Day-by-Day Program Schedule

106th Annual International Conference of the American Society for Horticultural Science

Millennium Hotel, St. Louis, Missouri

Note: An asterisk (*) in front of a name indicates the presenting author.
The schedule is subject to change.

Friday, 24 July 2009

7:00 am–7:00 pm

Nut Tour at the Horticulture and Agroforestry Research Center

Sponsored by the Temperate Nut Crops (NUTS) Working Group

This tour will highlight northern pecan, eastern black walnut, and Chinese chestnut research at the University of Missouri Horticulture and Agroforestry Research Center (HARC) in New Franklin, Missouri. Cultivars in the clonal repositories will be featured, a trellised walnut planting, rootstock trials, as well as a unique flood tolerance laboratory. Breeding, cultivar/rootstock selection, propagation, crop management, and marketing research will be discussed. Harvest and hulling equipment designed for these crops will be displayed. Snacks and lunch will be provided.

9:00 am–5:00 pm **Field**

ASHS Board of Directors Meeting

Chair–Mary Peet; President–John R. Clark; President-elect–William J. Lamont; Education Division–Dennis Ray; Extension Division–Richard Durham–Industry Division, Neal De Vos–International Division, John Griffis–Research Division, Marc van Iersel–Treasurer and Finance Committee Chair–Carl Sams; Publications Committee Chair–Louise Ferguson

1:00–5:30 pm

Missouri Botanical Garden and Forest Park: Professional Tour

Departure Site: *front of the Millennium Hotel at 4th Street*

Founded in 1859, the Missouri Botanical Garden is the nation's oldest botanical garden in continuous operation and a National Historic Landmark. The Garden is a center for botanical research and science education, as well as an oasis in the city of St. Louis. This itinerary includes an overview of Forest Park, one of the largest city parks in the United States. Cost: $48.00 per person

12:00–5:00 pm **Assembly Area**

Exhibitor Set-up

Exhibitors may set up at their booths in assigned spaces located in the Assembly Area.

2:00–5:00 pm **Illinois/Missouri/Meramec**

Poster Set-up

Presenters may hang posters in their assigned spaces on boards located in the Illinois/Missouri/Meramec rooms.

7:00–10:00 pm **Laclede**

Ag*Idea Committee Meeting—Session 1

The Great Plains Initiative has spawned a new project called the Ag*Idea. Ag*Idea is a course-swap/degree program model for distance education. Currently, there are about 15 institutions that are cooperating in this program at both the BS and MS levels. This meeting will focus on long-term program planning.

Saturday, 25 July 2009

7:00–10:00 am **Assembly Area**

Exhibitor Set-up

Exhibitors may set up at their booths in assigned spaces located in the Assembly Area.

7:00 am–12:00 pm **Illinois/Missouri/Meramec**

Poster Set-up

Presenters may hang posters in their assigned spaces on boards located in the Illinois/Missouri/Meramec rooms.

7:30 am–6:00 pm **St. Louis East**

Registration Open–Saturday

8:00–9:00 am **Jefferson D/E**

Working Group Chairs and Chairs Elect Meeting

Presiding: John R. Clark

All Working Group Chairs/Chairs-Elect are asked to join ASHS leadership at this session to discuss the responsibilities and requirements for each Working Group. We will detail processes, procedures and deadlines for *required* Working Group reports.

8:00–10:00 pm **St. Louis West**

Ag*Idea Committee Meeting—Session 2

Continuation of the Saturday evening session.

8:00–10:00 am **Soulard**

Pyrus Crop Germplasm Committee Meeting

Chair: Richard Bell

9:00–10:00 am **Jefferson B**

Consumer Horticulture and Master Gardeners (CHMG) Working Group Business Meeting

Chair 2008–09: Angela O'Callahan

The CHMG Working Group's objectives are to familiarize members with cooperative extension home horticulture programs within the United States, to identify and develop the ability to respond to home horticulture information needs, and to improve methods of information delivery to home horticulture audiences.

9:00–10:00 am **Shaw**

Continuing Education Committee Meeting

Committee members: John R. Clark, *Chair*; Richard Campbell, Janet Cole, Matt Kleinhenz, Craig Campbell, Dennis T. Ray, John Griffis, Marc van Iersel, Neal E. De Vos, and Richard Durham

9:00–10:00 am **Field**

Graduate Student (GRAD) Working Group Business Meeting

Chair 2008-09: Amanda Hershberger

The GRAD Working Group provides a formal organization for Graduate Students in ASHS to support programs and issues facing Graduate Students in Horticulture.

9:00–10:00 am **Chouteau**

Moderators Training Session

Chair: Carl Sams, Dennis Ray

This session will detail the processes associated with moderating a session during the ASHS conference. You will meet the on site Audio Visual staff and go over the procedures requested to fulfill the moderator duties.

9:00–10:00 am **Laclede**

Postharvest (PH) Working Group Business Meeting

Chair 2008-09: Jinhe Bai

The PH Working Group: 1) exchanges ideas and information relating to postharvest biology and technology of horticultural crops; 2) increases the awareness among other researchers, research administrators, legislators, and the public of the importance of the postharvest aspects of horticulture to the physical, economic, and psychological well-being of the population; and 3) integrates activities with those of associated Working Groups.

9:00–10:00 am **Jefferson F**

Viticulture and Small Fruits (VSF) Working Group Business Meeting

Chair 2008-09: Joseph C. Scheerens

The VSF Working Groups' objectives are: 1) to study the improvement, production, propagation, and culture of small fruit and grape crops; 2) to perform services for the Society and the general public in the area of small fruits and grapes; and 3) to exchange current information on recent research findings and educational and industry problems.

10:00–12:00 pm **Mississippi**

ASHS 2009 Awards Ceremony

Presiding: John R. Clark, ASHS President

Presentation of the following ASHS Awards for 2009:

- Hall of Fame Inductee
- Class of Fellows
- Outstanding Extension Educator
- Outstanding Graduate Educator
- Outstanding Undergraduate Educator
- Outstanding Industry Scientist
- Outstanding International Horticulturist
- Outstanding Researcher Award
- Publication Awards: Cross-Commodity; Extension; Education; Fruit; Ornamental; and Vegetable

10:00 am–12:00 pm **Mississippi**

ASHS Opening Plenary Session and William A. "Tex" Frazier Lecture

Sponsored by Seminis Vegetable Seeds

Seminis®

Keynote Speaker: **Peter H. Raven**,
President of the Missouri Botanical Garden

(See inset on p. 921)

10:30 am–4:00 pm

Historic Neighborhoods and Beautiful Blooms Sightseeing Tour

Departure Site: *front of the Millennium Hotel at 4th Street*

This driving overview of the Soulard and Lafayette Square neighborhoods includes stops at the Soulard Market and Missouri Botanical Garden. Soulard is a delightful, old working-class neighborhood, which boasts the oldest continuous farmers market west of the Mississippi River. En route to the Missouri Botanical Garden drive through Lafayette Square, which features renovated Victorian mansions and row houses surrounding Lafayette Park—the oldest public park west of the Mississippi. Next, enjoy nature

The William A. "Tex" Frazier Lecture is sponsored by Seminis Vegetable Seeds, Inc.

Keynote Speaker:

Peter H. Raven
Director, Missouri Botanical Garden

The American Society for Horticultural Science welcomes **Peter H. Raven** as the 22nd William A. "Tex" Frazier Lecturer. Dr. Raven is President of the Missouri Botanical Garden, a world-class center for botanical research and education, and horticultural display.

Described by *Time* Magazine as a "Hero for the Planet," Raven champions research around the world to preserve endangered plants and is a leading advocate for conservation and a sustainable environment. He is the recipient of numerous prizes and awards, including the International Prize for Biology from the government of Japan and the U.S. National Medal of Science.

About the Tex Frazier Lecture Series:

The Tex Frazier Lecture series was named in honor of William A. "Tex" Frazier, an eminent member of the faculty at Oregon State University. The intent of the lecture series is: "to foster and promote reciprocal liaisons between ASHS and other professional groups; to recognize distinguished scholars and to bring their point of view to ASHS members; and to encourage the development of a holistic philosophy within the horticultural science profession so that ASHS members and students can enjoy the benefits of a broader perspective provided by an understanding of the interrelationship of seemingly diverse disciplines."

Past William A. "Tex" Frazier lecturers include: (2008) **Philip E. Nelson,** the 2007 World Food Prize Laureate, Purdue University; (2007) **Bruce A. Kimball,** Soil Scientist, Arid-Land Agricultural Research Center, Maricopa, AZ; and (2006) **Paul Soniat,** Director, New Orleans Botanic Garden

Did you know . . . .

The Climatron at the Missouri Botanical Garden, built in 1960, was the world's first climate-controlled geodesic dome designed as a greenhouse. Today, it houses a recreated rain forest filled with plants and uses E-feron glass to help it use solar energy more efficiently. The Garden also is the site of the largest Japanese Garden in North America.
Source: St. Louis Convention & Visitors Commission

at it's finest at the Missouri Botanical Garden. The oldest botanical garden in the country and a National Historic Landmark, the Garden has been internationally recognized for horticulture, education and scientific research since it is founding in 1859. Cost: $65.00 per person.

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Crop Physiology/Physiology: Cross-Commodity

(41) Growth and Salinity Tolerance of *Zinnia elegans* When Irrigated with Wastewater from Two Distinct Growing Regions in California

*Christy T. Carter, Catherine Grieve

(42) Rheological Properties of Water-soluble Polysaccharide in Peach Gum from Almond (*Prunus dulcis*)

Sen Wang, Lin Zhang, *Deyi Yuan, Qiuping Zhong, Yina Li

(43) Oleocellosis Damage of Fruitlets in Late Season Mechanical Harvested 'Valencia' Trees Does Not Affect Fruit Quality

*Juan Carlos Melgar, Jill Dunlop, James P. Syvertsen

(44) Phloem Development in Sweet Orange Pedicels

*Libia Laskowski, Dra

(45) Pollination and Growth Regulators on Productivity of Olive Tree Under Dessert Conditions in México

*Raul Grijalva-Contreras, R. Macias Duarte, A. Lopez Carvajal, Fabián Robles Contreras, M.J. Valenzuela Ruiz, F. Nuñez Ramirez

(46) Comparison of Commercial Sunburn Protection Products

*Ines Hanrahan, Tory R. Schmidt, James McFerson

(47) Effects of Ethylene Associated Compounds on In Vitro Growth and Differentiation of *Cymbidium sinense* Rhizomes in Media for Rhizome Propagation and Shoot Differentiation

*Yao-Chien Alex Chang, Jhen-Ying Pan, Nean Lee

(48) Programs to Increase Fruit Size and Yields in Stone Fruit

*Ines Hanrahan, Tory R. Schmidt, James McFerson

(49) Soluble Fertilization with Ammonium-Calcium and the Effect on Production of Vegetative Shoots in Mexican Lemon [*Citrus aurantifolia* (Christ.) Swingle]

Marcelino Bazán-Tene, Tirzo Noé Tejeda-Chávez, José María Anguiano-Cárdenas, Javier Farias-Larios, Sr., Salvador Guzmán-González, *José Gerardo López Aguirre

(50) Phenolic Content, Antioxidant Capacity and Cytotoxicity of Whole and Fractioned Pawpaw Extracts

*Hideka Kobayashi, Changzheng Wang, Kirk Pomper

(51) Performance of Rabbiteye Blueberry (*Vaccinium ashei*) Cultivars in North Alabama

*Elina Coneva, Jeff Sibley, Arnold W. Caylor

(52) Maintaining Quality and Reducing Decay of Berry Fruits with Plant Volatile Oils

*Chien Wang

(53) Retrograde Vesicles from the Vacuole Regulate Tonoplast Surface Area During Sucrose Uptake by Fluid Phase Endocytosis

*Ed Etxeberria, Pedro Gonzalez, Javier Pozueta

(54) Influence of Mineral Nitrogen and Glycine Concentrations on Growth and Nitrogen Assimilation Enzymes of Tomato (*Solanum lycopersicum*) Seedling Under Aseptic Hydroponic Cultivation

*Danfeng Huang, Tida Ge, Shiping Wang

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Genetics/Germplasm/Plant Breeding: Biotechnology

(310) Evaluation of a Transgenic Lettuce with Big-vein Disease Resistance for Biosafety Assessment

*Yoichi Kawazu, Yuji Noguchi, Masaharu Kubota, Hidekazu Ito, Hiroyuki Fukuoka

(311) Isolation of a MYB Transcription Factor Regulating Red Coloration of the Skin of Apple Fruit

*Sornkanok Vimolmangkang, Yuepeng Han, Schuyler Korban

(312) Full Length cDNA Sequence of Pear (*Pyrus bretschneideri* Rehd.) S29-RNase and S29-Allele Identification

*Lin Zhang, Xiaofeng Tan, Donglin Zhang, Yan Shen, Deyi Yuan

(313) Analysis of Seed-Expressed Sequence Tags in *Vernicia fordii*

Lushan Xie, Xiaofeng Tan, *Lin Zhang, Donglin Zhang, Hongxu Long, Jiao Hu

(314) SAD and FAD2 cDNA Genes Cloned from *Camellia oleifera* Abel

Xiaofeng Tan, Hongpeng Chen, Dangquan Zhang, Lin Zhang, *Donglin Zhang

(315) Identification of Two Calmodulin cDNA Genes for *Camellia oleifera* Abel

Baoming Wang, Xiaofeng Tan, Lin Zhang, *Donglin Zhang

(316) Cloning Cyclophilin cDNA Gene from *Camellia oleifera* Abel

Xiaofeng Tan, Baoming Wang, Lushan Xie, Lin Zhang, *Donglin Zhang

(317) Fertility Restoration of *Buddleia* Species by In Vitro Chromosome Doubling

*Wenhao Dai, Wei Sun, Victoria Magnusson, Yuanjie Su

(318) Substantial Equivalence Evaluation of CMV-Resistant GM Red Pepper in Terms of Fatty Acid Composition

Sunita Basnet, Shiva Ram Bhandari, Kyu-Hwan Chung, Ki-Hyun Ryu, *Young-Sang Lee

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Genetics/Germplasm/Plant Breeding: Viticulture and Small Fruits

(277) DNA Barcoding in *Fragaria* Species

*Wambui Njuguna, Kim E. Hummer, Nahla Bassil

(278) Fertility Improvements in Primocane-fruiting Blackberry (*Rubus* L. spp.) Genotypes

*Alisha Ruple, John R. Clark, M. Elena Garcia

(279) Fruit-Rot Resistance in the American Cranberry, *Vaccinium macrocarpon*

Jennifer Johnson-Cicalese, *Nicholi Vorsa, James J. Polashock

(280) Performance of An Elite Strawberry Population Derived from Wild Germplasm of *Fragaria chiloensis* and *F. virginiana*

*Travis Stegmeir, Ryan M. Warner, Chad Finn, James Hancock

(281) Two Methods for Assessing Frost Tolerance in Flowers of Highbush Blueberry Cultivars

Lisa Rowland, *Mark Ehlenfeldt, Elizabeth Ogden, John Philips, D. Michael Glenn, Fumiomi Takeda

(282) Transferability of *Rubus* Microsatellite Markers for Use in Black Raspberry

*Michael Dossett, Nahla Bassil, Kim Lewers, Chad Finn

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Horticultural Crops Culture and Management: Floriculture Crops

(179) Physical Properties of Biocontainers Designed for Greenhouse Crops Production

*Michael Evans, Jeff Kuehny, Matthew D. Taylor

(180) Physical Properties of Growstones-, Perlite-, and PBH-Containing Root Substrates

*Michael Evans, Clint Metcalf

(181) Modeling Daily Water Use of Abutilon and Lantana Based on Environmental Conditions

*Jongyun Kim, Marc van Iersel

(182) Zinnia Variety Evaluation for Powdery Mildew and Bacterial Leaf Spot

*Jenny S. Carleo, Daniel L. Ward, Nicholas Polanin, C. Andrew Wyenandt, Peter Nitzsche, George Wulster, Pedro Perdomo

(183) Height Control of Six Ornamental Grasses with Foliar Sprays of Trinexapac-ethyl or Uniconazole

*Sonali R. Padhye, Judith K. Groninger

(184) Acquired Stress Tolerance for Improving Landscape Survivability of Petunia

*Jennifer Mader, Jeff Kuehny, Jeffrey Beasley

(185) Development of a Rapid and Effective Screening Method for Basal Stress Tolerance of *Petunia* ×*hybrida*

*Miao Liu, Jeff Kuehny, Jeffrey Beasley

(186) Evaluation of New Poinsettia Varieties in Central Missouri

*Sanjun Gu, Theresa Blank

12:00–1:00 pm **Top of the Riverfront**

Award Recipient Reception (by invitation only)

Complimentary reception for ASHS award recipients. *This reception is by invitation only.*

12:00–1:00 pm **Illinois/Missouri/Meramec**

Graduate Student Poster Competition - Session 1

Note: *You must be present at your poster for the **entire** judging session.*

12:00–5:00 pm **Assembly Area**

Exhibits—Saturday

The exhibits are located in the foyer area surrounding the meeting space this year. The exhibitors will staff their booths only during the ASHS specified exhibit hours.

12:45–1:15 pm **Assembly Area**

Saturday All Delegate Luncheon

Lunch will be available for all attendees. This is a grab and go networking focused event.

1:00–2:00 pm **Illinois/Missouri/Meramec**

Graduate Student Poster Competition—Session 2

Note: *You must be present at your poster for the **entire** judging session.*

1:00–5:00 pm **Lewis/Clark**

Certified Horticulturist Certification Examination

Please contact ASHS for information regarding applying to sit for this examination.

1:15–2:00 pm **Illinois/Missouri/Meramec**

Poster Session—Crop Physiology/Physiology: Health Properties

(84) Effect of Supplemental UV Light Exposure on the Anthocyanin Content of Two Red *Lactuca sativa* Cv. Outredgeous and Firecracker Grown Under Light Emitting Diodes and Fluorescent Lamps

*Sharon I. Edney, Gary W. Stutte, Gerard J. Newsham

(85) Effects of Tissue Freezing, Storage Time and Temperature, and Extraction Conditions on Marrubiin Content of the Medicinal Plant, *Marrubium vulgare*

*James W. Gegogeine, Hazel Y. Wetzstein

(86) Phenolic Content and Antioxidant Capacity of Native Teas

*Hideka Kobayashi

(87) Identification of Biomarker Compounds in Muscadine

*Damayanthi (Dayan) Ranwala, Hannah Lane, Micheal Wargovich, Joseph D. Gangemi

(88) Seasonal Variation in Essential Oil Constituents of Japanese Spicebush

Jun Pill Baek, Kuen-Woo Park, *L.E. Craker

(89) Sweetpotato Leaves as a Source of Antioxidant Phenols

*Changzheng Wang, Lingyu Huang, Michael Bomford, Anthony Silvernail

(90) Effect of Humic Substances on Biomass Production and Constituent Levels in Thyme

C.R. Juarez-Rosete, *L.E. Craker, M.N. Rodriguez-Mendoza, J.A. Aguilar-Castillo

(91) Nutrient Content of Commercial Sweetpotato Cultivars

*David H. Picha

1:15–2:00 pm Illinois/Missouri/Meramec

Poster Session—Horticultural Crops Culture and Management: Weed Control and Pest Management

(117) Steam and Solarization to Disinfest Soil in California Strawberry and Cut-flower Production

*Jayesh B. Samtani, Celeste A. Gilbert, Steven A. Fennimore, Krishna V. Subbarao, Rachael Goodhue, John B. Weber

(118) Occurrence of *Xyllela fastidiosa* and Its Vector, Glassy-Winged Sharpshooter, in Selected Alabama Orchards

*Xing Ma, Elina Coneva, Henry Fadamiro, John F. Murphy, Fenny Dane

(119) Tolerance of Selected Bedding Plants to Four Herbicides in Irrigation Water

*Lyn Gettys, W.T. Haller

(120) Weed Control Trials on Selected Ornamentals at The Ohio State University

*Luke Case, Hannah Mathers, Kyle Daniel, Upender Somireddy, Dania Rivera

(121) Preemergence Weed Control in Container-grown Herbaceous Perennials

*James Klett, David Staats

(122) Third Season Performance of Synthetic Ground Covers in Blackberries

*Donald Makus, John L. Jifon

(123) Field Evaluation of Herbicide and Mulch Combinations for Weed Control Efficacy

*Upender Somireddy, Hannah M. Mathers, Luke Case, Kyle Daniel

(124) Cultural and Chemical Weed Control in Newly Established French-American Hybrid Grapes

*Harlene Hatterman-Valenti, Collin P. Auwarter

(107) An Online Cover Crop Decision Tool to Quickly Choose the Right Cover Crop

*Thomas Björkman, Joseph W. Shails

1:15–2:00 pm Illinois/Missouri/Meramec

Poster Session—Marketing/Economics/Human Issues/International Horticulture

(10) Fall After-school Garden Curriculum for Overweight and Obesity Prevention

*Cynthia Domenghini, Candice Shoemaker

(11) Affecting Family Support for Home Gardening through An After-school Garden Club Intervention

*Ann Marie Smith, Candice Shoemaker

(12) Consumer Purchasing Behavior and Preferences for Locally Grown, Certified Organic Produce and Value-added Products in the Mid-Atlantic Region

*Amy Chamberlain, Kathleen Kelley, Jeffrey Hyde

(13) Invasive Plants in the Marketplace: Consumer Perception and Purchasing Habits in New Jersey

*Brian Oleksak, Nicholas Polanin

(14) Cell to Sell—Commercialization of BioProducts

*Kenneth B. Anderson, Stephen Myers

(15) The Kenyan Export Horticulture Industry

Joel Gehrig, *John Masiunas, Francis Itulya, Vasey Mwaja

(16) USDA-CSREES-ISE Program Funded VEGINET-USA in Participation of International Conference on Horticulture (ICH-2009) Horticulture for Livelihood Security and Economic Growth

*Usha Palaniswamy, Prem Nath

1:15–2:00 pm Illinois/Missouri/Meramec

Poster Session—Seed Technology/Asexual Propagation

(263) Propagation of Alaska Bog Blueberry, *Vaccinium uliginosum*

*Patricia S. Holloway, Katie M. Kokx, James Auer, Shannon Pearce

(264) Germination Responses of Purpletop and Big Bluestem Caryopses Subjected to Prechilling, Sodium Hypochlorite, and Storage

*Michael W. Olszewski, Grant J. Folin

(265) Germination Response to Seed Pretreatments in Two Genotypes of Mountain Laurel (*Kalmia latifolia* L.)

Linda L. Taylor, *Rumen Conev, J. Roger Harris

(266) Amending Storage Vessel and Media Improves Subculture Interval of *Musa* sp. Tissue Culture Plantlets

*Brian Irish, Ricardo Goenaga, Barbara Reed

(267) Histological Analysis of Blueberry Regeneration

Kate L. Thomas, Thompson D. Pizzolato, Joanne M. Kramer, Conrad R. Pope, James J. Polashock, *Sherry Kitto

(268) Nutrition Management of Perennial Stock Plants to Optimize Cutting Quantity and Quality

*Holly L. Scoggins, Jaime L. Crocker, John R. Freeborn, Joel L. Shuman

(269) Rapidly Screening Plant Species for Phytoremediation through Suspension Culture

*Guochen Yang, Zhongge (Cindy) Lu, Vestal Shirley

(270) Cutting Propagation of Wild *Rhododendron decorum* Franch.

Xuejuan Chen, Yan Zhou, Qixiang Zhang, *Donglin Zhang, Xun Chen

(271) Rooting and Acclimatization of Bunchberry In Vitro-Derived Propagules

Hans J. Straight, *Todd P. West

(272) Vegetative Propagation of *Shepherdia rotundifolia* (Roundleaf Buffaloberry) from Softwood Cuttings

*Chalita Sriladda, Heidi Kratsch, Billie Curtis, Roger Kjelgren

(273) Use of Light-Emitting Diodes in *Dracaena* Micropropagation

*Kent D. Kobayashi, John Griffis

(274) Evaluation of Four Grafting Methods for Propagating Cashew (*Anacardium occidentale* L.) in the Dry Tropic of Mexico

Juan-Manuel González-González, *Salvador Guzmán-González, Oscar Iñiguez-Sánchez

(275) In Vitro Regeneration of Blueberry (*Vaccinium corymbosum* L.) 'Biloxi' in Culture Media with N^6-(2-isopentil) Adenina

*Salvador Guzmán-González, Pedro Valadez-Ramírez, Juan-Manuel González-González, Gilberto Manzo-Sánchez, Elpidio Peña-Beltrán

(276) Jack Fruit (*Artocarpus heterophyllus* Lam.) Propagation Testing Three Types of Bud Graft

Juan-Manuel González-González, *Salvador Guzmán-González, Alejandro Pérez-Amezcua

2:00–3:30 pm **Jefferson D/E**

Oral Session 1—Horticultural Crops Culture and Management: Viticulture and Small Fruits 1

Moderator: Carl Sams, carlsams@utk.edu

2:00–2:15 pm Comparison of Growing Degree Unit Models for Primocane-fruiting Blackberry

*Christopher I. Vincent, M. Elena Garcia, Curt R. Rom

2:15–2:30 pm Field Performance and Propagation of *Vaccinium elliottii* Selections

*WeiQiang Yang, Nonnie Bautista, James Ballington

2:30–2:45 pm Use of Pine Bark in Soil Management of Southern Highbush Blueberries (*Vaccinium corymbosum*, L.)

*Luis E. Mejia, Paul Miller, Jeffrey Williamson

2:45–3:00 pm Mummy Berry Fruit Rot and Shoot Blight Incidence in Blueberry: What Length of Evaluation Is Needed for Reliable Disease Assessment?

*Mark Ehlenfeldt, James J. Polashock, Allan W. Stretch, Matthew Kramer

3:00–3:15 pm Off-season Greenhouse Strawberry Production

Dennis Deyton, *Carl Sams, Fumiomi Takeda, John C. Cummins

3:15–3:30 pm Severity of Sanding or Pruning Impacts Yield and Microclimate of Cranberry Vines

Brett Suhayda, *Carolyn DeMoranville, Hilary Sandler, Wesley Autio, Justine Vanden Heuvel

2:00–4:00 pm **Jefferson A**

Workshop 1—Advances in Specialty Nut Crops

Sponsor: Temperate Tree Nut Crops (NUTS) Working Group

Moderator: Richard J. Heerema, rjheerem@nmsu.edu

In this Workshop, experts will summarize the status of specialty tree nut crop industries in North America—including both Old World and native New World nut tree species. They will discuss historical challenges and successes of these industries and the potential for each to survive, and even thrive, in the future.

2:00–2:30 pm Black Walnut: A New Nut Crop for the Midwest

*Mark Coggeshall

2:30–3:00 pm Improvements in Hazelnut Production in the United States

*Jeff Olsen

3:00–3:30 pm Piñon: The Next Orchard Nut Crop?

*John Mexal, John Harrington

3:30–4:00 pm Chinese Chestnut as a Niche Crop

*Michele R. Warmund

2:00–6:00 pm **Mississippi**

Colloquium 1—The Efficient Use of Alternative Water and Traditional Irrigation Sources in Horticulture

Sponsor: Water Utilization and Management (WUM) Working Group

Moderator: Mengmeng Gu, mgu@pss.msstate.edu

This colloquium will focus on efficient use of both fresh and recycled water in horticultural crop production and in landscapes. The topics will include growth and physiological responses of plants to water stress and salinity stress related to irrigation with recycled water, health issues involved in edible horticultural crop production when irrigated with recycled water, and influence of different quantities of fresh irrigation water or recycled water on horticulture production, yield, quality, and landscapes.

2:00–4:00 pm **Field**

Workshop 2—ASHS Primer: Getting the Most Out of the Conference

Sponsor: Collegiate Activities Committee

Moderator: Tracy A.O. Dougher, tracyaod@montana.edu

This Workshop will provide students and other ASHS Conference attendees basic information on how to approach the professional meetings, the opportunities available, and how to gain the most benefits from attending the conference.

2:00–2:20 pm Navigating the Meeting

*Tracy A.O. Dougher

2:20–2:40 pm Expanding Your Network: Meeting the Faculty of ASHS

*Richard Criley

2:40–3:00 pm Getting the Most from Posters and Presentations

*Kent D. Kobayashi

2:00–4:00 pm **Laclede**

Oral Session 2—Crop Physiology/Physiology: Postharvest 1

Moderator: Preeti Sood, preeti.sood@ufl.edu

2:00–2:15 pm Biosynthesis of Branched-chain Esters in Ripening Apple Fruit: Implications of ^{13}C- Labeled Acetate Incorporation In Vivo

*Nobuko Sugimoto, Randolph Beaudry

2:15–2:30 pm Internal Fruit Quality Affected by Sunburn Browning in Apples

*Larry Schrader, Cindy B. Kahn

2:30–2:45 pm Effects of Nitric Oxide Fumigation on Postharvest Life, Chilling Injury, and Quality of Japanese Plums (*Prunus salicina* Lindell)

*Sukhvinder Pal Singh, Zora Singh

2:45–3:00 pm Optimal Harvest Maturity for Melting and Non-melting Flesh Subtropical Peach Varieties Ripened Immediately After Harvest or Following Storage

*Ming-Wei Kao, Jeffrey (Jeff) Brecht, Jeffrey Williamson

3:00–3:15 pm Laser Labeling and Its Effect on the Storage Quality of Citrus Fruits

*Preeti Sood, Ed Etxeberria, Jan Narciso, Chris Ference

3:15–3:30 pm Color, Chlorophyll Fluorescence, and Volatile Production in Banana Fruit Ripened at High Temperature

XiaoTang Yang, *Jun Song, ZhaoQi Zhang

3:30–3:45 pm Environmentally Friendly Microperforated Containers for Improving Postharvest Berry Shelf Life

*Eva Almenar, Hayati Samsudin, Rafael Auras, Janice Harte, Bruce Harte, Maria Rubino

3:45–4:00 pm Shelf Life Study of Blackberry Fruit in an Eco-friendly Container

*MinJung Joo, Hayati Samsudin, Eva Almenar, Rafael Auras, Janice Harte, Bruce Harte

2:00–4:00 pm **Chouteau**

Workshop 3—Program Sustainability: Generating and Managing Funds in Tight Economic Times

Sponsor: Consumer Horticulture and Master Gardeners (CHMG) Working Group

Moderator: Lelia S. Kelly, leliak@ext.msstate.edu

Speakers will share their different approaches for generating and managing funds. A panel discussion will provide interaction and discussion on this topic.

2:00–2:20 pm Putting University Foundations to Work for Master Gardeners Programs (*Buddy, Can you Spare a Dime!*)

*Dave Close

2:20–2:40 pm Writing Grants that Receive Funding

*Ellen Bauske

2:40–3:00 pm Master Gardener Programs and Money Management

*Janet Carson

2:00–4:00 pm **Jefferson C**

Workshop 4—Standardized Phenotyping: Advantages to Horticulture

Sponsor: Genetics and Germplasm (GG) Working Group

Moderator: Nahla Bassil

The Workshop will: 1) describe phenotyping efforts in diverse horticultural disciplines; 2) relate advantages for using standardized phenotyping for broad applicability in research and breeding programs; 3) emphasize the importance of standardization for genomic applications; and 4) give an update on standardized ontology for horticultural crops.

2:00–2:20 pm Standardized Plant Disease Evaluations Will Enhance Resistance Gene Discovery

*J. Postman, Herb Aldwinckle, Gayle Volk

2:20–2:40 pm Phenotyping of Tomato for SolCAP and Onward Into the Void

*Jay W. Scott

2:40–3:00 pm Standardizing Postharvest Quality and Biochemical Phenotyping for Precise Population Comparison

*David Rudell

3:00–3:20 pm Standardized Phenotyping of Apple Texture for Improved Breeding and Research Efficiency

*Cameron Peace, Susan Brown

3:20–3:40 pm Advantages for the Use of Standardized Phenotyping in the National Plant Germplasm System

*Gayle Volk

2:00–3:00 pm **Jefferson F**

BioEnergy (BioE) Working Group Business Meeting

Chair 2008-09: Zong-Ming (Max) Cheng

The BioE Working Group provides a platform for promoting and expanding the opportunities to apply expertise and technologies of horticulture to bioenergy crops and for sharing and disseminating information related to bioenergy research and expanded funding potential.

2:00–3:00 pm **St. Louis West**

Emeritus (EMER) Working Group Business Meeting

Chair 2008-09: Arlie Powell

This Working group provides a forum for retired horticulturists where some issues of concern to ASHS can be defined, analyzed, and acted on. It also works to establish a registry of retired horticulturists; and to identify an accessible reservoir of research, extension, and teaching talent that may be called on for help and guidance.

2:00–3:00 pm **Shaw**

International Division Advisory Council Meeting

John Griffis, Chair; Richard Campbell, All Working Group Chairs and Chairs-elect, International Division

2:00–3:00 pm **Soulard**

William A. ("Tex") Frazier Lecture Series Selection Committee Meeting

Justin Morris, Chair; Alan Lakso, Bruce Schaffer, Stephen Love, and Penelope Perkins-Veazie

2:00–5:30 pm

Tour the Anheuser-Busch Brewery Followed by a Stop at Ted Drewes Frozen Custard

Departure Site: *front of the Millennium Hotel at 4th Street*

Situated in a complex with over 70 red brick structures on 100 acres, the brewery buildings are known for their unique architecture and several are National Historic Landmarks. During the tour, you will see the World Famous Clydesdales, the Fermentation Building, the Packaging and Bottling Plant, the Brew House and a film about the brewing process. No visit would be complete without a stop in the hospitality room to sample the family of Anheuser-Busch products. After leaving Anheuser-Busch you're in for one last treat—a stop at Ted Drewes Frozen Custard, a St. Louis tradition since 1929. Here enjoy a specialty "concrete" shake that is so thick you can turn it upside down. Cost: $36.00 per person.

3:00–4:00 pm **Shaw**

Certified Professional Horticulturist (CPH) Board Meeting

Terry Ferriss, Chair; Chris Gunter, David Zlesak, John Abbott, and Robert Mazalewski

3:00–4:00 pm **Jefferson F**

Floriculture (FLOR) Working Group Business Meeting

Chair 2009-11: Kimberly Clock Moore

The FLOR Working Group strives to identify problem areas (and propose approaches to resolving them), to develop higher standards of quality, and to share information about activities occurring in floriculture research, education, and extension.

3:00–4:00 pm **Jefferson B**

History of Horticultural Science (HIST) Working Group Business Meeting

Chair 2008-09: Donald N. Maynard

The objectives of the HIST Working Group are to exchange information and promote interest in the history of horticultural technology and science.

3:00–4:00 pm **Soulard**

Horticultural Landmark Selection Committee Meeting

George Fitzpatrick, Chair; Frank Blazich, David Tay, Chuck Ingels, John Masiunas, and Donald N. Maynard

3:00–4:00 pm **St. Louis West**

Industry Division Advisory Council Meeting

Neal E. De Vos, Chair; Craig A. Campbell, All Working Group Chairs, and Chairs-elect, Industry Division

3:30–4:30 pm **Jefferson D/E**

Fruit Breeding (FRBR) Working Group Business Meeting

Chair 2008-09: Mark Ehlenfeldt

The FRBR Working Group promotes and coordinates research efforts in the genetics and breeding of fruit crops.

4:00–5:00 pm **Jefferson B**

Produce Quality, Safety and Health Properties (QUAL) Working Group Business Meeting

Chair 2008-09: Dean Kopsell

The QUAL Working Group promotes more creative research, teaching, and industry liaison among horticulturists and food scientists.

4:00–5:00 pm **Jefferson F**

International Horticultural Consultants (ICON) Working Group Business Meeting

Chair 2008-09: John Griffis

The objective of the ICON Working Group is to discuss the credentials and accreditation of international consultants and sources of information, backstopping, teamwork, training, experience, and communications necessary for effective employment as an international consultant in either the private or public sector, and to develop a directory of international horticultural consultants in ASHS and their sources of information.

4:00–5:00 pm **Soulard**

Awards Committee Meeting

Frederick S. Davies, Chair; Paul E. Read, William R. Woodson, Mary M. Peet, John R. Clark

4:00–6:00 pm **Laclede**

Oral Session 3:—Genetics/Germplasm/Plant Breeding: Biotechnology

Moderator: Jude W. Grosser, jgrosser@ufl.edu

4:00–4:15 pm Ethidium Bromide Induced Mutations from Inflorescence Cultures of Indiangrass

*Loren Stephens

4:15–4:30 pm Improvement of Landscape Plants Using In Vitro Mutation Method

*Wenhao Dai, Victoria A. Magnusson, Hongxia Wang, Yuanjie Su

4:30–4:45 pm Assessing Genetic Relationship Among Scented Geraniums (*Pelargonium* sp.) with TRAP Markers

*Hwei-Yiing Li Johnson, Ruifen Li, Jinguo Hu

4:45–5:00 pm Generation and Analysis of ESTs for Differential Gene Expression to Anthracnose in Yam (*Diascorea alata* L.)

*Satya Narina, Shaukat Siddiqi, Alieu Sartie, Robert Asiedu

5:00–5:15 pm Development of SSR Markers for *Chionanthus retusus* (Oleaceae) and Cross Amplification of Closely Related Taxa

*Renee Arias, Natascha Techen, Timothy Rinehart, Richard Olsen, Joseph H Kirkbride, Brian E. Scheffler

5:15–5:30 pm Fine Mapping Ty-3, a Major Begomovirus Resistance Gene in Tomato

*Samuel Hutton, Jay W. Scott, Yuanfu Ji, David J. Schuster

5:30–5:45 pm Cloning and Characterizing Two PpSFBB-Alpha Genes in Chinese Sand Pear (*Pyrus pyrifolia* Nakai.)

*Lin Zhang, Xiaofeng Tan, Xu Zhou, Deyi Yuan, Donglin Zhang

5:45–6:00 pm Multiple Approaches for Genetic Engineering of Citrus for Disease and Pest Resistance

Manjul Dutt, *Jude W. Grosser, Ahmad Omar, Gary A. Barthe

4:00–6:00 pm **Jefferson A**

Oral Session 4:—Horticultural Crops Culture and Management: Pest Management

Moderator: Beiquan Mou, beiquan.mou@ars.usda.gov

4:00–4:15 pm Effectiveness of Host Resistance Inducers and Humic Acid for Fire Blight Control and Shoot Growth on Apple Cultivars with M9 Rootstock

*Kubilay Bastas

4:15–4:30 pm Advanced Granular Technology for Material Delivery

*Stephen Myers, Kenneth B. Anderson

4:30–4:45 pm Genetic Diversity Within and Between Nursery Populations of *Paria fragariae* Species Complex and Implications for Insecticide Resistance

*Grant Kirker, Tim Rinehart, Blair Sampson

4:45–5:00 pm Alternatives to Methyl Bromide for Raspberry Nurseries

*Michael Particka, Thomas Walters, John N. Pinkerton, Inga Zasada

5:00–5:15 pm Sweetpotato Storage Root Count Response to 1,3-Dichloropropene Plus Chloropicrin Treatments

*Arthur O. Villordon

5:15–5:30 pm Influence of Cucurbita spp. on *Macrophomina phaseolina* Soil Densities

*S. Alan Walters, Jason P. Bond

5:30–5:45 pm Inheritance of Resistance to Leafminer and Downy Mildew in a Wild Relative of Lettuce *Lactuca saligna*

*Beiquan Mou

5:45–6:00 pm Methods for Managing Phytophthora Blight (*Phytophthora capsici*) of Pepper

*Mohammad Babadoost

4:00–6:00 pm **Chouteau**

Workshop 5—Successful Strategies for Obtaining Specialty Crops Funding

Sponsors: ASHS Research Division

Moderators: Marc van Iersel (Research Division Vice President) and Rebecca Darnell (Research Division Vice President-elect)

This Workshop will focus on becoming more competitive for specialty crops research and extension program funding.

4:00–6:00 pm **Field**

Workshop 6—The Missouri Botanical Garden: Contributions to the Horticultural Sciences

Sponsor: ASHS Education Division

Moderator: Jules Janick, janick@purdue.edu

This Workshop will provide attendees with an overview of the Missouri Botanical Garden and showcase its many contributions to the horticultural sciences.

4:00–5:00 pm **Soulard**

Awards Committee Meeting

Frederick S. Davies, Chair; Paul E. Read, William R. Woodson, Mary M. Peet, John R. Clark

4:00–5:00 pm **Jefferson F**

International Horticultural Consultants (ICON) Working Group Business Meeting

Chair 2008-09: John Griffis

The ICON Working Group discusses the credentials and accreditation of international consultants and sources of information, backstopping, teamwork, training, experience, and communications necessary for effective employment as an international consultant in either the private or public sector, and develops a directory of international horticultural consultants in ASHS and their sources of information.

4:00–5:00 pm **Jefferson B**

Produce Quality, Safety and Health Properties (QUAL) Working Group Business Meeting

Chair 2008-09: Dean Kopsell

The QUAL Working Group promotes creative research, teaching, and industry liaison among horticulturists and food scientists.

4:15–6:00 pm **Jefferson C**

Oral Session 5—Horticultural Crops Culture and Management: Fruit and Nut Crops 1

Moderator: R. Paul Schreiner, paul.schreiner@ars.usda.gov

4:15–4:30 pm Cytokinin for Chemical Fruit Thinning of Asian Pears

*Daniel L. Ward, Winfred Cowgill, Neil Vincent, Rebecca Magron, Thomas Gianfagna

4:30–4:45 pm Does Foliar-applied Phosphorus Influence Vine P Status, Mycorrhizal Fungi, or Fruit Yield and Quality of 'Pinot Noir' Grapevines?

*R. Paul Schreiner

4:45–5:00 pm Water Relations and Net Carbon Assimilation Rate Response in Two Commonly Used Pecan Rootstocks

*Leonardo Lombardini, Astrid Volder, Hermann Restrepo Diaz

5:00–5:15 pm Effects of Nitrogen, Potassium, Irrigation, and Crop Load on Honeycrisp Fruit Quality

Sergio Lopez Cuevas, *Terence Robinson

5:15–5:30 pm ReTain Can Increase Nutmeat Yield of Pecan Trees

*Bruce Wood, Richard Heerema

5:30–5:45 pm Development of Citrus Cultivars Resistant to Huanglongbing Disease by Transformation with AMP Genes

*Kim D. Bowman, Greg McCollum, Randall Niedz, Ed Stover, Ute Albrecht, Ric Stange

5:45–6:00 pm Yield and Postharvest Quality Attributes of Date Palm Are Affected by Sub-optimal Irrigation During Fruit Development

*Rashid Al-Yahyai, Latifa Al-Kharusi, Fahad Al-Said, Hayder Abdel Rahman

4:45–6:00 pm **Jefferson D/E**

Oral Session 6: Horticultural Crops Culture and Management: Floriculture Crops 1

Moderator: James Barrett, jbarrett@ufl.edu

4:45–5:00 pm Production Environment Light and Temperature Affects Postharvest Vaselife of Cut L.A. *Lilium* 'Dazzle' and *Helianthus* 'Sunbright'

*Emma L. Locke, John M. Dole, John D. Williamson

5:00–5:15 pm Bulb Tissue Cold-tolerance Sensitivity Differences in Non-hardy and Winter Hardy *Lilium*

*Fang Du, Neil Anderson

5:15–5:30 pm Application of Benzyladenine and Gibberellic Acid Prevents Abscisic Acid Induced Leaf Chlorosis in Pansy and Viola

*Nicole L. Waterland, Craig A. Campbell, John J. Finer, Michelle L. Jones

5:30–5:45 pm The Timing and Duration of High Temperature Exposure Impacts Flowering Time of Poinsettia

*Rebecca A. Schnelle, James Barrett

5:45–6:00 pm Effects of Spray Volume and Washing on Efficacy of S-ABA Spray Applications

*James Barrett, C.A. Bartuska

5:00–6:00 pm **Jefferson F**

International Topics of Concern (ITCH) Working Group Business Meeting

Chair 2008-09: Paul Read

The ITCH Working Group provides a forum for the exploration, discussion, and exchange of information on global issues of vital concern to horticulturists in all divisions and disciplines. It also provides a potential mechanism through concerted action for input into decision and policymaking processes at the national and international levels.

5:00–6:00 pm **Jefferson B**

Seed and Stand Establishment (SSEST) Working Group Business Meeting

Chair 2008-09: J. Pablo Morales-Payan

The SSEST Working Group brings together those interested in seed technology, seed storage, seed production, seed physiology, seed pathology, plant breeding, and all other phases of research, education, or extension related to horticultural seeds and seed quality, to discuss problems, new methods, technologies, and other aspects related to these areas, and to promote a strong union of public- and private-sector workers interested in seeds and seed crops. The group also promotes activities related to the establishment of a uniform and vigorous crop from seed, transplant material, or vegetative propagules, with emphasis on seed

treatments, soil amendments, transplanting techniques, and other practices that might lead to stand enhancement in the field or greenhouse.

