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Extension

AN INTERACTIVE WEB SITE FOR TRAINING LANDSCAPE PROFESSIONALS
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A Web CT site was developed to support the Georgia Certified Landscape Professional Testing Program. The certification program is a cooperative statewide project of the Georgia Green Industry Association, The Metro Atlanta Landscape and Turf Association, The Georgia Turfgrass Association and The University of Georgia. The web site includes reference information on each component of the test, including a streaming video providing an overview of the certification process, narrated PowerPoint lectures on seventeen chapters in the certification manual, on-line practice examinations, a printable blueprint, and over 1,000 images of common plants and plant problems. Since its release in January, 2002, the site has been accessed by 100 students. The Web CT format allows us to track students in the course, obtain feedback from them, and answer questions they may have about the site or the testing process. In a test administered in January, 2004, 69% of the students who passed the written portion of the test had visited the site and had made an average of 126 hits on various content pages. Only 36% of those who failed the written exam had visited the web site and averaged only 65 hits on content pages. These data indicate that the web site is helping students pass the exam.

OVERVIEW OF THE LSU AGCENTER'S NURSERY, LANDSCAPE, AND FLORICULTURE EXTENSION PROGRAMMING EFFORTS
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The LSU AgCenter has made considerable effort over the last five years in improvement of extension programming efforts in commercial ornamental horticulture. Target audiences included wholesale nursery growers, wholesale greenhouse growers, licensed horticulturists, landscape contractors, retail garden center managers, arborists, and golf course superintendents. Programs that have been implemented over the last five years include continuing education classes for licensed arborists in Louisiana (six times annually), a nursery production short course (held once every 2 years), ginger garden open houses (held twice), and regional field days for cut flower growers (held twice). Programs that have been enhanced over the last five years include the annual Louisiana Plant Materials Conference, certified nursery professional manual review and exam (held three times annually), annual poinsettia open house, and open houses held at nurseries around the state (once or twice annually). Multi-state programming efforts include the Mid South Greenhouse Growers Conference held annually in the Jackson, MS area and the Gulf States Horticultural Expo educational programs held annually in Mobile, AL. The Mid South Greenhouse Growers Conference is a cooperative effort of the extension services in Mississippi, Louisiana and Arkansas in co-sponsorship with the Louisiana Nursery and Landscape Association and Mississippi Nursery and Landscape Association. The Gulf States Horticultural Expo educational programs is a cooperative effort of the extension services in Louisiana, Mississippi, and Alabama in co-sponsorship with the nursery and landscape associations in Louisiana, Mississippi, and Alabama. In 2003 the LSU AgCenter recorded 22.8 FTEs of extension commercial ornamental horticulture effort.

GET IT GROWING PROJECT
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Get It Growing is a joint project of the LSU AgCenter Department of Horticulture and Communications Department developed to effectively utilize mass media in Louisiana to provide accurate, research based, regionally appropriate consumer horticulture information in an accessible, understandable format. The desired outcome is to develop an efficient method to deliver information to a home gardening audience that will make their efforts to select, plant and maintain trees, shrubs, lawns, ground covers, flowers, vegetables and indoor plants more successful. The project involves utilizing an AgCenter spokesperson to produce weekly 1.5 minute television segments, weekly newspaper columns and daily 1-minute radio messages. The challenge was convincing mass media around the state to carry the TV segments, radio messages and columns. This often involved personal visits and/or live appearances on TV and radio stations around the state. The weekly television segment is currently shown by six TV stations around the state (five are the no. 1 station in their market). Ten radio stations currently air the daily message, generally during the morning drive time. Fourteen daily and weekly newspapers around the state carry the weekly column; other publications use the column occasionally. The project also includes a website, www.getitgrowing.com, that plays an important role. Individuals are able to view, listen to or read current and past Get It Growing segments and columns on the website. Individuals participating from the Communications Department include Bobby Soileau, cameraman and video editor, Tobie Blanchard, audio editor and Tom Merrill, copy editor.

LANDSCAPE CLASSES FOR THE CONSUMING PUBLIC: INVOLVEMENT OF MASTER GARDENERS.
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A real need and want of consumer horticulture clients is information that will allow them to create and maintain the home landscape of their dreams. Landscape classes have been provided in northeast Louisiana Since 1991, with some 2000 clients having taken the course. The course is taught by LSU AgCenter personnel, Extension personnel from neighboring states, and other renowned horticulturists. The classes have also become a valuable tool for training horticultural tradesmen. Some horticultural providers, after taking the classes, have seen the opportunity to expand, and have taken the Commercial Applicator and/or the Landscape Contractor test. Several of the class participants have built businesses that gross six figure incomes. The landscape classes existed ahead of the local Master Gardener program. The Master Gardener organization now handles financial and classroom responsibilities for the landscape classes.

DEVELOPING A CURRICULUM TO TRAIN AND CERTIFY NURSERY WORKERS IN MIAMI-DADE COUNTY, FLORIDA
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Currently, there are 1,248 registered nurseries in Miami-Dade County, Florida. It was estimated in 2000 that the economic impact of the nursery industry in Miami-Dade County reached $555 million. In the year 2000, there were 6460 direct jobs with the nursery industry in Miami-Dade County. A survey was conducted with the registered nurseries in the county to determine the educational needs of the workforce and to assess the possibility of developing a curriculum model for
training and certifying nursery workers. The results showed that 72% of the current nursery workforce is of origin Hispanic. 60% of those nursery workers surveyed said that only 10% of their workforce speak basic English. The respondents indicated that “legal documents,” “language,” “turnover,” and “personal transportation” were limiting factors in hiring non-English-speaking workers in the county. When the respondents were asked about the educational needs of nursery workers, they indicated that topics such as “plant propagation,” “handling of the liners,” “potting- and-moving-up,” “customer satisfaction,” “ethics,” and “personal safety” were considered “very important” components of this training. More than 50% of those surveyed said that they would hire a certified nursery worker and more than 60% of them indicated that they would pay a better salary to a certified nursery worker. In summary, the nursery industry is willing to support the idea of training certified workers.

COASTAL ROOTS: AN EDUCATIONAL OUTREACH PROGRAM

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COASTAL ROOTS is an integrated educational program operating 17 schools and 9 parishes in Louisiana. The combined efforts of faculty and students in the LSU Louisiana Sea Grant College Program, LSU AgCenter’s Horticulture Department, LSU AgCenter’s Curriculum and Instruction Department, and LSU AgCenter’s Extension Service are essential to the program’s success. The student population is selected from public/private elementary, middle, and high schools and the goal of the program is to promote wetland stewardship and hands-on learning in science classrooms and in the field. A student-maintained school-based nursery produces containerized trees used in yearly hands-on coastal restoration efforts by students. Community leaders in each school district are contacted to assist with the selection of the restoration site. Lesson plans have been developed around this program to satisfy national and state teaching standards. The manual Putting Down Roots was published through the LSU Louisiana Sea Grant to serve as a resource book to assist new schools and community groups wanting to participate in this program. There is an established web site (coastalroots.org) with additional instructions and contact information. Supporters of this program include: The Louisiana Sea Grant, LSU AgCenter, NOAA, Barataria-Terrebonne National Estuary Program, Americorps on the Bayou, Coalition to Restore Louisiana Wetlands, Le Reflexions du Bayou, Restore American’s Wetlands, Louisiana Department of Natural Resources’ Coastal Impact Assistance Program, and Motiva.

Watermelon Research Group

WATERMELON AND CANTALOUPE VARIETY TRIALS, POLLENIZER EVALUATION, AND WATERMELON PRODUCTION IN GEORGIA


Watermelon trials, a cantaloupe trial, and evaluation of pollenizer ‘Companion’ were conducted in 2003. The watermelon trial at the Vidalia Onion and Vegetable Research Center (VOVRC) in Lyons, GA had 32 entries with 14 seedless entries. A second watermelon trial consisting of only seedless entries was conducted in Crisp County, GA. Yields in the VOVRC watermelon trial ranged from 19,511 to 55,431 pounds per acre. Watermelon acres in GA have declined slightly, while crop value has increased dramatically based on county agent surveys. The crop value for 2002 was estimated at close to $95 million; however, this is considerably more than the GA. Agr. Statistics Service estimate of about $30 million. According to The Packer, 60% of watermelons shipped from GA are now triploid. There were no yield differences among the cantaloupes trialed. Finally, ‘Companion’ pollenizer was evaluated as the pollen source interplanted every second or fourth triploid plant with no difference in yield.

J.B. Edmond Undergraduate Competition

AN EVALUATION OF POSTHARVEST FRUIT ROT RESISTANCE IN BLACKBERRY GENOTYPES

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Forty-nine blackberry genotypes (17 cultivars and 32 breeding selections) were evaluated for post-harvest fruit rot resistance in June and July, 2003. Fully mature, undamaged berries were harvested on two dates for each genotype at the University of Arkansas Fruit Substation, Clarksville. After processing in chilled coolers back to the Plant Pathology Department in Fayetteville, two replications of 10 berries of each genotype were placed in a high humidity chamber for 3 d (21–23 °C; 16-h daylength). This provided a total of four replications for each entry across the two harvest dates. Natural inoculum from the field provided the post-harvest pathogens, and no additional inoculations were conducted. Berries were evaluated after 3 d in the chambers for the presence of postharvest rot. If rot was present, then a rating scale of 1 to 3 (1 = very little mycelial growth present; 3 = berry totally covered by mycelia) was used to quantify rot. The fungal growth was examined visually and microscopically to identify the causal pathogen. There was a wide range of post-harvest fruit rot responses among the genotypes. The cultivars with the least rot were ‘Kiowa’, ‘Triple Crown’, and A–1689, with 80%, 73%, and 60% berries free of any rots, respectively. Botrytis cinerea was identified on all berries that had any presence of rot and was the most important pathogen that contributed to berry decay. Colletotrichum spp. was found less frequently on rotted berries. Results indicate that substantial fruit rot resistance existed among genotypes and variation for resistance could likely be used in breeding. Botrytis cinerea is the primary pathogen to target in post-harvest fruit rot breeding resistance at this location.

PROPERATION OF THORNLESS BLACKBERRIES UTILIZING ADVENTITIOUS SHOOTS FROM ROOT CUTTINGS

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Studies were conducted in early 2003 to determine the effect source of root cuttings and root lengths on yield of adventitious shoots and on subsequent plant yield for Arkansas-developed thornless blackberries. In the first study, roots from ‘Arapaho’ and ‘Apache’ plants grown in an above-ground bed containing commercial potting soil were compared to field-grown roots. Bed-grown roots averaged 6.9 shoots per 15 cm root cutting while field grown roots produced 3.4. ‘Arapaho’ had higher shoot production compared to Arapaho, 5.9 vs. 4.4 shoots/root cutting. In a comparison of 15- vs. 30-cm-long root cuttings of ‘Apache’, ‘Arapaho’, and ‘Ouachita’, shoot yield of 30-cm roots was higher than that of 15 cm roots, but total yield of shoots per unit of root length was not increased by the longer root cuttings. Rooting of adventitious shoots near 100% in both studies, and resulting quality of plants from these shoots was very good. The use of adventitious shoots from root cuttings for blackberry plant propagation appears to be a viable method for nurserymen to consider to increase total plant yield from root cuttings of blackberry.

Warren S. Barham PhD

Graduate Student Competition

LANDSCAPE PERFORMANCE AND GAS EXCHANGE OF BIRCH TAXA (BETULA SPP.) IN ARKANSAS

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The early landscape performance of 19 birch taxa was evaluated in
DEVELOPMENT OF A MICROP PropAGATION PROTOCOL FOR ASTILBE

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Astilbe spp. and cultivars are increasingly popular perennials in the nursery and landscape industry. Their slow vegetative multiplication rate by crown division and difficult seedling establishment make some species, such as Astilbe bibernata good candidates for micropropagation. We attempted in vitro culture of several organs, including rhizomes, leaf rachises, leaf blades, immature inflorescences, and stem tissue of young greenhouse-grown Astilbe chinensis var. taquetii hybrids. Bacterial and fungal contamination of explants ranged from 0% to 99% depending on the explant and method of surface sterilization. Surviving cultures did not exhibit significant callus or shoot proliferation on woody plant media (WPM) supplemented with various combinations of naphthaleneacetic acid (NAA) and either kinetin, benzyladenine (BA) or 2-isopentenyl adenine (2iP). Developing embryos in immature fruit of Astilbe bibernata succumbed to the sterilization treatment did not grow. Surface sterilized seeds (2% sodium hypochlorite or 50% plant preservative mixture (PPM) for 15 min) of Astilbe x arendssii and Astilbe bibernata placed on MS basal medium had low contamination but poor germination. Seed with no surface sterilization treatment was placed on sterilized germination paper and transferred to WPM medium with 2.0 mg·L–1 2,4-D, NAA and BA, or with NAA and kinetin after germination. Germinated seedlings were subsequently dipped in 50% PPM and produced callus on medium with either NAA or proliferated shoots with NAA with BA or kinetin. Difficulty in eliminating microorganisms from explants and recalcitrance of explants have limited our attempts to micropropagate Astilbe to in vitro manipulations of seedlings.

DO STUDENTS REALLY LEARN AS MUCH HORTICULTURE WITH WEB-BASED INSTRUCTION AS IN THE CLASSROOM?

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A study was conducted to compare student performance when receiving horticultural instruction online or traditional classroom instruction. In addition, the perception of students towards horticulture and the relationship between student performance and learning styles and demographic factors were examined. A survey distributed to all students at the beginning of their course obtained background information and students’ perception of horticulture. A similar survey distributed at or near the end of the course examined whether students’ attitudes changed over the course of the semester. The surveys included a quiz to measure students’ knowledge of horticultural concepts. In addition, students took a learning styles inventory to suggest which learning styles they preferred. Final numerical course grades were obtained for each student. Mean scores of the survey quizzes increased from pre to post-course for both groups of students. The increase for traditional course students was greater than for web-based students. Traditional course students reported that their course was an adequate learning experience more than did web-based students. Preference of instructional mode for horticulture changed over the semester from web-based to traditional for the web-based students. The perception of horticulture as an important science increased only among traditional course students over the semester. Course grades of traditional course students were positively correlated with their preferences for reflective, factual, verbal, and linear learning styles. Final grades for web-based students were positively correlated with grade point average (GPA), precourse quiz score, age, and distance living from campus. Final grades for traditional course students were positively correlated with GPA and precourse survey and negatively correlated with age and distance living from campus. The results suggested that web-based students did not learn as much as traditional-course students.
color, winter flowering, and indehiscent fruit. *Buddleja davidi* is a tetraploid (2n = 4x = 76) and other *Buddleja* species are diploids (2n = 2x = 38). Crossing a tetraploid with a diploid should produce a triploid (2n = 3x = 58). Plants with odd ploidy levels have been reported to have reduced fertility. The first goal of this study was to create artificial hybrids possessing ornamental characteristics not normally found in *B. davidi* cultivars. The second goal of this study was to create sterile hybrids by crossing a tetraploid to a diploid. Two successful crosses were obtained. The first cross, between *B. madagascarensis* Lam. and *B. crispa* Benth., produced 20 progeny with fleshy indehiscent fruit and orange flowers that occurred throughout the year in some seedlings. Morphological characteristics were intermediate between both parents. The second cross, between *B. davidi* var. *nanhoensis* ‘Monum’ (Petite Plum) (Chitt.) Rehd. (2n = 4x = 76) and *B. lindleyana* ‘Miss Vicie’ Fort. ex Lindl. (2n = 2x = 38), produced one progeny with larger flowers than either of the parents. Morphological features strongly resembled the male parent. Chromosome counts confirmed the progeny was a tetraploid indicating the possibility of unreduced gametes.

FLURPRIMIDOL AND UNICONIZOLE COMPARISON FOR HEIGHT CONTROL OF ‘STAR GAZER’ LILY
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Flurprimidol preplant soaks, foliar sprays, and substrate drenches were compared to the commercially recommended concentrations of uniconazole as a preplant soak and foliar spray for height control of ‘Star Gazer’ oriental lilies (*Lilium sp.*). Preplant bulb soak concentrations of flurprimidol were from 25 to 400 mg·L–1 (ppm) and uniconazole concentrations were 5 and 10 mg·L–1. Foliar spray concentrations of flurprimidol were from 5 to 160 mg·L–1 and the uniconazole foliar spray was 10 mg·L–1. Flurprimidol substrate drenches were from 0.25 to 4 mg a.i. Uniconazole at 10 mg·L–1 did not control plant height as a foliar spray and flurprimidol controlled height at concentrations >80 mg·L–1. Substrate drenches of flurprimidol at 0.5 mg a.i. adequately controlled plant height resulting in plants 45.3 cm (17.8 inches) tall, 23.7% shorter than the untreated control. Uniconazole preplant soaks of 5 and 10 mg·L–1 controlled plant height producing similar results as 35.5 and 42.7 mg·L–1, respectively, flurprimidol preplant bulb soaks. Preplant bulb soaks of flurprimidol at 25 mg·L–1 resulted in plants 47.7 cm (18.8 inches) tall, 22.7% shorter than the untreated control. Substrate drenches of flurprimidol and preplant bulb soaks of flurprimidol and uniconazole will need to be assessed, in terms of labor and product costs, to determine which method will provide adequate height control at a reasonable cost.

