Abstracts of the ASHS Southern Region 66th Annual Meeting

Orlando, Fla. 2–4 February 2006

J.B. Edmond Undergraduate Student Paper Competition

ADVENTITIOUS SHOOT PROPAGATION AND CULTURAL INPUTS ON NURSERY PRODUCTION OF A PRIMOCANE-FRUITING BLACKBERRY SELECTION

Kimberley Dennis, John R. Clark, and James A. Robbins, Department of Horticulture, 316 Plant Science, University of Arkansas, Fayetteville, AR 72701

Studies were conducted from January to November of 2005 to determine the effect of root-cutting length on adventitious shoot yield and the management practices necessary to produce nursery-quality blackberry plants. The first portion of the study measured the average number of shoots produced from 7.6 and 15.2 cm long root cuttings of APF-44 blackberry—a primocane-fruiting clone (not available in commerce) from the University of Arkansas breeding program. Cuttings were forced in a shallow bin containing soilless potting media. The average number of shoots per root cutting from 7.6- and 15.2-cm-long root cuttings averaged 1.6 and 2.7 shoots per root cutting, respectively. Rooting percentage of shoots was near 100% regardless of root cutting length and produced rooted plants of equal quality. The latter part of the study included various treatments on the rooted shoots that might affect the productivity and quality of the final product intended for nursery sales in early fall. With the aim of producing a flowering/fruiting shrub by late September, three treatments were applied: pot dimension, fertilizer rate, and shoot tipping. Fertilizer rate had the greatest impact of all treatments. Above normal summer/fall temperatures may explain lack of fruiting on APF-44 blackberries, but the dimension and size of some plants provided a portion of the intended aesthetic.

IN VITRO SHOOT AND LEAF PROLIFERATION OF *ENCYCLIA TAMPENSIS* (LIND.) ORCHIDS

**Monica Haddix, Marihelen Kamp-Glass, Charles Raczkowski, Department of Natural Resources and Environmental Design, North Carolina A&T State University, Greensboro, NC 27411*

Encyclia is a genus of orchids with four members native to Florida that are Endangered or commercially exploited. If a commercial orchid tissue culture media was found that could be used to propagate *Encyclia*, the resulting plants could be introduced into protected habitats to increase the wild populations or could be grown commercially to lessen the demand for collected plants. Six month *Encyclia tampensis* (Lindl.) seedlings were grown in Orchid Maintenance/Replate Medium w/Banana and Charcoal with 6 g·L^{-1} agar (C), ½ strength Orchid Multiplication Medium with 6 g·L^{-1} agar and 10 g·L^{-1} charcoal (OM), Knudson C Orchid Medium – Morel Modification with 6 g·L^{-1} agar and 10 g·L^{-1} charcoal (K), or Vacin and Went Modified Orchid Medium w/agar and sucrose with 10 g·L^{-1} charcoal (VW) for seven weeks. Plants grown in OM and VW media both produced more shoots and roots (7.56 leaves, 1.92 shoots and 6.67 leaves, 1.76 shoots respectively) than the control medium (5.87 leaves, 1.70 shoots) with OM producing the highest averages. Plants grown in the K medium averaged significantly less shoots and leaves than the other three media (4.94 leaves, 1.35 shoots).

Norman F. Childers MS Graduate Student Paper Competition

TRANSPLANTING AND ORGANIC MULCH AFFECT GAS EXCHANGE AND GROWTH OF FIELD GROWN RED OAK (*QUERCUS SHUMARDII* BUCKLI.)

Amber Bonds and Thayne Montague; Department of Plant and Soil Science, Texas Tech University, Lubbock, TX 79409-2122*

Balled in burlaped is a common method for moving large trees into landscapes and affects of transplanting on tree gas exchange and growth has been documented. Organic mulch provides many benefits and is often recommended for landscapes. Because little research has been conducted on affects organic mulch has on gas exchange and growth of transplanted and non-transplanted trees, this research investigated the effects transplanting and organic mulch have on gas exchange and growth of field grown red oak (*Quercus shumardii*) trees. In March 2003, 12 multi-trunked trees were selected from a tree farm near Lubbock, Texas, and six trees were dug using a tree spade and placed in their original location. Mulch at a depth of 10 cm was placed around the rootball of 3 transplanted and 3 nontransplanted trees and maintained at this depth the remainder of the experiment. Over the next three growing seasons predawn leaf water potential and midday stomatal conductance were measured on each tree every 1 to 3 weeks. At the end of every growing season shoot elongation, stem caliper and subsample leaf area were recorded. Our data indicates transplanting has a negative affect on gas exchange and growth of red oak. Each growing season gas exchange, shoot growth, and subsample leaf area were less for transplanted trees when compared to nontransplanted trees. Mulch also influenced gas exchange and growth of these trees. For nontransplanted trees with mulch, gas exchange and growth were reduced when compared to nonmulched, nontransplanted trees. For transplanted trees with mulch, predawn leaf water potential was less negative and subsample leaf area was greater when compared to transplanted trees with out mulch.

INFLUENCES OF SUBSTRATES ON ROOTING *CLEMATIS SOCIALIS* STEM CUTTINGS

C.N. Johnson, D.J. Eakes, A. N. Wright, J.L Sibley, and L.L. Bruner, Department of Horticulture, 101 Funchess Hall, Auburn University, AL 36849*

Clematis socialis Kral, commonly known as the Alabama Leatherflower, is an endangered species with only six known populations in northeast Alabama and northwest Georgia. Cutting propagation of the species will aid in establishing additional self-sustaining populations and provide genetic material for future hybridization and genetic preservation. Such research would also benefit growers, especially native nurseries, who wish to produce this species commercially for its ornamental value. Several experiments were performed to determine the effects of four non-amended substrates on root initiation, root growth, and survival of *C. socialis* stem cuttings. The four substrates tested included sand, perlite, vermiculite, and a 1 peat (P): 1 pine bark (PB) : 1 sand (S) mix (by volume). Some of the best results in the preliminary experiments in 2000 were observed when 2 to 3 node cuttings kept under shade and treated with higher IBA/NAA concentrations were used. In 2004, there was a correlation between root growth and cutting survival and particle size of the substrates. Cuttings rooted in the finer-particle substrates sand and vermiculite had higher cutting survival, root growth, root number, and root quality than those rooted in perlite and the 1 P : 1 PB : 1 S mix. Sand, perlite and vermiculite consistently outperformed the 1 P : 1 PB : 1 S mix which had some of the lowest growth data means. Sand was among the highest performing substrates in all years and it is the most inexpensive and readily available making it the most logical substrate for rooting *C. socialis* stem cuttings.

REPRODUCTIVE BEHAVIOR OF DIPLOID AND ALLOTETRAPLOID AZALEODENDRONS

Ryan N. Contreras and Thomas G. Ranney, Department of Horticultural Science, Mountain Horticultural Crops Research and Extension Center, North Carolina State University, Fletcher, NC 28732-9244*

Wide hybridization can potentially lead to the combination of diverse traits, but these hybrids are often sterile as is the case with the inter-subgeneric hybrid *Rhododendron* 'Fragrant Affinity'. Induction of polyploidy can restore chromosome homology and fertility in wide hybrids. In this study we successfully developed an allopolyploid form of *R.* 'Fragrant Affinity' using oryzalin as a mitotic inhibitor and chromosome doubling agent. Approximate genome size (2C), determined using flow cytometry, was 1.6 pg

for the diploid and 3.2 pg for the allotetraploid. Pollen viability, determined by staining and germination tests, was 4% and 0%, respectively for the diploid and 68% and 45%, respectively for the allotetraploid. No seeds were produced when the diploid *R.* 'Fragrant Affinity' was crossed with pollen from viable diploid and tetraploid parents. The allotetraploid produced viable seeds and seedlings when crossed with viable pollen from either diploid or tetraploid parents, including self pollination, demonstrating restored fertility. Additional crosses were successfully completed using the allotetraploid as part of an ongoing breeding program to develop new fragrant, cold hardy, evergreen rhododendron.

SELECTIVE BROADLEAF WEED CONTROL IN GROUNDCOVERS

Christina Walsworth, Edward Bush, Ronald Strahan, Ann Gray, Louisiana State University Agricultural Center, Baton Rouge, LA 70803

Selective broadleaf weed control is a major economic issue facing commercial landscapers and homeowners alike. Minimal selective post-emergent weed research has been successful in controlling landscape weeds. The objectives of this experiment were to determine the efficacy of seven selective broadleaf herbicides [nicosulfuron (0.66 oz/acre), flumioxazin (8 oz/acre), penoxsulam (2.3 fl oz/acre), bensulfuron (1.66 oz/acre), glyphosate (1% by volume), sulfentrazone (8 fl oz/acre), trifloxysulfuron (0.56 oz/acre) and the control] and to determine the ornamental phytotoxicity on three groundcover species (*Liriope muscari*, *Ophiopogon japonicus*, and *Trachelospermum asiaticum*). A RCBD design was used with five blocks. Each block was split establishing either mulched or bare soil plots (nonmulched). The groundcovers were established three months before herbicide application. On 29 June 2005, four weed species were evenly seeded into the blocks with one hundred seeds each of *Sesbania exaltata, Ipomea hederacea*, *Amaranthus retroflexus*, and *Euphorbia maculata*. Herbicides were applied using a CO_2 backpack type sprayer on 6 Sept. 2005. Plant and weed control data were taken to evaluate phytotoxicity and efficacy at 0, 1, 7, 14, and 28 DAT. On 27 Oct. 2005, weeds were harvested from each plot and dried for a minimum of 48 h and weighed. No significant differences in phytotoxicity were observed on either *Liriope muscari* or *Trachelospermum asiaticum*. However, there was a significant increase in phytotoxicity exhibited by the *Ophiopogon japonicus* treated with sulfentrazone compared to all of the other herbicides. Glyphosate demonstrated the best overall control of all broadleaf weeds except *Sesbania*, while trifloxysulfuron showed the best control of *Sesbania*. There were no significant differences in herbicide efficacy between the mulched and nonmulched plots. Further research is being done to measure the effects of herbicide efficacy and phytotoxicity in 2006.

Warren S. Barnham PhD Graduate Student paper Competition

FATE AND MOVEMENT OF NO_3^- N AS A RESULT OF STAGED LEACHING IRRIGATION EVENTS AND FERTILIZER SOURCE DURING POTATO PRODUCTION IN NORTHEAST FLORIDA

Christine M. Worthington and Chad M. Hutchinson, Horticultural Sciences Department, University of Florida, Gainesville*

The St. Johns River has been identified by the state of Florida as a priority water body in need of restoration. Best Management Practices were evaluated for potato (*Solanum tuberosum* L. 'Atlantic') production in the Tri-County Agricultural Area to reduce nitrate run-off from about 9,300 ha in production. Objectives of this study were 1) determine the influence of soluble and controlled release fertilizer (CRF) and timing of leaching irrigation on nitrate leaching and 2) compare yield and quality of the potato crop fertilized with either a soluble or controlled release nitrogen fertilizer in a seepage irrigated production system. The experiment was a split-split plot with four replications. Main plots were irrigation events (0, 2, 4, 8, and 12 weeks after planting, (WAP)), nitrogen source and rates included (ammonium nitrate (AN) 224 kg·ha^{-1} or controlled release fertilizer (CRF) 196 kg·ha^{-1}). About 7.6 cm of water was applied at each irrigation event and surface water runoff collected. CRF decreased NO_3-N loading by an average of 35%, 28%, and 32% compared to AN fertilizer during the 2, 8, and 12 WAP irrigation events, respectively, compared to AN. Plants in CRF treatments had significantly higher total and marketable tuber yields (30 and 25 t·ha^{-1}) compared to plants in AN treatments (27 and 23 t·ha^{-1}), respectively. Plants in the CRF treatments also had significantly higher total and marketable yields in 2005 (28 and 23 t·ha^{-1}) compared to plants in AN treatments (25 and 21 t·ha^{-1}), respectively. CRF was an effective alternative to conventional soluble forms of fertilizer maintaining yields and protecting natural resources from nonpoint source pollution.

ANTIOXIDANT ACTIVITY AND PHENOLIC COMPOSITION CHANGES IN SWEETPOTATO ROOT AND LEAF TISSUE DURING DEVELOPMENT

M.S. Padda and D.H. Picha, Department of Horticulture, Louisiana State University AgCenter, Baton Rouge, LA 70803*

Antioxidant activity and phenolic content of sweetpotato root and leaf tissues were quantified at different developmental stages. 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical method was used to measure antioxidant activity and total phenolic content was quantified by spectrophotometry using Folin-Denis reagent. Individual phenolic acids were quantified using reversed phase high performance liquid chromatography. Antioxidant activity and phenolic content decreased with root development and leaf maturity. Roots at the initial stages of development (about 4.0 g root weight) had a higher antioxidant activity and phenolic content compared to fully developed roots. Phenolic content in fully developed roots was significantly higher in the cortex tissue than internal pith tissue. The highest total phenolic content and antioxidant activity was found in cortex tissue at the initial stage of development (10.3 mg chlorogenic acid eq/g dry tissue weight and 9.7 mg Trolox eq/g dry tissue weight, respectively). Sweetpotato leaves had a significantly higher phenolic content and antioxidant activity than roots. Immature unfolded leaves had the highest total phenolic content (88.5 mg chlorogenic acid eq/g dry tissue weight) and antioxidant activity (99.6 mg Trolox eq/g dry tissue weight). Chlorogenic acid was the major phenolic acid in root and leaf tissues with the exception of young immature leaves in which the predominant phenolic acid was 3,5-dicaffeoylquinic acid.

Extension Section

USING A BILINGUAL GAPS AND HAND-WASHING DVD TO TRAIN FRESH PRODUCE FIELD AND PACKINGHOUSE WORKERS

D. C. Sanders[1], L. M. Reyes[1], D. J. Osborne[1], D. R. Ward[2] and D. E. Blackwelder[3,1] Horticultural Science, [2]Food Science and [3]Rowan County Extension, North Carolina State University

The Southeastern Fresh Produce Food Safety Training Program has been training extension agents across the southeastern U.S. since 2000. This program has utilized a variety of methods including group case study to enhance learning and promote team work. Multistate trainings have fostered collaboration between states and institutions. One goal of the program was to produce a method for agents to provide training that was repeatable and easy to implement. As a result, two videos were produced for use in training field and packinghouse workers. These videos were an English language good agricultural practices (GAPs) video entitled *Bridging the GAPs: From the Farm to the Table* and a Spanish language hand-washing video entitled *¡Lave sus Manos: Por Los Niños!* This program has been very effective, but has faced challenges due to language barriers. Many field and packinghouse crews were mixed in terms of language with some crew members speaking only English while others spoke only Spanish. As a result, Spanish speakers were unable to access the information in the good agricultural practices video while English speakers were unable to access information in the hand-washing video. The solution was to produce a bilingual training aid that included both sets of information and has been compiled into a DVD containing the footage of both of the original videos in both languages. For the Spanish version of the GAPs video and the English of the hand-washing video, the audio of the video's original language was left at a low sound level and the audio of the alternate language was added. These DVDs are currently being distributed to extension programs in all of the cooperating states with the aim of reaching growers who want to start a food safety plan.

GARDENDATA.ORG, AN INTERACTIVE FAQ DATABASE FOR CONSUMER HORTICULTURE

Richard E. Durham (rdurham@uky.edu) and Winston C. Dunwell, Department of Horticulture, University of Kentucky, N-318 Agricultural Science Building North, Lexington, KY 40546-0091*

GardenData.org developed from a need, identified by a survey of Kentucky county Extension agents, for a database resource to assist in answering frequently asked questions (FAQs) from home gardeners and consumers. A team, consisting of representatives from both the University of Kentucky and Kentucky State University and made up of an administrator, horticul-

ture specialists, county Extension agents, and agricultural communication specialists, worked together to create GardenData.org. Development of the database of FAQs in consumer or home horticulture began in 2004 and all content is peer reviewed by Kentucky Extension specialists before making answers publicly available. An interactive prototype program was launched for use by county Extension agents in February 2005. Following a positive response Gardendata.org was made publicly available in Summer 2005. Clients are asked their electronic mail address and Kentucky county in order to enter the web site and to become a repeat user of GardenData.org. Once they have conducted a search of available FAQs, clients may submit a question to GardenData.org to be answered by Kentucky Extension personnel. From recent data (December 2005 and January 2006) the self-service rate for the site is greater than 95%, indicating that most visitors are content to search existing FAQs rather than ask a new question. As new questions are submitted, they are answered by Extension personnel, reviewed and added to the growing database of FAQs.

FIRE ANTS HAVE MET THEIR MATCH: THE ESTABLISHMENT OF THE DECAPITATING PHORID FLY IN SOUTH FLORIDA

Adrian Hunsberger and Ruben Regalado, University of Florida/IFAS, Miami-Dade County Extension, 18710 SW 288th St., Homestead, FL 33030*

The red imported fire ant (*Solenopsis invicta*) has become a serious agricultural and animal pest in the southern U.S. since its accidental introduction in the 1930s. Traditionally, this pest ant has been under chemical control with very limited success and treatments must be repeated on a regular basis. One strategy to manage the red imported fire ant, which has been tried in parts of the southern U.S., is to use biocontrol agents to reduce fire ant populations. We released decapitating phorid flies (*Pseudacteon tricuspis*) as a self-sustaining biocontrol agent specific to *S. invicta* at two sites in South Florida during the spring of 2003 (site 1) and 2005 (site 2). Establishment of fly populations was monitored by disturbing 10 fire ant mounds and inspecting the number of hovering flies for 15 min. per mound. At site 1, within 1.5 years, 30% of mounds were positive for phorid flies and total estimated fire ant mounds decreased by 94%. At site 2, the number of mounds was recorded 1 day prerelease and 2 months postrelease. Ant mound density decreased by 71.4% with 73% of the remaining ant mounds positive for flies. This study confirms the successful establishment of the decapitating phorid fly in South Florida.

USING A CONSUMER HERB GARDENING STUDY TO DETERMINE PROGRAM AND PUBLICATION NEEDS

Lelia S. Kelly, Michael Newman, Ken Hood, Mississippi State University Extension Service, North Mississippi Research and Extension Center, PO Box 1690, Verona, MS 38879; Mississippi State University Extension Service, Department of Human Sciences, Box 9745, Mississippi State, MS 39762; Mississippi State University Extension Service, Department of Agricultural Economics, Box 5187, Mississippi State, MS 39762*

Extension specialists are charged with developing programs and publications based on audience needs. In consumer horticulture it can be difficult to gauge the needs that are client driven rather than extension driven. This study was an attempt to gather herb gardening information directly from gardeners. In total, 188 Master Gardeners completed a questionnaire that included questions ranging from the use of OTC herbal supplements to preservation methods. Analysis of data indicated that, based on sex, age or household income, participants were not different in most of their responses. When asked to check all the reasons they grew herbs, the top two were culinary and ornamental. Thirty-seven percent took OTC herbal supplements and 35% of those did so without their doctor's knowledge. Twelve percent indicated they treated themselves or family members for a medical condition using homegrown herbs. There was a significant difference between male and female when answering this question. Thirty-two percent of the male sample compared to just 9% of the females provided this home treatment. Primary propagation method was transplants. Pesticide use was minimal with only 2% using these. Easiest herbs to grow were rosemary, mint and basil in that order. Most popular herbs for cooking were basil, rosemary and chives. Top preservation method was drying, but freezing, vinegars and even herbal liquors were popular methods. Study results indicate that information dealing with cooking or ornamental uses of herbs would be popular. New ideas for old favorites as well as including new herbal cultivars would be useful. Nutritive and health issues, in particular involving herbal supplements, would be an opportunity for collaborative work with health and nutrition specialists.

TEACHING MASTER GARDENERS HOW TO APPLY IPM PRINCIPLES

Mary Lamberts and Adrian Hunsberger, UF Miami-Dade County Extension, 18710 SW 288th Street, Homestead, FL 33030-2309*

When Master Gardeners first begin a training class, their preconceived notions about concepts such as IPM, pests and pest management are usually very similar to those of the general gardening public. Master Gardeners interact extensively with home owners and are often either the first or the only person from an Extension office with whom an individual speaks. We designated part of their initial training to a module aimed at getting them to understand basic concepts about IPM, pests and pest management. Slides were used to review the different types of pests/pesticides and Integrated Pest Management (IPM) principles that apply to a) insects and related organisms, b) diseases and c) weeds. These were accompanied by very simple guidelines for each pest group, stressing that pesticides should not automatically be the home owner's first choice. The pesticide label reading portion of this module started with basic information about pesticide labels themselves. From there, Master Gardener trainees were led through an exercise where they had to find specific information on various labels: Sevin, RoundUp, Daconil 2787, Brush-B-Gon, Phyton 27, Dipel, and Amdro. For fruit and vegetable use, they had to find preharvest intervals and any restrictions on planting. For all products, they looked for rates, timing, Personal Protective Equipment (PPE)—if listed, and noted label variations. Pre-training scores averaged 60% while post-training scores were 90% or higher.

EXTENSION FULFILLING A NICHE: A NEW HORTICULTURE COURSE IN SOUTH FLORIDA

Henrique Mayer, Adrian Hunsberger and Marguerite Beckford, University of Florida, IFAS, Miami-Dade County Extension, 18710 SW 288 St., Homestead, FL 33030*

Miami-Dade County Extension, with the participation of University of Florida faculty and other speakers, created a Certified Course in Horticulture in 2005. The intended audience is landscape maintenance and installation personnel, tree trimming employees, home gardeners, city and parks employees, and others who want horticultural knowledge. The goal of the program was to educate the participants in basic horticultural practices such as: plant selection and installation—including palms and turf; plant propagation; landscape design; pruning; irrigation; fertilization; pest control, and related topics. The class was limited to 60 participants due to space constraints. The response surpassed all expectations with 58 people completing the course and 40 passing the final exam. Eight months after the end of the program, a follow-up telephone survey was conducted with 24 participants. The results reflect that a high percentage of the participants are still using the correct landscape techniques. In order to reach as many people as possible a video or CD with the entire course is going to be prepared.

SUSTAINABLE NURSERY PRODUCTION PRACTICES EXTENSION PROGRAMS: IPM AND BMP

Amy Fulcher, Dava Hayden, Winston Dunwell, Department of Horticulture, University of Kentucky, N-318 Agricultural Science Building North, Lexington, KY 40546-0091*

The objectives of Kentucky's Sustainable Nursery Production Practices Extension Program are for 1) the Kentucky nursery industry to continue sustained growth and 2) Kentucky growers to produce high quality plants, efficiently use pesticides, be stewards of their land and Kentucky's environment. Sustainable Nursery Program Components are 1) Integrated Pest Management (IPM): Nursery Scouting, Scout Training and Scouting Education for growers, Extension workers, and students; 2) Best Management Practice (BMP) Workshops: BMP VI: Disease Demolition Workshop; 3) Production Practice Demonstration: Pruning Training, Pesticide Handling, and Safety and Environmental Stewartship. 4.) Research: Pruning protocols; Media and media amendments; Precision Fertilization and Irrigation. The Kentucky Nursery Crops Scouting Program scouting guidelines were developed and contained: a weekly scouting/trapping guide; a listing of which pests to look for and on what host plants, and a detailed methodology of precisely how to look for the pest, its damage, and how to record this information such that comparisons could be made across nurseries and seasons.

Education Section

USING THE COMMUNITY TO TEACH PLANT MATERIALS—A REAL-WORLD STUDY IN PLANT IDENTIFICATION

Allan M. Armitage, Department of Horticulture, University of Georgia, Athens, GA, 30602

A teaching methodology was employed to use gardeners in the community to help in the teaching of a Herbaceous Perennial Plant Identification class (8 weeks, about 160 taxa). Most universities do not have a diverse collection of herbaceous perennials planted on campus, nor do most campuses have horticultural or botanical gardens for students. Teaching plant materials with photos alone or trying to force materials in the greenhouse is not only a horticultural challenge but seldom provides students with the important identification characteristics (habit, fragrance, fruit) of the taxon. Approximately six gardeners in the community agreed to open their private gardens to the students. Plants are evaluated 2 days before class time, and a list of plants is published on WebCT each week All gardens chosen must be within 15 minutes driving time from campus. Students were able to drive to the gardens, meet the gardeners and were exposed to the plants in garden setting. Potential problems of being unable to drive to gardens, or not being able to return to the gardens to study were not realized. Gardeners embraced the program and students were enriched by studying plants in a natural garden environment. The final examination is conducted in one of the gardens visited by the class. The use of gardeners in the community has been an important part of the class for 10 years.

CREATION OF A VIRTUAL MS NONTHESIS PROGRAM IN HORTICULTURE

Cynthia McKenney, Department of Plant and Soil Science, Texas Tech University, Lubbock, TX, 79409 and Department of Horticulture Sciences, Texas Agricultural Experiment Station, Dallas, TX 75252

An on-line MS nonthesis horticulture program has recently been developed by Texas Tech University. The profile of the average student participating in the program does not match the current national demographics of a 25 to 27 year old female. Rather, this distance student profile is 40- to 50-year-old male who owns his own horticultural business or serves in a horticultural management position for a city. These distance students generally excel academically as they have waited for years to pursue an advanced degree. They also communicate effectively and frequently via e-mail or course platform outlets. The distance MS students complete a traditional 36-hour program, have a graduate committee of both internal and external faculty members and stand for an oral defense. Enrollment has increased an average of 50% each semester the program has been offered. The primary challenge incurred since the inception of the program has been sustained rapid growth. While the MS nonthesis program has grown, the BS enrollment has increased almost as rapidly.