5:00–7:00 pm **St. Louis West**

American Pomological Society Board of Directors Meeting

6:00–7:00 pm **Poolside**

Student Reception

Come hang out and meet other undergraduate and graduate students attending the conference. A poolside gathering with light snacks and refreshments will be served. This will also be another opportunity to network or talk one-on-one with the speakers from the Student Workshop and possibly about your future plans with regard to career and post-graduate options . . . . or you can just have fun in the pool! Wear your swimsuit! Cost $15. *Preregistration is required*.

7:00–8:00 pm **Assembly Area**

ASHS Welcome Reception

Sponsored by Monsanto

MONSANTO imagine®

Join us for the opening reception for the ASHS–2009 Annual Conference. Meet and greet your colleagues and friends while enjoying some light snacks. Admission to the Reception is complementary for all conference registrants. *This event is not planned as a dinner function*.

Sunday, 26 July 2009

7:30–10:00 am **Shaw**

Public Gardens Task Force Breakfast Meeting

Chair: Robert Lyons

7:30 am–5:00 pm **St. Louis East**

Registration Open - Sunday

8:00 am–12:00 pm **Jefferson D/E**

Colloquium 2—Rising above the Gathering Storm: Effecting Change for the Future of Horticulture Higher Education

Sponsor: Teaching Methods (TCHG) Working Group and the Education CAC

Moderator: Curt R. Rom, crom@uark.edu

Moderator: Dennis T. Ray, dtray@email.arizona.edu

The objective of the colloquium is to develop an awareness and provide information to ASHS members on issues and opportunities facing horticulture higher education preparing students for the challenges of global competitiveness in the 21st Century.

Agenda:

Introduction to the Colloquium
*Curt Rom, *Dennis Ray

A Leadership Summit to Effect Change in Teaching and Learning—Introduction to the Colloquium; Importance and History of an Effort to Effect Change; and Recommendations for Change
*Adam P. Fagen

Filling the Nation's Need in Industry and Business in the Future
*Pat Verduin

The University of the Future
*Michael V. Martin

Horticulture Education and Research for the 21st Century
*Randy Woodson

Changes in Teaching and Learning in the Biological Sciences for the 21st Century: Recommendations from the Summit Report Affecting Teaching
*Susan R. Singer

Down in the Trenches: Transforming the Horticulture and Crop Science Image and Curriculum to Recruit More Students
*John Peterson

Panel Discussion, Q&A

8:00–9:30 am **Jefferson A**

Workshop 7: Management of Abscission in Fruit Crops

Sponsor: Growth Regulators in Fruit and Nut Production (PGR) Working Group

Moderator: Gregory Clarke, gregory.clarke@valent.com

This Workshop will review the current understanding of fruit abscission and how it may be controlled with PGRs in both sub-tropical and temperate crops.

8:00–8:15 am Current State of the Science Related to Fruit Abscission
*Jacqueline Burns

8:15–8:30 am Understanding and Managing Abscission in Subtropical Fruit Crops
*Carol J. Lovatt

8:30–8:45 am Understanding and Managing Abscission of Apples
*Rongcai Yuan

8:00–10:00 am **Laclede**

Workshop 8: Managing and Thriving in Tough Times, When Every Dime Counts!

Sponsors: Nursery Crops (NUR) Working Group, Marketing and Economics (MKEC) Working Group, and the American Nursery & Landscape Association

Moderator: Gladis Zinati, zinati@aesop.rutgers.edu

The objective of this Workshop is to discuss the impact of the recent economical crisis on sustainability of the nursery industry. Speakers, selected from various regions of the U.S., will elaborate on the challenges the nursery growers are facing these days and present creative managerial strategies that we all could learn from to assist the nursery industry firms in making better decisions.

8:00–8:20 am Making Cents of Green Industry Economics
*Charles Hall

8:20–8:40 am Strategies Producers in the Northeast Are Using to Reduce Costs and Increase Profits in Tough Economic Times
*Robin Brumfield

8:40–9:00 am Will Marketing Be Enough to Sustain Nursery Businesses
*Jennifer Dennis

9:00–9:20 am Florida Nurseries: Why Some Struggle and Some Sail through Economic Hard Times
*Teresa Olczyk, Juanita Popenoe

9:20–9:40 am Growing in the Season of Change
*Kim Lovelace-Young

9:40–10:00 am Panel Discussion: Speakers/ Audience Discussion (Q/A) Session
*Gladis Zinati

8:00–10:00 am **Jefferson C**

Workshop 9—Waste Utilization in Home Horticulture

Sponsor: Waste Utilization in Horticulture (WUH) Working Group

Moderator: William Evans, wbe@ra.msstate.edu

Objectives: Discuss issues and concerns related to the use of organic wastes in home gardens.

8:00–8:15 am Wastes and Organics for Home Use: What We've Tested and Learned
*William Evans

8:15–8:30 am Survival of Insect Pests, Plant Pathogens, and Weed Propagules in Green Waste Stockpiles
*Mauren Mochizuki

8:30–8:45 am Non-traditional Soil Amendments: Human Hair and Sheep Wool as a Nutrient Source and Growth Medium Constituent
*Valtcho D. Zheljazkov

8:00–10:00 am **Field**

Workshop 10—Whole Plant Physiology in High Tunnels and Under Protected Cultivation

Sponsor: Crop Physiology (CRPP) Working Group

Moderator: Martin Gent, martin.gent@po.state.ct.us

How does the environmental modification resulting from high tunnels and other methods of protected cultivation affect root-shoot balance, source-sink relations, and temperature stress? The environmental conditions in high tunnels are moderated in certain respects and exacerbated in others, compared to production in the open field. This can lead to physiological disorders and lower quality of produce. In what ways can we manage these conditions using experience from field production, and where do we need new algorithms to manage fruit and vegetable crops grown under protected cultivation? Several studies related to this topic will be presented in the hopes of generating a wide discussion of environment and plant physiology of fruit and vegetable crops grown in protected cultivation.

8:00–8:40 am Impact of Tunnels on Growth, Physiology, and Fruit Quality of Berry Crops
*Bernadine Strik

8:40–9:20 am Management and Breeding to Reduce Heat Stress Related Physiological Disorders of Lettuce Grown Under Row Covers and in the Field
*Sylvie Jenni

9:20–10:00 am Physiological Disorders in Grafted Heirloom Tomatoes Grown in High Tunnels Using Organic Production Practices
*Mary Peet, S. O'Connell, C. Rivard, C. Harlow, F. Louws

8:00–9:00 am **Jefferson B**

Genetics and Germplams (GG) Working Group Business Meeting

Chair 2008-09: Nahla Bassil

The GG Working Group provide a forum for plant breeders, geneticists, botanists, general horticulturists, and others interested in collecting, preserving, evaluating, distributing, and/or using germplasm in or for research or teaching programs.

8:00–9:00 am **Top of the Riverfront**

International Opportunities and Interests Breakfast

Featured speaker: John Griffis.

This breakfast is in recognition of ASHS's diverse international membership from over 100 countries. Network with your international colleagues who have come from different parts of the world to meet in St. Louis, MO. Presentation will be given on International Opportunities for Horticulturists. Please sign up in advance via the ASHS conference registration. All delegates are invited to attend this event (including those from the United States).

8:00–9:00 am **Jefferson F**

Weed Control and Pest Management (WCPM) Working Group Business Meeting

Chair 2008-09: Carlene Chase

The objective of the WCPM Working Group is to share new ideas and other research information concerning pest control in the varied areas of horticultural crop production.

8:00–3:00 pm **Lewis/Clark**

Commodity Judging Contest Set-up

9:00–10:00 am **St. Louis West**

HortTechnology Editorial Board Meeting

Chair: Neal E. De Vos

Board Members: Jeanine M. Davis, Robert E. Lyons, Mary H. Meyer, Katharine B. Perry

9:00–10:00 am **Jefferson F**

Plant Biotechnology (BTCH) Working Group Business Meeting

The objectives of this Working Group are to: 1) communicate research ideas, techniques, and progress on the emerging techniques in micropropagation, cell selection, protoplast culture, embryo culture, haploidy, gene transfer, and molecular biology as they relate to horticultural crop improvement; and 2) encourage collaboration among researchers in the fields of plant genetics, germplasm and breeding, stress physiology, tissue culture, growth regulator research, and plant growth and development on problems of concern in improvement and propagation of horticultural crops.

9:00–10:00 am **Jefferson B**

Working Group of Asian Horticulture (WGAH) Working Group Business Meeting

Chair 2008-09: Beiquan Mou

The WGAH promotes dialogue and information and germplasm exchanges between horticulturists residing in America and Asia and to assists in developing horticultural education, research, and extension programs to better preserve and utilize their rich horticultural resources.

9:00 am–5:00 pm **Assembly Area**

Exhibits - Sunday

The exhibitors will staff their booths only during the ASHS specified exhibit hours.

9:30–10:00 am **Jefferson A**

Plant Growth Regulators (PGR) Working Group Business Meeting

Chair 2008–09: Gregory Clarke

The PGR Working Group fosters excellence in plant growth regulator research. The group works to help and encourage new research talent in plant growth regulators, and to unify research and industry workers in an attempt to solve horticultural problems related to plant growth regulator research between ASHS and other related organizations.

10:00 am–12:00 pm **Jefferson C**

Workshop 11—Asia's Indigenous Horticultural Crops

Sponsor: The Working Group of Asian Horticulture (WGAH)

Moderator: Beiquan Mou, beiquan.mou@ars.usda.gov

The objectives of this Workshop are: 1) to introduce and assess the current status of indigenous horticultural crops from Asia grown in different Asian countries and in the U.S.; 2) to examine the limiting factors and challenges for the preservation and production of these unique and important crops; and 3) to identify opportunities, strategies, and priorities for future research and development of these crops in Asia and the world.

10:00–10:30 am Indigenous Crops: Exploring Health Promoting Properties?

*Bhimanagouda S. Patil, G.K. Jayaprakasha, Amit Vikram

10:30–11:00 am Horticulture in Nepal and Thailand

*Michael Schnelle

11:00–11:30 am Introduction to Some Indigenous Vegetables in Japan

*Yukihiro Fujime

11:30 am–12:00 pm Sinqua, Moqua, and Donqua—What in the World Are They?

*Richard Molinar

10:00 am–12:00 pm **Laclede**

Workshop 12—Methods of Imposing Environmental Stresses in Plant Research

Sponsor: Environmental Stress Physiology (STRS) Working Group

Moderator: Derek Woolard, derek.woolard@valent.com

A variety of methods can be used to create environmental stresses for plant research. Some methods of inducing drought, salinity, and cold stress will be discussed with an emphasis on the implications of the methodology.

10:00–10:25 am Using Soil Moisture Sensors for Controlled Drought Stress Experiments

*Marc van Iersel

10:25–10:50 am Salinity Stress in Horticultural Crops: Essential Concepts and Considerations to Sound Experimental Details and Procedures

*Raul I. Cabrera

10:50–11:15 am Methods for Evaluating Whole-plant Freezing Tolerance: Silver Birch (*Betula pendula*) As a Model to Determine the Effect of Regulated Deficit Irrigation or Exogenous Abscisic Acid (ABA) on Whole-plant Freezing Tolerance

Brent J. Markus, Nina L. Bassuk, Timothy L. Setter, Harold M. Van Es

10:00–11:00 am St. Louis West

Journal of ASHS Editorial Board Meeting

Chair: Neal E. De Vos

10:00–11:00 am Jefferson F

Ornamental/Landscape and Turf (O/LT) Working Group Business Meeting

Chair 2008-09: Ryan Stewart

The O/LT Working Group's objective is to study woody (ornamental and native) herbaceous and turf materials with an emphasis on plant adaptability, selection, and maintenance requirements. The group also provides a vehicle for arboreta, botanic gardens, and the landscape industry (architects and contractors) to become more closely allied to ASHS.

10:00–11:00 am Jefferson B

Waste Utilization in Horticulture (WUH) Working Group Business Meeting

Chair 2008-09: William B. Evans

The WUH Working Group enables researchers, teachers, and service professionals to meet and share common interests and experiences; to minimize duplication of efforts; to plan future areas of research; and to promote cooperative research. The group serves as a source of current information and guidance to those involved in waste recycling that benefit horticultural industries.

10:15–12:00 pm Jefferson A

Oral Session 7—Horticultural Crops Culture and Management: Fruit and Nut Crops 2

Moderator: Lenny Wells, lwells@uga.edu

10:15–10:30 am Monitoring and Evaluation of the Mango Supply Chain to Improve Mango Quality
*Jeffrey K. Brecht, Steven A. Sargent, Elizabeth J. Mitcham, Adel A. Kader, Mary Lu Arpaia, Elhadi M. Yahia, Fernando Maul, Maria Auxiliadora C. de Lima, Patrick E. Brecht, Octavio A. Menocal, Malkeet Padda

10:30–10:45 am Differential Effects of Nitrogen Supply on Skin Pigmentation and Flesh Starch Breakdown of 'Gala' Apple
*Huicong Wang, Lailiang Cheng

10:45–11:00 am Genetic Determination for Susceptibility to CO_2-induced Injury in Apple
*Nnadozie C. Oraguzie, Doug Burmeister, Peter Alspach, Nagin Lallu

11:00–11:15 am Are Resting Spurs Necessary for Return Bloom in Apple?
*Peter Hirst

11:15–11:30 am Assessing Apple Cultivar Characteristics for Hard Cider Production
*Gary Moulton, Carol A. Miles

11:30–11:45 am Establishment, Productivity, Cross-Compatibility, and Pollen Vectors for 28 Pawpaw Cultivars in Upstate New York
*Ian Merwin, Agnes Farkas, Michael G. Brown, Gregory M. Peck

11:45 am–12:00 pm Mechanical Fruit Thinning Enhances Production of Cape Fear and Sumner Pecan
*Lenny Wells

10:30 am–12:00 pm Field

Oral Session 8—Genetics/Germplasm/Plant Breeding: Cross-Commodity

Moderator: Linda Wessel-Beaver, lbeaver@uprm.edu

10:30–10:45 am Breeding Snap Beans (*Phaseolus vulgaris*) for Large-scale Production
*James Nienhuis

10:45–11:00 am Genetic Diversity of USDA *Cucumis metuliferus* Collection Revealed by Cucumber Genomic Microsatellite Markers
*Yiqun Weng

11:00–11:15 am Phenotypic Variation for Resistance to Tomato Spotted Wilt Virus in Pepper
*Kevin Crosby

11:15–11:30 am Genotype and Environment Effects on Carotenoid Content of Broccoli
*Mark Farnham, Dean Kopsell

11:30–11:45 am Plant Breeding Recruitment and Education: A Puerto Rico–North Dakota Collaborative Initiative
*Linda Wessel-Beaver, Feiko H. Ferwerda, Richard D. Horsley

11:45–12:00 pm Resistance to the Large Raspberry Aphid (*Amphorophora agathonica*) in Black Raspberry
*Michael Dossett, Chad Finn

11:00 am–12:00 pm St. Louis West

HortScience Editorial Board Meeting

Chair: M. LeRon Robbins

11:00 am–12:00 pm Jefferson B

Human Issues in Horticulture (HIH) Working Group Business Meeting

Chair 2007-09: Candice Shoemaker

The HIH Working Group stimulates discussion among those engaged in research and education programs in areas of horticulture that interact with the social sciences, such as economics, psychology, education, various forms of therapy, urban and rural sociology, and urban and rural development.

11:00 am–12:00 pm Jefferson F

Public Horticulture (PUBHORT) Working Group Business Meeting

Chair: Robert Lyons

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Horticultural Crops Culture and Management: Fruit and Nut Crops

(216) Fruit Growth and Quality as Influenced by Low Irradiance Levels in the Pear Cultivar 'Red Sensation'

*Patricia I. Garriz, Graciela M. Colavita, Hugo L. Alvarez, Valeria Blackhall

(217) Rootstocks for California Prune (*Prunus domestica*) Production

*Richard P. Buchner

(218) Pecan Shell Mulch Affects Peach Tree Growth, Yield, and Survival

*Eric Stafne, Becky Carroll, Charles Rohla

(219) Diurnal Variation of Photosynthetic Characteristics in Coolidge Pineapple Guava

Xu Zhou, Shengping Xiang, *Deyi Yuan, Sidong Zhao, Donglin Zhang, Lin Zhang

(220) Growth and Development of Huafeng Pear

*Deyi Yuan, Jinghua Duan, Donglin Zhang, Xiaofeng Tan, Lin Zhang

(221) Utilizing Within-cluster Hand-thinning to Increase Pawpaw Fruit Weight

*Sheri Crabtree, Kirk Pomper, Jeremiah Lowe

(222) Improving 'Bing' Sweet Cherry Fruit Quality with Plant Growth Regulators

*Caixi Zhang, Matthew Whiting

(223) Influence of Proline Foliar Application on the Growth Characteristic and Fruit Quality of 'Fuji' Apple Trees

*Ik-Jo Chun, Byeong-Gak Kim, In-Kyu Kang

(224) Dormant-applied Nitrogen Fertilizers Advance 'French' Prune Bloom

*Franz Niederholzer

(225) Production and Fruit Quality Attributes of Eight Exotic Banana Genotypes Grown in Oman

*Rashid Al-Yahyai, Abdullah Al-Hosni

(226) Automation for Specialty Crops: A Comprehensive Strategy, Current Results, and Future Goals

Sanjiv Singh, Tara Baugher, Marcel Bergerman, Ben Grocholsky, Jay Harper, Gwen-Alyn Hoheisel, Larry Hull, Vincent Jones, George Kantor, Harvey Koselka, Karen Lewis, William Messner, Henry Ngugi, *James Owen, Jr., Johnny Park, Clark Seavert

(227) Developing Mechanical Harvesting for California Black Ripe Process Table Olives *Olea europaea* Cv. 'Manzanillo

*Louise Ferguson, Uriel Rosa, Sergio Castro, Jacqueline Burns, Kitren Glozer, William H. Krueger, Neil O'Connell, Jorge Mario Ortiz, Jose Luis Ladux, Fabricio Jose Fernandez, Peter S. Searles, John Henry Ferguson, Peter Kulakow, Richard Rosecrance

(228) Relationship of Leaf Necrosis and Defoliation to Phosphorus and Potassium Concentrations in Selected Tissue and to Certain Fruit Quality Parameters of Pecan

*Michael W. Smith

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Horticultural Crops Culture and Management: Organic

(251) Biological Activity and Property of A Biopesticide, *Pichia anomala*

Sui Shen T. Hua, *Dan Parfitt, Brent Holtz, Siov Bouy L. Sarreal

(252) Identification of Phytohormones in Vermicompost Tea

Abira Selvaraj, Carol J. Lovatt, John Balles, *Milton E. McGiffen, Jr.

(253) The Grafted Tomato System: Are There Advantages in the Presence of Soil Borne Diseases?

Cary L. Rivard, Frank J. Louws, Suzanne O'Connell, Chris D. Harlow, *Mary Peet

(254) Organic Versus Conventional Fertilization of Pac Choi and Tomato Produced in the Field Versus High Tunnels Influences Crop Yield, Plant and Soil Nitrogen, and Phytochemical Content

*May Altamimi, Myung-Min Oh, Rhonda R. Janke, Kimberly A. Williams, Nathan O. Nelson, C.B. Rajashekar, Dorith Rotenberg, Edward E. Carey

(255) The Effect of Weed Control and Tillage on Soil Health in Organic Vegetable Production

*Anthony Francis Silvernail, Michael Bomford

(256) Interdisciplinary Vegetable Pest Management Potentials of Selected Cover Crops

Oli Bachi, Antoon Ploeg, Gregory Walker, *Milton E. McGiffen, Jr.

(257) Assessment of Various Mulches for Organic Production of Cucumber

*Reddy, R. Chinthakuntla, Patrick Igbokwe, Rao S. Mentreddy, Frank Matta

(258) Effect of Cultivar and Pest Management on Organic Sweet Corn Production

*Kathleen Delate

(259) Estimated Nitrogen Balance of Young Apple Trees Grown in Response to Various Organic Apple Production Systems

*Hyun-Sug Choi, Curt R. Rom

(260) Protected Cultivation of Peach as Technique for Organic Production

*Flavio Roberto De Salvador, Carlo Fideghelli

(261) Ground Cover Management and Nutrient Source Affect Weed Density, Vole Damage, and Survival During Establishment of an Organic Apple Orchard

*Jason D. McAfee, Curt R. Rom

(262) Performance of High Tunnel Organic Blackberry and Raspberry

*H. Friedrich, Curt R. Rom, J. McAfee, M. Elena Garcia, D.T. Johnson, J.S. Popp, C. Vincent

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Horticultural Crops Culture and Management: Ornamental Crops

(170) Conversion of Ammonium to Nitrate in a Pine Tree Substrate

Linda L. Taylor, Alex X. Niemiera, Robert Wright, *J. Roger Harris

(171) Post-transplant Irrigation Scheduling for Two Native Deciduous Shrub Taxa

Abby L. Bailey, *Amy N. Wright

(172) Short Interval Cyclic Flooding Affects Growth and Physiology of Three Native Shrub Taxa

Katie L. Werneth, *Amy N. Wright

(173) Growth and Photosynthesis of Selected Native Shrubs Planted Above-grade with Organic Matter

Scott B. Hanes, *Amy N. Wright

(174) Comparative Studies Between Acclimatization and Cultivation of Hook-Moss Grown in a Vinyl House

*Ju Kwang Hwang, M.G. Ahmed, Y.D. Chang, Daeil Kim, C.H. Lee

(175) Influence of Daily Light Integral on Coleus Morphology and Leaf Variegation

*Katherine Garland, Stephanie Burnett, Lois Berg Stack, Donglin Zhang

(176) Several Factors Affecting In Vitro Mass Propagation and Morphogenesis in Prothalli of *Pteris cretica* 'Wilsonii'

*Ju Kwang Hwang, S.L. Shin, Daeil Kim, C.H. Lee

(177) Target Region Amplification Polymorphism (TRAP) for Evaluating Genetic Diversity in *Malus* Mill. Genus

*Ling Guo, Rose Palumbo, Zuoshuang Zhang, Guo-liang Wang, David Tay, Donglin Zhang, Xiang Shen, Huairui Shu

(178) Ornamental Peppers for the Gulf States

William Evans, *Yan Chen, Crofton Sloan, Susan Harkness

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Horticultural Crops Culture and Management: Plant Nutrition

(163) Silicon Fertilization of Potted Orchids

*Wagner A. Vendrame, Ania Pinares, Aaron J. Palmateer, Lawrence E. Datnoff

(164) Influence of Elevated Phosphorus Levels in Nutrient Solution on Micronutrient Uptake and Deficiency Symptom Development in Strawberry Cultured with a Fertigation System

Jong Myung Choi, *Chiwon W. Lee

(165) Carotenoid Pigments in Kale Are Influenced By the Ratio of Calcium to Magnesium

*David Kopsell, Dean Kopsell

(166) Foliar Application of Nickel and Copper on Pecan Performance

*Pradeep Wagle, Michael W. Smith, Bruce W. Wood, Charles T. Rohla, Charles C. Reilly

(167) Interaction Between Nutrient Source and Growing Substrate on the Yield of Beetroot in NFT Hydroponic Culture

*Jonathan Egilla

(168) Commercial Fertilizer Source Affects Marketable Leaf Yield of Collards in NFT Hydroponic Culture

Jonathan N. Egilla, *Rose Ogutu

(169) Growth and Inorganic Nutrient Absorption of 'Fuyu' Persimmon Trees as Affected by Different Fruit Loads

*Seong-Tae Choi, Seong-Mo Kang, Doo-Sang Park, Yong-Cho Cho

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Horticultural Crops Culture and Management: Viticulture and Small Fruit 2

(110) Carbon Dioxide Enrichment Increases Yield of Field-grown Red Raspberry Under High Tunnels

Oleg Daugovish, *Maren J. Mochizuki, Miguel Ahumada, Shawn Ashkan, Carol Lovatt

(111) Establishing Organic Highbush Blueberry Production Systems—The Effect of Raised Beds, Weed Management, Fertility, and Cultivar

*Handell Larco, Bernadine Strik, David Bryla, Dan Sullivan

(112) Sensory, Health and Quality Evaluation of Two Blackberry (*Rubus* subgenus *Rubus*) Cultivars from Arkansas and Oklahoma

*Richelle Stafne, William G. McGlynn, Eric T. Stafne, Edralin A. Lucas, John R. Clark

(113) Effect of Mounding Height and Mulching Material on Growth and Fruiting of 'Duke' Highbush Blueberry Plants

*Eunju Kim, Hyunggook Kim, Kyudong Choi, Sunghee Guak

(114) Effect of Peat Moss-based Organic Material Mixtures on Soil pH, Growth and Fruit Quality of Highbush Blueberry Plants

*Eunju Kim, Hyunggook Kim, Namki Oh, Sunghee Guak

(115) Primocane and Floricane Yield Characteristics of Primocane Fruiting Blackberries from the University of Arkansas Breeding Program Grown in Kentucky

*Jeremiah Lowe, Kirk Pomper, Sheri Crabtree, John R. Clark, John Strang

(116) BLUE FORMOSA—A Blueberry Initiative Program in Taiwan

*Kuo-Tan Li

12:00–1:00 pm **Illinois/Missouri/Meramec**

Graduate Student Poster Competition—Session 3

*You must be present at your poster for the **entire** judging session.*

12:00–1:00 pm **Illinois/Missouri/Meramec**

Poster Session—Undergraduate Poster Session and Competition: Session 1

You must stay with your poster for the full session time period.

(1) Effect of Vine Cutback on Symptom Severity and Virus Titers of a Resistant and Susceptible Sweetpotato Variety

*Carly Gillette, Maureen Thiessen, Don LaBonte, Chris Clark, Cecilia McGregor

(2) Early Phenotypic Mutation Results Induced by Ethyl Methyl Sulfonate (EMS) on Species of Penstemon

*Rhyan B. Dockter, Shaun R. Broderick, James D. Daley, Shawna L. Daley, Mitchell A. Mendenhall, Bryson J. Ewell, Brad Geary, Mikel Stevens

(3) Molecular Mapping of the Tomato Spotted Wilt Virus Resistance Gene *Sw-7* in Tomato

*Keri G. Dockter, Derek S. O'Neil, David L. Price, John Scott, Mikel Stevens

(5) Photosynthetic, Antioxidant and Leaf Ultrastructural Responses to Drought in Two Spinach Cultivars of Contrasting Morphology

*Ronald Cherubin, Tommy Do, Kanniah Rajasekaran, Dalton Gossett, Harish Ratnayaka

12:00–2:00 pm **Chouteau**

Networking Luncheon/Session
Topic: Doing Horticultural Research in an Era of Outcome Funding

A new trend in funding horticultural research is a model in which the final outcome of the project is a change in the behavior of people, usually farmers, rather than the discovery of how some process works or the development of a new tool. That drastic change in paradigm is a big challenge, but also presents a big opportunity. Granting programs that are successful in demonstrating positive outcomes are valued by lawmakers who fund them. Horticultural scientists are in a better position than most plant biologists to deliver good outcomes. This lunch discussion will envision a future of horticulture where even fundamental research is integrated so closely to outcomes that it is a field that enjoys strong and enduring support. *This is a ticketed event. Tickets can be purchased at Registration.*

12:00–2:00 pm **Soulard**

Pi Alpha Xi Luncheon

Sponsor: Pi Alpha Xi

Chair: Daniel Warnock

What do 12,000 people and 25 ASHS presidents have in common? Pi Alpha Xi—Celebrating over 80 years of scholarship, fellowship, leadership, and enrichment of human life through plants. *This is a ticketed event–advance ticket purchase required.*

1:00–2:00 pm **Illinois/Missouri/Meramec**

Graduate Student Poster Competition: Session 4

You must be present at your poster for the entire judging session.

1:15–2:00 pm **Illinois/Missouri/Meramec**

Herbs, Spices and Medicinal Plants Graduate Student Poster Competition

Note: *You must be present at your poster for the **entire** judging session. All posters must be set up per ASHS guidelines.*

1:15–2:00 pm **Illinois/Missouri/Meramec**

Poster Session—Crop Physiology/Physiology: Cross Commodity 2

(55) Harvest Date, Cultivar, and Nut Filling on Vivipary Levels of Pecan Trees Growing in Warm Climate in Northwest Mexico

*Humberto Nunez, Sr., Arnulfo Marquez-Cervantes, Gerardo Martinez Diaz

(56) Effect of Compost Socks System on Antioxidant Capacity, Flavonoid Content, and Fruit Quality of Strawberries

*Shiow Wang, Patricia Millner

(57) Physicochemical Characteristics of Strawberry Fruits as Affected by Cultivar and Fruit Cluster

Sung Kyeom Kim, Ro Na Bae, Moo Jung Kim, Jeong Hwa Song, *Changhoo Chun

(58) Temperature Tolerance, Not Photoperiod Insensitivity, Is the Primary Factor Controlling Repeat Flowering (Remontancy) in Strawberry

*Emma Bradford, James Hancock, Ryan Warner

(59) Ecophysiology and Comparative Foliar Micromorphology of Big-Bracted *Cornus* Selections

*Amy Fulcher, Robert Geneve

(60) Developing a Carbon Balance Model for 'Kyoho' Table Grapes Under Double Cropping Production System in Subtropical Climate

*Ben-Min Chang, Kuo-Tan Li, Alan Lakso, Tzong-Shyan Li

(61) Partitioning of Phosphorous and Potassium in Pecan Trees in Relation to Annual Crop Intensity

*Michael W. Smith

(62) Broccoli Cytochrome P450 Genes Associated with Indole Glucosinolate Biosynthesis

Hyoung Seok Kim, *John A. Juvik

(63) Cucumber Fruit Transcriptome Analysis by 454 Sequencing

*Kaori Ando, Rebecca Grumet

(64) Snap Bean Yield and Photosynthesis During Twilight Extended Field Conditions

*Meriam Karlsson, Jeffrey Werner

(65) Carbohydrate Accumulation in Cucurbit Rootstock Hypocotyls Correlates with Grafting Success

*Frederic D. Memmott, Richard L. Hassell

(66) Ovary Size at Anthesis in Bell Pepper Is Reduced by Growing Fruits

Nicacio Cruz-Huerta, *Rebecca Darnell, Jeffrey Williamson

1:15–2:00 pm Illinois/Missouri/Meramec

Poster Session—Crop Physiology/Physiology: Growth Regulators

(67) Effect of Abscisic Acid on Thinning and Return Bloom of Bartlett Pears

*Duane W. Greene

(68) Evaluation of Aminoethoxyvinylglycine (AVG) for Flower Retention in Paprika (*Capsicum annuum* L.)

*Mark E. Uchanski

(69) Effect of Exogenous Gibberellic Acid Application on King Dominance and Endogenous Gibberellic Acid Level of 'Granny Smith' Apple

*Jozsef Racsko, Diane Doud Miller

(70) Rootstock Effects on King Dominance in 'Pink Lady' Apple

*Jozsef Racsko, Diane Doud Miller

1:15–2:00 pm Illinois/Missouri/Meramec

Poster Session—Horticultural Crops Culture and Management: Nursery Crops

(194) Response of Conocarpus Trees Growth to Pruning and Paclobutrazol Treatments

*Fahed A. Al-Mana, Salem M. Aljaman, Sr.

(195) Evapotranspiration and Growth-based Models to Estimate Irrigation of Container-grown Korean Spiraea (*Spiraea fritschiana* 'Wilma') Under Four Irrigation Regimes

*Aaron L. Warsaw, R. Thomas Fernandez, Bert Cregg, Jeffrey Andresen

(196) Development of a Double Crop Production System Using Retractable Roof Houses

*Dania Rivera, Hannah Mathers, Luke Case

(197) Influence of Accelerator™ Containers and MicroKote™ on Growth and Water Loss of Container-Grown 'Recurvifolium' Ligustrum

*John Ruter

(198) Use of Switchgrass as the Primary Potting Component in Nursery Containers

*James Altland, Jonathan Frantz

(199) Differential Effects of Controlled Release Fertilizer Rates of Growth and Leaf Nutrient Concentrations of Containerized Shade Tree Species

*Michael V. Mickelbart, Julia Prado, Michael J. Gosney, Cliff Sadof

(200) Eastern Red-Cedar (*Juniperus virginiana*) as a Substrate Component for Container Production of Woody Plants

*Jason Griffin

(201) Assessment of Struvite Containing Controlled Release Fertilizer as a Source of Phosphorus for Containerized Ornamental Crops

*Jim Owen, Heather Stoven, Judy Kowalski, Kim Phillips

1:15–2:00 pm Illinois/Missouri/Meramec

Poster Session—Horticultural Crops Culture and Management: Vegetable Crops

(238) Mesotrione Applications Impact Kernel Carotenoid Concentrations Among Different Sweet Corn Genotypic Sensitivities

*Dean A. Kopsell, Greg R. Armel, Thomas C. Mueller, J. Scott McElroy

(239) New Uses for Oversized Spinach Leaves as a Fresh Product

*Hallie G. Dodson, M.E. Fitch-Hilgenberg, Teddy Morelock

(240) Microclimatic Factors Associated with Enhanced Plant Growth Under Rowcover

*Ramon A. Arancibia

(241) An Evaluation of Humates on Disease Resistance of Field Tomatoes to Early Blight

Ronald R. Muse, *Barbara D. Muse

(242) The Effect of Growing Conditions on Health-promoting Phytochemicals in Two Lettuce Cultivars

Myung-Min Oh, Edward E. Carey, *C.B. Rajashekar

(243) Yield and Sensory Attributes of Four Sweet Corn Varieties in South Central Alabama

*Desmond Mortley, Conrad Bonsi, Eunice Bonsi, Kennedy Aganah, Salifu Wahab

(244) Evaluation of Three Growth Regulators in Garlic Variety Taiwan (*Allium sativum* L.) in Sonora, Mexico

*Santiago Ayala, Jose Juvera-Gonzalez, Gabriela Juvera-Gonzalez, Fernando Juvera-Gonzalez, Jose Juvera-Bracamontes, Everardo Zamora, Jose Guerrero-Ruiz

(245) Evaluation of 3 Lines of the Garlic Variety Taiwan (*Allium sativum* L.) Using 3 Fertilizer Rates in Sonora, Mexico

*Santiago Ayala, Jose Juvera-Gonzalez, Gabriela Juvera-Gonzalez, Fernando Juvera-Gonzalez, Jose Juvera-Bracamontes, Everardo Zamora, Jose Guerrero-Ruiz

(246) Effect of Stem Cutting on the Garlic Ampelo (*Allium ampeloprasum* L.) Growing in Sonora, Mexico

*Santiago Ayala, Jose Juvera-Gonzalez, Gabriela Juvera-

Gonzalez, Fernando Juvera-Gonzalez, Jose Juvera-Bracamontes, Everardo Zamora, Jose Guerrero-Ruiz

(247) Effects of Chemical Fungicides, *Trichoderma viride* and Garlic Extract on Control of Fusarium Wilt and Fruit Yield of Round Melon

*Manphool Fageria, B.D. Yadav, R.B.S. Gurjar, P.S. Shekhawat, Yogesh Sharma, Saroj Rolania

(248) Influence of Soil Type and Foliar Potassium Fertilization on Fruit Quality and Phytochemical Contents of Muskmelon

*John L. Jifon, Gene Lester

(249) Cultural Practices to Reduce the Expression of Iris Yellow Spot Virus in Onion

*Clinton C. Shock, Erik B.G. Feibert, Lamont D. Saunders, Lynn B. Jensen, Hanu R. Pappu, S. Krishna Mohan, Ram K. Sampangi

(250) Evaluation of Brassica Greens Cultivars for Fresh and Processing Production

*Lynn Brandenberger, James Shrefler

1:15–2:00 pm **Illinois/Missouri/Meramec**

Poster Session—Teaching Methods

(24) An Exercise to Improve Laboratory Write-ups in Plant Propagation

*Richard Criley

(25) The Alliance for Cooperative Course Exchange in the Plant Sciences

*Michael Evans, Donna Graham, Janet C. Cole, Edwin Miller, Richard Harkess, Walter Taylor, Jeff Kuehny, Elizabeth Garrison

(26) Embracing Social Networks as a Tool for Strengthening Communications with Alumni

*Dan Stearns, Michael Reinert, Michael R. Mohney

(27) Faculty Indicate Need for Instructional Multimedia Resources for Use in Teaching Nursery Production

*Amy N. Wright, Mengmeng Gu, James Robbins

(28) USDA–CSREES–ISE Competitive Program Award (2006) Funding for Internationalization of Biology Curriculum in Sustainability: Development Programs in Progress at M.S. Swaminathan Foundation, Chennai, India

*Usha Palaniswamy

(29) Introducing Modern Molecular Biology and Biotechnology to Students and Public in Kentucky Areas

*Li Lu, Kirk Pomper, Karan Kaul, Narayanan Rajendran, James Tidwell

(30) Week Long Practicum Course to Teach Landscape Contracting Skills

Alex X. Niemiera, *J. Roger Harris

(31) Virtual Field Trips in a Tropical Production Systems Course

*Kent D. Kobayashi, Kauahi Perez

(32) Student Learning Opportunities as a Component of Poinsettia Cultivar Trials

*Christopher J. Catanzaro, Kimberly A. Williams, Daniel F. Warnock

(33) Kids University—Yard and Garden Sleuths: A Week Long University of Minnesota Youth Program that Introduces 8- to 9-Year-Old Students to Horticulture through Campus Horticultural Resources

*David Zlesak, Karyn E. Vidmar, Nancy L. Mulholland, Kathryn Zuzek

1:30–3:00 pm **Jefferson F**

Association of Collegiate Branches (ACB) Annual Business Meeting

Presiding: Sarah Hobbie, ACB President

The ACB of the American Society for Horticultural Science was founded in 1961 by a group of concerned undergraduate horticulture students and Society members. The purpose of the member clubs is to encourage undergraduate participation in the Society, provide a forum for exchange of club and professional ideas, encourage a greater understanding of regional and national horticulture, and act as an official body for undergraduate horticulture student contribution. The ACB is broken into four regional group: Southern, Western, Northeastern, and Mid-Atlantic. Each region has its own constitution, officers, and annual meeting. Each year, ACB officers and members meet with ASHS at the Annual Conference.

2:00–3:30 pm **Jefferson C**

Oral Session 9—Horticultural Crops Culture and Management: Floriculture Crops 2

Moderator: Marc van Iersel, mvanier@uga.edu

2:00–2:15 pm Possible Roles of Silicon, Calcium, and Regulated Deficit Irrigation on Poinsettia Plant Quality and Postharvest Performance

*W. Roland Leatherwood, Neil S. Mattson, John M. Dole

2:15–2:30 pm Effects of Controlled Release Fertilizer on the Post-production Performance of *Impatiens wallerana*

*Gladys Anguti Andiru, Claudio Pasian, Jonathan Frantz, Michelle Jones

2:30–2:45 pm Daily Water Requirements of Petunias as a Function of Plant Age and Environmental Conditions

*Jongyun Kim, Marc van Iersel

2:45–3:00 pm Water Content in Soilless Substrates: Spatial and Temporal Dynamics

*Marc van Iersel, Sue Dove

3:00–3:15 pm Influence of Root Medium Water Content and Supplemental Calcium on Severity of Oedema During Ivy Geranium Production

*Nicole Rud, Kimberly A. Williams, M.B. Kirkham

3:15–3:30 pm Predicting Calcite ($CaCO_3$) Requirements of Sphagnum Peat Moss from pH Titration Curves

*Ka Yeon Jeong, Dean Hesterberg, Paul Nelson, Jonathan Frantz

2:00–4:00 pm **Laclede**

Oral Session 10—Crop Physiology/Physiology: Vegetable Crops

Moderator: Genhua Niu, gniu@ag.tamu.edu

2:00–2:15 pm Effect of ABA Rates and Application Frequency on Growth of Bell Pepper and Watermelon Transplants

*Daniel Leskovar, Shinsuke Agehara, Kevin Crosby

2:15–2:30 pm Commercial Tomato Rootstock Performance When Exposed to Natural Populations of Root-Knot Nematodes in Florida

*Michael G. Bausher

2:30–2:45 pm Emergence and Seedling Characteristics of Native American Maize from the Southwestern United States

*Jennifer M. Bousselot, Deborah A. Muenchrath, Allen D. Knapp, Jean D. Reeder

2:45–3:00 pm Rapid Screening for Salt Tolerance in Specialty Peppers

*Genhua Niu, Denise Rodriguez, Kevin Crosby, Daniel Leskovar, John L. Jifon

3:00–3:15 pm Drought Tolerance of Specialty Chile Peppers

*Genhua Niu, Denise Rodriguez, Daniel Leskovar, Kevin Crosby, John L. Jifon

3:15–3:30 pm Crop Coefficients Specific to Phenological Stages for Evapotranspiration-based Irrigation Management of Onion and Spinach

*Giovanni Piccinni, Jonghan Ko, Thomas Marek, Daniel Leskovar

3:30–3:45 pm Leaf Tissue Carotenoids and Chlorophyll Fluorescence Parameters Differ Among Sweet Corn Genotypes with Differential Sensitivity to Mesotrione

*Gregory Armel, Dean A. Kopsell, Javier Vargas

3:45–4:00 pm Effect of Organic and Inorganic Amendments on Soil and Produce Quality

*James Rietkerk, Jeffrey Wong, Chip Appel

2:00–4:00 pm **Jefferson A**

Workshop 13—Native Fruits of the Midwest

Sponsor: The American Pomological Society

Moderator: Kirk Pomper, kirk.pomper@kysu.edu

The objective of this Workshop is to examine production practices and advancements in breeding of a number of fruit and nut species that are native to the Midwestern region of the United States.

2:00–2:20 pm Blackberry Breeding in the Midwest

*John R. Clark

2:20–2:40 pm Nut Crops of the Midwest

*Michele R. Warmund

2:40–3:00 pm Elderberry Research and Development in Missouri

*Patrick Byers, Andrew Thomas, John Avery, Chad Finn, Penelope Perkins-Veazie, Hwei-Yiing Li-Johnson, Sanjun Gu

3:00–3:20 pm Pawpaw and the American Persimmon: Niche Tree Fruit Crops for the Midwest and Eastern United States

*Kirk Pomper, Sheri Crabtree, Jeremiah Lowe, Jerry Lehman

2:00–4:00 pm **Field**

Workshop 14—The University-based Public Garden—Relevancy, Challenges, Triumphs, and Future Potential

Sponsor: Public Horticulture (PUBHORT) Working Group

Moderator: Holly L. Scoggins, perennials@vt.edu

This Workshop will illustrate, by example, the diverse roles that university and college public gardens and arboreta have in communicating the many dimensions of public horticulture to students in higher education as well as the general public.

2:00–2:20 pm Introduction to Public Horticulture and University Gardens

*Robert Lyons

2:20–2:40 pm Integrating the Development of Campus Gardens Into an Undergraduate Horticulture Curriculum: A Case Study

*Dan Stearns

2:40–3:00 pm Public Gardens: Fulfilling the University's Research Mission

*Mary Meyer

3:00–3:20 pm Horticulture Outreach and Children's Gardening at McCrory Gardens, South Dakota State University

*David Graper

3:20–3:40 pm University Garden Stakeholders: Student, Industry, and Community Connections

*Holly L. Scoggins

3:40–4:00 pm Marketing the Work of a University Gardens Director to Deans and Provosts

*Mary Albrecht

2:00–6:00 pm **Jefferson D/E**

Workshop 15—Strengthening Private and Public Research Relationships in Horticulture

Sponsors: Industry Division and VALENT BIOSCIENCES CORPORATION

Moderator: Peter Petracek,
peter.petracek@valent.com

The speakers will present their vision of the future of horticulture and agronomic research and highlight opportunities for industry and public collaborations.

Proposed speakers:

John R. Clark, ASHS President

Kathleen Merrigan, USDA Deputy Secretary (Invited)

Prem Warrior, Gates Foundation

Jacqueline Hughes, Deputy Director General, Research, AVRDC, The World Vegetable Center

Stephen Myers, Ohio Bioproducts Innovation Center

Leigh English, Seminis/Monsanto

2:00–3:00 pm **Jefferson B**

Environmental Stress Physiology (STRS) Working Group Business Meeting

Chair 2008-09: Derek Woolard

The STRS Working Group promotes basic and applied research on the physiology of horticultural crops with primary emphasis on crop physiological responses to environmental stresses, specifically including temperature, water, and air pollution stresses.

2:00–3:00 pm **Shaw**

Marketing and Economics (MKEC) Working Group Business Meeting

Chair 2008-09: Jennifer Dennis

The MKEC Working Group brings together workers having horticultural and economic interests in the marketing of horticultural crops and works to expand markets and improve marketing techniques for horticultural crops.

2:00–3:00 pm **St. Louis West**

Tropical Horticultural Crops (TROP) Working Group Business Meeting

Chair 2009: Bhimanagouda Patil

The objective of the TROP Working Group is to discuss the culture, postharvest physiology, and processing of tropical fruits, vegetables, herbs, spices, condiments, pharmaceuticals, flavors, fragrances, latex, nuts, oils, beverages, and underutilized horticultural plants.

