Abstracts of the ASHS Southern Region 61st Annual Meeting

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J.B. Edmond Undergraduate Competition

Evaluation of Chilling Requirements for Six Arkansas Blackberry Cultivars Utilizing Stem Cuttings
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Arkansas-developed blackberry (Rubus subgenus rubus Watson) cultivars are being grown in various climates. Chilling requirement estimates are needed for accurate recommendations of adaptation. Determining chilling requirement using stem is desirable. We conducted a study to evaluate both artificial and field chilling of six cultivars. For the artificial-chilling study, 12-node stem cuttings were collected 2 days after the first killing frost. These were placed in a moist medium in a cooler at 3 °C. At 100-hour chilling intervals, five cuttings of each cultivar were placed under an intermittent mist system. For the field-chilling study, a biophenometer was placed in the field to measure chill. Ten 12-node stem cuttings of each cultivar were collected at 100-hour intervals of chilling up to 1000 hours below 7 °C and placed under mist. In both studies, cuttings were placed in a mist bench in a heated greenhouse (min. temperature of 15 °C), according to a completely random design, and budbreak was recorded weekly. Studies were analyzed separately by SAS. For the artificial-chilling study, budbreak after 5 weeks was very low for all cultivars except ‘Kiowa’, which was significantly higher, averaging 21% across all chilling intervals. Due to poor budbreak and lack of clear differentiation among chilling intervals and cultivars, the results indicated poor success using artificial chilling of stem cuttings. For the field-chilling study, preliminary findings indicate that ‘Kiowa’ appeared to have a low chilling requirement, and the data supports that this may be between 300 and 400 hours. This method shows promise for determining chilling requirements for blackberry cultivars.

Lantana Propagation in Various Bark Mixes and Hormones
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Lantana camara ‘New Gold’ was propagated in three soil mixes and three hormones to determine which treatment combination produced the highest rooting percentages. The soil mix treatments were 1 pine bark : 1 perlite, 1 pine bark : 1 rice hulls, and 1 pine bark : 1 peat moss (v/v). The hormone treatments were Hormodine 1 (1000 ppm), IBA (1000 ppm), and Dip ‘N Grow softwood rate. Rice hulls are an alternative media component that is readily available in regions of the country and can be useful in different production systems. The study was a completely randomized design, with three replications per treatment and five cuttings per experimental unit. Cuttings were taken in June, cut to 2 inches, and placed under intermittent mist for 6 weeks. Rooting percentages, and fresh and dry weights were recorded. Pine bark : perlite and pine bark : rice hulls were significantly different than the pine bark : peat moss soil mix, with 95.8%, 96.8% and 65.6% rooting, respectively. The pine bark : perlite and pine bark : rice hulls were also significantly different than pine bark : peat moss in comparison of both total fresh weight means and total dry weight means.

Replacement of Peat-lite Medium with Compost for Cauliflower Transplant Production
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Seeds of ‘Candid Charm’ cauliflower (Brassica oleracea L. Botrytis group) were grown in six different media comprising varying proportions of a commercial peat-lite mix (PL) and a 50% yard waste/50% biosolids compost (C). A control of 100% PL was compared to treatments of PL:C at 80%:20%, 60%:40%, 40%:60%, and 20%:80%, respectively, by volume, and 100% C. The experiment was performed twice. Electrical conductivity and pH of the medium increased curvilinearly with increasing compost additions, while carbon : nitrogen ratio decreased curvilinearly. Seedling emergence was delayed when compost comprised the majority of the medium, but stands were not reduced except with 100% C. Decreases in seedling height and dry weight began to occur in the 60% PL: 40% C treatment and were more pronounced with higher amounts of compost. Seedlings grown in 80% PL: 20% C compared favorably with the control.