NEXT GENERATION OF SCIENTISTS IS INSPIRED AT AN EARLY AGE

Ellen B. Peffley[1] and Chad S. Davis[2]; [1]Department of Plant & Soil Science, Texas Tech University, Lubbock, TX 79409; [2]Department of Agricultural Education and Communications, Texas Tech University, Lubbock, TX 79409

The concept that plants and humans in a living system are mutually beneficial was communicated to 2nd to 12th grade students in science educational and outreach programs at Texas Tech University's Center for Space Science. Students traveled to the TTU horticulture greenhouse for a live program, which focused on research in the Engineering Development Unit. The research is funded by NASA's Advanced Life Support. During the program students were presented with the science of growing plants, how plants benefit humans in space, and baseline science vocabulary. A survey instrument was developed to assess student level of understanding of sciences, and their comprehension of living cycles, which work together to support manned space missions. The survey consisted of multiple-choice questions covering topics presented during the program. Likert questions were used to assess student's desire to travel in space, be an astronaut or a scientist, and their enjoyment of science and growing plants. The survey was administered before the program; immediately after the program; and a delayed test was administered in their classroom several weeks after the program. Student performance was scored according to correct responses in the survey. Responses were analyzed for changes over time using an analysis of variance with repeated measures. The results showed there was an overall improvement in knowledge from preprogram survey to postprogram survey and that students recognize science is the main topic to be studied to expand for better space programs. Some elementary education students scored equal to or higher than secondary education students. Enthusiastic science teachers may drive student interest exhibited in the early grades. There is evidence that a teacher's attitude towards science and one's basic science knowledge is important to molding student's attitudes and interests in science.

TEACHER IMMEDIACY/MORE POSITIVE CLASSROOM EXPERIENCE

Marihelen Glass, North Carolina A&T State University, Greensboro, NC

Most people do not even know the definition of immediacy. It is the perception of physical or psychological closeness: verbal and nonverbal. The practice of immediacy in the class room can help student behavior in the class room. Examples of Teacher Immediacy in the class room areas follows. 1) How the teacher's appearance can affect the student's learning. 2) What the teacher's gestures and movements mean. 3) How facial behavior can be positive or a negative to the student. 4) How eye behavior can affect the student's learning. 5) How the teacher's vocal behavior affects the attentiveness. 6) How the environment in the classroom affects the student's ability to concentrate.

Floriculture, Ornamentals, and Turf Section

OPPORTUNITIES FOR EXPORTING ORNAMENTAL PLANTS FROM MIAMI-DADE COUNTY TO THE CARIBBEAN

A. R. Rafie and Joe Garofalo, University of Florida, Miami-Dade County Cooperative Extension Service, 18710 SW 288th St., Homestead, FL 33030; Stephen Colyer, Miami-Dade College, 300 NE 2nd Avenue, Miami, FL 33132*

In Miami-Dade County, Fla., there are 1,240 registered nurseries, growing plants in 14,000 acres, making it the state's leading nursery crop producer. This industry provides 18,000 nursery related jobs and in 2000 had an estimated total value of $790 million. Like many other agricultural industries in Florida, the nursery industry has become very competitive; as a result, many growers are searching for new marketing opportunities. The Caribbean region consists of 28 nations with a population of 21 million. This region is considered one of the most dependent on agricultural imports. In 2004, United State agricultural exports to the Caribbean reached a total value of $1.9 billion, of which $9 million was nursery plant product. Due to proximity of many of the Caribbean countries and cheap transportation costs, the United State is essentially trading in its own backyard. To strengthen the export knowledge of local nursery growers, a partnership was created among the Southern U.S. Trade Association (SUSTA), the USDA's Caribbean Basin Agricultural Trade Office (CBATO), Miami–Dade College, and the University of Florida/Miami–Dade County Cooperative Extension Service. Two different workshop series were offered to train selected nursery managers about the export essentials. As a result of this partnership, 21 nursery growers were able to complete the program, 57% of the participants had exported in the past to the Caribbean and 43% are now starting to export.

INFLUENCE OF STEM CUTTING LOCATION ON PROPAGATION OF *MURRAYA PANICULATA* AND *TECOMA STANS*

Christopher B. Cerveny, James L. Gibson, and James E. Barrett, University of Florida, 1545 Fifield Hall, Gainesville, FL 32608*

Orange Jasmine (*Murraya paniculata* L. Jack) and Texas Star [*Tecoma stans* (L.) Juss.] are two tropical ornamentals which have become popular in the specialty floriculture crop market because of their outstanding flower characteristics. Unfortunately they are difficult to root and little has been published on how to propagate them effectively. Therefore, the objective of our experiment was to determine the optimum physiological age of stem tissue necessary to effectively root 2-node stem cuttings. Forty-five cm shoots of *Murraya* were harvested on 27 June and 7 Sept. 2005, and divided into 2-node stem cuttings representing the top, middle, and bottom sections of the stem (soft-wood, semi-hardwood, and hardwood, respectively). Cuttings were measured for stem length and diameter, dipped in a 1,500 mg·L^{-1} solution containing indolebutyric acid (IBA) 1% : napthaleneacetic acid (NAA) 0.5%, and propagated under mist for 10 weeks in a 4 perlite : 1 vermiculite substrate (by volume). *Tecoma* followed a similar regime but were harvested once on 13 Sept. and evaluated 4 weeks after planting. Both species were evaluated for percent survival and rooting quality on a 1 to 5 scale; 1 = poor, 5 = best. Stem quality differences in *Tecoma* cuttings were shown, but did not

influence rooting performance or percent survival. *Murraya* cuttings indicated a similar trend suggesting that age of tissue is not an important factor when propagating these species. However, when comparing the two harvest dates, data from *Murraya* cuttings showed an increase in survival from 79% and 95% and an increase in rooting quality from 2.72 to 4.26 when harvested in June compared to Sept., respectively. Cuttings harvested in Sept. were also shown to be 17% shorter with a 126% larger diameter than those harvested in June. These data suggest a trend toward a seasonal effect when harvesting cuttings of *Murraya paniculata* in Florida. Further studies should be conducted to verify this trend and to identify the ideal season for propagation.

THE INFLUENCE OF COOLING ON WOODY SHRUBS USED FOR GREENHOUSE FORCING

Allan M. Armitage, N. H. Hamill and S. Anderson, Department of Horticulture, University of Georgia, Athens, GA, 30602*

Research to determine protocols for greenhouse forcing of woody shrubs was initiated as part of the New Crop Research program at the University of Georgia. About 15 woody taxa were initially selected for the program based on habit, foliar qualities and flowering (if present). All plants were subjected to 1.7–4.4 °C for 0, 6, or 10 weeks in a controlled temperature cooler. Based on growth and visual characteristics, *Leptodermis oblonga*, *Indigofera pseudotinctoria* 'Rose Carpet', *Forsythia ×intermedia* 'Golden Peep' and *Philadelphus coronaria* 'Manteau d'Hermaine' was discarded. *Caryopteris* x *clandonensis* 'Sunshine Blue', *Leycesteria formosa* 'Golden Lanterns', *Sambucus nigra* 'Black Lace', *Philadelphus coronaria* 'Variegata' and *Physocarpus oblongifolius* 'Summer Wine' were investigated further. Data presented for *Physocarpus* suggested that cooling was not necessary for growth; however, 10 weeks of cooling resulted in the least time to finish in the greenhouse. Ten, six, and zero weeks cold resulted in 17, 10, and 7 weeks finish time respectively. Additional work conducted in 2005 and future research will be discussed.

THE INFLUENCE OF COOLING ON GROWTH OF THREE SHRUBS FOR GREENHOUSE FORCING: A PRELIMINARY STUDY

Natalia K. Hamill, A.M. Armitage, S. L. Anderson, Department of Horticulture, University of Georgia, Athens, GA 30602*

As part of the New Floriculture Crop Program at the University of Georgia, a research project was initiated in Fall 2004 to determine production protocols for forcing woody shrubs in the greenhouse. The influence of cooling on greenhouse forcing of three woody taxa (*Caryopteris ×clandonensis* 'Sunshine Blue', *Leycesteria formosa* 'Golden Lanterns' and *Sambucus nigra* 'Black Lace') was evaluated. Dormant rooted liners (7 cm) were received in November 2004 and were cooled for 0, 6, or 10 weeks at 1.7–4.4 °C. With 0 weeks cooling, *Caryopteris ×clandonensis* 'Sunshine Blue' never reached an acceptable finish stage. With 6 weeks cooling, plants were not of sufficient quality to be saleable; however with 10 weeks cooling, plants finished in 7 weeks in the greenhouse. With 0 weeks cooling, *Leycesteria formosa* 'Golden Lanterns' was saleable in 13 weeks. With 6 weeks cooling, plants finished in 7 weeks. With 10 weeks cooling, plants finished in 8 weeks. With 0 weeks cooling, *Sambucus nigra* 'Black Lace' never reached a saleable stage. With 6 weeks cooling plants were saleable in 11 weeks; with 10 weeks cooling plants finished in 6 weeks. The data suggest that cold is necessary for greenhouse forcing of *Caryopteris* and *Sambucus*, and that 10 weeks of cold resulted in the shortest production time. Data suggest that 6 weeks cooling of *Leycesteria* resulted in the shortest production time; however cooling is not necessary to produce a finished plant of good quality.

PREVENTING BLOW-OVER OF NURSERY CONTAINERS

Richard Parish, Hammond Research Station, Louisiana State University AgCenter, 21549 Old Covington Highway, Hammond, LA 70403*

A study was conducted in 2004 comparing commercial plant restraint systems with a grower standard consisting of a steel rod driven through the container into the soil. Commercial systems included wire baskets, above-ground plastic pot-in-pot, trellis with straps, and brackets on individual posts. This test was conducted on 15-gallon containers. Costs and efficacy of the systems were recorded. All of the commercial systems worked well, but the annualized cost of the grower standard was much less even though more blow-over occurred with the grower standard. A different system consisting of a horizontal rod over the top of containers and held down with J-stakes was tested on 4-gallon containers. Not enough stakes were used and the system was less effective than vertical stakes in each pot. A new study was initiated in 2005 to refine the grower standard through the use of one or two stakes per container, longer stakes, and the use of rebar instead of smooth rod. More stakes, longer stakes, and rebar were also evaluated with the horizontal rod system. The 2005 test was lost due to Hurricane Katrina. It will be repeated in 2006.

CONTROLLING LITTLE-LEAF DISORDER ON *LOROPETALUM CHINESE* VAR. *RUBRUM* WITH FOLIAR APPLICATIONS OF COPPER

John M. Ruter, University of Georgia, Department of Horticulture, Tifton, GA 31794*

Loropetalum chinense var. *rubrum*, Chinese fringe-flower, was introduced into the United States in 1989 and quickly became on of the most popular plants in the nursery trade. Growth abnormalities (little-leaf disorder) became a problem on container-grown plants in pine bark substrates during the late 1990s. Symptoms are as follows: darkening of older growth, shortening of internodes, upward cupping of leaves, crinkling of new growth, particularly the distal part of the leaf, decrease in leaf size. In severe cases leaf necrosis occurs along with stem elongation, thus branches appear to be elongating without new leaves. Petioles become very short. Branchlets may also be reflexed or drooping. In Florida, an eriophyid mite has been touted as the causal agent for the disorder. On plants sampled from Georgia nurseries, eriophyid mites have never been detected. 'Ruby' consistently has the problem, while it has also been noted on 'Sizzling Pink' and 'Suzanne'. Plants in the ground do not express the problem. There may be an element present in native soil that is not supplied in sufficient quantity in organic substrates. Foliage from a commercial nursery was sampled for micronutrients concentrations. Initial data indicated that copper, zinc, and nickel were low and could be causing the problem. In May 2005, a study was initiated at a commercial nursery in Grady County, Ga. Copper and zinc sulfate, along with nickel lignonsulfonate, was applied as foliar sprays to symptomatic plants of 'Suzanne' growing in #5 containers. Within two weeks after treatment, plants sprayed with copper sulfate resumed normal growth. Control plants, or plants treated with zinc or nickel did not resume normal growth. A second study was initiated in June to evaluate different rates of copper sulfate and Kocide, a copper fungicide. Medium to high rates of copper sulfate and the high label rate of Kocide were effective. The plants in this study had severe symptoms and required repeat applications of copper. Further research is needed on appropriate formulations of copper, rates of application, and rates of incorporation into pine bark substrates to eliminate the problem.

AS THE GROWERS SEE IT: A SURVEY OF HURRICANE KATRINA DAMAGE TO NURSERY CROPS AND STRUCTURES IN MIAMI-DADE, FLORIDA

Joe Garofalo, University of Florida, Miami-Dade County Cooperative Extension Service, 18710 SW 288th St., Homestead, FL 33030. Marcelo Siqueira, Altria Lab Plants, LLC, Homestead, FL*

There are 1,240 certified nurseries producing ornamentals in 14,000 acres in Miami-Dade Co., Fla. About half the acreage is tropical foliage plants produced under shade. A small percentage, mainly bedding plants and specialty crops, is in structures which are enclosed and heated during the winter. Total annual sales are near $1 billion. Official damage estimates are made by local, state, and federal agencies within 24 hours. after an event. According to these estimates, Hurricane Katrina resulted in crop losses of $370,650,000 in August. With 6 weeks, Hurricanes Rita and Wilma caused additional crop losses of $195,475,000. Katrina caused extensive flooding, with many woody plants under water for several days. Most of the damage to tropical foliage was from exposure to the sun after shade structures were torn apart. Katrina destroyed 60% of the covered acreage, and Wilma destroyed another 20%. With assistance of the Miami–Dade chapter of the Florida Nursery Growers and Landscape Association, growers were asked to estimate their losses. On average they saw their losses as at least twice the official estimates.

INCORPORATING PONDS INTO SOUTHERN FLORIDA'S TROPICAL URBAN LANDSCAPE

Christian L. Miller and Joe Garofalo, University of Florida, Miami-Dade County Cooperative Extension Service, 18710 SW 288th St., Homestead, FL 33030*

Water gardening is fast becoming an integral part of many South Florida landscapes. Due to this growing trend, many professional pond construction and maintenance companies are prospering. However, most people lack the knowledge, finances, or space to build a large show pond. In areas where space is an issue, homeowners may find that a smaller container water feature may be a suitable replacement for the more traditional display pond. Ponds

come in a wide variety of styles, shapes, materials, and sizes, so one is only limited by their imagination and budget. Since proper planning is critical to the long term success of any pond, a prospective pond owner should seek the expertise of professional pond company or their county extension agent. Due to South Florida's subtropical climate, a unique variety of plants and fishes are available to the water gardener, which allow for the garden to be enjoyed year-round.

LONG-TERM SURVIVAL OF GOLDEN TRUMPET TREE AND COPPERPOD ON ROCKLAND SOIL IN SOUTH FLORIDA

Joe Garofalo and Ruben Regalado, University of Florida, Miami-Dade County Cooperative Extension Service, 18710 SW 288th St., Homestead, FL 33030*

The soil in south Miami–Dade Co., Fla., consists of 4 to 6 inches of scarified limestone, officially a "very gravelly loam". The bedrock reaches the surface; with little weathered material or organic matter. Heavy equipment is used to break up the rock, and a rock plow is used every few years to prevent re-compaction. Street trees in swales are installed in shallow holes dug in the rock and back-filled with crushed limestone. Golden trumpet tree, or yellow tab, *Tabebuia chrysotricha*, and copperpod, *Peltophorum pterocarpum*, are deciduous, tropical trees of medium size. Both are popular throughout south Florida because they produce spectacular displays of yellow flowers before the leaves emerge in the spring. When planted on rockland soil, both species present maintenance problems which suggest that they may not be good choices for use as street trees. In Summer 2005, after three hurricanes, both species were evaluated for long-term survival. Of 246 *Tabebuia*, 26% fell, 18% leaned (or 45% damaged), and 25% were missing, having been destroyed in previous years. Only one was broken, the rest fell due to root failure. Six large trees growing near buildings were standing. It appears that yellow tab is not a good street tree in rockland, not even for the short-term. Of 142 *Peltophorum*, 23% fell, 3% leaned (or 26% damaged), and 4% were missing. Due to an umbrella-like branching pattern, 15% had branches broken on the street side, caused by vehicles, not wind. Though it sustained only half the wind damage of yellow tab, copperpod is not a good street tree, due to poor branching patterns.

Fruit Crops Section

POLICIES FOR THE PROPRIETARY RELEASE, DISTRIBUTION AND SALE OF FRUIT VARIETIES AND GERMPLASM AT THE UNIVERSITY OF ARKANSAS

John R. Clark, Department of Horticulture, 316 Plant Science, University of Arkansas, Fayetteville, AR 72701

James N. Moore, who began the University of Arkansas fruit breeding program in 1964, filed the first plant patent for a cultivar from the program in 1982, 'Reliance' grape. Before that, he released six nonpatented cultivars. 'Reliance' was anticipated to be more adapted to the midwestern U.S. than Arkansas and the South, and Moore was interested in program support outside Arkansas for those that would benefit from this development. He found that nurseries and producers were receptive to the idea of patented cultivars and paying per plant royalties on new developments. In 1984, eight nurseries were licensed to propagate 'Reliance'. Since that time the fruit breeding program has released 40 cultivars, of which 25 have been plant patented. Licensing for the patented cultivars has been on a nonexclusive basis with nurseries in the U.S., and exclusive agreements for defined territories have been exercised outside the U.S. Total license agreements in early 2006 total >300. Trademarking was first used in 2003 for the first primocane-fruiting blackberry cultivars. Breeding agreements were put in place 2003 as a way to generate program support and move germplasm developments into additional commercial channels. Testing agreements have been expanded outside the U.S., with fees paid to test genotypes and provide first option for exclusive licensing. Proprietary releases have been of benefit to the University of Arkansas and intellectual property protection of new developments should continue to be used.

BLUEBERRY RESEARCH IN THE SOUTHERN PART OF CHINA

Yu Hong, D. Creech, Wang Chuanyong, Gu Yin, and He Shanan; Nanjing Botanical Garden, Jiangsu Province and Chinese Academy of Sciences, P.O. Box1435, 210014 Nanjing, China*

Blueberries are now the hot point of fruit development in China. Researches conducted in the past since 1980s include mainly introduction and propagation. More than 30 cultivars of rabbiteye blueberries and southern highbush blueberries were introduced successfully in the Nanjing Botanical garden in late 1980s. For dormant cuttings of 4 rabbiteye blueberry cultivars Gardenblue, Tifblue, Climax, and Premier the rooting percentage could reach 84%, 52%, 62%, and 79% respectively under interrupted misting. Lignification of the cuttings seemed the key point for rooting. For soft cuttings the rooting percentage can reach 90% to 95% with chemical treatments. Seedling selection has been conducted and some promising individuals are under observation. So far, there were little experiments on cultural practice under taken. But looking at the difference of soils between the blueberry growing areas in the US and China it seems that there are a series of aspects should be researched in the future.

SUITABLE REGIONS FOR BLUEBERRY GROWING IN CHINA

Yu Hong, D. Creech, Wang Chuanyong, Gu Yin, and He Shanan; Nanjing Botanical Garden, Jiangsu Province and Chinese Academy of Sciences, P.O. Box 1435, Nanjing 210014, China*

The native species of *Vaccinium* are distributed in both northeast and south of China but more species are in the South. Ecologically, there is a vast territory in the South with acidic soils and plenty of precipitation and warm weather. On the other hand in the northeast regions temperature in winter is usually a problem for cultivated blueberries and protection from freezing is necessary for young plantations. Based on the result of introduction of cultivars, including rabbiteye, southern highbush and lowbush blueberries, in both northern and southern parts in China during the last 2 decades authors suggested that the most prospective regions for blueberry growing could be mostly in south of China. In the between of the two regions the natural ecological conditions are not appropriate for blueberry growing but plantations under plastic film appeared relatively vigorous. 12 rabbiteye blueberry cultivars have been tested in the south and the performance of growth and fruiting are good. It is expected that the average of yield could reach about 15 $t \cdot ha^{-1}$. The quality of fruits is similar to that of the natives in North America. Up to now there are less insects and diseases damages. It seems that the regions in the south of Changjiang (Yangtze) River provide good conditions for blueberry commercial growing.

IR4 UPDATE: NEW PEST CONTROL PRODUCTS BEING RESEARCHED FOR THE FRUIT CROPS INDUSTRY

Charles Meister, University of Florida, Gainesville, FL 32611

The IR4 Specialty Crops Program was established to assist in the registration of pest control products for minor uses. The national program, headquartered at Rutgers University and operating through four regions with a network of scientists in every state develops lists of grower needs, prioritizes projects and develops protocols to secure EPA tolerances that lead to labels. Every year IR4 works on pest control products needed by the fruit industry. Pest control products being researched for 2006 include: Insect and disease control in tropical fruit crops: Lepadopterous larvae control in peaches with Avaunt, Danitol, and Spintor: Mite and raspberry crown borer control in blackberry: Weed control in blueberry with Sandea and Spartan: Botrytis and anthracnose control in strawberry.

POLICIES FOR THE PROPRIETARY RELEASE, DISTRIBUTION AND SALE OF SMALL FRUIT CULTIVARS AND GERMPLASM BY LAND GRANT UNIVERSITIES IN THE SOUTHERN REGION OF THE U.S.

James R. Ballington, Horticultural Science Department, North Carolina State University, Raleigh, NC 27695-7609

Public funding for land-grant university plant breeding programs has declined to the point that alternative sources of funding have had to be identified in order for these programs to continue. Small fruit breeding programs at land-grant universities in the southern region of the U.S. now derive their support for day to day operations from a number of alternative funding sources including commodity organizations and research foundations. Royalty income generated from sale of plants of patented cultivars has also become a significant source of support for essentially all land grant programs. In addition, cooperative agreements and contracts with partners in private industry play a prominent role in support for several programs, and these will likely increase significantly in the near future. At present, U.S. plant patents are generally applied for upon the release of cultivars from small fruit breeding programs at land grant universities in the southern region, with some move toward trademarking. Releases are generally nonexclusive within the region, and either exclusive or nonexclusive outside the region. The use of germplasm from other breeding programs usually carries with it the expectation of mutual exchange and use of germplasm and/or sharing of royalty income from cultivars derived from such germplasm.

PERFORMANCE OF PAWPAW CULTIVARS IN SOUTH CAROLINA

Gregory L. Reighard, David R. Ouellette, and Kathy H. Brock, Clemson University, Department of Horticulture, Clemson, SC, 29634-0319*

A field planting of 18 selections and 10 named cultivars of pawpaw (*Asimina triloba*) was established in November 1996 near Clemson, S.C., as part of the Pawpaw Regional Variety Trial coordinated by Kentucky State University. Trees were planted at 2.0 × 5.5 m spacing with drip irrigation and straw mulch in a randomized complete block design consisting of 8 single-tree replications. Data collected through 2005 included tree survival, total tree yield, and yield and average weight of fruit weighing >150 g. Since the start of the trial, 3 selections, 1-7-1, 11-5 and 8-58 have been named and released as 'Shenandoah', 'Susquehanna' and 'Rappahannock', respectively. The highest yielding cultivars were 'Shenandoah', 'Rappahannock', and 'PA-Golden'. The cultivars with the largest percentage of large fruit were 'Shenandoah' and 'Susquehanna'. 'Middletown', 'Mitchell', 'Rappahannock', 'Taytwo', 'Wells' and 'Wilson' produced the largest percentage of small fruit (<150 g). After 9 years, 66% of the original trees (i.e., scions) were alive. 'Rappahannock', 'PA-Golden', 'Sunflower' and 'Wilson' had either one or zero trees die, whereas 'Middleton' and 'Wells' had only 2 trees alive. Among the selections, 2-54, 9-58, 11-13, 1-68, 3-11, and 8–20 had either 88% or 100% survival. The highest yielding selections were 10-35, 1-7-2, 1-68, and 2-10, and 1-7-2, 2-10, 4-2, and 5-5 produced the highest percent of large fruit. Fruit quality characters such as aroma, flavor, aftertaste and texture were not quantified or evaluated.

Postharvest–Biotechnology–Plant Biology Section

MASTER GARDENER PERCEPTION OF GENETICALLY MODIFIED ORNAMENTAL PLANTS

William Klingeman[1,], Charles Hall[2] and Beth Babbit[1]; [1]Plant Sciences Department and [2]Department of Agricultural Economics, University of Tennessee, 252 Ellington PSB, Knoxville, TN 37996-4561 (wklingem@utk.edu)*

Though genetically modified (GM) ornamental cut flowers are already available commercially, U.S. academics and Green Industry growers have not assessed consumer perception about GM ornamental plants for landscape use. Because we must make inferences from studies of GM foods, we risk misunderstanding and alienating stakeholders and clients. If we misjudge the end-user, we jeopardize the market for future GM ornamental plant introductions. To address this gap, we surveyed Tennessee Master Gardener Volunteers in 2004. Respondents (n = 607) revealed that concern and belief about GM ornamental plants parallel U.S. expectation about GM foods. Average Master Gardener volunteer responses predict that GM ornamental plants would provide only slight benefits to both the environment and human health once used in the landscape. Compared with non-GM plants, GM ornamental plants are expected to be about the same or less invasive in the landscape. While all types of GM ornamental plants were expected to provide slight benefits, plant types were perceived differently with male respondents expecting perennials to yield the most environmental benefits and females indicating grasses and turf. Men and women also differed in their relative acceptance of GM ornamental plants, if genes were added from different types of organisms to achieve a genetic transformation of an ornamental shrub. Our results suggest that academic outreach and Green Industry marketing to promote new GM plant products should emphasize attributes of benefit, rather than GM transformation processes. Regardless, about 73% of TN Master Gardener respondents reported interest in buying GM ornamental plants if sold commercially, but the majority advocated a requirement for GM plant product labeling at point-of-sale.