3:00–4:00 pm **Shaw**

Computer Applications in Horticulture (COMP) Working Group Business Meeting

Chair 2008-09: Kent Kobayashi

The COMP Working Group studies the application of computers in research, extension, and teaching of horticulture.

3:00–4:00 pm **Jefferson F**

Growth Chambers and Controlled Environments (CE) Working Group Business Meeting

Chair 2008-09: Carl Sams

The CE Working Group offers leadership for horticulturists in the use of growth chambers and controlled environments and provides a means for cooperative research and teaching among those using or interested in such facilities in their programs.

3:00–4:00 pm **St. Louis West**

Membership Committee Meeting

Marc van Iersel, Chair; J. Donna Fare, Hideika Kobayashi, Carole Bassett, Jun Song, Joseph Kemble, John R. Clark, Michael W. Neff

3:00–4:00 pm **Jefferson B**

Nursery Crops (NUR) Working Group Business Meeting

Chair 2008-09: Gladis Zinati

This group works to identify those conducting nursery crop research and to ascertain the scope and direction of their studies. The NUR Working Group also develops and shares information for teaching nursery management and production courses, and provides staff development opportunities for nursery crop specialists, teachers, and researchers by developing information programs and interacting with the nursery industry and profession.

3:00–6:00 pm **Lewis/Clark**

The Horticultural Commodity Judging Contest and Plant Identification Contest

These two contests are held at each ASHS Annual Conference. Undergraduate students from ACB member clubs compete by rating the quality of horticultural commodities, identifying a large number of plants, many from out of their region, and by taking a general examination of horticultural knowledge.

4:00–6:00 pm **Laclede**

Oral Session 11—Vegetable Culture and Management 1

Moderator: Richard Smith, rifsmith@ucdavis.edu

4:00–4:15 pm Growth Rate of Lettuce: Implications for Nitrogen Fertilization

*Richard Smith, Michael Cahn, Timothy Hartz, Miriam Silva Ruiz

4:15–4:30 pm Influence of Preplant Nitrogen and Sulfur Fertilization on Bell Pepper

*Bielinski Santos

4:30–4:45 pm Sufficiency Ranges for Nitrate in Leaf Petiole Sap of Greenhouse Pac Choi Produced with

Organic Versus Inorganic Fertilizers

May Altamimi, Rhonda R. Janke, *Kimberly A. Williams

4:45–5:00 pm Glucosinolate Content of Potential Brassicaceae Biofumigant Crops

*John Masiunas, Mosbah M. Kushad, Zack Grant, Stephen Bossu

5:00–5:15 pm Increasing Sustainability of Vegetable Production by Using Urban Waste Compost: Results of a Two-year Rotation

*Paolo Sambo, Federico Roncolato

5:15–5:30 pm Effects of Rye Cover Crop Mulch on Pumpkin Yield and Fruit Quality

*Maurice Ogutu

5:30–5:45 pm The Need to Integrate Plant Populations Into Cover Crop Seeding Recommendations: Case Study with Two Oilseed Radish Cultivars with Contrasting Seed Masses

*Mathieu Ngouajio

5:45–6:00 pm Arbuscular Mycorrhizal Dependency of Three *Moringa* Genotypes

*Theodore J.K. Radovich, Mitiku Habte

4:00–6:00 pm **Field**

Workshop 16—Horticulture and Health: Historical Resources

Sponsor: History of Horticultural Science (HIST) Working Group

Moderator: Donald N. Maynard, DMaynard@ufl.edu

The Workshop will present information that demonstrates that the connection between horticulture and health is an extension of ancient and medieval concerns.

4:00–4:20 pm *Tacuinum Sanitatis:* Medieval Horticulture and Health

*Jules Janick, Marie-Christine Daunay, Harry Paris

4:20–4:40 pm *Rubus* Pharmacology: Antiquity to the Present

*Kim E. Hummer

4:40–6:00 pm The Library Collection of the Missouri Botanical Garden: A Resource for Historical Literature on Health and Horticulture

*Douglas Holland

4:00–6:00 pm **Jefferson C**

Workshop 17—Innovative Applications of Computers In Horticulture

Sponsor: Computer Applications in Horticulture (COMP) Working Group

Moderator: Kent D. Kobayashi, kentko@hawaii.edu

The objective of this Workshop is to familiarize the audience with several of the latest innovative computer applications in horticulture for research, extension, and instruction.

4:00–4:25 pm Fresh Produce Traceability

*Christopher Gunter

4:25–4:50 pm Bayesian Belief Networks for Predictive Modeling and Decision Support

*Arthur O. Villordon

4:50–5:15 pm Innovative Cutting-edge Techniques in Horticultural Photography

*James McConnell

5:15–5:40 pm Using Computer-aided Landscaping

*Kurt Range

4:00–5:00 pm **Jefferson A**

American Pomological Society Tasting Session

4:00–5:00 pm **Jefferson F**

Citrus Crops (CITR) Working Group Business Meeting

Chair 2008-09: Glenn Wright

The CITR Working Group provides a forum for exchange of ideas between the various specialists in citrus research and citrus extension personnel.

4:00–5:00 pm **St. Louis West**

Scholarship Awards Committee Meeting

Holly Scoggins, Chair; Ryan Stewart, Heidi Kratsch, Annette Wszelaki, Brian Trader, Douglas Needham, Curt Rom, Carl Sams

4:00–5:00 pm **Jefferson B**

Water Utilization and Management (WUM) Working Group Business Meeting

Chair 2008-09: Mengmeng Gu

The WUM Working Group gathers and disseminates information on water conservation, crop water requirements, irrigation methods, and efficient and effective water management.

5:00–6:00 pm **Shaw**

Endowment Fund Committee Meeting

Robert Geneve, *Chair*; Mary Lewnes Albrecht, Amy Goldman, Ellen Paparozzi, Irwin Goldman, Larry Rupp, Max Cheng, Adel Kader, Bernadine Strik, Beiquan Mou, Curt Rom, John R. Clark, Carl Sams, Michael W. Neff

5:00–6:00 pm **Jefferson A**

American Pomological Society Annual Business Meeting

5:00–7:00 pm **Jefferson F**

Specialty Nuts Germplasm Committee Meeting

6:00–7:00 pm **Dugout**

Industry Reception

Sponsored by the Industry Division of ASHS.

This open to all activity brings together attendees from private industry, academia, and other disciplines in a casual setting designed to foster conversation. The event has no formal program except for the awarding of the Industry Travel Grant to a deserving student. Participants can relax after a day in the sessions and talk with friends and colleagues.

6:00–7:00 pm **Illinois/Missouri/Meramec**

Poster Session—Undergraduate Poster Session and Competition—Session 2

You must stay with your poster for the full session time period.

(4) Chilling Requirement to Overcome Bud Dormancy in Chokecherry

*Jeremy R. Crook, Brent L. Black

(6) Evaluating a Columnar Population of 'Pink Lady' and 'Fuji' Seedlings

*Julia M. Harshman, Christopher Walsh

(7) Seed Propagation of *Sphaeralcea* (Globemallow)

*Ailina Smith, Heidi Kratsch

(8) Relation Between Metal Accumulation and Surface Characteristics of Leaves and Stems in Two Cultivars of Sweetpotato [*Ipomoea batatas* (L.) Lam.] 'Commensal' and 'Salyboro' Under Salt Stress

*Andre James, Stefanie G. Owens, Devi Prasad Potluri

(9) Evaluation of Organic Winter Greens Production in Unheated High Tunnels

*Matthew Espe

6:30–10:30 pm

St. Louis: The Spooky and the Supernatural

Departure Site: *front of the Millennium Hotel at 4th Street*

Visit some of the spookiest sights in St. Louis. Hear the fascinating history of the amazing cave systems beneath St. Louis told en route to your first stop, the Lemp Mansion. Built in the 1860s, it was the home of William J. Lemp, one of the best-known beer barons of the city. In 1980, LIFE Magazine featured the 33-room mansion as one of the most haunted places in America. Explore Lafayette Park and Square, the location of several haunted sightings. Enjoy a view of Powell Symphony Hall, home of the Saint Louis Symphony Orchestra, where it is said that a spirit nicknamed "George" has been seen wearing a white suit and hat. In 1949, an exorcism took place at Alexian Brothers Hospital in South St. Louis and at the rectory which was located between the Church and DuBourg Hall on Grand Avenue. These events were the basis for the famous movie "The Exorcist." We do not promise that you will encounter a spirit or a ghost on this tour, but we know you will enjoy exploring the Gateway to the Ghostly. Cost: $47.00 per person.

7:00–9:00 pm **Chouteau**

All Division Dinner

7:00–11:00 pm **St. Louis West**

USDA Project NCDC-216: Water Management and Quality for Ornamental Crop Production and Health Meeting

Monday, 27 July 2009

7:00–9:00 am **St. Louis West**

Industry Involvement Task Force Breakfast Meeting

Chair: Peter Petracek

7:30 am–5:00 pm **St. Louis East**

Registration Open - Monday

8:00–9:00 am **Shaw**

Crucifer Crop Germplasm Committee

Presiding: Mark Farnham

8:00 am–12:00 pm **Mississippi**

Colloquia Session 3—Food Safety of Fresh Fruits and Vegetables: What Can Be Done to Minimize the Risks?

Sponsor: Postharvest (PH) and Vegetable Breeding (VGBR) Working Groups

Moderator: Jinhe Bai, jinhe.bai@ars.usda.gov

The objective of this colloquium is to bring together leaders in the fields of postharvest physiology, plant breeding, food microbiology, and environment science to address the needs for genetically enhancing produce safety, preventing outbreaks, and development of new cultivars exhibiting resistance to food borne microorganisms.

8:00–8:45 am Micro-Ecology of Plant Cuticles and Efficiency of Sanitation Methods

*Jan Narciso

8:45–9:20 am Microbial Risk Assessments Related to Horticultural Products

*Mickey Parish

9:20–10:05 am Use of Food Testing Data for Risk Assessment

*Martha Lamont

10:05–10:40 am Food Safety Programs for Horticultural Crops

*James R. Gorny

10:40–11:15 am Technologies and Guidelines for Safe Fresh and Fresh-Cut Produce in Japan

*Hidemi Izumi

11:15–11:50 am Developing Tomatoes for Low Stem Scar Water Uptake for Bacterial Soft Rot Tolerance; Implications for Food Safety

*Jay W. Scott

8:00–9:15 am **Jefferson A**

Oral Session 12—Horticultural Crops Culture and Management: Herbs, Spices, and Medicinal Plants

Moderator: Hazel Y. Wetzstein, hywetz@uga.edu

8:00–8:15 am Flower Morphology and Development in *Artemisia annua*, a Medicinal Plant Used as a Treatment against Malaria

*Hazel Wetzstein, Jules Janick, Jorge F.S. Ferreira

8:15–8:30 am Harvesting and Drying Effect on Oil Yield and Composition of Four Mint Genotypes Grown in Mississippi

*Valtcho Jeliazkov (Zheljazkov), Charles Cantrell, Valtcho Jeliazkov

8:30–8:45 am Enhancing Medicinal Plant Growth in Southwest Mississippi

*Patrick Igbokwe

8:45–9:00 am Desert Parsley (*Lomatium* spp.) Seed Production Challenges

*Clinton Shock, Erik B.G. Feibert, Lamont D. Saunders, Nancy L. Shaw, Ram K. Sampangi, S. Krishna Mohan

9:00–9:15 am Peppermint Productivity and Composition in Mississippi as a Function of Cutting Date and N Rates

*Vasile Cerven, Valtcho D. Zheljazkov, Charles Cantrell, M. Wayne Ebelhar, Dennis Rowe, Valtcho D. Jeliazkov

8:00–9:15 am **Laclede**

Oral Session 13—Teaching Methods 1

Moderator: Ann Marie VanDerZanden, vanderza@iastate.edu

8:00–8:15 am Employer Attitudes and Perceptions of Job Preparedness of Recent Iowa State University Horticulture Graduates

*Ann Marie VanDerZanden, Michael Reinert

8:15–8:30 am Service-Learning in Horticulture: The Freshman Experience

*Brian Trader, April K. Heiselt

8:30–8:45 am The Power of Peer Reviewing to Enhance Writing in Horticulture

*Neil Anderson, Pamela Flash

8:45–9:00 am Student Perceptions of Skills for Solving Ill-structured Problems

*Ann Marie VanDerZanden, Tigon Woline

9:00–9:15 am Clickers in the Classroom: Student Perceptions and Prior Knowledge in a Home Horticulture Course

*Cynthia Haynes, Jennifer Diers

8:00–9:30 am **Field**

Oral Session 14—Horticultural Crops Culture and Management: BioEnergy

Moderator: Donglin Zhang, donglin@maine.edu

8:00–8:15 am How Are Greenhouse Growers Coping with Rising Energy Costs?

*Robin Brumfield, A.J. Both, George Wulster

8:15–8:30 am Investigating Seed Dormancy in Switchgrass (*Panicum virgatum* L.)

*Denise V. Duclos, Dennis T. Ray, Alan G. Taylor

8:30–8:45 am Susceptibility of *Camelina Sativa* to Blackleg Disease, *Leptosphaeria maculans*

*Tara L. Gregorich, Alice L. Pilgeram, Brekke L. Peterson, William A. Hoch

8:45–9:00 am Fermentation of Sweet Sorghum Juice

Valerie H. Teetor, Jeerawan Chawhuaymak, Mark R. Riley, *Dennis T. Ray

9:00–9:15 am Evaluation of Several Horticultural Plants as Biodiesel Crops

*Steven Vaughn, Nathan A. Deppe, Bryan R. Moser

9:15–9:30 am Potential Biodiesel Plant Resources from China

Lijuan Jiang, Jinquan Tong, Changzhu Li, *Donglin Zhang

8:00–10:00 am **Lewis/Clark**

Oral Session 15—Horticultural Crops Culture and Management: Landscape and Turf

Moderator: Richard C. Beeson, Jr., rcbeeson@ifas.ufl.edu

8:00–8:15 am Relationship of Transpiration, Reference Evapotranspiration and Tree Size During Six Years of Growth for *Ilex* × 'Nellie R. Stevens'

*Richard C. Beeson, Jr.

8:15–8:30 am A Survey of Urban Tree Damage After a Major Ice Storm Event in Northwest Arkansas

*Garry McDonald

8:30–8:45 am Assessing Water and Nutrient Use by Leafy Mistletoe (*Phoradendron* spp.) and Some of Its Urban Host Trees

*Raul I. Cabrera, Jennifer McCormick

8:45–9:00 am Defining Variability in Residential Landscape Soils That Influence Nutrient Runoff

*Brian J. Pearson, Richard C. Beeson, Jr.

9:00–9:15 am The Effects of Four Pre-emergent Herbicides on the Rooting Architecture of Hybrid Bermudagrass (*Cynodon dactylon* L. Pers. × *C. transvaalensis* Burtt-Davy)

*C.J. Nettles, Jr., G.C. Munshaw, Jeffrey Beasley, B.R. Stewart, Brian Trader

9:15–9:30 am Restoration Techniques for Landscape Soils Damaged by Construction

Rachel M. Layman, Susan Day, *J. Roger Harris

9:30–9:45 am Landscape Performance of 'Razzle Dazzle' Crape Myrtles

*Allen Owings, Edward W. Bush, C. Allen Broyles

9:45–10:00 am Comparison of Root Measurements for Kentucky Bluegrass Sod Establishment

*Steven Borst, Jeffrey Beasley, Edward Bush V, Ron E. Strahan

8:00–10:00 am **Jefferson C**

Workshop 18—Genetic Control of Root Architecture, Physiology and Disease Resistance Traits

Sponsor: Root Growth and Rhizosphere Dynamics (RHIZ) Working Group

Moderator: Astrid Volder, a-volder@ag.tamu.edu

Moderator: Gennaro Fazio, gf35@cornell.edu

The objective of this Workshop is to improve our current understanding of the genetic control of processes implicated in architectural, physiological, and disease resistance features of root systems.

8:00–8:35 am The Genetic Analysis of Maize Root Complexity

*Martin Bohn, Tony E. Grift

8:35–9:10 am QTL Mapping of Root Architectural Traits in Apple Rootstocks

*Gennaro Fazio, Darius Kviklys, Terence Robinson

9:10–9:45 am Root Traits in Hybrid Aspen with Transgenically Altered Gibberellic Acid Metabolism

*Kevin Kosola, Angela Allred, Beth Ann Workmaster, David Coyle, Ani A. Elias, Cathleen Ma, Elizabeth Etherington, Mark Davis, Jeff Morrell, Camille Freitag, Victor Busov, Steven H. Strauss

8:00–10:00 am **Jefferson D/E**

Workshop 19—Global Sustainable Development: Concepts and Approaches in Practice and Education

Sponsor: Association of Horticulturists of Indian Origin (AHIO) Working Group

Moderator: Usha R. Palaniswamy, usha.palaniswamy@gmail.com

Ecosystems have existed for millions of years, maintaining natural populations and processes that sustain the ecosystems. Natural ecosystems are great models of sustainability. The use and management of natural ecosystems need to be channeled to alleviate the threat to long-term sustainability. This Workshop will begin with a discussion of the concepts of sustainability at the international and local level, provide an example of partnership with communities and the government for sustainable development in the developing world (M.S. Swaminathan foundation, Chennai, India) and present a reasoning and methodology in the evolution of a Sustainable Agriculture Undergraduate Program in a Public Research University (University of Kentucky) the United States.

8:00–8:40 am Concepts of Sustainability at the International and Local Level

*L.E. Craker, Cynthia Barstow

8:40–9:20 am Partnering with Communities and the Government for Sustainable Development: M.S. Swaminathan Foundation's Approach in India

*Usha R. Palaniswamy, S. Senthil Kumaran

9:20–10:00 am Evolution of the University of Kentucky Sustainable Agriculture Undergraduate Program, Mark Williams, University of Kentucky

*Mark Williams

8:00–9:00 am **Jefferson F**

Propagation (PROP) Working Group Business Meeting

Chair 2008-09: Christopher Catanzaro

The PROP Working Group exchanges ideas and information on propagation of horticultural crops and provides interaction between industry and public institutions interested in propagation of horticultural crops.

8:00–10:00 am **Top of the Riverfront**

Administrators (ADM) Working Group Breakfast

Chair 2008-09: Robert J. Joly

The ADM Working Group provides a forum for department and government administrators to meet to consider and discuss common problems and responsibilities and to share ideas that may enhance administrative abilities.

Ticket required to attend this breakfast. Ticket purchase is available at registration.

8:00 am–12:00 pm

Gateway to St. Louis Tour

Departure Site: *front of the Millennium Hotel at 4th Street*

Includes views of Laclede's Landing, the Old Cathedral, the Old Courthouse and Busch Stadium, a tram ride at the Gateway Arch, a stop at the New Cathedral in Midtown, a drive through the Central West End and a Forest Park overview. Cost: $49.00 per person

9:00–10:00 am **Shaw**

Finance Committee Meeting

Carl E. Sams, Chair; Curt Rom, David Hensley, Mary Peet, John R. Clark, William J. Lamont, Jr., Louise Ferguson, Michael W. Neff

9:00 am–5:00 pm **Assembly Area**

Exhibits - Monday

The exhibits are located in the foyer area surrounding the

meeting space this year. The exhibitors will staff their booths only during the ASHS specified exhibit hours.

9:00 am–12:15 pm

Missouri Botanical Garden: Undergraduate Student Tour

Departure Site: *front of the Millennium Hotel at 4th Street*

Founded in 1859, the Missouri Botanical Garden is the nation's oldest botanical garden in continuous operation and a National Historic Landmark. The Garden is a center for botanical research and science education, as well as an oasis in the city of St. Louis and offers 79 acres of beautiful horticultural display—including a 14-acre Japanese strolling garden, Henry Shaw's original 1850 estate home, and one of the world's largest collections of rare and endangered orchids. Cost: $15.00 per person

9:15–10:00 am **Jefferson F**

Teaching Methods (TCHG) Working Group Business Meeting

Chair 2008-09: Peg McMahon

The TCHG Working Group provides information and an area of interaction among educators at all levels and extension personnel interested in teaching, with emphasis on teaching procedures, effective use of photographic equipment and materials, and lists of source materials.

9:30–10:30 am **Laclede**

Oral Session 16—Horticultural Crops Culture and Management: Citrus Crops

Moderator: Timothy Spann, spann@crec.ifas.ufl.edu

9:30–9:45 am Effect of Humic Acid on Some Morpho-physiological and Bio-chemical Attributes of Kinnow Mandarin (*Citrus reticulata* Blanco)

*Saeed Ahmad, Tahira Abbas, Muhammad Yaseen, Raheel Anwar, Muhammad Mumtaz Khan, Rashad Mukhtar Bilal, Muhammad Aslam Pervez

9:45–10:00 am The Use of Plant Growth Regulators for Yield and Quality Improvement of Kinnow Mandarin

*Waqar Ahmed, Muhammad Azhar Nawaz, Muhammad Mumtaz Khan, Raheel Anwar

10:00–10:15 am Debris Accumulation in Loads of Mechanically Harvested Oranges

*Timothy Spann, Michelle D. Danyluk, Robert C. Ebel, Jacqueline K. Burns

10:15–10:30 am Effect of Soil and Foliar Applied Fungicides on Production and Quality of 'Blood Red' Sweet Orange in Pakistan

*Basharat Ali Saleem, Aman Ullah Malik, Zafar Iqbal, Raheel Anwar, Ishtiaq Ahmad Rajwana

10:00 am–12:00 pm **Field**

Workshop 20—Assessing the Effectiveness of Horticulture Courses and Curricula

Sponsor: Teaching Methods (TCHG) Working Group

Moderator: Margaret McMahon, mcmahon.43@osu.edu

This Workshop will present ways of assessing teaching effectiveness at both the course and curriculum or program level.

10:00–10:12 am Curriculum Assessment of the Technical, Management and Problem Solving Skills of the Horticulture and Landscape Horticulture Majors at Colorado State University

*Harrison Hughes

10:12–10:24 am A Program Level Assessment Model for the Horticulture Baccalaureate Degree

*Cynthia McKenney

10:24–10:36 am Demystifying Learning Outcome Assessment at the Program Level

*Caula Beyl

10:36–10:48 am North Dakota State University Horticulture Program Assessment

*Harlene Hatterman-Valenti

10:48–11:00 am Reflective Writing as An Assessment for Analysis and Synthesis Ability

*Ann Marie VanDerZanden

11:00–11:12 am Assessing Student Confidence as a Measure of Learning. Really?

*Candice Shoemaker

10:00 am–12:00 pm **Jefferson D/E**

Workshop 21—Propagation and Conservation of Plants with Horticultural Value

Sponsor: Seed & Stand Establishment (SSEST) Working Group

This Workshop has been cancelled.

10:00–11:00 am **Jefferson B**

Association of Horticulturists of Indian Origin (AHIO) Working Group Business Meeting

Chair 2008-10: Usha Palaniswamy

The objectives of the AHIO Working Group are: 1) to promote fellowship among the horticultural scientists of Indian origin and increase professional opportunities through increased interaction among them and with other American scientists; 2) promote awareness of ASHS membership benefits and encourage membership pool from India; 3) facilitate and support ASHS ad-hoc membership to attract Indian Horticulturists; 4) to act as scientific ambassadors to facilitate an exchange of scientific information and cultural ideas between India and countries in North America; and 5) help share and

transfer results of scientific research to India to improve agricultural productivity and quality.

10:00–11:00 am **Jefferson F**

Root Growth and Rhizosphere Dynamics (RHIZ) Working Group Business Meeting

Chair 2008-09: Astrid Volder

The RHIZ Working Group provides a forum to promote and exchange information on basic and applied research about the plant rhizosphere, soil microorganisms, root growth and development, and root modeling, which apply to horticultural (fruit, vegetable, ornamentals), forest, and agronomic crops grown in synthetic or field soils.

10:00 am–12:00 pm **Chouteau**

ASHS National Issues Task Force Update Session

Chair: Thomas Björkman

The National Issues Task Force (NITF) has been focused on implementation of the new funding horticulture received in the Farm Bill last year, and on building relationships with new legislators on key committees. The session will provide highlights of the year's successes and plans for next year from consultant Jonathan Moore and NTIF chair Thomas Björkman as well specialists on specific initiatives. In the past year, NITF established member liaisons in many states to follow their State Department of Agriculture's process for implementing the substantial new funding in the Specialty Crops Block Grants and to advocate for research and extension funding. The Specialty Crops Research Initiative provided a great opportunity for planning more broadly and a challenge in developing a wholly new kind of project. Legislators we visited are very supportive of horticultural research and extension, particularly in relation to local foods, food safety and rural or urban economic development. In the coming year, we see interesting opportunities to increase funding both to do translational biology with horticultural outcomes and to do plant breeding. There are opportunities for any member to help contribute. One of NITFs goals is to identify actions that take advantage of your unique situation to have the greatest impact. The Workshop will be a good opportunity to find out how you can contribute easily.

10:30 am–12:00 pm **Jefferson A**

Oral Session 17—Crop Physiology/Physiology: Growth Regulators

Moderator: Thomas Davenport, tldav@ufl.edu

10:30–10:45 am Comparative Analysis of Early Events in Tomato and Arabidopsis Brassinosteroid Signal Transduction

*Vikramjit Bajwa, Kevin Blackburn, Michael B. Goshe, Steven D. Clouse

10:45–11:00 am Do Pollinizer Cultivars Affect King Dominance of 'Gala' Apple?

*Jozsef Racsko, Diane Doud Miller

11:00–11:15 am Plant Growth Regulators Improve Sweet Cherry Fruit Quality without Reducing Endocarp Growth

*Caixi Zhang, Matthew Whiting

11:15–11:30 am Growth and Yield Response of Mango to Paclobutrazol Application Under Subtropical Climate

*Raheel Anwar, Muhammad Tahseen Malik, Saeed Ahmad, Basharat Ali Saleem, Ishtiaq Ahmad Rajwana, Muhammad Nafees

11:30–11:45 am Comparison of the Mango Florigenic Promoter Activity in the Subtropics and Tropics

*Thomas Davenport, Fernando Ramirez

11:45 Am– 12:00 pm Effect of Sprayable 1-MCP (Harvista) on Preharvest Drop and Fruit Quality of 'McIntosh' Apples

*Duane W. Greene

10:30 am–12:00 pm **Jefferson C**

Oral Session 18—Horticultural Crops Culture and Management: Nursery Crops

Moderator: Brent Justin Markus, bjm27@cornell.edu

10:30–10:45 am Altering Taproot Architecture of Black Tupelo (*Nyssa sylvatica*) to a More Fibrous Root System

*Jimmy Klick

10:45–11:00 am A Photosynthesis-based Irrigation Model for Woody Plants

*Amy Fulcher, Robert Geneve

11:00–11:15 am Influence of Container Size, Insulation, Moisture Content, and Medium Type on Low Temperatures in Containers

*Brent Justin Markus, Nina Bassuk, Harold M. van Es

11:15–11:30 am Effect of Postemergent Herbicide on Sucker Removal/Injury of Field Tree Liners

*Kyle Daniel, Hannah M. Mathers, Luke Case

11:30–11:45 am Effect of Irrigation and Nitrogen Fertilization on Growth and Foliar Chemistry of *Abies fraseri* (Pursh) Poir. Grown in Containers

*Pascal Nzokou, Bert Cregg

11:45 am–12:00 pm Effects of Soil Matric Potential on Fraser Fir (*Abies fraseri*) Growth and Water Stress Under Drip Irrigation in Michigan

*Pascal Nzokou, Nicholas A. Gooch, Bert Cregg

10:30 am–12:00 pm **Lewis/Clark**

Oral Session 19—Horticultural Crops Culture and Management: Organic 1

Moderator: Erin Silva, emsilva@wisc.edu

10:30–10:45 am Linking Plant Production Traits with Performance in Organic Systems

*Erin Silva, Patrick Carr

10:45–11:00 am Cover Crop, Nutrient Amendment, and Crop Cultivar Affect Organic Cucumber and Tomato Production Systems in the Great Lakes Region

*Ajay Nair, Mathieu Ngouajio

11:00–11:15 am Nitrogen Availability from Liquid Organic Fertilizers

*Timothy Hartz

11:15–11:30 am Mechanisms Explaining Sudangrass Interference and Defoliation Suppression of Canada Thistle

Abram Bicksler, *John Masiunas

11:30–11:45 am Suitability of Biodegradable Plastic Mulches in Certified Organic Production

Andrew Corbin, *Carol A. Miles, Douglas Hayes, John Dorgan, Jonathan Roozen

11:45 am–12:00 pm Solarization and Biofumigation for Organic Control of White Mold in High Tunnels

*Michael Bomford, Paul C. Vincelli, George F. Antonious, Brian A. Geier, Ed Dixon

11:00 am–12:00 pm **Laclede**

Oral Session 20—Asexual Propagation

Moderator: Khalid Ahmad, Graduate, khalidmasood@bzu.edu.pk

11:00–11:15 am *Symplocos tetragona* Chen Ex Y.F. Wu and Its Cutting Propagation

Fang Geng, *Donglin Zhang, Fangping Tong

11:15–11:30 am Developmental Stage and Hormone Concentration Differentially Affect Vegetative Propagation of Select Baldcypress Clones

*Andrew R. King, Michael Arnold, Douglas F. Welsh, W. Todd Watson

11:30–11:45 am Micropropagation of *Ilex glabra* (L.) A. Gray

*Youping Sun, Donglin Zhang, John Smagula

11:45 Am– 12:00 pm In Vitro Regeneration of Venus Fly Trap (*Dionaea muscipula* Ellis) from Leaf Explant

*Khalid M. Ahmad, Shehzadi Saima, Javed I. Mirza

11:00 am–12:00 pm **Jefferson F**

Crop Physiology (CRPP) Working Group Business Meeting

Chair 2008-10: Martin Gent

The CRPP [formerly Plant Biology (PB)] Working Group provides a cross commodity forum for discussions of the integrative physiology of horticultural crop growth, development, and cropping. Areas of interest include (but are not limited to): patterns of vegetative and reproductive development; crop radiation interception and microclimate; dry matter production and partitioning; cultural and environmental influences on crop physiology and productivity; integration of carbon, water and nutrient physiology; modeling of physiological processes.

11:00 am–12:00 pm **St. Louis West**

Extension Division Advisory Council Meeting

Richard Durham, Chair; Matthew Kleinhenz, All Working Group Chairs, and Chairs-elect, Extension Division

11:00 am–12:00 pm **Jefferson B**

Production and Harvest Mechanization (MECH) Working Group Business Meeting

The MECH Working Group provides an informal organization to bring together those interested in production and harvest mechanization needs, opportunities, and problems in horticultural crops.

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Crop Physiology/Physiology: Postharvest 1

(92) Analytical Evaluation of *Capsicum* Germplasm Resources for Genetic Improvement of Aroma and Flavor in Pepper Fruit

Elena Albrecht, John Stommel, Eunhee Park, *Robert Saftner

(94) Chilling and Heating Induced Antioxidant Responses in Tomatoes

Yoshihiro Imahori, Jinhe Bai, *Elizabeth Baldwin

(95) Changes in Visual Fruit Quality and Antioxidant Content at Harvest and Following Cold Storage of Pepper Fruits Harvested from Plants Fed with Nutrient Solutions Containing Hydrogen Peroxide

*Tissa Kannangara, Wei Lin, Xiao Wu, Glenn Block

(96) Role of Light Emitting Diode (LED) in Negating Needle Drop in Balsam Fir (*Abies balsamea* L.)

R. Scott Veitch, *Rajasekaran Lada

(97) Ethylene Modulates Needle Abscission in Root-detached Balsam Fir

Mason T. MacDonald, *Rajasekaran Lada, Alex I. Martynenko, Martine Dorais, Steeve Pepin, Yves Desjardins

(98) Estimation of the Flesh Texture of Watermelon Fruits Using Elastic Surface Waves

*Takashi Ikeda, Pak-Kon Choi, Ikko Arai, Masako Osawa

(99) Quality and Shelf Life of Grape and Cherry Tomato Varieties for Farm-to-School Programs

*Penelope Perkins-Veazie, Billy Roberts, Shelia Magby, Wyatt O'Hern

(100) Measurement of CO_2 Evolution in a Multiplexed Flask System

*Jason R. Hupp, Richard L. Garcia, Rod Madsen, Dayle K. McDermitt

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Crop Physiology/Physiology: Produce Quality

(80) A Comparison of Artificial Neural Network and Multiple Linear Regression Models in Understanding the Influence of Agro-climatological Factors on Carrot Bulking

*Arumugam Thiagarajan, Rajasekaran Lada

(81) Potential Impacts of Engineered Nanoparticles on Crop Productivity and Quality

Sijie Lin, Pu-Chun Ke, Hong Luo, *Nihal Rajapakse

(82) Squalene and Phytosterol Contents in Seeds of Some Korean Adlay (*Coix lacryma jobi* L.) Varieties

Shiva Ram Bhandari, Suk-Keun Park, Sunita Basnet, Young-Cheol Cho, *Young-Sang Lee

(83) Variation in Tocopherol and Tocotrienol Contents in Some Koean Adlay (*Coix lacryma jobi* L.) Varieties

Suk-Keun Park, Shiva Ram Bhandari, Sunita Basnet, Young-Cheol Cho, *Young-Sang Lee

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Genetics/Germplasm/Plant Breeding: Marker Assisted Selection in Vegetable Crops

(93) Evaluating Sterility of a Late-Flowering Ornamental Tung Oil Tree (*Aleurites fordii*)

*Timothy Rinehart, Ned Edwards

(319) Pyramiding QTL Conditioning Partial Phenotypic Resistance to *Sclerotinia sclerotiorum* Into a Bush Blue Lake Green Bean (*Phaseolus vulgaris*) Background

*M. Barrett, J. Davis, S. Zimmerman, J.R. Myers

(320) Mapping of QTL Controlling Ananas Melon Fruit Net Formation

*Soon O. Park, Hye Y. Hwang, In K. Ham, Kevin M. Crosby

(321) Mapping of QTL Affecting Ascorbic Acid in Ananas Melon

*Soon Park, Hye Y. Hwang, Eun M. Lee, Kevin M. Crosby

(322) Molecular Mapping of RAPD Markers and Andromonoecious Associated with QTL for Days to Harvest in Ananas Melon

*Soon Park, Hye Y. Hwang, Kevin M. Crosby

(323) Automated Design of PCR Primers and Polymorphism Discovery for Marker-Assisted Selection in Tomato

*Jeremy Edwards, Mehul Bhakta

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Horticultural Crops Culture and Management: Floriculture Crops 2

(187) Chemical Properties Over Time of Root Substrates Containing Increasing Amounts of Growstones, Perlite, and PBH

*Michael Evans

(188) Physical Properties of a Processed Dairy Manure Product Used as a Greenhouse Root Substrate Component

*Elmer Roldan Salazar, Michael Evans

(189) Growth of Vinca and Geranium in Growstones-, Perlite-, and PBH-Containing Root Substrates

*Michael Evans, Clint Metcalf

(190) Night Interruption and Cyclic Lighting Using LEDs Promote Flowering and Save the Production Cost of Cyclamen in Winter

Jong Hwa Shin, Hyun Hwan Jung, Hyun Jin Kim, Bo Kyung Kang, *Ki Sun Kim

(191) Abscisic Acid: A Potential Treatment for Reducing Leaf Wilting in Potted Bedding Plants

*H. Brent Pemberton, Andrew J. Macnish, Michael S. Reid, Cai-Zhong Jiang, William R. Roberson

(192) Fertilizer Requirement of *Phalaenopsis* During Reproductive Stages

Hsin-Yi Lei, *Yao-Chien Alex Chang

(193) Assessing Biodegradable Containers for Greenhouse and Landscape Performance

*Jeff Kuehny, Michael Evans, Matthew D. Taylor

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Horticultural Crops Culture and Management: Viticulture and Small Fruits

(229) Does Drying Temperature Affect Grape Leaf Nitrogen and Carbon Concentration?

Joan R. Davenport, *Catherine Jones, Mercy A. Olmstead

(230) High Tunnel Strawberry Cropping Systems Research in West Virginia

*Lewis Jett

(231) Comparative Growth and Development of Vines and Fruit of Red Globe Table Grapes on Harmony and on Its Own Roots

*L. Antonio Lizana, Hugo Sepulveda, Marcelo Orellana

(232) Characteristics of Elderberry Fruit in Response to Genotype, Environment, and Pruning Management

*Andrew L. Thomas, Patrick L. Byers

(233) Effects of Training System on Sunlight Penetration, Canopy Structure and Fruit Characteristics of 'Frontenac' (*Vitis* spp.)

*Christina Huck, Elizabeth A. Walter-Shea, Paul Read

(234) Effect of Compost Sources on the Soil Fertility and the Behavior of Raising Grape in Caborca, Sonora

Fabián Robles Contreras, Manuel Valenzuela Ruiz, *Raul Grijalva-Contreras, Rubén Macias Duarte, Fidel Nuñez Ramirez

(235) Effect of the Date of Cuts of Irrigation in Postharvest Time on the Productivity and Quality of Superior Seedless for Table Grape in the Region of Caborca,

Sonora

Manuel Valenzuela Ruiz, Fabián Robles Contreras, *Raul Grijalva-Contreras, Rubén Macias Duarte, Fidel Nuñez Ramirez

(236) Development of Pitanga (*Eugenia uniflora* L.) as a Commercial Crop for Hawaii

Virginia E. Smith, Ty G. McDonald, Malcolm M. Manners, *John L. Griffis, Jr.

(237) Biofumigation of a Strawberry Matted-Row Site with *Brassica* Green Manure Cover Crop

*Martin Kaps, John Avery, Patrick Byers

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Horticulture Extension

(17) Evaluation of Program Changes with the Ohio State University Nursery Short Course

*Hannah M. Mathers, Densie M. Johnson

(18) Microbial Food Safety Training for the Produce Industry in New Jersey

*Wesley Kline, Larry Hardwick

(19) Intermountain Regional Evaluation and Introduction of Native Plants

*Karen Panter, Heidi Kratsch

(20) Expanding Sustainable and Organic Training Opportunities in Arkansas

*M. Elena Garcia, H. Friedrich, Curt R. Rom

(21) Landscape Horticulture Extension Programming for Prison Inmates in Florida

*Geoffrey C. Denny

(22) Focus Groups Gain Insights from Spanish-speaking Horticultural Workers in Iowa

*Cynthia Haynes, Emilie Justen, Ann Marie VanDerZanden

(23) Reaching out to the Amish and Mennonite Vegetable Growers in Missouri on Integrated Pest Management

*Sanjun Gu, James Quinn

12:45–1:15 pm **Assembly Area**

Monday All Delegate Luncheon

Lunch will be available for all attendees. This is a grab-and-go networking focused event.

1:15–2:00 pm **Illinois/Missouri/Meramec**

Poster Session—Genetics/Germplasm/Plant Breeding: Floriculture Crops

(293) Developing EST-SSR Markers for Gerbera Breeding and Genetic Analysis

*Li Gong, Zhanao Deng

(294) Amplification, Cloning and Characterization of Resistance Gene Candidate Sequences in Gerbera and Caladium

*Li Gong, Zhanao Deng

(295) Transferring SSR Markers Across Genus for Caladium Breeding and Genetic Analysis

*Li Gong, Zhanao Deng

(296) Volatile Analysis of Impatiens, *Impatiens walleriana*, and Their Impacts on Western Flower Thrips, *Frankliniella occidentalis* (Pergande), Behavior

*Katie A. Yu, Daniel Warnock

(297) Chemically Induced Polyploidization in *Chlorophytum amaniense* through Indirect Shoot Organogenesis

Feixiong Liao, Juanxu Liu, Min Deng, *Jianjun Chen, Richard J. Henny

(298) Potential for Crop Improvement in Ornamental Salvia Via Interspecific Hybridization

*Joseph Tychonievich, Ryan M. Warner

(299) Inheritance of Crop Timing and Quality Attributes in Petunia Interspecific Hybrid Populations

*Ryan M. Warner

(300) Introduction of New Roses Cultivars Into Ornamental Collection and Their Behavior in Transylvania Conditions

*Maria Cantor, Corina Catana, Erszebet Buta

(301) Evaluation of Vinca Cultivars for the Landscape or as Potted Plants in Guam

*James McConnell

1:15–2:00 pm **Illinois/Missouri/Meramec**

Poster Session—Genetics/Germplasm/Plant Breeding: Vegetable Crops and Cross-Commodity 1

(324) Rate of Natural Outcrossing in Watermelon as Affected by In-row Spacing

*Rakesh Kumar, Todd Wehner

(325) Tomato Flavor Affected by Variety and Production System

*Dilip R. Panthee, Jeanine M. Davis, Luis Perez-Albela, Carl Sams

(326) PA-559: A New, Root-Knot Nematode Resistant, Red-fruited, Habanero-type Pepper

*Richard Fery, Judith A. Thies

(327) Assembling Germplasm Collections of Nuttall's Povertyweed [*Monolepis nuttalliana* (Schult.) Greene] and Other Spinach (*Spinacia oleracea* L.) Allies

*David M. Brenner, Grace Kostel, Mark P. Widrlechner, Candice A. Gardner

(328) Productivity and Quality of Nine Cabbage Varieties in Northeast Sonora, Mexico

Rubén Macias Duarte, *Raul Grijalva-Contreras, Fabián Robles Contreras, Manuel Valenzuela Ruiz, Fidel Nuñez Ramirez

(329) Evaluation of Heterosis and Combining Ability for Important Characters in Muskmelon

Saroj Rolania, *Manphool Fageria

(330) Inheritance of Papaya Ringspot Virus Resistance in Temperate and Tropical Genotypes of Pumpkin

*Robert McPhail-Medina, Linda Wessel-Beaver, José Carlos V. Rodrigues

(331) Carotenoid Concentrations in Brassicaceae Sprouts Do Not Differ Among Genotypes

*Kristin Abney, Dean Kopsell

(332) Our Sleeping Asset: A Strategic Approach to Getting Value from Plant Breeding Reports

*Ann Marie Thro

1:15–2:00 pm Illinois/Missouri/Meramec

Poster Session—Horticultural Crops Culture and Management: Landscape and Turf

(202) Soil Moisture-monitoring Devices in Field Experiments

*Luci Fisher, Kimberly Moore

(203) Impact of Four Irrigation Treatments on Seven Shrub Species

*Ronda Koski, James Klett, Jason Smith

(204) Native Grass Sod Suitability for Transportation and Competition with Resident Weeds

*Tracy A.O. Dougher, Lisa Rew

(205) Water-Use of *Eriogonum corymbosum* in An Irrigated Field Study

*Graham C. Hunter, Heidi Kratsch, Roger Kjelgren, David Hole, Leila Shultz

(206) Validating Nitrogen Fertilization Recommendations for Florida Landscape Plants—Cool Season Annuals

*Gitta Shurberg, Geoffrey C. Denny, Amy L. Shober

(207) Tecoma Grown in Bags Outperform Plants Grown in the Ground

*Clydette M. Alsup, Pamela B. Trewatha

(208) Optimizing Bag Material and Potting Mix Components for "Gardening in a Bag"

*Clydette M. Alsup, Pamela B. Trewatha

(209) Rudy Haag Burning Bush (*Euonymus alatus*) as a Non-invasive Alternative to Current Burning Bush Cultivars

*C.H. Finneseth, Robert Geneve, Winston Dunwell

(210) The Effect of Mulch, Drip Irrigation, and Irrigation Supplement on Native Conifer Establishment in Seattle Parks

Lisa Ciecko, Brandon Neuhaus, *Soo-Hyung Kim

(211) Flowering Ornamentals and Their Phenological Sequence for Integrated Landscape Pest Monitoring

*Yan Chen, Regina Bracy, Dale Pollet

(212) Influence of Topdressing on Thatch Decomposition

*Dustin S. Parker, Jeffrey Beasley, Ron E. Strahan, Edward Bush V

(213) Bermudagrass Establishment on Levees to Reduce Erosion and Nitrogen Losses

*Robert Burwell, Jeffrey Beasley, Edward Bush V, Ron E. Strahan, Steven Borst

(214) Establishing a Decision Making Tool to Reduce Drought Vulnerability in Residential Urban Landscapes

*Salman D. Al-Kofahi, Gregg Garfin, Clyde W. Fraisse, Merrill Bean, Rolston St. Hilaire

(215) Linking Landscape Types to Water Use of Residential Urban Landscapes

Rolston St. Hilaire, *Malik G. Al-Ajlouni

1:15–2:00 pm Illinois/Missouri/Meramec

Poster Session—Horticultural Crops Culture and Management: Sustainable Production

(125) Tillage Impact on Water Use and Yield of Three Sweet Corn Cultivars

*Wayne Whitehead, Bharat P. Singh

(126) Growing Conventional and Organic Squash with Black Plastic or Straw Mulch and Transitional Squash with Living Mulch

*Elizabeth Maynard

(127) Influence of Tillage on Leaf Area Index and Aboveground Biomass Yields of Six Sweet Corn Cultivars

*Wayne Whitehead, Bharat P. Singh

(128) Impact of Brassica Cover Crops on Eggplant Transplant Growth and Muskmelon Seed Germination Under Field Conditions

*Victoria Ackroyd, Mathieu Ngouajio

(129) Applied Allelopathy: Effects of Daffodils on Other Species in Sustainable Agriculture and the Home Landscape

*Sonja Lallemand, Martin Kaps, Frank Einhellig

(130) Use of Vermicompost and Their Effect on Physical and Chemical Properties in an Acid Soil

Ernesto Arturo Domínguez-Camarena, Sr., Javier Farias-Larios, Sr., Arnoldo Michel-Rosales, *José Gerardo López Aguirre, Marcelino Bazán-Tene, Jaime Molina-Ochoa

(131) Application of Doses of Vermicompost in a Saline Soil on Chili (*Capsicum annuum* L.) Plant Growth Under Greenhouse Conditions

Zaira Araceli Barreto-Curiel, *José Gerardo López Aguirre, Javier Farias-Larios, Sr., Marcelino Bazán-Tene, Salvador Guzmán-González

(132) A Spacing Calculator for Mixed Plantings

*Michael Bomford

(133) Evaluation of Corn Gluten Meal for Weed Control in Cowpea

*James Shrefler, Lynn Brandenberger, Charles Webber III, Merritt Taylor

(134) Enhanced Forage Production from Triticale and Triticale-Pea Mixtures

*Kurt Nolte, Guangyao (Sam) Wang, Nancy A. Elliott

2:00–3:30 pm **Mississippi**

ASHS Presidential Address and Annual Business Meeting

Presidential Address: John R. Clark, ASHS President

ASHS Annual Business Meeting (immediately follows the Presidential Address)

Presiding: Mary Peet, Chair, ASHS Board of Directors (2008–09)

Agenda includes:

- Observation of a moment of silence for deceased members
- Open discussion on matters of importance to members
- Association of Collegiate Branches (ACB) report
- Industry Division Travel Grant Award Presentation
- Presentation in recognition of services to ASHS
- Introduction of the 2009–10 ASHS President and Board of Directors

2:15–5:45 pm

Monsanto Biotechnology: Graduate Students Tour

Departure Site: *front of the Millennium Hotel at 4th Street*

This tour is open to graduate students only. Monsanto is a global leader in agricultural biotechnology. The Monsanto Biotechnology facility in Chesterfield, MO is a center for the company's research on improving agronomic crop production (primarily corn, soybeans, cotton, and canola). The tour will highlight the workings of the "pipeline", from transformation to commercial release of crops with improved traits, including pest resistance, drought tolerance, nitrogen use efficiency, and increased yield. Cost: $15.00 per person

3:30–5:00 pm **Chouteau**

Consulting Editors Meetings

Presiding: Ron Robbins and Neal De Vos

3:30–5:30 pm **Laclede**

Workshop 22—Biopesticides and Reduced Pesticide Approaches in Horticultural Cropping Systems

Sponsor: Weed Control and Pest Management Working (WCPM) Group

Moderator: Carlene A. Chase, cachase@ufl.edu

The Workshop provides horticulturists with information on biopesticides and reduced pest management approaches in order to promote greater adoption.