The Effect of Crop Load on Pecan Nut Quality as Determined by Fatty Acid Analysis
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The influence of crop load on nut quality, fatty acid composition, percentage of oil, percentage of kernel, and yield between two cultivars of pecan [Carya illinoinensis (Wangenh.) C. Koch] was investigated. Sixteen trees of cultivars Stuart and Pawnee were selected. Four trees of each cultivar were thinned at four different percentages of crop load treatments. The mean crop load was taken and categorized at 25%, 50%, 75%, and 100%. Analysis of variance was calculated on individual trees in each treatment. A comparison using Satterthwaite’s approximation and the folded form of the F statistic was calculated to test for significance. After the test for significance, linear regression statistics were applied among percentage of crop load treatments. Strong evidence indicates that the percent fatty acids, and percentage of kernel and yield (g/cm²) help determine which crop load produces the best quality fruit. Crop load did not influence the oleic:linoleic acid ration of ‘Pawnee’ kernels, but did have a slight negative influence on the ‘Stuart’ oleic : linoleic ratio. However, ‘Stuart’ produced twice as many nuts as ‘Pawnee’ at full crop load. This difference between the two cultivars was probably due to ‘Pawnee’ having a lower crop load in 1999, followed by a heavy load in 1998. This experiment should be repeated in the alternate year when crop loads are reversed to determine if the oleic : linoleic ratio is influenced more by genetics or environment. It may soon be important to know the oleic acid content of pecans because of current research proving that pecans rich in oleic acid decrease the risk of coronary heart disease. It is suggested that more cultivars be measured to delineate parents for breeding purposes. Such selective breeding could help in the management of alternate bearing.
Evaluation of Selected Zinnia Taxa for Heat, Bacterial Leaf Blight, and Powdery Mildew Tolerance in Central Texas

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(Submitted at the ASHS–SR 60th Annual Meeting in Lexington, Ky., Jan. 2000.)

Thirteen cultivars from four species, Zinnia angustifolia Humboldt, Bonpland, & Kunth Zinnia elegans von Jacquin, Zinnia haageana Regel, Zinnia peruviana L., or hybrids of Z. angustifolia × Z. elegans, were transplanted from 0.55-L cell packs and grown in replicated landscape trials to determine growth, flowering responses, and susceptibility to Erysiphe cichoracearum and Xanthomonas campestris pv. zinniae infection during the heat of a Central Texas summer. Zinnia elegans, Z. haageana, and Z. pauciflora exhibited more rapid early season growth and flowering propensity. Zinnia haageana, and especially Z. pauciflora, tended to be more spindly in appearance compared to the other species. A large proportion of the Zinnia elegans cultivars were infected with powdery mildew by June, while infestation with bacterial leaf spot began to occur earlier in the growing season and varied more widely in prevalence among the Z. elegans cultivars. Zinnia angustifolia was nearly immune to powdery mildew and only rarely showed symptoms of bacterial leaf blight infestation. Zinnia angustifolia also had greater flower numbers during the heat of summer than most Z. elegans taxa. While the hybrid cultivars Profusion Cherry and Profusion Orange exhibited much of the disease resistance of their Z. angustifolia parent, aesthetic limitations rather than disease or intolerance to heat were a concern. ‘Profusion Orange’ had a rather irregular growth form. ‘Profusion Cherry’ exhibited serious fading of the flower color by early summer. By September only the Z. angustifolia and Z. elegans × Z. angustifolia hybrid cultivars were alive. Zinnia elegans cultivars tested in this study were not suitable for use as season-long summer annuals in Central Texas due to disease and/or heat intolerance. Zinnia angustifolia cultivars appeared to perform most reliably of the species tested, but they did not grow as quickly as the Z. elegans seedlings early in the growing season. Zinnia pauciflora and Z. haageana cultivars were more disease resistant than those of Z. elegans, but had small flowers and generally less compact growth habits than the other species tested.