ANTIOXIDANT ACTIVITY AND PHENOLIC COMPOSITION CHANGES IN SWEETPOTATO ROOT AND LEAF TISSUE DURING DEVELOPMENT

M.S. Padda and D.H. Picha, Department of Horticulture, Louisiana State University AgCenter, Baton Rouge, LA 70803*

Antioxidant activity and phenolic content in sweetpotato root and leaf tissues were quantified at different developmental stages. The 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical method was used to measure antioxidant activity and total phenolic content was quantified by spectrophotometry using Folin-Denis reagent. Individual phenolic acids were quantified using reversed phase high performance liquid chromatography. Antioxidant activity and phenolic content decreased with root development and leaf maturity. Roots at the initial stages of development (about 4 g root weight) had a higher antioxidant activity and phenolic content compared to fully developed roots. Phenolic content in fully developed roots was significantly higher in the cortex tissue than internal pith tissue. The highest total phenolic content and antioxidant activity was found in cortex tissue at the initial stage of development (10.3 mg chlorogenic acid eq/g dry tissue weight and 9.7 mg Trolox eq/g dry tissue weight, respectively). Sweetpotato leaves had a significantly higher phenolic content and antioxidant activity than roots. Immature unfolded leaves had the highest total phenolic content (88.5 mg chlorogenic acid eq/g dry tissue weight) and antioxidant activity (99.6 mg Trolox eq/g dry tissue weight). Chlorogenic acid was the major phenolic acid in root and leaf tissues with the exception of young immature leaves in which the predominant phenolic acid was 3,5-dicaffeoylquinic acid.

LYCOPENE CONTENT OF ORGANICALLY GROWN TOMATOES

P. Perkins-Veazie,, J.K. Collins, and W. Roberts, USDA–ARS, South Central Agricultural Research Laboratory, Lane, OK 74555; Wes Watkins Agricultural Research and Extension Center, Oklahoma State University, Lane, OK 74555*

Reports on the lycopene content of tomatoes vary widely with country and source of fruit (field, greenhouse, retail). This study was done to compare the lycopene content of organically grown tomatoes, and to compare fully red fruit to those ripened after harvest. Thirteen tomato cultivars (12 beefsteak and one Roma type) were planted in land designated as transitional organic and fertilized with organic poultry litter. No additional fertilizer was applied. Pesticides approved for organic use were applied as necessary. Fruit at the turning to firm red stages were harvested and held at 20 to 28 °C until the soft red stage was reached (about 2 to 8 days). Day 0 fruit at pink to soft red stages was harvested at the same time. Multiple harvests were made for 6 weeks, until 10 fruit per cultivar and ripeness stage and storage treatment were obtained. Lycopene content of firm red and soft red fruit were similar, and was 50 to 65 $mg \cdot kg^{-1}$ for all the round fruit types, and 115 $mg \cdot kg^{-1}$ for the Roma type. Fruit ripened after harvest without ethylene were able to obtain similar levels of lycopene, even in those fruit harvested with just a trace of color. 'Sunmaster' and 'Solar Set' tomatoes grown organically were similar in lycopene content to those grown in previous years in a conventional production system. These results show that organically grown tomatoes can achieve normal to high levels of lycopene. Tomatoes ripened after harvest without ethylene can achieve the lycopene content of fruit harvested fully ripe.

POTENTIAL OF CHLORINE DIOXIDE TO EXTEND THE LONGEVITY OF CUT FLOWERS

Andrew J. Macnish, Ria T. Leonard, and Terril A. Nell; Department of Environmental Horticulture, University of Florida, Gainesville, FL 32611*

The postharvest longevity of fresh-cut flowers is often limited by the accumulation of bacteria in vase water and flower stems. Aqueous chlorine dioxide is a strong biocide with potential application for sanitizing cut flower solutions. We evaluated the potential of chlorine dioxide to prevent the build-up of bacteria in vase water and extend the longevity of cut *Matthiola incana* 'Ruby Red', *Gypsophila paniculata* 'Crystal' and *Gerbera jamesonii* 'Monarch' flowers. Fresh-cut flower stems were placed into sterile vases containing deionized water and either 0.0 or 2 $\mu L \cdot L^{-1}$ chlorine dioxide. Flower vase life was then judged at 21 ± 0.5 °C and 40% to 60% relative humidity. Inclusion of 2 $\mu L \cdot L^{-1}$ chlorine dioxide in vase water extended the longevity of *Matthiola*, *Gypsophila* and *Gerbera* flowers by 2.2, 3.5, and 3.4 days, respectively, relative to control flowers (i.e., 0 $\mu L \cdot L^{-1}$). Treatment with 2 $\mu L \cdot L^{-1}$ chlorine dioxide reduced the build-up of aerobic bacteria in vase water for 6 to 9 days of vase life. For example, addition of 2 $\mu L \cdot L^{-1}$ chlorine dioxide to *Gerbera* vase water reduced the number of bacteria that grew by 2.4- to 2.8-fold, as compared to control flower water. These results confirm the practical value of chlorine dioxide treatments to reduce the accumulation of bacteria in vase water and extend the display life of cut flowers.

FLOWER ABSCISSION AND ANTHOCYANIN DEVELOPMENT IN CUT PHLOX FLOWER HEADS: EFFECT OF ETHYLENE INHIBITORS AND SUCROSE

Wayne A. Mackay and Narendra Sankhla, Texas A&M University, TAES-Dallas, 17360 Coit Road, Dallas, TX 75252*

Phlox paniculata 'John Fanick' produces long lasting, dense terminal flower heads and has potential as a specialty cut flower. Quality and postharvest display life of cut flower heads depends primarily on ethylene-induced flower abscission, flower bud opening, and maintenance and development of

flower color during vase life. Late events, such as flower and leaf senescence may also be detrimental to flower quality. In the control treatment, the initial red-pink and purple flower color changes to violet blue in 3 to 4 days, and may lose >50% of initial anthocyanins. Incorporating sucrose (SUC) in the vase solution not only maintained >75% of the initial floral pigments, but also promoted opening of additional flowers and anthocyanin development. Although both ethylene biosynthesis (AOA, ReTain, a.i. AVG) and action inhibitors (STS, 1-MCP) delayed flower abscission, STS and 1-MCP were relatively more effective than AOA and AVG. As in the control, newly opened flowers remained very small when treated with ethylene inhibitors, did not develop red-pink color, and exhibited only shades of violet blue color. Sucrose antagonized the effect of ethylene inhibitors. As such, the flowers in SUC+ethylene inhibitors treatments enlarged in size and developed a reddish-pink blue color. However, the flower quality in SUC alone was much superior than those in SUC+ethylene inhibitors. These results indicate that ethylene inhibitors, alone and in combination with SUC, were not of any additional value in improving postharvest performance and display life of cut phlox flower heads.

FRUIT SIZE AND STAGE OF RIPENESS AFFECT POSTHARVEST WATER LOSS IN BELL PEPPER FRUIT (*CAPSICUM ANNUUM* L.)

Juan Carlos Díaz-Pérez[1], María Dolores Muy-Rangel[2], and Arturo Gaytán Mascorro[3], Department of Horticulture, Tifton Campus, University of Georgia, Tifton, GA 31793; [1]Associate professor and corresponding author (jcdiaz@uga.edu); [2] Visiting scientist, present address Centro de Investigación en Alimentación y Desarrollo, Carretera a Culiacán–El Dorado, km. 5.5, P.O. Box 32-A, Culiacán, Sinaloa 80129, Mexico; [3] Visiting scientist, present address INIFAP, Carretera Torreón - Matamoros Km. 17, P.O. Box 247, Torreón, Coahuila 27000, Mexico*

Fruit water loss significantly affects the quality of bell peppers. The objective of this study was to determine the effect of fruit weight, size, and stage of ripeness on the rate of water loss and permeance to water vapor. Fruit surface area/weight ratio decreased logarithmically with increases in fruit size, with smaller fruit showing larger changes in the ratio than larger fruit. Mean water loss rate for individual fruit and permeance to water vapor declined with increases in fruit size and as fruit ripeness progressed. Fruit surface area/weight ratio and rate of water loss were both highest in immature fruit and showed no differences between mature green and red fruit. In mature fruit, permeance to water vapor for the skin and calyx were 29 $\mu mol \cdot m^{-2} \cdot s^{-1} \cdot kPa^{-1}$ and 398 $\mu mol \cdot m^{-2} \cdot s^{-1} \cdot kPa^{-1}$, respectively. About 26% of the water loss in mature fruit occurred through the calyx. There was a decline in firmness, water loss rate, and permeance to water vapor of the fruit with increasing fruit water loss during storage.

EDAMAME VEGETABLE SOYBEAN PRODUCTION IN TENNESSEE

Debra Carpenter, Vince Pantalone, Fred Allen, Dennis Deyton, Carl Sams, and Allison Stewart, University of Tennessee, 2431 Joe Johnson Drive, Knoxville, TN 37996-4561

There are three objectives for this study: to determine the within-row plant spacing and time of planting that will produce optimal yields and seed isoflavone content, to explore the feasibility of incorporating edamame soybeans in a double-cropping system with strawberries, and to study the potential as an edamame soybean of newly identified line TN03-349. TN03-349 was planted into black plastic, irrigated strawberry beds in an East Tennessee location at five different within-row spacings (7.62, 15.24, 30.48,60.96, and 121.92 cm) in 2004 and 2005. Another strawberry bed planting was located in Middle Tennessee in 2005. Four soybean lines and two planting dates were used in the Middle Tennessee experiment. Two lines are high yielding soybean checks, while the third is a commercially available edamame cultivar. The fourth line is TN03-349. Planting dates were 24 May and 14 June 2005. A final field experiment utilized the same four soybean lines and planting dates with an additional planting on 6 July 2005. Four different within-row spacings were used, as well. All experimental plantings were harvested at both the R6 (green) and R8 (dry) stages. Preliminary data indicates that isoflavone content was not affected by within-row spacing in the 2004 East Tennessee strawberry bed experiment. Yield data from the same experiment seems to indicate that soybeans were able to compensate for fewer plants per row at the 7,62, 15.24, and 30.48 cm spacings. Yield dropped sharply at the 60.96 and 121.92 cm treatments. Line TN03-349 produced beans with large seed size and nutty flavor, traits that are essential for edamame soybeans.

TIME AND TEMPERATURE EFFECTS ON DEGRADATION OF ISOTHIOCYANATES IN BIOFUMIGATION SYSTEMS

Christina L. Pierson, Carl E. Sams, Dennis E. Deyton, Craig S. Charron, The University of Tennessee, Plant Sciences Department, 2431 Joe Johnson Drive, 252 Ellington PSB, Knoxville, TN, 37966-4561*

Biofumigation is an alternative to traditional methods of soil sterilization such as methyl bromide. Biofumigation utilizes volatile, pesticidal compounds in soil incorporated plant material from various *Brassica* species. Three experiments were conducted to study the degradation of allyl isothiocyanate (AITC) generated from the breakdown of glucosinolates present in Oriental mustard (*Brassica juncea* L. Czerniak). Mustard seed meal was incorporated into a sandy clay loam soil in all experiments. In the first experiment, samples were hydrated and then held in an incubator at 20 ± 0.2 °C. Samples were taken periodically for 7 days or until AITC was not detectable. For the second experiment, hydrated samples were removed from the incubator after 4 hours and 5 mL of ethyl acetate was added. The samples were then placed in a refrigerator at 4 ± 0.2 °C and samples were taken periodically over 77 days. For the third experiment, samples were taken from a strawberry plot experiment grown in a randomized complete block design. Samples were taken and 5 mL of ethyl acetate was added. Then samples were placed into a cooler until returning to the laboratory. The incubator experiment was repeated and showed that the highest concentration of AITC occurred between 2 and 8 hours after hydration. The storage experiment showed a stable relationship between time and AITC degradation. AITC was still present after 77 days. The strawberry plot experiment showed rapid AITC degradation similar to the incubator experiment. Future research will be done to confirm the effects of temperature and glucosinolate content on the amount of allyl isothiocyanate present.

CURRENT RESEARCH PROGRAMS AT THE USDA–ARS CITRUS AND SUBTROPICAL PRODUCTS LABORATORY

Elizabeth Baldwin, USDA–ARS Citrus and Subtropical Products Laboratory, Winter Haven, FL*

The USDA–ARS Citrus and Subtropical Products Laboratory is a food science and postharvest facility for fresh and processed fruits and vegetables of tropical and subtropical origin. The term "tropical" is extended to vegetables grown during the summer of temperate climates like tomato. There are also projects involving strawberry and blueberry since these are important crops for Florida. The majority of the work, however, is on citrus (70%). There are four projects at the facility including quality and by-product research. The two quality projects involve work on juice (mainly citrus juices) and fresh fruit flavor. The other quality project includes work on edible coatings or other surface treatments to reduce decay, water loss and to improve of the appearance of fresh or fresh-cut fruits and vegetables. The two by-product projects aim to develop products from citrus processing waste. One project mines citrus waste for edible fiber, nutraceuticals and compounds in grapefruit that enhance uptake of certain drugs. The other by-product project seeks to develop industrial products from the carbohydrates in citrus peel such as suspension aids and fuel ethanol.

NUTRITIONAL COMPONENTS IN SELECT FLORIDA TROPICAL FRUITS

Kanjana Mahattanatawee, Elizabeth Baldwin, Kevin Goodner, John Manthey, and Gary Luzio; USDA–ARS Citrus and Subtropical Products Laboratory, Winter Haven, FL*

Fourteen tropical fruits from southern Florida [red guava, white guava, carambola, red pitaya (red dragon), white pitaya (white dragon), mamey, sapodilla, lychee, longan, green mango, ripe mango, green papaya and ripe papaya] were evaluated for antioxidant activity, ascorbic acid (vitamin C), total fiber and pectin. ORAC (oxygen radical absorbance capacity) and DPPH (1,1-diphenyl-2-picrylhydrazyl, radical scavenging activity) assays were used to determine antioxidant activity. The total soluble phenolics (TSP), ORAC, and DPPH ranged from 205.4 to 2316.7 µg gallic acid equivalent/g puree, 0.03 to 16.7 µmole Trolox equivalent/g puree and 2.1 to 620.2 µg gallic acid equivalent/g puree, respectively. Total ascorbic acid (TAA), total dietary fiber (TDF) and pectin ranged from 13.6 to 159.6 mg/100 g, 0.88 to 7.25 g/100 g and 0.2 to 1.04 g/100 g, respectively. The antioxidant activities, TSP, TAA, TDF and pectin appeared to be influenced by cultivar (papaya, guava and dragon fruit) and ripening stage (papaya and/or mango). Data demonstrate the potential benefits of several of these fruits for human health.

Vegetable Crops Section

PURPLE NUTSEDGE MANAGEMENT FOR ORGANIC VEGETABLE PRODUCTION

Carlene A. Chase[1], Rosalie L. Koenig[2], Jeffery E. Pack[1], and Clinton C. Warren[1]; University of Florida, Horticultural Sciences Department, PO Box 110690, Gainesville, FL 32611 and Rosie's Organic Farm (cachase@ufl.edu)*

Weed management is a major constraint of organic vegetable production and perennial weeds such as purple nutsedge (*Cyperus rotundus*) are particularly difficult to control. A study was initiated in 2005 to determine how summer fallow techniques impact purple nutsedge population density, tuber number and tuber viability; and to evaluate the impact of the treatments on the yields of two fall crops differing in canopy size and rate of development. Clean fallow treatments accomplished with weekly tillage or weekly flaming were conducted for 12 weeks. Two sets of summer cover crop treatments of sunn hemp (*Crotalaria juncea*) were established by broadcasting 40 lb of seed per acre and were undercut at 13 weeks after seeding. Cover crop residue was either incorporated before transplanting or retained on the surface as mulch for the fall crops of lettuce and broccoli. Soil solarization was initiated on 2 July and the transparent solarization film was maintained in place until mid-October. A weedy fallow treatment was included as a control, which was tilled before establishing the fall crops. Before the initiation of the summer fallow treatments, no difference in viable tubers or nutsedge shoot density was observed. After fallow, flaming had the highest number of viable tubers, with all other treatments similar to the weedy control. Nutsedge shoot density was suppressed by all fallow treatments to lower levels than with the weedy control, but solarization was the least effective. Leaf-cutting insects eliminated the crops in the sunn hemp mulch treatment within days of being transplanted. Lettuce stands with all other treatments were similar and greater than with the weedy control. Highest broccoli stands were obtained with flaming, solarization, and tillage; but broccoli stand with incorporated sunn hemp was similar to the weedy control. Highest lettuce yields occurred with incorporated sunn hemp, solarization, and weekly tillage. However, lettuce yields with flaming and the weedy control did not differ statistically. Broccoli yields were greatest with flaming, solarization, and tillage. Broccoli development was delayed with the weedy control and incorporated sunn hemp treatments and no significant yield was obtained.

SANDEA–SOIL INSECTICIDE INTERACTION STUDIES IN NORTH CAROLINA POTATOES

R.B. Batts and A.W. MacRae, North Carolina State University, Raleigh, NC and University of Georgia, Tifton, GA*

Trials were conducted at Plymouth, NC in 2004 and 2005 to determine the effect of halosulfuron on the yield and grade of white-skinned and red-skinned Irish potatoes when used in combination with different in-furrow insecticides. Factors for the factorial design used included potato variety, halosulfuron timing, halosulfuron rate, and insecticide. In-furrow insecticides included imidacloprid. aldicarb, and phorate at 30.3, 293, and 233 g ai/1000 m of row, respectively. Halosulfuron was applied at 26.3 or 52.6 g ai/ha preemergence (PRE), postemergence, over the top (POST), or postdirected (P-DIR) to the potatoes. Preemergence applications of halosulfuron were made after last hilling of the bed, POST applications were made at early flowering, and P-DIR sprays were applied at late flowering. Crop injury was evaluated visually at 2 and 4 weeks after treatment (WAT). Potatoes were dug and graded at maturity. Data was subjected to analysis of variance (ANOVA) with means separated using Fisher's protected LSD ($p = 0.05$). No interaction between insecticides and halosulfuron were observed. However, some yield differences were seen due to halosulfuron alone. Minimal (<10%) injury was seen with PRE and P-DIR applications. Substantial injury was only seen at 2 WAT, and only from POST treatments. At this timing, halosulfuron applied at the low rate injured potato 14-19% across the insecticides, while the high rate caused significantly higher injury (23% to 24%). Injury from the POST timing did affect yield. Higher levels of smaller potatoes (USDA Grade #1) were found in the POST treatments, when pooled over years, varieties and rates. This indicates that tuber development may have been delayed due to foliar injury. This is supported by the lower levels of USDA Grade #3 potatoes from POST applications compared to other timings. When pooled across years, varieties, and rates, the lowest total yields were with the POST timing.

WEED CONTROL IN TOMATO WITH HALOSULFURON (SANDEA)

Joseph G. Masabni, Fruit and Vegetable Extension Specialist, University of Kentucky Research and Education Center, Princeton, KY 42445

Experiments were conducted in the last 3 years to evaluate the safety and efficacy of halosulfuron (Sandea 75WG) application under the plastic mulch within 7 days of transplanting tomato. In 2003, tomato plants were transplanted daily from day 0 through 7 after halosulfuron 0.051 kg a.i./ha application. Plant survival and height were collected. Tomato plants survived all dates of transplanting treatments. Plant height indicated that plants transplanted early were taller than those transplanted late, only because they had more time to establish and grow in the field. In 2004, tomatoes were set on a 2-day interval from day 0 through 10 after halosulfuron application. Halosulfuron 0.025 or 0.052 kg a.i./ha had no effect on plant height or yield. In 2005, an experiment was initiated to determine whether addition of trifluralin to halosulfuron under the plastic mulch will improve grass control and remain safe to tomatoes. Halosulfuron at 0.025, 0.052, and 0.1 kg a.i./ha, was applied alone and combined with trifluralin 0.63 kg a.i./ha. All treatments were applied under the plastic mulch. Tomato plants were transplanted at 6 days after application (DBT) and 0 DBT. Halosulfuron 0.1 kg ai/ha resulted in slight stunting and yield reduction of tomato, whether applied at 6 or 0DBT. However, this stunting was not statistically significant. Trifluralin didn't affect tomato yield at 6DBT and significantly increased yields at 0DBT for 0.052 and 0.1 ka a.i./ha halosulfuron rates. Trifluralin reduced grass biomass but resulted in an increase of nightshade biomass. Halosulfuron was determined to be very safe on tomato growth and yield, even if tomato was transplanted on the same day of application. Trifluralin also was found to have little or no effect on tomato growth or yield, and appears to have a potential use as an herbicide for under plastic application in tomato production.

NUTSEDGE CONTROL IN TOMATO WITH COMBINATIONS OF SANDEA (HALOSULFURON) AND DUAL MAGNUM (*S*-METOLACHLOR)

Wheeler G. Foshee, III[1], Collin W. Adcock[1], Glenn R. Wehtje[2], Charles H. Gilliam[1], and Larry W. Wells[3]; [1]Auburn University, Department of Horticulture, Auburn, AL 36849; [2]Auburn University, Department of Agronomy and Soils, Auburn, AL 3684, [3]Alabama Agricultural Experiment Station, Auburn University, Auburn, AL 36849*

Effects of combining labeled rates of halosulfuron (Sandea) and *s*-metolachlor (Dual Magnum) were evaluated as a preemergence (PRE) application in a randomized complete block designed experiment at the Wiregrass Experiment Station in southeastern Alabama. Treatments were assigned in a factorial arrangement of four levels of halosulfuron (0.0, 0.009, 0.018, and 0.036 lbs. a.i./acre) and six levels of *s*-metolachlor (0.0, 0.25, 0.50, 0.75, 1.0, and 1.25 lbs. a.i/acre). The purpose of the study was to ascertain possible synergistic effects from combining these two herbicides to control nutsedge at a possible lower cost. Two repetitions were completed in 2005 with data pooled in analysis. Results found no interaction between the halosulfuron and the *s*-metolachlor and therefore no synergistic affects. Analysis of the main effects revealed that the highest labeled rate of either herbicide gave the highest percent control relative to the nontreated control. Soil activity of halosulfuron in controlling nutsedge has been shown to be less effective than foliar applications. Our own LD_{90} greenhouse studies confirmed this to be true. We examined four application techniques of halosulfuron (POST both soil and foliar, POST foliar only, POST soil only, and PRE soil only) to determine the LD_{90}. Results revealed that halosulfuron had the lowest LD_{90} from the treatments with a foliar application. However, some soil activity was observed. Results from field studies indicated that PRE applications of halosulfuron must be at the highest labeled rate to provide effective control. *S*-metolachlor was equal to halosulfuron on percent control and is lower in cost on a per acre basis.

METHYL BROMIDE RATE REDUCTION AND MULCH EFFECT ON NUTSEDGE CONTROL

Bielinski M. Santos, James P. Gilreath, Myriam N. Siham, and Camille E. Esmel; Gulf Coast Research and Education Center, IFAS–University of FL (bmsantos@ufl.edu)*

In Florida, nutsedge (*Cyperus* spp.) is a major weed problem in mulched-vegetable production. As methyl bromide (MBr) is phased out, alternatives are essential for growers. However, because of critical use exemptions, growers will still be able to use restricted amounts of MBr. Therefore, using highly-retentive mulch, such as virtually impermeable film (VIF), can reduce fumigant loss and may allow rate reduction without compromising efficacy.

Preliminary studies have shown that metalized mulches can be an alternative to VIF. However, further studies are needed to compare MBr retention properties and nutsedge control of high density polyethylene (HDPE) mulch, VIF, and metalized mulch. Two field studies were conducted in spring 2005, in Ruskin, Florida. Metalized and HDPE mulches, and VIF were combined with the following rates of MBr + chloropicrin (Pic) (67/33, w/w): 175 and 350 lb/acre. Methyl bromide retention was evaluated in soil air samples at 1, 2, 4, and 6 days after treatment (DAT). Nutsedge plants were counted at 2, 4, 7, 9, and 12 weeks after treatment (WAT). Data were examined with regression analysis to establish the relationship between the time and both MBr concentration and nutsedge densities. Concentration of MBr + Pic under either the metalized mulch or VIF was about 6 times higher than under HDPE at 5 DAT, regardless of the MBr + Pic rate. At 12 WAT, nutsedge population was <1 plant/50 ft row with metalized and VIF and 175 lb/acre of MBr + Pic, whereas about 25 plants/50 ft row were present with 350 lb/acre of the fumigant and HPDE. The weed population reached >100 plants/50 ft row with 175 lb/acre of MBr + Pic. These findings demonstrate that metalized and VIF mulches can provide effective control of nutsedge with one-half of the commercially used MBr + Pic rate.