3:30–3:50 pm Activities of IR-4's Biopesticide and Organic Support Program in Horticultural Pest Management
*Michael P. Braverman

3:50–4:10 pm Biopesticides for Control of Bacterial Plant Diseases
*Jeffrey B. Jones

4:10–4:30 pm Ecological Management of Arthropod Pests of Horticultural Crops: Lessons from the Central Coast of California
*Hugh Smith

4:30–4:50 pm Organic Production of Pecans
*Joe M. Bradford, Larry M. Zibilske

4:50–5:10 pm Managing Weeds with Reduced Herbicide Inputs
*Harlene M. Hatterman-Valenti

3:30–5:30 pm **Field**

Workshop 23—Preharvest Skin Disorders of Apple Fruit

Sponsor: Poology (POM) Working Group

Moderator: Steven McArtney, steve–mcartney@ncsu.edu

The Workshop will review normal and aberrant skin development in apple fruit and describe the efficacy of current methods for overcoming skin disorders including sunburn, russet, and scarf skin.

3:30–3:50 pm Overview of Skin Development in Normal and Russeted Apple Fruit
*Martin C. Goffinet

3:50–4:10 pm Development and Control of Russet and Scarf Skin
*Steven McArtney

4:10–4:30 pm Environmental Interactions That Increase Sunburn Damage in Apple
*David Glenn

4:30–4:50 pm Sunburn of Apples: Causes and Suppression of Sunburn Damage
*Larry Schrader

3:30–5:30 pm **Lewis/Clark**

Workshop 24—Student Forum on Graduate School: The What, Why, and How!

Sponsor: Collegiate Activities Committee

Moderator: Richard Harkess, rharkess@pss.msstate.edu

The objective of this Workshop is to expose undergraduate students to graduate school options in horticulture and provide a forum for students to ask questions and get answers from a panel of current graduate students and faculty in horticulture.

3:30–6:00 pm **Jefferson A**

Workshop 25—Efficient Nutrient and Water Use in Protected Culture

Sponsor: Plant Nutrient Management (PNM) Working Group

Moderator: Christopher Gunter, chris_gunter@ncsu.edu

What are the best methods for managing water and nutrients in protected culture? How can those measurements

be made in real time and used for management making decisions? How do different substrates effect water and nutrient management these unique cultural systems? What are accurate budget estimates for nutrient management in these systems? These topics and more will be covered in the this Workshop sponsored by the Plant Nutrient Management Working Group.

3:30–3:45 pm Water and Nutrient Management in Protected Agriculture—the Importance of Managing Water
*John Lea-Cox

3:45–4:00 pm Nutrient Use in High Tunnel Production, Penn State Experience
*Elsa Sanchez, Catherine Rasmussen, Kathleen Demchak

4:00–4:15 pm Nursery and Greenhouse Water Use, Water Conservation Strategies and Treatment Technologies
*Youbin Zheng, Mike Dixon

4:15–4:30 pm Real Time Measurement of Water and Electrical Conductivity in Soilless Substrates, to Precisely Monitor and Control Irrigation and Fertigation Events
*John Lea-Cox, Felix R. Arguedas, Andrew G. Ristvey, David S. Ross, George Kantor

4:30–4:45 pm Substrate Type Affects Growth, Mineral Nutrition and Physiological Responses of Salinized Carrizo Citrange Seedlings
*James P. Syvertsen, Francisco Garcia-Sanchez

4:45–5:00 pm Water Use for Establishment, Growth and Yields of Florida Strawberries in High-Tunnels
*Bielinski M. Santos

5:00–5:15 pm Horticultural Crop Residues in Organic Production and Nutrient Management
*Girish Panicker

5:15–5:30 pm Nutrient Management and Budgets in High Tunnels
*Carl Rosen, Terrance T. Nennichh, Jerry A. Wright

5:30–5:45 pm Innovations in Controlled Release Fertilizer Technology at the Scotts Company
*Frederick Hulme, Joseph L. Craig

5:45–6:00 pm How to Optimize the Uptake of Phosphorous in Potted Plants
*Theo Blom, David Kerec, Youbin Zheng

3:30–6:30 pm **Jefferson C**

Workshop 26—Grapes in the Western Heartland and Great Plains: Regional Challenges, Innovative Solutions, and Unique Products

Sponsor: Viticulture and Small Fruit (VSF) Working Group

Moderator: Joseph C. Scheerens

The objective of this Workshop is to highlight the success of grape-based industries in the region by examining their history and current potential, exploring the regional challenges faced by grape producers, examining progress in genetic and cultural solutions and showcasing the unique quality of grape products produced within.

3:30–3:35 pm Welcome and Workshop Introduction
*Joseph C. Scheerens

3:35–3:50 pm Regional History of the Industry and Its Current Potential
*Paul Read

3:50–3:55 pm History and Potential Discussion
*Joseph C. Scheerens

3:55–4:15 pm Regional Challenges—Abiotic Stresses
*Anne Fennell

4:15–4:35 pm Regional Challenges—Biotic Stresses
*Bruce Bordelon

4:35–4:50 pm Regional Challenges Discussion
*Joseph C. Scheerens

4:50–5:10 pm Innovative Solutions-Developing Adapted Grape Cultivars
*J.J. Luby

5:10–5:30 pm Innovative Solutions-Cultural Adaptations
*Gail Nonnecke

5:30–5:45 pm Innovative Solutions Discussion
*Joseph C. Scheerens

5:45–6:05 pm Unique Products
*R. Striegler

6:05–6:30 pm Unique Products Discussion and Interaction
*Joseph C. Scheerens

3:30–4:30 pm **Shaw**

Horticultural Hall of Fame Selection Committee Meeting

Cary Mitchell, Chair; John W. Kelly, Paul E. Read, Frederick S. Davies, Eric Stafne, Bob Lyons, Chiwon Lee, John R. Clark, Donald N. Maynard

3:30–4:30 pm **Jefferson B**

Temperate Tree Nut Crops (NUTS) Working Group Business Meeting

Chair 2008-10: Richard Heerema

The objectives of the NUTS Working Group are: 1) to bridge the wide communications gap among nut tree researchers; 2) to exchange ideas, results, and experiences in similar orchard crops; and 3) and to provide a forum to discuss various aspects of research unique to tree nut crops.

3:30–4:30 pm **Jefferson F**

Vegetable Crops Management (VCM) Working Group Business Meeting

Chair 2008-09: Alicia Whidden

The VCM Working Group promotes research and exten-

sion of a systems approach to production and utilization of vegetables.

3:30–6:30 pm **Jefferson D/E**

B.Y. Morrison Lecture: Fulfilling the Promise—Applying Molecular Tools to Horticultural Crops

Michael S. Reid

Professor of Environmental Horticulture, University of California, Davis

Sponsors: USDA and ASHS

(See inset on p. 954)

Recent discoveries in plant biology are already driving the laboratory testing of new strategies for modifying the architecture, flowering, longevity, and pest and disease resistance of horticultural plants. Fulfilling the promise of biotechnology requires a concerted effort to remove the financial, regulatory, and intellectual property roadblocks to releasing these plants for commercial production.

4:30–5:30 pm **Shaw**

Nominations and Elections Committee Meeting

Education Division: Harrison Hughes, Carolyn Robinson, Jayne Zajicek

Extension Division: Bob Polomski, Brad Bergefurd, Lucy Bradley, Kurt Nolte

Industry Division: Hugh Poole, Juanita Popenoe

International Division: Kimberly Moore, Devi Prasad, Potluri Chandran Ravindran, John Bower

Research Division: Randy Beaudry, Renae Moran, Jason Griffin, Chieri Kubota

4:30–5:30 pm **Jefferson F**

Organic Horticulture (ORGH) Working Group Business Meeting

Chair 2008-09: Carol Miles

The ORGH Working Group stimulates discussion on horticultural research techniques that enable growers to produce horticultural crops according to organic standards and on the processes that make organic production systems function.

4:30–5:30 pm **Jefferson B**

Ornamental Plant Breeding (OPB) Working Group Business Meeting

Chair 2008-09: Richard Olsen

The objectives of the OPB Working Group are to promote ornamental plant breeding, to serve as a forum for exchange of information among breeders, and to coordinate the communication of results to industry and academe.

5:30–6:30 pm **Shaw**

Collegiate Activities Committee (CAC) Meeting

Richard Harkess, Chair; Bob Mirabello, Tracy A.O. Dougher, Gary Bachman, Brian Trader, Curt Rom, Ann Marie VanDerZanden, Todd West, Candice Shoemaker, Amanda Krieg

5:30–6:30 pm **Field**

Pomology (POM) Working Group Business Meeting

Chair 2008-09: Matthew Fidelibus

The POM Working Group assists the planning and development of research, extension, and teaching programs in pomology. The group also serves the current and future needs of the fruit industry.

5:30–6:30 pm **St. Louis West**

Research Division Advisory Council Meeting

Marc van Iersel, Chair; John R. Clark, All Working Group Chairs and Chairs-elect, Research Division

6:00–6:30 pm **Jefferson A**

Plant Nutrient Management (PNM) Working Group Business Meeting

Chair 2008-09: Christopher Gunter

The PNM Working Group exchanges ideas and information on mineral nutrition and provides interaction between industry and public institutions interested in mineral nutrition of horticultural crops.

7:00–10:00 pm **Busch Stadium**

Baseball Night at Busch Stadium

Come to visit the home of the St. Louis Cardinals and enjoy a game between the Cardinals and Los Angeles Dodgers. By virtue of the Cardinals winning the World Series in 2006, New Bush Stadium joined a very short list of ballparks whose occupants won the Series in the ballpark's inaugural year.

Tuesday, 28 July 2009

8:00 am–12:00 pm **Jefferson D/E**

Colloquium 4—Understanding and Assessing Sustainability in Horticulture; Use of Life Cycle Analysis/Assessment (LCA) to Study and Improve Horticulture Sustainability

Sponsor: Pomology (POM) Working Group

Moderator: Curt R. Rom, crom@uark.edu

Moderator: Paolo Sambo, paolo.sambo@unipd.it

B.Y. Morrison Memorial Lecture Series

Fulfilling the Promise: Applying Molecular Tools to Horticultural Crops

Monday, 26 July 2009

The Agricultural Research Service (ARS), USDA's principal in-house scientific agency, and ASHS are pleased to announce that **Michael S. Reid,** Professor of Environmental Horticulture at the University of California, Davis, has been named the 2009 B.Y. Morrison Memorial Lecturer.

According to Reid, "Molecular strategies provide powerful tools for breeding novel horticultural crops by readily incorporating important phenotypes that improve quality and production traits into existing elite cultivars. Although the 'FlavrSavr' tomato was the first commercial crop to be developed using these new tools, biotechnology has primarily been applied to large-scale agronomic crops. Recent discoveries in plant biology are already driving the laboratory testing of new strategies for modifying the architecture, flowering, longevity, and pest and disease resistance of horticultural plants. Fulfilling the promise of biotechnology requires a concerted effort to remove the financial, regulatory, and intellectual property roadblocks to releasing these plants for commercial production."

Reid is a leading expert in the further understanding of the fundamental basis of flower and leaf senescence, with a view toward extending the postharvest life of ornamental plants. His work covers a spectrum from the biochemistry of senescence to application in the field of new methods of postharvest technology (handling and marketing of environmental plants).

Among his major accomplishments are the identification of the cause of postharvest leaf blackening in cut flower proteas and the development of strategies for using *G. robustus* as a tolerant rootstock for grafting ornamental grevilleas. Together, proteas and ornamental gravilleas represent a multimillion dollar industry in the United States. As the Postharvest Cooperative Extension Specialist assigned to work with ornamentals, he has served the ornamentals industry throughout California, providing information on techniques for improving the postharvest life of ornamental crops. He continually evaluates new techniques for improving the life of cut flowers, and maintains a watching brief on new floral preservatives.

Michael S. Reid
University of California, Davis

Reid received his PhD in cell biology from the University of Auckland, New Zealand, 1968; and the D.Sc. degree in 1993.

About the Lecture:

The B.Y. Morrison Memorial Lecture series was established in 1968 by the Agricultural Research Service to honor the memory of Benjamin Y. Morrison and to recognize scientists who have made outstanding contributions to horticulture and other environmental sciences, to encourage the use of these sciences, and to stress the urgency of preserving and enhancing natural beauty.

Benjamin Y. Morrison (1891–1966) was a pioneer in horticulture and the first director of the U.S. National Arboretum in Washington, D.C. A scientist, landscape architect, plant explorer, author, and lecturer, Morrison advanced the science of botany in the United States and fostered broad international exchange of ornamental plants. Morrison was also chief editor of the American Horticultural Society's magazine from its inception in 1926 until 1963, only three years before his death.

Moderator: Stephano Bona, stefano.bona@unipd.it

The presentations featured in this Colloquium will focus on the utilization of Life Cycle Analysis/Assessment (LCA) as a means of evaluating systems, technologies, production, storage, and processing sustainability.

8:00–8:20 am Developing Sustainability Metrics for Agriculture Using Life Cycle Assessments
*Marty Matlock

8:20–9:00 am Sustainability Metrics/LCA in the Market Place: Insights from Industry
*Chuck Tryon *(invited)*

9:00–9:20 am Assessing Food System Sustainability: Insights from LCA Theory and Practice
*Nathan Pelletier

9:20–10:00 am Life Cycle Impact Assessment of Horticulture Crop Production
*Olivier Jolliet

10:00–10:30 am Use and Impact of LCA in Crop Research and Production
*Stefano Bona

8:00–9:00 am **Lewis**

Oral Session 21—Teaching Methods 2

Moderator: Tina Marie Waliczek, tc10@txstate.edu

8:00–8:15 am Use of Virtual Field Trips to Enhance the Educational Experience
*Kimberly Moore

8:15–8:30 am Exploring Undergraduate Interest in Organic Agriculture Curriculum
*Xin Zhao, Zhifeng Gao, Marilyn E. Swisher

8:30–8:45 am Will Hybrid Course Formats Attract Additional Enrollment?
*T.E. Michaels, J.J. Luby

8:45–9:00 am The Benefits of Integrating Service Teaching and Learning Techniques Into the Undergraduate Horticulture Curriculum
*Tina Marie Waliczek

8:00–9:30 am **Jefferson C**

Oral Session 22—Horticultural Crops Culture and Management: Plant Nutrition 2

Moderator: Dharmalingam Pitchay, dharma.pitchay@gmail.com

8:00–8:15 am Vermicompost Extracts Influence Growth, Total Carotenoids, Phenolics and Antioxidant Activity in Pak Choi (*Brassica rapa* cv. Bonsai, *Chinensis* group) Grown Under Vermicompost and Chemical Fertilizer
*Archana Pant, Theodore J.K. Radovich, Nguyen V. Hue, Stephen Talcott, Kim Krenek

8:15–8:30 am Nutrient Requirements and Monitoring Options for Drip-irrigated Processing Tomato Production
*Timothy Hartz, T.G. Bottoms

8:30–8:45 am Reduced Nitrogen Rates in Combination with Acadian *Ascophyllum nodosum* Seaweed Extract Effects on Yield and Nitrate Leves in the Petioles of Watermelon
Gerald E. Brust, *Robin Ross

8:45–9:00 am Effects of S Fertilization Rates and Irrigation Programs on Tomato Growth and Yields
*Camille Esmel, Bielinski Santos, Eric Simonne, Jack E. Rechcigl, Joseph W. Noling

9:00–9:15 am Phytoremediation of New Orleans Soils Using Urban Horticulture Plants
*Edward Bush, Jeffrey Beasley, Kathryn Fontenot, Allen Owings

9:15–9:30 am Cellular Analysis of Ca, B, and Ca, and B Deprivation
*Dharmalingam Pitchay, Chad V. Jordan, Paul Nelson, Udo Blum, Eva Johannes, Dominique Robertson

8:00–9:45 am **Field**

Oral Session 23—Topics of Concern in Human Issues and International Horticulture

Moderator: Amy L. McFarland

8:00–8:15 am Graduate Student Use of Campus Green Spaces and the Impact on Their Perceptions of Quality of Life
*Amy L. McFarland, Tina Marie Waliczek, Jayne Zajicek

8:15–8:30 am Growing Minds: Evaluating the Effect of Gardening on Quality of Life in Older Adults
*A.J. Sommerfeld, Jayne Zajicek, Tina Marie Waliczek

8:30–8:45 am The Effect of Gardening Activities on Motor Skills Development of Pre-K and Kindergarten Students
*Melody Baker, Tina Marie Waliczek

8:45–9:00 am The Effect of Tree Cover and Vegetation on Incidence of Childhood Asthma in Regions of Texas
*Monica Pilat, Tina Marie Waliczek

9:00–9:15 am Urban Youth: Effects of a Summer Agriculture, Cooking, and Nutrition Program
*Emily K. Neustrom, Carl E. Motsenbocker

9:15–9:30 am Proposal for the Establishment of a Mutually Beneficial Botanical Staff Exchange Program Between China and the United States
*Barnabas Seyler, Robert Lyons, Paul Meyer, Chung-Min Maria Tu

9:30–9:45 am Classic Islamic Influence in Garden Design: Legend or Fact?

*Margaret Balbach, Harold Balbach

8:00–10:00 am **Chouteau**

Oral Session 24—Crop Physiology/Physiology: Produce Quality/Health Properties

Moderator: Todd Dalotto, dalottot@onid.orst.edu

8:00–8:15 am Effect of Timing and Duration of Blue Light Exposure on the Anthocyanin Content of Red Leaf Lettuce Cv. Outredgeous Grown Under Light Emitting Diodes

*Gary W. Stutte, Sharon I. Edney, Gerard J. Newsham

8:15–8:30 am Antioxidant Activity of An Italian Heirloom White Fleshed Sweetpotato

Paolo Sambo, Ferdinando Pimpini, *Carlo Nicoletto

8:30–8:45 am Comparison of Characteristic Flavor and Aroma Volatiles in Melons and Standards Using Solid Phase Microextraction (SPME) and Stir Bar Sorptive Extraction (SBSE) with GC-MS

*John C. Beaulieu, Casey C. Grimm, Rebecca E. Stein, Ana L. Amaro, Domingos Almeida

8:45–9:00 am Effect of Location and Age of Plantation on Organoleptic Characteristics of a Typical Italian Asparagus Crop

Paolo Sambo, Ferdinando Pimpini, *Carlo Nicoletto

9:00–9:15 am Purification and Fractionation of Phenolic Compounds in Medicinal Herbs and Evaluation of Their Anticancer Activities

*Weiguang Yi, Hazel Y. Wetzstein

9:15–9:30 am Total Phenolics, Antioxidants Activity, and Organic Acids Compositions of 38 Varieties of Hot Peppers

*John Masiunas, Joel Gehrig, Mosbah M. Kushad

9:30–9:45 am Variation of Phenolics in Anthocyanin- and Nonanthocyanin-fruit Tomatoes

*Todd Dalotto, Peter Boches, James R. Myers

9:45–10:00 am Risk Management for Field-grown Tomatoes: Comparing Source of Spray Water on the Potential for Food-borne Human Pathogens

*Donna M. Pahl, Demetra Skaltsas, Michael Newell, Andrea Ottesen, Christopher Walsh

8:00–10:00 am **Jefferson A**

Workshop 27—Current Trends and Issues in IP Protection in the Biological Sciences

Sponsor: Intellectual Property Rights (IPR) Working Group

Moderator: Mark Farnham

This Workshop will discuss trends in protecting and licensing IP at different public and private institutions, examine current trends in the use of utility patents and provide an overview of open source approaches to technology development.

8:00–8:20 am Licensing Stories from Michigan State University

*Karim Maredia

8:20–8:40 am Monsanto Public-Private Partnerships

*Natalie DiNicola

8:00–10:00 am **Laclede**

Workshop 28—Urban Agriculture: The Role of Horticulture in the City

Sponsor: Organic Horticulture (ORGH) Working Group

Moderator: Carl E. Motsenbocker

This workshop is the first of the two-part workshop on urban agriculture. In this workshop the general benefits of urban horticulture on the general population and participants will be discussed. Case studies of successful urban horticulture projects as well as the training and use of volunteers in projects will also be presented.

8:00 am–12:00 pm **off-site**

Workshop 29—Herbaria and Reference Collections: Important Repositories of Germplasm Information

Sponsor: Ornamental Plant Breeding (OPB) Working Group

Moderator: Richard Olsen, richard.olsen@ars.usda.gov

The Workshop will expose plant breeders to the wealth of information pertaining to germplasm that can be found locked away in herbaria and botanical reference collections. The Workshop will be held at the Missouri Botanic Garden, hosted by herbarium and library staff. Tours of the herbarium and rare books will expose researchers to information that can be gleaned from combining herbarium specimen labels with historic texts and the resulting taxonomic and geographical data that affect plant breeder's use of germplasm.

8:00–9:00 am **St. Louis West**

Annual Conference Technical Program Committee Meeting

Dennis Ray, *Co-chair;* Carl Sams, *Co-chair;* Jackie Burns, Michael Evans, Kathryn Orvis, Bala Rathinasabapathi, Kirk Pomper, Julia Kornegay, Yan Chen, Linda Wessel-Beaver, John R. Clark, Michael W. Neff

8:00–10:00 am **Shaw**

Cucurbit Genetics Cooperative Meeting

Chair: Todd C. Wehner

8:00–10:00 am **Shaw**

Leafy Vegetable Crop Germplasm Committee Meeting

Chair: Beiquan Mou

8:00 am–4:00 pm **St. Louis East**

Registration Open - Tuesday

9:00 am–12:45 pm **Assembly Area**

Exhibits - Tuesday

The exhibits are located in the foyer area surrounding the meeting space this year. The exhibitors will staff their booths only during the ASHS specified exhibit hours.

9:45 –10:45 am **Jefferson C**

Oral Session 25—Horticultural Crops Culture and Management: Controlled Environments

Moderator: Gioia Massa, gmassa@purdue.edu

9:45–10:00 am Effects of High Tunnel Production on Florida Strawberry Cultivars

*Teresa P. Salame Donoso, Bielinski M. Santos, Craig Chandler, Steven Sargent

10:00–10:15 am Cultural and Environmental Improvement of Three Strawberry Cultivars Grown in Controlled Environments for Long Durations

*Gioia Massa, Cary A. Mitchell

10:15–10:30 am Efficacy of End-of-day Far-red Light in Controlling Tomato Rootstock Height

*Po-Lung Chia, Chieri Kubota

10:30–10:45 am Storing Seedlings at Low Temperature as a Key Technology to Introduce Vegetable Grafting in North America

Ian Justus, *Chieri Kubota

9:45–11:45 am **Lewis**

Oral Session 26—Genetics/Germplasm/Plant Breeding: Ornamental Crops

Moderator: David Zlesak, zles0001@umn.edu

9:45–10:00 am Potential for Domestication of *Shepherdia rotundifoila* (Roundleaf Buffaloberry)

*Chalita Sriladda, Heidi Kratsch, Roger Kjelgren

10:00–10:15 am Field Assessment of Black Spot Resistance in Roses in a Hot Humid Climate

*David Byrne, Natalie Anderson, Matthew Orwat, Valerie Eitriem

10:15–10:30 am Evaluation of Landscape Roses from the Earth-Kind® Trials: Race-specific Black Spot (*Diplocarpon rosae* Wolf) Resistance and Ploidy

*David Zlesak, Vance Whitaker, Michelle Grabowski, Steve George, Stan Hokanson

10:30–10:45 am Utilizing Flow Cytometry for Quantitative Estimations of Nuclear DNA in Over 50 Penstemon Species

*Shaun R. Broderick, Rhyan B. Dockter, Mitchell A. Mendenhall, Shawna L. Daley, James D. Daley, Bryson J. Ewell, Tyler J. Mock, Stephen Love, Brad Geary, Mikel R. Stevens

10:45–11:00 am Pollen-mediated Gene Flow from *Coreopsis tinctoria* to *Coreopsis leavenworthii*: Detection, Effects of Planting Distance, and Insect Pollinators Involved

*Sarah M. Smith, Zhanao Deng, James F. Price

11:00–11:15 am Unreduced Gametes and Polyploidization in *Lantana camara*

*David M. Czarnecki II, Zhanao Deng

11:15–11:30 am Pollen Stainability and Seed Production of 32 *Lantana camara* and 2 *Lantana montevidensis* Cultivars

*David M. Czarnecki II, Zhanao Deng

11:30–11:45 am Morphological and Histological Evaluations of Flower Development in *Elliottia racemosa*

*Carrie A. Radcliffe, James M. Affolter, Hazel Y. Wetzstein

10:00 am–12:00 pm **Chouteau**

Oral Session 27—Tomato Culture, Management and Plant Breeding

Moderator: Xin Zhao, zxin@ufl.edu

10:00–10:15 am Tomato Fruit Quality in Response to Reduced Water Application

*Aziz Baameur, Marita Cantwell, Jim Leap

10:15–10:30 am Breeding Tomato for Increased Fruit Phenolics

Peter S. Boches, Brooke C. Peterschmidt, *J.R. Myers

10:30–10:45 am The Grafted Heirloom Tomato System for Organic Production in High Tunnels: Are There Advantages in the Absence of Diseases?

Suzanne O'Connell, *Mary Peet, Cary L. Rivard, Frank J. Louws, Chris D. Harlow

10:45–11:00 am Response of Tomato Growth Characters to Soil Amended with Vermicompost

*Bryan D. Shupe, S. Alan Walters, Brian P. Klubek, Terry D. Wyciskalla

11:00–11:15 am Screening Varieties for Resistance to Tomato Yellow Leaf Curl Virus

*Monica Ozores-Hampton, Phil Stansly, Eric H. Simonne, Gene McAvoy

11:15–11:30 am Evaluation of Eliminating Fall-timed Subsoil Tillage in Processing Tomatoes Production

*Gene Miyao, Jeff P. Mitchell, Timothy K. Hartz, Shrinivasa Upadhyaya, LeRoy Garciano

11:30–11:45 am Evaluating Rootstocks for Greenhouse Tomato Production

Daniel J. Cantliffe, Quang Vinh Ngo, *Xin Zhao, Nicole L. Shaw, Steven A. Sargent

11:45 am–12:00 pm Grafting as an Alternative to Methyl Bromide in Field Tomato Production

*Xin Zhao, Eric H. Simonne, Robert C. Hochmuth

10:00 am–12:00 pm **Field**

Workshop 30—Fruit Tree Functional Genomics

Sponsor: Plant Biotechnology (BTCH) Working Group

Moderator: Zong-Ming Cheng, zcheng@utk.edu

This Workshop will introduce various functional genomics tools and illustrate with some specific examples of functional characterizations of genes in fruit trees. In addition, the Workshop will provide a platform for promoting participation, collaboration, and cooperation among the ASHS members in fruit functional genomics, which will consequently benefit fruit breeders, geneticists, and biotechnologists, and ultimately the fruit industry, and the general public.

10:00 am–12:00 pm **Laclede**

Workshop 31—Production Issues in the Urban Setting

Sponsor: Vegetable Crops Management (VCM) Working Group

Moderator: Alicia Whidden

Production issues, challenges, and government regulations facing producers in urban and peri-urban settings will be discussed.

10:00–10:20 am Urban Ag, Farmers Markets and Small Farm Use of "Plasticulture" in Oklahoma

*James Shrefler, Keegan Varner, David Sorrell, Joe Benton, Kelsey McCollum, Justin Whitmore, Micah Anderson

10:20–10:40 am Healthy Foods from Brownfields?

*Sabine Martin, Ganga Hettiarachchi

10:40–11:00 am Urban Farming Issues in Philadelphia

*William Lamont

11:00–11:20 am Food Safety in Urban Agriculture

*Wesley Kline

11:20–11:40 am Local Laws, Government Regulations, and Other Issues

*Mary Lamberts

10:00–11:00 am **St. Louis West**

Fellows Screening Committee Meeting

Mary L. Albrecht, Chair; George Hochmuth, Sylvia Blankenship, Freddi Hammerschlag, Esmaeil Fallahi, Donald Elfving, James M. Motes, Kim Hummer, Paul Bosland, John R. Clark

10:00–11:00 am **Shaw**

Graduate Student Activities Committee

Chrislyn Particka, Chair; Mengmeng Gu, Roberto G. Lopez, Clare Bowen-O'Conner, Justin Moss

10:00–11:00 am **Jefferson B**

Intellectual Property Rights (IPR) Working Group Business Meeting

Chair 2008-09: Janice M. Strachan

The IPR Working Group provides a forum that will promote the exchange of information and discussion of issues concerning the protection of intellectual properties.

10:30 am–11:45 am **Jefferson A**

Oral Session 28—Crop Physiology/Physiology: Postharvest 2

Moderator: Jinhe Bai, jinhe.bai@ars.usda.gov

10:30–10:45 am Effect of Chilling and Heating Treatment on Production of Volatiles from Lipids via Oxidation in Tomatoes

*Jinhe Bai, Elizabeth Baldwin, Yoshihiro Imahori

10:45–11:00 am Comparative Evaluation of Physiological Postharvest Root Deterioration of 25 Cassava Accessions: Hydroxycoumarin Fluorescent Accumulation Versus Visual Analysis

Andres Salcedo, Barbara Sanchez, Victor Ocasio, Angel Del Valle, Amaury Ortiz, Pedro Marquez, *Dimuth Siritunga

11:00–11:15 am Effects of Season and Cultivar Selection on External Maturity Indicators in Personal-size Seedless Watermelons

*Edgar Vinson, Floyd Woods, Penelope Perkins-Veazie, Joseph Kemble, Angela Davis, Wheeler Foshee, Raymond Kessler, Jason Burkett

11:15–11:30 am Ecophysiology of Plant Growth Regulators in Inducing and Modulating Root Bulking in Cut and Peel Carrots

U.P. Rayirath, *Rajasekaran Lada, A. Adams, R.S. Veitch

11:30–11:45 am Loss of Aroma Volatile Compounds in Fresh-cut Carrots

*Charles Forney, Michael A. Jordan, Sherry A.E. Fillmore

11:00 am–12:00 pm **Jefferson C**

Oral Session 29—Horticultural Crops Culture and Management: Viticulture and Small Fruits 2

Moderator: Lailiang Cheng, lc89@cornell.edu

11:00–11:15 am The Effect of Foliar Nitrogen Application on Juice Yeast Available Nitrogen in 'Riesling' Depends on Vine Nitrogen Status

*Lailiang Cheng, Tim Martinson

11:15–11:30 am Selecting Wine Grape Cultivars for the Very Cool Mesoclimates of Maritime Western Washington

*Gary A. Moulton, Carol A. Miles

11:30–11:45 am Ballerina Training System Improves Yield and Maintains Fruit Quality of 'Cabernet Franc' Grapevines

*Bradley Taylor, Imed Dami

11:45 am–12:00 pm A New Self-Watering Technique for Container-grown Grapevine—Capillary Wicking Water Cultivation (CWWC)

*Shiping Wang, Qingtao Zhang, Mitsuhiro Inoue, Caixi Zhang

11:00 am–12:00 pm **Shaw**

Education Division Advisory Council Meeting

Dennis Ray, Chair; All Working Group Chairs and Chairs-elect, Education Division

11:00 am–12:00 pm **St. Louis West**

Investment Trustees Committee Meeting

Curt Rom, Chair; Fred Bliss, Tom Ranney, Robert M. Crassweller, Randolph R. Beaudry, Carl Sams, John R. Clark

11:00 am–12:00 pm **Jefferson B**

Vegetable Breeding (VGBR) Working Group Business Meeting

Chair 2008-09: Kevin Crosby

The VGBR Working Group promotes the exchange of information on breeding procedures, screening techniques, and other areas of specific interest to vegetable breeders. The group encourages the exchange of germplasm among vegetable breeders.

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Computer Applications/Consumer Horticulture

(34) Benefits and Impact of OSU Master Gardener Program

*Weston Miller, Gail Langellotto

(35) The History and Evolution of Longwood Gardens' Research Program

*Matthew D. Taylor

(36) Utilizing Master Gardeners as Extension Educational Material Editors

*Lelia S. Kelly

(37) Technologies for Creating Efficient Workflow Between 2-D AutoCAD Drawings and 3-D SketchUp Models in the Preparation of Planting Plans

*Michael Mohney, Dan Stearns, Martin McGann

(38) Multipshot Techniques to Use with Digital Cameras for Optimizing Horticultural Photography

*James McConnell

(39) Growth Performance of Rose Cultivars in Raised Brick Beds

*Pamela Collins, Ekaterina Jeliazkova, Dennis Rowe

(40) An Analysis of Species Selection and Acquisition Practices by Community Tree Planting Programs

*Daniel C. Burcham, Robert Lyons

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Crop Physiology/Physiology: Postharvest 2

(101) Effect of An Alkaline Surface Treatment on Edible Coating Performance as Pertains to Gas and Water Vapor Exchange of Carambola and Mango Fruit

*Jinhe Bai, Jan Narciso, Elizabeth Baldwin

(102) Effect of Controlled Atmosphere, 1-MCP and Preconditioning Treatments in the Development of Physiological Disorders in 'Honeycrisp' Apples

*Carolina Contreras, Randolph Beaudry

(103) Production and Quality of Strawberry Fruits in Vitroplants Cultivar Chandler Treated with Gibberellic Acid

*Maria De Camacaro, Norca Mogollon, Maritza Ojeda, Aracelis Gimenez

(104) Investigation of Factors Contributing to the Development of Lenticel Breakdown in 'Royal Gala' Apples in South Africa

*Elmi Lotze, K. Theron

(105) Preharvest Programs to Reduce Lenticel Breakdown in Apples

*Ines Hanrahan, Tory R. Schmidt, James McFerson

(106) Laser Labeling, a Safe Technology to Label Produce

*Preeti Sood, Ed Etxeberria, Jan Narciso, Chris Ference

(108) Proteomic Approach to Study Scald Disorder of Apples

*Jun Song, QiFa Zheng, Gordon Braun, Charles Forney, Christopher Watkins, Eric Bevis

(109) Influence of Postharvest Aqueous 1-Methylcyclopropene (1-MCP) on the Aroma Volatiles and Shelf Life of 'Arkin' Carambola

Oren Warren, *Steven A. Sargent, Donald J. Huber, Jeffrey K. Brecht, Anne Plotto, Elizabeth Baldwin

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Crop Physiology/Physiology; Environmental Stress

(71) Physiological Responses to Drought of Turfgrass Species Under Field Conditions

*Nisa Leksungnoen, Paul G. Johnson, Roger Kjelgren

(72) Physiological Functions of Chilling Tolerant Sweetpotato (*Ipomoea batatas* L.) Genotypes

*Md. Shahidul Islam, Ehiorobo Izekor, James O. Garner

(73) Hypobaria, Hypoxia, and Light Affect Gas Exchange, and the CO_2 Compensation and Saturation Points of Lettuce (*Lactuca sativa*)

Chuanjiu He, *Frederick Davies, Jr., Ronald E. Lacey

(74) Changes in Concentrations of Free Amino Acids and Nonstructural Carbohydrates of *Ligustrum japonicum* as Plants Die from Water Stress

*Dilma Silva, Richard C. Beeson, Jr.

(75) Water Stress on Physiological and Biochemical Traits of Hybrid Liriodendron Clones

Qirui Wang, Wei Fan, Xiaofeng Tan, Lin Zhang, *Deyi Yuan

(76) Impact of Shading on Seedling Growth of *Maclura pomifera* (Osage Orange)

*Jenna Rozum, David Kopsell, Gary Bachman, Bryon Wiegand

(77) Calla Lily Growth and Development in Response to Saline Irrigation

*Maren Blohm, Lindsay Morningstar

(78) Water Relations, Yield and Fruit Quality of Grafted, Field-grown Watermelons

*John L. Jifon, Kevin Crosby, Daniel Leskovar

(79) Novel Red, Green, Blue LED Light Source and Whole Plant Chamber Make Possible Photosynthetic Assessment of Small Plants

Patrick B. Morgan, *Jason R. Hupp, Dayle K. McDermitt

12:00–12:45 pm Illinois/Missouri/Meramec

Poster Session—Genetics/Germplasm/Plant Breeding: Fruit and Nut Crops

(283) Evaluation of Several Pecan Cultivars and Selections as Immature Trees in Southern Georgia

*Patrick Conner

(284) Genetic Diversity and Classification of *Malus* Germplasm Using Simple Sequence Repeats (SSRs)

*Sarah M. Potts, Mosbah M. Kushad, Schuyler S. Korban

(285) Genetic Variability Among Eastern Black Walnut Cultivars

*Michele R. Warmund, Mark Coggeshall

(286) Pollen Tube Growth in Compatible and Incompatible Pear Genotypes

*Lin Zhang, Xiaofeng Tan, Donglin Zhang, Deyi Yuan

(287) Pawpaw Cultivar Fingerprinting and Progeny Determination Using Simple Sequence Repeat Markers

*Jeremiah Lowe, Shandeep Dutta, Li Lu, Kirk Pomper, Sheri Crabtree, Kyle Schneider

(288) Assessment of Genetic Diversity of Pawpaw (*Asimina triloba*) Cultivars with Simple Sequence Repeat Markers

*Kirk Pomper, Jeremiah Lowe, Li Lu, Sheri Crabtree, Shandeep Dutta, Kyle Schneider, James Tidwell

(289) Assessing Genetic Diversity and Population Structure of *Prunus davidiana* from China Using Simple Sequence Repeat (SSR) Markers

Zhongping Cheng, *Ksenija Gasic

(290) Identification of the Chromosomal Genomic Regions Associated with Peach Tree Short Life Syndrome Using Microsatellite/SSR Markers

Xiaoyu Liu, *Gregory Reighard, Ginger A. Swire-Clark, William C. Bridges, Albert G. Abbott, William V. Baird

(291) Evaluation of *Pyrus* Germplasm for Resistance to Pear Psylla in the Orchard

*Richard Bell

(292) A Navel Orange Variety Trial for the Desert Citrus Industry

*Glenn Wright

12:00–12:45 pm Illinois/Missouri/Meramec

Poster Session—Genetics/Germplasm/Plant Breeding: Ornamental Crops

(302) Assessment of Ploidy Level and Genetic Relationships Among Selected Hemerocallis Hybrids

*Wagner A. Vendrame, Luciana A. Fogaça, Ania Pinares, Francine L. Cuquel, João C.B. Filho

(303) Analysis of Ploidy Levels in *Dichroa febrifuga*

*Sandra Reed, Timothy Rinehart

(304) Polyploid Induction for Developing Sterile, Non-invasive Forms of *Nandina*

*Sarah M. Smith, Zhanao Deng

(305) An Oryzalin Induced Polyploid from a Hybrid of *Hibiscus acetosella* × *H. radiatus* (Malvaceae) Exhibits Reduced Fertility and Altered Morphology

*Ryan Contreras, John Ruter

(306) Analysis of Genetic Diversity and Identity of Redbud (*Cercis*) Cultivars Using SSR Markers

*Margaret Pooler, Timothy Rinehart, Renee Arias, Brian Scheffler, Robert Trigiano

(307) Analysis of Genetic Diversity and Relationships in the China Rose Group

*Valerie A. Eitreim, David Byrne

(308) Quantitative Trait Correlations in a Vitex Breeding Program

*Amanda Hershberger, David Knauft, Carol Robacker

(309) Cistus and Halimium Species and Cultivars Grow and Flower Well in Western Oregon

*Neil Bell, James Altland

12:00–12:45 pm Illinois/Missouri/Meramec

Poster Session—Genetics/Germplasm/Plant Breeding: Vegetable Crops and Cross-Commodity 2

(333) GRIN-Global: An International Project to Develop a Global Plant Genebank and Information Management System

*G. Kinard, P. Cyr, B. Weaver, M. Millard, C. Gardner, M. Bohning, G. Emberland, Q. Sinnott, J. Postman, K. Hummer, T. Franco, M. Mackay, L. Guarino, P. Bretting

(334) Genetic and Phenotypic Diversity within the USDA, ARS *Capsicum baccatum* Germplasm Collection

Elena Albrecht, Dick Lensink, Robert Saftner, *John Stommel

(335) Politics and Promiscuity in Vegetable Seed Production: The Unintended Consequences of Going Green

*Michael Quinn, Carol Malllory-Smith, James R. Myers

(336) Genetic Control of Floral Morph in Tristylous Pickerelweed (*Pontederia cordata* L.)

*Lyn Gettys, D.S. Wofford

(337) Inheritance of Resistance to Zucchini Yellow Mosaic Virus in Tropical Pumpkin

*Luis G. Sierra-Rivera, Linda Wessel-Beaver, Giseiry Rosa-Valentín, José Carlos V. Rodrigues

(338) Quantifying Vitamin C and Flavonoid Levels in a Unique F_2 Pepper Family

*Justin D. Butcher, Kevin Crosby, Kilsun Yoo

(339) Phytophthora Foliar Blight Multi-race Screening Technique in *Capsicum annuum* L.