Norman F. Childers Graduate Competition

Evaluation of Single and Double Cropping Systems of Primocane-fruiting Blackberry Selections

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Primocane-fruiting blackberry (Rubus rubus Watson) selections have recently been developed by the Univ. of Arkansas, but proper field management practices have not yet been determined. One unknown aspect of management is the difference between double cropping (producing a crop on both the floricanes and primocanes) and single cropping (producing a crop on only the primocanes). Many researchers have observed that competition exists between floricanes and primocanes of floricanes-fruiting red raspberries (R. idaeus L.) and trailing blackberries. The objective of this study was to determine the effect of floricanes cropping on primocane performance. Two plantings, one in Fayetteville, Ark., and one in Clarksville, Ark., were used, and selections APF-8 and APF-12 were included as genotypes. The two treatments included removal of floricanes from plants in the primocane-fruiting only group in early spring before the floricanes broke dormancy, and a non-removal control. Data collected included date first primocanes reached 1 m (primocane emergence), number of primocanes, yield of primocanes and floricanes, average berry weight of primocanes and floricanes, and total berry number for primocanes. Results showed that the impact of cane management on most variables was nonsignificant, except for primocane emergence, which was delayed by non-removal of floricanes with one of the genotypes. Results were consistent at both locations. Additional findings of the study will be discussed.

Development of Crop Databases to be Used in the Revised Universal Soil Loss Equation (RUSLE): An Overview of Current Research

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Plant and residue parameter values developed from experimental data collected under the climatic and soil conditions in the southeastern United States are required by the Agricultural Research Service (ARS) and Natural Resources Conservation Service (NRCS) of the USDA for improved soil erosion prediction models (Weesies, 2001). Corn, sudangrass, green beans, and okra were grown in three 13.38 m × 15.80 m plots, with rows spaced 0.91 m apart. The plots were equally divided into destructive and nondestructive sections equivalent to 6.69 m in length. Growth characteristics (canopy height, root width, leaf area index, percent canopy cover, and canopy width) and residue decay relationships were obtained. Data indicated that plot 1 yields were greater than those of plots 2 and 3. Nutrient testing (Ca, K, Mg, Zn, Fe), soil fractioning (percentage of soil, silt, and clay), and pH analyses were conducted to determine causes of variation. Nutrient availability and percent soil fractions differed only slightly between plots and were therefore concluded not to be determining factors. Ideal pH values for agricultural crops range from 6.0 to 6.8; however, variances in soil pH were 5.51, 5.23, and 5.07 for plots 1–3, respectively, corresponding to variations cited in data. The information collected will be used to improve or revise such models as the Revised Wind Erosion Equation (RWEQ), the Water Erosion Prediction Project (WEPP), Wind Erosion Prediction System (WEPS), and the Revised Universal Soil Loss Equation (RUSLE) (Weesies, 2001).

Fall Potting Using Dibble-applied Controlled-release Fertilizers

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This study was conducted to evaluate winter injury susceptibility and growth of three container-grown woody ornamentals potted during the fall using different controlled-release fertilizer (CRF) types and rates. Twelve-month CRFs, Polyon 17–5–11, Nutricote 18–6–8, and Osmocote 15–9–12, were dibble-applied at one-half and the recommended rate for each product. Uniform liners of Ilex crenata ‘Soft Touch’ (holly), Juniperus horizontalis ‘Bar Harbor’ (juniper), and Rhododendron indicum ‘Formosa’ (azalea) were potted on 11 Oct., 1 Nov., and 1 Dec. 1999 using the six fertilizer treatments. Of the three species tested, only azaleas exhibited winter damage 120 days after potting (DAP; 11 Oct.). December-potted azaleas exhibited no winter damage regardless of fertilizer type or rate. Osmocote-treated plants potted in October exhibited the greatest winter damage, with 100% and 90% of the plants damaged for the low and high rates, respectively. Of the Nutricote-treated plants potted in October and November, only the high-rate plants potted in November had damage (40% of plants). In general, growth indices (average of height plus greatest width plus perpendicular width) for each of the three species were observed for the high fertilizer rate plants potted in October, 210 DAP, regardless of fertilizer type.