GENETIC INVESTIGATION OF ANTIOXIDANT ACTIVITY IN COWPEA (VIGNA Unguiculata (L.) WALP.)
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Analysis of antioxidant activity (AA) of entries in the 2002 Regional Southernpea Cooperative Trials revealed not only significant differences among entries, but that entries with pigmented (black and red) seed coats were clustered among the highest, cream types were the lowest, while pinkeye and blackeye types were intermediate. These findings provided strong evidence that compounds responsible for pigmentations would be the preferred control measure. Greenhouse methods to evaluate cowpea germplasm for seedling resistance to *R. solani* were developed using inoculum cultured on dent corn kernels. The kernels were chopped into various sized particles in order to evaluate different levels of inoculum potential of *R. solani*. Single seeds of ‘Charleston Greenpack’ and ‘White Acre’ cowpea and ‘Kentucky Wonder–191’ pole bean (*Phaseolus vulgaris*) were planted in 0.2-L cells containing pasteurized soil (2 sand : 1 soil) infested with *R. solani* inoculum. Two weeks later, seedlings were rated for disease on a 1 to 5 scale with 1 = 0% to 3%, 2 = 4% to 25%, 3 = 26% to 50%, 4 = 51% to 80%, and 5 = 81% to 100% of hypocotyl circumference covered with lesions or dead plant. Various inoculum levels (particle size x concentration) of *R. solani*-infested corn kernels were assessed to determine the optimum inoculum rate (0.6 x 0.6 x 0.2 cm3 particle size at 0.5 g per cell) for seedling resistance evaluations. Three-hundred sixty plant introductions from the core subset of the USDA Cowpea Germplasm Collection were evaluated for seedling resistance using the optimized screening method. The moderately resistant check, ‘Kentucky Wonder–191’ pole bean, was included in all tests. Nine cowpea accessions exhibited moderate resistance (disease index <3.0) in the initial screening and will be re-evaluated in a replicated test. The optimized ground kernel method is an efficient screening technique to evaluate cowpea for seedling resistance to *R. solani*.
COWPEA BREEDING LINES WITH GOOD TOLERANCE TO FOMESAFEN AND IMAZAMOX

Herbicides already registered in soybean could potentially be used in cowpea. Fomesafen (Reflex) is a postemergence, broadleaf herbicide primarily used in soybean. Cowpea is sensitive to fomesafen. Imazamox (Raptor) is a newly registered herbicide for cowpea with the same mode of action as imazapic. Imazamox may cause injury, in the form of stunting and reduced yields, to sensitive cowpea cultivars. Experiments were conducted to identify cowpea cultivars or advanced breeding lines with high tolerance to fomesafen and imazamox. Selection for fomesafen tolerance was done at the Vegetable Substation, Kibler, Ark., in 2001 and 2002 using 0.84 kg a.i./ha and 50 entries each year. Six advanced breeding lines were chosen from the 2001 screen and used in replicated trials, sprayed with 0.67 kg a.i./ha fomesafen, in 2002. Early Scarlet was the commercial standard. Yield reduction ranged from 0 to 62%. Early Scarlet incurred 30% yield loss. Of the six advanced lines, three were chosen for multiclosetest in 2003. Trials in 2003 were conducted at Kibler and Marriana, Ark., and Bixby, Okla. Fomesafen rates were 0, 0.17, 0.34, and 0.67 kg a.i./ha. Line 00-584 showed the least foliar injury and least delay in pod set compared to other lines and Early Scarlet. Lines 00-582 and 00-584 showed the most tolerance to fomesafen across locations. Selection for imazamox tolerance was conducted in 2002 at Kibler. AR using 50 entries sprayed with 0.044 kg a.i./ha. A wide range of yield reduction were observed between entries. Seven lines were chosen for the replicated trial in 2003. Stunting ranged from 1% to 30% 2 weeks after treatment. The only line that did not show yield loss from Raptor was 01-1164.

COWPEA BREEDING LINES WITH HIGH TOLERANCE TO ACIFLUORFEN AND BENTAZON

Acifluorfen (Blazer) and bentazon (Basagran) are postemergence herbicides used for broadleaf weed control in soybean. Acifluorfen is not labeled for use in cowpea because the crop is more sensitive to acifluorfen than soybean. Bentazon is labeled for cowpea, but cultivars show differential sensitivity to this herbicide. Potential cowpea injury from bentazon is less than that of acifluorfen. Studies were conducted between 2001 to 2003 to identify cowpea lines and cultivars with high tolerance to acifluorfen and bentazon. Selection of advanced lines were done in 2001 and 2002, using 1.12 kg a.i./ha acifluorfen and 2.24 kg a.i./ha bentazon, at the Vegetable Substation, Kibler, Ark. Replicated studies using selected lines were then conducted in 2002 at Kibler; and in 2003 at Kibler and Marriana, Ark., and Bixby, Okla. Erex Set and Early Scarlet were used as commercial standards. Lines with good tolerance to acifluorfen also had excellent tolerance to bentazon. The commercial standards also showed good tolerance to both herbicides. Three of the best lines (00-178, 00-855, and 92-552) were used, along with the commercial standards, in multilocation trials in 2003. Rates for acifluorfen were 0, 0.28, 0.56, and 1.12 kg a.i./ha and that of bentazon were 0, 1.12, and 2.24 kg a.i./ha. Average injury from acifluorfen (0.28 kg a.i./ha) between entries ranged from 24% to 38% and 10% to 15% from bentazon (1.12 kg a.i./ha). Line 92-552 (released as Empire in 2003) showed consistent tolerance to acifluorfen, incurring no yield reduction at commercial use rates. Empire generally yielded better than Early Scarlet. Although injury from bentazon is oftentimes negligible, some lines incurred yield loss from bentazon treatment.

EVALUATION OF FRESH MARKET COWPEA LINES
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Twenty-nine entries were received for a trial of southerpea (Vigna unguiijulata) cultivars and cultivgens for green-shell, hand-harvest. Entries included black-eye, pink-eye, crowder, and creamtypes. Plots were single rows, 4.5 m long, spaced 0.75 m apart, with 32 seeds/s/m along the row. The trial was planted at Crystal Springs, Miss., on 25 June 2003. Plants stands ranged from 85 to 96 plants/plot. Some foliar disease ratings were made before the first harvest. Plant lodging was rated during the harvest period. Multiple harvests began Aug. 14. Pods were picked at the green-shell stage, weighed, shelled, and the seeds re-weighed. Of particular interest were entries that set pods above the foliage, a trait thought to reduce labor costs for hand harvest. Generally, black-eye and pinkeye types out-yielded the cream-types under the conditions of this trial. Yields before shelling ranged from under 1000 g/plot to over 3300 g/plot. Percent shell-out ranged from 25.9% to over 60%. Plants setting pods above the foliage were generally easier to harvest than those setting pods deeper in the plant.

Education

GREENHOUSE MANAGEMENT ONLINE—AN INTERACTIVE ALTERNATIVE TO TRADITIONAL GREENHOUSE MANAGEMENT TEXTBOOKS
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Greenhouse Management Online is a web-based learning center for teachers and students of greenhouse and controlled environment agriculture. It is designed to replace traditional printed textbooks. The site consists of twelve learning units covering specific topics related to greenhouse management and controlled environment agriculture. A searchable index allows users to find information on any topic throughout the site. Each learning unit contains text with a printer friendly option available so that students may print the text before attending lectures. Each learning unit contains color images linked to keywords in the text. Each learning unit also contains numerous short videos that are used to display technologies and practices where motion is important. At the end of each unit, links are provided to sites of interest related to the topic of the respective learning unit. Upon completing a learning unit, students may take a self-examination to determine how well they understand the material in the unit. Greenhouse Management Online is available (http://www.uark.edu/~mreavans/4703) for any instructor of greenhouse management or controlled environment classes to use as a teaching aid or as a replacement for traditional greenhouse textbooks.

USING A DATABASE TO SERVE MULTIPLE AUDIENCES AND WEB PAGES
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Inspired by the need for a plant identification resource tailored to the students and classes taught at Oklahoma State University, the website www.okplantid.org was created. okPLANTid has evolved and grown to where it now provides detailed photographs and cultural information for plants taught in seven different classes at Oklahoma State University and serves FFA, 4-H, and ASHS-ACB audiences. In addition to the specific plant lists provided for classes and the audiences listed above, the general public can visit the website and search the databases by scientific- or common name. Two dedicated servers—a database file server and a web server—provide instantaneous access to taxonomic data and photos via okPLANTid. FileMaker Server 5.5, a multiple user, platform- and operating system independent, dedicated database file server, handles all search and sort calls to the twelve relational databases of OBGA-PIM©, the Oklahoma Botanical Garden and Arboretum’s Plant Information Manager. FileMaker Server returns the requested data to FileMaker Pro Unlimited 5.5, running on a dedicated web server, which, then, delivers the customized web pages of okPLANTid to the WWW via FileMaker’s Web Companion plug-in. Since okPLANTid web pages are dynamically generated from data stored in OBGA-PIM, when changes or additions are desired, only the databases need to be edited, not the web pages. Many have contributed to the creation of the okPLANTid website. The authors would like to acknowledge the following people: Todd Johnson for first suggesting that the website be served by a database; Jennifer Lewis for her exceptional programming skills.
HORTICULTURE 101: GROWING TO THE NEXT LEVEL
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Horticulture is outdoors and hands-on, yet, at the University of Georgia, we teach the introductory course in a large classroom with 170 students and no windows. The goals and objectives for this course vary. Students want an interesting course that is not too difficult. As the instructor, I want students that are interested and participate. The department wants more majors and minors, and the college wants higher enrollment. In large classes PowerPoint has become the norm; however, students are often bored with PowerPoint. In this introductory course, if PowerPoint is used, it is for imagery, but descriptions are verbal, not squeezed onto a picture frame. Students are given a houseplant to grow and return for a plant fair on the last day of class. They are graded for participating and given bonus credit for categories like ‘best looking’ and ‘ugliest’. Students also prepare a food dish using a horticultural crop and bring it in for a pot luck meal. Additional outside class assignments include collecting a soil sample for analysis and completing a water audit of their home. These projects provide opportunities for student interaction and fun on presentation days. To build further interest, small plants are brought to class and given away for answering questions from lecture notes. This reinforces subject matter like plant nomenclature and plant propagation. Grades, handouts and links are posted on the course WebCT site, to save classroom time. Departmental teaching faculty members are invited to speak on a subject of their choosing, exciting students about other courses. The results: enrollment from 50 to 170 in 2 years; enrollment up in other horticulture courses; 10% increase in horticulture majors fall of 2003. Student evaluations have been very positive.

PROBLEM-BASED LEARNING IN THE CLASSROOM
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As professors of horticulture, we are challenged to prepare our students for careers in production horticulture and, yet, many of us rely almost exclusively on sequential lectures, directed reading and writing assignments, and quizzes and exams that stimulate and evaluate students only at the basal levels of the cognitive domain of Bloom’s Taxonomy. Our challenge is to drive students beyond these basal knowledge and comprehension levels to the analysis, synthesis, and evaluation levels. Problem-based learning (PBL) is one teaching technique to help students develop problem solving skills, lifelong learning skills, communicative skills, and team leadership skills. HORT 3113—Greenhouse Management at Oklahoma State University uses the PBL “seven step” as developed by the University of Maastricht, the Netherlands, to help students develop these skills, which are essential for solving the problems encountered in production horticulture. The students are distributed into PBL study groups of 8–10 students each. During the first session, in which a given PBL topic is introduced, students move sequentially through the first five steps of the PBL seven step: 1) clarifying concepts, 2) defining the problem, 3) analyzing the problem, 4) organizing facts and knowledge, and 5) formulating learning objectives. The sixth step is self-study, during which students select and study resources and establish links between previous and new knowledge. A few days to 1 week later, students reassemble for the second session with their PBL study group peers to engage in the seventh step: discussion.

ACTIVE CLASSROOM PARTICIPATION AND DEMONSTRATIONS TO EXCITE NONSCIENCE MAJORS ABOUT THE SCIENCE OF HORTICULTURE
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Horticulture traditionally has been a popular technical elective. Increasingly, horticulture is realized to be an excellent science elective. A general horticulture course is an ideal vehicle to present principles of plant biology and physiology coupled with real world application of science. Such applied science courses often have high enrollment of nonscience majors, which often have inadequate background and lack a genuine interest in science. Active teaching techniques and class room demonstrations offer excellent approaches to excite nonscience majors. Active participation and demonstrations have been found to be extremely effective in the following: using students to act-out excitation of chlorophyll and electron flow in the electron transport chain of photosynthesis; using a cardboard box inflated with a trash bag to simulate turgor; using an overhead projector, podium and students acting a plants to demonstrate sunny and shady side of building for planting sun versus shade plants; a globe and overhead projector to demonstrate photoperiod; a broom covered with paper then pipe insulation to dem- onstrate air layering, grafting and budding; and a guy dressed in turtle neck under a camouflaged shirt to simulate T-budding his chest. These techniques offer visual images and actions that capitalized on visual and aural memory, demonstrate complex relationships better that pictures, graphs and diagrams, and break the monotony of class and hold the student’s attention. One has to make sure the “show” does not become more important than the “educational objective”; in other words, it cannot be all “sizzle” and no “steak”.

Posters
PEDITRACK—A SIMPLE PEDIGREE PROGRAM FOR LINEAGE TRACKING
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Lineage tracking remains an important part of the plant sciences, especially for plant breeders. However, breeding programs are burdened with a yearly proliferation of crossing information that are often held in a cumbersome spreadsheet-like environment. In a simple database system which allows for quick and accurate querying, PediTrack takes the spreadsheet one step farther to generate pedigrees in an easily understandable format. Other pedigree programs are available commercially, yet they are often combined with expensive statistical analysis software, specific to certain organisms, or unadaptable for specific programmatic use. The purpose of PediTrack is to allow a PC user with Microsoft (MS) Access version 2000 (Microsoft Corp., Redmond, Wash.) or higher to use the simple program without charge. Since PediTrack does not perform any calculations, the initial program size is small(<2MB). The program consists solely of the basic framework for housing pedigree information and reporting pedigrees based on those records.

PROPAGATION OF THORNLESS ARKANSAS BLACKBERRIES BY HARDWOOD CUTTNGS
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Affects of auxin application and cutting location on canes on adventitious root development in hardwood cuttings of three Arkansas thornless blackberry cultivars were studied. Dormant canes were collected from 1-year-old plants of ‘Apache’, ‘Arapaho’, and ‘Navaho’ and stored in a cold room until February. Two- or three-node cuttings were taken from the canes at apical, mid, and basal locations along the cane and were placed under intermittent mist in a perlite-filled greenhouse bed. Cuttings were either untreated or treated with auxin indole-3-butyric acid (IBA), applied as a liquid quick dip at 0.3%. In general, cutting diameter was greatest for basal, and smallest for apical cuttings. Significant interactions were observed for cultivar and cutting location, and cultivar and auxin treatment for rooting. ‘Apache’ with auxin treatment had the highest rooting percentage, and ‘Arapaho’ and ‘Navaho’ with auxin the lowest. For cuttings that rooted, auxin treatment increased the root rating, representing root system development, for ‘Apache’ and ‘Navaho’ but had no affect on ‘Arapaho’.

‘PALMETTO’—A NEW SOUTHERN Highbush BLUE-BERRY CULTIVAR
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Released in 2003 by the University of Georgia and U.S. Dept. of Agriculture, ‘Palmetto’ is an early season southern highbush blue-
berry (*Vaccinium* sp.), having favorable fruit attributes, concentrated ripening, good yields and excellent plant vigor. ‘Palmetto’, tested as TH-471, was selected in 1985 at the Coastal Plain Experiment Station in Tifton, Ga. from a cross of US–158 X TH–157. The hybrid is mostly *V. corymbosum*, but it also has *V. darrowi* and *V. australis* germplasm in its pedigree. ‘Palmetto’ fruit ripens early with the cultivar Star in south Georgia, and 8 days before ‘Georgia’. On average over a 6-year period, ‘Palmetto’ ripened >75% of its fruit in the first 2 weeks of May in south Georgia. Berry stem scar, firmness, and flavor of the new cultivar are excellent, and berry size and color are medium. ‘Palmetto’ plants are vigorous, with an open, spreading bush habit and narrow crowns. The cultivar blooms in early March in south Georgia and will likely benefit from frost protection (similar to ‘Star’). Over a 5-year test period, ‘Palmetto’ yield exceeded ‘Georgia’ by more than 100%. Propagation of the new cultivar is easily accomplished from softwood cuttings. Chill hour requirements should be similar to that of other early season southern highbush such as ‘Star’ and ‘O’Neal’, in the range of 350 to 450 hours. Plants are self-fertile to a degree, but should be planted with other southern highbush blueberry cultivars with a similar time of bloom to provide optimum pollination. Propagation rights are controlled by Georgia Seed Development Commission, 2420 S. Milledge Avenue, Athens, Ga. 30606.

‘BRIGHTWELL’: A MORE SELF-FERTILE RABBIT-EYE BLUEBERRY

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‘Brightwell’, one of the most planted rabbiteye blueberry cultivars, has a tendency to produce full crops in fields where others, such as ‘Tifblue’, obtain only a partial crop. The objective of this study was to test whether or not the degree of self-fertility helps to explain the difference in performance between ‘Brightwell’ and ‘Tifblue’. Flowers were hand pollinated with either self- or cross-pollen, and berries were harvested at full maturity. Fruit set, seeds per berry, berry weight and days to ripening were recorded. A self-fertility index (self/cross) was calculated using fruit set data. Self-pollination reduced fruit set relative to cross-pollination in both cultivars, even though the extent of this decrease was more severe in ‘Tifblue’. ‘Brightwell’ was significantly more self-fertile than ‘Tifblue’. This difference contributes to the explanation of their different performance in the field. Cross-pollination increased berry weight and rate of ripening in both cultivars. These two parameters were linearly related to the number of seeds per berry. In ‘Tifblue’, the pollen source also affected the allocation of seeds among locules within berries. Seeds were highly concentrated in one or two locules in self-pollinated berries. There was no effect of pollen source on seed allocation in ‘Brightwell’. These findings suggest that a prezygotic mechanism may contribute to self-inferitility in rabbiteye blueberries, and that its expression would depend on the cultivar.

DIFFERENCES IN DEPOLIATION AND DAMAGE BY JAPANESE BEETLE (*POPILLIA JAPONICA*) AMONG VARIOUS FRUIT GENOTYPES

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Experimental trials of commercial cultivars and breeding selections of apple, blackberry, grape, and blueberry in Fayetteville, AR received significant damage by Japanese beetle during 2003. Individual plants were rated for damage severity (0 = no damage, 5 = severe damage) and apples were rated for percent defoliation. A total of 262 apple, 20 blackberry, 17 grape, and 22 blueberry genotypes were evaluated. Significant differences among genotypes were observed in all crops except blueberries. Mean damage ratings ranged from 0.5 to 4.3 in apples, 0.5 to 4.0 in blackberries, and 0.3 to 3.8 in grapes. About 45% of apple, 25% of the blackberry, and 30% of the grape genotypes were rated as moderate or less damage (rating <2.0). Among apples, *Malus baccata* displayed the greatest average percentage damage (70%); about 30% of the genotypes had <5% damage. Among commercial cultivars, Liberty showed the greatest defoliation (85%) and Cortland and Arkansas Black were among the least damaged. Among blackberries ‘Apache’ sustained the greatest damage (4.0) while several breeding selections received average ratings <1.0. Significant differences in damage were noted among 12 thornless and 8 thorny genotypes, with the thornless types having greater damage (2.8) than thorny types (2.1). The grape cvs Neptune and Jupiter along with other breeding selections had damage ratings >3.0 while Mars averaged 0.3, significantly less damaged than any other genotype. Although variation in damage among blueberry cultivars was large, there were no significant differences in damage.

A COMPARISON OF THE PERFORMANCE OF ‘OZARK-BLUE’BLUEBERRY PLANTS PROPAGATED BY TISSUE CULTURE AND HARDWOOD CUTTINGS

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‘Ozarkblue’ blueberry plants propagated by tissue culture (TC) and hardwood cuttings (HC) were compared to determine whether there was a propagation method effect on bloom, ripening date, yield, berry quality, and plant volume. The yield of TC plants was significantly higher in the first (2001; P <0.05) and third (2003; P >0.07) fruiting years compared to the HC plants. The cumulative yield for the three-year fruiting period was significantly greater (P <0.06) for the TC plants. Average harvest date was significantly later for the TC plants in one of three years. Bloom date and berry weight were not affected by propagation method, nor were quality ratings or plant volume. There was an early benefit of increased yield for using plants obtained from TC in our study.