*Ariadna Monroy-Barbosa, Paul W. Bosland

(340) Field and In Vitro Studies of Jerusalem Artichoke (*Helianthus tuberosus* L.) and Its Potential as Biofuel Feedstock

*Sukhwinder Aulakh, Richard Veilleux, Muhammad J. Iqbal

12:00–12:45 pm Illinois/Missouri/Meramec

Poster Session—Horticultural Crops Culture and Management: Herbs, Spices and Medicinal Plants

(155) Podophyllotoxin Concentration in Needles of *Juniperus virginiana* Collected from Mississippi to North Dakota

*Valtcho D. Zheljazkov, Charles Cantrell, Valtcho Jeliazkov

(156) Effect of Poultry Compost Applications on Ginger Growth and Phosphorous Phytoremediation

*Instar Eljak, Lurline E. Marsh, Corrie P. Cotton, Fawzy M. Hashem

(157) Plant Part and Extraction Temperature Affect Cilantro (*Coriandrum sativum*) Biomarker Compounds

*Damayanthi (Dayan) Ranwala, Richard L. Hassell, Robert J. Dufault, Joseph D. Gangemi

(158) Comparison of Conventional and Organic Production of Basil Accessions in North Alabama

*Cedric A. Sims, Rao Mentreddy

(159) Development of a Miniaturized 24-Well Strawberry Leaf Disk Bioassay for Evaluating Natural Fungicides

*Xiaoning Wang, Stephen J. Cutler, Nurhayat Tabanca, David E. Wedge

(160) Insecticidal Activity of Some Plant Extracts

A.M. Donnia, J. Burand, *L.E. Craker

(161) Yield and Quality of Domestically Grown Chinese Medicinal Plants

Zoë Gardner, *L.E. Craker

(162) Irrigation and Mechanization for Seed Production of Sulfur Buckwheat, a Native Forb

*Clinton Shock, Erik B.G. Feibert, Lamont D. Saunders, Nancy L. Shaw, Ram K. Sampangi, S. Krishna Mohan

12:00–12:45 pm Illinois/Missouri/Meramec

Poster Session—Horticultural Crops Culture and Management: Plant Nutrition 2

(135) Changes of Amino Acid Compositions in the Leaf and Fruit of 'Fuji' Apple Trees as Influenced by Applications of Amino-Acid Fertilizer

*Ik-Jo Chun, Taewan Kim

(136) Cottonseed and Canola Meal as Organic Fertilizers for Landscape Plants

*Kathryn Fine, Janet Cole

(137) Effects of Ammonium to Nitrate Ratios on Substrate pH Shifts During Growth of Calibrachoa with Alkaline Water

*Matthew D. Taylor, Dieter Lohr

(138) Leachate Concentrations of Ammonium, Nitrate, and Phosphorus as Affected by Nutrient Release from Four Different Types of Controlled-release Fertilizers and Crop Development of Containerized Azaleas

*Eugene Blythe, Donald Merhaut, Joseph Albano, Julie Newman

(139) Leachate Concentrations of Ammonium, Nitrate, and Phosphorus as Affected by Nutrient Release from Four Different Types of Controlled-release Fertilizers and Crop Development of Containerized Waxleaf Privet

*Eugene Blythe, Donald Merhaut, Joseph Albano, Julie Newman

(140) Influence of Magnesium-mica Clay as a Peat-based Root Medium Amendment on Nutrient and Water Management of Poinsettia 'Early Glory'

*Rose Ogutu, Kimberly A. Williams

(141) Magnesium Deficiency in Marigold

*Touria El-Jaoual, Douglas Cox

(142) Manganese Toxicity in Marigold

*Touria El-Jaoual, Douglas A. Cox

(143) Manganese Toxicity in Marigold as Affected by Magnesium

*Touria El-Jaoual, Douglas A. Cox

(144) Nutrient Management of Potted Dendrobium and Oncidium Orchids

*Kent D. Kobayashi

(145) Growth and Flowering Responses of Container-grown Marigold to Organic and Inorganic Fertilizers

*Guihong Bi, William Evans, Dennis Rowe

(146) Container-grown Holly Response to Phosphorus

*Thomas Yeager, Claudia Larsen

12:00–12:45 pm **Illinois/Missouri/Meramec**

Poster Session—Horticultural Crops Culture and Management: Water Utilization

(147) Vegetated Floating Mats Effectively Remediate Nutrients

*Sarah A. White, Matthew Cousins, Brandon Seda

(148) Rapid Watering to Achieve Partial Saturation of Root Medium on Flooded Floors

*Martin P.N. Gent, Wade H. Elmer, Richard McAvoy

(149) Recycling Nutrient Solution for Greenhouse Tomato Grown in Rockwool

*Martin P.N. Gent, Michael R. Short

(150) NCDC216: A New Multistate Group for Water Management and Quality for Ornamental Crop Production and Health

*R. Thomas Fernandez, John Lea-Cox, Gladis Zinati, Chuanxue Hong, Raul Cabrera, Donald Merhaut, Joseph Albano, Marc van Iersel, Thomas Yeager, Douglas Buhler

(151) Growth and Physiology of Living Christmas Trees Under Cyclic Irrigation

*Amanda Taylor, Bert Cregg, Tom Fernandez, Pascal Nzokou

(152) Hydroponic Production of Selected Flower and Herb Crops in Red Lava Rock

*Sven Verlinden, Victoria Gonzalez Lerma

(153) Growth and Physiology of Six Horticultural Crops Irrigated with Municipal Reclaimed Water

*Soo-Hyung Kim, Hannah Kinmonth-Schultz, Sally L. Brown

(154) Evapotranspiration in Tomato Plants Grown Under Controlled Environment in Mexicali Baja, California, Model Prototipe Based on the Solar Radiation

Fidel Nuñez Ramirez, *Raul Grijalva-Contreras, Fabián Robles Contreras, Rubén Macias Duarte, Manuel Valenzuela Ruiz

12:45–5:00 pm **Assembly Area**

Exhibitor and Poster Tear Down

The poster hall will start dismantling at 1:00 pm. Any unclaimed posters remaining in the hall will be placed in a pile in the poster hall.

1:00–2:15 pm **Lewis**

Oral Session 30—Horticultural Crops Culture and Management: Floriculture Crops 3

Moderator: Guihong Bi, gb250@msstate.edu

1:00–1:15 pm Effects of Chemical Defoliants, Urea, and GA on Defoliation and Plant Performance of Hydrangeas

*Guihong Bi, Carolyn Scagel

1:15–1:30 pm Long Day Promotes Growth and Flowering of Dwarf Purple Loosestrife

*Hyun Jin Kim, Jong-Hwa Shin, Hyun Hwan Jung, Ki Sun Kim

1:30–1:45 pm Effect of 6-Benzylamine and Cyclanilide on Growth of Poinsettia 'Early Cortez' and 'Mars Red'

Mengmeng Gu, *Shen Ma, Richard Harkess, Brian Trader

1:45–2:00 pm Light and Cooling Requirements for Vernalization of Two Hybrid Nobile Dendrobium Orchids

*Min Lin, Terri Starman, Yin-Tung Wang

2:00–2:15 pm Production of *Kolkwitzia* 'Dreamcatcher' as a Greenhouse Crop—Influence of Cooling and Photoperiod

*Allan M. Armitage

1:00–2:15 pm **Jefferson A**

Oral Session 31—Horticultural Crops Culture and Management Ornamental/Nursery Crops

Moderator: Gladis Zinati, zinati@aesop.rutgers.edu

1:00–1:15 pm Extensive Green Roof Species and Soilless Media Evaluations in Semi-arid Colorado

*Jennifer M. Bousselot, James Klett, Ronda Koski

1:15–1:30 pm Seed Production and Viability of Eight Porterweed Selections Grown in Northern and Southern Florida

*Sandra Wilson, Gary W. Knox, Zhanao Deng, Rosanna Freyre

1:30–1:45 pm Integration of Natural Mycorrhizae in Production of Container-grown Nursery Crops

*Gladis Zinati, John Dighton

1:45–2:00 pm Substrate Media, Fertilizer Rate, and Mycorrhizal Inoculum Source Affect Azalea Plant Root Mycorrhizal Colonization and Severity of *Phytophthora cinnamomi* Infection

*Gladis Zinati, John Dighton, Ann B. Gould

2:00–2:15 pm Quantifying Winter Discharge of Controlled Release Fertilizers to Determine Environmental Impact and Plant Uptake

*Jim Owen, Jr., James Altland, Carolyn Scagel, Heather Stoven, Don Horneck, Jonathan Frantz

1:00–2:30 pm **Chouteau**

Oral Session 32—Horticultural Crops Culture and Management: Water Utilization and Weed Control

Moderator: Sangjoon Kim, kimjun7710@yahoo.com

1:00–1:15 pm Development of Bi-layer Hydrogels for Horticultural Applications

*Sangjoon Kim, Arunan Nadarajah

1:15–1:30 pm Irrigation Optimization Based on Physiological Response of Potted *Chrysanthemum*

morifolium Under Greenhouse Conditions

*Celia S. Kennedy, Mike Dixon, Youbin Zheng

1:30–1:45 pm Fruit Quality Response to Irrigation of 'Royal Gala' Apple in Semi-arid Climate

*Dario Stefanelli, Ian Goodwin, Rodney Jones

1:45–2:00 pm Grass–Legume Cover Crop Mixtures and Manure Affect Weed Seed Production and Legume Nodulation

*Daniel Brainard, Robin R. Bellinder, Virender Kumar

2:00–2:15 pm Efficacy of Four Preemergence Herbicides Declines Over Time

*Robert H. Stamps, Annette L. Chandler

2:15–2:30 pm Weed Management in Sweet Corn: What's Working and What's Not?

*Martin Williams II

1:00–3:00 pm **Field**

Workshop 32—Interspecific Hybrid Fruit Crops: Their Creation and Utilization

Sponsor: Fruit Breeding (FRBR) Working Group

Moderator: Mark Ehlenfeldt

This Workshop will present an overview of the use of interspecific hybrids in several fruit crops, and to show how useful characters are being incorporated from diverse germplasm.

1:00–1:25 pm Citrus Hybridization

*Jude W. Grosser

1:25–1:50 pm Grape Hybridization

*Stephen Stringer

1:50–2:15 pm Cranberry Hybridization

*Nicholi Vorsa

2:15–2:40 pm *Rubus* Hybridization

*Chad Finn

1:00–3:00 pm **Jefferson D/E**

Oral Session 33—Horticultural Crops Culture and Management: Vegetable Crops 1

Moderator: Kurt Nolte, knolte@ag.arizona.edu

1:00–1:15 pm Yield and Quality of Pathogen-free Horseradish (*Armoracia rusticana*) Planting Stock: Implications for a Certification Program

*Mark E. Uchanski, Margaret A. Norton, Robert M. Skirvin

1:15–1:30 pm Evaluation of Horseradish Cultivars in Illinois

*Frank Dorris, S. Alan Walters, John E. Preece

1:30–1:45 pm Determining Optimum Planting Dates for Inter-cropped Cucumber, Squash, and Muskmelon with Strawberry

*Bielinski Santos, Elizabeth Golden, Camille Esmel, Silvia Slamova

1:45–2:00 pm Broccoli [*Brassica oleracea* (Plenck) Var. *Italica*] Plant Growth and Yield as Affected by Colored Plastic Film Mulches

*Juan Diaz-Perez, John Silvoy, Jesus Bautista

2:00–2:15 pm Development of a PCR-based Protocol for In Planta Detection of Pathogens in Asymptomatic Horseradish (*Armoracia rusticana*) Tissues

*Mark E. Uchanski, Margaret A. Norton, Robert M. Skirvin

2:15–2:30 pm Using Vegetation and Polymers to Control Sediment, Nutrients, and Bacteria in Irrigation Run-off from Vegetable Fields

*Michael Cahn, Trevor V. Suslow, Adrian O. Sbodio, Sharid L. Kamal

2:30–2:45 pm Assessing a Site-specific Yield Determination and Field-level Tracking System for Iceberg Lettuce Production in the Desert Southwest

*Kurt Nolte

1:00–4:00 pm **Laclede**

Workshop 33—Sustainable Production Systems for Medicinal Plants, Herbs, and Spice Crops

Sponsor: Herbs, Spices, and Medicinal Plants (HSMP) Working Group

Moderator: Damayanthi Ranwala, nranwal@clemson.edu

Moderator: Valtcho Jeliazkov, vj40@pss.msstate.edu

Objectives of this Workshop are to : 1) provide research-based information on production of medicinal plants, herbs and spice crops in different ecosystems; 2) disseminate research findings on the effects of cultivation practices on growth, development, yield, phytochemical content, and bioactivity of medicinal plants, herbs, and spice crops; and 3) provide a platform for scientists and professional to exchange information and develop collaborations for furthering the science of medicinal plants, herbs, and spice crop production

1:00–3:00 pm **Jefferson C**

Oral Session 34—Marketing/Consumer/Extension Horticulture

Moderator: Kathleen Kelley, kmk17@psu.edu

1:00–1:15 pm Use of a Sensory Evaluation to Assess Consumer Acceptance and Preferences of Lesser-known Cultivars of Apple Scab Resistant Fresh Apples

*Kathleen Kelley, Jeffrey Hyde, Robert Crassweller, James Travis

1:15–1:30 pm Consumer Flower Color Preference on Calendar and Non-calendar Occasions

*Bridget Behe, Chengyan Yue

1:30–1:45 pm Understanding Grower Perceptions of Sustainability

Tanya Hall, *Jennifer Dennis, Roberto Lopez

1:45–2:00 pm Consumer Perception of Sustainably Grown Bedding Plants

*Roberto G. Lopez, Tanya J. Hall, Jennifer H. Dennis

2:00–2:15 pm Support of CEA Applications with Telepresence

*Gene Giacomelli, R. Lane Patterson, Efren Fitz-Rodriquez, Murat Kacira, Phil Sadler

2:15–2:30 pm Simple Irrigation Plan—Turning Evapotranspiration Science Into Irrigation Decisions

*Albert Sutherland, Shelly Sitton, Dennis Martin, Ryan Davis, Rafal Jabrzemski, Keith Boevers, David Williams

2:30–2:45 pm A Tool to Help Producers Calculate Their Costs

*Robin Brumfield

2:45–3:00 pm A Consumer Survey on Purchasing Waterwise Plant Material

*Amy Jo Detweiler, Linda McMahan, Steve Renquist

1:00–4:30 pm

Monsanto Biotechnology: Professional Tour

Departure Site: *front of the Millennium Hotel at 4th Street*

Monsanto is a global leader in agricultural biotechnology. The Monsanto Biotechnology facility in Chesterfield, MO, is a center for the company's research on improving agronomic crop production (primarily corn, soybeans, cotton, and canola). The tour highlights the workings of the "pipeline", from transformation to commercial release of crops with improved traits, including pest resistance, drought tolerance, nitrogen use efficiency, and increased yield. Cost; $26.00 per person

2:30–3:45 pm **Lewis**

Oral Session 35—Crop Physiology/Physiology: Floriculture Crops

Moderator: Michelle Jones, jones.1968@osu.edu

2:30–2:45 pm Phosphorus Remobilization During Developmental and Nutrient Stress-induced Senescence in Petunias

*Michelle Jones, Laura J. Chapin, Nicole L. Waterland

2:45–3:00 pm The Uptake and Partitioning of Nitrogen in *Phalaenopsis* Sogo Yukidian

*Yao-Chien Alex Chang, Ying-Chun Peng, Shui-Cheng Lee

3:00–3:15 pm Nutrient Leaching from Garden Mums Fertilized Using Water Soluble Fertilizer, Controlled Release Fertilizer or a Combination Program

*Neil S. Mattson, Mark Bridgen

3:15–3:30 pm Use of Compact Fluorescent Lamps to Provide a Long-day Photoperiod to Petunia and Pansy

Erik Runkle, *Wook Oh, Sonali Padhye

3:30–3:45 pm Bedding Plants Responded Differently to Salinity Stress

*Genhua Niu, Denise Rodriguez, Terri Starman

2:45–4:30 pm **Chouteau**

Oral Session 36—Crop Physiology/Physiology: Fruit Crops

Moderator: Lynnell E. Teichman Sage

2:45–3:00 pm Organic Acid Metabolism and Nitrogen Metabolism in the Leaves of Transgenic Apple Trees with Decreased Sorbitol Synthesis

*Fangfang Ma, Lailiang Cheng

3:00–3:15 pm Inhibition of Sorbitol Synthesis in Leaves Altered the Primary Metabolism in Transgenic 'Greensleeves' Apple Fruit

*Pengmin Li, Lailiang Cheng

3:15–3:30 pm Regulation of Return Bloom in 'Honeycrisp' Apple: Fruit Position and Seed Number

James A. Flore, *Lynnell E. Teichman Sage

3:30–3:45 pm Native Variation of Flowering and Fruiting in Spur-type 'Delicious' Apple

*Martin J. Bukovac, Paolo Sabbatini, Philip G. Schwallier, Franco Zucconi

3:45–4:00 pm Abscisic Acid, Ethylene, and Polygalacturonase Are Involved in Young Fruit Abscission Induced by NAA and Shading in 'Golden Delicious' Apples

*Hong Zhu, Rongcai Yuan

4:00–4:15 pm Regulated Deficit Irrigation of Montmorency Tart Cherry

Kylara Papenfuss, *Brent L. Black

4:15–4:30 pm Transcriptional Regulation of Cell Cycle Genes During Fruit Development in Apple

*Anish Malladi, Lisa Klima

2:45–4:45 pm **Jefferson A**

Oral Session 37—Horticultural Crops Culture and Management: Vegetable Crops 2

Moderator: Harlene Hatterman-Valenti, h.hatterman.valenti@ndsu.edu

2:45–3:00 pm Effect of Simulated Glyphosate Drift on Irrigated Potato Growth and Yield

*Harlene Hatterman-Valenti, Collin P. Auwarter

3:00–3:15 pm Hill Geometry Influence on Irrigated Russet Burbank Yield and Grade

*Harlene Hatterman-Valenti, Collin P. Auwarter

3:15–3:30 pm A Survey of High Tunnel Crop Producers in the Central Great Plains

*Lewis Jett, Edward Carey, Laurie Hodges, Kimberly A. Williams

3:30–3:45 pm Photoselective Shade Netting for Improving Vegetable Productivity, Pre- and Postharvest Quality and Pest Control

*Yosepha Shahak, David Ben-Yakir, Yossi Offir, Hanna Yehezkel, Aviv Goren, Elazar Fallik

3:45–4:00 pm Production and Fruit Quality of Specialty Melons Grown in a Passively-ventilated Greenhouse

Jeanmarie M. Harty, Daniel Cantliffe, Steven A. Sargent, *Peter J. Stoffella

4:00–4:15 pm Can Parboiled Rice Hulls Replace Perlite in Hydroponic Substrates?

*Barbara E. Liedl, Melissa A. Smith, Nathan A. Atkins, Kristen L. Wilfong, Jeremy M. Sisson

4:15–4:30 pm Improvement of Vegetable Production Using Quartz Porphyry Treated Nutrient Solution: An Emerging Technology for Future Food Production

*Md Abul Kalam Azad, Naima Islam, Katsumi Ishikawa, Sheheli Islam

4:30–4:45 pm Protected Cultivation in Turkey

*Nurgul Ercan

3:00–4:00 pm **Jefferson C**

Commercial Horticulture (CHEX) Working Group Business Meeting

Chair 2008–09: Albert Sutherland

The goals of the CHEX Working Group are to: 1) increase ASHS membership and meeting participation of horticultural extension specialists working with industry and/or community groups; 2) foster communications between such specialists; and 3) share ideas and methods for working with growers and commodity groups.

3:15–5:00 pm **Field**

Oral Session 38—Crop Physiology/Physiology: Environmental Stress

Moderator: Gary W. Stutte, garyw.stutte@nasa.gov

3:15–3:30 pm Evaluation of *Acer truncatum* Germplasm for Use in Urban Landscape Plantings

*Lucas D. Wooster, Nina Bassuk

3:30–3:45 pm Growth and Quality of Lettuce Cvs. Outredgeous and Flandria Under Hypobaric Conditions

*Gary W. Stutte, Jeffrey Richards, Mary Hummerick, Neil Yorio, Sharon Edney, Michael Stasiak, Douglas Gruendel, Raymond Wheeler, Michael Dixon

3:45–4:00 pm Dose-response Studies Assessing the Impact of Atmospheric Ozone on Greenhouse Crops

*Hazel Wetzstein, S. Edward Law

4:00–4:15 pm Alternate and Fixed Partial Rootzone Drying Save Water in Citrus

*Ayako Kusakabe, Juan C. Melgar, Jill Dunlop, Jim P. Syvertsen

4:15–4:30 pm Effect of Soil Moisture Level on Root and Shoot Growth of *Ligustrum japonicum* and Their Relationship to Free Amino Acid to Nonstructural Carbohydrate Ratios

*Dilma Silva, Richard C. Beeson, Jr.

4:30–4:45 pm Defining Post-flood Survival of Planted Oak Seedlings Using Odds Ratios

*Mark Coggeshall, J.W. van Sambeek, Michele R. Warmund

4:45–5:00 pm Soil Respiration and Soil Analysis Under American Sweetgum (*Liquidambar styraciflua*) as Affected by Pavement Type

*Bhavana Viswanathan, Astrid Volder, W. Todd Watson, Jacqueline Aitkenhead Peterson

4:00–5:00 pm **Lewis**

Oral Session 39: —Horticultural Crops Culture and Management: Organic 2

Moderator: Michelle Leinfelder, mml32@cornell.edu

4:00–4:15 pm Orchard Soil Health Indicators and Yield Efficiency Show Similar Trends in Apple Replant Disease, Groundcover Management Systems, and Integrated Versus Organic Fruit Production Studies

*Michelle Leinfelder, Ian Merwin, Michael Brown

4:15–4:30 pm Soil Microbial Community Composition Under Integrated and Organic Apple Systems in a New York Orchard

*Gregory Peck, Janice E. Thies, Ian Merwin

4:30–4:45 pm Early Performance of An Organic Apple Orchard as Affected by Ground Cover Management and Nutrient Sources

*Curt R. Rom, J. McAfee, H. Friedrich, H.S. Choi, M. Elena Garcia, D.T. Johnson, J.S. Popp, M. Savin

4:45–5:00 pm Using 'New' Alternatives to Enhance Adoption of Organic Apple Production

*M. Elena Garcia, Renae Moran, Terrence L. Bradshaw, Loraine P. Berkett, Sarah L. Kingsley-Richards, Morgan L. Cromwell

4:00–5:00 pm **Laclede**

Herb, Spices, and Medical Plants (HSMP) Working Group Business Meeting

Chair 2008-09: S. Rao Mentreddy

The HSMP Working Group promotes and encourages scientific research and education on herbs, spices, and medicinal plants, with emphasis on the botanical, cultural, environmental, genetic, harvesting, physiochemical, processing, and pharmacological aspects of these plants.

5:00–6:30 pm

ASHS Horticultural Landmark Dedication Ceremony

The Missouri Botanical Garden has been selected to receive the prestigious Horticultural Landmark designation from the American Society for Horticultural Science. The Horticultural Landmark designation is an honor bestowed upon the highest tier of horticultural sites around the world. Historical, scientific, aesthetic, or environmental sites are selected for their horticultural excellence.

Justin Hancock is a CPH*

—Justin Hancock, CPH
Editor, Garden Doctor Magazine
Better Homes & Gardens
Special Interest Publications
Des Moines, Iowa

*Certified Professional Horticulturist

The ASHS Certified Professional Horticulturist (CPH) program identifies qualified horticultural professionals for excellence in educational, scientific, and service activities with public and private agencies.

Established in 1991, the CPH program sets standards and maintains procedures for official certification of individuals having recognized credentials in the horticultural field.

A CPH may be sought to:

- consult for industrial and commercial horticulture ventures,
- advise government,
- give legal testimony,
- provide valid information to the media.

In addition to assisting professional advancement, CPH certification also contributes to the status and visibility of horticulture by:

- promoting and encouraging professional development, growth, and renewal;
- publicizing and exemplifying the CPH Code of Ethics;
- meeting state and national requirements regarding professional recommendations to the public.

For application information and other CPH resources, visit **ashs.org** on the web. From the home page, select the "Careers" tab at the top of the page. On the Careers page, select "Certified Professional Horticulturist Program." E-mail the CPH program coordinator at: **ashscph@ashs.org**

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Colloquia

106th Annual International Conference of the American Society for Horticultural Science

Millennium Hotel, St. Louis, Missouri

Presenting authors are denoted by an asterisk (*)
Note: Speakers and session topics are subject to change

Colloquium 1:
Saturday, 25 July 2009
2:00–6:00 pm **Mississippi**

The Efficient Use of Alternative Water and Traditional Irrigation Sources in Horticulture

Sponsor: Water Utilization and Management (WUM) Working Group

Moderator: Mengmeng Gu, Assistant, Extension, Professor
Mississippi State University, Mississippi State, MS; mgu@pss.msstate.edu

This colloquium will focus on efficient use of both fresh and recycled water in horticultural crop production and in landscapes. The topics will include growth and physiological responses of plants to water stress and salinity stress related to irrigation with recycled water, health issues involved in edible horticultural crop production when irrigated with recycled water, and influence of different quantities of fresh irrigation water or recycled water on horticulture production, yield, quality, and landscapes.

The horticulture industry is facing a sharply decreased supply of fresh water for irrigation and growing competition for water resources from other economic sectors. The drought conditions that occur on a regular basis in many states have tremendously affected horticultural production, and raised awareness of more efficient use of water resources and interest in alternative water resources including recycled water. Different from the clean fresh water, recycled water might be associated with higher levels of salt contents and presence and persistence of contaminants, such as drugs, hormones and pathogens. A myriad of research activities have been contributed to our knowledge of growth and physiological responses of plants when crops are irrigated less, and yet, to date, there has not been a concerted effort to conserve, or use recycled or reclaimed water for horticultural production. Advanced systems are now being developed and implemented for these purposes. A panel consisting members invited from the industry will demonstrate the latest technology and instruments applicable in research related to water application, conservation, and remediation, and stress physiology especially water stress and salinity stress, and illustrate the key barriers to implementation in crop production and in the landscape. From the colloquium, members of ASHS would be well served to be updated on breakthroughs in the aforementioned research activities and new technology and tools in the research area.

Colloquium 2:
Sunday, 26 July 2009
8:00 am–12:00 pm **Jefferson D/E**

Rising above the Gathering Storm: Effecting Change for the Future of Horticulture Higher Education

Sponsors: Teaching Methods (TCH) Working Group and the Education CAC

Moderator: Dennis T. Ray
University of Arizona, Tucson, AZ; dtray@email.arizona.edu

Moderator: Curt R. Rom
University of Arkansas, Fayetteville, AR; crom@uark.edu

The objective of the colloquium is to develop awareness and provide information to ASHS members on issues and opportunities facing horticulture higher education preparing students for the challenges of global competitiveness in the 21st Century.

It has been posited that a "Quiet Crisis" in science and technology education in the US is occurring due to the greying of the American scientific community and a lack of well-trained scientists, and the educational programs preparing scientists to replace them. The crisis may lead to a lack of international competitiveness. A panel of scientists appointed by the National Academy of Sciences (NAS) studied US global competitiveness and reported recommendations in, "Rising Above the Gathering Storm," stating problems and solutions in training and retaining the best and the brightest in sciences and technology. The Board of Agriculture and Natural Resources under the aegis of the NAS held a "Leadership Summit to Effect Change in Teaching and Learning Agriculture Science" in October 2006 to stimulate change in agriculture higher education. Summit goals were to enhance excellence in higher education, increase collaborative and integrative efforts of education and research, increase communication among the scientific professions, to foster integration of teaching, research and outreach, and to set a national agenda for higher education in academic programs in agriculture and the life sciences. This leadership summit was a call to arms to think about a new academic mission - to rethink the "land grant mission" of agriculture education. The colloquium will present big-picture perspectives on agriculture higher education and scientific competitiveness with some focus on specific challenges and opportunities faced in horticulture education. The colloquium brings these perspectives and ideas to ASHS to provide a basis for members to renovate and innovate horticulture higher education.

Introduction to the Colloquium:

Curt Rom, Dennis Ray

A Leadership Summit to Effect Change in Teaching and Learning—Introduction to the Colloquium; Importance and History of an Effort to Effect Change; and Recommendations for Change

Adam P. Fagen
Study Director, Transforming Agricultural Education for a Changing World, BANR/NAS

Filling the Nation's Need in Industry and Business in the Future

Pat Verduin
Currently Vice President for global R&D at Colgate Palmolive

The University of the Future

Michael V. Martin
Chancellor, Louisiana State University

Horticulture Education and Research for the 21st Century

Randy Woodson
Provost, Purdue University

Changes in Teaching and Learning in the Biological Sciences for the 21st Century: Recommendations from the Summit Report Affecting Teaching

Susan R. Singer
Laurence McKinley Gould Professor of Natural Sciences, Department of Biology, Carleton College, National Academy of Science Board on Science Education

Down in the Trenches: Transforming the Horticulture and Crop Science Image and Curriculum to Recruit More Students

John Peterson
Professor and Head, Department of Horticulture, California Polytechnic State University, San Luis Obispo, CA

Nationwide, enrollment in Horticulture and Crop Science departments has been declining. Since enrollment peaked in the mid-70's, Cal Poly has experienced similar declines. To better understand today's students and their interests, our Horticulture and Crop Science Department (HCS) engaged the well-respected Iowa-based firm, Stamats, for a marketing study to enable HCS to better identify and communicate with qualified potential students. This study looked into the tools and terminology used by the department to communicate with students. The end result was a brand portfolio of comprehensive marketing materials for student recruitment to HCS and a change in our curriculum. One of the more enlightening aspects of the study was how positively students react to contemporary terminology about the environment, such as sustainability, but they do not have a clear understanding of what horticulture and crop science is. Additionally, terminology describing department majors—horticulture, plant science, plant production, crop science—were little understood by the students. Even subjects like landscape design and management—seemingly self-explanatory—drew a variety of definitions, with most students settling on "something to do with agriculture." Students could not envision the coursework and likely career outcomes associated with these fields of study. The data gathered supported the idea that prospective students would benefit from time to fully explore their options before having to declare a specific major. Most students are interested in a single broad major that will let them explore various concentrations or areas of specialization. Prospective students may know agriculture appeals to them, but need time to explore the possibilities and career opportunities available to them. With this data we have been able to better attract prospective students. Our brand portfolio includes a statement of what HCS represents (our "promise"), a set of departmental attributes, a tagline, a thumbnail sketch of the HCS Department (our "elevator speech") and examples of marketing copywriting using audience-appropriate language. As a result of the study, we have changed our curriculum to offer a single broad major and allow students to explore a variety of concentrations and specializations before they decide exactly what it is they want to study. Thus, HCS will offer one major, Agricultural and Environmental Plant Sciences, with seven concentrations. These findings may have broad applications for Horticulture, Crop Science and Plant Science programs at other institutions to aid them to recruit students to fill a significant and growing need in the nationwide Agricultural Plant Science Industry.

Panel Discussion, Q&A

Colloquia Session 3:
Monday, 27 July 2009
8:00 am–12:00 pm — Mississippi

Food Safety of Fresh Fruits and Vegetables—What Can Be Done to Minimize the Risks?

Sponsors: Postharvest (PH) and Vegetable Breeding (VGBR) Working Groups

Moderator: Jinhe Bai
USDA–ARS, Winter Haven, FL; jinhe.bai@ars.usda.gov

The objective of this colloquium will be to bring together leaders in the fields of postharvest physiology, plant breeding, food microbiology, and environment science to address the needs for genetically enhancing produce safety, preventing outbreaks, and development of new cultivars exhibiting resistance to food borne microorganisms.

Fruits and vegetables are an important part of human diet. It is recommended by the American Cancer Society that consumers eat at least five servings or more of fruits and vegetables each day. On the other hand, each year, people get sick from foods that have not been properly grown, handled, refrigerated, or cooked. There were 71 U.S. produce outbreaks from 1996 to 2006. Providing consumers with safe, wholesome fruits and vegetables is the first priority of agricultural and food scientists and industries. Fruits and vegetables can pick up chemicals and microorganisms as they are being grown, harvested, handled, packed, shipped and marketed. Various approaches have been tried to reduce microbial contamination. Such approaches include proper pre- and postharvest practices followed by the Good Agricultural Practice (MAP) and Hazard Analysis and Critical Control Points (HACCP) programs; rapid detection of toxic chemicals and microbials; breeding for new cultivars with resistance to food borne microorganisms; traceability, etc. This workshop will address the major technologies for insuring fruit and vegetable safety, to help the industry to improve quality and safety of fresh and fresh-cut products.

Micro-ecology of Plant Cuticles and Efficiency of Sanitation Methods

Jan Narciso*
USDA–ARS Citrus and Subtropical Products Lab, Winter Haven, FL; jan.narciso@ars.usda.gov

The cuticle is a continuous extracellular hydrophobic membrane designed for plant survival by protecting against uncontrolled water loss. The structure of cuticles is variable and consists of cutin with various waxes, polysaccharides, cellulose and hemicelluloses. As in all other air or water interfaces, plant cuticles have dynamic populations of microorganisms. These include plant and human pathogens as well as epiphytes, which can interact forming associations with the cuticle which cannot be destroyed by even vigorous washing. Attachment of microbial propagules to cuticles happens very quickly and often preferentially on specific parts of the plant. Attachment is by adhesive materials specific to the plant and the residing organism (e.g. polysaccharides, lectins, cellulose fibrils, etc.). This presentation will explore the dynamics of cuticle/microbe interactions and the challenge to reduce microbial populations from fruit and vegetable surfaces before processing. Pros and cons of various sanitizing methods will be discussed.

Microbial Risk Assessments Related to Horticultural Products

Mickey Parish*
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Food protection risk assessment can be broadly defined as the use of scientific data to rank or measure hazards, assess exposure, and characterize risks associated with specific foods or food production practices. Risk Assessment, along with Risk Management and Risk Communication comprise the overall Risk Analysis paradigm adopted in the mid-1990's by numerous federal agencies to make regulatory decisions related to food protection. This adoption was based on an executive order from the President issued in September 1993 which requires agencies to use scientific data to assess risks and costs/benefits prior to proposing regulations. Assessments may be qualitative in nature, often involving ranking of risks associated with a specific situation, or quantitative in nature resulting in a number to describe an amount of risk associated with a specific situation. Risk assessments may address one microorganism in one food product (e.g., Salmonella in almonds), a specific production process, points within the food chain, or a group of toxins/microorganisms related with general category such as produce or poultry. This presentation will provide information about risk analysis and the risk assessment process as well as results from specific produce-related risk assessments.

Use of Food Testing Data for Risk Assessment

Martha Lamont*
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Food Safety Programs for Horticultural Crops

James R. Gorny*
Dept. of Plant Sciences, University of California, Davis, Davis, CA

Produce food safety from farm to table is everyone's responsibility, including growers, shippers, processors and consumers. Preventing contamination of fresh fruits and vegetables with human pathogens, dangerous levels of chemical residues, or physical contaminants is the most effective means by which one can assure that "fresh" foods such as produce are wholesome and safe for human consumption. Epidemiological data indicates that the greatest risk to human health from consumption of uncooked produce is from pathogenic microorganisms. To minimize food safety risks, many growers and shippers have implemented practices as outlined in the "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables" published by the Center for Food Safety and Applied Nutrition, U.S. FDA. 1998. This publication outlines what are commonly referred to as Good Agricultural Practices (GAPs) which, when followed, can significantly reduce the risk of microbial hazards in produce.

However, there are significant gaps in understanding of the microbial ecology of human pathogens on the farm and in the packing house environment. In particular, quantifiably defining water quality for irrigation as well as procedures and monitoring steps that assure the safe use soil amendments warrants further investigation. Until science based assessments of procedural risk are compiled, all recommendations are based merely on opinion and conjecture. This is particularly problematic for growers as they must currently make decisions regarding deployment of their limited food safety resources without science based understanding of all the risk factors or validation of intervention strategies. What risk factors are known and what information is needed to develop more effective on farm GAP programs will be discussed. Specifically, the most effective strategies to monitor and control agricultural water quality, chemical inputs and personnel training will be addressed. The current status of effective preventative and intervention strategies and research will also be discussed.

Technologies and Guidelines for Safe Fresh and Fresh-cut Produce in Japan

Hidemi Izumi*
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Fresh and fresh-cut produce can become contaminated with microorganisms and can be the vehicle for food-borne pathogens. The degree of contamination varies widely among produce types and is dependent on the environmental conditions from growing to processing. Our research showed that microbial count was basically higher on vegetables than on fruits, and approximately 80% of the total isolates were bacteria in vegetables and molds in fruits. It has been assumed that the inherent acidity of fresh fruits would prevent growth of bacteria. Most of the bacteria and molds isolated from produce are phytopathogenic and soilborne organisms. On-farm sources of microbial contamination are from animal feces, fertilizer, agricultural water, pesticide solution, soil, and humans at the preharvest level and animal feces, transport vehicles, dump and rinse waters, packing shed equipment, and humans at the postharvest level. Major sources of in-plant contamination are from the equipment and machinery used in preparing fresh-cut produce. The microbial flora characteristics of fresh produce during growing also persist after harvest and are therefore commonly found on fresh-cut produce. An on-farm food safety program such as Good Agricultural Practices (GAP) and an in-plant food safety program such as Hazard Analysis and Critical control Point (HACCP) have been recommended to minimize microbial food safety hazards of fresh and fresh-cut produce, although those programs in Japan are still in its infancy for implementation. In Japan, a more intensive and extensive research studies are needed to better understand the interaction of field and plant conditions and various treatments in reducing and regulating spoilage and human pathogens. We and others in Japan have researched many treatments including chlorination of agricultural water, ethyl alcohol spraying on packing shed

equipment, and chemical disinfectants such as electrolyzed water and physical treatment such as high-pressure of fresh-cut produce to result in safe food. These data and future data will be used to establish a scientific baseline for designing and improving food safety guidelines that will effectively control microbial quality and assure safety of fresh and fresh-cut produce. Various technologies that are being used or evaluated for maintaining food quality and safety of the produce appear promising in Japan.

Developing Tomatoes for Low Stem Scar Water Uptake for Bacterial Soft Rot Tolerance; Implications for Food Safety

Jay W. Scott*
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Colloquia Session 4: Tuesday, 28 July 2009
8:00 am–12:00 pm Jefferson D/E

Understanding and Assessing Sustainability in Horticulture; Use of Life Cycle Analysis/ Assessment (LCA) to Study and Improve Horticulture Sustainability

Sponsor: Pomology (POM) Working Group

Moderator: Curt R. Rom
University of Arkansas, Fayetteville, AR; crom@uark.edu

Moderator: Paolo Sambo
University of Padova, Legnaro (Padova) 35020; paolo.sambo@unipd.it

Objective: From presentations at the Colloquium, ASHS members would understand the utilization of LCA in their respective fields as a means of evaluating systems, technologies, production, storage and processing sustainability

Measuring the sustainability of an agriculture enterprise and the impacts of the production system from "farm to fork" is difficult, but is becoming important. Many retail operations and governmental regulation agencies are requesting or requiring production, processing, and packaging vendors to provide measurements of the sustainability and impact of the inclusive production system. One of the methods used to assess the inputs, outputs and impacts of the agricultural production system is life cycle analysis or assessment (LCA). LCA has been used in industrial as well as agriculture applications during the past 10 years. The use of LCA has both scientific as well as practical applications in the development and evaluation of production techniques. Although becoming a standard for measuring inputs and impacts of production systems with many uses in animal production and food processing systems, the application to American horticulture production has been limited. It appears that there is an information gap on the use of LCA to evaluate the inputs and impacts of horticulture production and processing systems in a farm-to-fork manner. Because of the value of LCA to research and the importance that LCA may have as a means for producers to document the inputs and impacts of their production system, this colloquium is presented to introduce the concept to horticulturists in order to stimulate validated research on horticulture crop production systems in the US with implications for use worldwide.

Introduction to the Colloquium: A Brief Review of LCA and Its Implication for Sustainable Horticulture

Curt R. Rom, Paolo Sambo

Developing Sustainability Metrics for Agriculture using Life Cycle Assessments

Marty Matlock*
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There are at least five active programs to define and measure sustainable agricultural practices in the United States. These programs are motivated by market forces, production ethics, and retail distribution requirements. Developing a set of common practices in measuring and assessing sustainable production practices is desirable in order to prevent conflicting and confusing market signals. Life cycle assessments provide a method of quantifying processes throughout the production supply chain in order to compare and innovate practices. However, those analyses must be based upon a set of metrics that are rational indicators of the parameters of concern. These metrics must include measurements of environmental, social, and economic state conditions in order to reflect sustainable production conditions. These metrics are often merged into a single index in order to simplify comparisons. Indexing of metrics is a normative process, requiring significant attention to legitimacy criteria in policy-making. These criteria include representation, equity, efficacy, and implementability. Most sustainability labels associated with agricultural production do not meet this criteria, and have significant unintended consequences, especially on poor and disenfranchised producers. A unified method for developing, approving, and implementing LCAs, metric development, and index implementation is recommended.

Sustainability Metrics/LCA in the Marketplace: Insights from Industry

Assessing Food System Sustainability: Insights from LCA Theory and Practice

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Food systems are critical drivers of anthropogenic environmental change. Given the complexity of the interlinked series of industrial activities underpinning the production, processing, distribution and consumption of food commodities, understanding and mitigating the environmental dimensions of global food systems requires a systemic perspective and analytical techniques of commensurate scope. Life Cycle Assessment (LCA) is an ISO-standardized biophysical accounting framework used to (1) compile an inventory of material/energy flows and emissions characteristic of each stage of a product or service life cycle and (2) quantify the contributions of these flows to a suite of resource and emissions-related environmental impact categories. The information produced is relevant to identifying opportunities for environmental performance improvements within existing supply chains, and also for making comparisons of the relative efficiencies of competing production technologies. A key strength of this approach is that it brings a suite of related biophysical accounting techniques under the umbrella of a single, consistent methodological framework, creating opportunities for

nuanced comparisons along multiple dimensions of environmental performance. This presentation will describe the theoretical basis of LCA, discuss key insights that have emerged from food systems research world-wide, and present findings from past and on-going LCA research of North American food production systems.

Life Cycle Impact Assessment of Horticulture Crop Production

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The presentation will start by presenting a few LCA applications in the field of horticulture, identifying several challenges we face to assess in a life cycle perspective the environmental impact of horticulture production on human health and ecosystems, i.e: What are the main impact associated with product produced in heated greenhouses or transported over long distances? What are the impacts of fertilizer solution leaching and/or recirculation? How to account for the pesticide residues in the food products? So far most LCIA methods for human toxicity have used steady state modelling only considering the diffuse impacts of chemicals such as pesticides. Humbert et al. (2007) have shown that pesticide residues in treated crops often dominate the life cycle impacts of pesticides on human health. Charles (2004) and Juraske et al. (2007, 2009) have opened prospects in the evaluation and quantification of xenobiotics in food by developing a time dynamic plant model for wheat and for horticultural crops. Their work shows that: a) accounting for impacts of pesticide products sprayed directly on the plant is crucial since these are generally rapidly absorbed, so that initial concentration in the plant may reach high levels b) Variation in pesticide characteristics and time of application, clarifies that the fraction of pesticide at harvest varies by 5 orders of magnitude between substances. c) A dynamic model is essential since the time elapsed between spraying and harvest is a key parameter. The presentation will end by discussing the potential and limitations of the application of life cycle impact assessment to horticulture crops

Use and Impact of LCA in Crop Research and Production

Stefano Bona*
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One of the most important topic in agronomic research is the possibility to compare different production processes, from seeds or transplants to the final product (ornamental plant, fruits, vegetables etc.), using methods different from the economic evaluation. Even the simplest agricultural systems becomes, therefore, very complex, because of all the different processes and structures which must be taken into account. These different processes and products are not homogeneous making almost impossible their global evaluation using conventional parameters or indexes. One of the most suitable methodology appears to be LCA which can be adopted for different field activity or processes. The fundamental approach of this "from the cradle to the grave" methodology is a systematic analysis of the flows of matter and energy during the life of a product - from the extraction of the raw materials, through production, its use, until the product is disposed of and becomes refuse. The procedure outputs are "impacts on different environmental categories" indicating the entity of environmental modifications generated by production activities. Flows of matter and energy affect different categories of impact (UNI EN ISO 14043): global warming, stratospheric ozone depletion, acidification, nutrient enrichment, photosmog formation, human and eco-toxicity and resources depletion. Nowadays LCA is mainly applied to industrial products or processes, but its use is increasingly widespread in agriculture. In this work some applications of LCA to agricultural sector are presented to give an overview of the possibilities offered by this method. Some of results of LCA are on data coming from Italian projects on organic crop production, in particular in comparing different cover crops, and on the evaluation of on-farm energy production for fulfilling farm energy needs. In addition some other applications such as impact of transport of fruits, different cropping systems, found in the literature, are reported.

Workshops

106th Annual International Conference of the American Society for Horticultural Science

Millennium Hotel, St. Louis, Missouri

Presenting authors are denoted by an asterisk (*)
Note: Speakers and session topics are subject to change

Workshop 1:
Saturday, 25 July 2009, 2:00–4:00 pm Jefferson A

Advances in Specialty Nut Crops

Sponsor: Temperate Tree Nut Crops (NUTS) Working Group

Moderator: Richard J. Heerema

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Objective: In this workshop, experts will summarize the status of specialty tree nut crop industries in North America—including both Old World and native New World nut tree species. They will discuss historical challenges and successes of these industries and the potential for each to survive, and even thrive, in the future.

