routinely used, and each has different objectives. Difference tests, such as the triangle and duo-trio, are used to determine if panelists can detect a difference between 2 products. These tests are usually used when differences are relatively small and may be used as the first step in a series of sensory tests. Consumer acceptability or preference tests are used to measure how much consumers like a product or which product they prefer. The 9-point hedonic scale is often used to measure the likeability of products, and the paired comparison test is often used to judge which of two products is the most preferred. Descriptive analysis uses small groups of well-trained panelists to describe and rate the sensory characteristics of products. Descriptive analysis can give valuable information on which sensory characteristics differ between products, and is often related to consumer acceptability.

Contact Information: Charles Sims, University of Florida, Food Science & Human Nutrition, PO Box 110370, Gainesville, FL 32611-0370; Phone: 352-392-1991 ext.202; Fax: 352-846-1157; Email: casims@ifas.ufl.edu
Identifying Orange Flavor Attributes that Drive Consumer Liking in Selected Global Markets

Carol Karahadian  
Firmenich SA, Geneva, Switzerland

David Smith  
Firmenich, Inc., Princeton, NJ, USA

Consumer food product companies are faced with the challenge of identifying the right flavour character of a given product for the markets they serve. For cost reasons, many multinational companies try to standardize the flavor profile of a product that is sold multiple countries. For some foods or product categories, limited success for this objective can be achieved, but often taste preferences from country to country vary widely and this approach is often abandoned. There are many factors that influence consumer preferences. Cultural cuisines and familiar foods play a substantial role in product/flavour acceptance and food choice. As a supplier of flavours in the worldwide market, Firmenich carried out a study to identify attributes of orange flavour in a PSD application that drive consumer acceptance and should be considered for a given market.

23 top selling orange flavoured PSD market products from 13 different countries were purchased from the respective local markets for descriptive flavour profile evaluation. Products from Brazil, China, Colombia, France, Germany, India, Indonesia, Mexico, Philippines, Singapore, Switzerland, UK and the US were included in the study. Of the 23 market products, 9 were chosen for consumer testing because their profiles covered a wide range of orange character. Those products were then evaluated for consumer acceptance in designated countries to determine what attributes drive liking for a particular country.

General findings indicated that in all countries where consumer testing commenced, juicy and/or peely characteristics of the orange flavor were positive drivers of liking. Specific details of findings for selected countries will be discussed during the presentation as well as how this information can be used to assist in identifying the desired profile of an orange flavoured still beverage for a particular population.

Contact Information: Carol Karahadian, Firmenich SA, Rue de la Bergère 7, CH-1217 Meyrin 2 Geneva, Switzerland; Email: carol.karahadian@firmenich.com

David Smith, Firmenich, Inc., P.O. Box 5880 Princeton, NJ 08453
Variability of Color Perception in Agricultural Products

Robert K. McMahan Sr.
Electro Optics Inc., Winter Park, FL, USA

The human eye perceives color based on a number of factors. Those include the source of illumination, the characteristics of the object and the visual sensation of the viewer. The presentation discusses these 3 functions and how the variability of each effects the perception of color.

Discussed is the methods by which we describe color in numeric values so that one can discuss color differences without seeing the product. Discussed at length are the factors that effect color with an emphasis on citrus and related product.

Contact Information: Robert K. McMahan Sr., Senior Applications Engineer, Electro Optics Inc., 2160 Park Ave N, Winter Park, FL 32789; Phone: 407.645.1000; Fax: 407.644.9000; Email: Bob@OrlandoResearch.com
The Domestic Juice and Beverage Market

Philana Berry  
Givaudan Flavors, Corp., Cincinnati, OH, USA

As more and more consumers shift toward healthier lifestyles, they continue to closely dissect the foods and beverages that they consume. This focus has created negative growth in the juice and juice drink category as consumers express concern for the high sugar content in many juices. As such, beverage manufacturers are looking at new and exciting ways to deliver alternatives to current juice offerings. In addition, manufacturers are looking at how to position juices favorably so that offerings are clearly aligned with the health and wellness movement. This presentation looks at some of the current trends that manufacturers are considering as they seek out ways to reverse the negative growth trend.