EFFECT OF VIF ON METAM, CHLOROPICRIN, AND 1,3-DICHLOROPROPENE, ALONE AND IN COMBINATION ON NUTSEDGE POPULATIONS

James P. Gilreath[1], Bielinski M. Santos[1], Myriam N. Siham[1], Paul Vaculin[2], and Michael Herrington[2]; [1]Gulf Coast Research and Education Center, IFAS-University of Florida; [2]Amvac Chemical Co (bmsantos@ufl.edu)*

Previous research has demonstrated stimulation of purple and yellow nutsedge (*Cyperus rotundus* and *C. esculentus*) with chloropicrin when applied at rates ranging from 100 to 150 lbs/acre (112 to 168 kg·ha^{-1}) under low or high density polyethylene film mulch. This stimulatory effect has been exploited in research by developing a program of metam application 5 days after application of chloropicrin, thus placing metam in the soil once the tubers have begun to sprout and are most vulnerable. This project was expanded in 2004–05 to include the commercial emulsifiable concentrate formulation of 65% 1,3-dichloropropene and 35% chloropicrin (1,3-D + Pic) and virtually impermeable film mulch as well as high density polyethylene film. The test site was a commercial tomato farm in west central Florida with a heavy infestation of purple nutsedge. Chloropicrin was applied into raised beds through three gas knives, while 1,3-D + Pic and metam potassium were applied in 1 acre inch of water through 2 drip irrigation tubes spaced 10 inches apart and 5 inches from the bed center. Metam was applied 5 days after application of chloropicrin and 1,3-D + Pic. Treatments were applied under both standard high density polyethylene film (Hilex and Bromostop) VIF. Stimulation of nutsedge sprouting and emergence was about the same with either chloropicrin alone or combined with 1,3-D; however, there was some enhancement when applied under VIF. There was a slight improvement in efficacy of metam potassium when applied alone under VIF, contrary to previous results. Application of metam 5 days after application of chloropicrin or 1,3-D + Pic greatly improved nutsedge control over that observed without the subsequent application of metam and VIF improved results to some degree. Producers of drip irrigated crops in Florida can achieve acceptable to excellent nutsedge control using this sequential application technique combined with VIF; however, the addition of a second drip tube on the bed top increases expense by about $125/acre and is not compatible with crops grown with more than a single row on the bed.

PERFORMANCE OF METHYL BROMIDE ALTERNATIVES FOR STRAWBERRY IN FLORIDA AND SPAIN

Bielinski M. Santos[1], José Manuel López-Aranda[2], James P. Gilreath[1], Luis Miranda[2], Carmen Soria[2], and Juan J. Medina[2]; [1]Gulf Coast Research and Education Center, IFAS–University of Florida; [2]Instituto Andaluz de Investigación y Formación Agraria, IFAPA, CICE–Junta de Andalucía, Spain (bmsantos@ufl.edu)

Tunnel and open field trials were conducted in two locations in Huelva, Spain, and one in Florida to determine the effect of selected methyl bromide (MBr) alternatives on strawberry yield. In Spain, the tunnel treatments were: a) nontreated control, b) MBr + chloropicrin (Pic) 50:50 at a rate of 400 kg·ha^{-1}; c) dazomet at 400 kg·ha^{-1}, d) 1,3-dichloropropene (1,3-D) + Pic 65:35 at 300 kg·ha^{-1}; e) Pic at 300 kg/ha; f) dimethyl disulfide (DMDS) + Pic 50:50 at 250 + 250 kg·ha^{-1}; and f) propylene oxide at 550 kg·ha^{-1}. All treatments were covered with virtually impermeable film (VIF), except the nontreated control, which was covered with low-density polyethylene (LDPE) mulch. Dazomet was rototilled 10 cm deep, whereas the other fumigants were injected with four chisels per bed. In Florida, the open-field treatments were a) nontreated control, b) MBr + Pic 67:33 at a rate of 400 kg/ha with LDPE; c) MBr + Pic 67:33 at 310 kg·ha^{-1} with VIF; d) 1,3-D + Pic 65:35 at 300 kg·ha^{-1} with VIF; e) methyl iodide (MI) + Pic 50:50 at 230 kg·ha^{-1} with VIF; f) Pic at 300 kg·ha^{-1} with VIF; g) DMDS + Pic 50:50 at 250 + 250 kg·ha^{-1} with VIF; and g) propylene oxide at 500 kg·ha^{-1} with VIF. The fumigants were applied with three chisels per bed. In Spain, the results showed that 1,3-D + Pic, DMDS + Pic, and Pic consistently had similar marketable yields as MBr + Pic. Similar results were found in Florida, with the exception of propylene oxide, which also had equal marketable fruit weight as MBr + Pic.

EFFECTS OF NITROGEN RATES ON SUMMER SQUASH GROWTH AND YIELD

Camille E. Esmel, Bielinski M. Santos, and James P. Gilreath; Gulf Coast Research and Education Center, IFAS–University of Florida (bmsantos@ufl.edu)*

Nitrogen (N) is the most growth-limiting for vegetable production in sandy soils. In Florida, current recommendations for preplanting N applications (100 lb/acre of N) in 'Crookneck' summer squash (*Cucurbita pepo*) differ from those used by the growers (>200 lb/acre). Therefore, two field studies were conducted in Ruskin and Balm, Fla., to examine the effect of 50, 100, 150, 200, 250, and 300 lb/acre of N on summer squash growth and yield. Variables collected during this study were plant vigor (0–10 scale, where 0 = dead plant) at 3 and 7 weeks after planting (WAP), petiole sap nitrate-nitrogen (NO_3-N) at 4 and 8 WAS, and marketable yield starting on 4 WAS (13 and 10 harvests in Ruskin and Balm, respectively). In Ruskin, plant vigor increased linearly with N rates, whereas there was no significant N effect in Balm. No differences in petiole sap NO_3-N were observed in either location. In Ruskin, there was a rapid marketable yield increase (≈25%) between 50 and 100 lb/acre of N, followed by no change afterwards. In contrast, there was no yield response in Balm. In the latter location, no crop had been established in the previous 3 years, enabling the soil to maximize its organic N accumulation (>40 lb/acre organic-N), whereas in Ruskin the experimental location had been continuously planted during the last three seasons (≈25 lb/acre organic-N). The data demonstrated that organic N is an important source of the nutrient to complement preplant applications in summer squash.

EFFECTS OF COLORED MULCHES ON "B" SIZE POTATOES

Richard L. Hassell, Tyron L. Phillips, Teri Hale; Clemson University, Coastal Research and Education Center, 2700 Savannah Highway, Charleston, SC 29414*

The small, B size potatoes (<2 inches but ≥1.25 inches in diameter) represent a keen interest in new, specialty food items. Exotic shapes and color shades of the specialty varieties are also known for intense flavors and variations in textures in firmness and fiber that consumers are looking for today in an ever increasing health consciousness among consumers. In 2006, the varieties 'French Fingerling' (West Edmonton, Alberta, Canada), Villetta Rose (Univ. of Wisconsin) and B1145-2 (USDA, Beltsville, Md.) were planted in a double row 8 inches between tubers and 18 inches between rows in a replicated trial using colored mulches. The mulch color included red, white, black, blue, green, and silver foil. These plastic mulches were laid on 6-ft centers. The mulches were shown to affect the microclimate of soil temperature, as expected, and therefore affecting yield. These temperature differences were measured with a Campbell CR 10X weather station (Logan, Utah) probes at a 2 inches above the soil surface and 4 and 6 inches below the soil surface. Plant stands were excellent with all mulches, however, blue mulch caused early emergence while white and silver delayed emergence. Just the opposite effect happened when it came to yields. The highest individual tubers per plant came from the white mulch with the green having the lowest tuber yields. Cultivar differences were also seen in there ability to produce marketable tubers. 'Villetta Rose' had the highest plant vigor and also the most marketable tubers per plant. B1145-2 produced most of its tubers >2 inches in diameter with the tubers nonuniform in shape. French Fingerling produced a very uniform oblong tuber with few defects. Yields and quality were above normal for all cultivars when grown on either the silver reflective mulch or the white mulch.

FIELD ESTIMATION OF NITRATE LOAD FROM VEGETABLE FIELDS IN THE CARIBBEAN BASIN

Eric Simonne, D. Studstill, M. Dukes, G. Hochmuth, R. Hochmuth, F. Roka, J. O'Hallorans, and A. Gazula; UF–IFAS Horticultural Sciences Departments, 1241 Fifield Hall, Gainesville, FL 32611-0690

The development of best management practices (BMP) and the alloca-

tion of pollution among land users in a watershed (TMDL) requires an understanding of the effect of cultural practices on both yields and nutrient leaching below the root zone. 'Florida 47' tomato and 'La Estrella' tropical pumpkin were grown on plasticulture using combinations of UF–IFAS recommended N and irrigation rates in a 1-ha field in 2004. Average N and irrigation rates over the whole field were 100% and 80%, respectively. Nitrate movement was assessed with twenty-four 1-m-long drainage lysimeters in each plot and ten 7-m-deep wells in and around the field Lysimeters and wells were sampled every 2 and 3 weeks throughout the year, respectively. Leachate volume and concentration in the drainage lysimeters were highly variable. Except shortly after the 25-cm rain due to hurricane Jeanne, most leachate volumes were <1 $L \cdot m^{-1}$. Annual NO_3-N mean treatment load ranged between 7 and 15 $kg \cdot ha^{-1}$, but these differences were not significant due to high variability (CV = 175%). Single-lysimeter annual highest load was 39 $kg \cdot ha^{-1}$ of NO_3-N (17.5% of N applied). In 2004, NO_3-N concentration in well water was <1, ranged between 15 and 35, ranged between 0 and 10 $mg \cdot L^{-1}$ NO_3-N in the up-stream control, inside, and perimeter wells, respectively. These concentrations are in the same ranges as those observed in this field in previous years (1997–2003) and often exceeded the 10 mg/L drinking water standard. Because NO_3-N discharge into the environment may occur after the growing season, BMPs should be implemented on a year round basis. The methodology used in load measurement should be improved to better account for spatial variability.

HIGH TUNNEL PRODUCTION OF TOMATOES AND SNAPDRAGONS IN SOUTHEAST ALABAMA

Wheeler G. Foshee, III[1], Brad E. Reeder[1], Raymond J. Kessler Jr[1]., Larry W. Wells[2], Joseph M. Kemble[1], Edgar L. Vinson[1], Robert T. Boozer[1], and William A Dozier, Jr[1]; [1]Auburn University, Department of Horticulture, Auburn, AL 36849; [2]Alabama Agricultural Experiment Station, Auburn University, Auburn, AL 36849

Production of high tunnel tomatoes and snapdragons was evaluated over a 2-year period at the Wiregrass Experiment Station, in southeastern Alabama. 'BHN 640', 'Florida 91', 'Sunleaper', and 'Carolina Gold', were evaluated in early Spring2004. Results indicated that 'BHN 640' outperformed 'Florida 91' and 'Carolina Gold' in early production of high tunnel grown tomatoes. A late Fall 2005 study examined 'BHN 640' and 'Florida 91'. Results indicated that 'BHN 640' was superior to 'Florida 91' in total marketable fruit. Season extension of both spring and fall tomato production were accomplished. A planting date study was completed in the early Spring 2005. The following four planting dates were evaluated: 31 Jan., 17 Feb., 4 Mar., and 25. Mar 2005. Wind damage to the high tunnel caused some mortality; however, the two earliest planting dates (31 Jan. and 17 Feb. 2005) produced over 10 lbs. of marketable tomatoes per plant. These were both superior to the last planting date of 25 Mar 2005. Cut snapdragons were evaluated for suitable colored mulch (red, white, or blue) and varieties for summer ('Opus Yellow', 'Opus Rose', 'Monaco Red', and 'Potomac Early White') and fall ('Apollo Purple', 'Apollo Yellow', 'Monaco Red', 'Monaco Rose', and 'Potomac Early Orange') production. Results indicated that inflorescence length was affected by the color of mulch. The red mulch had increased inflorescence length compared to the white in Summer 2005. The Fall 2005 study revealed that white mulch had longer inflorescence length than the red or blue mulch. Some varietal differences were observed. The 'Apollo Purple' had longer stem lengths than all other varieties for the fall study. The summer study revealed that 'Opus Yellow' had longer inflorescence lengths than all others but stem lengths were all similar.

EARLY SEASON PRODUCTION OF TOMATOES AND STRAWBERRIES IN HIGH TUNNELS IN ALABAMA

J.M. Kemble, P. Sanders, W. Foshee and D. Fields, Auburn University, Dept of Horticulture, 101 Funchess Hall, Auburn, Alabama 36849*

High tunnels (HT) can reduce negative environmental strains on crop production and have been shown to extend the growing season for many small fruits and vegetables. Because HTs require relatively low initial investment compared with standard greenhouse structures, they are well suited for the small to mid-size grower. HTs provide a practical means of entry into intensive crop production for farmers who direct market their produce. By using HTs, direct market farmers may create a special marketing niche which set's them apart by offering locally grown vegetables, cut flowers, small fruits, and herbs earlier in the growing season and into the fall after frost. This project examined 1) the potential use of HTs for the production of fresh-market tomatoes (*Lycopersicon esculentum* Mill.) and strawberries (*Fragaria* spp.) and 2) the seasonal market potential for these crops in Alabama. Viable markets were determined by conducting surveys at regional locations throughout Alabama, such as farmers markets, grocery stores, shopping centers, etc. Upscale restaurants were also surveyed to determine the demand for locally grown herbs. These surveys were used to determine target markets by asking demographic questions and determining spending habits. Justification for establishing a direct farmer-to-consumer market or a direct farmer to restaurant market for HT products was determined.

PLASTIC MULCHED BED WIDTH EFFECTS ON PEPPER AND CANTALOUPE YEILD

[1]William Terry Kelley and [2]David B. Langston, Jr. Departments of Horticulture[1] and Plant Pathology[2], University of Georgia, P.O. Box 1209, Tifton, Georgia 31793*

The phase out of methyl bromide has precipitated a need to reduce usage of the all purpose fumigant. Reduction in methyl bromide use can extend the life of existing stocks and make it more likely to continue critical use exemption for future production. Traditional widths for plastic mulch covered beds in Georgia ranges from 32 to 36 inches. By reducing bed top widths, it could be possible to reduce the amount of methyl bromide applied by as much as 60%. The objectives of this work were to evaluate the effects of narrower bed tops and lower rates of methyl bromide on pepper and cantaloupe growth and yield. Bed top widths of 36, 30, and 24 inches were each tested with broadcast rates of 400 and 300 lb/acre of both 67:33 and 50:50 methyl bromide-chloropicrin at Tifton, GA in the fall of 2005. Bed widths were the main plot and methyl bromide rates the sub plot. Plots were 20 feet long with two rows of pepper planted per bed with 12 inches between plants and one row of cantaloupe planted per bed with two feet between plants. All beds were on 6-ft centers and fertilizer rates were constant across plots within a crop. There were four replications. Otherwise normal cultural practices were employed. Crops were harvested at maturity and data collected on yield and plant growth. Pepper yields were depressed by early cold weather. The 24-inch bed tops produced significantly lower yields of extra large, large and total fruit, but had greater top dry weight and root fresh weight than the 36-inch beds. There were no differences found among methyl bromide rates for cantaloupe or for pepper except extra large fruit were greater at the highest rate compared to the lowest. There were no differences among bed top widths for cantaloupe yield or plant growth.

TOMATO IN ROW SPACING RESPONSES AND IMPLICATIONS

John D. Downes, Prof. Em., PSS, Texas Tech Univ., 1231 Miami St, Athens, TN 37303

Celebrity Hybrid tomatoes were grown in six ft rows at spacings of 16, 19.2, and 24 inches, equivalent to 4506, 3755, and 3004 plants/acre (in 6008.3-ft planted row/acre) using BPE mulch, seep hose irrigation and Florida weave trellising. Thirty-eight-day marketable yields were 2192, 2273, and 2049 lb boxes (25 lb)/acre respectively, and 88-day marketable yields were 2533, 2917, and 2665 boxes/acre. Estimated spacings maximizing 38- and 88-day marketable yield (Ymax) were 18.37 inches (3925 ppa, Ymax 2274 box/acre) and 19.61 inches (3677 ppa, Ymax 2919 boxes/acre), respectively. Using a combined plant and staking cost of $1.00/plant and marketable tomato price of $2.50/box, the optimal spacings were estimated at 21.71 inches for 88 days (3321 ppa, 2848 boxes/acre), and 22.64 inches for 38 days (3185 ppa, 2126 boxes/acre). Yields increased almost linearly thru the first 38 days of harvest, slowed due to low fruit set (high temperatures), then resumed augmentation to day 88. Fruit size declined about 20% from early to late season. Ymkt as percent of total was highest at widest spacing (78.0% vs. 74.3% and 74.6% for other two). Higher yields/a were obtained only in first 10 days from the closest spacing. Thereafter wider spacings generally gave higher yields/acre. Yields per plant increased with spacing. Yield fluctuations over the season have implications for labor management. Plants per acre and closely associated costs (setting, trellising) impacted estimated optimal populations and thus spacings.

OKRA IN-ROW SPACING ALTERS PLANT GROWTH AND YIELD IN SOUTHERN FLORIDA

Teresa Olczyk, Kent Cushman*, and Waldemar Klassen, University of Florida IFAS, Gainesville, FL 32611-0690*

Okra *(Abelmoschus esculentus)* is grown as a direct-seeded cash crop at high plant populations (>87,000 plants/acre) on calcareous soils in Homestead, south Florida. A study was established in a commercial field in May 2005 to evaluate if high populations translated to higher yields. Seedlings were thinned to within-row spacings of 2, 4, 6, 8, and 10 inches in rows set 3 ft apart (87120, 43560, 29040, 21780, and 17420 plants/acre). Harvest data was

collected from 29 July to 30 Sept. 2005 (26 harvests) from 10 ft of the center row within plots 15 ft long and 3 rows wide. Decreasing plant density resulted in decreasing plant height early in the season and increasing height late in the season. Density affected stem caliper with a clear trend of decreasing density and increasing caliper. Early, mid-, and total yields by weight (boxes/acre) were not affected by density, but plants at the lowest density produced 55% more late yield than plants at the highest density. Plants at the lowest density produced 30% fewer early pods and 31% more late pods than plants at the highest density. Decreasing plant density resulted in increasing average pod weight for early, late, and total harvests by as much as 14% to 18%. With inexpensive open pollinated cultivars such as 'Clemson Spineless 80', there seems little economic incentive to reduce plant populations below what is commonly used in the Homestead area. Growers should not be alarmed, however, if plant stands are reduced to some extent after seeding.

INFLUENCE OF COMPOST ON VEGETABLE CROP NUTRIENT MANAGEMENT

D.C. Sanders[1], L.M. Reyes[1], D.W. Monks[1], K.M. Jennings[1], F.J. Louws[2], and J.G. Driver[2]; [1] Horticultural Science Department, [2] Plant Pathology Department, NCSU, Raleigh, NC 27695

Tomato, pepper and cucumber were grown for consecutive years using compost from two North Carolina cities (Lexington and Edenton) and McGill Composts (CMC) sources and CMC amended with Tracoderma 382. Treatments included compost with an untreated control and Telone C-35 (Telone) with and without additional fertilizer. The objective was to evaluate compost influence on yield and pest management. Results showed significant differences between treatments and among years. Cucumber and pepper had higher total and marketable yields in 2005 than in 2004. Although tomato yield was lower in 2005 than in 2004 it was evident that CMC+Telone had a higher marketable and total plant dry weight in both years. Two year data showed that combinations of treatments with CMC and Telone (Telone+fertilizer, CMC+Telone, CMC+T382) produced higher yield for tomato and cucumber. Composts from Lexington and Edenton produced more number 2 grade peppers, but treatments did not differ in total and marketable yield. In general compost treatments with or without amendments showed better results in crop yields than the control. Weed counts by species were determined on all plots. Pepper had the greatest number of weeds relative to cucumber and tomato. Organic amendments seem to increase the action of the compost source in several crops. Combination of treatments may depend on the particular crop.

DEPTH AND WIDTH OF THE WETTED ZONE AFTER LEACHING IRRIGATIONS ON A SANDY SOIL

Michela Farneselli, David W. Studstill, Eric H. Simonne, and Bob Hochmuth; Horticultural Sciences Department, University of Florida, 1241 Fifield Hall, Gainesville, FL 32611-0690 (esimonne@ufl.edu)

The quantitative assessment of nitrate-nitrogen (NO_3-N) leaching below the root zone of vegetable crops grown with plasticulture (called load) may be done using deep (150-cm) soil samples divided into five 30-cm long subsamples. The load is then calculated by multiplying the NO_3-N concentration in each subsample by the volume of soil (width × length × depth, W × L × D) wetted by the drip tape. Length (total length of mulched bed per unit surface) and depth (length of the soil subsample) are well known, but W is not. In order to determine W at different depths, two dye tests were conducted on a 7-m deep Lakeland fine sand using standard plasticulture beds. Dye tests consisted in irrigating for up to 38 and 60 hours (11,756 and 18,562 L/100 m of irrigation, respectively), digging transverse sections of the raised beds at set times and taking measurements of D and W at every 30-cm. Most dye patterns were elliptic elongated. Maximum average depths were similar (118 and 119 cm) for both tests despite differences in irrigation duration and physical proximity of both tests (100 m apart in the same field). Overall, D response (cm, both tests combined) to irrigation volume (V) was quadratic ($D_{comb,avg} = -2 \times 10^{-7} V^2 + 0.008V + 34$), and W responses (applying maximum and average values, W_{max} and W_{mean}) to D (cm) were linear ($W_{max} = -0.65D+114$: $W_{mean} = -0.42D + 79$). Predicted W_{max} were 104, 84, 64, 44, and 25 cm at 30-cm depth increments. These preliminary values may be use for load calculations, but are likely to over-estimate load as they were determined without transpiring plants and may need to be adjusted for different soil types.

EFFECT OF WASHING AND CUTTING ON NO_3-N AND K SAP CONCENTRATIONS ON VEGETABLE PETIOLES

David Studstill, Michela Farneselli, Eric Simonne, and Bob Hochmuth; Horticultural Sciences Department, University of Florida, 1241 Fifield Hall, Gainesville, FL 32611-0690

Petiole sap testing using ion-specific electrodes is a simple method that can be used to guide in-season applications of N and K to vegetable crops. This method requires petiole sampling and sap extraction using a sap press. Because some vegetables are grown with foliar applications of N and/or K and because some crops have large petioles, petioles may need to be washed and/or cut before being pressed. Because limited information is available on the effect of washing/cutting on sap testing results, muskmelon, bell pepper and tomato petioles were used to test if washing/cutting reduced NO_3-N and K concentrations and changed the subsequent interpretation of plant nutritional status. Washing for 30, 60, or 120 seconds in distilled water and cutting petioles before or after washing significantly reduced sap concentrations ($p = 0.01$ and $p = 0.04$ for NO_3-N and K, respectively) in 7 of 12 tests when compared to the control method (petioles cut and not washed). The average concentration reductions between the control and the lowest value among all the washing/cutting treatments were 30% for NO_3-N and 19% for K. These losses due to washing/cutting are likely to change the diagnosis of nutritional status from "sufficient" to "less than sufficient" and therefore may suggest the need for unnecessary fertilizer applications.

OPTIMIZATION OF DRAINAGE LYSIMETER DESIGN FOR FIELD DETERMINATION OF NUTRIENT LOADS

Aparna Gazula, Eric Simonne, Michael Dukes, George Hochmuth, Bob Hochmuth, and David Studstill; Horticultural Sciences Department, University of Florida. 1241 Fifield Hall, P.O. Box 110690, Gainesville, FL 32611*

Collecting leachate from lysimeters installed in the field below vegetable fields may be used to quantify the amount of nitrogen released into the environment. Because limited information exists on the optimal design type and on the effect of design components on lysimeter performance, the objective of this study were to identify existing designs and their limits, assess cost of design, and test selected designs. Ideally, lysimeters should be wide enough to collect all the water draining, long enough to reflect the plant-to-plant variability, durable enough to resist degradation, deep enough to allow for cultural practices and prevent root intrusion, have a simple design, be made of widely available materials, and be cost-effective. Also, lysimeters should not restrict gravity flow thereby resulting in a perched water table. Previous study done with a group of free-drainage lysimeters (1-m-long, 45-cm-wide, installed 45-cm-deep) under a tomato-pumpkin-rye cropping sequence resulted in variable frequency of collection and volume of leachate collected (CV of load = 170%). Improving existing design may be done by increasing the length of collection, lining the lysimeter with gravel, limiting the depth of installation, and/or breaking water tension with a fiberglass wick. Individual lysimeter cost was estimated between $56 to $84 and required 9 to 14 man-hours. for construction and installation. Costs on labor may be reduced when large numbers of lysimeters are built. Labor needed for sampling 24 lysimeters was 8 man-hr/sampling date. Because load may occur after a crop, lysimeter monitoring and sampling should be done year round.

IR4 UPDATE: NEW PEST CONTROL PRODUCTS BEING RESEARCHED FOR THE VEGETABLE CROPS INDUSTRY

Charles Meister, University of Florida, IR-4 Research Coordinator (cmeister@ufl.edu)

The IR4 Specialty Crops Program was established to assist in the registration of pest control products for minor uses. The National program, headquartered at Rutgers University and operating through four regions with a network of scientists in every state,develops lists of grower needs, prioritizes projects and develops protocols to secure EPA tolerances that lead to labels. Every year IR4 works on pest control products needed by the vegetable industry. Pest control products being researched for 2006 include Club root and wire stem control in crucifers with Ranman and Moncut: Lep. Larvae control in beans with Avaunt and Rimon; *Phytopthora capsici* control in peppers and squash; weed control in tomatoes with Reflex, Goal, and Dual Magnum and powdery mildew control in cucurbits. Research Projects were discussed and updated.