Nut trees have a long history in North America. Native Americans enjoyed the nutritional value and flavor of nuts from native trees, such as American chestnut, several species of walnut and hickory (including pecan) and piñon, many centuries before Christopher Columbus arrived from Europe. As Europeans settled in North America in the 16th and 17th centuries, they carried with them their familiar Old World nut trees such as Persian walnut, almond and European filbert, but soon they too found uses for and became fond of the native North American nut trees. In the 19th and early 20th centuries sizable commercial tree nut industries in North America grew out of some of the Old World imported species, as well as two native nut species. Due to several factors, including growing worldwide nut demand, falling agronomic crop prices and relatively low labor requirements for nut crop production, commercial nut industries in general have experienced dramatic expansion in North America in recent decades. With few exceptions (e.g., pistachios), this expansion has been primarily evident in already well-developed nut crop industries, especially almonds and Persian walnuts. Yet, there has also been renewed interest in development of markets, cultivars, orchard systems and other commercial aspects for several of the lesser known native and Old World nut tree species. The speakers in this workshop will give overviews of four specialty tree nut crops—including two Old World species and two North American natives. In addition to the historical challenges and successes of each of these niche industries, they will discuss what advances are necessary for these industries (and similar industries) to not simply survive, but expand and thrive, in upcoming decades.

Black Walnut: A New Nut Crop for the Midwest

Mark Coggeshall*

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Eastern black walnut (*Juglans nigra*), is a native tree species valued both for its timber and nuts. Individual trees require excellent soils with adequate moisture for maximum wood and nut productivity. The vast majority of black walnut nutmeat production is centered in the western part of the species' native range and is predominantly derived from wild, unimproved sources. Historically, the size of this crop has ranged from 4.5 to 15.9 million kg. (fresh weight, without hull), with less than 1% obtained from improved cultivars. Alternate bearing is common in this species, primarily due susceptibility to walnut anthracnose (*Gnomonia leptostyla*). Significant reductions in nut productivity caused by walnut curculio (*Conotrachelus retentus*) are common for unimproved, wild trees. Based on a collection of 65 nut cultivars established by the University of Missouri, black walnut exhibits significant genetic variation for a range of commercially important nut traits including: precocity, percent kernel, nut bearing habit, anthracnose tolerance, season length and yield efficiency. Exploiting this variation through traditional plant breeding techniques will result in new, improved varieties in the future. Defining improved cultural practices that will significantly impact yield and nut quality remain areas of active investigation. Such knowledge will need to be combined with improved cultivars that are well adapted to local growing conditions to insure the commercial success of this species over the long run.

Improvements in Hazelnut Production In the United States

Jeff Olsen*

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In the mid-1980s, eastern filbert blight (EFB) was discovered in Oregon's main hazelnut-producing region and now is present throughout the hazelnut-producing area. Oregon State University's (OSU) hazelnut breeding program responded by developing EFB resistant cultivars first released in 2005. The breeding program has also selected for other beneficial traits for hazelnut production such as uniform early nut maturation, larger kernel size, and improved kernel quality. A 2008 OSU economic study on the costs of establishing and producing hazelnuts showed that the EFB resistant varieties enhance economic viability orchards, increasing cumulative cash flow during establishment by $12,243. Several completely resistant cultivars have been released from the OSU Hazelnut Breeding program, all of which have 'Gasaway' as a parent to give a single gene resistance to EFB. Hazelnut genotypes with EFB resistance have been collected worldwide and are being integrated into the OSU hazelnut breeding program to create new varieties with multiple sites for EFB resistance. There is increasing interest in growing hazelnuts in the other parts of the United States. The Arbor Day Foundation began the Hazelnut Research Project in 1996 in Nebraska. Recently, to maximize progress, a Hybrid Hazelnut Consortium was formed to join the leading hazelnut researchers in the world. The Consortium's goal is to create a world leading research and breeding program to develop hazelnuts as a widely adapted, high-yielding and low-input sustainable crop that is competitive with annual crops for food, feed or bio-energy. Rutgers University has been researching hazelnuts for the eastern United States since 1996. They currently have around 11,000 hazelnut seedlings undergoing evaluation and selection. The Rutgers program is also looking to find cold tolerant genotypes. They have been working closely with OSU to assess the response of OSU hazelnut selections that are resistant to EFB in Oregon to EFB strains from the eastern U.S. This has demonstrated the need for cultivars with multiple sources of resistance and has prompted a restriction of importation of hazelnuts into Oregon. They are also searching for new and integrating new sources of resistance to EFB from seedling populations from Europe. More effective IPM for EFB-susceptible hazelnut cultivars have been developed by OSU

scientists. They recommend a management program that integrates scouting for and pruning out of infected tissue, fungicide sprays, and the use of more resistant varieties. Advancements in hazelnut fertilizer management have included discovery of nitrogen uptake, distribution and utilization patterns through work with isotopically-labeled nitrogen.

Piñon: The Next Orchard Nut Crop?

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Piñon are edible pinenuts produced by low-growing pines of western North America. The primary species, out of as many as 14 species are: *Pinus edulis*, *P. monophylla*, and *P. cembroides*. Piñon occur in seven southwestern states in the US, and throughout much of Mexico. Piñon are nutritious and a popular ingredient in many recipes both as a main course and dessert. However, harvesting occurs only in natural stands, which tend to have infrequent cone production. Consequently, piñon availability is sporadic and prices tend to be high (>$20/kg in shell). The objective of this paper is to discuss opportunities and obstacles to develop piñon as an orchard crop. Topics include: species, natural distribution, seed sources, management practices, harvesting strategies, and nutritional benefits.

Chinese Chestnut as a Niche Crop

Michele R. Warmund*
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Chinese chestnut (*Castanea mollissima* Bl.) is an exotic species that has potential as a niche crop. As a "nut" crop, it is relatively precocious in its bearing habit and has resistance to chestnut blight, tolerance to low winter temperatures, and relatively few pests. Current prices for fresh chestnuts are as much as $11/ kg. Most chestnut growers (64%) have small orchards (< 4 ha) and have been producing this crop for less than 10 years. Commercial production is low (≈680,000 kg), but the industry is just beginning in the United States. Limitations to growing this crop include limited availability of grafted trees, high tree costs, low yield efficiency, and high labor costs due to limited large-scale harvest equipment in the U.S. However, on-going research utilizing cultivars on dwarfing rootstocks, thinning of secondary flowers, and improved tree nutrition will likely enhance profitability of production. In a 2003 survey, 67% of those interviewed had never consumed Chinese chestnuts, but associated chestnut roasting with holidays. Chestnuts provide health benefits including a source of fiber, a significant amount of vitamin C, no cholesterol, and are gluten-free.

Workshop 2:
Saturday, 25 July 2009, 2:00–4:00 pm Field

ASHS Primer: Getting the Most out of the Conference

Sponsor: Collegiate Activities Committee

Moderator: Tracy A.O. Dougher
Montana State University, Bozeman, MT; tracyaod@montana.edu

Objective: To provide students and members attending the ASHS Conference basic information on how to approach the professional meetings, the opportunities available, and how to gain the most benefits from attending the conference.

Attending an ASHS professional conference can be an overwhelming experience. Getting the information and contacts that will help you in your career can be challenging. The mystery of where to go, what to do, how to find where the talks are, what can I attend, or even what is ASHS, this workshop is designed to provide basic information on the opportunities available to attendees at the national conference. This workshop will answer questions about the conference and help guide students in obtaining the most from their conference experience.

Navigating the Meeting

Tracy A.O. Dougher*
Montana State University, Bozeman, MT; tracyaod@montana.edu

We'll be navigating through the ASHS meeting program, understanding the difference between workshops and colloquium, and learning how students can contribute through the business meetings.

Expanding Your Network: Meeting the Faculty of ASHS

Richard Criley*
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We'll provide tips on how students can break out of their student, lab, or university groups at ASHS and become comfortable meeting ASHS faculty, presenters, and other students.

Getting the Most From Posters and Presentations

Kent D. Kobayashi*
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We'll share information on what students can do to give their best poster/presentation and how to approach and ask questions at poster/presentation sessions.

Workshop 3:
Saturday, 25 July 2009, 2:00–4:00 pm Chouteau

Program Sustainability: Generating and Managing Funds in Tight Economic Times

Sponsor: Consumer Horticulture Master Gardener (CHMG) Working Group

Moderator: Lelia S. Kelly
Mississippi State University Extension Service, Verona, MS; leliak@ext.msstate.edu

Objective: Provide successful techniques for generating and managing funds by speakers sharing their different approaches. Provide interaction and discussion on this topic by having a panel discussion.

With budget cutbacks a certainty for the near future and grant monies becoming more competitive this workshop will provide creative ideas to resource outside funding and generate monies for sustaining consumer horticulture programs and positions. Speakers will share their successful techniques through the use of foundation accounts, fee-based programming, 501c3 status, sale of curricula, successful grant writing ideas, and other methods. The last part of the workshop will be a panel discussion where any participant can share successful methods of funding management.

Putting University Foundations to Work for Master Gardeners Programs (*Buddy, Can you Spare a Dime?*)

Dave Close*
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Writing Grants that Receive Funding

Ellen Bauske*
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Master Gardener Programs and Money Management

Janet Carson*
University of Arkansas, Little Rock, AR; jcarson@uaex.edu

Workshop 4:
Saturday, 25 July 2009, 2:00–4:00 pm Jefferson C

Standardized Phenotyping: Advantages to Horticulture

Sponsor: Genetics and Germplasm (GG) Working Group

Moderator: Nahla Bassil

USDA–ARS, NCGR, Corvallis, OR

Objectives:

1) Describe phenotyping efforts in diverse horticultural disciplines.
2) Relate advantages for using standardized phenotyping for broad applicability in research and breeding programs.
3) Emphasize the importance of standardization for genomic applications.
4) Give an update on standardized ontology for horticultural crops.

New and emerging DNA sequencing technologies have recently accelerated the pace of gene discovery. Phenotypic information is not keeping pace with the explosion in available genomic information and statistical methods of associating phenotypic and genotypic data, thus hindering our understanding of biological processes. Analyses of whole-genome sequences and preliminary comparative studies indicate a surprising amount of genome synteny and conservation of gene function, order and content among plants. Putative function of a novel gene is based on its reported function in other plants and in some instances, other organisms. Nevertheless, these inferences must be validated by experimental genetic analysis. The 'phenotype gap' must be filled by developing a coordinated effort to standardize phenotyping protocols and apply uniform phenomic nomenclature to facilitate database searches, comparisons and extrapolations. Such a system of comparative phenomics would facilitate the progression of knowledge throughout model biological systems in plants and from other well-studied organisms.

Standardized Plant Disease Evaluations Will Enhance Resistance Gene Discovery

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Gene discovery and marker development using DNA based tools require plant populations with well-documented phenotypes. Related crops such as apples and pears may share a number of genes, for example resistance to common diseases, and data mining in one crop may reveal genes for the other. However, unless consistent phenotype evaluation methods or data scoring techniques are employed, data mining for marker-trait associations is difficult. Fire blight resistance evaluations for apples may use a scale of 1–5 and pear evaluations may use 1–9. Some reports use a low numerical rating to indicate low susceptibility and others to indicate low resistance. Still others may report disease resistance as greater than or less than that of a standard cultivar. Environment, pathogen isolate and whether disease ratings are the result of natural infection or artificial inoculation also have strong impacts on disease resistance ratings. Before disease resistance phenotype data can be correlated with genetic data, the rating scale and evaluation environment must be standardized to the extent possible. Examples of pome fruit disease evaluations will be presented and a standardized disease rating system will be proposed.

Phenotyping of Tomato for SolCAP and Onward Into the Void

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Standardizing Postharvest Quality and Biochemical Phenotyping for Precise Population Comparison

David Rudell*
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Selection of plant material with desired traits from different populations can be difficult, if not impossible, when trait evaluation methods are not comparable. This is especially true regarding postharvest fruit traits where techniques and reporting protocols can be unique or nonexistent for traits crucial to fruit quality and storability. Moreover, difficulties evaluating postharvest traits may be exacerbated by the dynamic nature of fruit ripening, introducing error even into intrapopulation comparisons. With the rise of biochemical phenotyping of fruit quality-related traits, opportunities to standardize evaluation of these and other important fruit postharvest traits are materializing. Standardized trait evaluation among breeding programs and, most importantly, germplasm collections is expected to allow more precise trait comparison between populations, expediting integration of economically important fruit quality traits into new populations as well as marker discovery.

Standardized Phenotyping of Apple Texture for Improved Breeding and Research Efficiency

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Fruit texture in fresh and lightly processed apple products is a trait of significant horticultural variability and economic value. Worldwide, diverse crop improvement programs seek to define the trait, identify critical physiological parameters, and elucidate its genetic control. All breeding programs include an emphasis on superior texture to meet consumer expectations. These programs, their supporting germplasm repositories, and research programs, each conduct fruit evaluations in their own manner. This independent, individual approach limits the transferability of information among programs. The recently completed multi-institutional European apple research project, HiDRAS, broke this mold by coordinating phenotyping across several breeding and research programs and germplasm collections. In the 2009–10 USDA-CSREES NRI-funded project, "Functional gene markers for Rosaceae tree fruit texture," we are taking this a step further by coordinating texture phenotyping efforts across a dozen programs in the United States, Europe, and New Zealand. Initial efforts include developing standardized protocols, trait definitions, and target phenotyping environments. In addition to the anticipated ability to conduct powerful analyses with combined datasets, standardized phenotyping in apple is creating a common language for interdisciplinary and international collaboration. We expect project outcomes to provide direct impact on genotypic prediction of performance in apple, provide insight into genomes of related crop genera, and provide producers and the public with more accessible and reliable quality indices.

Advantages for the Use of Standardized Phenotyping in the National Plant Germplasm System

Gayle Volk*
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As genomic technologies progress, it becomes possible to retrieve genetic information from one species and utilize it in another. Genomic sequence data is becoming prevalent in databases; however, associated phenotypic data is much more expensive and difficult to obtain. It often involves multi-year, multi-location evaluation trials and comprehensive databases for information storage are not available. Full database documentation of data collection methods and standards would enable data users to compare results and apply them to their research programs. Existing databases provide some information, but details regarding field site locations, conditions, and methods of replication are often lacking. Standardized ontologies for trait classification provide a mechanism by which searches can be efficiently performed. By improving database documentation systems, the value of existing data can be determined. Through standardization efforts, results can be compared across years, researchers, and locations. Both genotypic and phenotypic data can then be analyzed to identify germplasm accessions of interest for improved yield, quality, and stress tolerance.

Workshop 5:
Saturday, 25 July 2009, 4:00–6:00 pm Chouteau

Successful Strategies for Obtaining Specialty Crops Funding

Sponsor: ASHS Research Division

Moderators: Marc van Iersel (Research Division VP)
University of Georgia, Athens, GA

Rebecca Darnell (Research Division VP-elect)
University of Florida, Gainesville, FL

Objective: Becoming more competitive for specialty crops research and extension program funding

This workshop will update ASHS members on specialty crop funding opportunities available through USDA, with the overall objective to provide advice on how to become more competitive for specialty crops research and extension program grants. Jonathan Moore, the ASHS consultant in Washington, D.C., will discuss the latest developments in federal research funding. Thomas Björkman will review the latest development in specialty crop block grants that are allocated to state governments, and talk about how some of this funding may be used for research and extension programs. Tom Bewick, USDA-CSREES national program leader, will share his experiences from the first funding round of the Specialty Crops Research Initiative, and discuss what made successful proposals stand out from the rest. The final part of the program will be a panel discussion and question/answer period with panel members who received funding in the first round of the SCRI program. There will also be discussion of programs implemented by universities to assist their faculty in developing SCRI programs.

Workshop 6:
Saturday, 25 July 2009, 4:00–6:00 pm Field

The Missouri Botanical Garden: Contributions to the Horticultural Sciences

Sponsor: ASHS Education Division

Moderator: Jules Janick
Purdue University, West Lafayette, IN; janick@purdue.edu

Objective: To present to the attendees of the Annual Conference an overview of the Missouri Botanical Garden and to showcase its many contributions to the horticultural sciences.

Founded in 1859, the Missouri Botanical Garden is the nation's oldest botanical garden in continuous use, and is both a National Historic Landmark and a newly designated **ASHS HortLandmark.** The 79 acres of the Garden are a beautiful horticultural display within the city of St. Louis and is a center for botanical research and science education. This year, 2009, marks the Garden's sesquicentennial. For 150 years the Garden has been an oasis in a city, a place of beauty and family fun, and also a center for education, science, and conservation.

Workshop 7:
Sunday, 26 July 2009, 8:00–9:30 am Jefferson A

Management of Abscission in Fruit Crops

Sponsor Growth Regulators in Fruit and Nut Production (PGR) Working Group

Moderator: Gregory Clarke
Valent BioSciences, Dillsburg, PA; gregory.clarke@valent.com

Objective: This workshop will review the current understanding of fruit abscission and how it may be controlled with PGRs in both sub-tropical and temperate crops.

Managing abscission in fruit crops is essential for achieving economic and horticultural objectives. For crops with chronically poor fruit set, reducing fruit abscission can help improve yields and fruit quality. Conversely, crops with tendencies toward high rates of fruit set may benefit from increasing early fruit abscission in order to ensure acceptable fruit size and adequate return bloom. Furthermore, management of abscission near harvest is often desirable to prevent premature fruit drop and to promote an orderly harvest. Abscission itself is a complex, highly coordinated process that is influenced by environmental, abiotic, and endogenous factors. A general model for understanding this process will be reviewed. Plant growth regulators have proven to be effective tools in either increasing or decreasing abscission in both temperate and sub-tropical crops. While the field-level effects of PGRs in these systems have been known for some time, recent studies have helped to expand our understanding of the underlying mechanisms that control abscission. The study of alternate bearing crops like avocado and mandarin illustrate the importance of endogenous physiological factors and how they interact with temperature to determine final fruit set. Effects of PGRs and foliar-applied nutrients on these processes will also be presented. Recent studies in apple with NAA, AVG, and 1-MCP have improved our understanding of which genes control ethylene production, ethylene perception, and cell wall degradation in both the fruit cortex and fruit abscission zones. This information may be useful in developing new strategies for management of preharvest fruit drop. Workshop presentations will be interspersed with opportunities for discussion and interaction among attendees and speakers with the goal to encourage the exchange of ideas and to spur creative research in this area.

Current State of the Science Related to Fruit Abscission

Jacqueline Burns*
University of Florida, Lake Alfred, FL; jkbu@crec.ifas.ufl.edu

Abscission is a highly coordinated developmental process that results in shedding of organs at predetermined sites called abscission zones. Abscission is often considered a stress response in plants, as it can be triggered by environmental, abiotic and pathogen-related challenges as well. An accepted model of abscission identifies 4 major steps in the abscission pathway: 1) differentiation of the abscission zone; 2) competence to respond to abscission signals; 3) activation of abscis-

sion; and 4) post abscission transdifferentiation. Step 1 is a major control point, and plants with fruit disrupted in their ability to form an abscission zone do not abscise. Competence of fruit to respond to abscission signals is developmentally regulated and influenced by environmental stimuli and cross talk between phytohormones such as auxin and ethylene. Activation of fruit abscission involves perception and transduction of signals that lead to downstream responses. Increased gene expression of cell wall hydrolases and those involved in secondary metabolism, hormonal metabolism and the PR response occur as abscission advances. Final preparation for fruit separation and post abscission transdifferentiation may involve induction of genes and proteins whose activities may be associated with ongoing cell wall loosening processes and building a protective layer around the fractured surface of the abscised organ and the parent plant. Examples of abscission control points in fruit and commercial implications of such control will be discussed.

Understanding and Managing Abscission in Subtropical Fruit Crops

Carol J. Lovatt*

University of California, Riverside, CA; carol.lovatt@ucr.edu

For subtropical tree fruit crops, flowering (including pollination and fertilization), fruit set (and its associated early drop period), and June drop [the period June through July when fruit development occurs simultaneously with flushes of vegetative shoot and root growth, creating competition and fruit drop] are phenological stages during which the greatest gains in fruit retention and, hence, final yield can be made. Moreover, events or treatments during these stages of phenology also impact fruit size and quality. Abscission data collected for alternate bearing crops, e.g., 'Hass' avocado (*Persea americana* Mill.) and seedless Clementine mandarin (*Citrus reticulata* Blanco) during successive years, provided evidence that periods of flower and fruit drop are caused by endogenous physiological factors. Temperature extremes exacerbate these normal abscission processes. Plant growth regulators (PGRs) are possibly the most powerful tools available for solving production problems in the field. Two factors critical to achieving a desired outcome are properly timing the PGR to tree phenology and understanding the influence of crop load on the tree's response to the PGR applied. In general due to natural fruit thinning, successively later treatments are less effective in increasing total fruit number but of greater benefit in increasing the yield of commercially valuable large-size fruit. Depending on application time, auxins, gibberellic acid, cytokinins and the ethylene biosynthesis inhibitor aminoethoxyvinylglycine have proven effective in increasing total fruit number or yield of large-size fruit. Due to the fact that flowering, fruit set and fruit development are phenological stages of high nutrient demand, a plant growth regulator effect resulting in increased total yield or yield of large-size fruit is obtained from foliar-applied fertilizers, even when the tree is not deficient in the nutrient by standard leaf (or petiole) analyses, by properly timing the fertilizer application to tree phenology. Boron or low-biuret urea applied directly to avocado inflorescences at the cauliflower stage of development increased the number of pollen tubes that penetrated the ovule and increased ovule viability, respectively, resulting in a significant increase in avocado yield. Low-biuret urea applied to the foliage of citrus trees during early drop or at maximum peel thickness, which marks the end of the cell division stage of fruit development, increased yield and yield of commercially valuable large-size fruit, respectively.

Understanding and Managing Abscission of Apples

Rongcai Yuan*

Virginia Polytechnic Institute and State University, Winchester, VA; yuan@vt.edu

Apples are typical climacteric fruit characterized by a marked increase in ethylene production and respiration at ripening. Excessive pre-harvest apple fruit drop, which occurs just before fruit develop optimum red color, maturity and/or size, is one of its faults and usually causes a serious economic loss. Conversely, picking fruit before adequate maturity may lead to poor storability and poor fresh and processed fruit quality. The expression of genes related to ethylene production, ethylene perception, and cell wall degradation increases drastically in both fruit cortex and fruit abscission zones during preharvest fruit drop. However, different members of gene families are responsible for ethylene production, fruit softening, and fruit abscission in fruit cortex and fruit abscission zones. Naphthaleneacetic acid (NAA), a synthetic auxin, aminoethoxyvinylglycine (AVG), an inhibitor of ethylene biosynthesis, and 1-methylcyclopropene (1-MCP), an inhibitor of ethylene action are three compounds that can effectively delay pre-harvest drop of apples. NAA may delay apple fruit drop while increasing fruit ethylene production and fruit softening. This is related to decreased expression of *MdPG2* in fruit abscission zones and increased expression of *MdACS1*, *MdACO1*, and *MdPG1* in fruit cortex after application of NAA. AVG and 1-MCP inhibit fruit ethylene production, reduce preharvest fruit drop, and delay fruit ripening by suppressing expression of *MdACS1*, *MdACO1*, and *MdPG1*in fruit cortex and expression of *MdACS5A*, *MdACO1*, and *MdPG2* in fruit abscission zones in apples. The combination of NAA and AVG or 1-MCP is more effective in inhibiting expression of *MdPG2* in fruit abscission zones and delaying fruit drop than are NAA, AVG, and 1-MCP alone in apples while maintaining fruit quality.

Workshop 8:
Sunday, 26 July 2009, 8:00–10:00 am Laclede

Managing and Thriving in Tough Times, When Every Dime Counts!

Sponsors: Nursery Crops (NUR) Working Group, Marketing and Economics (MKEC) Working Group, and the American Nursery & Landscape Association (ANLA)

Moderator: Gladis Zinati

Rutgers University, New Brunswick, NJ; zinati@aesop.rutgers.edu

Objective: The objective of this workshop is to discuss the impact of the recent economical crisis on sustainability of the nursery industry. Speakers, selected from various regions of the United States, will elaborate on the challenges the nursery growers are facing these days and present creative managerial strategies that we all could learn from to assist the nursery industry firms in making better decisions.

The 2009 economic crisis involving the United States has many nursery operators worried about thriving in tough times. The economic downturn prompts new challenges to the nursery growers that force them to get creative, rethink the management strategies, invest in people, and change as the consumer changes in spending habits. In this workshop, a panel of invited speakers will present and discuss the impact of the current economy on controlling costs, supply and demand, and provide insight on creative management strategies that improve marketing of nursery crops, sustain profits, and continue to serve the consumer demands in a period of high competition.

Making Cents of Green Industry Economics

Charles Hall*

Texas A&M University, College Station, TX; chall@ag.tamu.edu

Many current economic trends and driving forces point to the fact that we are in a period of hypercompetition and maturing consumer demand in the Green Industry today. A number of folks have already been forced out of the Green Industry during this shakeout period. This presentation will: 1) provide an overview of current economic trends and their influence on the Green Industry;

2) discuss supply-side methods of (and technologies for) controlling costs during an economic downturn; and 3) address proactive demand-side differentiation and pricing strategies that will not only help ensure survival, but will also position nursery growers, service providers, and retailers for competing profitably in this period of hypercompetition.

Strategies Producers in the Northeast Are Using to Reduce Costs and Increase Profits in Tough Economic Times

Robin Brumfield*
Rutgers University, New Brunswick, NJ; brumfield@aesop.rutgers.edu

The greenhouse and nursery industry in the Northeast is an important component of agricultural production with over $3.4 billion in farm cash receipts, equating to 20.4% of all farm cash receipts across the country. It is the number one agricultural commodity in five Northeastern states. Competition in the green industry has become fierce. The recent volatility of fossil fuels and general energy prices, domestic competition, off-shore production, a weakening and stressed economy, and the growth of the mass market add-up to collectively put downward pressure on prices. Nationally, the number of producers continues to decline as a direct result of the newly defined economic risks. The industry's profit margins are typically low, leaving little room for growers to absorb significant increases in costs or decreases in revenues. Unlike farmers who produce field crops, nursery firms bear the entire price, market, and production risks because these crops have had no government support programs. In this presentation I will discuss what strategies producers in the Northeast are using to reduce costs and increase profits in tough economic times. How have they honed their marketing and management skills to continue to survive and respond to current trends?

Will Marketing Be Enough to Sustain Nursery Businesses?

Jennifer Dennis*
Purdue University, West Lafayette, IN; jhdennis@purdue.edu

In an economic downturn many businesses are facing constraints. Most nursery owners are deemed "technicians" and focus on what they know how to do best—grow! Those businesses who will survive will have a complete business toolkit and will incorporate the managerial and entrepreneurial sides into their business. As an Extension Specialist, how do you provide services to nursery clientele to help them prosper? This presentation will discuss the state of the nursery industry and how cash management, customer capital and business planning will help nursery stakeholders become more successful.

Florida Nurseries: Why Some Struggle and Some Sail through Economic Hard Times

Teresa Olczyk*
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Juanita Popenoe
University of Florida, Lake County Extension, Tavares, FL; jpopenoe@ufl.edu

The Florida nursery industry generated $3 billion in farm gate sales in 2005, positioning Florida as the nation's second largest nursery crop production state after California. This industry directly employs 294,000 people statewide and has a total economic impact of $101.9 billion (2008 numbers). The recent downturn in the economy and collapse of the housing market has had a negative impact on some sectors of the industry, forcing many of the nurseries producing landscape plant material out of business, but leaving some nurseries untouched. An informal survey by extension agents indicated nurseries are coping with various strategies including reductions in labor force, increased efficiencies in irrigation and fertilizer, BMP adoption, creative marketing strategies, specialization in the production of unique crops and innovative production and business techniques.

Growing in the Season of Change

Kim Lovelace-Young*
Forrest Keeling Nursery, Elsberry, MO; kyoung@fknursery.com

How the economy is challenging growers is to examine everything from production methods, fuel efficiency, to labor and marketing.

-**Efficiency** -Move to Lean Production Methods, Best Management Practices, and Alternate fuels.

-**Marketing**-Emerging trends and markets require a hard look at what the grower is offering the consumer. Sustainable landscapes, impact of LEEDS, Green Building Council. Drastic drop in new home construction and commercial development. What is in the Economic Recovery Plan and how that will affect both parties?

-Distribution- Regional markets or shopping locally.

-**Labor-** Current status of H2A and H2B programs and Agjobs. How the economy and unemployment rate drive public opinion about these programs? State laws vs. Federal.

Panel Discussion: Speakers/ Audience Discussion (Q/A) Session

Gladis Zinati*
Rutgers University, New Brunswick, NJ; zinati@aesop.rutgers.edu

The audience of the workshop are engaged in a question/answer session with the five main speakers of the workshop after the last speaker ends her presentation.

Workshop 9:
Sunday, 26 July 2009, 8:00–10:00 am Jefferson C

Waste Utilization in Home Horticulture

Sponsor: Waste Utilization in Horticulture (WUH) Working Group

Moderator: William Evans
Mississippi State University., Crystal Springs, MS; wbe@ra.msstate.edu

Objective: Discuss issues and concerns related to the use of organic wastes in home gardens.

Home gardeners face a dizzying array of waste materials for use in gardens and landscapes. Many are locally or regionally marketed, and because they do not fall under state fertilizer laws, they are often misused, or at least misunderstood, by the homeowner. Products available for home use may or may not go through rigorous testing, and may or may not be uniform within or among lots. In addition, waste products marketed to homeowners may or may not be suitable for the intended use. The renewed interest in home food production makes it imperative that users of these materials receive sound information on characteristics and uses of the products available for use in their gardens and landscapes. This workshop will shed light on the diversity of waste products available to homeowners and address some of the pitfalls seen from the use of widely available and not so widely available products. Participants will gain insights into both the potential of waste products for home use, as well as a better understanding of some of the caveats many of these products have.

Wastes and Organics for Home Use: What We've Tested and Learned

William Evans*
Mississippi State University., Crystal Springs, MS; wbe@ra.msstate.edu

Survival of Insect Pests, Plant Pathogens, and Weed Propagules in Green Waste Stockpiles

Mauren Mochizuki*
University of California Extension, Ventura, California; mmochizuki@ucdavis.edu

Non-traditional Soil Amendments: Human Hair and Sheep Wool as a Nutrient Source and Growth Medium Constituent

Valtcho D. Zheljazkov*
Mississippi State University, Verona, MS; vj40@pss.msstate.edu

Workshop 10:
Sunday, 26 July 2009, 8:00–10:00 am Field

Whole Plant Physiology in High Tunnels and Under Protected Cultivation

Sponsor: Crop Physiology (CRPP) Working Group

Moderator: Martin Gent
Conn. Agric. Expt. Sta, New Haven, CT; martin.gent@po.state.ct.us

Objective: How does the environmental modification resulting from high tunnels and other methods of protected cultivation affect root-shoot balance, source-sink relations, and temperature stress? The environmental conditions in high tunnels are moderated in certain respects and exacerbated in others, compared to production in the open field. This can lead to physiological disorders and lower quality of produce. In what ways can we manage these conditions using experience from field production, and where do we need new algorithms to manage fruit and vegetable crops grown under protected cultivation? Several studies related to this topic will be presented in the hopes of generating a wide discussion of environment and plant physiology of fruit and vegetable crops grown in protected cultivation.

Impact of Tunnels On Growth, Physiology, and Fruit Quality of Berry Crops

Bernadine Strik*
Oregon State University, Corvallis, OR; strikb@hort.oregonstate.edu

Tunnels or other forms of "protected cultivation" are used either with temporary cover to advance, delay, or extend the fruiting season, or with permanent cover during crop development to more fully alter growth, development, and fruiting season of berry crops worldwide. There is relatively little research published on the impacts of various protected structures on whole plant physiology of berry crops. This presentation will include a summary of research conducted on growing blackberries for extended season production and the impacts of tunnels on plant growth and fruit quality. A summary of other research, observations on the impact of tunnels on plant growth and fruit quality, and physiological disorders in berry crops will be presented with a goal of stimulating discussion.

Management and Breeding to Reduce Heat Stress Related Physiological Disorders of Lettuce Grown Under Row Covers and in the Field

Sylvie Jenni*
Agriculture and Agri-Food Canada, St Jean Sur Richelieu, QC; jennis@agr.gc.ca

Covering a cool season crop such as lettuce often increase the incidence of heat-stress related physiological disorders such as rib discoloration, tipburn, and premature bolting, so its use is often limited to early production and very light covering materials. These disorders are controlled by both genotype and environment. Management practices to reduce crop losses under row covers and in the field are limited and will be discussed. Breeding for improved resistance to the disorders is the most appropriate long term solution.

Physiological Disorders in Grafted Heirloom Tomatoes Grown in High Tunnels Using Organic Production Practices

Mary Peet*
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A systems comparison study was conducted to evaluate two scion-rootstock combinations and a non-grafted control, grown in both an organic high tunnel and open field system. 'Cherokee Purple', an heirloom, susceptible to cracking and cat-facing (rough fruit) was grafted on 'Maxifort' and 'Beaufort' rootstocks. The study was conducted in 2007 and 2008 at The Center for Environmental Farming Systems (CEFS) in Goldsboro, North Carolina. Over both seasons, total fruit production was greater in the high tunnel system compared to the field system. High tunnel planting dates were approximately 1 month earlier and resulted in peak harvests 21 days earlier compared to the field system. Fruit quality measured by the number of fruit with cat-facing, cracking, blossom-end rot, sun-scalding, insect damage or other defects showed differences among the systems. In particular, insect damage was greater in the field system while cat-facing and blossom-end rot were greater in the high tunnel system. In 2007, marketable fruit yields were greater in the high tunnel system compared to the field system but the opposite was true in 2008. In the second season with improvements to the irrigation management, fruit cracking was considerably decreased in the high tunnel system. We had expected greater fruit quality from tunnel production but both blossom end rot and cat-facing caused large number of defects in the high tunnel system. The effects of environment and watering on the incidence of defects will be discussed.

Workshop 11:
Sunday, 26 July 2009, 10:00–12:00 pm Jefferson C

Asia's Indigenous Horticultural Crops

Sponsor: The Working Group of Asian Horticulture (WGAH)

Moderator: Beiquan Mou
USDA-ARS, Salinas, CA; beiquan.mou@ars.usda.gov

Objectives:

1) To introduce and assess the current status of indigenous horticultural crops from Asia grown in different Asian countries and in the United States.

2) To examine the limiting factors and challenges for the preservation and production of these unique and important crops.

3) To identify opportunities, strategies, and priorities for future research and development of these crops in Asia and the world.

Crop diversity is an urgent issue in horticulture today. Present day horticulture is faced with an erosion of crop variability as monoculture dominates throughout the world, especially in the West. Thus, growers face increased risks both biologically and economically, as crops are vulnerable to attacks of diseases and insects as well as climate changes. The sustainable and alternative agriculture, the commercial potential of high-value crops, the conservation of crop germplasm, and the rapid increase of organic production and farmer's markets in recent years all lead to renewed interests in indigenous horticultural crops around the globe. Even in the United States, the increase of new immigrants and ethnic groups all are demanding the crops and tastes of home. Asia covers a wide range of geographic areas and climates, has a long history of agriculture, and is one of the most horticulturally dynamic regions in the world. There is a great diversity of native fruits, nuts, vegetables, and ornamentals in many Asian countries. These crops have had important nutritional and economic values in local areas for centuries. They are also explored and developed today for new markets such as pharmaceutical, industrial, or biofuel uses. Despite their great potential, many of these crops have received little attention from researchers, and face threats of biotic and abiotic stresses and shrinking acreage. In this workshop, experts from Asian countries and the United States will introduce these unique and interesting horticultural crops from Asia including their domestication, use, nutritional value, genetic resources, production, and research; discuss the limitations and challenges in their preservation and utilization; and identify opportunities, strategies, and priorities for future development and commercialization of these crops in Asia and other parts of the world.

Indigenous Crops: Exploring Health Promoting Properties

Bhimanagouda S. Patil*

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G.K. Jayaprakasha

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Amit Vikram

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Mankind uses more than 6000 species for different purposes and out of these about 2000 plant species are edible. However, only a few plant species are consumed as part of daily-diet. During the last three decades, research related to health promoting bioactive compounds in fruits and vegetables has increased at a rapid rate but most of the research is limited to commonly consumed fruits and vegetables. This narrow repertoire of commonly used fruits and vegetables delimits the achievable health benefits to mankind. Interestingly, indigenous fruits and vegetables have tremendous medicinal and nutritional value, which remains to be explored. Currently, there are very few systemic attempts to enumerate the potential benefits of indigenous vegetables and fruits. Some of the indigenous crops have received fair amount of attention in recent times but many are still obscure. Several indigenous crops such as bitter gourd (*Momordica charantia* L.), fenugreek (*Trigonella foenum-graecum* L.), cluster bean (*Cyamopsis tetragonolobus* L.) and drumstick plant (*Moringa oleifera* L.) are being studied for their bioactive components and traditional knowledge about medicinal use is being substantiated. For example, bitter gourd has been shown to reduce the serum glucose and cholesterol levels in rats as well as induce apoptosis in colon cancer cells. Moreover, bitter gourd was found to be hypoglycemic in clinical trials. The activity may be due the presence of chrantin, vicine, momordicine (bitter substance) and polypeptide-P. Fenugreek, another important indigenous crop, found to be hypoglycemic in phase I clinical trials. It has 4% to 8% saponins (diosgenin) and about 1% alkaloids (trigonelline), contributing to bitterness, gastric stimulation, and increased appetite. Research during last decade has shown that diosgenin suppress proliferation and induce apoptosis in cells in human colon carcinoma cells. Moreover, a better understanding of the bioactive constituents of these crops is necessary by purifying and understanding the structure activity relationship. In order to determine the breadth of health benefits offered by these crops, it is imperative to investigate the indigenous crops for their bioactive components, and enumerate the health promoting properties of these obscure vegetables. Potential of some of the indigenous crops and their health promoting properties will be discussed.

Horticulture in Nepal and Thailand

Michael Schnelle*

Oklahoma State University, Stillwater, OK; mike.schnelle@okstate.edu

An overview of horticultural crops cultivated and/or found indigenous to Nepal and/or Thailand will be discussed. In addition to climatic factors, other challenges in the cultivation of such crops will be discussed including but not limited to fertilization, irrigation, pest control and other cultural factors.

Introduction to Some Indigenous Vegetables In Japan

Yukihiro Fujime*

Kyoto Prefectural University, Kyoto; yfujime@rio.odn.ne.jp

Although Japan has clear changes of the seasons, since it is surrounded by the sea, the winter is mild. Even if it snows in the coastal area of Japan Sea in winter, it does not so in the Pacific Ocean area. As is much rain in summer and the relative humidity is high, many horticultural crops can be grown in the cool upland, including Hokkaido. The Japanese Islands are long from south to north between north latitude 24° and 46 °. Many indigenous vegetables, such as water dropwort, Japanese hornwort, wasabi, Japanese butterbur, rakkyo, Chinese chive, chive, goldband lily, mioga ginger, and Japanese pepper have been grown in about 2000 years, have been domesticated under selection, and are still important vegetables. Many variations have taken place by the different climatic and the soil conditions while these were growing. Daikon, turnip, Japanese bunching onion, komatsuna, kyona, taro, and eggplant have so many variations in the growing areas. Most variations are found in daikon and turnip whose shape is small round, large round, long, and conical and color is white, green, and red. Kyona and komatsuna belong to same species, *Brassica rapa* and there are many useful variations as leafy vegetables in this species. Japanese bunching onion has also so many variations and, in East Japan, the leaf sheaths are etiolated by hilling with soil in winter and etiolated leaf sheaths are harvested. In West Japan, the leaf sheaths are grown without hilling and green leaves are harvested. Those variations from these indigenous vegetables are selected in every condition and devised cultures are developed in growing areas. We have devised also how to cook and to use them in our eating habit as our food culture.

Sinqua, Moqua, and Donqua— What in the World Are They?

Richard Molinar*

University of California Cooperative Extension, Fresno, CA; rhmolinar@ucdavis.edu

Better known as *Luffa actuangula, Benincasa hispida var. chiehgua, and Benincasa hispida*, these Asian vegetables are but a few of the 70 or so being grown in Fresno, CA. These little-known vegetables are very common to the 1200 Hmong, Mien, Lao, Chinese, and Cambodian farmers growing them for the specialty markets in Fresno. Having been born, raised, and educated in the United States, I was really quite unaware of the specialty Asian vegetables until I started working with the farmers here. I knew about the common vegetables in the cucurbit family but not about bittermelon, luffa, opo, donqua, snake gourd, moqua, sinqua, Hmong pumpkin, and

kabocha. Nor did I know that bittermelon stuffed with rice and pork was really quite good. Or that the loofah sponge I bought in the drug store was from the luffa plant. Take any vegetable family and you will find an equivalent Asian vegetable to the common American vegetable. Sinqua is to the Hmong consumer as zucchini is to the American, but it is generally agreed that sinqua is better tasting. For years the supermarkets have been selling the large globe-shaped American eggplant from the Solanaceae family, not knowing that the elongated Chinese or Japanese eggplants were sweeter and more flavorful. Every Asian farm in Fresno has lemongrass, *Cymbopogan citratus,* to sell to the packing houses or use at home. The plants are set out in March from last year's culms, which are separated from the clump. Harvest starts in November, nine months after planting, and can continue for the next year when market prices improve. They are protected in the wintertime from freezes by covering six rows at a time with 4 mL clear plastic. *Dioscorea batatas, or yamaimo,* is grown in long plastic tubes filled with mushroom compost. The roots can reach a length of over three feet and require a backhoe to dig them out of the soil. *Raphanus sativus var. longipinnatus* has the same genus and specie as the common red radish but this 10–18" white radish has a much milder, very pleasant taste. Along with many of the specialty Asian vegetables found on the farms in Fresno is a wide array of medicinal herbs (many referred to as "chicken soup herbs") used to cure everything from stomach aches to eye infections.

Workshop 12:
Sunday, 26 July 2009, 10:00–12:00 pm Laclede

Methods of Imposing Environmental Stresses In Plant Research

Sponsor: Environmental Stress Physiology (STRS) Working Group

Moderator: Derek Woolard

Valent Biosciences Corp, Long Grove, IL; derek.woolard@valent.com

Objective: A variety of methods can be used to create environmental stresses for plant research. Some methods of inducing drought, salinity, and cold stress will be discussed with an emphasis on the implications of the methodology.

Using Soil Moisture Sensors for Controlled Drought Stress Experiments

Marc van Iersel
University of Georgia

Plant responses to drought stress not only depend on the severity of drought, but also on the rate at which the drought stress develops. However, in many experiments, plants are exposed to drought by simply reducing the amount of water provided to the plants, or even by withholding water altogether. In containerized plants, this may result in a very rapid imposition of drought, that is not representative of how drought stress is likely to develop under field conditions. Using soil moisture sensors and a datalogger, it is possible to control both the rate of imposition, as well as the severity of drought stress, thus mimicking "real-world" drought conditions.

Salinity Stress in Horticultural Crops: Essential Concepts and Considerations to Sound Experimental Details and Procedures

Raul Cabrera
Texas A&M University

Besides quantity, water quality is one of the most significant factors affecting productivity and quality of horticultural crops, many of which are considered salt-sensitive. As horticulturists we all are familiar with the basic concept and measurement of salinity, almost invariable reported in the lumped parameter of electrical conductivity (EC), and experimentation with NaCl as the primary or sole salinizing agent. In this presentation the essential definition(s) and concepts of salinity will be discussed in light of its dynamic nature in the rootzone, the chemistry of the soil solution and its role in salinity stress.

Methods for Evaluating Whole-plant Freezing Tolerance: Silver Birch (*Betula pendula*) As a Model to Determine the Effect of Regulated Deficit Irrigation or Exogenous Abscisic Acid (ABA) on Whole-plant Freezing Tolerance

Brent J. Markus, Nina L. Bassuk, Timothy L. Setter, Harold M. Van Es
Cornell University, Ithaca, NY

Approximately 1200 silver birch (*Betula pendula*) were established in standard nursery trade size #3 containers (11.4 L) and irrigated with microspray sprinklers. Controlled deficit irrigation was managed and abscisic acid was applied to the root zone using the irrigation system. Proportional injectors (Dosmatic MiniDos 2.5%) controlled the application of abscisic acid at four concentrations (0.01, 0.1, 1.0, and 10.0 µmol ABA). Levels of plant ABA are being analyzed using ELISA. A standard marine low temperature refrigerated container was modified for large scale hardiness and freezing tolerance evaluations to determine the effect of exogenous ABA or controlled deficit irrigation on whole plant freezing tolerance.

Workshop 13:
Sunday, 26 July 2009, 2:00–4:00 pm Jefferson A

Native Fruits of the Midwest

Sponsor: The American Pomological Society

Moderator: Kirk Pomper

Kentucky State University, Frankfort, KY; kirk.pomper@kysu.edu

Objective: The objective of this workshop is to examine production practices and advancements in breeding of a number of fruit and nut species that are native to the Midwestern region of the United States.