Contact Information: Philana Berry, Givaudan, 1199 Edison Dr, Beverage Marketing, Cincinnati, OH, 45216; Phone: 513-948-2367; Email: philana.berry@givaudan.com
Programs of the Juice Products Association

*Patricia Faison*

Juice Products Association, Atlanta, GA, USA

JPA is the trade association representing the fruit and juice products industry. We represent processors, packers, extractors, brokers and marketers of fruit and vegetable juices, juice beverages, fruit jams, jellies and preserves, as well as industry suppliers and food testing laboratories. JPA also includes firms engaged in the trading of orange juice futures and/or options contracts on behalf of JPA processor members.

JPA was formed in 2003 from the consolidation of two well-established trade associations, the National Juice Products Association (NJPA) and the Processed Apples Institute. In 2005, the Association brought into its membership the former members of the International Jelly and Preserve Association and the Concord Grape Association. JPA encompasses 128 member companies.

JPA sponsors two meetings per year: the Annual Meeting held in April/May and the Fall Business Meeting held in November. JPA also hosts the biennial International Economic Outlook Conference.

Under the JPA umbrella are 12 Committees. The Governmental Affairs and Technical Affairs Committees are the largest and most active. The Technical Affairs Committee monitors and addresses domestic and international issues of a technical, scientific and regulatory nature affecting the juice industry. Activities under this Committee’s purview include updates to the JPA Model Tanker Wash Guidelines for the Fruit Juice Industry, maintenance of the JPA pesticides, patulin and heavy metals database, and overseeing the JPA-sponsored research undertaken by the University of Florida to validate the JPA tanker wash guidelines.

On the regulatory and legislative front, JPA is the voice of the juice industry and has provided numerous comments to Federal, state and international agencies. JPA is currently developing comments to the USDA regarding the August 2006 proposed rule to revise the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). This year, JPA has provided comments to the FDA on food coloring, CGMP Modernization and the Center for Food Safety and Applied Nutrition (CFSAN) 2007 Program Priorities. JPA also contributes industry input to Codex on a number of issues, including food additives, the Codex General Standard for Fruit Juices and Nectars and the draft Codex Standard for Jams, Jellies and Marmalades.

JPA just entered year two of its Pro-Active Communications Program designed to promote the healthfulness of 100% juice and counter negative publicity about juice contributing to obesity.

JPA, along with the Food Products Association conducted a CARVER (Criticality-Accessibility-Recuperability-Vulnerability-Effect-Recognizability) + Shock vulnerability assessment for the juice industry. This 2005 exercise led to the identification of juice processing critical nodes that can be most susceptible to intentional contamination, and the development of guidelines to boost security in these parts of processing facilities. Done in coordination with the FDA, the intent is to demonstrate to the Federal Government that the juice industry is taking pro-active steps to address food security, and hopefully forestall any regulatory action.

JPA is managed by the Kellen Company, the premier association management company with offices in Atlanta, Georgia; Washington, D.C.; New York, New York; Tucson, Arizona and Brussels, Belgium.

Contact Information: Patricia Faison, Juice Products Association, 1100 Johnson Ferry Road, Suite 300, Atlanta, GA, 30342; Phone: 404-252-3663; Fax: 404-252-0774; Email: pfaison@kellencompany.com
Not From Concentrate (NFC) Futures

Tim Barry
New York Board of Trade, New York, NY, USA

This presentation provides an explanation of the terms and conditions of the new Not From Concentrate Futures contract to be introduced later this year by the New York Board of Trade, along with an explanation of the rationale behind the new contract.

The presentation includes:

1. A brief introduction to NYBOT, its products and trading system.
3. The terms and conditions of the existing Frozen Concentrated Orange Juice futures contract.
4. A review of relevant commercial market developments that have led to changes in the FCOJ contract and that have now led to the new NFC future contract.
5. Terms and conditions of the new NFC future contract.

Contact Information: Tim Barry, New York Board of Trade, 1 North End Avenue, New York, NY 10282; Phone: 212 748-4096; Email: tbarry@nybot.com
Trending New Ingredients in the Marketplace

Diane Hnat
DSM Nutritional Products, Inc., Parsippany, NJ, USA

What are the consumer and the food industry looking for in the way of innovative ingredients? Where do these ingredients come from? The North American marketplace is a unique portfolio of supplements and various food and beverage categories unlike ROW. The plethora of information readily available to consumers on health conditions and basic natural and synthetic ingredients, which they can access, allows them to seek and try many substances. As consumer awareness levels about health beneficials increase, industry market research can track and trend it.

