

# ofa Academic Update

## Purdue University Floriculture: Teaching, Research, and Extension Programs

by Roberto Lopez

The Department of Horticulture and Landscape Architecture (HLA) at Purdue University can trace its roots back to 1884, when Professor James Troop founded the Department of Horticulture and Entomology. Today, there are over 30 faculty members in HLA with four new hires slated to join the department within the next few years. Current faculty, specialist, professionals, and technicians with floriculture responsibilities and interests include Roberto Lopez (Commercial Floriculture Extension Specialist), Natalia Dudareva (Molecular Biology of Floral Scent), Jennifer Dennis (Specialty Crop Specialist), Mike Dana (Landscape Horticulture), Elizabeth Maynard (Commercial Floral and Vegetable Crops), Mary Lou Hayden (Garden Coordinator and Floral Design), Rosie Lerner (Consumer Horticulture Extension and Master Gardener Coordinator), and Diane Camberato (Floriculture Technician). However, extensive support is provided by Purdue Plant and Pest Diagnostic Lab (P&PDL) members Tom Creswell and Gail Ruhl, Janna Beckerman (Plant Pathology Specialist), Cliff Sadof (Landscape Entomology Specialist), and Mike Mickelbart (Nursery Management Specialist).

### Teaching and Advising

The department offers two undergraduate programs: Horticulture and Landscape Architecture, with 129 and 160 students, respectively. Students in the horticulture program can choose from the following majors: Landscape Horticulture and Design, Horticultural Production and Marketing, Public Horticulture, or Horticultural Science. Students interested in ornamental plant production and marketing have a wide array of courses available to them: Plant Propagation, Herbaceous Landscape Plants, Woody Landscape Plants, Flower Arrangement and Indoor Plant Management, Professional Floral Design, Floriculture and Nursery Crops, Landscape Design and Construction, and Principles of Marketing and Management of Horticulture Businesses.

The HLA program at Purdue is unique in that it has a Floral Design and Interior Plant Management course that is a service course for horticulture majors and non-majors alike. It is extremely popular with a current enrollment of over 120 students. Mary Lou Hayden's goal is that by the end of the semester, students will have practiced 14 different floral design forms. Topics covered throughout the semester include: Principles and Elements of Floral Design, Color, Cut Flower Care, House Plant Care, Plant Propagation, Body Flowers and Wedding Design, and many others (Figure 1).



**Figure 1.** Students design arrangements in the Floral Design and Interior Plant Management course.

The Professional Floral Design course is also a popular class and structured in the same manor, except enrollment is limited to 20 students. The intent of this class is to hone the skills of the students and increase speed of production. Basic designs are practiced and more advanced styles are introduced. The students are graded on their skills, and proficiency is encouraged. Topics covered throughout the semester include: Review of the Basic Principles and Elements, Event Planning, Funeral Designs, Mass Production Techniques, Advanced Cut Flower Care, and others topics.

Janna Beckerman and Cliff Sadof will be teaching a new course this fall called Integrated Plant Health Management for Ornamentals. The objective of this course is to provide students with a basis for recognizing, diagnosing, and managing insect and disease problems of the greenhouse, nursery, and urban forest landscapes. They believe that a combined focus on insects and diseases will improve the ability of students to handle these problems when they face them in real-world situations. Further, by training students how to evaluate and write pest management recommendations, they hope to improve their critical thinking skills.

In addition to courses on campus, our students also have the opportunity to learn about ornamental plants in an HLA study abroad program. In The English Landscape, a course taught by Mike Dana, Paul Siciliano, and Matt Jenks, students travel to

**Continued on page 24**

# Purdue University Floriculture: Teaching, Research, and Extension Programs

Continued from page 23



**Figure 2.** Students on the *In The English Landscape* study abroad course in front of Hampton Court Palace near London.

England for nearly four weeks to familiarize them with ways that human culture and natural environments intersect to create ornamental landscapes (Figure 2).

## Recent Floriculture Undergraduate and Graduate Student Honors and Awards

Jessie Heller, a junior majoring in horticulture science was recently awarded The H. W. Gilbert and Betty Polanka Floriculture Scholarships for her academic achievements and commitment to the floral and landscape industries. She has strong roots in floriculture as her family owns Heller Nursery in Decatur, Indiana and has interned at the trial gardens at Ball Horticultural Company in West Chicago, Illinois. This summer she interned at Bailey Nurseries in Yamhill, Oregon.