The intake of fresh fruit and vegetables has increased by American consumers, as has consumer acceptance of new fruits and vegetables. Growers are becoming increasingly interested in identifying new niche markets for specialty fruits and nuts in the United States. Native alternative fruit and nut crops have great potential for fresh market and value-added sales at farmers' markets, as well as community supported agriculture (CSAs), and many of these crops can be grown organically. The goal of this workshop is to examine production practices and advancements in breeding of a number of fruit and nut species that are native to the Midwestern region of the United States.

Blackberry Breeding in the Midwest

John R. Clark*
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There have been between 450 and 500 blackberry cultivars named thus far, including wild and developed genotypes, according to a recent review. Since 1985, over 60 cultivars have been named. Blackberry cultivars for the region of the United States east of the Rocky Mountains are distinctly different than those grown in the western states. The western cultivars tend to lack winter hardiness for much of the East, are trailing, and can suffer substantial disease pressure. They are viewed by many to be the highest quality however, particularly in flavor. In general there exists a substantial genetic

divide between eastern and western cultivars. Midwestern cultivars have been developed based on several early wild selections that were named, including 'Eldorado' (Ohio, 1880), 'Lawton' (date unknown, New York), and 'Brewer' (New Jersey, 1920). Subsequent breeding resulted in cultivars such as 'Hedrick', 'Darrow', and 'Brazos'. The introgression of thornlessness from the English cultivar 'Merton Thornless' by the USDA-ARS was a great advance, and led to a series of thornless, hardy cultivars for the Midwest with 'Chester Thornless' and 'Triple Crown' being the most popular currently. Other breeding developments have contributed over the years including 'Illini Hardy', and several cultivars from the University of Arkansas. However, the Arkansas cultivars have not been hardy throughout the Midwest and are not reliably adapted to more northern areas of the region. The major limitation to blackberry production in the Midwest is winter hardiness, and breeding for this along with other traits such as fruit quality, thornlessness, and plant productivity and health are the top priorities. Primocane-fruiting has recently surfaced as an approach to address winter hardiness, allowing fruit to be borne on current-season canes that do not have to be overwintered. Most breeding activity has ceased in the Midwest, although the University of Arkansas program is very active in flori- and primocane-fruiting breeding and it is hoped that products from this program will be useful in all areas of the region.

Nut Crops of the Midwest

Michele R. Warmund*
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Northern pecan [*Carya illinoensis* (Wangenh.) K. Koch] and eastern black walnut (*Juglans nigra* L.) are two important native nuts grown and sold commercially in the Midwest region of the United States. While other less common native nuts are found in local markets, their small kernel size and thick shells prevent their widespread acceptance. Native northern pecan trees are often found growing in a floodplain or near streams and rivers. Northern cultivars differ from southern types in that the nut and kernel size is smaller, kernel oil content is greater, shells may be thicker, and nut yields are lower. Native eastern black walnut trees are adapted to deep, well drained soils. Although 99% of the black walnuts marketed are from native trees, several cultivars have been recently fingerprinted. While nuts from wild trees generally have 17% kernel, those from cultivars are typically > 30%, with thinner shells and have improved cracking qualities. Although Chinese chestnut (*Castanea mollissima* Bl.) is an exotic species, it has potential for commercial production due to its resistance to chestnut blight and tolerance to low winter temperatures. At the University of Missouri Horticulture and Agroforestry Research Center, 110 northern pecan, 65 black walnut, and 65 Chinese chestnut cultivars are growing in repositories for evaluation of tree growth, nut production, and kernel quality. Breeding advances, as well as progress regarding sensory characteristics of kernels, floral biology, and tree propagation and management practices have been made within the past five years.

Elderberry Research and Development in Missouri

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The American elderberry, *Sambucus canadensis* L, is a widely adapted large shrub or small tree native to eastern North America. The fruit, blossoms, and other plant parts are useful in a wide range of medicinal and culinary products. The Elderberry Development Program, established in 1997, is a multi-institutional research and development project with collaborators at the University of Missouri, Missouri State University, USDA–ARS, North Carolina State University, and Lincoln University. The program has three phases: evaluation of elderberry germplasm and development of superior elderberry cultivars, investigations into elderberry culture, and investigations into the biochemical and genetic characteristics of elderberry. Progress to date in phase 1 includes the collection and characterization of 68 elderberry selections and cultivars; replicated testing at multiple sites of 22 superior selections; initial preparations to name and release two cultivars; and a multilocational genotype by environment study that compared Missouri and Oregon grown plants. Phase 2 investigations include a multi-year study at two sites that compared four pruning treatments; a study to evaluate foliar nutrient content of old shoots vs new shoots during three collection periods; and plant performance under three levels of nitrogen fertilization. Phase 3 studies include three years of measurement of juice characteristics from 12 selections and cultivars, including measurements of antioxidant activity; investigations into antioxidant activity in non-fruit plant tissue; and investigations into the genetic relationships among selections of *S. canadensis* and other *Sambucus* species in our germplasm collection using the Target Region Amplification Polymorphism genotyping technique.

Pawpaw and the American Persimmon: Niche Tree Fruit Crops for the Midwest and Eastern United States

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Jerry Lehman
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Pawpaw (*Asimina triloba*) and American persimmon (*Diospyros virginiana*) are tree fruits native in the eastern and Midwestern United States and have potential as niche crops for these regions. Pawpaw is in the early stages of commercial production with small plantings established across the United States. This fruit has a tropical-like flavor that is similar to a blend of pineapple, banana, and mango. Pawpaw fruit have fresh market appeal for farmers' markets, community supported agriculture, and direct sales to restaurants and the gourmet market. American persimmon fruit have a unique flavor and processing potential, but may have a more limited appeal than pawpaw due to astringency associated with the fruit. Currently, persimmon fruit are mainly collected from the wild; however, small plantings have been established across the United States. Both pawpaw and American persimmon have positive

attributes as uniquely flavored fruits; however, both of these tree fruits also have cultural and postharvest issues. Cultivar options are also somewhat limited for both these tree fruit species. Recent pawpaw cultivar releases with large, high quality fruit have provided new options for existing and potential growers. Some American persimmon cultivars, primarily from the 90-chromosome race of *D. virginiana*, produce large, less astringent, sweet and flavorful fruit, which could be more acceptable to the general public. Some major challenges in developing a commercial industry for either of these tree fruits are: developing a grower base, rootstock development, new variety development, postharvest handling and processing of fruit, and developing an overall marketing strategy.

Workshop 14:
Sunday, 26 July 2009, 2:00–4:00 pm Field

The University-based Public Garden—Relevancy, Challenges, Triumphs, and Future Potential

Sponsor: Public Horticulture (PUBHORT) Working Group

Moderator: Holly L. Scoggins

Virginia Polytechnic Institute and State University, Blacksburg, VA; perennials@vt.edu

Objective: To illustrate, by example, the diverse roles that university and college public gardens and arboreta have in communicating the many dimensions of public horticulture to students in higher education as well as the general public.

University and college public gardens share a similar context but their missions and how they are viewed by administration often differ. Case studies from a variety of university gardens and arboreta will be presented, each with a specific focus, which may include the integration of the garden into undergraduate and graduate curricula, community connections via extension and outreach programs, managing plant collections for research and conservation, and how administration and management responsibilities are considered for professional advancement and reward in an academic environment. The broader goal for this workshop is to provide a point of reference or framework on which to build future ASHS PHWG workshops.

Introduction to Public Horticulture and University Gardens

Robert Lyons*

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The field of public horticulture has never been more relevant than it is today, and the university-based garden has historically figured prominently within its widening definition. The managing personnel of these gardens often originate from academic departments characterized by dominant, traditional horticultural specialty areas; and garden managers frequently possess discipline expertise in other areas in addition to public horticulture. For these and other reasons, ASHS has been their primary professional society. In the absence of formal, ASHS recognition of public horticulture and an observed, growing interest in this field amongst its members, the ASHS leadership convened a Task Force at the 2008 national meetings to consider options for measuring and serving a membership audience having public horticulture interests. The initial Task Force discussions and results of a Society-wide survey will be discussed, as will the efforts to establish a new ASHS Working Group in public horticulture and the opportunities for future activities within ASHS.

Integrating the Development of Campus Gardens Into an Undergraduate Horticulture Curriculum: A Case Study

Dan Stearns*

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Students majoring in Landscape Contracting at the Pennsylvania State University participate annually in the planning and implementation of campus gardens. Course instructors partner with professionals from the university's Office of Physical Plant to guide students in tasks such as material selection, scheduling, safety management, and construction operations. Students gain extensive knowledge of construction technology and project management, while the university benefits from reduced project costs.

Public Gardens: Fulfilling the University's Research Mission

Mary Meyer*

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The University of Minnesota's Landscape Arboretum will be featured as an example of a public arboretum that conducts research in a public setting and fulfills the important research mission of a university. In 2008, the Horticultural Research Center (HRC) at the Minnesota Landscape Arboretum celebrated its 100th Anniversary. Known for introducing many cold hardy fruits and ornamental plants, the HRC, along with the Arboretum serve as a public garden with a strong research component. Examples of successful applied research, including plant collection and evaluations, breeding, models of native plant restorations, collaboration between Arboretum staff and university faculty, as well as publications and symposium will be discussed.

Horticulture Outreach and Children's Gardening at McCrory Gardens, South Dakota State University

David Graper*

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University-based public gardens play a key role in outreach and consumer horticulture at many institutions. McCrory Gardens is a relatively small public garden with roughly 25 acres of formal display gardens and a 45 acre arboretum but it is widely used by classes in the Horticulture, Forestry, Landscape and Parks Department and also by other groups, like Master Gardeners, school children and the general public. In the next two years we will have established our new Children's Gardening and Education Center at McCrory Gardens that will focus on early childhood education in the basics of the importance of plants and fundamentals of gardening. The focal point for this new endeavor is a 900 sq. ft. straw bale building with a living roof of sedum. Surrounding the building will be interactive plantings and displays to capture the imagination of the children visiting the gardens and expose them to the wonderful world of gardening. This new facility will also expose visitors to elements of sustainable design, native plants, and research in the use of green roofs and energy conservation. The straw bale building was constructed using locally grown wheat straw and many in-kind donations from local contractors. The building was erected largely by volunteers and students that were taking a class in sustainable design. The children's interactive garden was designed by senior Landscape Architecture students at South Dakota State University (SDSU) and is being installed by student workers at the gardens and a few area contractors. We are cooperating with the early childhood development program at SDSU, the local Boys and Girls Club, and elementary school

teachers and administrators in the area.

University Garden Stakeholders: Student, Industry, and Community Connections

Holly L. Scoggins*
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University gardens have a rather unique set of stakeholders, both internal and external, as compared to non-academic public gardens. Garden directors, staff, and college- and university-level development personnel can promote and enhance these stakeholder relationships; in the case of the Hahn Horticulture Garden, a six acre teaching and display garden, Horticulture undergraduates spend a significant amount of time learning in as well as assisting with the garden. These students potentially become active alumni with continuing interests in the garden. Landscape and nursery industry professionals, many of whom are graduates, parents of graduates, or employ graduates from the program, are in a position to assist with in-kind donations of plant material, equipment, and expertise. Community stakeholders exist on two levels: The campus community is comprised of faculty, staff, and students who come to the garden to relax and reflect. The greater civic or regional community views the garden and staff as a source of creative inspiration, expertise, and education. Both the campus and civic community value the garden and in turn contribute by volunteering their time as well as attendance to gardening workshops, seminars, and special events. The commitment or "buy-in" of all these stakeholder groups is essential to the efforts and success of the garden.

Marketing the Work of a University Gardens Director to Deans and Provosts

Mary Albrecht*
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Many campus gardens are led by faculty members who are evaluated using a traditional yardstick of research publications, classroom instruction, and Extension programming. Alternate models of scholarship, creative achievement, and program impact should be used to measure a faculty member's work when they move into a director's position. This does not imply that a faculty member no longer contributes to advancing the field of horticulture; it means redefining the "advancing the field of horticulture." Alternate models exist in the arts, humanities, and architecture that can be used to evaluate the work of faculty who are garden directors.

Workshop 15:
Sunday, 26 July 2009, 2:00–6:00 pm Jefferson D/E

Strengthening Private and Public Research Relationships in Horticulture

Sponsor: Industry Division and Valent Biosciences Corporation

Moderator: Peter Petracek, peter.petracek@valent.com

Objective: The speakers will present their vision of the future of horticulture and agronomic research and highlight opportunities for industry and public collaborations.

*Invited speaker*s*:*

John R. Clark, ASHS President

Kathleen Merrigan, USDA Deputy Secretary (Invited)

Prem Warrior, Gates Foundation

Jacqueline Hughes, Deputy Director General, Research, AVRDC, The World Vegetable Center

Stephen Myers, Ohio Bioproducts Innovation Center

Leigh English, Seminis/Monsanto

Workshop 16:
Sunday, 26 July 2009, 4:00–6:00 pm Field

Horticulture and Health: Historical Resources

Sponsor: History of Horticulture Working Group

Moderator: Donald N. Maynard
University of Florida, Wimauma, FL; DMaynard@ufl.edu

Objective: The workshop will present information that demonstrates that the connection between horticulture and health is an extension of ancient and medieval concerns.

Horticulture and health is one of the burgeoning fields of horticultural research as a result of the increasing interest in diet for a healthy lifestyle. Although ancient medicine was based on a completely different cosmology than present-day medicine, horticultural crops were valued both as medicine and food, although in most cases the reasons are different from present-day nutrition and pharmacology.

Tacuinum Sanitatis: Medieval Horticulture and Health

Jules Janick*
Purdue University, West Lafayette, IN

Marie-Christine Daunay
INRA , Montfavet Cedex, France

Harry Paris
A.R.O. Newe Ya'ar Research Center, Ramat Yishay, Israel

Lavishly illustrated manuscripts known as the Tacuinum Sanitatis were first commissioned by northern Italian nobility during the last decades of the 14th century. These manuscripts were based on an 11th-century Arabic manuscript known as the Taqwim al-Sihha bi al-Ashab al-Sitta (*Rectifying Health by Six Causes*) which was a guide for healthy living written by the Christian physician and philosopher Ibn Butlan (d. 1063), who was born and educated in Baghdad and whose travels took him to localities that are today in Iraq, Syria, Egypt, Israel, and Turkey. The expensive, illustrated *Tacuinum Sanitatis* tomes portray a utopian feudal society in which nobles are engaged in play and romance whilst feudal laborers work the estate. Rich in horticultural imagery, they include vivid scenes of the harvest of vegetables, fruits, flowers, and culinary and medicinal herbs. Each scene is accompanied by a brief summary of the health aspects of the subject. Although medieval medicine was based on ancient philosophical concepts of Greek sciences, particularly Hippocrates and Galen, these documents connect vegetables and fruits with human health and well-being, similar to modern medicine. Hence, the present-day focus on the connection between horticulture and health can be seen as an extension of ancient and medieval regimens for a healthy lifestyle. The *Tacuinum Sanitatis* are a series of lavishly illustrated manuscripts first commissioned as gifts by Northern Italian nobility during the last decades of the 14th century and continuing during the course of the 15th century. They were derived from an 11th century Arabic document known as *Taqwim al-sihha bi al-ashab al-sitta* (*Tables of Health*, or *Balancing Health by Six Methods*) written in Baghdad by the Christian physician and philosopher Ibn Butlan (d. 1068) as a guide for healthy living. These expensive volumes, portraying an utopian feudal society in which nobles were engaged at play and romance while feudal laborers worked on the estate, are rich in horticultural imagery and include vivid scenes of the harvest of vegetables fruits, flowers, and culinary and medicinal herbs. The brief texts that accompany the scenes summarize the health aspects of each species. Although the

basis of medieval medicine was based on the ancient philosophical concepts of Greek science, particularly Hippocrates and Galen, the conclusions of these documents are similar to present day conclusions that fruits and vegetables contribute to human health and well being. Thus, the present day emphasis of horticulture and health can be seen as an extension of ancient and medieval concerns.

Rubus Pharmacology: Antiquity to the Present

Kim E. Hummer*
USDA-ARS-NCGR, Corvallis, OR

The genus *Rubus* L., indigenous to six continents, includes blackberries, raspberries and their hybrids, and is commonly referred to as brambles or briers. *Rubus* species provided food for native peoples soon after the ice age. Medicinal and food uses for brambles were documented in Greek (Aeschylus, Hippocrates, Krataeus, Dioscorides, and Galen) and Roman (Pliny the Elder, Pompey, and Palladius) sources, and in Asian medicinal texts. Although in modern times *Rubus* is grown for its delicious and vitamin-rich fruit for fresh and processed product consumption, the ancients used the whole plant and its parts. Stems, branches, roots, leaves, and flowers were used in decoctions, infusions, plasters, oil or wine extractions, and condensates. Decoctions of branches were applied to stop diarrhea, dye hair, prevent vaginal discharge, and as an anti-venom for snake bites. Leaves were chewed to strengthen gums and plastered to constrain shingles, head scurf, prolapsed eyes, and hemorrhoids. Flowers triturated with oil reduced eye inflammations and cooled skin rashes; infusions with water or wine aided stomach ailments. Greeks recorded female applications, while the Chinese described uses in male disorders. The fruits of *R. chingii*, is combined in a yang tonic, called fu pen zi, "overturned fruit bowl," and prescribed it for infertility, impotence, low backache, poor eyesight, and bedwetting or frequent urination. The *Leech Book of Bald* described its use against dysentery combining ancient medicinal knowledge with pagan superstition and herb lore. Medicinal properties of *Rubus* continued in Renaissance and modern herbals, sanctioning leaf infusions as a gargle for sore mouth, throat cankers, and as a wash for wounds; the bark containing tannin, was a tonic for diarrhea; root extract a cathartic and emetic. Recent research reports high ellagic acid, anthocyanin, total phenolics, and total antioxidant content in *Rubus* fruits. Fruit extracts have long been used as colorants, and are now being tested as anti-carcinogenic, anti-viral, anti-allergenic, and cosmetic moisturizing compounds. Medicinal properties of *Rubus* championed by Ancient herbalists, medieval druids, and folk medicine practitioners, are now promoted by present day nutritionists.

The Library Collection of the Missouri Botanical Garden: A Resource for Historical Literature on Health and Horticulture

Douglas Holland*
Missouri Botanical Garden, St. Louis, MO

The Missouri Botanical Garden (MBG) Library ranks among the finest botany libraries in the world. From its beginnings in 1856 as a small collection of horticultural books purchased by the Garden's founder Henry Shaw, the library has now grown to over 200,000 volumes, containing a significant portion of the world's accumulated knowledge about plants. While most researchers know and use the collection for post-Linnaean plant nomenclature, classification, and evolution, the collection is also very rich in early literature, including a comprehensive set of Renaissance herbals, as well as general Materia Medica and horticulture spanning five centuries. The oldest volume dates from 1474 and the library contains over 6000 volumes printed before 1830. This collection is freely available for scholarly use and increasingly available via digital facsimile online. The presentation will highlight important literature found in the MBG collection relevant to health and horticulture, featuring examples from some of the earliest printed books containing plant illustrations. It will also introduce attendees to the Biodiversity Heritage Library digital library and how best to access and mine the freely available data and digital collections available at this resource.

Workshop 17:
Sunday, 26 July 2009, 4:00–6:00 pm Jefferson C

Innovative Applications of Computers In Horticulture

Sponsor: Computer Applications in Horticulture (COMP)

Moderator: Kent D. Kobayashi
University of Hawaii at Manoa, Honolulu, HI; kentko@hawaii.edu

Objective: The objective of this workshop is to familiarize the audience with several of the latest innovative computer applications in horticulture for research, extension, and instruction.

With ever-changing developments in computers, software, and high technology, one's professional development calls for keeping abreast of the latest innovative applications. Four speakers will present their experiences with innovative applications of computer usage developed for research, extension, and teaching. The audience will learn about fresh food traceability, Bayesian belief networks, computer-aided landscaping, and cutting-edge techniques in horticultural photography.

Fresh Produce Traceability

Christopher Gunter*
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The quality of fresh fruit and vegetables depends on practices at the individual nodes in the farm-to-fork supply chain. A failure at any point in the supply chain (production, packing, transport, distribution, retail or consumer) can result in a dramatic loss of value of the product. If the failure affects the safety of the product, it can impact public health, consumer confidence and can be economically devastating. The fresh produce industry is addressing fresh produce safety through the implementation of Good Agricultural Practices (GAPs). GAPs, a series of evidence-based practices can, when implemented correctly, minimize the risk of fresh produce contamination. Traceability, the ability to trace and follow food through all stages and locales of the supply chain, is a fundamental aspect of a working GAPs program. Large fruit and vegetable suppliers are typically required to ensure traceability of their fresh produce by their brokers/buyers. The demand for traceability in the production chain has recently included mid-size and small operations. Current systems to track products, location, and practices through the production chain, from various operation sizes, will be discussed. How these systems are being implemented currently and future developments in the area of traceability will also be explored.

Bayesian Belief Networks for Predictive Modeling and Decision Support

Arthur O. Villordon*
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Bayesian belief networks (BNs) are models that graphically and probabilistically represent associations among variables. BNs have been shown to be efficient representation tools for modeling and describing domains containing some degree of uncertainty due to an imperfect understanding of the underlying states. The resulting knowledge representations enable visual depiction of complex stochastic systems and serve as the basis for the development of efficient inference algorithms. BNs are increasingly being used as the model base in knowledge based systems. Some examples

of applications include predictive modeling, decision support, risk analysis, diagnostics, and troubleshooting. Enhancements in computing capabilities as well as algorithms have made possible the development and evaluation of BNs using personal computing platforms. An overview will be presented for some open source and proprietary software applications used for BN modeling and inference. Examples will be presented for the application of BNs in agricultural research. Advantages and disadvantages will be outlined for using BNs in agricultural research. A worked example will be given for the development of a Bayesian belief network from empirically derived data.

Innovative Cutting-edge Techniques in Horticultural Photography

James McConnell*
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Compared to film photography, digital photography equipment and software change at much faster rate. With these innovations come new techniques which can be used to advantage in horticultural photography. Among the techniques discussed are: multi-shot; high dynamic range; increased resolution; extended depth of field; and panoramics. These techniques can extend the capabilities of many cameras. Many types of photography including photomicroscopy, close-ups and field shots can be improved. Supplemental equipment can help simplify or automate the process of producing multi-shot images. Gigapan robots automate the capture of over 200 shots which can be stitched into one high resolution image. This allows the use of a point and shoot camera to produce a higher resolution image. Other useful tools discussed will be wireless flashes, diffusers and reflectors, and white balance calibrators that are portable and can be used in the field. Image processing software and plugins for Photoshop will be discussed. Participants will be able see which innovations may be useful for their photographic needs.

Using Computer-aided Landscaping

Kurt Range*
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Computer-Aided Landscaping is becoming more popular with landscape companies across America. Consumers enjoy the realistic images. There are three parts to this particular software. Pro Landscaping Image Editor, Planner, and Proposal are all separate software applications, but all three work together sharing information. An overview will focus on Pro Landscape Image Editor. This module produces a photo-realistic, ground level view landscape. The landscape shows plant material after one year's growth, five year's growth, or even 10 year's growth. This software shows not only the plants, but also turf, hardscapes, landscape lighting, and what it will look like at night, along with text callouts to the elements in the landscape. Advantages and disadvantages of this software will be discussed.

Workshop 18:
Monday, 27 July 2009, 8:00–10:00 am Jefferson C

Genetic Control of Root Architecture, Physiology and Disease Resistance Traits

Sponsor: Root Growth and Rhizosphere Dynamics (RHIZ) Working Group

Moderator: Gennaro Fazio
USDA–ARS, Geneva, NY; gf35@cornell.edu

Moderator: Astrid Volder
Texas A&M University, College Station, TX; a-volder@ag.tamu.edu

Objective: To improve our current understanding of the genetic control of processes implicated in architectural, physiological and disease resistance features of root systems.

Genetic research on plant systems has largely focused on traits measured above ground leaving important rhizospheric traits virtually undiscovered. Understanding the mechanisms and genetic control of root traits will greatly benefit the genetic improvement of a wide range of crops. This workshop will summarize our current understanding of the genetic control of processes implicated in architectural, physiological and disease resistance features of root systems including adventitious rooting, basal root elongation, basal root-growth angle, lateral rooting, active nutrient uptake, drought tolerance, tolerance to submergence and salt stress, and resistance to soil borne root diseases as affected by environmental conditions.

The Genetic Analysis of Maize Root Complexity

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The development of a healthy root system is an important part of the overall plant development program. Root branching and architecture are strongly linked to plant survival under abiotic (e.g., drought, flooding, nutrient deficiencies) and biotic (e.g., competition among plants, diseases, pests) stress conditions. A limited number of genetic studies is available relating corn root architecture and development with yield, root lodging, and tolerance to stresses under field conditions. This lack of in-depth knowledge is mainly due to the labor-intensive digging required to obtain root samples, the destructive nature of this procedure, and the highly heterogeneous root systems within and among different corn cultivars as a response to a complex soil matrix and diverse environmental signals. In addition, traditional measures such as root length and biomass do not provide an accurate quantification of root branching or complexity We hypothesize that complex root systems, characterized by a high number of branching points, have a higher probability of finding adequate resources by exploring a larger portion of the soil face than root systems with less complex root systems. The complexity of root systems can be determined by applying the mathematical concept of fractal dimensions (FD). A key feature of fractals is self-similarity at varying scales, i.e., a small part of the structure resembles the whole structure. Fractals are dimensionless and fractal geometry allows for the description, study, and analysis of complex shapes found in nature. In general, FD is more suitable to describe complex natural objects than standard Euclidian geometry. We developed a root imaging device that allows capturing multiple images from rotating adult maize root systems. As a standard procedure we take six images from each root, i.e., one image from each side and two images from above. All images are stored and a dedicated MATLAB software package developed in our laboratory processes and evaluates each image. Using this high throughput root evaluation set up, we investigated the inheritance of the complexity of primary and secondary root systems in maize. Extensive germplasm screening and QTL experiments demonstrated that our technical approach reliably determines genetic differences between genotypes for root complexity and provides, therefore, the technical basis for a systematic investigation of maize root complexity. In addition, we are constantly investigating new algorithms and approaches for their usefulness to evaluate the complexity of root systems.

QTL Mapping of Root Architectural Traits in Apple Rootstocks

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Grafting allows uncoupling the selection of scion (fruit quality) and rootstock traits (dwarfing, precocity, and productivity) for breeding and development of new cultivars. Among apple rootstock traits, root specific traits have been largely ignored during the selection process because of the difficulty in the evaluation of such traits. Recently we noticed that several high performance apple rootstocks that shared common parentage displayed unusually prominent fine root formations. The same group of rootstocks also exhibits tolerance to replant disease. Such fine root formations might be involved in better soil profile exploration and improved tree nutrition. We utilized a segregating population made up of 186 individuals that shared parentage (Ottawa 3 and Robusta 5) with these high performance rootstocks to investigate the inheritance of this trait. We collected replicated quantitative data on in 2008 and 2009 on several tree architecture traits as well as root architecture using a visual scoring method in 2008 for preliminary analysis and a more rigorous method in 2009 that utilized the WinRhizo™ image analysis software to quantify root mass, root length, and preponderance of fine roots in the individuals in the population. A 530 point molecular linkage map spanning all 17 linkage groups of apple and made with the individuals of the same population had been already developed. This quantitative data were used in combination with the molecular marker linkage map to scan the genome using interval and MQM mapping with MapQTL 6 software. We discovered several significant loci modulating all root architecture traits analyzed. In particular we discovered a large QTL on linkage group 11 of apple that explained ~40% of the genetic variation with the interval mapping method. This data is being utilized to fine map and clone this genetic factor for further characterization. Furthermore we are developing data on a number of nutrition and disease resistance related traits to investigate possible correlation with the improved performance of apple rootstocks.

Root Traits in Hybrid Aspen with Transgenically Altered Gibberellic Acid Metabolism

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The effects of transgenic overexpression of GA-inhibition genes (*gai, rgl2, GA2- oxidase*) on root traits in hybrid aspen will be discussed. We expected that semi-dwarf trees could increase soil carbon sequestration; transgenic semi-dwarf trees typically had increased carbon allocation to roots, demonstrated by an increased root weight ratio. Although variation in root composition was observed among the transgenic events, there were no biologically significant effects on root susceptibility to fungal decomposition.

Workshop 19:
Monday, 27 July 2009, 8:00–10:00 am Jefferson D/E

Global Sustainable Development: Concepts and Approaches in Practice and Education

Sponsor: Association of Horticulturists of Indian Origin (AHIO) Working Group

Moderator: Usha R. Palaniswamy
Excelsior College, Albany, NY 12203, Albany, NY; usha.palaniswamy@gmail.com

Objective: Ecosystems have existed for millions of years, maintaining natural populations and processes that sustain the ecosystems. Natural ecosystems are great models of sustainability. The use and management of natural ecosystems need to be channeled to alleviate the threat to long-term sustainability. This workshop will begin with a discussion of the concepts of sustainability at the international and local level, provide an example of partnership with communities and the government for sustainable development in the developing world (M.S. Swaminathan Foundation, Chennai, India) and present a reasoning and methodology in the evolution of a Sustainable Agriculture Undergraduate Program in a Public Research University (University of Kentucky) the United States.

Concepts of Sustainability at the International and Local Levels

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Cynthia Barstow
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The demand for agriculture to produce safe, quality foods to sustain life has been on-going in every population group since the beginning of farming. While food productivity through the ages has increased through the cultivation of additional land, the introduction of mechanization, and the development of technology, questions have arisen about the economic, environmental, and social costs when the expansion in farm output leads to fewer, but larger farms, disrupting rural communities and distancing the grower from the consumer. A growing consumer movement over the past 30 years has challenged the concept of mass, high-tech production and has begun to support more local production in which the grower is part of the community and utilizes farming practices that protect the soil, water, and other resources. This presentation begins the examination of whether this change is truly sustainable, good for horticulture, and adaptable to international trade.

Partnering with Communities and the Government for Sustainable Development—M.S. Swaminathan Foundation's Approach in India

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S. Senthil Kumaran
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The M.S. Swaminathan Foundation (MSSRF, Chennai, India) is a non-profit research and development foundation founded in 1988–89. The foundation mandates that all programs are pro-nature, pro-woman and pro-poor. The foundation's strength is its strategic and participatory research, capacity building, networking and partnership building, based on the principles of social inclusion in access to technologies which help to enhance income and environment. Research and outreach strategies are devised to bridge the rich-poor and gender divides in the areas of information, knowledge and skill empowerment. The talk will specifically focus on the education, communication, training and capacity building program and describe the concepts of village knowledge center, village resource center and bio-village as has been developed in a village in the Union Territory of Puducherry, India.

Evolution of the University of Kentucky Sustainable Agriculture Undergraduate Program

Mark Williams*
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This talk will discuss why the recently created undergraduate curriculum in sustainable agriculture was initiated at the University of Kentucky, and describe the process that was used to define the structure of the curriculum. The curriculum will be presented and discussion will follow on how it has been developed specifically to focus on the three pillars of sustainable agriculture: environmental stewardship, economic profitability, and social responsibility. The presentation will briefly show how experiential learning is a focus of the curriculum and how it is being incorporated through the creation of an apprenticeship program. This apprenticeship allows students to gain hands-on learning on a wide range of topics as they work on our organically-certified horticulture farm and market produce through a community supported agriculture (CSA) program. An overview of the University of Kentucky farm and how the structure of the apprenticeship and CSA maximizes the student learning and outreach will be given.

Workshop 20:
Monday, 27 July 2009, 10:00 am–12:00 pm Field

Assessing the Effectiveness of Horticulture Courses and Curricula

Sponsor: Teaching Methods (TCHG) Working Group

Moderator: Margaret McMahon
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Objective: This workshop will present ways of assessing teaching effectiveness at both the course and curriculum or program level.

As accountability for learning outcomes becomes more demanding at the college and university level more and more horticulture accreditiation associations are requiring program and curriculum assessment, effective assessment methods are needed. The workshop will present techniques that can be used to assess student learning outcomes at the course and at the curriculum or program level. Topics include pre- and post-tests, capstone courses, service learning, exit tests and interviews, along with others. A series of short presentations on methods will be followed by a discussion.

Curriculum Assessment of the Technical, Management and Problem Solving Skills of the Horticulture and Landscape Horticulture Majors at Colorado State University

Harrison Hughes*
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The formal assessment of the Horticulture and Landscape Horticulture majors has been an ongoing activity at Colorado State University for many years. The program mission has been described as the preparation of graduates with a passion for Horticulture/Landscape Horticulture who can contribute to Colorado's agricultural and green industry economy through high levels of: (1) Technical competency and skills, including disciplinary competence, and a working knowledge in the appropriate field; (2) Management and leadership skills; and (3) Problem-solving skills. Assessment methods involved the development of evaluation forms for internships, practicum, independent study, group study and the capstone courses. Student, faculty, clients and industry personnel used standardized forms, which varied somewhat for the two majors and seven concentrations, to critically assess and score student and faculty efforts. Internships, practicum, and capstone courses were evaluated for program purpose (1). Management and leadership skills (2) of the students were evaluated based on their performance during internships by cooperators and also by their activities demonstrated through their involvement in university, college, departmental and community activities. Problem solving skills (3) were evaluated primarily through student performance in capstone courses, specific criteria in the internship and in leadership activities of clubs. The evaluation forms have been used for several semesters and a number of the assessment tools have been improved. The expectation is that 70% to 75% of the students will score 3 or 3+ on all criteria established for a rating system of 1–5. Students have generally met this standard and plans have been to continually upgrade courses and related activities to improve the teaching program.

A Program Level Assessment Model for the Horticulture Baccalaureate Degree

Cynthia McKenney*
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Increasingly, employers and the academe desire evidence of a student's skills, abilities and knowledge outside of the traditional measures of grades, certificates and degrees. Evidence of quality in education is also a primary objective of regional accreditation organizations. One method implemented by institutions of higher education to accomplish this goal is the use of large-scale program assessment practices. When using this model, learning outcomes are identified and an assessment methodology is developed to identify both the strengths and weaknesses of a program. To this end, the Horticulture Competency Curriculum Project was undertaken in 2006 and provides a starting point for institutions starting down the program assessment trail.

Demystifying Learning Outcome Assessment at the Program Level

Caula Beyl*
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In addition to being an essential part of the continuous cycle of improvement, program assessment helps to provide for documented

accountability, improved learning content, and enhanced pedagogy. The process of developing learning outcomes for programs using descriptions of the ideal graduate, program descriptive material, faculty and student input, and overlapping course outcomes will be demystified. Audience participation will be used to solidify the process using a public horticulture program within a hypothetical university. Both direct and indirect assessment methods will be explained including classroom embedded assessment, capstone experiences, collective portfolios, standardized tests, pre- and post-tests, exit interviews, and various surveys. A program matrix will be shown to indicate how to track where various program learning outcomes are being addressed within individual courses. This presentation will give a fundamental first approach to assessing and documenting program learning.

North Dakota State University Horticulture Program Assessment

Harlene Hatterman-Valenti*

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Assessment can be considered a conversation about student learning, enriched by data with a goal to improve student learning. Assessment has been a major issue since approximately 1982, but by the end of 1995, the North Central Association of Colleges and Schools mandated that assessment plans be in place. These assessment plans consist of direct, indirect, and non-measures of student learning. For many years we have been assessing student knowledge through testing and exams. We have also been conducting indirect measures of student learning through employer surveys, exit interviews with graduating seniors, and job placement data. All have programmatic significance, but with direct measures of student learning in relation to objectives and program outcomes, we can provide evidence to help ensure that student outcomes are being achieved and student learning is being improved. Three years ago a course review assessment plan was initiated for the horticulture curriculum, which included a request that all faculty members conduct a pre-test/post-test for each didactic course they teach. This classroom assessment technique (CAT) provided a direct measure of student learning, but it was quickly discovered that proper CAT implementation was needed for reliable information. In response, faculty members met and discussed the best methods to utilize this CAT and are now incorporate pre-test questions in exams and finals so that questions represent course objectives and more accurately reflect student learning. The course review assessment plan divided the courses over six semesters so that each faculty member would not review more than one course that he/she taught each year. This review consisted of the faculty member redefining course learning objectives and relating these objectives to the horticulture program outcomes; incorporating at least one additional classroom assessment technique; and evaluating assessment results. In addition, all faculty members were asked to complete a self-evaluation of their assessment practices every other year. It is anticipated that in time, each faculty member will increase their level of implementation for each individual category of achievement in evaluating student learning. The final aspect of assessing the horticulture program at NDSU consists of closing the loop with students and faculty members. This means sharing information with students and faculty in order to improve student learning at the course level as well as the program level.

Reflective Writing as an Assessment for Analysis and Synthesis Ability

Ann Marie VanDerZanden*

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Analysis and synthesis of concepts is an important part of the higher order thinking skills described in Bloom's Taxonomy, and providing students opportunities to practice these skills is critical to their undergraduate education. Reflective writing is one assessment technique that allows students to develop analysis and synthesis abilities, as well as refine their written communication skills. For a beginning landscape design course I have developed a series of three reflective writing assignments. The same image of a residential front yard landscape is used for all three assignments. In the first assignment, at the beginning of the semester, students describe the landscape in as much detail as possible. In the second assignment, after the principles of landscape design are discussed in class, students apply these principles to the image giving particular examples of how the design principles are evidenced in the landscape. In the third part of the assignment they describe the landscape in light of what we have covered regarding the eras of landscape design and the influences these eras have had on the contemporary design in the image. Data has been collected over the past four years evaluating how students have scored on a particular exam question where they must apply the principles of design to a landscape image. The data reflects two years with the reflective writing assignments completed and two years without the reflective assignment as part of the course. Class size, overall grades and other factors were similar between the two groups, but those students who completed the reflective writing assignments scored significantly higher on the exam question suggesting they were better able to apply information learned in the course.

Assessing Student Confidence as a Measure of Learning. *Really?*

Candice Shoemaker*

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Three to five Student Learning Outcomes (SLOs) were written for each of seven units for the Principles of Horticultural Science course, the foundation course for all horticulture majors. Specific strategies were implemented by the instructor to reinforce the SLOs throughout the semester. A pre- and post-assessment was given to the students enrolled in the course in the past five fall semesters to determine if the SLOs were being met. The assessment asked the students to indicate how confident they were in being able to do something reflective of the 50 SLOs, such as "distinguish between transpiration and respiration" or "write a scientific plant name." Confidence did change for most items from pre- to post-assessment. The comparison of the student's reported confidence and their academic performance in the course will be presented.

Workshop 21: Monday, 27 July 2009, 10:00 am–12:00 pm — Jefferson D/E

Propagation and Conservation of Plants with Horticultural Value

Sponsor: Seed & Stand Establishment (SSEST) Working Group

This Workshop has been cancelled.

Workshop 22: Monday, 27 July 2009, 3:30–5:30 pm — Laclede

Biopesticides and Reduced Pesticide Approaches in Horticultural Cropping Systems

Sponsor: Weed Control and Pest Management (WCPM) Working Group

Moderator: Carlene A. Chase

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Objective: To provide horticulturists with information on biopesticides and reduced pest management approaches in order to promote greater adoption.

Limiting adverse effects on human health and the environment, pesticide resistance, limited pesticide options for specialty crops, reduction in production costs, and providing pest management options for organic systems are some of the many reasons driving research on biopesticides and reduced pesticide approaches. However, adoption of these approaches often fails to keep pace with conventional pesticide usage and may be due to less or no marketing, slower activity, and lower efficacy that demands integration with additional measures. The workshop will highlight the applicability of biopesticides and other approaches that can reduce the reliance on or eliminate the need for conventional pesticides for managing weeds, insects, and pathogens in horticultural cropping systems.

Activities of IR-4's Biopesticide and Organic Support Program in Horticultural Pest Management

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The IR-4 Project has an annual biopesticide grant program to enable research on new products, label expansion and biopesticide demonstration projects. IR-4 and The Biopesticides and Pollution Prevention Division (BPPD) of EPA have jointly funded and reviewed a cooperative demonstration grant program to reduce the barriers to the adoption of biopesticides. A searchable biopesticide label database has been completed to provide listings of biopesticides for food and ornamental crops based on pest control problems, which was supported by EPA region 2. The IR-4 Project is also involved in assisting with the registration of biopesticides. Recent registrations and research in horticultural crops will be discussed.

Biopesticides for Control of Bacterial Plant Diseases

Jeffrey B. Jones*

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Diseases incited by bacterial plant pathogens are responsible for major economic losses to agricultural production. Significant challenges are associated with controlling bacterial plant diseases. The principal reason for a lack of adequate control is that effective bactericides are not abundant or do not exist. For most bacterial plant diseases, an integrated management strategy is essential by combining proper cultural practices, biological control, bactericides or plant activators, where applicable, and plant resistance. Biological control has gained recent interest for controlling bacterial diseases. Various strategies for using biological control for bacterial diseases include the use of nonpathogenic or pathogenically-attenuated strains of the pathogen, saprophytic bacteria, and plant growth-promoting rhizobacteria to suppress pathogen populations or induce a reaction in the plant such that the pathogen is reduced in its ability to colonize the plant and cause disease. Disease control using these approaches has been variable. Bacteriophages for bacterial disease control have gained interest in the area of plant protection and can be used as part of integrated disease management strategies. However, the efficacy of phages, as is true of many biological control agents, depends greatly on prevailing environmental factors as well as on susceptibility of the target organism.

Ecological Management of Arthropod Pests of Horticultural Crops: Lessons From the Central Coast of California

Hugh Smith*

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Options for managing arthropod pests of horticultural crops using ecological principles are determined by the behavior of the pest, the availability of environmentally sound suppression tools, including biological controls, and the type of damage the pest inflicts. The use of appropriate monitoring and scouting programs to detect pests and evaluate the development of infestations is the foundation of any ecologically based pest management program. Among the most difficult arthropods to suppress on California's Central Coast are soil pests, such as symphylans, collembolans, and root maggots. As a group, these arthropods are neither good candidates for biological control, nor easily suppressed with softer insecticide chemistries or crop rotations. Each crop is attacked by a suite of pests during the course of its development. Members of a crop's pest complex may differ in their susceptibility to natural enemies. Similarly, insecticides that have a preferred environmental profile and that are compatible with some degree of biological control may be available for some pests of a given crop but not others. The use of broad spectrum insecticides to suppress one pest may disrupt biological controls for another pest on the same crop. For example, the use of broad spectrum insecticides to suppress Lygus hesperus in strawberry in California can flare infestations of spider mites by killing their natural enemies. Spider mites are major pests of strawberries, and can be managed with a combination of releases of predatory mites and application of selective acaricides. Organic strawberry growers rely entirely on natural enemies to suppress mites. Reliance on the suppressive activity of natural enemies is perceived as too risky by many conventional growers, while conservation biological control is essential for pest management in organic production. Nasonovia ribisnigri, a lettuce aphid, infests the inner leaves of the lettuce head where few natural enemies other than syrphid larvae are effective. Conventional growers rely on swift suppression of infestations using systemic and contact insecticides. Organic growers allow infestations to become established and rely on syrphid larvae to eliminate aphids prior to harvest. Many organic growers on California's Central Coast plant insectary crops such as sweet alyssum to provide floral resources to natural enemies with the intention of enhancing their activity.

Organic Production of Pecans

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The basic organic approach for development of organic crop production systems requires balance of both soil nutrients and beneficial soil microbes. Achieving such a balance results in a soil and crop with improved health having greater resistance to disease and insects. In 2002 USDA-ARS began using this approach to convert a 17-year old conventionally managed pecan orchard to organic. Compost tea was soil applied three times each year through the irrigation system and monthly as a foliar spray uniformly across all treatments. Yields harvested from individual trees indicated that, in general, applications of 168 kg/ha of nitrogen from three applications of ammonium sulfate (the conventionally managed control) resulted in the lowest yields, whereas application of 1120 kg/ha poultry litter applied twice yearly with mycorrhizal fungi gave the greatest pecan yield. In 2008 comparing yields with the conventionally-managed (no compost tea) and organic orchards showed a 6.7 times increase for 'Desirable' and 3.8 times for 'Cheyenne' for the organic orchard. Pests were controlled partially through improved soil and plant health and with the addition of biopesticides and biocontrol agents, for example pecan casebearer through release of trichogramma wasps and one 0.0146 L/ha foliar application of spinosad, and pecan weevils through soil applications of compost tea. Pecan scab was partially controlled with compost tea and additional studies must be conducted. In

summary, the grower must remember that organic production is a system with highly significant interactions among components and attempting an individual component control taken out of the system will result in failure.