EARLY PERFORMANCE OF PEACH CULTIVARS IN SOUTHWEST ARKANSAS

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Twenty-nine peach cultivars were evaluated in southwest Arkansas from 2001 through 2003 cropping seasons. Preliminary results indicated significant differences in productivity of the cultivars. During the 3 seasons, 12 of the cultivars bloomed before the last average frost including PF23, PF24, PF27, PF7, and PF15A. Ripening dates ranged from 8 June (‘PFI’) to 10 Aug. (‘Encore’). Average fruit size, after uniform hand thinning ranged from <100 g (‘Jayhaven’) to >200 g (‘Glohaven’, ‘Loring’, ‘Contender’). PF24. There was no significant correlation of average fruit size and yield, or average fruit size and days from bloom to harvest among the cultivars evaluated. Based on bloom the early performance characteristics, yield, and fruit quality, the cultivars Bounty, Bellaire, Contender, Ernie’s Choice, Jon Boy, PF-15A, Surecrop and Sentinel are adaptable to this location. The cultivars Canadian Harmony, PF-23, Redhaven and Winblo were high-yielding but susceptibility to peach.
scab and brown rot made them unsuitable at this location. Continued evaluation of these cultivars will continue to substantiate these initial findings and test additional new selections and cultivars.

**CALADIUM GROWTH CONTROL WITH FLURPRIMIDOL TUBER SOAKS AND SUBSTRATE DRENCHES**

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Flurprimidol preplant tuber soaks (1.25 to 40 mg·L–1) and substrate drenches (0.25 to 4 mg a.i.) were applied to ‘Red Flash’ caladium plants for growth control. Flurprimidol was compared to the industry recommendations of paclobutrazol preplant tuber soaks (2.5 to 40 mg·L–1) and paclobutrazol substrate drenches (0.25 to 4 mg a.i.). At the concentrations used, neither flurprimidol nor paclobutrazol preplant tuber soaks controlled plant height or diameter. Longer soaking time and/or higher concentrations of flurprimidol may be required for growth control of vigorous caladium cultivars. Uniconazole substrate drenches of <4 mg a.i. did not provide height or diameter control. Both flurprimidol and paclobutrazol substrate drenches at 2 mg a.i. provided acceptable height control resulting in plants 16.8% and 15.0%, respectively, shorter plants than the untreated control. The 4 mg a.i. drench provided excessive control.

**WILD CHRYSANTHEMUM (ARTEMISIA VULGARIS L.) MANAGEMENT IN ORNAMENTAL PLANT PRODUCTION**

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Wild chrysanthemum is a clump forming rhizomatous perennial broadleaf weed capable of forming solid stands with extensive underground root entanglement. Once established in ornamental plant production systems, especially where postdirected herbicide applications are not possible, physical removal may be the only control option. Research focus was placed on herbicide options and application timings that could be utilized in fallow land before ornamental plant production. Initial studies demonstrated that ROUNDUP PRO 4L [(glyphosate) at 2.0 qt./acre], LONTREL 1.5EC [(chlorpyrifos) at 7.5 fl. oz./acre plus nonionic surfactant (NIS) at 1.0 pt./acre] and ALLY 60WG [(metsulfuron) at 2.0 oz. /acre plus NIS at 1.0 pt./acre] provided varying levels of control of this weed. Two additional studies were conducted. In the first study, ROUNDUP, LONTREL and ALLY where applied alone and in combinations of ROUNDUP + LONTREL, ROUNDUP + ALLY and ROUNDUP + LONTREL + ALLY at three application timings of early-, mid- and late-season. In the second study, ROUNDUP, ROUNDUP + LONTREL, ROUNDUP + ALLY and ROUNDUP + LONTREL + ALLY where applied in multiple applications of early-season, early-season followed by mid-season, and early-season followed by mid- and late-season applications. Treatment performance was based on long-term evaluation at the end of the second season after application. The results of the first study demonstrated that a single application of ROUNDUP did not give complete control. A single application of LONTREL applied mid- or late-season gave >80% long-term control. Combinations of either ROUNDUP + LONTREL or ROUNDUP + ALLY applied mid- or late-season gave >80% long-term control. Overall, wild chrysanthemum was more sensitive to these herbicides when applied mid- or late-season. Three applications of ROUNDUP alone where required to achieve >95% long-term control. Two applications of either ROUNDUP + LONTREL or ROUNDUP + ALLY where required to give >95% long-term control.

**ADDRESSING SEED DORMANCY AND GERMINATION ISSUES IN HELIANTHUS ANNUS (L.)**

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_Helianthus annus_ do not germinate uniformly as viability of achenes is influenced by many factors. This characteristic is a drawback for seed producers and growers desiring uniform stands while it also complicates the control of weedy populations. Viability of _H. annus_ seed was determined using an excised embryo test and resulted in 57.1% germination with radicle emergence first occurring after 2 days of incubation. Germination percentage of whole achenes was 2.9% with first radicle emergence occurring on the fifth day. Achenes soaked overnight before incubation showed 8% germination with first emergence occurring after 3 days. Excised embryos separated by density gave increasing germination percentages with increasing density. The low density embryos exhibiting 40% germination, medium density 80% germination, and high density 100%. Radicle emergence was seen after 2 days in all three density groups. Whole achenes, whole achenes allowed to soak, and whole achenes treated with gibberellic acid did not significantly improve germination as compared to the viability test. Separating _H. annus_ seed by density can be used as a method of improving germination uniformity.

**IN VITRO GERMINATION OF GALAX**

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Aseptic cultures were established using the tiny rust-colored seeds collected from South Toe, Yancey County, NC Fall 2002 at an elevation of about 1100 meters. In vitro seed germination was achieved under different pH conditions. Seeds cultured in the medium with pH 4.2 tend to germinate early with a better rate than those cultured with higher pH of 5.0 or 5.8 at the very beginning. Gradually, seeds from pH 5.0 and 5.8 caught up in germination. Eventually, seeds from all pH treatments (4.2, 5.0, and 5.8) produced the very similar germination rate. Due to heavy contamination, no aseptic cultures were established using the matted and scaly rhizomes and very tender new growth as explant materials. Our observation suggested that the very tender new growth can be a good source as explant once the optimum sterilization time is established.

**CUT FLOWER POINSETTIA: POSTHARVEST ANALYSIS AND CONSUMER PREFERENCE**

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The Winter Rose family of poinsettias (Paul Ecke Poinsettia Ranch) has been identified as a suitable poinsettia for use as a cut flower. With curly bracts that resemble rose petals, they may add welcome variety to florists’ holiday repertoire. Winter Rose poinsettias are now available in five cultivars which vary in color. They are considered late season poinsettias, requiring nine and a half weeks to mature and come into full color from cuttings. The objectives of this study were to determine the suitability of Winter Rose poinsettia as a cut flower by evaluating quality each day following the cut, stem conditioning treatments, preservative treatments, and consumer preference for Winter Rose poinsettia as a cut flower. Traditionally, poinsettia stems have been heat treated in order to stop the flow of sticky latex from being released from the stem at cutting. Most poinsettias have a short vase life, making them unsuitable as a floral alternative. Preliminary studies with Winter Rose cultivars suggest a long vase life of two weeks or more with or without heat treatment. Preservative treatment did not significantly affect vase life. Consumers preferred the treatment ‘Winter Rose ‘Dark Red’ over ‘Deep Pink’, ‘White’, and ‘Marble’ in order of preference. Consumers indicated a willingness to pay $14.00 for an arrangement consisting of six poinsettia stems.
THE EFFECT OF CYCLIC IRRIGATION AND HERBICIDE ON PLANT AND WEED GROWTH IN PRODUCTION OF MAGNOLIA Grandiflora ‘Alta’

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An experiment was conducted to evaluate the effect of cyclic irrigation (dividing the plants daily water allotment into more than one application with resting intervals between applications) and herbicide formulations on weed growth in container production. On 21 Mar. 2003, one quart Magnolia grandiflora ‘Alta’ liners were potted into 26.3 liter (7#) containers (Nursery Supplies Inc.) using an 8.1:1 (v/v) pine bark: sand medium amended with 3.0 kg·m–3 (5 lb/yd3) of dolomite limestone and 0.9 kg·m–3 (1.5 lb/yd3) of Micromax (The Scotts Co.) micronutrients. Polygon (Purecall Technologies Inc.) 17N–2.9P–9.8K (17–7–12) was applied to the surface of the container media at potting at 210 g (7.4 oz) per container. Irrigation was applied using a spray stake (Bowsmith, Inc., model JS-52) attached to a 11.4 L (3 gal) per hour pressure compensating drip emitter (Plastro model 3245-0012). The experimental design was a randomized complete block with 8 single plant replicates. There were three irrigation and three herbicide treatments. Irrigation was applied in a single application, divided into three applications with a two hour resting interval between applications, or divided into six applications with a one hour resting interval between applications. All plants received about 2.3 L (2.4 qt) of water daily. Herbicides were Rout (Oxyfluorfen + Oryzalin, The Scotts Co.), Snapshot (Trifluralin + Isoxaben, Dow AgroSciences), or Regal O-O (Oxyfluorfen + Oxidiazon, Regal Chemical Company). All herbicides were applied at the label recommended rate. Herbicides were applied on 28 Mar. On 31 Mar., containers were over-seeded with 20 prostrate spurge (Chamaesyce prostrata). Weeds were harvested on 26 June and containers were retreated and reseeded. Data collected monthly was plant height and caliper as well as percent weed coverage. Weed top dry weight was determined at study completion on 20 Oct. Herbicide formulation had no effect on plant or weed growth. Irrigation treatment had a significant effect on plant height and caliper increase. On 20 Oct., plants receiving six irrigation treatments had on average a 20% greater height and caliper than those receiving one or three applications. Irrigation treatment also had a significant effect on weed top dry weight. Plants receiving three and six irrigation applications had 261% and 285% greater weed top dry weight respectively than those receiving one application. Growers using cyclic irrigation should be aware of its effect on herbicide efficacy. Dividing the plants daily water allotment into six applications produced larger Magnolia grandiflora ‘Alta’ despite the increase in weed infestation.

NITROGEN AND POTASSIUM CONCENTRATION AFFECT YIELD AND SUBSEQUENT ROOTING OF STEM CUTTINGS FROM STOCK PLANTS OF NEW GUINEA IMPATIENS AND SCAVEOLA

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Effects of N and K concentration on yield, cutting quality, and adventitious rooting were investigated to establish a scientifically based program for light and moderate to heavy nutrient requiring stock plants. Stock plants of New Guinea impatiens (Impatiens x hawkeri ‘Grenada’ (light) and scaevola (Scaevola aenuil. R. Br.) ‘Purple Fan’ (moderate to heavy) were fertigated with a factorial arrangement of N and K at concentrations of 100, 200, or 300 mg·L–1. Shorter cuttings with smaller leaf areas occurred when stock plants of New Guinea impatiens were fertilized with N at 100 mg·L–1, however the greatest yield, root number, and shoot dry weight were achieved with N at 300 mg·L–1. Shorter cuttings with smaller leaf areas were not influenced by K or K concentration and decreased over time. Stock plants of scaevola fertilized with N at 300 mg·L–1 produced more cuttings and more roots per cutting than N at 100 mg·L–1. Greater cutting root and shoot dry weight of New Guinea impatiens were achieved at the lower concentration of K at 100 mg·L–1. No improvement occurred in cutting production and rooting of scaevola at K concentrations over 100 mg·L–1. Excessive K leached from the substrate when applied to New Guinea impatiens at 200 and 300 mg·L–1 and scaevola at 300 mg·L–1 suggesting that the lower concentrations be used. Based on these results, stock plants of New Guinea impatiens and scaevola should be fertilized with N and K at 300 and 100 mg·L–1, respectively.

VEGETATIVE PROPAGATION AND SUBSEQUENT CONTAINER PRODUCTION OF A WEEPING ULMUS PARVIFOLIA CLONE

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A weeping phenotype of Ulmus parvifolia Jacq. was identified with aesthetic landscape value. Softwood, semi-hardwood and hardwood cuttings were treated with 0, 5000, 10000, or 15000 mg·L–1 of auxin and placed under intermittent mist to determine the most efficient method to perpetuate this desired phenotype. After rooting, cuttings were transplanted initially to 2.3 L containers and subsequently to 6.2 L containers and grown until the majority of the controls reached a marketable size. Softwood cuttings had a higher rooting percentage (84%), more roots regenerated per cutting (18), and longer total root length (50 cm) than either semi-hardwood or hardwood cuttings using 10000 mg·L–1 auxin. Semi-hardwood cuttings had greater height (153.4 cm) and trunk diameter (12.5 mm) at end of production in 6.3 L containers than softwood and hardwood cuttings, however, the survival rates were lower for semi-hardwood cuttings (29%) than for softwood cuttings (86%). Although successful rooting techniques were identified for the Ulmus clone, the weeping phenotype was not stable.

RESPONSE OF PARKINSONIA ACULEATA TREES TO GROWTH REGULATOR TREATMENTS

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Parkinsonia aculeata seedlings were sprayed three times at two-week intervals with Gibberellic acid, GA, at 0, 50, 100, or 200 ppm and Daminzoide as B-Nine, Butanedioic acid mono(2,2-dimethylhydrazide) at 0, 500, 1000, or 1500 ppm. The obtained results showed that the application of Gibberellic acid increased the plant height, stem elongation and shoots dry weight compared to the untreated plants. This increase in plant growth was parallel to the increase in the applied Gibberellic acid concentration. Daminzoide treatments decreased plant height and stem elongation specially when high concentrations were applied. Moreover, the applied Daminzoide treatments increased the shoots dry weight compared to the untreated plants. Nitrogen, phosphorus and potassium percentages in Parkinsonia aculeata shoots were affected as a result of Gibberellic acid and Daminzoide application.

DAYLILIES: FLOWERS OR FOOD?

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Edible flowers have increased in popularity in recent years. Many fine restaurants offer flowers as a decoration or food, presenting a potential high return niche market for suppliers of those flowers. Several books feature edible flowers while numerous web sites provide recipes. Daylilies (Hemerocallis sp.) sold in containers accounted for $25.5 million in sales in 1998. Twenty-three Mississippi nurseries reported selling daylilies with total sales of $96,000. The main objectives of this study were to determine the influence of cultivar on taste of daylily and to determine the consumer acceptability of daylily flowers as an edible crop. Fifteen daylily cultivars were evaluated by panelists at the Garisson Sensory Evaluation Laboratory at Mississippi State University.
Panelists found the daylilies to be palatable and area chefs have shown an interest in daylilies as an addition to their menus. ‘Rosie Meyer’ was the most preferred daylily. The second ranked tier of daylily flowers included ‘Lavender Doll’, ‘Joan Senior’, and ‘Aztec Gold’. The third tier of daylilies included ‘Gentle Shepherd’ and ‘Along the Way’. The least preferred daylilies were ‘Bananza’ and ‘Border Baby’. Daylilies merit consideration for a niche edible flower industry based on Mississippi’s already strong ornamental horticulture industry.

EFFICACY OF FOLIAR SPRAYS FOR MANAGEMENT OF DOWNY AND POWDERY MILDEW OF WINTER SQUASH

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Control (with various fungicides) of downy mildew (Pseudoperonospora cubensis) and powdery mildew (Podosphaera xanthii) 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 Spring 2003 season. A grower standard (Bravo Weatherstick) and three experimental foliar sprays (KP481 + Kocide 2000 alternated weekly with Bravo Weatherstick; KP481 alternated weekly with Bravo Weatherstick; and Pristine 38 alternated weekly with Bravo UltraTrex) were evaluated against an untreated control. Marketable yields (t ha–1), mean fruit size (g/fruit), culls (t ha–1), and area under the disease progress curve (AUDPC) were measured. Plants in the untreated control plots had a higher AUDPC rating than plants in each foliar spray treatment except for KP481 + Kocide. There were no significant differences among treatments for marketable yield and mean fruit size. However, the untreated control had the highest cull weight (primarily from sunburns) as compared with the other treatments.

EVALUATION OF YIELD AND QUALITY OF TOMATO CULTIVARS DEVELOPED FOR RESISTANCE TO TOMATO SPOTTED WILT VIRUS

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Eleven tomato breeding lines and three commercial cultivars were evaluated for tomato spotted wilt virus (TSWV) tolerance and for horticultural attributes. Included was the southeast Arkansas tomato industry’s standard, ‘Mountain Spring’, the only nonresistant entry in the study. In the absence of TSWV in 2003, yield and quality aspects were evaluated. Ten of the breeding lines performed as well or better than ‘Mountain Spring’ for XL#1 fruit. Seven of these lines performed better than the commercial cultivars, ‘BHN-444’ and ‘Amelia’, for XL#1 fruit. The breeding line NC 0392 performed extremely well for total yield, grade, and average fruit size. It could be one of several possible replacements for ‘Mountain Spring’ if TSWV continues to be a severe problem for the industry.

HARVEST DATE EFFECT ON YIELD AND CONTROLLED ATMOSPHERE STORABILITY OF SHORT-DAY ONIONS

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This study was undertaken to evaluate the effect of harvest date on yield and storage of short-day onions in controlled atmosphere (CA) storage conditions. In general, harvest yields increased with later harvest dates. Yields of jumbo (>7.6 cm) onions generally showed a quadratic or cubic response to harvest date, first increasing and then showing diminished or reduced marginal yields. Medium (3.1 to 7.6 cm) onions generally showed diminished yield with later harvests as jumbos increased. Storability of onions under CA conditions was not predictable based on days to harvest for any particular cultivar.

THE EFFECTS OF FERTILIZER RATES AND TIMING ON PRODUCTION AND MACRONUTRIENT ELEMENTAL LEAF CONTENT OF ‘MALABAR’ SPINACH (BASELLA ALBA L.)

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The effects of four fertilizer treatments on yield, plant growth parameters, and leaf elemental macronutrient content of ‘Malabar’ spinach (Basella alba L.) were evaluated in a Ruston fine sandy loam soil (fine-loamy, siliceous, thermic Typic Paleudult) at the USDA Small Fruits Research Station in Poplarville, area of Florida. Nitrogen recommendations were as important as total applied N. Leaf nitrogen (N) of the best performing tomato breeding lines consisted of (1) 96 kg·ha–1 applied twice during the season (June and August) for a total of 224 kg·ha–1, (2) 112 kg·ha–1 applied 4 times during the season (June, July, August, September) for a total of 448 kg·ha–1, (3) 224 kg·ha–1 applied twice for a total of 448 kg·ha–1, and (4) 224 kg·ha–1 applied 4 times for a total of 896 kg·ha–1. Plant growth was positively correlated with total N applied regardless of application timing. Leaf yield followed the same pattern as total plant growth, except frequent N applications was as important as total N. Plant growth was best with the 224 kg·ha–1 per year N fertilization rate. Nitrogen rates of 448 to 896 kg·ha–1 per year did not result in different leaf size regardless of the number of applications. Increased total N fertilization increased N. Nitrogen was decreased only by the highest N fertilization level.