Dustin Potts, a senior double majoring in public horticulture and horticulture science, was selected as the 2008 Outstanding Senior in the College of Agriculture and American Society for Horticultural Science Outstanding Undergraduate Student. He has received numerous scholarships and awards while at Purdue such as the Garden Club of America Kathryn M. Grosscup, Garden Club of Indiana Professor E.R. Honeywell, Southwestern Indiana Daylily Society, and Southwestern Indiana Master Gardener Association Scholarships. Dustin has also interned in the HLA Floral Design Lab, Missouri Botanical Garden, Indianapolis Museum of Art, and the Mesker Park Zoo and Botanical Garden.

Tanya Hadley, M.S. student, was awarded the Charles C. Chappelle Fellowship on the basis of character, intellectual ability, and promise of degree attainment. Tanya's research is in the area of sustainable floriculture and is evaluating willingness of Midwestern growers to adopt sustainable practices and consumer willingness to pay for products produced with sustainable practices.

Anthony Qualley, Ph.D. candidate received a Carl Storm under-represented minority fellowship award to participate in the 2007 Gordon Research Conference on Floral and Vegetative Volatiles in Les Diablerets, Switzerland. He also received an American Society of Plant Biologists (ASPB) travel grant to participate in the 2007 ASPB annual meeting.

Amy Marshall-Colón, Ph.D candidate, received a Purdue Graduate Student Government travel grant to participate in the 2007 Gordon Research Conference for plant metabolic engineering in Tilton, New Hampshire.

## Research and Teaching Facilities

In 1998, the Department of Horticulture and Landscape Architecture opened the \$7.2 million state-of-the-art plant growth facility (PGF) with 24 glass and 1 poly greenhouse zones totaling 34,800 square feet, 2 indoor growth rooms with high pressure sodium (HPS) and metal halide lamps, 17 growth chambers, 5 walk-in coolers, a tissue culture laboratory, 3 teaching laboratories, and a head house. Ten years later, PGF manager Rob Eddy maintains a goal of having it "better than the day it opened."

Last fall the College of Agriculture provided funds to upgrade our Priva Maximizer environmental computers to the latest motherboards and software enabling us to control 40 outputs (fans, curtains, lights, irrigation, etc.) and 30 inputs (sensors) in each greenhouse. In addition, all the floriculture zones have recently been equipped with energy efficient HPS lamps and sensor to monitor and record daily light integral, temperature, media moisture, and leaf wetness.

The goals of the Applied and Basic Floriculture Research Programs at Purdue University are to provide the industry with knowledge to improve the quality, efficiency, marketing, and sustainability of crops. Several of the current research programs are highlighted below.

## Greenhouse Grower and Consumer Perception of Sustainably Grown Floriculture Crops

Jennifer Dennis, Roberto Lopez, and their graduate student Tanya Hadley are conducting research to explore growers' willingness to adapt sustainable practices and consumer's willingness to pay for sustainably-grown bedding plants. They are currently conducting a survey (<http://flowers.hort.purdue.edu>) to determine greenhouse grower perceptions and awareness of sustainable production practices and their willingness to adopt these practices in their facilities. A second survey will identify consumer knowledge and willingness to purchase sustainable floriculture crops. Conventional and sustainable floriculture crops were grown at Purdue University and transported to retail garden centers across the state of Indiana to determine consumer willingness to pay a premium price for sustainably produced crops. Consumer demographics and grower perception data and potential challenges about sustainable production practices will be disseminated to floriculture growers through Extension publications and seminars.

## Floriculture Integrated Pest Management

Cliff Sadof, Purdue Entomology, and Luis Cañas from The Ohio State University have recently teamed with Roberto Lopez and Jennifer Dennis to investigate how sustainable certification program standards affect pest management needs and the efficacy of approved control options. Katie England, a graduate





student in Purdue's Department of Entomology is comparing pest loads and qualities of paired greenhouse-grown bedding plants using sustainable and conventional growing practices. This information will compliment the consumer study that Tanya Handley is conducting to determine consumer willingness to pay for sustainably-produced floriculture crops. Future plans include extending this study to other commercially-important greenhouse crops such as poinsettia and Easter lily.

### High Tunnel Floriculture Crop Production

Purdue University will be installing a closed-loop underground water recirculation system that will conduct hot wastewater from the campus power plant below a site where high tunnels will be erected during the fall of 2008. Roberto Lopez, Cary Mitchell, and other collaborators will grow a variety of horticulture crop species (including floriculture crops) in the high tunnels. The plants and production techniques will be evaluated within the tunnels to determine if this is a viable and sustainable option for growers. The project will test proof of concept for local, waste-energy-leveraged crop production in temperate climates, thereby avoiding negative impacts of fossil-fuel use related to energy-intensive greenhouse production and long-distance transportation.