Managing Weeds with Reduced Herbicide Inputs

Harlene M. Hatterman-Valenti*
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Many researchers have coined terms such as sustainable production, natural systems agriculture, organic production, and pesticide free production to describe methods that alter what we have come to know as conventional production. Most have reduced or eliminated one or more inputs in a production process. Some have eliminated synthetic inputs in an attempt to mimic a natural system. However, all have the goal to develop an environmental and economical production practice for producers. The same can be said for weed management. Researchers continue to assess alternative methods for weed control with the goal that these methods are viable both environmentally and economically. Most of these methods require increased management: specific weed assessment, understanding economic thresholds, knowing the critical period for control; knowing the competitiveness of the crop; and understanding an herbicide's biologically effective dosage. These factors were all considered when investigating onion weed management strategies. Incorporating the micro-rate technology developed for weed management in sugarbeet worked well because both crops had similar characteristics during the early stages of growth and development. Both crops are also more prone to herbicide injury during and shortly after emergence, than later growth stages. Lastly, both crops had post-emergence herbicides registered for use. Micro-rate technology takes advantage of differential metabolism between the target weeds and the crop. Thus, the onion seedlings metabolize or inactivate the herbicides faster than the target weeds so that by the second herbicide application, the targeted weeds continue to accumulate the active herbicide in their systems. The subsequent applications increase the activity of the herbicide in the weeds resulting in improved control without increased crop injury. Utilizing the micro-rate technology, we have been able to develop a weed management strategy that not only reduces the amount of herbicide used each season; it also improved weed control during the critical period for control.

Workshop 23:
Monday, 27 July 2009, 3:30–5:30 pm Field

Preharvest Skin Disorders of Apple Fruit

Sponsor: Pomology (POM) Working Group

Moderator: Steven McArtney
North Carolina State University, Fletcher, NC; steve_mcartney@ncsu.edu

Objective: To review normal and aberrant skin development in apple fruit and describe the efficacy of current methods for overcoming skin disorders including sunburn, russet and scarf skin.

Skin disorders of apple can account for significant losses of crop value in the preharvest environment. The cuticle and epidermal layers of the fruit skin normally provide some protection against potentially harmful external stimuli including desiccation and UV radiation. Presenters will review normal and aberrant skin development in apple fruit and describe the efficacy of current methods for overcoming preharvest skin disorders. Attendees will be encouraged to discuss their observations and results in a moderated discussion following the presentations.

Overview of Skin Development in Normal and Russeted Apple Fruit

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The developmental anatomy of the russeting process in apple fruit, regardless of its cause, is fairly predictable. Most severe russeting can be related to induction early in fruit growth, because cuticular and cell disruptions at that time will most severely inhibit expansion of the fruit surface, while fruit volumetric growth is accelerating. In this presentation, the normal development of apple skin will be reviewed and the developmental anatomy of russet will be contrasted against it. Both historical studies and the presenter's own observations on apple russet will provide points of discussion, especially in regard to timing and severity of russet induction by fungi during fruit histogenesis.

Development and Control of Russet and Scarf Skin

Steven McArtney*
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Russet and scarf skin are the consequence of aberrant development of the epidermis and cuticle of apple fruit that can reduce crop value of some cultivars/strains. Russet may result from a variety of stimuli including fungi, insects, freezing temperatures around the time of bloom, high humidity and precipitation in the weeks after bloom, or some crop protection sprays. Scarf skin results from a separation of the fruit cuticle from underlying epidermal cells and is more obvious on heavily pigmented cultivars. Multiple applications of a proprietary mixture of 15–20 $mg \cdot L^{-1}$ GA_{4+7} during the first three to four weeks after petal fall have been shown to reduce the severity of both russet and scarf skin. Somewhat paradoxically, the gibberellin biosynthesis inhibitor prohexadione-calcium has also been shown to reduce the severity of both russet and scarf skin, either alone or additively when combined with GA_{4+7}.

Environmental Interactions That Increase Sunburn Damage in Apple

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Sunburn of Apples: Causes and Suppression of Sunburn Damage

Larry Schrader*
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Sunburn of apples causes large economic losses to growers in several regions of the world. Sunburn is caused by stress from high temperatures and excessive solar radiation. Fruit surface temperature (FST) on sun-exposed apples is frequently 11 to 17 °C higher than air temperature. The three types of sunburn we have identified and characterized are each caused by different factors. Sunburn necrosis occurs when FST reaches 52 °C for only 10 minutes. Thermal death of epidermal cells occurs at that temperature and necrosis appears subsequently on the peel. Sunburn browning, which is usually the most important type commercially, occurs in full sunlight when FST reaches 46 to 49 °C for an hour; damaging ultraviolet (UV) radiation is also involved. The minimal FST required for sunburn browning varies with cultivar. Photooxidative sunburn, the third type, is caused by sudden exposure of apples that have not previously been exposed to full sunlight (i.e. non-acclimated to high light). Photooxidative damage can occur at much lower FST and without UV-B radiation. Radiation in the visible range causes photooxidative sunburn and can occur during summer pruning, thinning, or shifting of branches with heavy crop loads.

Photobleaching occurs on the sun-exposed side, and necrosis may then appear subsequently. Sunburn can be suppressed by several means. Overhead evaporative cooling (EC) is the most effective means for reducing FST, but does not reduce stress from UV. RAYNOX® is a wax-based formulation that reduces transmission of UV, visible and infrared rays to fruit; blocking damaging UV rays is most important in suppressing sunburn. RAYNOX® should be applied three or four times during the season to augment natural waxes of the fruit. Several particle film products (based on kaolin clay, talc, or calcium chloride) are also available to growers, but RAYNOX® is the only rainfast sunburn suppressant that can be combined with EC to obtain excellent protection from both high FST and damaging UV rays. 'Fuji' stain and "sunburn scald" of 'Granny Smith' are other skin disorders that can markedly increase crop losses. Both disorders can appear during cold storage on apples with sunburn browning, suggesting that induction of sunburn also predisposes those sunburned apples to develop the other disorders during storage. Incidence of both disorders can be reduced by using RAYNOX® for sunburn suppression.

Workshop 24:
Monday, 27 July 2009, 3:30–5:30 pm Lewis /Clark

Student Forum On Graduate School: The What, Why, and How!

Sponsor: Collegiate Activities Committee

Moderator: Richard Harkess

Mississippi State University, Mississippi State, MS; rharkess@pss.msstate.edu

Objective: The objective of this workshop is to expose undergraduate students to graduate school options in horticulture and provide a forum for students to ask questions and get answers from a panel of current graduate students and faculty in horticulture.

Students working on an undergraduate degree in horticulture are often only vaguely aware of graduate school, what it is, why pursue an advanced degree, and how to go about it. Traditional job fairs focus on careers in allied industries but don't often offer an open forum for students to ask questions about graduate school or careers requiring an advanced degree. Current graduate students and faculty will present their perspective on graduate school. Following the presentations, there will be a panel discussion to answer questions from the attending students. This workshop will help students learn about graduate school and career options requiring advanced degrees.

Workshop 25:
Monday, 27 July 2009, 3:30–6:00 pm Jefferson A

Efficient Nutrient and Water Use in Protected Culture

Sponsor: Plant Nutrient Management (PNM) Working Group

Moderator: Christopher Gunter

North Carolina State University., Raleigh, NC; chris_gunter@ncsu.edu

Objectives: What are the best methods for managing water and nutrients in protected culture? How can those measurements be made in real time and used for management making decisions? How do different substrates effect water and nutrient management these unique cultural systems? What are accurate budget estimates for nutrient management in these systems?

Water and Nutrient Management in Protected Agriculture—The Importance of Managing Water

John Lea-Cox*

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There are many factors that influence nutrient availability which will be discussed in this workshop, including morphological differences in nutrient uptake, differing strategies to apply nutrients and maximize uptake, including substrate management and innovations that have been made in fertilizer technology. Since almost all intensive horticultural operations use porous, lightweight soilless substrates, and more importantly most protected agriculture uses some form of irrigation, precision water management has been cited as the key factor to optimize nutrient management in these environments. Soilless substrates have negligible anion exchange capacity and thus soluble nitrate and phosphate can be easily leached from the root zone. From a practical standpoint, it is important that we monitor the interception efficiency and leaching fraction of irrigation applications, in order to optimize the nutrient availability. We now have the ability to monitor soil and substrate moisture in real-time using precision sensor technology, which will allow us to better relate matric potential measurements to actual plant water use. The use of these tools will allow growers to make better decisions in the future to decrease the cost of production, reduce environmental impacts and increase the quality of crops grown in protected culture.

Nutrient Use in High Tunnel Production, Penn State Experience

Elsa Sanchez*

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Lengthening the growing season offers growers an opportunity to extend the period for producing and harvesting crops and, therefore, for capturing profits. At Penn State University, the High Tunnel Research and Education Facility at Rock Springs, PA, was initiated in 1998 to study the use of high tunnels as an option for season extension of vegetable and fruit crops. The facility houses over 40 high tunnels, the majority of which are 17 × 36-ft and constructed using the Penn State design. The soil type at the facility is a Hagerstown silt loam. One production issue encountered at the facility is the impact of fertility management on soil quality and plant growth because of the unique environment created within the high tunnels. High tunnels exclude environmental factors (i.e. precipitation, excess wind) that assist in decomposition and/or mineralization of organic nutrient sources. Additionally, the environment and cultural practices limit leaching which results in a build-up of salts that can negatively affect soil organisms and plant growth, regardless of using organic or inorganic nutrient sources. This has negatively impacted the growth of several crops as illustrated by a two-year study on bell peppers. The high tunnel environment also tends to favor vegetative and reproductive plant growth resulting in a higher need for plant nutrients than recommended by production guides for certain crops. Brambles are one such crop where potassium deficiency has been documented with tissue analysis. Fertility management protocols for production in high tunnels is an area warranting further study and will be different from open field production owing to the unique environment within high tunnels.

Nursery and Greenhouse Water Use, Water Conservation Strategies and Treatment Technologies

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In 2008 a national survey was conducted on overall water use, the application of water conservation strategies and treatment technologies in the Canadian ornamental plant production industry (e.g. nurseries, floriculture greenhouses, sod farms, and Christmas tree farms). Also, between 2002–03 a survey was conducted of the water and nutrient use, including advantages and disadvantages of some of the water conservation technologies used in vegetable and floriculture greenhouses in Ontario where majority of Canada's greenhouse operations were located. Our research team at the University of Guelph has been conducting studies on water conservation and treatment technologies for many years. Among our projects was an extensive study of the critical free chlorine levels for controlling common soil- or water-borne plant pathogens. We have also established chlorine phytotoxicity thresholds for more than 20 ornamental crop species. These critical chlorine levels and phytotoxicity thresholds are essential in guiding the use of chlorine products in irrigation water treatment. This talk will present the results of the above mentioned surveys and research results to facilitate discussion of water and nutrient management issues in modern horticulture.

Real Time Measurement of Water and Electrical Conductivity in Soilless Substrates, to Precisely Monitor and Control Irrigation and Fertigation Events

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The precise monitoring and control of irrigation and electrical conductivity (EC) in real-time has been a goal for many nursery and greenhouse producers for many years, but most technologies are either extremely expensive or imprecise for widespread use in porous soilless substrates. We have deployed a low-cost wireless sensor network, developed by Carnegie Mellon University, in a commercial cut-flower operation in Maryland. We are integrating Decagon Devices capacitance (Ech_20-TM) and EC (5-TE) sensors into this network, to precisely monitor water content and EC in real time, so we can automatically control applications of water and nutrients based upon plant requirements. The challenge is to precisely measure spatial and temporal dynamics of water in real-time, so we can control precision irrigation scheduling, to improve the uniformity and quality of cut-flower *Antirrhinum* produced by this operation. We are working toward a full integration of these control capabilities with the grower, so that he can fertigate based upon substrate matric potential or electrical conductivity set-points, so he can maximize net returns, conserve resources, and limit environmental impacts from his operation.

Substrate Type Affects Growth, Mineral Nutrition and Physiological Responses of Salinized Carrizo Citrange Seedlings

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We studied growth, mineral nutrition and physiological responses to salinity of five-month-old seedlings of Carrizo citrange rootstock grown in a greenhouse in containers of three different substrates: Candler sand soil, Floridana sandy clay soil or a commercial soilless peat/perlite/vermiculite potting media. Plants were kept well watered with a complete nutrient solution plus either no salt (control) or 50 mM NaCl for nine weeks. Without salinity, substrate type did not affect plant growth even though there were differences in mineral nutrient relationships attributable to substrate. Pre-dawn leaf water potential, midday CO_2 assimilation and leaf water use efficiency, however, were highest in seedlings grown in the soilless peat. The salt treatment decreased leaf and root growth, reduced leaf Ca^{2+} and increased leaf K^+ concentration in all the three substrates. Overall, plant growth was negatively related to leaf Cl^-. Leaf growth reductions were least in Candler-grown seedlings and greatest in Floridana soil. This was related to leaf Cl^- concentrations which were lowest in Candler sand and highest in Floridana soil. Leaf Na^+ was also highest in Floridana seedlings. In contrast to leaf ions, roots of salinized seedlings in Candler sand had the highest Na^+ and Cl^- concentration. Salinity reduced net gas exchange of leaves and plant transpiration similarly in all three substrates. Salinity reduced both leaf water potential and osmotic potential such that leaf turgor was increased. Based on the relative rankings of leaf growth and leaf Cl^- concentrations, Carrizo seedlings from Candler sand had the highest salt tolerance and those grown in Floridana soil had the lowest salt tolerance. Substrate type should be considered when characterizing plant growth and physiological responses to salinity.

Water Use for Establishment, Growth and Yields of Florida Strawberries in High Tunnels

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The predominant production system for strawberry in Florida uses fumigated and polyethylene-mulched beds with drip fertigation in open fields. However, there is the necessity of exploring alternative production systems to improve sustainability and economic returns. High tunnels offer an opportunity to improve water use for plant establishment, freeze protection and growth during the winter production season. In open fields, strawberry transplants with bare roots are established with 10 to 14 days of sprinkler irrigation for 8 to 10 hours per day. This practice seeks to prevent crown dehydration and to promote new root and shoot formation. Rapid urbanization and encroachment into agricultural lands along with efforts leading to improve water utilization and reduce nutrient leaching are the main reasons for exploring alternative strawberry establishment practices. Studies were conducted in high tunnels to determine the effects of: a) crop protectants on strawberry establishment; b) diverse irrigation programs for strawberry production; and c) low temperatures and sprinkler irrigation for freeze protection of strawberry cultivars. Preliminary results indicated that using crop protectants based on calcium carbonate reduced the amount of water needed for establishment from 10 to 6 days without affecting yields and quality in comparison with non-treated plots.

On the other hand, water loss due to evaporation was about 20% lower inside the tunnels, due to lower air and soil temperatures especially in October and November of each year, resulting in lower water volumes required for crop production in comparison with open fields. After three consecutive years of high tunnel research, sprinkler irrigation for freeze protection was not necessary, providing inside temperatures between 6 to 10 °C higher than in open fields, and yields during the following six harvests following a freeze between 45% to 200% higher than in open fields.

Horticultural Crop Residues in Organic Production and Nutrient Management

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Residue management has been well established as a valuable technology for reducing soil erosion and weed growth, improving water quality and infiltration, contributing plant nutrients and nutrient cycling, retaining soil moisture, and increasing microbial activity and productivity. The rate of residue decomposition in various crop seasons is an integral part of a scientific nutrient management program. As a part of the research being conducted on horticultural crops for nutrient management and conservation planning, fresh residues of crops were placed in fiberglass mesh bags either at the surface or 15 cm deep in a Memphis silt loam soil (Typic Hapludalf, silty, mixed, thermic) and were allowed to undergo decomposition for a period of six months. Decomposing samples were collected from the field every ten days and dried, ground, and analyzed for the rate of decomposition, plant nutrients, and C:N ratios. The sub-surfaced root and shoot residues decomposed faster than the surfaced residues. The decomposition rates of both root and shoot residues were negatively correlated with the low C:N ratios. The results recorded on residues of several crops showed that the rate of decomposition of residues was a function of C:N ratios, season, and the placement in soil.

Nutrient Management and Budgets in High Tunnels

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Proper nutrient management is essential for optimizing yield and quality in a high tunnel system. Because the season is extended and conditions less stressful, the yield potential of vegetables in a high tunnel system is generally higher than in open field production. This is especially the case in cold climate regions of the United States, such as Minnesota. As yield potential increases, the need for nutrients also increase. Lack of nutrients may cause nutrient deficiencies, while excessive application can result in salt accumulation. Both situations can negatively affect yield and quality. In order to obtain a better understanding of the nutrient uptake capacity of high tunnel-grown vegetables, a study was conducted using tomato (*Lycopersicon esculentum* cv. Sunshine) and cucumber (*Cucumis sativus* cv. Sweet Success) in a high tunnel in Staples, MN. The native soil is a Verndale sandy loam and was amended with 4 inches of yard waste/manure-based compost in the fall prior to planting the following spring. Soil samples were collected before planting and following final harvest to a depth of two feet. Both tomatoes and cucumbers were planted in double rows in beds spaced 4 feet apart. Within bed spacing was 18 inches between plants in staggered rows. Plants were irrigated with a drip tape system installed beneath plastic mulch. Because of high soil test potassium and phosphorus, only nitrogen, as either urea-ammonium nitrate (UAN, 28% N) or calcium nitrate (CAN, 15.5% N), was applied using a batch fertigation system. Three, nine foot sections (each section containing six plants) of each vegetable were monitored for yield and nutrient uptake. Tomato and cucumber plants were pruned periodically to promote upright growth. All pruned material was weighed fresh and then dried. Harvest of tomatoes started on July 15 and continued at periodic intervals until October 7. Cucumber harvest started on June 28 and continued until October 19. Fresh weight yields were recorded and subsamples were collected periodically to determine fruit dry matter percentage. At the final harvest, all remaining above ground shoots and leaves were weighed and then dried. Dried samples of pruned material, vines, and fruit were ground and then analyzed for nutrient concentrations and nutrient uptake calculated. A nutrient budget for each crop will be presented.

Innovations in Controlled Release Fertilizer Technology at the Scotts Company

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The Osmocote® fertilizer coating technology traces its origins back to the mid-1960s, but there have been recent breakthroughs in the capabilities of what these products can do based on many years of field research. This talk will focus on the methodologies used at Scotts R&D stations to assess fertilizer performance in field based situations and describe patterned nutrient release profiles that resulted from this work. Patterned nutrient release offers growers a means to better fit nutrient release from coated fertilizers to plant demands while reducing nutrient waste and improving crop quality. Additionally we will touch on recent dual coat technology that provides delayed start capabilities to coated fertilizer.

How to Optimize the Uptake of Phosphorous in Potted Plants

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Many greenhouse growers are using soluble multi-nutrient fertilizers with a high percent phosphorous (P_2O_5) content on their crops in addition to the phosphorous applied to the substrate as a pre-plant as superphosphate or treble superphosphate. Using potted chrysanthemum as the model plant and using a recirculating sub-irrigation system to control the nutrient inputs, we determined the effectiveness of the pre-plant and post-plant phosphorous on various plant parameters, and also how much phosphorous could be recovered from the P-inputs. For this purpose, we used four rates of pre-plant P and four rates of post-plant P in a completely factorial experiment. Another aspect of the study has been to compare a number of phosphorous sources as a pre-plant on the water soluble phosphorous concentration in the substrate over time and on growth parameter of the chrysanthemums. P-recovery by the plant relative to the P-input will be discussed.

Workshop 26:
Monday, 27 July 2009, 3:30–6:30 pm Jefferson C

Grapes in the Western Heartland and Great Plains: Regional Challenges, Innovative Solutions and Unique Products

Sponsor: Viticulture and Small Fruit (VSF) Working Group

Moderator: Joseph C. Scheerens
Ohio State University, Wooster, OH

Objective: The objective of this workshop is to highlight the success of grape-based industries in the region by examining their history and current potential, exploring the regional challenges faced by grape producers, examining progress in genetic and cultural solutions and showcasing the unique quality of grape products produced within.

Grape and wine industries have historically contributed to the agricultural wealth and productivity of selected states west of the Mississippi River. Recently, however, all states within in the Western Heartland and Great Plains have enjoyed a period of tremendous growth in grape production acreage, in the number of operating wineries, and in the organizational structure and competitiveness of these industries. Improvements in grapes, grape-growing techniques and wine-making have resulted in highly successful agribusinesses, job creation, increased tax revenues for state and local entities, increased local interest in grape products and internationally award-winning wines. The objective of this workshop is to highlight the success of grape-based industries in the region by examining their history and current potential, exploring the regional challenges faced by grape producers, examining progress in genetic and cultural solutions and showcasing the unique quality of grape products produced within.

Welcome and Workshop Introduction

Joseph C. Scheerens*
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Regional History of the Industry and Its Current Potential

Paul Read*
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History and Potential Discussion

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Regional Challenges-Abiotic Stresses

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Regional Challenges—Biotic Stresses

Bruce Bordelon*
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Regional Challenges Discussion

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Innovative Solutions—Developing Adapted Grape Cultivars

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Innovative Solutions—Cultural Adaptations

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Innovative Solutions Discussion

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Unique Products

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Inst. Continental Climate Viticulture & Enology, Columbia, MO; strieglerk@missouri.edu

Unique Products Discussion and Interaction

Joseph C. Scheerens*
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Workshop 27:
Tuesday, 28 July 2009, 8:00–10:00 am Jefferson A

Current Trends and Issues in IP Protection In the Biological Sciences

Sponsor: Intellectual Property Rights (IPR) Working Group

Moderator: Mark Farnham
USDA–ARS, Charleston, SC.

Objective: To discuss trends in protecting and licensing IP at different public and private institutions. To examine current trends in the use of utility patents. To provide an overview of open source approaches to technology development.

Many people consider materials covered by intellectual property rights to be unavailable for use. In reality, use is often covered by various types of licensing agreements. Such agreements may be have broad or narrow scopes. It is important to stay informed about the types of licensing agreements that are in use and what are the pro's and con's of each. Some groups are exploring other options, such as public-private partnerships and open sourcing. What are the details of these options? Who are using them and how effective are these programs? There are observations that patents are difficult to get at the moment. What may be the causes for this?

Licensing Stories From Michigan State University

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Monsanto Public-Private Partnerships

Natalie DiNicola*
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Workshop 28:
Tuesday, 28 July 2009, 8:00–10:00 am Laclede

Urban Agriculture: The Role of Horticulture in the City

Sponsor: Organic Horticulture (ORGH) Working Group

Moderator: Carl E. Motsenbocker
Louisiana State University, Baton Rouge, LA

Objective: This workshop is the first of the two-part workshop on urban

agriculture. In this workshop the general benefits of urban horticulture on the general population and participants will be discussed. Case studies of successful urban horticulture projects as well as the training and use of volunteers in projects will also be presented.

Urban horticulture (agriculture) is an industry located within (intra-urban) or on the fringe (peri-urban) of a town, city or metropolis which grows and raises, processes, and distributes a diversity of food and nonfood products, using or reusing largely human and natural resources, products, and services found in and around that urban area and in turn supplies human and material resources, products, and services largely to that urban area. Urban agriculture has been practiced by many civilizations throughout human history with historic models such as Machu Picchu. Current urban agriculture projects include development of productive market gardens and farms in and around the megacities in Asia as well as cities in North America. This is important as about half of the world's population resides in or around urban areas and urban agriculture contributes to food security and food safety. Urban agriculture increases the amount of food available to people living in cities and it allows fresh vegetables and fruits to be made available to urban consumers. Although urban farming is practiced primarily for income earning or food producing activities, in some communities the main impetus is recreation and relaxation such as community gardens. The recent rise in food prices has led to the greater demand for access to gardens as well as local produced food. A common method of urban horticulture production is the use of relatively efficient biointensive or organic production methods, which are often perceived as sustainable practices. Urban agriculture is also important as it often serves to reclaim land and resources to serve urban populations in a sustainable manner. This workshop is the first of the two-part workshop on urban agriculture. In this workshop the general benefits of urban horticulture on the general population and participants will be discussed. Case studies of successful urban horticulture projects as well as the training and use of volunteers in projects will also be presented.

Workshop 29:
Tuesday, 28 July 2009,
8:00 am–12:00 pm **Off-site Tour**

Herbaria and Reference Collections: Important Repositories of Germplasm Information

Sponsor: Ornamental Plant Breeding (OPB) Working Group

Moderator: Richard Olsen

U.S. National Arboretum, Washington, DC; richard.olsen@ars.usda.gov

Objective: To expose plant breeders to the wealth of information pertaining to germplasm that can be found locked away in herbaria and botanical reference collections. The workshop will be held at the Missouri Botanic Garden, hosted by herbarium and library staff. Tours of the herbarium and rare books will expose researchers to information that can be gleaned from combining herbarium specimen labels with historic texts and the resulting taxonomic and geographical data that affect plant breeder's use of germplasm.

Plant breeders utilize many sources of germplasm for inclusion to their programs, from publicly funded germplasm repositories and botanical collections to commercial nurseries and private collectors, encompassing cultivated and wild collected material. But where do breeders turn, when the germplasm trail turns cold? When the cultivated material is inadequate and wild-type material not known? While herbaria and botanical reference collections are well used by taxonomists and historians, they are often overlooked by plant breeders as a source of information on germplasm for their programs. The Missouri Botanic Garden herbarium has 5.2 million specimens (world's sixth largest) and has an active research program encompassing floristic studies for much of the tropical world and parts of the temperate world, coordinating the Flora of North America project and the English translation of the Flora of China, and maintaining numerous databases pertaining to plant taxonomy. The library contains over 160,000 volumes, including 9,000 rare books by the likes of Linnaeus, Michaux, Nuttall, Darwin, Banks, and many other botanical pioneers and explorers. We will use modern germplasm collection issues to illustrate the usefulness of these collections in solving current taxonomic and germplasm identification problems in attendee's breeding programs.

Details on meeting location and transport to the botanic garden will be announced during the conference.

Workshop 30:
Tuesday, 28 July 2009, 10:00 am–12:00 pm **Field**

Fruit Tree Functional Genomics

Sponsor: Plant Biotechnology (BTCH) Working Group

Moderator: Zong-Ming Cheng

Dept. of Plant Science & Landscape Systems, Knoxville, TN; zcheng@utk.edu

Objective: To introduce various functional genomics tools and illustrate with some specific examples of functional characterizations of genes in fruit trees. To provide a platform for promoting participation, collaboration, and cooperation among the ASHS members in fruit functional genomics, which will consequently benefit fruit breeders, geneticists, and biotechnologists, and ultimately the fruit industry, and the general public.

As the genomes of grapevine and papaya have been completely sequenced and those of apple, peach, and other fruit crops are underway, the emphasis of fruit crop genomics research will be shifted to functional characterization and evaluation (or functional genomics) of the key genes of horticultural significance, such as those controlling fruit quality, resistances to diseases and pests, and environmental adaptation . Functional characterization of these genes will allow fruit breeders and geneticists to improve fruit species through genome-guided breeding processes. In this workshop, we will introduce various functional genomics tools and illustrate with some specific examples of functional characterizations of genes in fruit trees. We hope that this workshop will provide a platform for promoting participation, collaboration, and cooperation among the ASHS members in fruit tree functional genomics, which will consequently benefit fruit breeders, geneticists, and biotechnologists, and ultimately the fruit industry, and the general public.

Workshop 31:
Tuesday, 28 July 2009, 10:00 am–12:00 pm **Laclede**

Production Issues in the Urban Setting

Sponsor: Vegetable Crops Management (VCM) Working Group

Moderator: Alicia Whidden

Hillsborough Co. Extension Service, Seffner, FL

Objective: To discuss production issues, challenges and government regulations facing producers in urban and peri-urban settings.

Urban agriculture, whether within cities (intra-urban) or on the outskirts of cities or towns that have grown up around farms (peri-urban), is a growing industry nationally as well as worldwide. With this growth come many challenges for both the experienced producer and the many novices who are interested in entering this field. Production techniques, food safety issues, urban ag projects in parts of the US, unique challenges and governmental regulations will be presented. An open forum discussion of the issues and clientele needs from research and extension will conclude the workshop. This workshop is the second part of two workshops being held on urban agriculture.

Urban Ag, Farmers Markets and Small Farm Use of "Plasticulture" in Oklahoma

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Small farm produce growing and marketing is exhibiting some distinctly new activity in Oklahoma. Although farmers' markets have existed in the state for some time, changes are taking place in numbers markets and in how they are promoted. The Oklahoma Department of Agriculture, Food and Forestry (ODAFF) supports a farmers' market registration program. Over the period 2006 to 2009 the number of registered markets has grown from 31 to 60. Market activities and trends differ somewhat for urban versus rural areas. Markets in the major urban areas of Tulsa and Oklahoma City have become very poplar and busy entities. In each case, these cities have several market locations with growers selling products that include organic and ethnic produce items, herbs, baked goods and specialty meat products, to name a few. In some mid-size cities, markets have existed but are seeing some renewal and growth activity. In these cases there is both increased interest on the part of sellers and customers. In Shawnee, a change in the market location probably contributes in-part to the increased activity. In Stillwater, existing sellers provide adequate produce supplies and newer sellers tend to sell items such as eggs, meats, plants, breads and processed foods. In smaller rural communities market changes are also varied. In some towns, true farmers' markets have not been successful although other retail sales of local produce can be found. In others, such as Madill and Tishomingo, growers have taken the initiative to establish new markets, often with the assistance of the Oklahoma Cooperative Extension Service and municipal development organizations. Another ODAFF program is called the "Plasticulture program." Developed to facilitate the adoption by small farmers of a raised bed, plastic mulch, and drip irrigation production system for vegetables, this program provides cooperators with a 3 year trial period during which be construction and mulch application for up to two acres are provided to the farmer. The 2009 growing season will be year 3 for this program and growers have been receptive to the concept. The development of farmers markets and the use of plasticulture technology will be discussed.

Healthy Foods From Brownfields?

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Local gardening and marketing initiatives and agricultural activities in urban areas are on the increase—especially recently, due to rising energy costs, demand for fresh, locally grown food, and society's interest in sustainable practices. Vacant and abandoned lots may be "re-used" for gardening activities including food production, and many local farms are or will be located on land that may be impacted by previous use. These kinds of properties, i.e. vacant or abandoned properties with real or perceived contamination issues are called "brownfields". Little is known about the number and characteristics of contaminants that can impact local farming activities. Substances such as lead and other metals, asbestos, chlordane, and other contaminants from previous land use including certain gardening practices may pose threats to gardeners and food safety. This may especially be true for sites with limited or no previous environmental assessments, unknown institutional controls (for example, deed restrictions), or where organic manures, irrigation with reclaimed waters, and "background" urban or natural contaminants are factors. Appropriate risk management, if necessary, and education is needed, if brownfields are used for farming/gardening. In April 2009, Kansas State University (KSU) started to work with select community–based gardening/farming initiatives to evaluate uptake of heavy metals and other contaminants by food crops, and develop recommendations for seedbed preparation and corrective/protective actions to address contaminants. The goals of this project are: 1) to enhance the capabilities of garden/farming initiatives to produce crops locally without potentially adverse health effects to the grower or the end consumer; 2) to contribute to the meaningful revitalization of brownfields sites in a sustainable manner; 3) to increase confidence in urban food production quality; and 4) to provide resources for producers, urban land managers, local and state government, and extension agents to implement proposed best management practices for the detection and mitigation of potentially harmful substances in soils on brownfields sites.

Urban Farming Issues in Philadelphia

William Lamont*
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The City of Philadelphia has a rich history of urban gardening since it's founding by William Penn. Each wave of immigrants that settled in Philadelphia brought their own form of urban gardening and an array of new ethnic food crops. Philadelphia like many other large metropolitan cities is afflicted with urban blight or urban voids left by the deterioration and ultimate removal of structures in neighborhoods throughout the city. This land area now available for some use has resulted in the mayor, city officials, and other community groups to consider the establishment or expansion of urban farming enterprises. The utilization of vacant lands for urban agriculture offers many positive aspects such as, production of nutritious fruits and vegetables for consumption by or sale to people in local neighborhoods, communities or restaurants, active engagement and education of the urban youth about the food production system as well as the sciences behind the production of food, the economic development and revitalization of neighborhoods through urban farming, re-greening of the urban landscape, and increased tax revenue for the city. There are also major stumbling blocks or issues that need to be addressed such as: acquisition and ownership of the land resources, getting community involvement and buy in, what horticultural production technology to be employed, need to create urban agricultural zoning, need to incorporate urban farming as a permanent part of the overall future city planning, marketing outlets and strategies, development of educational linkages to the city school systems and other youth empowerment organizations, and finally availability of funding. There are many issues to be addressed but the opportunities to reconnect the urban areas to the production of foods and natural order of life is tremendous.

Food Safety in Urban Agriculture

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Urban agricultural food safety can be as complicated as in rural areas. The production site must be evaluated for possible sources of prior contamination. Locations should be tested for lead and other heavy metals. If not acceptable, select an alternative site or switch to growing in raised beds or tabletop gardens. If using compost, obtain from a reliable source and if possible test for pathogens. Restrooms and hand-washing facilities must be available for employees and customers Stock the facility with soap, single use towels, and potable water (preferably hot and cold). Everyone should wash their hands when entering the farm, before leaving, and after handling animals. Encourage people with clearly displayed signs in the appropriate languages. Animals can be a concern in any agricultural operation. Efforts must be taken to exclude animals, including pets, from the production and sale areas. Rodent traps around the perimeter will help reduce the population, but do not use poison which may end up in the produce. Inspect picking containers on a regular basis, clean and sanitize as needed. If food sampling is planned, samples should be kept in clean covered containers; washed prior to cutting with potable water and handled with disposable plastic gloves when cutting. Potentially hazardous food should be kept at 45 °F and all other foods disposed of in two hours. Utensils and cutting surfaces should be smooth and nonabsorbent and sanitized prior to use. When displaying produce keep at least six inches off the ground and shaded to keep as cool as possible. Produce can be sprayed with potable water to provide evaporative cooling and displayed on ice if practical. All products not on display should be stored at 45 °F or lower to maintain shelf-life. If selling salad/mesclun mixes, consider marking the product "not ready to eat please wash before consuming."

Local Laws, Government Regulations, and Other Issues

Mary Lamberts*
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The urbanized parts of southern and central Florida have a long history of interaction between commercial vegetable production and encroaching suburbs. This area is now seeing an interest in small-scale farming in more metropolitan locales and in production specifically for an increasing number of farmers' markets, including several under commercial management. Some producers are familiar with vegetable farming, but face zoning and related issues. Others are not familiar with the supplemental aspects of commercial vegetable production such as the Worker Protection Standard, perishability, and food safety associated with growing food crops. New producers run the gamut from those making the transition from avid gardener to farmer to those converting a portion of a nursery operation to vegetables. This talk will also lead to a discussion of other issues facing producers farming in an urban setting.

Workshop 32:
Tuesday, 28 July 2009, 1:00–3:00 pm **Field**

Interspecific Hybrid Fruit Crops: Their Creation and Utilization

Sponsor: Fruit Breeding (FRBR) Working Group

Moderator: Mark Ehlenfeldt
USDA–ARS, Chatsworth, NJ

Objective: To present an overview of the use of interspecific hybrids in several fruit crops, and to show how useful characters are being incorporated from diverse germplasm.

Interspecific hybrids have been utilized by breeders in a diverse range of fruit crops to access valuable characteristics impacting fruit quality traits, disease resistance, and adaptation. The significant features of most uses of interspecific hybridization are the identification of the character or characters to be to be incorporated, determination of the optimal methodologies for transfer or hybridization, and critically, the successful recovery a commercial horticultural type. The methodologies needed for successful use of germplasm have covered the range from traditional to molecular. This workshop will examine specific examples of interspecific hybridization in fruit improvement from *Citrus*, *Rubus*, *Vaccinium*, and *Vitis*.

Citrus Hybridization

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Our citrus improvement program has relied heavily on interspecific hybridization of complementary parents as needed to package appropriate traits. Seedlessness is also highly desirable in new citrus fruits, thus we are using ploidy manipulation to generate seedless triploids. The most efficient method for generating unique triploids is interploid crossing of teteraploids with diploids, using monoembryonic citrus as females. The availability of quality tetraploids is essential to the success of this approach, and we have invested a great effort to build our tetraploid germplasm. We have produced quality autotetraploids by several methods, including the screening of seedling populations, in vitro colchicine treatments, and as byproducts from somatic fusion experiments. Crosses of these with selected diploid females of different citrus species generate triploid interspecific progeny. We have also produced numerous allotetraploid somatic hybrids via protoplast fusion, using our model system of fusing embryogenic cell culture protoplasts with leaf protoplasts of a second complementary parent; many of these are interspecific hybrids. We now have many quality tetraploids that are flowering, and we have an evolving program of interploid hybridization that has generated more than 16,000 triploids to date, mostly interspecific. Significant progress has been made in three primary areas: hybrid mandarin improvement by combining mandarin germplasm with sweet orange and/or grapefruit germplasm with emphasis on flavor, shelf-life and convenience to eat; hybrid pummelo/grapefruit improvement with emphasis on flavor, red pigmentation, disease resistance and reduced furanocoumarins; and acid-citrus fruit improvement (lemon and lime types) with emphasis on disease resistance, cold-hardiness and oil quality. Examples of unique new seedless hybrids in each category will be provided.

Grape Hybridization

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Although muscadine grapes have been under cultivation in the Southeastern United States for nearly 400 years, active breeding has only been practiced for the last 100 years, and the most modern cultivars are only a few generations removed from the wild. Although some improvements have been made in important traits including yield potential, disease resistance, and fresh and processing fruit quality, even greater advances must be made on these and other shortcomings in important horticultural traits before demand, crop value, and production of muscadines can be substantially increased. The fresh market demands that cultivars are perfect-flowered, ripen uniformly, produce large seedless berries with thin edible non-astringent skins, crisp pulp, and excellent flavor; and dry picking scars and resistance to fruit rots for enhanced shelf life and attractiveness. Muscadines cultivars for use in wines must also highly yield berries with high sugar content and stable pigments. Currently, muscadine grape breeding and genetics research programs are being conducted privately in North Carolina, by universities in several

states including Florida, Georgia, and North Carolina, and by the USDA–ARS in Mississippi and recent milestones and strategies involving conventional and molecular approaches to interspecific hybridizations are discussed.

Cranberry Hybridization

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Domesticated American cranberry, *Vaccinium macrocarpon* Ait., sect. *Oxycoccus*, has been successfully crossed with both intrasectional and intersectional species. Intersectional hybrids have been recovered from crosses with species from *Vaccinium* sections *Vitis-idaea*, *Macropelma*, and *Cyanococcus*. The intersectional hybrids are largely sterile as is typical with most *Vaccinium* intersectional hybrids. It has been reported that colchicine-doubled *V. macrocarpon* clones were successfully crossed with tetraploid *V. oxycoccus*, but the materials are not available for study. Among intrasectional crosses, a population of *V. macrocarpon* × *V. oxycoccus* hybrids have been produced between various cultivars of American cranberry and diploid *V. oxycoccus* representatives from Alaska. The hybrids were largely intermediate morphologically for both flower and vegetative traits, with flowering phenology skewed toward *V. oxycoccus* earlier flowering period. Three large F_2 ($n > 100$) families and numerous BC_1 (to *V. macrocarpon*) populations have exhibited considerable segregation for phenological, morphological, fruit chemistry, and fertility traits. Segregation for fruit and leaf anthocyanin glycosylation pattern in these families indicates a single major locus determining carbohydrate attachment at the 3-*O* position. Both F_2 and BC_1 populations exhibit 'second bloom' during mid-summer under New Jersey conditions, resulting in two crops offset in fruit development and maturation. These *V. macrocarpon* × *V. oxycoccus* F_2 populations offer the greatest opportunity for the genetic mapping and study of phenological, morphological, physiological, climatic adaptation, biochemical, and other traits in cranberry.

Rubus Hybridization

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The blackberries and red and black raspberries are members of the diverse *Rubus* genus whose center of diversity is in China. The entire blackberry industry is dependent on cultivars that have multiple *Rubus* species in their backgrounds. The blackberry cultivars developed in the eastern U.S. were derived from species native to that region (i.e. *R. argutus*, *R. allegheniensis*), however, the source of thornlessness in the modern tetraploid cultivars from the European *R. ulmifolius*. The western blackberries are an even greater mix of species with eastern cultivars, red raspberry (*R. idaeus*), and a source of thornlessness from the lower Midwest that traces to a *R. baileyanus* ×*R. argutus* hybrid, in a background that is predominantly from the highly-polyploid, West-Coast-native *R. ursinus*. While the red raspberry cultivars were predominantly derived from the European *R. idaeus*, the North American *R. strigosus* has been a recent contributor of abiotic and biotic stress tolerance and other species including *R. crataegifolius*, *R. occidentalis* and *R. spectabilis* can be found in the pedigrees of recent cultivar releases. Black raspberries have the smallest acreage of the three primary *Rubus* crops and they are nearly completely derived from *R. occidentalis*, although *R. leucodermis* and *R. idaeus* figure in the background of at least two commercial cultivars. Many species have been evaluated in multiple programs for what they potentially could contribute to the breeding pool. While in most cases these species have proven to be incompatible or do not exhibit any obviously valuable traits, there are several species or new germplasm sources within previously used species that hold great promise for improving these crop plants.

Workshop 33:
Tuesday, 28 July 2009, 1:00–4:00 pm **Laclede**

Sustainable Production Systems for Medicinal Plants, Herbs, and Spice Crops Workshop

Sponsor: Herbs, Spices, and Medicinal Plants (HSMP) Working Group

Moderator: Damayanthi Ranwala
Clemson University, Charleston, SC; nranwal@clemson.edu

Moderator: Valtcho Jeliazkov
Mississippi State University, Verona, MS; vj40@pss.msstate.edu

Objectives:

1. Provide research-based information on production of medicinal plants, herbs and spice crops in different ecosystems.
2. Disseminate research findings on the effects of cultivation practices on growth, development, yield, phytochemical content, and bioactivity of medicinal plants, herbs, and spice crops.
3. Provide a platform for scientists and professional to exchange information and develop collaborations for furthering the science of medicinal plants, herbs, and spice crop production.

Niche markets for medicinal plants, culinary herbs, and specialty spice crops and their products have developed in the United States during the past few years. However, research-based information that is necessary to appropriately advice and support growers and processors of these crops is limited as compared with the research-based information available to the growers producing traditional agronomic and horticultural crops. Successful development of medicinal, herb, and spice crop markets requires the knowledge on germplasm selection, good agricultural and manufacturing practices to produce a marketable product. Such knowledge and support could help to stimulate local and regional agricultural growth, and improve the financial status of small farm/land owners and associated horticultural and processing industries in the United States. Fulfillment of such potential, however, faces a number of challenges due to limited information available on cultivation know-how, effects of production practices on plant growth and development, effects of pre- and post-harvest practices on phytochemical profiles and bioactivity of these crops. The primary objective of this workshop is to provide science-based information to better understand the dynamics of interactions in these specialty crops and their production systems as they relate to product quality and bioactivity. This workshop aims to provide a platform for scientists to share their research findings and interact with industry professionals engaged in these specialty crops. Such an exchange of information could foster collaborative approaches to problem solving and development of these niche market crops into mainstream cash crops.

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HORT opportunities

The American Society for Horticultural Science (ASHS) offers job placement advertising in the HortOpportunities section of the ASHS Newsletter.

Jobs listed in this section are also listed on the ASHS web site under the name HortOpportunities. ASHS accepts advertisements from Equal Opportunity/Affirmative Action Employers.

Additional information may be accessed on the ASHS web site at **ashs.org**. Click on HortOpportunities.

HortOpportunities Advertising Rates for 2009

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Professional opportunities include (but are not lmited to) faculty, extension, and industry positions.

Web-Only ads (posted for up to 90 days)

up to 200 words = $230
each additional word = $1.50

Web plus print ads *(includes one insertion in the monthly ASHS Newsletter at no extra charge)*

up to 200 words = $230
each additional word = $1.50

Assistantships, Fellowships, and Postdoctoral Opportunities:
These are listed under a separate category, and include research assistantships, fellowships, or postdoctoral positions.

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up to 200 words = $110
each additional word = $1.00

Highlight any ad:

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Add your logo - (black & white in Newsletter, color on web) = $15

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For web-only logos, color JPG or GIF graphics must be supplied.

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For submissions of job announcements to HortOpportunities

The following information is required for all submissions to HortOpportunities

Billing Information
Contact Person:
Billing Address:
E-mail:
Phone no:
Fax no:
Purchase order number (if required by your institution):
Credit card payments are accepted.

Job Information
Job Title:
Application Deadline:
check one: _____Web-Only ___ Newsletter +Web
add logo: _____Yes ___ No
box ad: _____Yes ___ No
Job Description (attach a Word file of the text, or include in the body of the e-mail)

Submission requests are accepted via e-mail or fax.

Upon receipt of request to post a HortOpportunities announcement, uou will be sent a 'review' copy via return e-mail of the ad as it will appear in HortOpportunities - including a price quote.

Upon your approval of the review copy and price quote—the ad will be posted and space reserved in the next available edition of the *ASHS Newsletter*.

E-mail the completed information directly to Hort Opportunities at plcmnt@ashs.org or fax it to 703.836.2024.