PRODUCTION STRATEGIES FOR EARLINESS IN GLOBE ARTICHOKE

Smiljana Goreta[*1], Lovre Bucan[1], Gvozden Dumicic[1], and Daniel I. Leskovar[2]; [1]Institute for Adriatic Crops, Put duilova 11, Split 21000, Croatia, [2]Texas Agricultural Experiment Station, VFIC, Department of Horticultural Sciences, Texas A&M University, 1619 Garner Field Rd., Uvalde, TX 78801*

Globe artichoke is a native crop of the Mediterranean region with about 80% worldwide production. It is estimated that about 3,000 ha are grown in the U.S., mostly in California. Artichoke crop can be grown as a perennial, by vegetative cuttings, or as annual by seeds. Crop production can be limited by freezing winter temperatures leading to irreversible plant damage or by high summer temperatures causing poor head quality. Successful artichokes production, particularly in areas with constraining climatic conditions, requires proper selection of cultivars and planting dates. Cultivars with low vernalization requirements are more prone to a short growing season. The application of GA_3 to overcome the lack of low temperatures and fulfill the vernalization requirements of early cultivars is well known. The goal of this multi-year project is to select production strategies contributing to earliness, extension of harvesting period, and improved yield and head quality under a variety of environmental conditions in Croatia and Texas. Selecting cultivars with different maturity groups and planting dates enabled harvesting period from autumn to late spring depending on locations. When GA_3 was applied (12.5 to 125 ppm) on a naturally vernalized crop from autumn planting, early yield was substantially increased without affecting earliness. Conversely, application of GA_3 (30 or 45 ppm) on nonvernalized plants established during late spring or summer was necessary for fall harvest in the Croatian locations. Head quality evaluated as head weight and size, or crude protein and total fiber concentration, progressively decreased during late spring harvest in Texas. Shifting the harvesting period towards early spring may be essential for improving head quality and for increasing the market share. To achieve adequate yields, longer harvesting period, and superior head quality, it is necessary to develop and adjust cultural practices for the specific growing area.

ORGANIC VEGETABLE CULTURE IN MISSISSIPPI: GROWING AND PROFITABLE

William B. Evans[*1], Kenneth W. Hood[2], Peter M. Hudson[1], and Keri L. Paridon[1]; [1]Mississippi State University, Truck Crops Branch, Crystal Springs, MS 39059-0231; [2]Mississippi State University, Agricultural Economics*

Yield and economics of vegetable crops are being evaluated in non-adjacent organic (OG) and nonorganic (NOG) vegetable production field areas in Crystal Springs, Mississippi. Each production area has six sections in which crops are rotated over several seasons and years. Production techniques and management are as similar in timing and methodology as possible between the systems without compromising either system. Production methods, timing, and costs are recorded for each operation. These are combined with yield data to create budgets and estimated returns for each production system/crop combination. When possible, harvested produce is marketed by a cooperating grower-retailer at a local mid- to up-scale farmers market. Three years into the study, positive returns have been found for several crops including potato (*Solanum tuberosum* L.), lettuce (*Latuca sativa* L.), summer squash (*Cucurbita pepo* L.), cucumber (*Cucumis sativa* L.), and others. Marketable new potato yields in 2005 were under 10,000 lb/acre for Yukon Gold and Red Lasoda in either production system. Estimated net returns, based on an actual $2.00/lb market price, were positive for all system/cultivar combinations although final budget numbers are not firm. Significant differences in yield among cultivars were seen in potato, lettuce, summer squash, and cucumber. Organic production budgets for other crops in the study are also being developed.

INFLUENCE OF COMPOST ON VEGETABLE CROP NUTRIENT MANAGEMENT

D.C. Sanders[1], L.M. Reyes[1], D.W. Monks[1], K.M. Jennings[1], F.J. Louws[2] and J.G. Driver[2]; Horticultural Science Department, [2]Plant Pathology Department, NCSU, Raleigh, NC 27695

Tomato, pepper, and cucumber were grown for consecutive years using compost from two North Carolina cities (Lexington and Edenton) and McGill Composts (CMC) sources and CMC amended with Tracoderma 382. Treatments included compost with an untreated control and Telone C-35 (Telone) with and without additional fertilizer. The objective was to evaluate compost influence on yield and pest management. Results showed significant differences between treatments and among years. Cucumber and pepper had higher total and marketable yields in 2005 than in 2004. Although tomato yield was lower in 2005 than in 2004 it was evident that CMC+Telone had a higher marketable and total plant dry weight in both years. Two year data showed that combinations of treatments with CMC and Telone (Telone+fertilizer, CMC+Telone, CMC+T382) produced higher yield for tomato and cucumber. Composts from Lexington and Edenton produced more number 2 grade peppers, but treatments did not differ in total and marketable yield. In general compost treatments with or without amendments showed better results in crop yields than the control. Weed counts by species were determined on all plots. Pepper had the greatest number of weeds relative to cucumber and tomato. Organic amendments seem to increase the action of the compost source in several crops. Combination of treatments may depend on the particular crop.

Posters

CHILLING REQUIREMENTS OF SELECTED FLORICANE AND PRIMOCANE-FRUITING BLACKBERRIES

Dr. John R. Clark[1], and P. Manjula Carter[2]; [1]University of Arkansas, Dept. Horticulture, 316 Plant Sciences Building, Fayetteville, AR 72701; [2]University of Arkansas Southwest Research and Extension Center, 362 Hwy 174 N., Hope, AR 71801

The chilling requirements of the University of Arkansas blackberry cultivars Apache, Ouachita, and Prime-Jim*, and the primocane-fruiting selections APF-25, APF-27, APF-40, APF-42, APF-44, APF-46, APF-52, and APF-53 were investigated using stem cuttings from field-grown plants. A biophenometer was used to measure chilling (hours below 7 °C) in the field and 12-node cuttings of lateral shoots were taken from the cultivars every 100 hours up to 1000 hours below 7 °C. However, only 500 chilling hours had occurred at the time of this writing, and the response of budbreak to higher chilling levels could not be reported. The cuttings were placed in a mistchamber in the greenhouse with a daylength of 16 hours and air temperature of 26–29 °C. Percent budbreak was measured weekly. The cultivar × chilling interaction was significant ($P = 0.05$). 'Apache' and 'Ouachita' showed little or no budbreak up to 500 h, indicating a higher chilling requirement. The chilling requirement of Prime-Jim was determined to be between 300 h and 400 h, and that of the APF selections appeared to be between 300 h and 500 h. The chilling requirement of APF-53 could not be determined since budbreak was consistent at all levels of chilling up to 500 h. In general, the primocane-fruiting genotypes appeared to require less chilling than floricane-fruiting 'Apache' and 'Ouachita', and they would therefore be more suitable for low-chill locations.

MANAGEMENT OF DOWNY AND POWDERY MILDEW FOR WINTER SQUASH

A.H. Beany[1], K. Pernezny[2], P. J. Stoffella[1], N. Havranek[2], and J. Sanchez[2]; [1]University of Florida, IFAS, Indian River Research and Education Center, 2199 South Rock Road, Fort Pierce, Florida 34945-3138; [2]University of Florida, IFAS, Everglades Research and Education Center, 3200 East Palm Beach Road, Belle Glade, FL 33430-4702

Control of downy (*Pseudoperonospora cubensis*) and powdery [(*Podosphoera xanthii* (*Sphaerotheca fuliginea*)] mildew on 'Sweet Dumpling' winter squash (*Cucurbita maxima*) was evaluated at the University of Florida, IFAS, Indian River Research and Education Center (IRREC), in Fort Pierce, Florida during the Spring of 2005. Three foliar spray fungicide treatments were evaluated against an untreated control. Powdery and downy mildew ratings (estimated percentage of foliage damage) and marketable yields (mt/ha) were measured. Plants in the untreated plots had significantly higher powdery and downy mildew ratings. All fungicide treatments significantly reduced both mildews. There were no significant differences among treatments for marketable yield. Although the level of disease occurrence was not sufficient to reduce yields, Gavel alternated with Nova, Bravo Ultrex weekly, and Cabrio + Forum alternated with Bravo Ultrex + Manzate 75WG reduced downy mildew by ≥50%.

GROWING OLIVES IN TEXAS; REGULATION OF FLOWERING IN 'ARBEQUINA'

S. Nasir, A. Malik, Joe M. Bradford, and Jim Brockington; USDA–ARS, 2413 E. Hwy 83, Weslaco, TX 78596

Olives have not been commercially grown in Texas because earlier investigators considered Texas climate inappropriate for olive cultivation. No experimental investigations were conducted in Texas. Olives, however, grow in very diverse climatic conditions throughout the world, and >2000 cultivars of olives have been reported worldwide. To study temperature regulation of

flowering in olives, relatively inexpensive growth chambers were developed. These walk-in type growth chambers can be made with about $7K where as costs of similar size commercial chambers could reach to $100K. Using these chambers we have discovered that flowering and fruiting in 'Arbequina' cultivar of olives could be achieved under mild conditions with almost no typical chilling (<7 °C) hours. We postulated that it is the high daytime temperature that prevent flowering in olives in southern Texas rather than lack of chilling hours. Further experiments demonstrated that subjecting trees to 24 °C for 4 hours everyday during winter could significantly reduce flowering in Arbequina. It appeared that several sites near coastal Texas, particularly Galveston, may not experience high daytime temperatures and hence could be suitable for olive cultivation. Trees have now been planted in these sites, but serendipitously several olive trees, >25 years old, were found in Galveston that had been flowering and fruiting for years. Olive accessions have also shown adaptability to local climates at various other sites in Southern Texas. Our initial surveys of olives groves established during the last 4–6 years have revealed the existence of at least two trees with remarkable adaptability to Texas conditions. One of these trees had flowered and fruited in the Rio Grand Valley where earlier workers had predicted that flowering in olives will not occur. Thus, there appears some genetic diversity and clonal variations among limited number of existing olive trees in Texas that there is a hope for viable cultivations of olives in Texas. Clones from these trees have now been produced which will be planted at various locations within the Texas Valley to evaluate their performance in the next few years.

2005 PERSONAL SIZE "MINI" TRIPLOID WATERMELON VARIETY TRIAL

Thomas Horgan[1], Richard Snyder[2], Peter Hudson[2], Edgar Vinson[3], and Joseph Kemble[3]; [1]Horticulture Research & Education Unit, North Mississippi Research & Extension Center, P.O. Box 1690, Mississippi State University, Verona, Mississippi 38879; [2]Truck Crops Experiment Station P.O. Box 231, Mississippi State University, Crystal Springs, Mississippi 39059; [3]E.V. Smith Research Center, 101 Funchess Hall, Auburn University, Alabama 36849

Ten "mini" or personal size seedless watermelons were evaluated at three locations: north and central Mississippi and in central Alabama. 'Betsy', 'Bobbie', 'Demi-Sweet', 'Extazy', 'Mini Yellow', 'Petite Treat', 'Solitaire', 'Valdoria', 'Vanessa', and 'Wonder' were the cultivars trialed. Seedlings were started, in a greenhouse, four weeks before planting. All locations used drip irrigation and black plastic mulch and were fertilized according to soil testing lab recommendations. A personal size diploid (seeded) variety, 'Jenny', was used as the pollinator. One pollinator was planted, and interspaced evenly, for every three triploid plants. Four harvests were made at each location on 7-day intervals. Yields reported are based on 2,074 triploid plants per acre and 1,037 pollinizer plants per acre. Only the triploid yield reported. Plant spacing was 14 ft^2 per plant. For total yield (lb/acre) the cultivars 'Petite Treat' (27,210), 'Valdoria' (25,700), and 'Demi-Sweet' (26,400) were among the top producers at each location. 'Mini Yellow' was a top producer at all locations averaging 22,480 lb/acre. For total yield (fruit/acre) the cultivars 'Valdoria' (3,380), 'Petite Treat' (3,470), 'Bobbie' (3,470), 'Betsy' (3,380), and 'Vanessa' (2,740), were among the top producers at each location. For total yield (lb/fruit) 'Betsy' (6.9), 'Wonder' (6.7), and 'Vanessa' (6.1) had the overall lowest individual fruit weights. 'Demi-Sweet' had the highest individual fruit weight in central Alabama (10.0) and north Mississippi (8.8). One problem observed was that a number of melons among cultivars were above or below size class. Also determining melon ripeness was a challenge. Melon quality was good. The soluble solids concentration (sweetness) of all melons was excellent. 'Demi-Sweet' had the highest incidence of hollowheart. 'Wonder' and 'Extazy' had no incidences of hollowheart at any location. Rind thickness had no significant differences, however in both locations measured 'Mini Yellow' had the thinnest rind. Rind necrosis was not encountered.

PHYSICAL PROPERTIES OF MEDIA COMPOSED OF GROUND WHOLE PINE TREES AND THEIR EFFECTS ON VINCA (*CATHARANTHUS ROSEUS*) GROWTH

Glenn B. Fain[1] and Charles H. Gilliam[2]; [1] USDA–ARS, Southern Horticultural Laboratory, P.O. Box 287, Poplarville, MS 39470; [2]Department of Horticulture, 101 Funchess Hall, Auburn University, AL 36849

The objective of this study was to evaluate the potential use of container substrates composed of whole pine trees. Three species [loblolly pine (*Pinus taeda*), slash pine (*Pinus elliottii*) and longleaf pine (*Pinus palustris*)] of 8–10 year old pine trees were harvested at ground level and the entire tree was chipped with a tree chipper. The chips from each tree species were then further processed with a hammer mill to pass a ½-inch screen. On 29 June 2005 these three substrates along with 100% pinebark were mixed with the addition per cubic yard of 9.49 $kg \cdot m^{-3}$ Polyon 18–6–12 (18N–2.6P–10K), 2.97 $kg \cdot m^{-3}$ dolomitic lime and 0.89 $kg \cdot m^{-3}$ Micromax. One gallon (3.8 L) containers were then filled and placed into full sun under overhead irrigation. Into these containers were planted 72 cell plugs of *Catharanthus roseus* 'Little Blanche'. Data collected were pre-plant chemical and physical properties of substrates, as well as plant growth index (GI), plant top dry weight, root ratings, and plant tissue (leaves) nutrient analysis at 60 days after planting (DAP). The test was repeated on 27 Aug. 2005 with *C. roseus* Raspberry Red Cooler. Top dry weights were on average 15% greater for the 100% pinebark substrate over all others at 60 DAP. However there were non differences in plant GI for any substrate at 60 DAP. There were no differences in plant tissue macro nutrient content for any substrate. Tissue micronutrient content was similar and within ranges reported by Mills and Jones (1996, *Plant Analysis Handbook II*) with the exception of Manganese. Manganese was highest for slash and loblolly pine and well over reported ranges. There were no differences in root ratings. There were no differences in substrate physical properties between the three whole tree substrates. However the 100% pinebark substrate had on average 50% less air space and 25% greater water holding capacity than the other substrates. Physical properties of all substrates were within recommended ranges. Based on the results of this study substrates composed of whole pine trees have potential as an alternative sustainable source for a substrate used in producing short term nursery crops.

HERBICIDE USE IN HARDY FERNS

Glenn B. Fain[1], Charles H. Gilliam[2] and Gary J. Keever[2]; [1]USDA–ARS, Southern Horticultural Laboratory, P.O. Box 287, Poplarville, MS 39470; [2]Department of Horticulture, 101 Funchess Hall, Auburn University, AL 36849

Hardy ferns are widely grown for use in the landscape. Studies were conducted to evaluate the tolerance of variegated leatherleaf fern (*Arachniodes simplicor* 'Variegata'), tassel fern (*Polystichum polyblepharum*), autumn fern (*Dryopteris erythrosora*), holly fern (*Cyrtomium falcatum* 'Rochfordii'), and southern shield fern (*Dryopteris ludoviciana*), to applications of selected preemergence applied herbicides. Liquid applied herbicides were pendamethalin (LPM) at 3.36 or 6.73 $kg \cdot ha^{-1}$, prodiamine (LPD) at 1.12 or 2.24 $kg \cdot ha^{-1}$, isoxaben (LIB) at 1.12 or 2.24 $kg \cdot ha^{-1}$, and the combination of prodiamine plus isoxaben (LPI) at 1.12 plus 1.12 $kg \cdot ha^{-1}$. Granular applied herbicides were pendamethalin (GPM) at 3.36 or 6.73 $kg \cdot ha^{-1}$, prodiamine (GPD)1.12 or 2.24 $kg \cdot ha^{-1}$, oxadiazon plus prodiamine (GOP) at 1.12 + 0.22 or 2.24 + 0.44 $kg \cdot ha^{-1}$, oxyfuorfen plus oryzalin (GOO) at 2.24 + 1.12 or 4.48 + 2.24 $kg \cdot ha^{-1}$, trifluralin plus isoxaben (GTI) at 2.24 + 0.56 or 4.48 + 1.12 $kg \cdot ha^{-1}$, oxadiazon (GO) at 4.48 or 8.97 $kg \cdot ha^{-1}$, and oxadiazon plus pendamethalin (GOPD) at 2.24 + 1.4 or 4.48 + 2.8 $kg \cdot ha^{-1}$. The greatest reduction in growth of autumn fern was observed with GOPD, GO, and GOP; all three containing oxadiazon as an active ingredient. Reductions in holly fern growth were most severe when plants were treated with GTI resulting in a 42% and 54% decrease in frond length and frond number, respectively. There were also reductions in number of fronds when treated with LPM, GPM, GOP, GOO, and GOPD. There were no reductions in frond numbers on tassel fern with any herbicides tested. However, there were reductions in frond length from 6 of the 10 herbicides evaluated. The most sensitive fern to herbicides evaluated in 2004 was leatherleaf with reductions in frond length and number of fronds with 6 of the 10 herbicides tested. While all herbicides tested on southern shield fern appeared to be safe, especially in the 2004 study, tassel fern and holly fern appear to be more sensitive. GPD proved to be a safe herbicide for all species tested in both 2004 and 2005. In 2005 all plants from all treatments were considered marketable by the end of the study. However there was significant visual injury observed on the holly fern treated with LIB at 60 and 90 days after treatment which might reduce their early marketability.

RECENT USDA–ARS BLUEBERRY CULTIVAR RELEASES

S.J. Stringer, J.M. Spiers, and A.D. Draper; USDA–ARS Thad Cochran Southern Horticulture Laboratory, P.O. box 287, Poplarville, MS 39470

Two new southern highbush blueberry cultivars, 'Dixieblue' and 'Gupton', will provide growers with new blueberry cultivars having excellent fruit quality that ripen relatively early in the season, during the profitable early fresh-market window. Berries of 'Dixieblue' are light blue, medium in size, and their flat shape makes them most attractive. 'Gupton' is very productive and berry quality is also excellent. The performance of these cultivars represent an improvement over most currently available southern highbush blueberry cultivars due to 1) their durability and performance on both upland and sandy soils endemic to the Gulf Coast and 2) consistent production of high quality

fruit that will meet the demand for early ripening fresh-market blueberries. The new rabbiteye blueberry cultivar, 'DeSoto', represents an improvement over currently available rabbiteye blueberry cultivars for late-season production. 'DeSoto' produces medium-to-large fruit having excellent color, flavor, and firmness Plants of 'DeSoto' are productive, vigorous but semi-dwarf, upright and spreading. It's semi-dwarf growth habit, which is unique among currently grown rabbiteye blueberries, results in bushes that attain a maximum height of about 2 meters upon maturity, reducing the necessity of top-pruning that is required for all other cultivars. 'DeSoto' blooms two to three weeks later than early-to-mid season cultivars such as 'Climax' and 'Tifblue', providing insurance against late-spring freezes. Similarly, its fruit mature 21 to 14 days or more, respectively after these same cultivars. 'DeSoto' will provide niche market blueberry growers with a new cultivar having productivity, plant vigor, fruit quality, and very late ripening period that will extend their marketing season. The new evergreen ornamental blueberry, 'Native Blue', is low growing, compact and finely branched with small glaucous leaves, traits that are quite typical of *V. darowii*. 'Native Blue' has beautiful foliage that changes color in different seasons. Mature leaves are darker green while newer growth exhibits a light pinkish hue that changes to a bluish green. Other desirable characteristics of 'Native Blue' are its dwarf growth habit, hardy and vigorous growth, and its capacity for a high level of fruit production that serves as an attractant to birds and other wildlife. 'Native Blue' will provide southeastern U.S. nurserymen, landscapers, and homeowners with a novel and beautiful new ornamental shrub that will complement plantings of azaleas, camellias, crepe myrtles, etc.

TESTING ANTIFUNGAL COMPETENCY OF COMPOUNDS AGAINST SOME POSTHARVEST PATHOGENS USING THE DISC ASSAY METHOD

J. Narciso, E. Baldwin, and A. Plotto; USDA–ARS Citrus and Subtropical Products Laboratory, Winter Haven, FL 33884

There are many methods to test the efficiency of antimicrobial compounds. Our goals were to perform screens of several natural, experimental compounds and evaluate their effects on postharvest pathogenic fungi isolated from fruit. This screen was the first test in series that would allow us to see if these experimental compounds had potential use as components in a coating or as a preharvest treatment to help insure postharvest fruit quality. The disc assay method was chosen as a preliminary method for our screen as most of our compounds are water soluble and this method is straightforward, efficient and easy to interpret. This poster describes the testing of natural compounds against problematic postharvest fungi using the disc assay as a screening method. The results of various compounds are shown via the formation of a prominent zone of inhibition. Comparisons are also shown of non-responsive compounds to *Penicillium digitatum* and *Geotrichum citri-aurantii*. The clarity of using this method for step-wise dilutions of the anti-fungal compounds is shown.

LABORATORY METHOD TO ESTIMATE INCIDENCE OF FRUIT SPLITTING IN CULTIVATED BLUEBERRY

Donna A. Marshall[1], J.M. Spiers[1], K.J. Curry[2], S.J. Stringer[1]; [1]U.S. Department of Agriculture, Agricultural Research Service, Southern Horticultural Laboratory, Poplarville, MS 39470; [2] Department of Biological Sciences, University of Southern Mississippi, Hattiesburg, MS 39426

Fruit splitting takes place in rabbiteye and southern highbush blueberries when a preharvest rainfall occurs and when fruit are fully ripe or approaching full ripeness. This study was initiated to develop a laboratory method to identify the rain-related incidence of splitting in cultivated blueberries. Multi-year field surveys of select rabbiteye and southern highbush cultivars show that the incidence of rain-related splitting is strongly cultivar dependent. Year to year variations within cultivars reflected yearly differences in ripening times and amounts and timing of rainfall. Laboratory values of forced splitting and field splitting data of three years show a strong correlation indicating that the incidence of fruit splitting can be accurately estimated by laboratory methods. Soaking the berries in distilled water 14 hours at room temperature gives a confident determination of splitting tendencies. Blueberry breeders can use this method to evaluate new potential blueberry cultivars for splitting tendencies. This laboratory method could also be used by geneticists to test selections accurately for splitting tendencies as part of routine screening. This can lead to a long-term goal of reducing splitting susceptible blueberries in commercial plantings.

NUTRIENT DEFICIENCIES OF *PENTAS LANCEOLATA* 'BUTTERFLY RED'

James L. Gibson, Jude Groninger, Sharon Wombles, and Kathryn Campbell; West Florida Research and Education Center, Institute of Food and Agricultural Sciences, Milton Campus, 5988 Highway 90, Building 4900, Milton, FL 32583

Elemental deficiencies of N, P, K, Ca, Mg, S, Fe, Mn, Cu, Zn, or B were induced in plants of *Pentas lanceolata* 'Butterfly Red'. Rooted stem cuttings were planted in 4.87-L plastic containers and fertilized with a complete modified Hoagland's solution or this solution minus the element that was to be investigated. Plants were harvested to measure dry weights when initial foliar symptoms were expressed and later under advanced deficiency symptoms. Deficiency symptoms for all treatments were observed within 7 weeks. The most dramatic expression of foliar symptoms occurred with N (medium green young leaves with interveinal chlorosis on base and tip), S (spindle-like young and recently mature leaves), Cu (purple-brown roots and young leaves with downward pointed leaf tips), and B (multiple youngest leaves arising from shoot tip). At the initial stage, all nutrient-deficient plants had similar dry weights, when compared to the control. Dry weights of plants treated with solutions not containing P were significantly lower when compared to the control under an advanced deficiency. In order to help prevent the development of deficiencies, minimal critical tissue levels have to be determined for adaptation by the greenhouse industry for nutritional monitoring.