CONTROLLED RELEASE FERTILIZER USE EFFICIENCY AND INFLUENCE ON POTATO TUBER QUALITY AND YIELDS IN NORTHEAST FLORIDA

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The Tri-County Agricultural Area (TCAA; Flagler, Putnam, and St. Johns counties) is the largest consolidated potato (Solanum tuberosum L., ‘Atlantic’) production area of Florida, with about 9,000 ha in production. The TCAA is subject to heavy seasonal rains making fertilizer leaching, particularly nitrates, into the St. Johns River watershed an environmental concern. Polymer-coated urea (PCU) controlled release fertilizer (CRF) products were compared to ammonium nitrate (AN) for their influence on tuber yield, tuber specific gravity, and nitrogen leaching during the 2003 growing season. The experiment was conducted at the PSREU farm in Hastings, Fla., on an Elley fine sandy loam, and was arranged in a randomized complete block design with four replications. Fertilizer treatments included a no fertilizer control, AN, and CRFs (six products from various manufacturers). Three fertilizer rates of 112 kg N/ha, 169 kg N/ha, and 224 kg N/ha were used with each product representing 50%, 75%, and 100% of current BMP nitrogen recommendations. Highest marketable tuber yields were 33.8 Mg ha–1 (TRT–10) and 32.8 Mg ha–1 (TRT–16), both of which were significantly higher than the AN products. Potato tuber specific gravity (SG) was highest with TRT–10 at 1.084, which was significantly higher than any of the AN treatments. Nitrogen recovery (in the form of tubers) was greatest for TRT–16 (139.1 kg N/ha) and TRT–10 (134.9 kg N/ha), though these were not significantly greater than the AN treatments when evaluated as a percentage recovery of applied N. On 20 Mar (36 days after planting, DAP), both nitrate (NO3-N) and ammonium (NH4-N) were present in wells in significantly higher concentrations than at 16.06 mg·L–1, respectively) than the average of all CRFs (2.85 and 4.79 mg·L–1, respectively) or the no fertilizer control (3.64 and 0.63 mg·L–1, respectively), while no significant difference was found between the CRFs and the control. By 24 Apr (71 DAP) no significant difference between treatments was found. This is important because during the early part of the season, when potato root systems are small, soluble nitrogen is easily moved out of the root zone and into the shallow water table. In 2003, over 23 cm precipitation fell over the first 45 days after planting, accentuating the leaching effect. In summary, PCU fertilizers can produce equal or higher total and marketable tuber yields and SG than AN, while reducing nitrate nitrogen leaching.
FATE AND MOVEMENT OF NITROGEN THROUGH A SANDY SOIL AS INFLUENCED BY POTATO CROP PRODUCTION AND LEACHING IRRIGATION EVENTS
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The St. Johns River has been identified by the state of Florida as a priority water body due to restoration under the auspices of the Surface Water Improvement and Management (SWIM) Act. Best Management Practices (BMPs) were evaluated for potato (Solanum tuberosum L., var. ‘Atlantic’) production in the Tri-County Agricultural Area (St John’s, Putnam, and Flagler, FL) to reduce nitrate run-off from about 9,300 ha of land in the St. John’s River watershed. The objectives of this study were to 1) determine the influence of fertilizer source (soluble and controlled release) and timing of leaching irrigation on nitrate leaching; 2) compare nitrogen cycling in a potato crop fertilized with either a soluble or controlled release nitrogen fertilizer in a North Florida seepage irrigated production system. The experiment was a split-split plot with four replications. The main plots were irrigation treatments (none, 2, 4, 8, and 12 weeks after planting, WAP). The first split was the nitrogen source ammonium nitrate (AN) or controlled release (CRF) fertilizer. The second split was an additional nitrogen application after the irrigation treatment (0 or 33.6–0–33.6 kg·ha–1 AN). An approximately 5-cm rainfall was applied in a 2-hour period and surface water runoff was collected. Fertilizer treatment did not significantly influence total and marketable tuber yields. Fertilizer treatment did not significantly affect the NO3-N (mg·L–1) solution concentration over the sampling period at the 8-WAP sampling event. The study will be repeated for the 2004 and 2005 production years.

AMMONIUM THIOSULFATE DEFLOWERING TREATMENTS TO INFLUENCE MATURITY OF ONCE-OVER HARVEST YIELD AND CAPSAICINOID CONTENT OF PEPPER FRUIT
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Pungency in hot peppers Capsicum annuum L. var. annuum is mostly due to capsaicin (CAP) and dihydrocapsaicin (DC), contributing more than 90% of the total pungency. Loss of harvestable pungency occurs during once-over winter harvest due to shattering of early set fruits. Ammonium thiosulfate (ATS) treatments were applied to pepper plants after first, second and third flower blossoms, designated as maturity stages I, II and III, respectively, as single applications (timing 1 = stage I, timing 2 = stage II, timing 3 = stage III) or as successive applications at stages I and II (timing 2) and stages I and II (timing 3). Five ATS concentrations of 0%, 5%, 10%, 15%, and 20% were applied in a 2-hour period and ATS concentrations had a positive effect on fruit yield and fruit capsaicinoid concentration, at timing 1 with 6% ATS concentration or above, at timing 4 with 9% ATS concentration or at timing 5 with 12% ATS concentration. The increase in capsaicinoid yield afforded by the best ATS treatments ranged from 8% to 20%.

A NOVEL PROCEDURE FOR Lycopene RECOVERY FROM RED-FLESHED WATERMELONS
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Lycopene is the carotenoid pigment responsible for the red color in several fruits and vegetables. A novel procedure to extract lycopene from watermelons by filtration of homogenized flesh and subsequent precipitation of the filtrates by centrifugation was described. Samples for lycopene and sugar analysis were taken at appropriate steps during the process, then analyzed by spectrophotometric and HPLC procedures respectively. The combined filtration processing and filtration precipitation steps represent a means to concentrate watermelon lycopene into two fractions: the filter cake and a filtrate pellet, with combined mass of <10% of the original melon weight. Lycopene recovery varied from 35% to 55% depending on maturity with higher yield achieved by only one filtration of mature melons. Lycopene from overripe melons tended to segregate more into the filtrate, but less was recovered by centrifugation. Due to substantial lycopene losses during filter cake water rinse, processing past the first filtration may not be feasible. One water rinse of the centrifuged pellet from the first filtrate reduced sugar concentration from 12 to <0.2% and, in combination with the filter cake resulted in total lycopene recovery of 40% to 50%.

LOW SUGAR WATERMELON FOR THE DIABETIC CONSUMER
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Conventional breeding techniques have increased the immediately available sugar content, or total soluble solids (TSS), in watermelon up to 14%. This results in a sweet flavor but also makes watermelon off limits to people concerned about dietary sugar intake. We screened watermelon lines from the Southern Regional Plant Introduction Station (Griffins, Ga) for TSS content and compared the value to color development. We showed that pigmented watermelon flesh tends to have higher TSS content than nonpigmented, but pigment production can occur without high TSS production. We found pigmented fruit with a TSS content of as low as 3.1%. Since this screening suggested that fully pigmented low sugar watermelon can be produced, we began making crosses to develop a low sugar high pigment watermelon. Currently we have a line that produces crisp red fleshed watermelon with a TSS content of around 5%. This line is heterogeneous for expression so further selections need to be performed. Analysis of the sugar composition of this selection is underway to determine amounts of fructose, glucose, and sucrose sugars.

A RAPID SPECTROPHOTOMETRIC METHOD TO DETERMINE β-CAROTENE CONTENT IN CUCUMIS MELO
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β-carotene is a carotenoid that has antioxidant properties, is a precursor of Vitamin A, and imparts the orange pigment in some fruits and vegetables. This compound is the major carotenoid in cantaloupe. Because of its health benefits, β-carotene content in fruits is of interest to the food industry. Current methods to assay β-carotene content in fruit are time consuming, expensive and use hazardous organic solvents. We conducted a study to measure β-carotene content on 30 cantaloupe purees using light absorbance measured with a xenon flash colorimeter/spectrophotometer. Our puree absorbance method had a linear correlation coefficient with β-carotene content by hexane extraction/spectrophotometry of $R^2 = 0.7$. This linear correlation shows that this method may work for quantitating β-carotene content in purees of fresh cantaloupe. Since pureeing the sample is the only processing required and no chemicals are needed, the method is rapid, inexpensive and is environmentally friendly.

DRY BEAN (Phaseolus vulgaris L.) YIELD COMPONENTS: WEED CONTROL AND SOIL MOISTURE INTERACTIONS
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Dry bean (Phaseolus vulgaris L.) is an alternative cropping option for the Southern Plains region with increasing production and market potential. Producers report that weed competition is the most detrimental factor influencing bean yields and therefore profitability. In addition, depending on the dry bean variety produced, the yield components may be affected differently by the stress produced by weed competition. This research was conducted to determine the effect of weed competition on...
the yield components of four dry bean varieties. The research design included two years (2001 and 2003), four dry bean varieties, two weed control levels, two moisture levels, and four replications. The four dry bean varieties included black bean cv. ‘Black Knight’, navy bean cv. ‘Gryphon’, pink bean cv. ‘ISB 462’, and pinto bean cv. ‘Apache’. In the two-year study, the beans were planted the last week of April with a four-row planter set on 91-cm row spacing. The two weed control treatments included season long (90-day) “weed-free” and “weedy-check” treatments. The “irrigated” beans received a total (irrigation and rainfall) of 45 cm (2001) and 42 cm (2003) compared to only 26 cm (2001) and 25 cm (2003) of rainfall for the “nonirrigated” (dryland) treatment. The greater soil moisture resulted in greater bean yields for the irrigated by significantly increasing the number of seeds/pod and producing larger, heavier seeds (g/100 seeds). Black beans produced greater yields than the other three bean varieties by producing significantly greater seeds/pod and plants/hectare. Averaged across bean varieties and soil moisture treatments, weed competition reduced seed yields by 27%, and decreased three of the four yield components: pods/plant (13%), weight per 100 seeds (8%), and plant populations (11%). This field research on dry bean production will be used to gain a greater understanding of the mode of action of seed yield depression in dry beans and possible methods for adapting the cultural practices for this region to maximize dry bean seed yields.

SPRING HIGH DENSITY SPINACH VARIETY TRIAL

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Spinach cultivars were evaluated for use in successive high density spring plantings. Cultivars included Samish, Avon, Tyee, Arkansas F-380 and F-415 that were planted on 4 Mar. 2003, 12 Mar. 2003, 27 Mar. 2003, and 3 Apr. 2003. Seeding rates were about 2,091,000 seeds per acre. Plots were arranged in a RCB with 4 replications. Spinach was harvested on dates ranging from 35 to 45 days after planting. Data recorded at each harvest included leaf color, growth habit, bolting and fresh cut yield. Avon and Samish consistently had higher color ratings than either F-380 or F-415 at each harvest date, Tyee had higher ratings than either F-380 or F-415 at each harvest date. Tyee had higher ratings than either F-380 or F-415 at each harvest date, Tyee had higher ratings than either F-380 or F-415 at each harvest date.

LONG-TERM SOIL CHANGES AS AFFECTED BY POULTRY LITTER APPLICATIONS

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Significant amounts of poultry litter are produced in eastern Oklahoma. The litter normally contains about 2% N, 2% P2O5, and 2% K2O, although the ratio varies. To a poultry producer, the litter is a waste product, to an agronomist or horticulturist the litter is a valuable source of nutrients, and to an environmentalist the litter is a pollutant of aquatic supplies. Poultry litter is often applied liberally to land near poultry houses, with resultant buildup in soil and also leaching of nutrients into the water supply. A study has been underway for 10 years at Lane, Oklahoma to determine the long term effect of poultry litter when added to soil. Both poultry litter and synthetic fertilizer at various rates have been added to selected plots each year. Applications have been made on an approximate annual basis, with vegetable crops being grown in the treated areas. Over the 10 year period, as much as 2200 kg N, 2200 kg K2O, and 3800 kg of P2O5 per hectare were added to plots. Soil samples were taken 18 times over the 10-year period. After 10 years, soil P had increased from about 25 to about 550 kg ha-1, K has increased from about 50 to about 225 kg ha-1, Zn has increased from about 1 to about 6 kg ha-1, and Cu has increased from about 1 to about 6 kg ha-1. Changes observed were consistent with Ca, Mg, Fe, and Mn. N and P fluctuated from year to year, probably as a result of precipitation and leaching. Buildup of soil P is considered by many to be the major environmental contaminant from the litter.

EFFECT OF PHOSPHORUS SOURCES AND GROWTH REGULATOR TREATMENTS ON GROWTH AND ACTIVE INGREDIENT OF GUAR (CYAMOPSIS TETRAGONOLOBA (L.) TAUB) PLANTS

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Guar (Cyamopsis tetragonoloba (L.) Taub) is a drought tolerant annual plant. World demand for guar has increased in recent years, leading to crop introductions in several countries. The plants were arranged in a split-plot experiment and treated with three sources of rock phosphate (Safaga, Sebaaia and Abou Tartor). Each was at 0, 15, 30, or 45 kg P2O5/ft2 (4200 m2). Trichlorophenoxy acetic acid was sprayed at 0, 5, 10, or 20 ppm, three times at two week intervals. The obtained results indicated that the application of the three sources of rock phosphate increased vegetative growth, seed yield and guaran (Guar gum) content. The highest rate of each fertilizer was the most effective. The most effective source was Safaga. Moreover, these treatments increased the photosynthetic pigments. The application of trichlorophenoxy acetic acid resulted in an increase in the vegetative growth, seed yield and guaran content. The photosynthetic pigments were also increased. The most effective concentration was 10 ppm. The interaction between the two main factors had a synergistic effect and the most effective combination was the application of Safaga at the highest rate and trichlorophenoxy acetic acid at the medium rate.

IDENTIFYING AMOUNTS AND TYPES OF ANTHOCYANINS IN CULTIVARS AND BREEDING LINES OF COWPEAS

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Anthocyanins are naturally occurring plant pigments that are typically blue, purple, violet, magenta, red, and orange (Jackman and Smith, 1996). Some plants that contain these pigments are blueberries, pansies, plums, grapes, and cowpeas. In addition to imparting color to plants, anthocyanins can possibly benefit humans health by affecting antioxidant activity, anti-inflammatory activity, anticlotting activity, reducing serum cholesterol and serum lipid levels, acting as chemo protectants in certain cancer therapies, improving cardiovascular function, and possibly improving eye function (Jackman and Smith, 1996; Sterling, 2001). Because of the importance of anthocyanins to human health, it is significant to find common foods that contain anthocyanins. Cowpeas, Vigna unguiculata, are known to contain anthocyanins, but it’s unknown what types and the amount of each anthocyanin that is found in each cultivar and breeding line of cowpeas. In this research project, sixteen cultivars and breeding lines, ranging from color-coded to an entirely black, were analyzed with High Performance Liquid Chromatography (HPLC) to determine type and amount of anthocyanins. Sixteen cultivars and Arkansas breeding lines of cowpeas were selected to determine anthocyanin levels and types in each. Seed color included cream, black, brown, red, pinkeye, blackeye and browneye. In Fall 2002, seed were harvested from the Vegetable Substation at Kibler, Ark., were dried and cleaned. Using a Braun mill (type 4041 model), each variety or breeding line was ground into a fine powder which was analyzed for anthocyanins with High Performance Liquid Chorotography (HPLC). Three of the 16 varieties and breeding lines of Cowpeas showed anthocyanins. However, only one showed significant amounts of anthocyanins 95-556, a black cowpea. Which contained delphinidin, cyanidin, and an unknown anthocyanin. The amounts are expressed in mg anthocyanins per gram pea ground: delphinidin-0.001 mg·g-1, peonidin-0.0002 mg/g, and unknownanthocyanin-0.0014 mg·g-1. Total of anthocyanin content is equal to 0.00242 mg·g-1.
TRIPOID (SEEDLESS) WATERMELON EVALUATIONS: ELONGATED GENOTYPES
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Evaluations of eight elongated genotypes of watermelons were conducted during 2002 and 2003 at three locations in Mississippi and at one location in each of the following states in 2003: Illinois, Indiana, and Missouri. 'Cooperstown' was used as a standard cultivar. It is an oval 'Tri-X 313' type cultivar that had performed well in previous trials at several of these locations. Three or four melons from each plot were cut open and observed for severity of hollowheart, bacterial rind necrosis, and incidence of colored seeds. Opened melons were also tested for soluble solids concentration with a hand-held refractometer. 'WX 28' produced the highest early yield and the largest melons, but it exhibited relatively low soluble solids concentration (SSC) and high incidences of hollowheart and colored seeds. 'Banner' also exhibited high incidences of hollowheart and colored seeds, 'Freedom' and 'SR 8026' performed well and had only one flaw, relatively high incidences of colored seeds. 'Seedless Sangria' produced melons with relatively low SSC. 'Vertigo', 4930, and HA 1042, appeared undesirable for several reasons. The first year results indicate that good yields may be achievable using organic practices in our environment. Crops grown in Fall 2003 included collards, cabbage, turnip, mustard, lettuce, snap beans, cucumbers, and summer squash. Only lettuce yields failed to meet or exceed regional yield averages. Several crops, including collards and squash, produced yields far exceeding reported state average yields, indicating potential for profitable economic production of organic vegetables in Mississippi. Future work will include economic analysis and development of local cost/return data.

PRELIMINARY FINDINGS FROM MISSISSIPPI'S ORGANIC VEGETABLE PLOTS
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Organic vegetable crop research plots were established at the Mississippi Truck Crops Branch at Crystal Springs, Miss., during Summer 2003. Research objectives for the work done on the plots include evaluation of yield and economic returns of vegetable crops produced in Mississippi using USDA-approved organic methods. Plots are not currently certified organic, but are managed as such. First-year results indicate that good yields may be achievable using organic practices in our environment. Crops grown in Fall 2003 included collards, cabbage, turnip, mustard, lettuce, snap beans, cucumbers, and summer squash. Only lettuce yields failed to meet or exceed regional crop yield averages. Several crops, including collards and squash, produced yields far exceeding reported state average yields, indicating potential for profitable economic production of organic vegetables in Mississippi. Future work will include economic analysis and development of local cost/return data.