### National Poinsettia Cultivar Trials

The national trials were established in an effort to bring a thorough body of research and information on cultivars from the five commercial breeders (Dümmen, Ecke, Florema Young Plants, Selecta, and Syngenta Flowers) to poinsettia growers from across the country. Trials will be led by John Dole at North Carolina State University (NCSU), Jim Barrett at the University of Florida (UF), and Roberto Lopez at Purdue University (PU). Homewood Greenhouse and Nursery in Raleigh, North Carolina also participates in the trials to give an industry perspective. Each trial location has an open house for the industry and consumers to help publicize the cultivars. This year's open house dates are December 4, 6, and 9 for NCSU, PU and UF, respectively. In addition, trial information is included in a series of articles published by *Greenhouse Product News* (GPN) and on the National Poinsettia Trials website (<http://flowers.hort.purdue.edu/PoinsettiaSite/default.html>).

### Low Input and Cold Poinsettia Finishing

As energy costs continue to increase and poinsettia prices remain stagnant, greenhouse growers are seeking cultivars that can be finished at a range of cold temperatures and with lower inputs. In collaboration with Brian Krug, University of New Hampshire, we are screening poinsettia cultivars from five breeding companies to determine which can be successfully finished at cold temperatures. Time to market data will be entered into the Virtual Grower software program (USDA-ARS Greenhouse Production Group) to predict greenhouse energy consumption. In addition, we are determining ways of growing poinsettia with the fewest inputs.

### Sustainable Floriculture Research and Extension Coalition

In order to help growers make informed decisions and tackle the issue of sustainable greenhouse production, marketing, and certification, a collaborative research and Extension effort between Brian Krug, University of New Hampshire; Stephanie

Burnett, University of Maine; Jennifer Dennis; and Roberto Lopez has been formed. The group is currently focusing on issues such as crop production and energy efficiency, pest management, plant nutrition, irrigation, and marketing local, sustainable, and organic floriculture crops. Once this information is gathered, we will then focus our Extension efforts into making the production and marketing transition a success by educating growers how to successfully implement these practices and consumer segments that are willing to buy based on these attributes (potential market buyers).

### Disease Management in Floricultural Crops

Janna Beckerman and her graduate students evaluate disease management strategies for floricultural crops. These activities range from fungicide efficacy trials, to the identification of new disease problems on *Dracaena* and *Gaillardia*, and corresponding management strategies.

### Biological Controls

Rob Eddy and Dan Hahn, PGF manager and technician, respectively, periodically conduct experiments to determine the efficacy of biological controls in greenhouses. In a recent controlled study, they compared the effectiveness of beneficial insects (*Hypoaspis miles*), Scanmask and Nemashield beneficial nematodes (*Steinernema feltiae*), and Gnatrol (a Bt formulation) to the insecticide Duraguard ME for controlling fungus gnats. Their preliminary results indicate that Gnatrol was highly effective at controlling fungus gnat populations after seven days compared to the untreated control. After 30 days, *Hypoaspis miles* had provided the best control.

### Water Loss in Ornamental Crops

Mike Mickelbart and his group are studying the physiological mechanisms that regulate nighttime water loss in bedding plants and other ornamentals and trying to understand the reasons for this loss. Most plants lose some amount of water at night, although the amount lost varies substantially among species and genotypes within a species. Since plants cannot photosynthesize in the dark, why do they not close down completely to conserve water? Before we begin to select plants based on their ability to conserve water at night, we must first try to understand if there is some advantage to this water loss.

### Floral Scent

Natalia Dudareva's group's primary research interest lies in the biochemistry of floral scent. Over time, breeding efforts targeted at increasing flower size, color, and shelf life have caused a reduction or, in many cases, complete elimination of floral aroma. Unlocking the key to floral scent will allow for the enhancement of scented blooms in floriculture crops.

### Purdue Extension Programs

#### Floriculture Extension

As a floriculture Extension specialist, Roberto's goal is to provide the ornamental industry of Indiana and surrounding states with research-based information (in both English and Spanish) on sustainable and energy efficient practices that will produce environmentally-friendly floriculture crops. The new

**Continued on page 26**



## Purdue University Floriculture: Teaching, Research, and Extension Programs

Continued from page 25

Extension floriculture web site (<http://flowers.hort.purdue.edu/>) provides commercial greenhouse growers with research-based articles, bulletins, production guides, and links. In addition, Roberto has developed an electronic quarterly bulletin, *The Indiana Flower Grower*. In collaboration with Ohio State and Texas A & M University faculty, Roberto, Cliff, and Janna are delivering educational programs for Spanish-speaking employees on diagnosing biotic and abiotic problems in the greenhouse.