NUTRIENT DEFICIENCIES OF *ALLAMANDA NERIFOLIA*

James L. Gibson, Jude Groninger, Sharon Wombles, and Kathryn Campbell; West Florida Research and Education Center, Institute of Food and Agricultural Sciences, Milton Campus, 5988 Highway 90, Building 4900, Milton, FL 32583

Elemental deficiencies of N, P, K, Ca, Mg, S, Fe, Mn, Cu, Zn, or B were induced in plants of *Allamanda nerifolia*. Rooted stem cuttings were planted in 4.87-L plastic containers and fertilized with a complete modified Hoagland's solution or this solution minus the element that was to be investigated. Plants were harvested to measure dry weights when initial foliar symptoms were expressed and later under advanced deficiency symptoms. Deficiency symptoms for all treatments were observed within 6 weeks. The most dramatic expression of foliar symptoms occurred with N (yellow-green young leaves with necrotic tips), K (downward bending medium-green mature leaves with splotchy chlorosis), S (greenish-yellow young and youngest leaves), and Zn (young leaves with interveinal chlorosis from base to tip). At the initial stage, all nutrient-deficient plants had similar dry weights, when compared to the control. Dry weights of plants treated with solutions not containing N or P were significantly lower when compared to the control under an advanced deficiency. To help prevent the development of deficiencies, minimal critical tissue levels have to be determined for adaptation by the greenhouse industry for nutritional monitoring.

ABSCISIC ACID DRENCHES IMPROVE POSTPRODUCTION SHELF LIFE OF IMPATIENS

James L. Gibson[1] and Shannon Crowley[2]; [1]West Florida Research and Education Center, Institute of Food and Agricultural Sciences, Milton Campus, 5988 Highway 90, Building 4900, Milton, FL 32583; [2]Emerald Coast Growers, PO Box 10886, Pensacola, FL 32524

Foliar sprays or root dips of synthetic abscisic acid (s-ABA) have shown to reduce the transpiration rate and subsequently prolong postharvest longevity in a select group of herbaceous ornamental crops. The objective of our study was to determine the impact of s-ABA on postproduction performance of seed impatiens in greenhouse or low light conditions. Market ready *Impatiens wallerana* 'Xtreme Scarlet' plants were sprayed or the root substrate was drenched with s-ABA at 250 or 500 mg·L^{-1} then boxed for 48 h to represent shipping conditions. Flower number was measured 3 days after application, and again after plants were hydrated following the day when the last treatment wilted 0, 2, 4, 8, 16, or 24 days after application. Visual quality ratings were made 0, 2, 3, 4, 8, 11, 16, or 19 days after application and again after plants were re-irrigated. Drenching the substrate with s-ABA at 500 mg·L^{-1} maintained foliage and flower turgidity up to 8 days in the greenhouse environment and 16 days in the low light environment. Substrate drenches at 500 mg·L^{-1} dramatically decreased flower number after removal from the shipping box under greenhouse conditions, and in the low light environment drenching the substrate at 250 mg·L^{-1} produced similar visual quality results to 500 mg·L^{-1} 16 days after treatment. Plants drenched at 250 mg·L^{-1} also had the same number of flowers 3 and 20 days after treatment, when compared to 500 mg·L^{-1}. Therefore, impatiens growers should drench the root substrate

with s-ABA at 250 mg·L^{-1} to reduce labor costs associated with hand-watering and prolong postproduction performance in low light conditions, such as indoor retail conditions.

2005 HERBACEOUS ORNAMENTAL TRIALS IN CENTRAL MISSISSIPPI

Keri L. Paridon, Norman Winter, William B. Evans, and Guihong Bi; Mississippi State University, PO Box 231, Crystal Springs, MS 39059

Landscape trials were conducted to evaluate 235 cultivars within 66 species in central Mississippi. All entries were grown from seed or vegetatively propagated material. Raised landscape beds were prepared using accepted regional methods. Planting into beds began on 4 April and was completed on 20 April. Plants were given an overall rating based on insect resistance, disease resistance, vigor, flowering, and foliage color. Each cultivar was rated bimonthly until early August when pruning or termination was necessary, depending on each cultivar, at which time rating frequency became once a month through the first freeze. The rating range was 0 to 5, where 5 is optimum and 0 is death. Height (cm) was measured for each cultivar at the same intervals as performance ratings. Heights were recorded to show the average height of each cultivar. No herbicides were applied; handweeding controlled weeds. No insecticides were applied to plants with the exception of the hibiscus where there was severe pressure from sawfly larva. In 2005 central Mississippi experienced a very hot and dry summer. Strong winds and heavy rains in late August and early September associated with Hurricanes Katrina and Rita took their toll on the trial, especially many of the taller cultivars. The top performing cultivars for 2005 were 'Intensia Lilac Rose' phlox (*Phlox* ×), Proven Winners; 'Intensia Neon Pink' phlox (*Phlox* ×), Proven Winners; 'Elliottii Wind Dancer' grass (*Eragrostis curvula*), Pan American Seed; 'Intensia Lavender Glow' phlox (*Phlox* ×), Proven Winners; 'Dolce Licorice' heuchera (*Heuchera* ×), Proven Winners; 'Diamond Frost' euphorbia (*Euphorbia* ×), Proven Winners; 'Gold Flake' mecardonia (*Mecardonia* ×), Proven Winners; 'Titan Polka Dot' annual vinca (*Catharanthus roseus*), Ball Seed; 'Sun Fan' scaevola (*Scaevola aemula*), Proven Winners; 'Golden Delicious' salvia (*Salvia elegans*), Proven Winners.

EFFECT OF ROOTSTOCK ON YIELD AND QUALITY OF 'CABERNET FRANC' (*VITIS VINIFERA*) IN OKLAHOMA

Eric T. Stafne[1], B. Dean McCraw[1], William G. McGlynn[1], and R. Keith Striegler[2]; [1]Department of Horticulture and Landscape Architecture, Oklahoma State University, Stillwater, OK 74078, [2]MVEC, Missouri State University, Mountain Grove, MO 65711*

Rootstocks can offer benefits such as pest resistance, tolerance of certain soil characteristics and tolerance of salts and salinity. The objective of this study was to determine if 'Cabernet Franc' grafted onto various rootstocks differed in a number of measured yield and quality variables. The plots consisted of Clone 1 'Cabernet Franc' with four different rootstocks: 1103 Paulsen, 140 Ruggeri, 3309 Couderc, and St. George. Rootstock did not have much effect on the yield or quality of fruit produced by 'Cabernet Franc'. Although not significantly different, the overall yield of 3309C appears to be lower than the other rootstocks. With further data, it might be possible to identify annual climate patterns that favor one rootstock over another with respect to certain quality attributes. One particular problem with 'Cabernet Franc' in Oklahoma is its tendency to overbear, thus resulting in uneven ripening.

CRAPE MYRTLE EVALUATIONS IN SOUTH MISSISSIPPI

Patricia R. Knight, John M. Anderson, Wayne McLaurin, and Christine Coker; Mississippi State University, Coastal Research and Extension Center, 1815 Popps Ferry Road, Biloxi, MS 39532*

Lagerstroemia indica x fauriei ' Tonto' and 'Sioux' were planted in March, 1995. All other cultivars were planted in October, 1985. Plants were planted into a Ruston sandy loam on a 12 × 12 ft (3.7 × 3.7 m) spacing. Trees were pruned to develop multiple trunks. Trees are pruned annually in winter to remove any limbs smaller than ¼ in (0.6 cm) in diameter. Pruning cuts are made 6–8 in (15.2–20.3 cm) above prior cuts. Severe pruning is performed every five years. Trees were evaluated at 2-week intervals during the flowering season to determine total length of flowering and duration of good to superior flowering. Growth indices (height + width + perpendicular width)/3 were recorded after plants were dormant. Total days of flowering and floral display (0–5 with 0 representing no flowers and 5 representing superior flowering) were rated. 'Muskogee' had the greatest growth index after the 2004 growing season. 'Seminole' had the least. However, 'Seminole' did have the greatest number of flowering days. 'Biloxi' had the fewest flowering days. 'Tonto' had the most good to superior flowering days while 'Tuskegee' and 'Muskogee' had the fewest.

POSTHARVEST TREATMENTS FOR EXTENDING MARKET LIFE OF FRESH HORSERADISH

D.H. Picha; Department of Horticulture, LSU AgCenter, Baton Rouge, LA 70803

Horseradish (*Armoracia rusticana*) has one of the highest rates of postharvest weight loss among all vegetable crops. Postharvest studies were conducted to identify improved methods of extending the market life of fresh horseradish roots. Postharvest treatments included submerging or coating thoroughly washed and dried roots in chlorine (150 ppm), hydrogen dioxide (Storox), 2,6-dichloro-4-nitroaniline (Botran), carnauba-based wax, shellac-based wax, paraffin wax, and polyolefin shrink film (75–100 micron thickness). Two treatments, shrink wrapping and paraffin waxing, were superior in reducing postharvest weight loss and extending horseradish root market life. Roots from the non-paraffin waxed and nonshrink-wrapped treatments lost an average of 20% weight after only 4 days of ambient temperature storage. This resulted in significant root shriveling and unacceptable market appearance. Roots from the shrink wrapped treatments lost an average of 1% weight after 4 days of ambient temperature storage, while paraffin waxed roots lost about 3% weight. It is important to thoroughly dry the roots before shrink wrapping, to avoid moisture condensation on the inner surface of the film and subsequent microbial growth. All of the shrink-wrapped roots and paraffin waxed roots were marketable after 14 days of ambient storage, and no surface mold was detected. Less than 3% weight loss occurred after 14 days of ambient storage in all shrink-wrapped roots, while paraffin-waxed roots lost about 9% weight. Weight loss in the unwrapped roots from the other postharvest treatments ranged from an unacceptably high 44% to 48% after 14 days.

'REBEL': A NEW EARLY RIPENING SOUTHERN HIGHBUSH BLUEBERRY CULTIVAR

D. Scott NeSmith, Dept. of Horticulture, 1109 Experiment Street, University of Georgia, Griffin, GA 30223-1797

A new southern highbush blueberry cultivar named 'Rebel' was released in 2005 by The University of Georgia. It is a very early season cultivar with large fruit having a medium to light blue color, and a small, dry picking scar. 'Rebel' berry firmness is good, while flavor is only average. The new cultivar flowers 3 to 4 days before 'Star' and ripens 6 to 9 days before 'Star' in south and middle Georgia. 'Rebel' plants are highly vigorous, very precocious and have a spreading bush habit with a medium crown. Yield has been similar to or greater than 'Star' in south Georgia. Leafing has been excellent, even following mild winters. Rebel has an estimated chill requirement of 400 to 450 hours (<7 °C). Propagation is very easily accomplished using softwood cuttings. Plants of 'Rebel' are self-fertile to a degree, but should be planted with other southern highbush blueberry cultivars with a similar time of bloom for cross-pollination ('Emerald' and 'Star' suggested). 'Rebel' is new, so planting on a trial basis is recommended. 'Rebel' requires a license to propagate. For licensing information and/or a list of licensed propagators, contact the Georgia Seed Development Commission, 2420 S. Milledge Avenue, Athens, GA 30606; or visit their web-site at www.gsdc.com.

'CAMELLIA': A NEW MIDSEASON SOUTHERN HIGHBUSH BLUEBERRY CULTIVAR

D. Scott NeSmith[1] and Arlen D. Draper[2]; [1]Dept. of Horticulture, 1109 Experiment Street, University of Georgia, Griffin, GA 30223-1797; [2]USDA–ARS (retired)*

A new southern highbush blueberry cultivar named 'Camellia' was released in 2005 by The University of Georgia and the USDA–ARS. 'Camellia' is a hybrid containing mostly *Vaccinium corymbosum* and a small amount of *V. darrowi*. The new cultivar was selected in 1996 at the Coastal Plain Experiment Station in Tifton, Ga. from a cross of MS-122 × MS-6, and was tested as TH-621 in plantings at Alapaha, Ga. beginning in 1998. 'Camellia' has an estimated chill requirement of 450 to 500 hours (<7 °C). It is an early- to mid-season cultivar, having berries that are large, with a very light blue color, and a small, dry picking scar. Berry firmness is good and flavor is very good. 'Camellia' flowers 5 to 8 days after 'Star' and 'O'Neal' in south Georgia, and ripens 4 to 9 days after 'Star', and with 'O'Neal'. Plants are highly vigorous, with strong cane growth and an open, upright bush habit and a narrow crown. Yields have been similar to 'Star' and greater than 'O'Neal'. 'Camellia' should be planted with other southern highbush blueberry cultivars with a similar time of bloom for cross-

pollination ('Star' and 'O'Neal' suggested). It is recommended on a trial basis at this time. 'Camellia' requires a license to propagate. For licensing information and/or a list of licensed propagators, contact the Georgia Seed Development Commission, 2420 S. Milledge Avenue, Athens, GA 30606; or visit their website at www.gsdc.com.

PRODUCTION OF DELPHINIUM IN A TOBACCO TRANSPLANT GREENHOUSE

Carl E. Niedziela Jr., Stephen A. Emerson, and Guochen Yang, Natural Resources and Environmental Design, North Carolina A&T State University, 238 Carver Hall, Greensboro, NC 27411

Plug seedlings of delphinium (*Delphinium elatum* L. 'Guardian') were planted on 19 Nov. 2004 in four production systems (harvest lugs, lay-flat bags, pots, and polystyrene trays). Production systems were randomized in a Latin-square design with four replications of each system. Each treatment plot was 0.7 × 1.1 m. Planting density was 31 plants/m^2. The harvest lugs were 55 × 37 × 16 cm. The lay-flat bags were 114 × 30 × 3 cm. The pots were 25 cm bulb pans. The polystyrene trays were 67 × 34 × 5 cm and contained 32 square cells. All of the containers were filled with the same tobacco germination media. The plants in the harvest lugs, lay-flat bags and pots were irrigated daily with 150 mg N/kg from 20N–4.4P–16.6K. The plants in the polystyrene trays were floated on a solution of 150 mg N/kg from 20N–4.4P–16.6K. Float solutions were monitored and adjusted weekly for volume and fertilizer concentration. Individual stems were harvested at the one-third bloom stage of development. The final harvest was on 1 Apr. 2005. Fewer stems were harvested from float trays and lay-flat bags than from pots and harvest lugs. The stems harvested from float tray plots were shorter than those from the other three systems. Stem fresh weight from greatest to least was lay-flat bags, harvest lugs, pots, and float trays. Stem dry weight was less for float trays than the other three systems.

MANDATED VIDALIA ONION VARIETY TRIALS; HOW WELL HAS IT WORKED?

George Boyhan, Bill Randle, Anna Resurreccion, Robert Shewfelt, Reid Torrance, Chris Hopkins, Randy Hill, and Thad Paulk; University of Georgia, East Ga. Extension Center, PO Box 8112, Statesboro, GA 30460*

Beginning in 2001 the Georgia Department of Agriculture mandated testing of new and existing Vidalia onion varieties under the supervision of the University of Georgia. This was prompted by the introduction of early maturing Japanese overwintering varieties, which were perceived to be more pungent than traditional varieties grown in the Vidalia district. The testing primarily focused on flavor and pungency (pyruvate analysis) to determine suitability as a Vidalia onion variety. Our testing compared varieties to an industry standard, initially variety Granex 33, which was later switched to 'Savannah Sweet'. In almost all flavor and pungency tests differences were detected among the varieties, however, since the chosen standard variety usually fell within the middle of the tested range, there was no consistent rejection of a variety. If a different statistical approach had been used it would have been possible to reject several varieties over the course of testing. Using multiple comparison with the best (MCB), a modification of Dunnett's test where the best performing variety for a particular parameter becomes the standard, several varieties would have been excluded, but not all of the early Japanese overwintering types. Finally, in 2005 a consumer acceptance study was conducted with 30 consumers evaluating each of 49 varieties resulted in an LSD (5%) with no differences between the top 38 entries, which included several of the Japanese overwinter types. It is becoming clear that concerns over flavor with these early varieties are unfounded.

GREENHOUSE-TOMATOES: A NEW E-LIST FOR COMMERCIAL GROWERS

Richard G. Snyder.; Mississippi State University, Truck Crops Experiment Station, P.O. Box 231, Crystal Springs, MS 39059

The greenhouse-tomatoes list was created to provide a method for commercial greenhouse tomato growers to communicate with each other to learn from others' experiences. Its purpose is to connect growers with vendors of greenhouses, fertilizers, seeds, and other supplies, and to facilitate networking among growers, agents, specialists, and researchers. The goal of the greenhouse-tomatoes list is to develop high quality discussion that benefits commercial growers and the entire greenhouse tomato industry. This is accomplished by promoting the list to growers; keeping the list small so that the traffic is manageable; avoiding promotion to hobbyists so the list does not become cluttered; avoiding SPAM. Excellent majordomo software has been 100% effective in the latter. The list was first offered to growers at the 2004 Greenhouse Tomato Short Course (GHSC) in Jackson, Miss. Then, it was promoted through other e-lists for vegetable specialists, new crops, greenhouse growers, hydroponics, etc. The final phase was to promote it at various grower meetings around the U.S., through trade magazines, and at the 2005 GHSC. Currently, the list consists of 141 members. Subscribers are from the U.S., Argentina, Australia, Canada, England, Germany, Newfoundland, Pakistan, Romania, South Africa, Virgin Islands, and Thailand. Demographics are 31% university, 15% suppliers, 34% growers, 20% unknown. The greenhouse-tomatoes list is housed on a server at Mississippi State University with nearly all functions handled seamlessly by majordomo software. To subscribe: send e-mail to majordomo@lists.msstate.edu with the following message: subscribe greenhouse-tomatoes. You will get a confirmation email telling you that you must reply. You must be subscribed to send anything to the list. Once subscribed, to communicate with the whole group, address an email message to greenhouse-tomatoes@lists.msstate.edu and everybody on the list will receive it. To make this easy, the user can save that address to a nickname, such as ght or greenhouselist. More information can be found at http://www.greenhousetomatosc.com.

EVALUATION OF COMMERCIAL BANANA CULTIVARS IN SOUTHERN GEORGIA FOR ORNAMENTAL AND NURSERY PRODUCTION

Gerard Krewer[1], Esendugue Greg Fonsah[2], Mark Rieger[3], Richard Wallace[4], David Linvill[5] and Ben Mullinix[6] ; [1,2] Depts. of Horticulture and Ag & Applied Economics, POB 1209, Tifton, Ga. 31793; [3] Dept. of Horticulture, University of Georgia, Athens, GA 30602; [4] Dept. of Chemistry and Physics, Armstrong Atlantic State University, Savannah, GA 31419; [5] UGA Chatham County Extension Service, Savannah, GA 31419; [6] Computer and Statisical Services, University of Georgia, Tifton, GA 31793

Bananas are a popular ornamental plant in the southern U.S. However, normally only a few cultivars, such as 'Lady Finger' and 'Orinoco', are grown in Georgia. Thirty-three primarily commercial cultivars of bananas were grown for two years near Savannah, Georgia to determine their suitability for ornamental and nursery production. Most plants were grown from tissue culture plugs. They where given rates of fertilization used for commercial banana fruit production. Most cultivars produced 10 to 14 leaves and grew to heights of 1.5 to 2.0 m. Some displayed desirable ornamental characteristics such as pink tinted pseudostems, colorful flowers, and large graceful leaves. Many of the cultivars flowered and began producing fruit in late summer, although only '1780', 'Raja Puri' and 'Sweetheart' produced palatable fruit before frost in November in some years. Cultivars were also rated for their ability to produce suckers that can be used for nursery production. In year two, '1780' and 'Manzano' produced the largest number of high quality suckers for nursery production. For the planting as a whole, sales of suckers at a field day averaged $7/per plant in year 2 and $17/per plant in year 3.

QUANTITATIVE DESCRIPTIVE ANALYSIS METHODOLOGY FOR THE DETERMINATION OF THE OPTIMUM MONTH FOR CONSUMPTION OF DAYLILIES (*HEMEROCALLIS* SPP.)

A.N. Pollard[1], P. . Coggins[1], P.R. Knight[2], and C.E. Coker[2]; (1) Dept. of Food Science, Nutrition and Health Promotion, Mississippi State Univ., 110 Herzer Bldg., Mailstop 9805, Mississippi State, MS 39762-9805, (2) Coastal Research and Extension Center, Mississippi State Univ., 2710 Beach Blvd., Ste. 1-E, Biloxi, MS 39531-4401

There are >52,000 cultivars of daylilies (*Hemerocallis* spp.), some of which the ancient Chinese used for nutritional and medicinal purposes. Daylilies have tremendous potential in foodservice due to the range of color, fragrance, flavor, and textural varieties. The objective was to quantify by descriptive analysis the attribute descriptors for two edible daylily cultivars; that is, 'Rosie Meyer' and 'Siloam Powder Pink,' and to provide data indicating the optimum month for consumption of these two cultivars of daylilies. Blooms were harvested during early morning hours over 5 months (May through September). Six panelists were trained to use Quantitative Descriptive Analysis for 6 months on the sensory attributes of 'Rosie Meyer' and 'Siloam Powder Pink' cultivars. Training consisted of determining attribute categories as well as intensity ratings for references. Attribute categories included appearance, odor/scent, handfelt texture, oral texture, basic taste(s), flavor, mouthfeel factors, and chew rate. Results showed attribute categories with descriptors for 'Siloam Powder Pink' as odor/scent, flavor, mouthfeel factors, and oral texture as having a significant difference ($P < 0.05$) for the evaluation months. 'Rosie Meyer' demonstrated significant differences ($P < 0.05$) for the evaluation months in attribute categories for appearance, odor/scent, flavor, oral texture, and mouthfeel factors. The optimum month

for consumption of 'Rosie Meyer] was September ($P < 0.05$); for 'Siloam Powder Pink,' it was July ($P < 0.05$). These results provide a descriptive language for daylily cultivars 'Rosie Meyer' and 'Siloam Powder Pink.' The optimum month for consumption to obtain the fullest range of desirable attributes will provide the food and horticultural industries with added information by which to market these cultivars.

EFFECT OF THE CONCENTRATION OF CHIPPED BARK IN SAWDUST SUBSTRATE ON CRUDE POLYSACCHARIDE EXTRACT AND LENTINAN CONTENT OF SHIITAKE MUSHROOMS

Ramakrishna Nalagorla, Catherine Sabota, and Caula Beyl, Alabama A&M University, P.O. Box 69, Normal, AL 35762*

Shiitake mushrooms contain lentinan, a polysaccharide that has numerous medicinal benefits. The objective of this research was to determine the impact of various rates of chipped and sawmill bark added to the substrate on lentinan found in shiitake mushrooms. Crude polysaccharide extract (CPE) and lentinan (LTN) content was significantly different among shiitake mushrooms grown on various artificial substrates containing different percentages of sawdust and chipped bark. The addition of chipped bark content from 0% to 50% increased the CPE content, but an increase in chipped bark content from 50% to 100% decreased the CPE and LTN content. CPE content in mushrooms was greater when equal proportions of sawdust and bark were used. A 100% heartwood treatment had the least CPE content.

MISSISSIPPI STATE UNIVERSITY'S RESEARCH AND EDUCATION EFFORTS TO INCREASE NURSERY MECHANIZATION ACROSS THE GULF SOUTH

Christine Coker, Patricia Knight, Ben Posadas, Scott Langlois, and Randy Coker; Mississippi State University, Coastal Research and Extension Center, 1815 Popps Ferry Road, Biloxi, MS 39532

The greenhouse and nursery industry is one of the fastest growing sectors of the region's agricultural economy; however, a major problem facing this industry is a shortage of workers, particularly skilled workers. A recent national survey of commercial nursery/landscape operations listed labor shortage as the number one limitation facing the industry at the end of 2001. The target population of this project is greenhouse and nursery workers in the Gulf South. The goal of this project is to develop and identify automated systems that can be adapted by the highly diverse greenhouse and nursery industry. Adoption of this technology will improve working conditions for greenhouse and nursery workers, increase worker retention, improve worker safety, increase worker productivity, improve skill levels, and create new jobs related to servicing the machinery and instrumentation. The Coastal Research and Extension Center, in cooperation with industry leaders representing the Gulf South, has identified several major areas of program focus. Together, we have developed a comprehensive set of production issues which will be addressed through the integration of applied mechanization technologies developed through this project.

PERFORMANCE OF HEIRLOOM AND LATE BLIGHT RESISTANT HEIRLOOM-TYPE TOMATO HYBRIDS IN ORGANIC AND CONVENTIONAL FIELD TRIALS

Jeanine M. Davis and Randolph G. Gardner; Department of Horticultural Science, North Carolina State University, Mountain Horticultural Crops Research and Extension Center, 455 Research Drive, Fletcher, NC 28732*

There is a good market for heirloom tomatoes that, according to many consumers, taste better than regular tomatoes. Unfortunately, most heirloom tomatoes have little disease resistance, tend to crack, are rough in appearance, and are not uniform in size. Randy Gardner recently developed several new indeterminate hybrid tomatoes with the goal of combining the flavor of heirloom tomatoes with the disease resistance, uniform size, and good shipping characteristics of more modern varieties. Two tests, using organic and conventional practices, were conducted in Waynesville, N.C., in which three popular heirloom varieties (German Johnson, Mr. Stripey, and Cherokee Purple) and four late blight resistant hybrids (NC 0455, NC 0571, NC 0576, and NC 05114), replicated four times, were grown using a high trellis system. The highest yields were obtained with German Johnson NC 0455, and NC 0576 in the conventional trial and German Johnson NC 0455, and NC 0571 in the organic trial. Public taste test results revealed that the experimental hybrid cluster type, NC 05114, was ranked by over 82% of the participants as good or excellent. NC 0455 was rated as good or excellent by >83% of the participants, which was better than the popular heirlooms Cherokee Purple and Mr. Stripey. This study demonstrated that the heirloom-type hybrid tomatoes could be successfully grown in organic and conventional systems in Western North Carolina and that two out of the four tested had flavor ratings similar to, or better than, the three heirloom varieties tested.