BRINGING ETHNIC VEGETABLES TO MISSISSIPPI GARDENERS
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The Fall Flower and Garden Fest is one of the nation's largest home horticulture field days, with more than 5,000 visitors touring the grounds during the two-day event. The oldest part of the Fest is the 1.2-ha vegetable display garden, but various specialty gardens have been added throughout its 25-year history. In all, the vegetable gardens feature single-row observational displays of more than 400 cultivars across more than 30 species. Beginning in the late 1990's, these gardens began to feature ethnic vegetables as part of the overall planting. Each spring, a committee selects species and cultivars to grow within selected ethnic categories. Seeds include commercially available entries and seed saved by researchers and gardeners. Entries are sown in the greenhouse or directly in the garden beds, Cassava is dug annually from the garden before winter, maintained in the greenhouse from cuttings, and replanted each spring in the garden. All beds are 3 to 6 m long, 1.2 or 2.4 m apart. All are overhead irrigated. Fertilizer is applied according to soil test recommendations for a mixed vegetable garden, with nitrogen side-dressing for some crops. Each ethnic garden has had six to 12 entries, with two or three gardens planted in a given year. Entries are rated for uniformity, relative maturity, relative overall health, and yield potential on a one to five scale, five being the best score for each characteristic. Additional notes are made about garden performance, uniqueness, and visitor reaction/interaction. Over the last four years, ethnic vegetable display gardens have been planted for the regions of Africa, Latin America, India, and Asia, with more than 50 species to date. Client response has been most numerous for the Latino and African gardens. Cooking demonstrations for the cuisine of these two ethnicities has provided additional educational opportunities at these vegetables at the Fest. Visitors have provided or offered seed of many species and selections for past and future gardens. Incorporation of the demonstrated vegetables into Mississippi gardens as a result of these garden plantings has occurred for several species. For more information, the Fest web site can be found at http://www.msstate.edu/dept/cmrec/fallgardenday.htm.
PASTEURIZED BROILER LITTER PELLETS FOR TOMATO PRODUCTION: 2003 RESULTS

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The influence of source, rate, and timing of fertilizer application on fresh-market tomato yield was studied in Crystal Springs, MS. Treatments included an unfertilized control; 66 kg·ha⁻¹ N as 3-3-3 Pasteurized chicken broiler litter-based pellets preplant incorporated (PPI); 66 kg·ha⁻¹ N as 3-3-3 PPI + 66 kg·ha⁻¹ N as chicken feather meal, side dressed at first anthesis; 1332 kg·ha⁻¹ N as 3-3-3 PPI; or 132 kg·ha⁻¹ 13–13–13 synthetic fertilizer PPI. No yield or fruit quality differences were found among treatments. Whole leaf samples taken 43 days after transplanting had similar nitrogen, phosphorus and potassium concentrations among treatments. Manganese concentrations were significantly higher in the 13–13–13 treatment. Leaf copper concentration in the 13–13–13 treatments. Manganese concentrations were significantly higher in the 13–13–13 treatment. Leaf copper concentration in the 13–13–13 treatment.

THE GREENHOUSE TOMATO SHORT COURSE – INTENSIVE TRAINING FOR COMMERCIAL GROWERS IN MISSISSIPPI AND BEYOND

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

The Greenhouse Tomato Short Course (GHSC) has been held each March in Mississippi for the past 14 years. The purpose is to provide an educational training program for commercial current and prospective greenhouse tomato and other greenhouse vegetable growers with a target audience of County Extension Agents and Specialists, university and corporate researchers, as well as growers. Starting in 1989 as modest training program for Mississippi growers in the conference room at the Truck Crops Experiment Station (attendance expected: 30; actual attendance: 70), it was relocated each of the next 4 years due to out-growing each facility. Currently, the GHSC is held at the Mississippi Agricultural & Forestry Museum in Jackson in their largest conference facility, the Sparkman Auditorium. Attendance over the past few years has ranged from 100 to 142, with the peak in 2003. Invited speakers for each subject area to be covered are brought in from Mississippi State University, as well as from other states or countries. Exhibitors are an important part of the GHSC, as growers need to know where to buy their greenhouses and supplies. Registration costs are kept low ($85 in advance or $100 at the door); the goal is not to make money, but to never go "in the red", either. The importance of breaks, food service and quality, and social time cannot be underestimated. Meals are held on site and are an important time for growers to talk to each other and to the invited speakers. There is plenty of time for questions and answers. In most years, registration and exhibitor fees cover all costs. However, in 2003, a Partnership Agreement with the USDA Risk Management Agency provided additional funding which allowed for enhancements not otherwise affordable. The funding supported chartered buses for a greenhouse tour, resource notebooks with Extension publications and handouts, agent training (all expenses paid) for County Agents in Mississippi and Alabama, and more out of state growers. Grower demographics at the GHSC are about 1/3 each prospective growers, new growers (<5 years), and experienced growers. Most attendance is from Mississippi and the Southeastern United States, but typically growers come from 20 to 25 states, and, in recent years, growers have come from several foreign countries as well. For more information, the GHSC website can be found at http://www.msstate.edu/dept/cmrec/ghsc.htm.

Vegetable Crops

WATERMELON AND CANTALOUPE VARIETY TRIALS, POLLENIZER EVALUATION, AND WATERMELON PRODUCTION IN GEORGIA


Watermelon trials, a cantaloupe trial, and evaluation of pollenizer 'Companion' were conducted in 2003. The watermelon trial at the Vidalia Onion and Vegetable Research Center (VOVRC) in Lyons, Ga., had 32 entries with 14 seedless entries. A second watermelon trial consisting of only seedless entries was conducted in Crisp County, Ga. Yields in the VOVRC watermelon trial ranged from 19,511 to 55,431 lb/acre. Watermelon acres in Georgia have declined slightly, while crop value has increased dramatically based on county agent surveys. The crop value for 2002 was estimated at close to $95 million; however, this is considerably more than the Georgia Agr. Statistics Service estimate of about $30 million. According to The Packer, 60% of watermelons shipped from Georgia are triplexed. There were no yield differences among the cantaloupes trialed. Finally, ‘Companion’ pollenizer was evaluated as the pollen source interplanted every second or every fourth triplexed plant with no difference in yield.

TOLERANCE OF OKRA (ABELMOSCHUS ESCULEN- TUS) TO SEVERAL COTTON HERBICIDES

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Field trials were conducted at Clinton, N.C., and TyTy, Ga., in 2002 and 2003 to identify potential new herbicides for okra, many of them registered for use in cotton. Trial sites received trifluralin preplant incorporated (0.84 kg a.i./ha). Treatments included preemergence (PRE) applications of halosulfuron (0.39 kg a.i./ha, prometryn (0.84 kg a.i./ha), fluometuron (1.12 kg a.i./ha), and pyrithiobac (0.048 kg a.i./ha). Pyri- thiobac (0.072 kg a.i./ha) applied postemergence over-the-top (POST) to six inch okra was included as were postemergence directed (P-DIR) applications of halosulfuron, prometryn, and flumioxazin at 0.38, 0.84, and 0.054 kg·ha⁻¹, respectively. P-DIR treatments were applied to okra stalk when it reached 12 inches in height. Two weeks after PRE treatments, okra injury from fluometuron PRE ranged from 12% to 73%. Pyrithiobac PRE stunted okra 7% or less at three locations, but stunting was 47% in Georgia in 2002. Stunting from halosulfuron PRE was 2% or less in North Carolina, but was 13% to 22% in Georgia. Prometryn PRE injured okra 7% or less at all sites. Injury from pyrithiobac POT was 5% to 27% 2 weeks after treatment. At 3 weeks after P-DIR, flumioxazin P-DIR caused less than 2% injury in North Carolina and 15% injury at Georgia in 2003. However, due to large stem lesions and subsequent wind storm, 67% of the crop in this treatment was lost at Georgia in 2002. Halosulfuron P-DIR injury on okra was 2% to 15% while injury from prometryn P-DIR was less than 8%. Prometryn injury was temporary necrosis of lower leaf margins. Similar to injury, the data varied by location. Okra treated with pre- P-DIR or halosulfuron P-DIR yielded consistently similar with the weed free control. Because of low injury risk and consistently high yields, potential exists for prometryn PRE or P-DIR and halosulfuron P-DIR to be labeled for use in okra.

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

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With the introduction of Japanese overwintering onions several years ago, there was concern that these onions were too hot to be grown and marketed as Vidalia onions. They did, however, have two characteristics that growers wanted, earliness (2 weeks earlier than other varieties) and foliar disease resistance. A program of testing was initiated to evaluate new and current varieties for pungency and flavor based on pyruvate testing and taste panel evaluations. A standard variety, initially ‘Granex 33’, and more recently ‘Savannah Sweet’, were used as the benchmark for evaluation using Duncan’s Multiple Range Test. New varieties had to have two out of three of favorable results in these tests to be recommended for inclusion on the official list of Vidalia onion varieties. Although differences were detected between varieties, the broad range of similar results for any specific entry resulted in no entry being excluded from the list. An approach that used a modified Dunnett’s test...
ECONOMIC EFFECT OF PLANT SPACING ON YIELD AND QUALITY OF TOMATOES
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Using the ‘Mountain Spring’ cultivar, four different in-row plant spacings were evaluated: 15, 20, 25, and 30 inches. Plant spacing had a significant effect on weight per plant of XL#1 fruit and on weight per plant of total marketable fruit. The greater the spacing, the greater the yield of fruit per plant. Plant spacing, however, did not significantly affect yield on an acreage basis, even though there was a trend for the closer spacings to yield more. Due to the need for fewer plants and stakes per acre at the wider spacings, it was determined that crop expenses could possibly be reduced without affecting yields. Further savings might also be realized from less labor for transplant production, transplanting, staking, pruning, stake removal, etc.

GROWTH OF SWEET ONION PLANTS GROWN ON ORGANIC AND INORGANIC MULCHES
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Sweet onions are typically grown on bare soil and irrigated with high-pressure systems such as sprinklers. Drip irrigation in combination with organic mulches is widely used for vegetable production, particularly in solanaceous crops. The objective of this study was to determine the effects of drip irrigation and mulch on onion plant growth and yield. The experimental design was a split plot, where the main plot was the irrigation system (sprinkler or drip) and the subplot was the type of mulch (bare soil, black plastic film or wheat straw). Weekly plant measurements during the course of the season indicated that bulb and shoot dry weight were higher under drip than under sprinkler irrigation. Root dry wt. was highest under bare soil while and lowest under wheat straw mulch. Shoot dry weight and bulb dry weight were highest under plastic and lowest under wheat straw mulch. Soil moisture content was lower and fluctuated more under sprinkler than under drip irrigation, and it was lowest under bare soil. Total yields were highest on bare soil and lowest under wheat straw. Root high zone temperatures under plastic mulches probably affected negatively plant growth at the end of the season and resulted in reduced yields. In conclusion, plants on bare soil yielded the most, and plants under drip irrigation had similar bulb yield and quality compared to plants under sprinkler irrigation.

FUMIGANT AND HERBICIDE COMBINATIONS FOR SOILBORNE PEST AND NUTSEDGE (CYPERUS SPP.) CONTROL IN FRESH TOMATO
James P. Gilreath and Bielinski M. Santost, Gulf Coast Research and Education Center, IFAS, University of Florida

Two field trials were conducted with multiple fumigant and herbicide combinations in search for methyl bromide (MBr) alternatives for soilborne pest and nutsche control in tomato. The treatments were: a) a nontreated control; b) MBr + chloropicrin (Pic) 67/33 at 350 kg·ha–1; c) 1,3-dichloropropene + Pic (Telone C-35), napropamide (Devrin), and halosulfuron (Sandea) at 350 L·ha–1; 2 kg a.i./ha, and 0.7 kg a.i./ha; d) Pic and liquid metam sodium (MNa) at 150 kg·ha–1 and 750 L·ha–1; e) propogone at 350 L·ha–1; f) furfural + solampyromethane (Multiguard FFA) at 1500 kg a.i./ha; g) furfural (Multiguard Protect) + liquid MNa at 500 L·ha–1 and 500 L·ha–1; h) Multiguard FFA at 1000 kg a.i./ha followed by four biweekly Multiguard Protect applications of 50 L·ha–1; i) Multiguard Protect + liquid MNa at 400 L·ha–1 + 300 L·ha–1 followed by four biweekly Multiguard Protect applications of 50 L·ha–1; j) Telone C-35 at 350 L·ha–1 with virtually impermeable film (VIF), k) Telone C-35, S-metolachlor (Dual Magnum), and triflouxethuron (Env). At 350 L·ha–1, 840 g a.i./ha, and 5.3 g a.i./ha; l) sodium azide (SEP 100) through drip irrigation at 75 kg a.i./ha followed by three biweekly water applications; m) SEP 100 through drip irrigation at 150 kg a.i./ha followed by three biweekly water applications; and n) pebulate (Tillam), Pic, and
fostihizate at 4 kg a.i./ha, 150 kg a.i./ha, and 4.5 kg a.i./ha. At the end of the tomato season, the combinations of Telone C-35 + Desvinol + Sandea; Pic + MNA; Telone C-35 + VIF; Telone C-35 + Dual Magnum + Envoke; SEP 100 at 75 kg a.i./ha; SEP at 150 kg a.i./ha; and Tillam + Pic + Fostihizate had the same nutfudge counts as MBt. The same pattern occurred for Fusarium wilt incidence. In terms of marketable fruit yield, all treatments, except the untreated control and SEP 100 at 150 kg a.i./ha, were equal to MBt.

**EFFICACY OF 1,3-DICHLOROPROPENE PLUS CHLOROPICRIN AND HERBICIDES ON PURPLE NUTSEDGE (CYPERUS ROTUNDUS) CONTROL IN TOMATO**

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Two field trials were conducted to compare the efficacy of various herbicides, in combination with the soil fumigant 1,3-dichloropropene (1,3-D) + chloropicrin (Pic) at the 83:17 proportion (C–17), on purple nutfudge control and their effect on fresh tomato yield. The combination of 1,3-D (325 kg a.i./ha) + Pic (67 kg a.i./ha) was used alone and along with either pebulate (4.50 kg a.i./ha), napropamide (4.50 kg a.i./ha), metolachlor (1.13 and 2.25 kg a.i./ha), lactofen (2.25 kg a.i./ha), or fluthalamid (0.40 kg a.i./ha). Pebulate was soil incorporated either at 10 or 20 cm deep. Results indicate that pebulate was consistently more effective controlling purple nutfudge than the other herbicides tested. C–17 in combination with pebulate was more effective in controlling purple nutfudge than the fumigant alone. Shallow pebulate incorporation failed to improve weed control and tomato fruit yield.

**LONG TERM EFFECT OF FUMIGANT AND HERBICIDE COMBINATIONS IN BELL PEPPER (CAPSICUM ANNUUM)**

James P. Gilreath*, Joseph W. Noling, Timothy N. Motis®, Erin Rosskopf®, and Bielinski M. Santos*. Gulf Coast Research and Education Center, IFAS, University of Florida. Citrus Research and Education Center, IFAS, University of Florida. US Horticultural Research Laboratory,ARS, US Department of Agriculture

Four field trials were conducted between Spring 2001 and Fall 2002 to determine the effect of combinations of soil fumigants and herbicides on bell pepper. All the trials were repeated in the same plots. Soil fumigant levels were: a) methyl bromide + chloropicrin (67:33) at a rate of 400 kg ha⁻¹ (350 lb/acre); b) Telone C-35 at 330 L ha⁻¹ (35 gal/acre); c) Promat at 710 L ha⁻¹ (75 gal/acre); d) chloropicrin + Vapam at 150 kg ha⁻¹ + 710 L ha⁻¹ (130 lb/acre + 75 gal/acre); e) Inline at 330 L ha⁻¹ (35 gal/acre); and f) an untreated control. Herbicide levels were: a) napropamide at 2.25 kg a.i./ha (2 lb a.i./acre); b) trifluralin at 0.85 kg a.i./ha (0.75 lb a.i./ha); and c) an untreated control. There were no significant differences in yield and quality parameters. Little difference was observed between the fumigant treatments. Methyl bromide with chloropicrin was comparable to those for all the other fumigants, but superior to the nonfumigated control. Among the herbicide treatments, trifluralin showed consistently higher yield than napropamide and than the nontreated control.

**TASTE PANEL PERCEPTION OF SWEETNESS AND ACCEPTABILITY AS COMPARED TO SUCROSE AND TOTAL SUGARS**

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Taste panel perception and preference of sweetness in three phenotypes (su, se, and sh2) of sweet corn harvested at three different maturities (early, mature and late) were compared to HPLC analysis for sucrose and total sugars. Panelist rating of sweetness and its acceptability significantly correlated with the HPLC analysis. Correlations were found for sucrose and total sugars present (for sweetness, r² = 0.70 and 0.61; acceptability, r² = 0.64 and 0.55). Sucrose significantly correlated with the total sugars present (r² = 0.95). The panelists’ perception of flavor also correlated significantly with the amount of sucrose present and total sugars (r² = 0.66 and 0.59, respectively). As maturity increased, so did the ability of the taste panel to identify differences in phenotypes. Although sucrose, total sugar and panel evaluation of sweetness were significantly different between se, sh2 and su, taste panelists indicated no significant difference in acceptability between se and sh2. Sh2 were more preferred on all harvest dates than se and su. Su was sweet according to panel evaluation only at early harvest, and did not receive high scores on acceptability. Overall, early harvest was most preferred in sweetness and acceptability to panelist. Se and sh2, were also acceptable at mature harvest. Sh2 remained sweet and acceptable across all three harvest dates and maintained sucrose content at all maturities. Su and se varieties experienced a drop in sucrose at mature harvest and then rose again with late harvest.

**EFFECTS OF COLORED MULCHES ON “B” SIZE POTATOES**

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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 textures in firmness and fiber that consumers are looking for today in an ever increasing health consciousness among consumers. In 2003, the varieties ‘Alfred’ and ‘French Fingerling’ (West Edmonton, Alberta, Canada) and ‘Red Companion’ and the numbered line W2275-3R (Univ. of Wisconsin) were planted in a double row 10 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 2 inches above the soil surface and 4 and 6 inches below the soil surface. 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 silver mulch with the blue having the lowest tuber yields. Cultivar differences were also seen in there ability to produce marketable tubers. W2275-3R had the highest plant vigor and also the most marketable tubers per plant. Allred produced most of its tubers ≥2 inches in diameter with the tubers nonuniform in shape. The market preferred the French Fingerling cultivar.