Contact Information: Diane Hnat, DSM Nutritional Products, Inc., 45 Waterview Boulevard, New Business Development, Parsippany, NJ 07054; Phone: 973-257-8322; Fax: 973-257-8675; Email: diane-louise.hnat@dsm.com
What's Hot, What Resonates and What Scares

David B. Schmidt  
President & CEO, International Food Information Council (IFIC), Washington, DC, USA

Learn which food safety and nutrition topics are foremost on consumer minds and covered by the news media. Using data from the International Food Information Council’s extensive consumer research on topics from obesity, food biotechnology, sugars, low-calorie sweeteners and others, Dave Schmidt will highlight which issues are of greatest concern to consumers and what implications that may have for communications. The impact of media coverage on ingredient issues, such as benzene, and emerging topics, such as nutrigenomics and nanotechnology will also be addressed.

The International Food Information Council communicates science-based information on food safety and nutrition to journalist, health professionals, government officials and others providing information to consumers. IFIC is supported by the broad-based food, beverage and agricultural industries.

Contact Information: David B. Schmidt, International Food Information Council (IFIC), 1100 Connecticut Avenue, NW, #430, Washington, DC 20036; Phone: 202-296-6540; Fax: 202-296-6547; Email: schmidt@ific.org
The use of the continuous segmented-flow analyzer (SFA) has been in use in many different industries for the rapid analysis of various compounds. Applications in the citrus industry are being explored for such common tests as Scott’s Oil (Total Recoverable Oils), Vitamin C and Calcium in orange and grapefruit juices. Benefits realized with SFA instrumentation are (1) greatly reduced usage of hazardous and flammable reagents, (2) more consistent results and (3) a large reduction in personnel-hours necessary to manually perform these tests in the Quality Control environment. However challenges associated with the analysis of juices remain, and industry input is essential to successful application of the technology.

Contact Information: Tom Swenson, Astoria-Pacific International, PO Box 830, Clackamas, OR 97015; Phone: 321-409-1195; Fax: 321-409-1882; Email: tom@astoria-pacific.com
Applying Bio-Pharm Valve Technology to Aseptic Citrus and Beverage Applications, including Aseptic Sampling

Carl Taylor  
Crane Co, Rancho Palos Verdes, CA, USA

The weir type diaphragm valve is the preferred valve concept for use in aseptic pharmaceutical and bio-technology applications. Bio-tech applications include service on FDA and USP regulated water and biological processes where the highest levels of sterility, hygienic performance and integrity are required.

Key advantages of diaphragm valve design include:

- Positive closure
- Free draining design
- Top entry design
- Crevice free design
- Isolating diaphragm

Diaphragm valves are used in aseptic food and beverage processes but the full potential application of the valve concept has not been realized.

The diaphragm valve design can be manufactured in configurations that reduce wetted area and volume and allow for custom solutions for critical applications such as aseptic sampling. This presentation will include a design that allows simple, reliable sampling of aseptic storage tanks and processing lines.

Contact Information: Carl Taylor, Crane Co, 12 Sweetbay Road, Saunders, Rancho Palos Verdes, CA 90275; Tel: 310-377-8190; Fax: 310-377-8192; Email: carl_taylor@cranevalve.com
Automatic Defects Removal for Citrus

Giuseppe Triani  
Protec s.r.l., Protec Sorting Equipment, Collecchio, Parma, Italy

The presentation explains a new sorting system for semi-liquid citrus products. This sorting system is based on a vision system. The vision system will be explained, including its main components, high speed cameras, special lighting, hardware and software. A key point is the unique defects rejection system based on an array of suction devices. The system can detect most of the defects that normally affect citrus pulp, such as black and dark spots, flavedo, and other contaminants. The optical sorter can handle a variety of products, including orange, grapefruit, Clementine cells and pulp.

The automatic sorter equipment derives from a concept already used by the processors. Usually workers removed defects by means of a small vacuum tube. The technology presented improves effectiveness, reliability, capability to work without interruption, and is typical of the automatic systems, with the highest flow rate.

The vision concept will be showed and explained through the following steps:

- One or more cameras look at the product flowing on a conveyor belt.
- A special type of light illuminates the product from the top.
- The belt is translucent, so the illumination system can light the product from the bottom.
- The lighting will be discussed, with an explanation of how some wavelengths enhance some contaminants.
- The vision system then observes the defects on the product’s surface and within the product.
- When a defect is detected the imaging system gives a command to a set of high speed valves. Specific nozzles, by means of vacuum, suck the defects from the product stream and convey them into a tank.
- Vacuum is continuously kept by means of one or more vacuum pumps. The vacuum is continuously checked and some functions of the machine can dynamically vary depending on condition of product and level of defects.