GRAFTING OF TRIPLOID WATERMELON ON SQUASH AND GOURD ROOTSTOCKS

Kent Cushman[1], Jin Huan[2], Lisa Cushman[1]; [1]Southwest Florida Research and Education Center, UF–IFAS 2686 SR 29 N, Immokalee, FL 34142; [2]Syngenta Seed, Inc., Naples, FL 34114

Grafting of watermelon scions onto squash or pumpkin (*Cucurbita*), bottle gourd (*Lagenaria*), wax gourd (*Benincasa*), or watermelon (*Citrullus*) rootstocks is practiced in most of the major watermelon production regions of the world. Advantages of grafting are protection against soilborne diseases, resistance to nematodes, and overall increased vigor of plants resulting in higher yield and better fruit quality. Disadvantages include increased cost of seedling production and the potential of altered horticultural characteristics of cultivars used as scions. With problems associated with watermelon vine decline in recent years in Florida and the increasing cost of soil fumigants, the use of grafted watermelon seedlings should be explored. Four grafting techniques for watermelon are common: splice, side insertion, approach, and hole insertion. The approach graft, though labor intensive, doesn't require exacting control of temperature and humidity after making grafts and may be well suited to south Florida conditions. All other grafts require excellent control of the post-grafting environment and a careful transition from low light and high humidity to high light and low humidity. A preliminary evaluation of grafted and ungrafted plants during Fall 2005 compared 'Tri-X 313', 'Palomar', 'Precious Petite', and 'Petite Perfection' on several rootstocks. Most rootstock/scion combinations produced fruit of normal size, appearance (internal and external), and soluble solids content. Some combinations resulted in irregular, pumpkin-shaped fruit and slightly higher incidences of hollowheart.

STUDY OF THE ORIGINS AND SPREAD OF THE SWEETPOTATO WEEVIL IN THE U.S. USING RDNA SEQUENCES

Megan Ulmer[1], Regina Ali[1], Conrad Bonsi[2], Louis Jackai[2], and Bryon Sosinski[1]; [1]NC State University Department of Horticultural Science, Campus Box 8619, Raleigh NC 27695, [2]Department of Agricultural and Environmental Sciences, Tuskegee University, 200-B Campbell Hall, Tuskegee AL 36088

The sweetpotato weevil (SPW), *Cylas formicarius*, is the most devastating insect pest of sweetpotato worldwide. In the U.S., the devastation by this pest costs the sweetpotato industry several million dollars in crop loss and lost income each year. Many growers in highly infested areas have simply abandoned growing sweetpotatoes. The overall project goals are to elucidate the routes used for the spread of the SPW, and to determine the existence of intra-specific variation in the SPW population in the US and selected overseas countries. These results will lead to more effective and targeted management of the SPW. Results will also make quarantine enforcement more efficient. We are examining the highly conserved and phenotypically neutral rDNA sequences of both the 18S and ITS1 regions of the SPW genome as a way to determine the population structures and origins of SPW in the US. Here, the molecular genetic aspects of the project are outlined, and preliminary results are presented.

VALUE-ADDED SWEETPOTATO PRODUCTS

G.R. Duran, P.C. Coggins, and J.A. Wilbourn; Nutrition and Health Promotion Department, Mississippi State University, P.O. Box 9805, Mississippi State, MS 39762

Nationally, about 97,900 acres of sweetpotatoes (*Ipomoea batatas*) were planted for 2001 with a yield of 156 cwt. Many of the sweetpotatoes are left in the field as unmarketable culls. A juicing technique used to produce a value-added product from the culls would be valuable to the sweetpotato farmer and the industry as a whole. This process would enable the farmers to turn an unmarketable product into a potentially profitable juice product. The research objective was to determine the usable yields of sweetpotato culls by extracting the juice. This would provide a value-added juice product for sweetpotato farmers. Juice would be easily transported and stored. Sweetpotato culls were collected, washed, and dried. Samples were chopped, weighed and processed with an automatic juice extractor (Juiceman Jr., Mount Prospect, Ill.). The extracted juice and remaining pulp were removed and weighed. Percent juice, pulp, and loss were calculated on a weight basis. Results showed that when processed with a grinding/centrifugal type juice extractor, an average of 53.6% of the initial weight from sweetpotato culls can be extracted as juice. Also, as the initial weight of the culls increased, the percent juice extracted increased. The combined solids collected from

the extracted pulp and the pulp remaining after equipment disassembly was on average 42.66% of the initial weight. The unsalvageable percent of juice and pulp was on average 3.93%. These results suggest that sweetpotato culls yield about half of their original weight as juice. Juice extraction may be a viable option for processing non-market grade sweetpotato culls. Sweetpotato juice may be consumed as a beverage or combined with other juices to form a variety of juice blends.

SQUASH PRODUCTION AND ORGANIC WEED CONTROL

Charles L. Webber, III[1] and James W. Shrefler[2]; [1]Research agronomist, USDA, ARS, SCARL, Hwy 3 West, P.O. Box 159, Lane, OK 74555; [2]Area Extension Horticultural Specialist, Oklahoma State University, Wes Watkins Agricultural Research & Extension Center, Hwy 3 West, P.O. Box 128, Lane, OK 74555*

Although CGM has been identified as an organic herbicide for weed control in turf and established vegetable plants, direct contact with vegetable seeds can decrease crop seedling development and plant survival by inhibiting root and shoot development. The objective of this research was to determine the impact of banded corn gluten meal applications on squash plant survival and yields. This factorial field study was conducted during Summer 2005 on 81-cm-wide raised beds at Lane, Okla., with two application configurations (banded and solid), two CGM formulations (powdered and granulated), two incorporation treatments (incorporated and nonincorporated), and three application rates (250, 500, and 750 $g \cdot m^{-2}$). The two CGM formulations at three application rates were uniformly applied in both banded and solid patterns on 19 Aug. The banded application created a 7.6-cm wide CGM-free planting zone in the middle of the raised bed. The CGM applications were then either incorporated into the top 2.5 to 5.0 cm of the soil surface with a rolling cultivator or left undisturbed on the soil surface. 'Lemondrop' summer squash (*Cucurbita pepo* L.) was then direct-seeded into the center of the raised beds. When averaged across the other factors, there was no significant difference between powdered and granulated CGM formulations or incorporating and nonincorporating the CGM for either squash plant survival or yields. As the CGM application rates increased the plant survival and yields decreased. Banded application resulted in significantly greater crop safety (90% plant survival) and yields (445 cartons/ha) than the broadcast (solid) applications (45% plant survival and 314 cartons/ha). The research demonstrated the potential usefulness of CGM in direct-seeded squash production, if used in banded application configuration.

MICROSATELLITE MARKERS FOR VERIFYING PARENTAGE OF PECANS

LJ Grauke[1], Maria Azucena Mendoza-Herrera[2], Carol Loopstra[2] and Tommy E. Thompson[1]; [1]USDA–ARS Pecan Breeding & Genetics, 10200 FM 50, Somerville, Texas 77879; [2]Department of Forest Science, Texas A&M University, College Station, Texas

Microsatellite or Simple Sequence Repeat (SSR) markers are being developed in ongoing research in the USDA ARS Pecan Breeding Program. These co-dominant markers provide a powerful tool for the verification of parentage. To confirm their utility, SSR profiles were used to confirm the parentage of 19 of the 25 controlled crosses released by the breeding program. Questions were raised concerning the parentage of some crosses thought to be known. When the genotype of the maternal parent is known, the paternal genotype necessary to have produced the progeny can be determined. A SAS program was written to query a database that includes 288 pecan accessions to find appropriate paternal genotypes given a maternal pattern. If neither parent is known, all possible parental combinations can be derived based on the progeny. Putative parents can be qualified on the basis of genotype as well as other evidence, such as nut morphology, dates of origin, locations of origin, and dichogamy. Using these techniques, putative parents are suggested for the historic cultivars 'Riverside' and 'Western'. Although the probabilities for a particular genotypic pattern can be determined based on allele frequencies within the population, assigning numeric probabilities to other evidence is more challenging. Meticulous records are necessary to establish the linkage between an inventory of an accession and its historic origin, thereby placing putative parents in combination at the proper place and appropriate time. Records of USDA–ARS National Plant Germplasm System, as exemplified by logbooks and vouchers of the McKay Collection of the National Arboretum, provide evidence for confident molecular genetic verification of cultivar identity and parentage, increasing the value of the living accessions in the NPGS.

YIELDS AND FRUIT PRODUCTION PATTERNS OF ELEVEN EGGPLANT CULTIVARS

Brian A. Kahn[1] and Mark E. Payton[2]; Depts. of [1]Horticulture and Landscape Architecture and [2]Statistics, Oklahoma State University, Stillwater, OK 74078*

Eggplants (*Solanum melongena* L.) were grown from transplants in a field study at Bixby, Okla., in 2005. Plants were harvested twice a week for 7 weeks. Data were taken from 3 individual plants per plot × 11 cultivars × 3 replications. The open-pollinated 'Black Beauty' was inferior to the hybrids for yield and fruit quality. Patterns of cumulative percent marketable fruit number did not differ for 3 of the 4 cultivars producing the numerically highest (not always statistically highest) marketable fruit weights per plant ('Classic', 'Nadia', and 'Santana'). 'Dusky' was the exception; fruit number peaked relatively early, but it still totaled among the highest for marketable fruit weight per plant. This might be considered an efficient fruiting pattern. Apart from 'Dusky', a relatively high cumulative percent marketable fruit number throughout the season tended to be associated with an intermediate to low marketable fruit weight per plant. Two factors usually were responsible for this pattern: relatively low average marketable fruit weight, or high cull production. Despite significant differences in individual marketable fruiting patterns and average fruit weights, one relatively simple curvilinear model gave an excellent estimation of total and marketable eggplant fruit production (respectively) over time. The model was pct = 1/(1+exp(-(a+b*day))), where pct = estimated cumulative percent based on number of fruit, a = intercept, and b = slope.

IMPROVEMENT, PROPAGATION AND USE OF TAXODIUM IN SOUTHEASTERN CHINA

D. Creech[1] and Yin Yunlong[2]; [1]SFA Mast Arboretum, PO Box 13000, Stephen F. Austin State University, Nacogdoches, TX 75962-3000; [2]Nanjing Botanical Garden, PO Box 1435, Nanjing, 21104, China

There are three botanical varieties associated with the genus Taxodium: 1) Baldcypress (BC) = *Taxodium distichum* (L.) Rich.var. *distichum*, 2) Pondcypress (PC) = *T. distichum* var. *imbricarium* (Nutt.) Croom and 3) Montezuma cypress (MC) = *T. distichum* var. *mexicana* Gordon. Taxodium hybridization promises to combine the best characteristics of superior parents. In 1988, clones T302 (a BC × MC F1 hybrid), T401 (PC × MC), and T202 (PC × BC) were selected in China primarily for growth rate and tolerance to alkaline and salt-rich coastal floodplains. T302 is recommended in China for soils with pH 8.0~8.5 and salt concentrations <0.2%. Other attributes of T302 included 159% faster growth than BC, good columnar form, longer foliage retention in fall and early winter, and no knees. T302 has been in the USA since January 2002 and is currently under evaluation in over 30 locations in southern USA. The clone was named 'Nanjing Beauty' in 2004 as a cooperative introduction of the SFA Mast Arboretum and Nanjing Botanical Garden. In March 2005, the SFA Mast Arboretum received two new clones from China. T140 and T27 are considered more evergreen than T302 and both demonstrate strong salt tolerance. The clones were selected from a field population of T302 × TM—with strong TM characteristics and improvements in growth rate, salt tolerance, form and vigor. T140 grows faster than T27, which produces a wider profile. The foundation of the most recent selections comes originally from crosses made by Professor Chen and Liu in 1992 at the Nanjing Botanical Garden. Pollen from TM was applied to a female T302 and fifteen selections were made in 1995. The main characteristics for selection were 1) fast growth rate, 2) dark green color during the growing season and a red-orange leaf color in the fall, and 3) evergreen leaves. In 2006 or 2007, the results from T140 and T27 will be reported and registered with the Chinese Forestry Department. It will be at least five years before T140 and T27 enter commerce. In June, 2005 there were <100 each of these two clones. T118, T120 and T149 have already been registered with the Chinese Forestry Department at the provincial level, while T302 has been registered at the national level.

PERFORMANCE OF 18 JALAPENO VARIETIES IN WHOLE PACK AND SAUCE

Paul Wilson, Horticulture Department, Louisiana State University, 163 J C Miller Hall, Baton Rouge, LA 70803 Baton Rouge, LA 70803

Jalapeños are versatile peppers with both green and mature-red peppers used fresh and in processed products. Peppers can be dried, pickled whole in brine or as salted mash for sauces. Mature fruit can also be smoked and dried to produce chipotle which can be used in several ways including preparation of sauces. Although there are many individual cultivars of jalapeño peppers available, little is known of their processing characteristics. Most

food processors still rely on fresh-market supplies rather than contracting specific cultivars which might provide better processing characteristics. A study was begun in Summer 2005 at LSU to provide information concerning the processing characteristics of commonly available jalapeño cultivars. Over a 3-year period, each cultivar will be evaluated in fresh form, as pickled whole fruit, as salted mash and as smoked chipotle. Besides good cultural production qualities, pepper cultivars that will be manufactured into processed products should have 1) acceptable and consistent heat content, 2) good stable color and, 3) consistent/suitable size (for whole pack). Seventeen jalapeño cultivars were evaluated in fresh green, brine-cured green and mature-red state for fruit surface color, average fruit weight, dry weight, and percent seed.

National Cowpea Improvement Association

RESPONSE OF COWPEA CULTIVARS TO *RHIZOCTONIA SOLANI* IN FIELD TESTS AT FOUR PLANTING DATES

J. A. Thies, P. A. Berland, and R. L. Fery. U.S. Vegetable Laboratory, USDA, ARS, Charleston, S.C.*

Rhizoctonia solani is an important pathogen of cowpea (*Vigna unguiculata*) in the southern U.S. and is the primary cause of seedling diseases in this crop. Stand losses caused by *R. solani* are especially severe when cowpea is planted in cold, spring soils. Three cowpea cultivars (Coronet, Knuckle Purple Hull, and Mississippi Silver) were evaluated in *R. solani*-inoculated field tests at four planting dates in Charleston, SC during 2005. The tests were planted on 25 Apr., 9 May, 27 May, and 13 June. The experimental design for each test was a split-plot with six replicates. Whole plots were cultivars, and sub-plots were inoculated with *R. solani* and an uninoculated control. *Rhizoctonia solani* caused significant seedling losses in all cultivars planted on the first three planting dates. Seed weight and seed numbers were reduced for 'Mississippi Silver' in inoculated plots for all planting dates. In general, 'Mississippi Silver' and 'Coronet' had higher stand counts and heavier seed yields than 'Knuckle Purple Hull', but all three cultivars were susceptible to *R. solani*. The development of resistant cowpea cultivars would reduce stand losses due to *R. solani* and improve seed yields of cowpea planted in cold, spring soils.

COWPEA TOLERANCE TO SANDEA HERBICIDE

N.R. Burgos[1], L. Brandenberger[2], C. Thomas[1], L. Wells[2], V. Shivrain[1], D. Motes[1], S. Eaton[1], L. Martin[1], and T. Morelock[1]; [1]University of Arkansas, Fayetteville, AR and [2]Oklahoma State University, Stillwater, OK*

Southernpea is a major vegetable crop in Arkansas and Oklahoma for commercial production and home gardens. Complete weed control is necessary for this crop in commercial production to keep the peas free of contaminants and achieve high harvest efficiency. Several weeds like pigweed, cocklebur, velvetleaf, lambsquarters, hophornbeam copperleaf, nightshade, nutsedge, and morninglories are difficult to control in this crop because of limited herbicide options. Sandea (halosulfuron) is an excellent herbicide for nutsedge control and has activity on most of the weeds mentioned above. It has both soil and foliar activity. Sandea is labeled for several vegetable crops and southernpea may have enough tolerance to Sandea to warrant a label expansion. Experiments were conducted in Arkansas and Oklahoma between 2002 and 2005 to determine the tolerance of southernpea to Sandea and its efficacy on some weed species. In Oklahoma, trials were conducted in LeFlore County and at the Bixby Research Station in 2002 and 2003. Treatments consisted of various herbicides applied preemergence (PRE) or postemergence (POST), among which were some Sandea treatments. The doses of Sandea tested ranged from 0.024 to 0.048 lb a.i./A with some treatments applied with Basagran (bentazon), POST. Preemergence treatments were applied at 20 GPA and POST treatments at 30 GPA. Experimental units were arranged in randomized complete block design with four replications. The cultivar used was Early Scarlet. Plots were comprised of four rows, spaced either 30 or 36 inches, depending on location, 15 ft long. The crop at Bixby was irrigated, but not at LeFlore. In Arkansas, two experiments were conducted in 2005 at the Vegetable Station in Kibler. One experiment was setup in a split-plot design, with four replications, with cultivar as mainplot and Sandea treatments as subplot. Eleven advanced breeding lines and Early Scarlet were used. Four Sandea treatments, using doses of 0.048 and .096 lb ai/A applied either PRE, at 1 to 2-trifoliate (early POST), and at 3- to 4-trifoliate (late POST) were tested. The second experiment compared the responses of 16 advanced breeding lines and Early Scarlet to 0.096 lb a.i./A Sandea applied PRE. Plot size at Kibler consisted of 4 rows, spaced 36 inches, 20 ft long. Herbicide treatments were applied at 20 GPA spray volume and the crop was sprinkler irrigated as needed. In Oklahoma, the commercial rate of Sandea (0.032 to 0.048 lb a.i.) did not cause any injury to southernpea when applied PRE regardless of availability of irrigation. However, when applied POST, significant stunting (up to about 20%) of plants was observed in both locations. This level of injury did not cause significant yield loss. The trial at Bixby could not be harvested due to excessive pigweed biomass later in the season. Sandea controlled Palmer amaranth and carpetweed >90% when applied PRE, but had no activity on these species when applied POST. Conversely, Sandea had excellent activity (100%) on common cocklebur when applied POST, but ineffective when applied PRE. Trials in Arkansas were strictly for tolerance evaluation so no weed control data was collected. In Arkansas, the PRE timing was also safer than POST when 0.096 lb ai Sandea was used. The 11 advanced lines tested in trial 1 were among the top 15 lines selected for tolerance to Sandea from a preliminary screen. These selected lines still showed different levels of tolerance to high rates of Sandea, but may not show any difference among each other at the recommended rates. The best lines were 00-609 and 00-178, which showed no yield reduction when treated with 0.096 lb ai Sandea PRE. All advanced lines had higher yield than Early Scarlet without herbicide treatment. In trial 2, 01-103, 01-180, and 01-181 had 0% to 10% yield loss when treated with 0.096 lb ai Sandea, PRE. All three had similar or greater yield than Early Scarlet. The commercial standard incurred about 20% to 30% yield loss from the high dose of Sandea applied PRE in both trials in Arkansas. Sandea is safe for cowpea, PRE at recommended doses. However, some advanced lines can tolerate high rates of Sandea. Some weeds are controlled by Sandea PRE, but not POST and vice versa.

WHIPPERSNAPPER, A SNAP-TYPE SOUTHERNPEA FOR HOME AND MARKET GARDENERS AND THE FOOD PROCESSING INDUSTRY

Richard L. Fery[1], Blair Buckley[2], and Dyremple B. Marsh[3]; [1]U.S. Vegetable Laboratory, USDA–ARS, Charleston, SC; [2]Red River Research Station, LSU AgCenter, Bossier City, LA; [3]Delaware State University, Dover, DE*

The USDA, Louisiana State University, and Lincoln University have released a new southernpea cultivar named WhipperSnapper. The new cultivar is the product of a plant breeding effort to incorporate genes conditioning superior yield and seed characteristics of Asian vegetable cowpeas into American snap-type southernpeas. The new cultivar was developed for use by home gardeners and market gardeners as a dual-purpose cultivar that can be used to produce both fresh-shell peas and immature, fresh pods or snaps. Typical ready-to-harvest WhipperSnapper snaps are green colored, 6.4 mm in diameter, 7.6 mm in height, and 24 cm long; the pods are slightly curved at the attachment end. Typical mature-green pods suitable for fresh-shell harvest exhibit an attractive yellow color, are 25 cm long, and contain 14 peas. Fresh peas are cream-colored, kidney-shaped, and weigh 24.5 g/100 peas. Dry pods exhibit a light straw color, and the dry peas have a smooth seed coat. The quality of WhipperSnapper seed is excellent. In replicated field trials, WhipperSnapper produced significantly greater yields of both snaps and peas than the snap-type cultivar Bettersnap. WhipperSnapper has potential for use as a mechanically-harvested source of snaps for use by food processors in mixed packs of peas and snaps. Protection for WhipperSnapper is being sought under the Plant Variety Protection Act.

EFFECTS OF POSTHARVEST STORAGE AND GENOTYPE ON QUALITY AND SHELF LIFE OF FRESH SOUTHERNPEAS [VIGNA UNGUICULATA (L.) WALP.]

Justin Butcher and Teddy Morelock; University of Arkansas, Fayetteville, AR 72701*

Postharvest storage of southernpeas is crucial in the production process. Governed by consumer demands, farmers strive for a product that is high in quality and freshness, and has an appropriate texture and appealing color. Improper storage of southernpeas results in their premature deterioration, lack of acceptance, and possible loss of profit. Therefore, an appropriate storage facility and temperature should be devised that will benefit both farmer and consumer. In an effort to prevent potential losses of southernpeas, a study was conducted to determine the best environmental condition at which to store and to potentially extend shelf life. In 2004, two experiments were conducted on the University of Arkansas Agriculture Research and Extension Center, Fayetteville, Ark., to determine the best genotype and storage environmental condition to maintain a quality marketable prod-

uct. In the first experiment, a screening of 23 southernpea genotypes was conducted from single plots to determine which genotypes could maintain their appearance the longest in a refrigerated environment. In the second experiment, two separate plantings were made of five southernpea genotypes in a randomized block design in two separate fields. Upon maturity, 12 mature green pods of each genotype were subjected to a sweated and unsweated treatment. After shelling, seeds were subjected to one of three different environmental conditions: cool regime, room temperature, and ambient air, evaluating each on the basis of changes in physical appearance; a hot water dip treatment was also examined. A refrigerated environment at or near 37 to 41 °F was the best environment to store southernpeas for nearly 2 weeks. The sweated treatment also aided in the shelling process and appeared to maintain the appearance of each genotype longer.

MISSISSIPPI HAND-HARVEST, FRESH-MARKET SOUTHERNPEA TRIAL: A THREE-YEAR REVIEW

William B. Evans[*1], Peter M. Hudson[1], and Keri L. Paridon[1]; Mississippi State University, Truck Crops Branch, Crystal Springs, MS 39059-0231*

In 2005, fifteen southernpea (*Vigna unguiculata* L.) Walp. subsp. *unguiculata* (L.) cultivars were evaluated for yield and quality at Crystal Springs, Miss. Pods were hand-harvested at the green-shell stage on three dates in August and early September 2005. In-shell fresh weights, shelled seed weight, and percent shell-out were recorded. Data was compared with that from similar trials in 2003 and 2004. Little disease or insect pressure has been seen in any year. Most peas evaluated have been in the pink-eye class. In 2005, all pink-eye types produced statistically similar fresh seed yield. Top Pick Brown Crowder produced higher seed yield than all other entries. Cream peas tested were generally lower yielding than the pink-eye types, with the lone black-eye cultivar tested, California Blackeye No. 5, intermediate in seed yield. Weighted average days to midharvest was not different among pink-eye cultivars evaluated but was slightly longer for several cream entries and for California Blackeye No. 5. Percent shell-out was highest in Top Pick Brown Crowder and lowest in Mississippi Cream. Over 3 years, more than thirty cultivars have been evaluated in the trials. Overall, most peas within a seed type have produced similar yields with few exceptions. Some lodging of the top-setting peas has been seen. The top-setting peas may offer advantages of ease of picking for hand-harvest in pick-your-own, small farm, and home garden situations. This trial does not address performance for machine harvest.

National Sweetpotato Collaborators Group

SWEETPOTATO VIRUS DISEASES RESEARCH IN EAST AFRICA

D.W. Miano[1], D. R. LaBonte[1] and C. A. Clark[2]. [1]Department of Horticulture and [2]Department of Plant Pathology and Crop Physiology, LSU, Baton Rouge, LA 70803*

Sweetpotato is an important staple food crop in Sub-Saharan Africa, with production being concentrated in East Africa, particularly around Lake Victoria. Productivity of the crop is greatly constrained by viral diseases. Four main viruses have consistently been detected from various surveys done in the region viz. sweet potato feathery mottle virus (SPFMV), sweet potato chlorotic stunt virus (SPCSV), sweet potato mild mottle virus (SPMMV), and sweet potato chlorotic fleck virus (SPCFV). Sweet potato caulimo-like virus (SPCaLV), sweet potato latent virus (SPLV), and cucumber mosaic virus (CMV) have also been detected though only in isolated cases. The most severe symptoms have been caused by co-infection with SPCSV and SPFMV, resulting in the synergistic Sweet potato virus disease (SPVD). Yield reductions due to virus infections have been estimated to be >90% in very severe cases. Virus detection has mainly been limited to the use of serological methods. Some plants have been observed with symptoms resembling those caused by viruses, but do not react with available antisera, indicating that the plants could be infected with viruses that have not been described, or not tested in the region. Use of other detection techniques such as PCR may result in identification of more viruses in the region. This report gives a summary of our research efforts towards detection of other viruses present in the region, and identification of resistant germplasm.