**POTATO VARIETY DEVELOPMENT: FLORIDA’S PAST AND FUTURE CROP**

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The average annual value of the Florida potato crop from 1997 to 2000 was $114 million. Potato consistently ranks in the top five valued vegetable crops in the state. However, for growers to remain economically viable, potato production efficiencies must improve. In other words, the monetary return from the potato crop per unit area must increase to offset increases in production costs. A variety evaluation program was implemented at the Plant Science and Education Unit’s Hastings Farm at the University of Florida to identify new potato selections that will improve production efficiencies. About 200 potato lines including chip stock, red-skinned, white-skinned, and russet-skinned fresh market varieties were evaluated in 2003. ‘Ambra’, a white-skinned, yellow-flesh variety performed well under standard production practices. Potatoes were planted, vine killed, and harvested on 30 Jan, 14 May, and 2 June 2003, respectively. ‘Ambra’ was grown from mini-tubers because of limited seed availability. ‘Ambra’ total and marketable tuber yields were 41.1 and 30.0 t ha⁻¹ and were not significantly different than ‘LaChipper’, the white-skinned standard, or ‘Yukon Gold’, the yellow-flesh standard. Specific gravity of ‘Ambra’ was significantly lower than both standards at 1.049. Total culls for ‘Ambra’, ‘LaChipper’, and ‘Yukon Gold’ were not significantly different averaging 17.3% of total tuber yield. Overall appearance was rated on a one to nine scale with nine considered excellent. Appearance scores for ‘Ambra’, ‘LaChipper’, and ‘Yukon Gold’ were 7.5, 6.5, and 5.5.
THE COMMERCIALIZATION OF AN ORIENTAL CRISP FLESH ‘SPRITE’ THROUGH THE NC SPECIALTY CROPS PROGRAM

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The N.C. Specialty Crops Program is a state-wide program aimed at developing new crops and products and markets for Eastern NC farmers. It is a partnership between NC State University and the NC Dept of Agriculture and Consumer Services Marketing Division and key funding comes from the Gold Leaf Foundation. The primary goal of the melon screening program is to identify superior cultivars of the various melon types and to determine their adaptation to the growing conditions of North Carolina. Another objective is to be sure promising cultivars and test market them to determine consumer acceptance. Market development occurs as production factors are being evaluated. The third objective of the program is to have grower and seller involvement in the market development. An oriental crisp flesh melon ‘Sprite’ was selected in 1998 to enter in the screening trial. It was tested in 1998, 1999 and the decision made to commercialize it. Since the melon did not slip, the growers needed to know when to harvest the fruit. In 2000 and 2001 phenology studies were conducted on ‘Sprite’ in order to identify visual cues that were related to soluble solids. Increased calyx and 2001 phenology studies were conducted on ‘Sprite’ in order to identify visual cues that were related to soluble solids. Increased calyx and 2001 phenology studies were conducted on ‘Sprite’ in order to identify visual cues that were related to soluble solids. Increased calyx

Preliminary Evaluation of the Potential for Edamame Production in North Georgia

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North Georgia vegetable producers face the conundrum of increasing urbanization shrinking their available farm land yet increasing the options for local roadside sales or niche markets. Therefore, they are continually looking for alternative crops to fit these markets. Green-podded edible soybean (Glycine max), also called edamame, could potentially fit this market since they have recently become more popular because of their nutritional benefits. Three planting dates and two seeding rates were evaluated for potential edamame production in the north Georgia area. Seeding rates of three and four seed per foot were planted in three-row plots on 29 May, 10 June, and 24 June, 2003 in Blairsville, Ga. Planting date was established as the main plot and seeding rate as the subplot in a split-plot design with four replications. Pods were harvested at optimum maturity on 13 Aug., 2 Sept., and 19 Sept. Yields of pods harvested from plots seeded on 10 June were significantly greater than the first planting. The latest planting produced the highest percentage of marketable pods and the second planting produced a higher percent marketability than the first. Four seed per foot produced significantly greater marketable yield than three seed per foot. Although not significantly, the earliest planting produced greater marketable dry weight than later plantings and three seed more marketable dry weight than four seed per foot. Since edamame is harvested and sold as a green-podded vegetable and not dried, it appears that the later planting date at four seed per foot would be the best combination for the greatest yield.

Use of Cover Crops and Strip-Tillage for the Production of Pumpkins in Alabama

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A study was conducted from 1998 through 2002 at the North Alabama Horticultural Crops Station in Cullman, Ala., to compare the use of strip-tillage, three different cover crop treatments [arrowleaf clover (Trifolium vesiculosum Saci. ‘Yuchi’); hairy vetch (Vicia villosa Roth.); wheat plus crimson clover (Trifolium aestivum L. + Trifolium incarnatum L.)] and three different nitrogen rates (0, 50, and 100 kg ha⁻¹) to conventional bareground pumpkin (Cucurbita spp.), production. Cover crop treatments were established in the preceding fall beginning in 1998. Cover crops were killed 2 to 3 weeks before strip-tillage. ‘Appalachian’ pumpkins were sown immediately after tillage each year. Data collected included biomass samples, marketable fruit number and yield, and soil moisture measurements. Partial budgets were developed for each cover crop treatments by nitrogen rate combination to determine potential returns. The arrowleaf clover and hairy vetch cover crops produced the most desirable C:N ratios. The effect of cover crops differed by years; however, the highest yields and yields were obtained with hairy vetch and arrowleaf clover but these were not always significantly higher than those of wheat plus crimson clover. Nitrogen rates did not interact with cover crops or with years. Fruit number and yield did not differ between the 50 and 100 kg ha⁻¹ nitrogen rates, but where higher than those of the 0 kg ha⁻¹ nitrogen rate. Using hairy vetch or arrowleaf clover at the 50 kg ha⁻¹ nitrogen rate produced potential returns greater than those of conventional bareground production using 100 kg ha⁻¹ nitrogen.

Securing Pest Control Product Registrations for Uses in Vegetables via IR-4

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The USDA Minor-use Program (IR-4) celebrated its 40th anniversary last year with its best ever performance. A record number of over 700 EPA registrations and tolerances were secured last year resulting in over 500 new pest control product labels for the vegetable industry. As OP, carbamate based and other older pesticides are phased out by EPA, IR-4 is securing tolerances for reduced risk materials and registrations for biopesticide products as effective replacements. The IR-4 Project Southern Region is providing support for efficacy and crop safety research that will identify and result in the labeling of environmentally sound, safe and effective products for pest control.

Area of Influence of Dayflower (Commelina communis) Interference with Bell Pepper (Capsicum annuum)

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Field trials were conducted in Citra, FL, to determine the area of influence of dayflower on bell pepper yield as affected by dayflower time of emergence. ‘Wizard’ bell pepper was transplanted on double rows at 30 cm between and within rows. One dayflower plant emerged alongside one pepper plant near the center of the plot (adjacent pepper plant, APP) at 1, 2, 3 or 4 weeks after transplanting (WAT) pepper. The yield of each pepper plant and its distance from the dayflower plants were recorded and compared to the yield of control (weed-free plants). Pepper yield was not affected when dayflower emerged 4 WAT, but earlier dayflower emergence resulted in significant crop yield loss. The magnitude of yield losses was given a function of its distance from the 20 cm plot and the time of dayflower emergence. When emerging 3 WAT, dayflower interference reduced the yield of pepper plants up to 30 cm from the APP. Dayflower emerging 2 WAT affected the yield of pepper plants up to 60 cm from the APP, whereas pepper yield was affected in plants up to 90 cm from the APP when dayflower emerged 1 WAT. These results indicate that one dayflower plant emerging 1 WAT may significantly reduce the yield of 12 neighboring pepper plants, while one dayflower plant emerging 2 and 3 WAT may significantly reduce the yield of 8 and 4 neighboring pepper plants, respectively.

Arugula (Eruca sativa) Leaf Area and Yield As Affected by Yellow Nutsedge (Cyperus esculentus) Density and Time of Emergence

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Field experiments were conducted in Live Oak, Fla., to determine the effect of time of emergence and density of yellow nutsedge on the leaf area and yield of polyethylene-mulched direct-seeded arugula. The crop emerged within 1 week after sowing (WAS). Yellow nutsedge emerged through the mulched at 1, 2, 3, or 5 WAS, at the densities of 0, 20, 40, 60, and 80 plants/m², and grew with the crop until harvest (7 WAS). Arugula
leaf area and shoot dry weight were affected to about the same extent by yellow nutseed density and time of emergence. Yellow nutseed emerging 4 WAS at the densities of 20 and 80 plants/m² resulted in yield losses by 30% and 65%, respectively. When yellow nutseed emerged 1 WAS at the densities of 20 and 80 plants/m², yield losses were 60% and 95%, respectively. Argula yield loss was 50% when yellow nutseed emerged 2 to 3 WAS (20 plants/m²), 3 to 4 WAS (40 plants/m²), and 4 to 5 WAS (60 to 80 plants/m²).

THE EFFECT OF REDUCED PHOSPHORUS ON SWEET CORN PRODUCED ON ROCKY CALCAREOUS SOILS IN SOUTH FLORIDA

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Sweet corn (Zea mays) is a major cash crop produced on marl and rocky soils in Miami-Dade County, FL, on about 4000 acres of

with an estimated value of $12.8 millions. Phosphorous, applied as fertilizer to these soils is fixed by calcium carbonate (calcite) through adsorption and precipitation and consequently the availability of P in calcareous soils is relatively low. Applications of large amounts of P fertilizer for many years resulted in the accumulation of high levels of P in calcareous soils. Accumulated P is slowly released into the soil solution to become available to plant roots. Previous studies conducted in this area showed little or no yield and crop quality response to phosphorus fertilizer applications. A large-scale field trial with reduced phosphorus applications was conducted in a grower’s field in 2002-03. The treatments were 8–0–8 and 8–8–8 and 8–15–8 (grower’s fertilizer rate) with an estimated value of $12.8 millions. Phosphorous, applied as fertilizer to these soils is fixed by calcium carbonate (calcite) through adsorption and precipitation and consequently the availability of P in calcareous soils is relatively low. Applications of large amounts of P fertilizer for many years resulted in the accumulation of high levels of P in calcareous soils. Accumulated P is slowly released into the soil solution to become available to plant roots. Previous studies conducted in this area showed little or no yield and crop quality response to phosphorus fertilizer applications. A large-scale field trial with reduced phosphorus applications was conducted in a grower’s field in 2002-03. The treatments were 8–0–8 and 8–8–8 and 8–15–8 (grower’s fertilizer rate) with six replications. The collected data included plant stand, plant height, nutrient concentration in leaf samples, leaf chlorophyll, tip fill, number and weight of marketable ears per acre. Reduced rates of phosphorus fertilizer did not significantly reduce yield and quality of sweet corn. This experiment is being repeated in the 2003-04 production season with similar P fertilizer rates including application of zeolite as soil amendment and installation of lysimeters for water quality evaluations.

RECOMMENDATIONS FOR EFFECTIVE USE OF A GARDEN SEEDER FOR RESEARCH PLOTS AND GARDENS

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An Earthway model 1001B garden seeder (Earthway Products, Bridgport, IN) is frequently used for seeding small research and demonstration plots as well as home gardens. Seeding uniformity tests were conducted with 18 species of vegetable in this seeder using the planter plates recommended by Earthway, alternate plates, and plates modified by taping off metering ports to change the seeding rates and spacings. Performance with the Earthway seeder with most vegetable seed would not qualify it as a precision seeder, but the Earthway seeder can do an acceptable job of planting many vegetable seeds in small plots at less than 1/10th the cost of a commercial-quality precision seeder. A table giving specific recommendations for each of the 18 species has been prepared to aid research and extension personnel as well as home gardeners. These recommendations are available at www.louisianalawnandgarden.org.

A KAOLIN BASED PARTICLE FILM TO AFFECT PEPPER YIELD

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Heat stress can limit yield in pepper (Capsicum spp.), generally through flower and fruit abortion. A kaolin based particle film, originally developed to protect fruit trees from insects, has been found to reduce temperatures in tissues of plants. The kaolin based material was tested to determine if it could be used to improve yields of pepper. Seedlings of a bell pepper, cv. Jupiter, and a nonpungent jalapeño, cv. Pace 103, were transplanted at three planting dates that would assure they would be subject to high day and night temperatures and the kaolin material applied when first flowers were produced. Applications were controlled through the settings of the first three flushes of fruit on a schedule, or on an as needed basis, to determine if the material improved yield. Controls did not receive the kaolin material. Planting bell pepper after 15 May is not recommended in years with normal conditions during the growing season. Planting the nonpungent jalapeño after mid-June, under some conditions during the growing season, can reduce yields. The kaolin material did not affect yield of either pepper type and is not recommended for use on peppers if the aim is to increase yields when there is little, or no, pressure from insects.

WEED CONTROL TRIALS IN TRANSPLANTED ONIONS IN OKLAHOMA

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Recent interest in establishing commercial bulb onion production in Oklahoma has prompted the need to develop suitable weed management recommendations for this crop. Trials were conducted in 2001 and 2003 at Lane, Okla., and in 2002 at Calvin, Okla., to address this need. Objectives were to evaluate chemical weed control strategies in transplanted onions using 1) the currently approved herbicides Prowl (pendimethalin) and Goal (oxyfluorfen) and 2) the herbicide Frontier (dimethenamid) which is currently in process of being registered for use in onions. Treatments were Prowl @ 1 pint/acre preemergence (PRE) followed by (fb) Prowl @ 1 pint/acre postemergence (POST), Prowl @ 2 pint/acre PRE, Prowl @ 1 pint/acre + Goal @ 1 pint/acre PRE, Goal @ 2 pints/acre PRE, Frontier @ 1 pint/acre + Prowl @ 1 pint/acre PRE, Frontier @ 2 pint/acre + Prowl @ 1 pint/acre PRE, Frontier @ 1 pint/acre + fb Goal @ 2 pint/acre POST and Frontier @ 2 pint/acre fb Goal @ 2 pint/acre POST. Based on visual evaluations of weed control, all treatments consistently provided excellent control of pigweeds and annual grasses except for Prowl and Goal when applied alone. For yellow nutseed (Cyperus esculentus), treatments that included Frontier provided best control. For broadleaf weeds including Pennsylvania smartweed (Polygonum pensylvanicum) and cutleaf groundcherry (Physalis angulata) the Prowl + Goal treatment and all treatments that included Frontier provided excellent control. For toothed spurge (Euphorbia dentata), Frontier and Goal treatments applied at 2 pint rates provided the best, but not complete control. Onion yield was increased significantly by several treatments in each study. The major effect on increased yield was to increase yield of large (>3 inch diameter) bulbs.

CALABAZA AS A SECOND CROP ON COLOR MULCH IN CENTRAL FLORIDA

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Calabaza (Cucurbita moschata (Duchesne ex Lam.) Duchesne ex Poir.) is in the squash family and is known by several common names: tropical pumpkin, green pumpkin, Cuban squash or pumpkin, and West Indian pumpkin. Semi-bush hybrids have been developed in Florida to replace the 20 m plus vining types. Several high value crops have been reported to have a positive response to various colored mulch such as red mulch with strawberry and red and silver mulch with tomato. This study was to investigate the response of calabaza to color mulches grown as a second crop to help reduce the expense of plastic mulch. Nine color mulches were evaluated over four years in replicated trials. Blue, olive, and silver mulches had less plant growth at 23 days after transplanting (DAT). Olive, black, and red mulches had more medium plant growth at 23 DAT. White on black, white, and green mulches had more large plant growth at 23 DAT. But there was no correlation between early plant growth and fruit yields or fruit size and average weight. The highest yield was on black, silver, blue, green, and white on black mulches. Red mulch had the lowest yield. Mulch color did not affect the number or early maturity of fruit. Fall grown calabaza had similar yield and fruit size as spring crops in central Florida.
Fruit Crops

EFFECTS OF CA-POLYSULFIDE AND OSMOTIC AGENTS ON APPLE POLLEN GRAIN GERMINATION IN VITRO

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This study was conducted to evaluate protocols and determine solution characteristic effects on apple pollen germination in vitro as a means of evaluating and screening potential bloom-time fruit thinning chemicals as alternatives to current methods. The solution characteristics at multiple concentrations (0%, 0.25%, 0.5%, 1%, 2%, 5%, and 10%) of Ca-polysulfide, NaOH, and CaCl2 for pH, EC, osmotic tension, and the effect on pollen germination in vitro were determined. Apple pollen ('Rome Beauty') was dispersed on germination and growth media placed in petri dishes. Micro-aliquots of each concentration were applied to pollen at multiple, marked locations on the petri dish and germination and growth monitored by microscopic observation at 4, 8, and 24 hours after treatment and incubation at 25°C and 12 hour photoperiod. Generally, the cumulative percentage pollen germination decreased asymptotically with increasing solution concentration. Pollen germination almost reduced to 0 at pH greater than 10.5, EC greater than 180 and at Osmotic tension above 5 Mpa. High concentrations of CaCl2 decreased germination almost reduced to 0 at pH greater than 10.5, EC greater than 180 and at Osmotic tension above 5 Mpa. Low concentrations of CaCl2 (0.25% to 1.0%) stimulated germination compared to controls. The most effective chemicals for restricting pollen germination and growth were Ca-polysulfide (0.25%), NaOH (1%), and CaCl2 (10%).

‘GALA’ ON 17 SIZE CONTROLLING ROOTSTOCKS: RESULTS FROM 10-YEAR STUDY OF THE 1994NC–140 APPLE ROOTSTOCK TRIAL IN ARKANSAS

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The growth and productivity of ‘Gala’ on 17 size-controlling apple rootstocks were studied in a 10-year trial in Arkansas as part of the NC–140 cooperative project. During the study, 70% of trees on ‘Mark’, M.27 EMLA and Ott.3 died while the overall survival average was 60%. The largest trees in TCSA and height were on V.1, while the smallest trees were on ‘Mark’, M.27, and P.16 rootstocks. There were no differences in tree size among six M.9 clones for TCSA, tree height, spread, yield efficiency, or fruit size. However, trees on M.9 NAKBT37, and M.9 FI56 have had significantly lower yields per tree than other M.9 clones. Among the M.9 clones, M.9 Nic29 and Pajam 1 were the largest and had the greatest yields, and significantly more root suckers than other clones. Trees on B.9 survived well but had lower yield and smaller fruit than trees on M.9 clones. There were no significant differences in tree size or cropping variables between M.26 EMLA and M.9EMLA. Fruit size of trees on M.27 EMLA and ‘Mark’ were significantly smaller than from all other rootstocks. Cumulative yield was significantly correlated to tree size variables TCSA, height, spread, estimated volume and estimated canopy surface area, but was highly correlated to estimated canopy surface area/volume ratio.

DORMEX INCREASES BLACKBERRY YIELD

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A distant shipping blackberry industry is rapidly developing in South Georgia as a complement to the 6000 acre (2420 ha) blueberry industry. Thornless blackberries from the Univ. of Arkansas are the preferred type in this area because of their excellent fruit quality. However, they have yielded poorly following mild winters. In 2002, Dormex (50% hydrogen cyanamide) at 0%, 2%, 3%, and 4%, and thidiazuron (200 ppm a.i., with 2% dormant oil) were tested on ‘Arapaho’, ‘Navaho’ and ‘Apache’ cultivars in a winter with 584 hours of temperatures below 7°C. Dormex at 3% and 4%, but not thidiazuron, accelerated foliar development and slightly advanced bloom and harvest periods. In 2003, a year with 906 hours of winter chill, Dormex was tested on ‘Apache’ and ‘Navaho’. Dormex at 3% again promoted early spring growth and increased yield in weeks 1, 2, and 3 for ‘Apache’ and weeks 1 through 5 for ‘Navaho’. Yield at week 5 for ‘Apache’ and week 6 for ‘Navaho’ was greater in the control than in plants treated with 3% Dormex. Dormex at 3% increased yield during the commercial market window by 89% in ‘Apache’ and 57% in ‘Navaho’. Dormex appeared to increase budbreak in the mid and lower part of the canopy. The results indicate that Dormex applications can be used as a tool to improve early season and overall plant yield in blackberries.