The rejected product is stored into a tank, and periodically emptied. The wasted product is then recovered and re-processed to obtain a second quality product for other purposes. The sorter is normally placed at the end of the process line but before the pasteurizer. The type of product that can be run on the machine will be discussed.

Cleaning is one of the most important issues for citrus process machinery. This sorting technology addresses this issue by including an automatic CIP system that helps the maintenance personnel to sanitize all the parts that come in contact with the product. Data demonstrating improvement of quality of the final product will be shown through pictures and graphs, while operation of the machine will be shown through video clips and pictures.

Contact Information: Giuseppe Triani, Protec s.r.l., Via Nazionale est 19, Collecchio, Parma, 43044, Italy; Tel: 390521800800; Fax: 390521802311; Email: g.triani@protec-italy.com
A Future Look at Industry From an Economic Perspective

Tom Spreen
University of Florida, Food Resource & Economics Department, Gainesville, FL, USA

The Florida citrus industry is facing many new challenges including new diseases such as citrus greening and canker, rising rural land values in Florida, and labor shortages stemming from concerns regarding illegal aliens. The citrus industry in Brazil faces its own challenges including disease pressure and competition for land from sugarcane. These challenges are discussed and their implications on production, cost of production, and prices are quantified. The production/price forecast is used to assess future directions for the industry.

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Mechanical Harvesting: Advances and Setbacks

Fritz Roka
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Citrus mechanical harvesting has the potential of reducing grower costs of harvesting by at least 75 cents per box, thus increasing grower returns by as much as $300 per acre. Before realizing this potential, however, capacity of the existing systems must be greatly expanded. The objectives of this presentation are to outline the major impediments to grower adoption and to separate which impediments can be overcome with an effective education and extension program and which require a research agenda.

UF/IFAS has launched a website that provides comprehensive information on the Institute’s mechanical harvesting efforts. Please visit http://citrusmh.ifas.ufl.edu/index.asp for more information.

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Huanglongbing (HLB = citrus greening) is widely regarded as one of the most serious diseases of citrus worldwide. It is the major limiting factor for citrus production in parts of Asia and Africa. In areas where the disease is endemic, citrus trees may live for 5-8 years and never produce usable fruit. The disease is caused by species of bacteria in the genus Candidatus Liberibacter. To date, three species of Candidatus Liberibacter have been described, including Candidatus Liberibacter asiaticus, Candidatus Liberibacter africanus, and Candidatus Liberibacter americanus. Citrus greening pathogens are transmitted by insect vectors in the family Psyllidae but they can also be transmitted by grafting and by dodder. Although the disease is caused by bacteria, it is not spread by casual contamination of personnel and tools or by wind and rain as is the case with citrus canker.

HLB was discovered for the first time in the western hemisphere in Brazil in 2004 and then in the United States in Florida in August, 2005. To date, the Asian form of HLB, caused by Ca. L. asiaticus, is the only form of HLB that has been found in Florida. In Brazil, both Ca. L. asiaticus and Ca. L. americanus have been detected. The disease often can be recognized in the field by both foliar and fruit symptoms. Early symptoms of HLB are small yellow leaves on one limb or section of the tree canopy. However the most diagnostic symptoms of HLB are a leaf mottling that often ignores the leaf veins. Although symptoms can provide strong evidence that HLB is present, confirmation testing is usually performed using molecular diagnostic techniques. Among the recommended disease management measures for HLB are the use of disease-free propagation material, the removal of infected trees (roguing), and control of the insect vector by means of multiple applications of insecticides.

Although the disease epidemics are in their early stages in both Florida and Brazil, it is readily apparent that HLB is spreading in both commercial and residential citrus plantings and that the presence of the disease will have negative impacts on the cost of production in both countries. Among the expected impacts of HLB that will be discussed are:

1) Increased tree mortality
2) Possible reductions in yield
3) Increased production costs due to increased insect control measures
4) Increased production costs due to roguing
5) Increased grove replanting costs
6) Reduction in the availability of nursery trees
7) Possible reductions in juice quality

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