VIRUS DISTRIBUTION IN FIELD GROWN SWEETPOTATO VINES IN AFRICA

D.W. Miano[1], D. R. LaBonte[1], and C. A. Clark[2]; [1]Department of Horticulture and [2]Department of Plant Pathology and Crop Physiology, LSU, Baton Rouge, LA 70803*

Sweet potato virus disease (SPVD) is a major constraint to sweetpotato production in East Africa. The disease is a result of co-infection with sweet potato feathery mottle virus (SPFMV) and sweet potato chlorotic stunt virus (SPCSV). Some local sweetpotato genotypes have been reported to recover from, or have localized distribution of SPVD, suggesting that the disease is not fully systemic. This has led to the suggestion that uninfected cuttings may be obtained from previously infected plants. Experiments were set to determine the possibility of obtaining cuttings long enough for propagation that are free from virus infection. This would form a basis for recommending to the local small-holder farmers of a way to reduce losses due to the disease. Field grown sweetpotato vines were cut into three pieces (15, 15 to 30, and >30 cm from the apex) and tested for SPCSV and SPFMV. Nine genotypes were selected from a group of 21 local clones and used for this study. The two viruses were equally present in all the three sections of infected vines, indicating that it is not easy to obtain a virus free cutting for field propagation from an infected vine.

AN UPDATE ON EVALUATION OF VIRUS STATUS IN THE HEIRLOOM SWEETPOTATO GERMPLASM MATERIALS WITH REAL-TIME PCR TECHNOLOGY

K.S. Ling, USDA–ARS, U.S. Vegetable Laboratory, Charleston, SC.; C.A. Clark and C. Kokkinos, Dept. Plant Pathology and Crop Physiology, Louisiana State University, Baton Rouge, LA.; J. R. Bohac, USDA–ARS, U. S. Vegetable Laboratory, Charleston, SC.; S.S. Hurtt, USDA–APHIS, Bldg. 580 Powder Mill Road, Beltsville, MD; R. L. Jarret and A. G. Gillaspie, USDA–ARS, Plant Genetic Resources Conservation Unit, Griffin, GA*

Sweet potato virus disease (SPVD) is the most devastating virus disease on sweetpotato [*Ipomoea batatas* (L.) Lam] world wide, especially in East Africa. However, weather it is present in the U.S. is unknown. SPVD is caused by co-infection of sweetpotato feathery mottle virus (SPFMV) and sweetpotato chlorotic stunt virus (SPCSV). Presence of two other potyviruses, sweetpotato virus G (SPVG) and Ipomoea vein mosaic virus (IVMV) has also been confirmed in the U.S. Sweet potato leaf curl virus (SPLCV), a whitefly (*Bemisia tabaci*) transmitted Begomovirus, also has the potential to spread to commercial sweetpotato fields and poses a great threat to the sweetpotato industry. The U.S. collection of sweetpotato germplasm contains about 700 genotypes or breeding lines introduced from over 20 different countries. Newly introduced sweetpotato germplasm from foreign sources are routinely screened for major viruses with serology and graft-transmission onto indicator plants (*Ipomoea setosa*). However, a large portion of this collection including heirloom cultivars or old breeding materials has not been systemically screened for these major sweetpotato viruses. In this study, a total of 69 so-called heirloom sweetpotato PI accessions were evaluated for their virus status. We used Real-time PCR to detect five sweetpotato viruses, including four RNA viruses (SPCSV, SPFMV, SPVG, and IVMV) and one DNA virus (SPLCV). A multiplex Real-time RT-PCR system was developed to detect three RNA viruses (SPFMV, SPVG, and IVMV). Preliminary data indicated that about 15% of these heirloom sweetpotato germplasm carried at least one of these viruses tested. Details on virus infection status will be presented.

INDIVIDUAL SHRINK WRAPPING OF SWEETPOTATOES: A VALUE-ADDED MARKETING TREND

D.H. Picha, Department of Horticulture, LSU AgCenter, Baton Rouge, LA 70803

The use of heat shrinkable plastic film for wrapping individual sweetpotato roots was evaluated as a form of value-added packaging. Individual shrink wrapping of sweetpotatoes is a recently adopted but increasingly used retail marketing technique. The shrink wrapping process involves enclosing individual roots in shrink film which is cut and heat sealed followed by transfer through a heat tunnel to create a tightly sealed package. Film thickness ranges from 40 to 100 microns (gauge). Manual, semi-automatic, and automatic application methods are available. Fully automated commercial methods approach a speed of 1 wrapped root per second. Shrink wrapping adds value to fresh market sweetpotatoes by enhancing appearance, reducing weight loss, and allowing for individual root labeling. Various film types and thicknesses were tested under simulated retail conditions. Root weight loss from shrink wrapped roots was significantly

reduced during storage, ranging from a total of 0.5% in wrapped roots to 2.5% in unwrapped roots after 3 weeks of ambient storage. There was an inverse relationship between film thickness and root weight loss, with the thicker gauge films showing the least amount of weight loss. Film type and thickness did not influence overall root flavor and sweetness perception. In order to reduce the incidence of surface mold, the root must be completely dry before wrapping. This form of packaging offers significant potential for enhancing retail consumer demand.

INTERIM RESULTS FROM THE SWEET POTATO RAMP GRANT IN MISSISSIPPI.

J.T. Reed, M.R. Williams, and D. Fleming; Dept. of Entomology and Plant Pathology, Mississippi State University*

Results from research funded by RAMP (Risk Assessment and Mitigation Program) funds conducted with sweetpotato growers in Mississippi during 2004 and 2005 are discussed. Insects were sampled on a weekly (2004) or biweekly (2005) schedule on land planted to potatoes with and without insecticidal input. Potatoes were harvested from each cooperator's field and evaluated for insect damage one or more times at the end of the season. Insect pest populations in Mississippi sweetpotatoes were relatively low during 2004 and 2005. Under these conditions, the percentage of sweetpotatoes damaged by insects was only slightly reduced by insecticides. Chrysomelid leaf beetles including flea beetles, cucumber beetles and tortoise beetles were the most obvious group of pest insects. The most prominent insect species in sweep net samples during the season was the sweetpotato flea beetle, however damage by this pest was negligible. The most damaging insect based on our evaluation of root damage was the twelve-spotted cucumber beetle. Root feeding by whitefringed beetles, white grubs, and sugarcane beetles was sporadic within the fields in the study, and damage by these insects was generally minimal in 2004 and 2005. Preliminary assessments of the effect of crops planted the year previous to the planting of sweetpotatoes indicate the following order of greater to lesser insect damage: pasture, soybeans, corn, sweetpotato, and cotton. Delay of harvest beyond the optimum harvest date tended to increase insect damage in marketable roots. Pesticide evaluations associated with the study indicate that some reduction in damaged roots may be derived from application of a soil-incorporated insecticide at lay by.

GIS ON THE CHEAP: DIVA–GIS AND OTHER FREE DATA VISUALIZATION TOOLS FOR RESEARCH

A. Villordon, LSU AgCenter, Sweet Potato Research Station, 130 Sweet Potato Road, Chase La 71324

Geographic information system (GIS) tools allow the visualization of research data that have a strong spatial component. Currently, several proprietary desktop GIS tools are available that enable researchers to generate maps and perform spatial analysis. However, these packages often require licensing agreements and do not provide specific options that enable rapid and uncomplicated analysis of biological diversity data. As an alternative, publicly available GIS applications that perform basic GIS as well as specialized functions are available. For example, DIVA–GIS was developed specifically to allow analysis of genebank and herbarium databases as well as to assess genetic, ecological, and geographic patterns in the distribution of crops and wild species. It is potentially useful for researchers who do not have the time to learn how to use proprietary GIS software, or who cannot justify purchasing a license to perform very basic GIS operations like creating and modifying maps. This presentation describes the basic features as well as some advanced functionality of DIVA–GIS and other publicly available GIS applications.

SUMMARY OF IRRIGATION STUDIES CONDUCTED AT THE SWEET POTATO RESEARCH STATION, 2000–2005

A.Q.Villordon, J.W. Franklin, and W. McLemore, LSU AgCenter Sweet Potato Research Station, Chase, LA 71324*

This report summarizes the results of irrigation studies conducted from 2000 to 2005 at the Sweet Potato Research Station, Chase, La. These studies investigated the role of various scheduling methods, soil moisture measurement devices, and irrigation delivery methods in sweetpotato production. The studies indicate that 15 to 20 inches of total rainfall and supplemental irrigation is required to produce 400 to 525 bu/acre of US#1 storage roots in Beauregard. Supplemental irrigation can be scheduled based on this benchmark, potentially reducing over-irrigation during dry periods. We have also found that during dry periods, irrigating every furrow can bring about 50% difference in US#1 yield vs. supplying irrigation to alternate furrows. During growing seasons characterized by optimum rainfall patterns, we did not detect any response in US#1 yield to various irrigation treatments. We evaluated several moisture measurement devices including granular matrix sensors, evaporation pan, time domain reflectometry (TDR)-based instrument, and tensiometers. We found the TDR-based device easy to use and convenient in terms of its portability. Based on studies conducted in 2001 and 2002, this device demonstrated potential as a management tool in sweetpotato production. For instance, a management allowable deficit (MAD) of 25% available moisture as measured using the TDR-based device can potentially result in the same yield as weekly irrigation and a MAD of 50% available moisture. When used properly, irrigation scheduling can reduce over-irrigation and contribute to overall efficiency in the use of production inputs.

TRANSPLANT AND STAND SURVIVABILITY STUDIES IN SWEETPOTATOES

A.Q.Villordon, J.W. Franklin, T.P.Talbot, J.M.Cannon, and W. McLemore, LSU AgCenter Sweet Potato Research Station, Chase, LA 71324*

Transplant survivability is important in achieving consistent economic yields in sweetpotatoes. We are conducting a series of studies that investigate the role of transplant quality in sweetpotato yield. In 2004, in addition to investigating the role of transplant diameter, we also investigated the influence of transplant water (about 6 oz per hill) on stand and yield. Even though rainfall events were regular and mean rainfall during the growing season was above average for the year, there was a significant increase in US#1 yield (23.57%) among plots derived from thick transplants (≥0.25 inches, no transplant water) versus thin transplants (no transplant water). There was a 44.16% increase in US #1 yield among plots planted with thick transplants vs. plots with thin transplants (with transplant water). In 2005, there was also a significant difference (14%) in US #1 yield between plots planted to thick and thin transplants, respectively. This indicates the possible role of transplant thickness on stand and yield. We also investigated the relationship between root spacing during bedding on cutting diameter as well as a farmer's practice of planting two transplants per hill. In both preliminary tests, no differences among the treatments were observed. Additional studies are planned to investigate the possible use of chemical-based treatments to enhance transplant thickness and survivability.

Watermelon Research Group

JUICE AND CAROTENOID YIELD FROM PROCESSED WATERMELON

P. Perkins-Veazie,[1] J.K. Collins[1], M. Siddiq[2], and K. Dolan[2]; [1]USDA–ARS Lane, OK 74555; [2]Michigan State University, East Lansing, MI 48824

Most watermelon in the U.S. is consumed fresh. Development of value-added products from watermelon is desirable for new market niches, and provides alternative markets for fruit that are cosmetically undesirable for the fresh market. The objective of this experiment was to determine if different processing techniques changed the lycopene and quality aspects of juices and concentrates. Watermelon flesh was macerated, followed by holding at room temperature (no heat) or heating to 50 °C. Macerate was then placed in a hydraulic press to obtain juice. Adding heat to macerate increased juice yield by 1% to 2% and increased lycopene content by 1 to 2 $mg \cdot kg^{-1}$. The residual pomace (waste from juicing) also contained lycopene, about 110% of that found in the juice, or 10% from the original macerate. In a second experiment, juice was subjected to pasteurization, which caused a slight loss of lycopene and beta-carotene compared to the unpasteurized juice. In a third study, juice was concentrated to 42 °Brix using either 40 or 50 °C heat treatments, followed by pasteurization. Heating juice to 50 °C concentrated the lycopene by 17% compared to heating to 40 °C. Pasteurization increased the lycopene content of the 40 °C concentrate by 10% but not of the 50 °C concentrate. In summary, the addition of heat at various steps during processing and pastuerization of watermelon concentrated but did not degrade lycopene. Additionally, the residual pomace created from juice manufacturing is a concentrated source of carotenoids and may have potential use as a value added nutraceutical product.

DEVELOPING EXPRESSED SEQUENCED TAGS (ESTS) FOR WATERMELON FRUIT

Amnon Levi[1], Angela Davis[2], Pat Wechter[1], Alvaro Hernandez[3], and Jyothi Thimmapuram[3]; [1]USDA, ARS, U.S. Vegetable Laboratory, 2700 Savannah Highway, Charleston, South Carolina 29414; [2]USDA, ARS, P.O. Box 159, Lane, Oklahoma 74555; [3]University of Illinois at Urbana-Champaign, Biotechnology Center, W.M. Keck Center for Comparative and Functional Genomics, 1201 W. Gregory Drive, Urbana, IL 61801

A cDNA library was assembled using mRNA of watermelon fruit. The cDNA library was normalized and subtracted by hybridization with leaf cDNA of the same watermelon cultivar (Illini Red). 1,046 cDNA clones were sequenced to identify genes associated with fruit development and quality. Of 1,046 cDNA clones sequenced, 832 were unique sequences and designated as expressed sequenced tags (ESTs). Of the 832 ESTs, 205 (24.6%) have not been reported in any other plant species. Additionally, 186 ESTs (22.4%) correspond to genes with unknown function, while 441 ESTs (53.0%) correspond to genes with known function in other plant species. These ESTs are mainly associated with primary metabolism, membrane transport, cytoskeleton synthesis and structure, cell wall and cell division, signal transduction, nucleic acid binding and transcription factors, and defense and stress response. Differential expression of the ESTs was examined using microarray analysis. About 200 (24%) of the 832 ESTs showed differential expression during the development and ripening of watermelon fruit. The ESTs were also screened for simple sequence repeat (SSR) motifs. Of 832 ESTs screened, 177 contain SSR motifs. Primer pairs are being designed for these ESTs, and will be used for development of EST-SSR markers and for mapping on a genetic linkage map constructed for watermelon. This study provides valuable information on genes controlling watermelon fruit development and quality.

EFFECTS OF POSTAPPLICATION HALOSULFURON-METHYL AT VARIOUS PERCENTS OF VINE COVERAGE ON WATERMELON YIELDS

Peter J. Dittmar, David W. Monks, Jonathan R. Schultheis, and Katherine M. Jennings; North Carolina State University, Department of Horticultural Science, Campus Box 7609, Raleigh, NC 27695-7609*

Most seedless watermelons are grown on black polyethylene mulch to aid crop establishment, growth, yield, and quality and weed control. However, nutsedge is a persistent problem in this production system, as it can easily penetrate the mulch. Halosulfuron-methyl is registered in some crops and provides excellent yellow nutsedge control. The objective of this research was to determine the effects of reduced halosulfuron-methyl contract to the watermelon plant on fruit yield and quality. The seedless watermelon cultivars, Tri-X-313 and Precious Petite, were transplanted into black polyethylene mulch and sprayed 16 days later. Halosulfuron-methyl at 35 g a.i./ha plus 0.25% (v/v) nonionic surfactant was applied at 187 L·ha^{-1} with a TeeJet 8002 even tip nozzle. Treatments were no spray, 25% of the vine tips, 25% of the crown, and over the top (entire plant). Plants in each treatment were rated (0% = no damage, 100% = fatality) for herbicide injury and the longest vine was measured on four plants. The no-spray treatment had the longest vines (156 cm). The topical halosulfuron treatment resulted in the shortest vines (94 cm) and the highest visual damage rating (63%). The herbicide caused foliage to yellow, internodes to shorten, and stems to crack. Treatments receiving halosulfuron-methyl applied to 25% of the vine (tip end) or 25% of the vine (crown end) resulted in reduced injury compared to the topical application. Generally, the 25% vine tip application was the safest halosulfuron treatment. The total yield (kg·ha^{-1}) and number of watermelons/ha were similar among treatments. The no-spray treatment produced 4450 kg·ha^{-1} and 8300 watermelons/ha. The over-top treatment produced 3500 kg·ha^{-1} and 7300 watermelons/ha. Watermelon in the no-spray treatment weighed 4.4 kg, while watermelons weighed 3.9 kg with the over the top treatment. Halosulfuron-methyl is registered to apply to middles between watermelon rows; however, topical applications are prevented due to the possibility of crop injury. This research suggests that reduction of topical application to only 25% contact of the crop may improve crop tolerance. Thus application to nutsedge patches where limited contact to watermelon occurs may be a possibility in the future.

YEAR TWO: EFFECTS OF GRAFTING ON WATERMELON YIELD AND QUALITY

Warren Roberts[1], Benny Bruton[2], Wayne Fish[2], and Merritt Taylor[1]; [1]Lane Agricultural Center, Oklahoma State University, P.O. Box 128, Lane, Ok 74555; [2]USDA–ARS/SCARL, P.O. Box 159, Lane, Ok 74555

This is the second year of research on the effects of grafting watermelon (*Citrullus lanatus*) onto rootstocks of squash and gourd. The study was conducted at Lane, Okla., in both 2004 and 2005. This report deals with the results from 2005. Treatments consisted of watermelon cultivars SF 800, SS 5244, SS 7167, SS 7177, and SS 7187 from Abbot & Cobb Seed Co., grown on their own roots, or grafted onto rootstocks of RS1330, RS1332, RS1420, or RS 1422. Additional controls consisted of nongrafted cultivars Sangria, Royal Sweet, Jubilee, and Jamboree. Two fields were planted, with three replications per field. Plants were grown on 1-m centers, with rows 3 m apart. Yields from grafted plants were higher than average farm yields in Oklahoma, but were lower than yields from the nongrafted plants in this experiment. Sugar content, measured as soluble solids, was in some cases lower with the grafted plants than with the nongrafted plants. Lycopene content of fruit from grafted plants was similar to that of fruit from nongrafted plants. Fruit firmness, as measured by a penetrometer, was significantly greater in the grafted fruit than in the nongrafted fruit. This increase in fruit firmness should be of significance to the fresh-cut fruit industry. Matching of scions with appropriate rootstocks was important, as interactions did occur. Rootstock 1332 generally had lower sugar content and yield than did the other rootstocks, but not with all scions. Certain combinations of rootstock and scion were significantly superior to other combinations.

COMPARISON OF CULTURAL PRACTICES AND FUNGICIDES FOR CONTROL OF PHYTOPHTHORA BLIGHT OF WATERMELON

W.R. Jester, Dept Horticultural Science, Kinston, NC 28501, M. L. Adams and G. J. Holmes, Dept. Plant Pathology, NC State Univ, Raleigh, NC 27695-7616

The experiment was conducted at the Cunningham Research Station in Kinston, N.C. (coordinates: N35 18.372; W77 34.937), on Goldsboro loamy sand. Three cultural systems (bare ground + overhead irrigation bare ground + drip irrigation, black plastic + drip irrigation) and seven fungicide treatments were evaluated in a split-plot design with cultural system as the main plot and fungicide treatments as subplots. The cultivar used was 'Mickey Lee'. The trial was installed 18 July. Soil moisture was monitored in each of the cultural regimes using soil moisture sensors (Spectrum Technologies, Inc, Plainfield, IL) and rain gauges. The cultural systems using drip irrigation were irrigated to 10 cb starting when soil moisture reached 40 cb. Overhead irrigation was used to maintain at least 2 inches per week total precipitation beginning 12 Aug. Cultural systems and fungicide treatments were replicated 4 times. To prevent gummy stem blight and powdery mildew, Pristine (14.5 oz/acre) and Quintec (6 oz/acre) were alternated with Bravo Weather Stik (2 pt/acre) and Flint (4 oz/acre) on a 7-day interval, beginning 16 Aug. Experimental fungicide treatments were applied using a CO_2 backpack sprayer equipped with a 3-nozzle (19-inch spacing) handheld boom with hollow cone nozzles (TXVS-26) delivering 40 gal/acre at 45 psi. Treatments were initiated when the largest fruit were about 6 inches in diameter. All treatments were applied on a 7-day interval with applications on 25 Aug. and 2, 9, 16, and 23 Sept. Plots were inoculated on 12 and 19 Sept. by hand-scattering 0.5 lb of 1-cm cubes of naturally *P. capcisi*-infected acorn squash fruit per plot. Disease severity was evaluated on 26 Sept. as fruit rot incidence and percent foliar necrosis. Captan was most effective in suppressing fruit rot regardless of cultural regime. Captan and NOA-446510 were both effective in reducing vine collapse across all cultural regimes. Incidence of fruit decay was significantly greater in the bare ground + overhead irrigation (overhead) cultural regime while plasticulture (plastic) and bare ground + drip irrigation (drip) resulted in similar levels of fruit decay and vine collapse. No interaction of cultural regime with treatment was detected. Watermelon stems and foliage are typically very resistant to Phytophthora blight, but significant vine collapse occurred in many plots. *P. capsici* was consistently isolated from diseased foliage and stems and is considered the primary cause of vine collapse.

ECONOMICS OF GRAFTED VS CONVENTIONAL WATERMELON PLANTS

Merritt Taylor[1] Benny Bruton[2], Wayne Fish[2], and Warren Roberts[1]; [1]Lane Agricultural Center, Oklahoma State University, P.O. Box 128, Lane, Ok 74555; [2]USDA–ARS/SCARL, P.O. Box 159, Lane, Ok 74555

Grafting of watermelons has been used in many countries to provide control of, or resistance to, certain soil borne diseases such as Fusarium wilt. The impact of grafting on postharvest quality has not been thoroughly examined. This report deals with the comparison of the costs of production between grafted versus conventional watermelons and the potential net revenue of the two. A 2-year study was conducted on the effects of grafting watermelon (*Citrullus lanatus*) onto rootstocks of squash and gourd at Lane, Okla., in both 2004 and 2005. Details of the research methodology are outlined in "Year Two: Effects of Grafting on Watermelon Yield and Quality" by Roberts et al. Costs of using grafted transplants increased the costs of production from $1,209 to $1,914 or $705/acre at 1,500 plants/acre. Results of the 2-year study indicated grafted watermelons had slightly lower yields per acre, similar sugar in some grafted combinations the first year but slightly lower the second year, similar lycopene content, and

much higher firmness. Results of a 10-day storage study indicated that firmness of fresh-cut flesh for all watermelons declined after ten days on the shelf. However, the grafted watermelon flesh was firmer after ten days than the nongrafted fruit at the beginning of the ten days. This improved shelf life should interest the cut-fruit industry and should lead to contract price enhancement for the growers. A market price of $0.02/lb for grafted watermelons above the market price of nongrafted watermelons would be needed to provide similar net revenues at the same yield per acre.

RESISTANCE OF WATERMELON (*CITRULLUS LANATUS* VAR. *CITROIDES*) GERMPLASM FOR RESISTANCE TO ROOT-KNOT NEMATODES

J. A. Thies and A. Levi; U.S. Vegetable Laboratory, USDA, ARS, Charleston, SC 29414*

Root-knot nematodes (*Meloidogyne incognita*, *M. arenaria,* and *M. javanica*) cause severe damage to watermelon and resistance has not been identified in any watermelon cultivar. In greenhouse tests, we evaluated 265 U.S. plant introductions (PIs) for nematode resistance (based on root galling and nematode reproduction), and identified 22 PIs of *Citrullus lanatus* var. *citroides* as moderately resistant to *M. arenaria* race 1. In subsequent tests, these 22 PIs exhibited low to moderate resistance to *M. incognita* race 3 and *M. arenaria* race 2. Three watermelon (*C. lanatus* var. *lanatus*) cultivars (Charleston Gray, Crimson Sweet, and Dixie Lee), three *C. colocynthis* PIs, and four *C. lanatus* var. *citroides* PIs, all previously shown to be susceptible to *M. arenaria* race 1, were susceptible to *M. incognita* race 3 and *M. arenaria* race 2. The *C. lanatus* var. *citroides* PIs that are most resistant to both *M. incognita* and *M. arenaria* should be useful sources of resistance for developing root-knot nematode resistant watermelon cultivars.

OVERVIEW OF WATERMELON VARIETY TRIALS IN GEORGIA

George E. Boyhan, East Georgia Extension Center, PO Box 8112, Statesboro, GA 30460 (gboyhan@uga.edu)

Watermelon variety trials have been held in Georgia for the past 8 years (1998–2005). Over this period of time, 165 varieties have been evaluated in the trials with 43 entries in the trial ≥2 years. Average yields have ranged from 13,267 lb/acre in 2005 to 45,867 lb/acre in 2002. Lower average yields reflect problems such as poor weed control. There was a concomitant increase in coefficient of variations (CVs) with lower average yields. Over the 8 years, the CV has ranged from 26% to 78%. Soluble solids have ranged from 8.7 in 1999 to 10.8 in 2004. Soluble solids CVs, however, remained relatively constant and ranged from 8% to 14%. The percent triploids ranged from 9% to 64% of entries over the 8 years. Trends over the 8 years included increasing percentage of triploids and the introduction of mini melons.