PRIMOCANE-FRUITING BLACKBERRY CULTIVAR RELEASES FROM THE UNIVERSITY OF ARKANSAS

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The first commercial primocane-fruited blackberry cultivars have been approved for release by the University of Arkansas Agricultural Experiment Station. These were selected in 1997, and have been evaluated at several locations in Arkansas and in other states. These genotypes were tested as APF-8 and APF–12. Both cultivars will be trademarked, utilizing the names ‘Prime-Jan’ (APF-8) and ‘Prime-Jim’ (APF–12) in commerce. In all evaluations, these cultivars have consistently expressed the primocane-fruited habit. These cultivars are both thorny with erect canes. Average primocane first bloom date for both cultivars at Clarksville, Ark., was 17 June, and first primocane fruit ripe 18 July. Depending on summer heat, they continue to flower and fruit until frost in the fall. High temperatures (in excess of 30°C for consecutive days) reduce fruit set and quality. In a more moderate climate at Aurora, Ore., these cultivars began primocane flowering in mid to late July, with first fruit mature about 1 Sept. They continued flowering until frost. Average primocane berry weight ranges from 4 to 5 g in Arkansas, and up to 8 to 10 g in Oregon. The floricanipe ripens early, just after that of ‘Choctaw’ with average berry weight of 5.0 g for both cultivars. Postharvest performance of ‘Prime-Jan’ and ‘Prime-Jim’ is similar to that of most Arkansas thorny cultivars, and lower than that of thornless cultivars. Therefore, these new cultivars are not recommended for shipping. ‘Prime-Jan’ and ‘Prime-Jim’ are recommended for home garden use and very limited commercial trial in moderate climates.

TOLERANCE OF YOUNG PAPAYA (CARICA PAPAYA L.) TO POSTEMERGENCE HERBICIDES

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Experiments were conducted to determine the tolerance of ‘Red Lady’ papaya transplants (six true leaves, 25 cm in height) to the herbicides oryzalin (0, 1.0, 2.0, 3.0, and 4.0 kg a.i./ha), oxyfluorfen (0.5, 1.0, 1.5, and 2.0 kg a.i./ha), pendimethalin (0.5, 1.0, 1.5, and 2.0 kg a.i./ha), imazaquin (35, 70, 105, and 140 g a.i./ha), imazethapyr (20, 30, 40, and 50 g a.i./ha), imazamox (0.25, 0.5, 0.75, and 1.0 kg a.i./ha) and bentazon (0.75, 1.0, 1.25, and 1.5 kg a.i./ha) applied over the top of the papaya canopy. Transplant dry weight, height, and leaf area were not affected by oryzalin, regardless of rate. Oxyfluorfen, pendimethalin, and bentazon at all rates killed the transplants within two weeks after application. Imazethapyr caused severe stunting and death of the transplants within four weeks after application. Transplants sprayed with imazamox and imazameth did not die. However, as imazaquin and imazameth rates increased, overall transplant growth decreased. Six weeks after treatment with imazamox and imazameth at recommended rates for efficacious weed control (0.5 kg a.i./ha and 70 g a.i./ha, respectively), transplant shoot dry weight, height, and leaf area were 15% to 20% lower than in untreated transplants. Thus, among the herbicides tested, only oryzalin would be safe for use young papaya transplants.

PASSION FRUIT (PASSIFLORA EDULIS VAR. FLAVICarpa) TRANSPLANT GROWTH AS AFFECTED BY SELECTED GROWTH REGULATORS AND BIOSIMULANTS

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Greenhouse experiments were conducted to determine the effect...
of gibberellic acid (GA) (0, 10, 20, 30, 40 mg L⁻¹), benzyl adenine
(BA) (10, 20, 30, 40 mg L⁻¹), acetylated proline (AP) (100, 200, 300,
400 mg L⁻¹), and a commercial glycine-rich mixture of amino acids
and short-chain peptides (APC) (1, 2, 3, 4 g L⁻¹) on the time necessary
to produce adequate passion fruit transplants. Passion fruits were considered
adequate for transplanting to the field when they had at least four leaves,
at least one tendril, and 25 cm in height (“short transplant”) or 50 cm in
height (“tall transplant”). Aqueous solutions of BA, GA, AP, and APC
were sprayed on the leaves of ‘Lilikoi’ passion fruit seedlings 15 days after
eruption. Untreated seedlings reached adequate tendril, leaf number,
and height for short and tall transplants at 53 and 76 days after emergence,
respectively. Seedlings treated with BA were ready for transplanting at
the same time as untreated seedlings. In general, increasing GA, AP,
and APC rates resulted in faster transplant growth. GA (30–40 mg L⁻¹)
and AP (300–400 mg L⁻¹) reduced the time necessary to produce short
transplants by 17% (9 days) and tall transplants by 20% (15 days), as
compared to untreated seedlings. APC (3–4 g L⁻¹) shortened the time to
produce short transplants by 28% (15 days) and tall transplants by 30% (22
days). These results indicate that AP, PC, and GA may be useful
to accelerate the production of passion fruit transplants.

GRAPE ROOT BORER TRIALS ON OWN-ROOTED AMERICAN
BUNCH AND FRENCH HYBRID VARIETIES
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Grape root borer is a serious vineyard pest in the eastern part of North
America. Most of its two-year life cycle is spent as a larva feeding on the
roots of vines resulting in reduced vine vigor and yields plus increased
susceptibility to external stresses. Control efforts are aimed at the sum-
mer of the second year in the life cycle when the larva migrates to the
upper soil level, pupates and emerges as an adult. Following mating, the
female lays eggs. The newly hatched larvae drop to the ground, enter the
soil and begin feeding on grape roots. Due to predation, diseases and
desiccation, most larvae succumb before entering the soil. Once larvae
are established in a feeding site, the mortality rates are very low. Passive
control methods include weed and grass control under vines, utilization
of a high trellis and summer pruning. These practices increase larval
mortality by favoring more light and, therefore, desiccation as well as
having merit from other production standpoints. Active controls include
mounding or construction of an insecticide barrier on the soil surface.
Mounding soil around the base of vines just before adult emergence is
not practical due to cost, the potential for vine damage and poor borer
control due to an extended emergence time. Lorsban 4E is labeled for
use as a directed spray to the soil surface. The use of pheromone
trapping is helpful in determining if borers are present and when might
be the optimum time to apply ground sprays. Lorsban 4E has a 35-day
preharvest interval. To comply, sprays under early-maturing varieties
would be applied too early to maintain a viable insecticide barrier at the
correct time. In such varieties, a postharvest spray would be better. The
best current program available at this time includes the use of passive
controls and the application of Lorsban 4E based on pheromone trap
counts and harvest dates. Even when properly carried out, this program
does not give protection throughout the period over which borers are
active. Additional grape root borer control techniques are currently
being investigated.

EXTENSION’S RAPID RESPONSE TO A REGIONAL
STRAWBERRY PLANT CRISIS
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On 27 Aug. 2003, anthracnose was positively diagnosed in plug
plants being grown from Canadian tips by strawberry growers in the
Upper Piedmont of North Carolina, and in subsequent days and weeks,
numerous other plug propagation facilities across the state were found
to be infected with Colletotrichum acutum—a species of anthracnose
known to primarily infect strawberry fruit. Hundreds of strawberry
growers were then forced to use fresh dug bare-root as replacements
for diseased plugs. But relatively few growers had knowledge of how
to properly hand-transplant perishable fresh-dug plants. Extension’s
emergency response program to the anthracnose plug crisis of August
was initiated in early September 2003 included plans for several On-farm demonstrations on correct planting techniques for fresh dug, but all of these programs with the exception of one in a northwest piedmont county, were cancelled due to hurricane Isabel (arrived 18 Sept. 2002). Fortunately, a team of faculty in horticulture, communication services and foreign languages,
were able to quickly generate web-based illustrated instructional materi-
als in both English and Spanish on each step involved in successfully
transplanting fresh dug bare-root plants. These materials were developed
in just one week (in mid-September), and were reviewed and then made
electronically available to growers and agents on Berry Agent as well as
the website of The Southern Regional Small Fruit Center just before the
arrival of millions of fresh dug strawberry transplants in the third and
fourth weeks of September 2003 (see, http://www.smallfruits.org/Straw-
org/Strawberries/production/strbry__Settingplantswithahandtool.pdf).

TWO YEARS OF FIELD TRIALS IN NORTH CAROLINA
WITH IODOMETHANE (MIDAS) AS A PREPLANT
FUMIGANT
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Methyl bromide is scheduled to be phased out of use by 2005. A
replacement fumigant is needed for strawberry nursery and fruit crop
use to maintain production levels. Iodomethane (IMe) has been studied
in both strawberry nursery production in North Carolina as well for fruit
production in the strawberry plasticulture system. In 2001 at the Upper
Mountain Research Station in Laurel Springs, N.C., nursery test plots
treated with IMe at 263 kg ha⁻¹ experienced significantly greater total
numbers of marketable daughter plants (1,069,000 plants/ha) than any
other fumigant treatment, including IMe at 263 kg ha⁻¹ + chloropicrin at
87 kg ha⁻¹ (872,000 plants/ha), and Telone C-35 at 327 L ha⁻¹ (775,000
plants/acre). The untreated control (UTC) yielded an average of 259,000
plants/ha. In a strawberry plasticulture fruiting trial conducted in 2002-03
at Clayton Central Crops Research Station, three fumigants: 1) IMe +
chloropicrin 98:2 at 134 kg ha⁻¹ (67 kg ha⁻¹ in-the-bed); 2) IMe +
chloropicrin at 168 kg ha⁻¹ (84 kg ha⁻¹ in-the-bed); and 3) Telone C-35
at 262 L ha⁻¹ (131 L ha⁻¹ in-the-bed), were not found to be statistically
different in marketable yield. However, plantback period, or the waiting
period from fumigation to transplanting, was highly significant.
Chandler plugs set on 27 Sept. 2002 (1 week after fumigation) had the
highest marketable fruit yield of 22,965 kg ha⁻¹ compared to planting
on 4 Oct. 2002 (2 week plantback) of 18,683 kg ha⁻¹, and 10,650 kg ha⁻¹
for planting on 11 Oct. 2002 (3 week plantback). The 98.2 formulation
of Iodomethane has been submitted to US-EPA for registration with a
7-day plantback.

HORTICULTURAL IMPACT OF EXTENDING DORM-
ANT OIL APPLICATION SEASON FOR SCALE
CONTROL
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An extension-oriented trial was conducted to determine the impact of
extending the period for application of Superior oils beyond the typical
application period associated with the dormant phenological phase of
tree development. This is desirable because peach growers do not have
sufficient time during South and Middle Georgia’s short winters to
make two oil applications 2 weeks apart over all of their acreage with
the avoidance of adverse weather conditions such as rain, heat and cold.
Applications were made at five rates, 0, 1.5, 3, 4.5, and 6% dormant oil

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on four different dates about 14 days apart during Fall 2001 and 2002 and 7 to 10 days apart during the spring of 2003. Fruit were harvested when commercially ripe and accessioned for size and weight. In addition, bud phenology was noted during the trial and bud set determined for each treatment. Rate or date of oil application did not have statistical impact on bud set. But numeric differences were noted in bud set with dates when temperatures dropped near or below 4.4°C, while statistical differences in fruit number were noted. However, yield was not very negatively affected as an inverse relationship was noted between fruit number and size. Ultimately, extension of the Superior oil application into the fall appears possible if careful attention is paid to expected morning temperature following treatment, avoiding lows of 4.4 °C or below and highs the day of treatment above 80 °F. If trees have reached 75% leaf drop, the temperature surrounding application was not important. During the spring the phenology of floral development was very important, making it critical to avoid temperatures below 7.2 °C when trees were at 40% flowering or more.

A NOVEL GIRDLING TECHNIQUE FOR PEACH TREES
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While useful in early peach varieties for increasing fruit size and earliness, standard girdling techniques cause substantial damage to peach trees and some believe compromise the tree’s health and longevity. We assessed the usefulness of a novel girdling technique that is apparently noninjurious to the tree. Application of one or two cable ties to scaffolds during the dormant season was compared to standard knife girdling, with a complete ringing of the scaffold near pit-hardening and a nongirdled control. All girdling treatments gave similar fruit size and total soluble solids with an increase of about 25% in fruit size and 15% in total soluble solids over the nongirdled control in the first season of the trial. During the second season, the cable-tie treatments out performed the nongirdled control and the knife girdled treatment, presumably because girdling caused excessive bleeding during a season that had about 63 cm of rain during the growing season, and the cable ties in preliminary study appear to improve the quality of fruiting wood. Cable ties are removed at the end of the harvest period to avoid damaging the tree’s vascular system. The cable tie girdles can be reapplied the following dormant season.

GUARDIAN PERFORMANCE IN REPLANT SITES WITH AND WITHOUT PREPLANT FUMIGATION
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Peach tree short life (PTSL) is one of the limiting factors to peach production in North Carolina as well as the Southeast. The peach rootstock Guardian is reported to be tolerant of root-knot and ring nematodes, which contribute to the incidence of PTSL. In 1994 a study was initiated to evaluate the performance of the Guardian peach rootstock, compared to Lovell. ‘Redhaven’ was the scion for both rootstocks. The site of this study has a history of poor peach tree survival. Six-year-old trees were removed because of tree mortality from PTSL in the Spring of 1993. After tree removal, one-half of each existing row was preplant fumigated and trees were replanted over the rows of the previous orchard in February 1994. By the end of the 2003 growing season, tree mortality for the trees planted in unfumigated soil was 55% for Lovell compared to 27% for the trees planted in unfumigated soil for Guardian. However, if the soil was fumigated, mortality was 14 and 8% respectively, for Lovell or Guardian. Trunk cross-sectional area for trees grown in the fumigated soil was 93.5 cm² squared compared to 81 cm² squared for trees grown in the unfumigated soil for both Guardian and Lovell. By the end of the 2003 growing season the trees planted on Lovell in unfumigated soil had a cumulative yield that was 34% of the trees grow in unfumigated soil on Guardian. When both rootstocks were planted on fumigated soil, the cumulative yield for Lovell was 65% of the yield of the trees grown on Guardian.

FREESIA RESPONSE TO FLURPRIMIDOL CORM SOAKS
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Freesia corms require high plant growth regulator (PGR) rates and long soaking times compared to other geophytes. The objectives of this study were to determine flurprimidol rates, evaluate soak temperature, soak time, and surfactant addition to flurprimidol soak efficacy. Freesia hybrida ‘Blue Sea’ and ‘Red Lion’ corms (6/7 cm) were soaked for 0.5 or 1 h in tap (7 °C) or tepid (32 to 17 °C) water with the presence or absence of 300 mg L⁻¹ Suffusion (Olympic Horticulture, Mainland, Pa.) with flurprimidol rates of 0, 12.5, 25, 50, or 100 mg L⁻¹. Four corms were planted in 10 cm pots containing BM1 commercial substrate (Berger, Saint-Modeste, Quebec) and grown in a polycarbonate-covered greenhouse with 15/22 °C night/day set temperatures. The treatments were applied on 19 Sept. 2003 and leaf height was recorded 101 days after treatment. A completely randomized design with a 2 × 2 × 2 × 5 factorial treatment combination was used with five replications. Regression analysis was used to determine the PGR rate at which 30% shorter plants than the control were obtained for each experimental unit and averaged to determine the I₃₀ rate for each treatment. Analysis of variance (P < 0.05) using the I₃₀ rate indicated main effect differences in cultivar such that ‘Red Lion’ was shorter than ‘Blue Sea’. Soil temperature interacted with surfactant such that using tepid water with surfactant required 54 mg L⁻¹ flurprimidol versus tap water with surfactant that required 77 mg L⁻¹ to achieve plant that were 30% shorter than controls. Soak times had no significant effect on the I₃₀ rate.

GREENHOUSE PRODUCTION APPLICATIONS OF PACLOBUTRAZOL AND ANCYMIDOL INDUCED RESIDUAL EFFECTS ON LANDSCAPE GROWTH OF PANSIES
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Pansies are typically grown as cool season annuals in the southern US with production beginning as early as August. Applications of plant growth regulators are usually required to control excessive stem elongation during the production phase. Pansies which appear stunted, but otherwise healthy, have been observed following planting into commercial and residential landscapes. An experiment was initiated in September 2002 to study possible effects of production applied growth regulators on subsequent landscape performance. Viola × wittrockiana H. Gams ‘Crown Yellow’ were germinated in plug trays (1.5 cm³ cells) on 1 July 2002. When grown at 55% RH and 16/16°C day/night temperatures, 50% flowering was noted. The plants were transplant into 150-mm pots containing a mix of soil, perlite, and peat (3:1:1). Plants were grown in a randomized design with a 2 × 2 × 2 × 2 × 5 factorial treatment combination. Plants were sprayed with paclobutrazol (formulated as Bonzi) or ancyclidon (formulated as A-Rest) at plug stage (3 Oct. 2002), at 10 days after transplant from plugs into 158-cm² containers, or at both stages. Paclobutrazol was applied at 0, 5, 10, and 15 mg L⁻¹ and ancyclidon at 0, 2, 4, 8 mg L⁻¹. Plants were transplanted on 11 Nov. 2002 to raised landscape beds to access residual effects on growth. Increased suppression of growth with increased PGR concentrations occurred during greenhouse production with paclobutrazol in response to all application times. Similar reductions were present for ancyclidon, but plug stage applications were less effective in growth reduction. Plug stage applications of ancyclidon did not adversely impact landscape growth, and only the 8 mg L⁻¹ applications during 6-pack production had a negative impact on landscape growth. Conversely, all tested rates of paclobutrazol reduced subsequent landscape growth of pansies.

APPLICATIONS OF MIXTURE THEORY IN HORTICULTURAL RESEARCH: AN INTRODUCTION TO MIXTURE EXPERIMENTS
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Mixture theory has many possible applications in horticultural research. Many of these possibilities have not been explored because of a general unfamiliarity with this statistical methodology. Mixture experiments compare proportions of components rather than the total amount of the mixture, as in factorial experiments. This methodology allows responses for various proportions of components to be predicted and the optimization of mixture composition. It also allows the influence of each component to be evaluated alone and in combination with the other components. On 10 Nov. 2003, seeds of marigold (Tagetes patula L. ‘Queen Sophia’) were sown in pots containing one of ten different substrates. Each substrate consisted of different proportions of peat, perlite, and vermiculite. The greenhouse grown plants were fertigated weekly to runoff with 250 mg L−1 of N from a 20N–8.7P–16.7K water-soluble fertilizer and were harvested after 57 d. Various growth and flowering data were collected. A growth index was calculated (height × width, × width,) and this data was analyzed using mixture theory. The model generated was statistically significant and indicated that a mixture containing 54% peat, 17% perlite, and 28% vermiculite would optimize the growth index. The analysis also indicated synergistic effects between all three components.