### Floriculture Industry Roundtable of Ohio (FIROO)

The mission of the FIROO is to provide an educational forum to Floriculture Extension personnel, growers, and members of the allied industries across the Midwest region, currently including Ohio, Michigan, Pennsylvania, Kansas, Kentucky, and Indiana for the exchange, discussion, and dissemination of information related to floriculture. Roberto Lopez, Gail Ruhl, and other FIROO members have bi-weekly conference calls to diagnose and help prevent widespread problems in the industry. In addition, FIROO publishes a regional digital newsletter, *FloriBytes* that is distributed to growers. FIROO is funded by OFA – an Association of Floriculture Professionals and the Gus Poesch Floriculture Industry Fund.

### Purdue Plant and Pest Diagnostic Lab (P&PDL)

The P&PDL is an interdisciplinary diagnostic laboratory that is an excellent resource for greenhouse growers. The lab's mission is to provide accurate and rapid identification of plants, pests, diseases, and plant problems; suggest management strategies, when requested; and serve as a source of unbiased information for plant and pest related problems. For commercial floriculture and ornamentals the lab utilizes the expertise of diagnosticians (Tom Creswell, Gail Ruhl, and Tim Gibb) and faculty Extension specialists (Janna Beckerman, Cliff Sadof, Roberto Lopez, Mike Mickelbart, and Steve Weller). In 2007, a total of 3,630 problems were diagnosed on 2,307 samples. The P&PDL Virtual Lab ([www.ppd.purdue.edu/PPDL](http://www.ppd.purdue.edu/PPDL)) is maintained by Lab Coordinator Amy Deitrich, and provides pertinent information on collection, packaging, and submission of samples as well as a picture of the week ([www.ppd.purdue.edu/PPDL/Weekly\\_Picture\\_index.html](http://www.ppd.purdue.edu/PPDL/Weekly_Picture_index.html)), hot topics, and useful links.

### Regional Floriculture Extension

Under Purdue's Northwest Commercial Horticulture Program, Elizabeth Maynard partners with the Northwest Indiana Floriculture Association (NWIFA) to co-sponsor greenhouse tours, networking opportunities, and educational meetings throughout the year. These events provide a chance to see a variety of facilities in operation, meet other growers, and learn from peers, industry, and Extension professionals. Extension professionals also consult one-on-one with growers by phone, e-mail, and during greenhouse visits to troubleshoot problems and provide information.

### Horticulture Gardens

The Horticulture Gardens are a source of knowledge and beauty for students and visitors. It is a living classroom where classes meet regularly, student workers and volunteers get hands-on training in garden maintenance, and visitors learn about garden plants and gardening techniques. Just under half an acre, the gardens display a wide diversity of plants, including over 300 cultivars of annual flowers and garden vegetables. Visitors can see how cultivars perform in side-by-side plantings featuring many new cultivars. As funding and space increase, more cultivar trials will be added.

Since the gardens were established in 1982, collections have grown to encompass nearly 200 species of perennial flowers and foliage plants in addition to the annual trials.

### Consumer Horticulture Extension

The Purdue Consumer Horticulture Extension program led by Rosie Lerner provides residents of Indiana and beyond with information, multi-media resources, and educational programs in the areas of ornamental plants, home fruit and vegetable production, and environmentally sound garden and landscape practices. Rosie also has an informative collection of gardening articles, calendars, and Q&A columns, organized by season for consumers ([www.hort.purdue.edu/ext/news\\_stories.html](http://www.hort.purdue.edu/ext/news_stories.html)) as well as a consumer horticulture site ([www.hort.purdue.edu/ext](http://www.hort.purdue.edu/ext)).

Much of the emphasis is on training of Master Gardener volunteers and outreach via web sites, mass media, and public events such as the Indiana Flower and Patio Show and State Fair. Direct end-user contact is provided at the White River Gardens Resource Center (Mary Welch-Keesey) in Indianapolis by responding to inquiries in person, by phone, and by e-mail. Education and ongoing support of county Extension educators are provided through staff development programs and creation of media resources such as bulletins, Internet references, PowerPoint programs, and news articles. Plant identification and diagnosis of plant problems are provided for Extension field staff and the general public through the P&PDL.

### Funding

Purdue faculty, staff, and students are greatly appreciative of the generous contributions provided by external funds including private floriculture companies, endowments, associations, and grants that are supportive of the various programs mentioned.

**Roberto G. Lopez**  
Purdue University  
625 Agriculture Mall Dr.  
West Lafayette, IN 47907  
765-496-3425  
Fax: 765-494-0391  
[rglopez@purdue.edu](mailto:rglopez@purdue.edu)