USE OF RECYCLED NURSERY RUNOFF FROM MIXED STAND WETLANDS INFLUENCES CONTAINER PRODUCTION OF FOUR TREE SPECIES

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The nursery/greenhouse industry is the fastest growing segment of United States agriculture. Consumer demand for excellent product quality requires luxury applications of water and agricultural chemicals. These cultural practices tend to yield significant volumes of runoff rich in nutrients and pesticides. A capture and recycle system at the Nursery/Floral Crops Research and Education Center at the Texas A&M University was fitted with 12 subsurface flow (SSF) and 12 free-surface flow (FSF) wetland cells. Three cells of each type were planted with Canna × generalis Bailey, Iris L. × Clyde Redmond, both species, or no wetland plants. Nursery runoff was continually collected and recycled through the wetland cells before application via overhead sprinklers or subcanopy microsprinklers. Although previous short-term (2.5 months, 6.2-L containers) studies with the system had resulted in little adverse effects during production of six container-grown species, overhead irrigation in longer term (15 months, 27 L containers) production schedules reduced height and trunk diameter growth and increased the foliage compared to plants irrigated with subcanopy microsprinklers. The extent of reduction was species dependent with Pinuselliottii Englmann being minimally impacted, Pyrus calleryanana Descaisne ‘Bradford’ intermediate, and Lagerstroemia indica L. and Taxodium distichum (L.) Richard exhibiting more pronounced effects. Damage appeared to be largely a result of high dissolved salt levels in irrigation water contacting the foliage. Evapotranspiration from FSF cells contributed more to elevated soluble salts than with SSF cells. The presence of wetland plants was more critical to nitrate removal in SSF than in FSF cells. Iris was more consistently effective year-round than Canna at nitrate removal.

THE INFLUENCE OF GROUND RUBBER TIRES, COMPOST AND FRESH RICE HULLS ON SOIL COMPACTION

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Soil compaction, the pressing together of soil particles, results in a denser media with less pore space. The number and size of macro pores are decreased, allowing soil particles to become closer, resulting in greater soil density. As bulk density increases, soil becomes more resistant to root penetration and water and nutrient infiltration are impeded. Compacted soils contain less oxygen, allowing a buildup of toxic gases. Compacted soils are a significant problem in the landscape, construction sites, sports fields, golf courses, and farms. Excavated soil was mixed with ground rubber tires, rice hulls, and compost in an effort to reduce soil compaction and its effects on the soil. One control was not amended, and a second not excavated. Treatments were compacted with a tractor once per week after a period of settling. The effect of soil compaction was measured as saturated hydraulic conductivity (Ksat), the ease with which water moves through the soil. Soil samples were extracted before compaction, and after 12 and 28 weeks of compaction. Compacting amended soil reduced Ksat for all treatments, compared to noncompacted evaluation, with the exception of the excavated control. 15% ¼-inch tire, and 25% compost. The soils amended with 25% rice hulls and 25% ¼" tires were the most effective at improving Ksat by the third sampling period.

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

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Over one growing season gas exchange and growth of transplanted and nontransplanted, mulched and nonmulched, field-grown red oak (Quercus shumardii) trees were investigated. In Spring 2003, twelve, multi-trunked trees were selected for uniformity and six of these trees were placed in a tree spade and then transplanted. Trees were placed in their original location. Chipped, wood mulch was placed in a circular pattern around the base of three randomly selected transplanted and three randomly selected nontransplanted trees. Over the growing season all trees were irrigated weekly with 95L of water. Before irrigating, weekly predawn leaf water potential (LWP) and midday stomatal conductance (GS) were measured on six leaves from each tree. At the end of the growing season, shoot elongation, stem area increase, and subsample leaf area data were collected. Weekly, LWP data indicated nontransplanted trees were not under moisture stress regardless of mulch treatment. However, transplanted trees were under greater water stress than nontransplanted trees and transplanted trees with out mulch were under greater water stress than transplanted trees with mulch. Midday, weekly GS data indicated nontransplanted trees generally had similar stomatal conductance throughout the growing season, regardless of mulch treatment. However, near the end of the season, nonmulched, nontransplanted trees had greater GS than mulched, nontransplanted trees. Early in the season, GS for transplanted, nonmulched trees was greater than GS for transplanted, mulched trees. However, this trend reversed as the growing season progressed. At the conclusion of the growing season, shoot elongation, stem area increase, and subsample leaf area were greatest for nontransplanted, nonmulched trees and least for transplanted trees regardless of mulch treatment. Results indicate if organic mulch is placed around the root zone of established multi-trunked, red oak trees, reductions in red oak gas exchange and growth may occur. In addition, we found that in the first year following transplanting, placing organic mulch around the root zone of transplanted, multi-trunked, red oak trees did not increase gas exchange or growth when compared to transplanted trees not receiving organic mulch.

SUPPRESSION OF SOIL-BORNE DISEASES CAUSED BY PYTHIUM AND PHYTOPHTHORA SPECIES IN CON- CONUT COIR-BASED SUBSTRATES

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Coconut coir is an agricultural by-product from the coconut industry. Coir has become a common horticultural substrate component. Research results have been published that demonstrates that coir is disease suppressive under certain conditions and several coir-based horticultural substrates are marketed as being diseases suppressive. The objective of this study was to evaluate the ability of coir to suppress damping-off of tomato seedlings caused by Phytophthora capsici, Phytophthora nicotianae, Pythium aphanidermatum and Pythium ultimum. Incidence of damping-off was reduced by 88%, 90%, and 41% for P. capsici, P. nicotianae, and P. aphanidermatum, respectively when grown in coir as compared to Sphagnum peat. Incidence of damping-off increased by 9% for P. ultimum when plants
were grown in coir dust as compared to Sphagnum peat. Population densities of the pathogens were reduced by 76%, 80%, 32%, and 11% in coir as compared to Sphagnum peat. Sterilization of Sphagnum peat increased the incidence of damping-off and population densities of the pathogens. However, sterilization of coir did not reduce or eliminate its suppressiveness.

**COMPARISON OF PHYSICAL PROPERTIES OF PERLITE AND PARBOILED FRESH RICE HULL-CONTAINING SUBSTRATES**

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Parboiled fresh rice hulls are an abundant agricultural by-product that has been proposed as a potential alternative to perlite in horticultural substrates. Bulk density, total pore space, water-filled pore space, air-filled pore space and water-holding capacity of Sphagnum peat-based substrates amended with 20%, 30%, 40%, 50%, and 60% perlite or parboiled fresh rice hulls was determined. Bulk densities were not significantly different between substrates containing equivalent amounts of perlite or parboiled fresh rice hulls. Water-filled pore space and water-holding capacity was higher in substrates containing 20% parboiled fresh rice hulls as compared to the substrate containing 20% perlite. However, water-filled pore space and water-holding capacity was lower in substrates containing 30% to 60% parboiled fresh rice hulls as compared to the substrates containing equivalent amounts of perlite. Total pore space and air-filled pore space was similar between substrates containing 20% perlite or parboiled fresh rice hulls. However, total pore space and air-filled pore space was higher in substrates containing 30% to 60% parboiled fresh rice hulls as compared to equivalent perlite-containing substrates.

**INFLUENCE OF POTASSIUM FERTILIZATION ON YIELD AND SUBSEQUENT ROOTING OF STEM CUTTINGS FROM STOCK PLANTS OF VEGETATIVE STRAWFLOWER**

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Yield and subsequent rooting of stem cuttings of stock plants of strawflower [Bracteantha bracteata (Vent.) A.A. Anderberg] were recorded when fertilized with K at 0, 29, 59, 117, or 234 mg·L–1. Cutting height was also evaluated because previous research had shown that lower concentrations of K produced compact shoots with commercially acceptable roots. While a threshold level of K at 32 mg·L–1 achieved the highest number of cuttings, rooting was not different with cuttings from stock plants fertilized with K at 59 to 234 mg·L–1. Deficiency symptoms appeared on stock plants fertilized with K at 59 mg·L–1 and less with necrosis on mature leaf tips and interveinal chlorosis on recently mature leaves. The minimum stock plant recently mature leaf K concentration necessary to avert unacceptable deficiency symptoms during subsequent rooting of cuttings was found to be between 4.7 and 6.6% K. Stock plants of strawflower can be fertilized at 1N:1.1K (N at 217 mg·L–1 and K at 234 mg·L–1) or 2N:1K (N at 217 mg·L–1 and K at 117 mg·L–1) ratios because upper cutting foliation did not exhibit deficiency symptoms and optimal cutting yield and rooting occurred.

**THE EFFECT OF A GARLIC EXTRACT ON SOIL-BORNE FUNGAL PATHOGENS OF GREENHOUSE CROPS**

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Losses from damping-off and seedlings diseases caused by soil-borne plant pathogens continue to be a problem to producers of horticultural crops. Several studies have suggested that garlic extracts may be useful in controlling these types of diseases. Such control would be attractive to producers who desire to find means of control with reduced use of synthetic pesticides. Our study involved four experiments performed to determine the efficacy of a garlic extract on controlling the growth of common soilborne fungal and fungal-like pathogens in vitro and to determine the efficacy of such an extract for eliminating diseases caused by such pathogens in Sphagnum peat-based substrates. Garlic extract displayed fungicidal properties in vitro at 10% levels. In a Sphagnum peat–perlite substrate, garlic extract up to 10% was not fungicidal and did not significantly reduce diseases caused by the soilborne pathogens tested. In some cases, garlic extract increased disease severity. In Sphagnum peat–perlite substrate, 35% garlic extract solution was required to kill the fungal-like plant pathogen tested. A second drench reduced the lethal concentration to 15%. In sand, on a single drench of 15% was required to kill the pathogen.

**DISTINGUISHING AMONG SEVERAL BUD-ROTTING DISEASES/DISORDERS OF PALMS IN NURSERIES AND LANDSCAPES**

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There are several diseases/disorders which lead to bud-rot symptoms in palms in nurseries and landscapes. Among these are physiological disorders, insect infestations, and parasitic diseases, and some of these have very similar symptoms. In most cases, a field diagnosis is possible using a few basic symptoms which suggest or eliminate one possible cause or another. Additionally, certain problems are especially common on certain species. The diseases which are most often confused include Phytophthora bud-rot, Ganoderma butt-rot, and Thielaviopsis bud-rot. In some species the confusion may also include Lethal Yellowing and Fusarium wilt. With Phytophthora bud-rot, the bud only falls over (appears to melt) and has a foul odor; for Ganoderma butt-rot, a button or conk is visible on the lower trunk, or growing from the soil or mulch. With Thielaviopsis bud-rot, the trunk falls over, bending well below the tip, near the middle; for lethal yellowing, the shedding of flowers and fruit is diagnostic; and for fusarium wilt, death of the leaflets on one side of the rachis. Nutrient deficiencies which can be confused with diseases include frizzle-top, (caused by Mn deficiency, common on queen palms); magnesium deficiency (common on Phoenix palms); and K deficiency (seen on royal palms). Palmetto weevil and royal palm bug are insects which cause symptoms similar to those of diseases; as do lightning strikes and rough handling during transplanting. It is important to compare symptoms to determine what tissue should be sampled and submitted to a diagnostic clinic, then draw conclusions based on symptom development, cultural practices, and laboratory results.

**THE USE OF TROPICAL FLOWERING AND FOLIAGE PLANTS AS GROUND COVERS IN THE LANDSCAPE**

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Most plants used as ground covers are low-growing woody or herbaceous perennials that readily spread by rhizomes, stolens, or natural layering. They are used in the landscape as alternatives to turf, as traffic barriers, and as transition elements between plantings and structures. Ground covers are also often used for erosion control and to stabilize steep slopes. However, the spreading nature of ground covers and their sometimes aggressive vigor has resulted in several ground cover species being placed on invasive species lists. For several years the use of tropical flowering and foliage plants has been evaluated as annual ground covers at the University of Kentucky-Lexington/Fayette County Arboretum. Species that have performed well over multiple years included grape ivy (Cissus rhombifolia Vahl), tahitian bridal veil (Gibasis pellucida [M. Mar-
rarely found in the plant matrix, but behavior of these compounds in isolated from the plant matrix, but behavior of these compounds in the plant matrix is not well understood. This experiment was done to determine how carotenoids changed in stored watermelon fruit. Ten to twenty watermelons each of the cultivars ‘Black Diamond’ (light red, seeded heirloom), ‘Summer Flavor 800’ (bright red, seeded hybrid), and ‘Sugar Shack’ (bright red, seedless triploid) were obtained from local growers and stored for 0 and 12 to 14 days at 5, 13, and 21 °C. Soluble solids content (SSC), pH, and carotenoid content were determined on 40 g of pureed sample. The average lycopene contents were 34, 57, and 58 µg·g–1 for ‘Black Diamond’, ‘Summer Flavor 800’, and ‘Sugar Shack’ melons, respectively. The total lycopene content of all melons stored at 13 °C was similar to that of fresh melons. Total lycopene content was 12% to 24% lower in melons held at 5 °C and 12% to 24% higher in those held at 21 °C, compared to fresh watermelons. Both cis- and trans- lycopene increased in ‘Sandria’ and ‘Sugar Shack’ melons held at 21 °C. β-Carotene more than doubled in all melons held at 21 °C, increasing from about 1 µg·g–1 to 3 to 5 µg·g–1. These results indicate that carotenoids are generally stable in stored uncut watermelons, and that carotenoid content can be increased in melons held at 21 °C.

COLOR, VARIETY, AND GROWING LOCATION INFLUENCE RASPBERRY ANTI-OXIDANTS

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Lycopene, a carotenoid pigment that imparts the red color to red-fleshed watermelons, has antioxidant properties and a high dietary lycopene intake is associated with a reduced incidence of some cancers. The stability of lycopene and other carotenoids is low when isolated from the plant matrix, but behavior of these compounds in the plant matrix is not well understood. This experiment was done to determine how carotenoids changed in stored watermelon fruit. Ten to twenty watermelons each of the cultivars ‘Black Diamond’ (light red, seeded heirloom), ‘Summer Flavor 800’ (bright red, seeded hybrid), and ‘Sugar Shack’ (bright red, seedless triploid) were obtained from local growers and stored for 0 and 12 to 14 days at 5, 13, and 21 °C. Soluble solids content (SSC), pH, and carotenoid content were determined on 40 g of pureed sample. The average lycopene contents were 34, 57, and 58 µg·g–1 for ‘Black Diamond’, ‘Summer Flavor 800’, and ‘Sugar Shack’ melons, respectively. The total lycopene content of all melons stored at 13 °C was similar to that of fresh melons. Total lycopene content was 12% to 24% lower in melons held at 5 °C and 12% to 24% higher in those held at 21 °C, compared to fresh watermelons. Both cis- and trans- lycopene increased in ‘Sandria’ and ‘Sugar Shack’ melons held at 21 °C. β-Carotene more than doubled in all melons held at 21 °C, increasing from about 1 µg·g–1 to 3 to 5 µg·g–1. These results indicate that carotenoids are generally stable in stored uncut watermelons, and that carotenoid content can be increased in melons held at 21 °C.
Sweetpotato Collaborators Group

EVALUATION OF PLANT BREEDING APPROACHES TO IMPROVE WEED MANAGEMENT IN SWEETPOTATO
Howard F. Harrison* and D. Michael Jackson, U.S. Vegetable Laboratory, USDA, ARS, Charleston, SC

Weed management in sweetpotato is expensive, because most acreage is hand weeded. Thus, application of plant breeding approaches to reduce the expense of weed control may be feasible. Some sweetpotato varieties are allelopathic to certain weeds due to production of a group of phytotoxic compounds referred to as periderm resin glycosides (PRG). In a genetically diverse group of sweetpotato genotypes, PRG levels ranged from 0.1% to <0.1% of the tissue dry weight. Several lines that produce high PRG levels have been identified, and preliminary studies indicate that PRG production is heritable. Development of advanced clones with high PRG content can be accomplished rapidly utilizing a relatively simple HPLC procedure. PRG also inhibits pathogen and insect growth, suggesting that they are part of the general defense chemistry of sweetpotato roots and may contribute to pest resistance. Sweetpotato genotypes also vary greatly in morphology which is another trait that may be useful in weed management. A field evaluation of sweetpotato varieties with diverse growth habits indicated that yields of the variety, Carolina Bunch were reduced less by weed interference than any other. Yields of the predominant variety, Beauregard were greatly reduced by weed interference. A subsequent experiment comparing the effect of various weed free intervals on Beauregard and Carolina Bunch indicated that Carolina Bunch required a shorter weed free period for maximum yield. Varieties with compact vine and dense canopies like Carolina Bunch appear to require less weeding than varieties with trailing vines and more open canopies like Beauregard.

EFFECTS OF A KILLED-COVER CROP MULCH ON SOIL INSECT PESTS OF SWEETPOATOE
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One insect-resistant (‘Ruddy’) and two insect-susceptible (‘SC1149–19’ and ‘Beauregard’) sweetpotato genotypes were grown in either conventionally tilled plots (CT) or in a killed-cover crop (KCC) tillage system at the US Vegetable Laboratory, Charleston, S.C., in 2002 and 2003. Four-row plots (100 plants/plot) were bedded (102-cm between rows) in the fall of 2001 and 2002. One-half of the plots were planted to a winter cover crop of crimson clover while the other one-half of the plots were left fallow. The conventionally tilled plots were re-bedded before sweetpotato slips were planted. One-half of each 4-row plot was hand-weeded while the other one-half was not. Thus, the four tillage treatments were 1) conventional tillage, hand-weeded (CT-HW), 2) killed-cover crop, hand-weeded (KCC-HW), 3) conventional tillage, weedy (CT-WE), and 4) killed-cover crop, weedy (KCC-WE). There were 6 replications in 2002 and 5 replications in 2003. Monocot and dicot weeds were sampled in all plots in mid-season. The CT-WE plots had 10 times as many monocots and 3 times as many dicots as the KCC-WE plots. The center-two rows of sweetpotatoes from each plot were harvested, weighed, and rated for insect damage. The insect resistance of Ruddy held up well under the killed-cover crop conditions, and this cultivar had significantly higher percent of clean roots and lower infestations by WDS (Wireworm-Diabrotica-Systena complex), sweetpotato flea beetles, grubs, and sweetpotato weevils than the two susceptible genotypes. In general, injury to sweetpotato roots by soil insect pests was significantly lower in the KCC plots than in the CT plots. Also, injury by sweetpotato weevils was significantly less in the weedy than in the hand-weeded plots.