Revising the Fertilization Strategy for Ornamental Cabbage

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Fertilizer recommendations for ornamental cabbage (Brassica oleracea var. acephala DC) suggest that nitrogen concentrations of 150 to 300 mg L⁻¹ should be applied until the development of coloration; then fertilization should be reduced or discontinued. Because these plants are actively growing during cooler weather, when coloration is
initiated, nutrient deficiencies may appear, thus reducing overall crop quality. The objectives were to investigate the optimal N:K ratio for plant growth of ornamental cabbage and the effects of continual and discontinued fertilization during the period of coloration. Fertilizing with 150 to 200 mg·L⁻¹ N and 150 to 200 mg·L⁻¹ K optimized plant growth and provided sufficient tissue concentrations of N and K. Coloration was not inhibited by N concentrations as high as 250 mg·L⁻¹; therefore, growers should fertilize until market date. Because plants are still actively growing by increasing shoot mass during the early stages of coloration, growers should continue to provide a complete analysis fertilizer at N concentrations ≥150 mg·L⁻¹ so that tissue concentrations of N, P, and K remain in the adequate range for optimal growth. Also, as plants are placed in retail settings where fertilization may not occur, a continual fertilization program will provide sufficient nutrient reserve in the tissue and prolong the visual quality of the plant through avoidance of nutrient deficiencies.

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### Extension

**New Format for Delivery of Environmental Landscape Schools to Clientele**

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EarthKind™ Environmental Landscape Design Schools represent an innovative way to encourage widespread, voluntary creation of environmentally responsible landscapes within a community. Our goal is to help clients create beautiful landscapes that require only minimum maintenance while providing maximum environmental protection. The curriculum consists of 6 hours of lecture plus a design consultation. Lecture topics include soil management, recommended plant materials, environmental protection techniques, and design principles. A unique aspect and real strength of these schools is that each household receives a 30-min individualized consultation with a design expert. From this consultation, the student realizes a detailed, personalized landscape plan for either their front or back yard. The school can be team-taught by the county Extension horticulturist and Extension specialist during four evening lectures, or by the specialist alone during a single Saturday. Both clientele and the Extension Service benefit from these schools. Clientele gain new knowledge and skills that increase their self-satisfaction and self-reliance, and receive authoritative landscaping advice at a greatly reduced cost. They also enjoy beautiful, easy-care, environmentally responsible home landscapes. Often the client's first contact with Extension, the schools serve as a window to the Extension Service and Texas A&M Univ. They are very effective in encouraging public acceptance of newly introduced plants and in recruiting future Master Gardeners. Last, these schools are among our most popular fee-based programs, and greatly strengthen Extension's position as a leader in research-based environmental protection.

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### Education

**A Study of the Effect of a Web-based Horticulture Course on the Performance and Perceptions of University Students**

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A study was conducted during the summer and fall semesters of 2000 to evaluate student perceptions of a web-based horticulture course and to examine whether students perform as well in the web-based course as in a live-classroom course. The web-based course is offered on Web-CT, with the companion laboratory on a CD-ROM. Students were asked to complete surveys twice during each semester, at the beginning and at the end of the course, regarding their background, interest in horticulture, and experience on computers. Included in the surveys was a quiz of 10 multiple-choice questions that evaluated their knowledge of horticulture. In general, web-based students were satisfied with their course. There was no change in their level of interest in horticulture over the course of the semester. Web-based students did not have a preference for a live or web-based course at the beginning or end of the semester, but indicated that they would use materials on the web as a supplement to a live course. Both traditional and web-based students' perception of horticulture as an important science increased significantly from the pre- to post-course surveys. Traditional students described their course as clearer and easier to follow than did the web-based students. Nevertheless, web-based students reported having little difficulty in navigating through Web-CT and the CD-ROM. Both web-based and traditional students had significantly higher post-course scores on the quiz than at the beginning of the course, with students in the live class reporting a greater increase. Traditional students rated their knowledge of horticulture on the post-course survey higher than did the web-based students.

**A Comparison of the Performance of Students Learning Plant Materials via the World Wide Web and Traditional Instruction**

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The performance of college students learning plant identification techniques via computer-based and traditional classroom instruction, or a combination of both (here forth, computer-enhanced instruction) was studied. Student study habits were self-reported in traditional classroom components of the study and monitored by the computer platform for the computer-based instruction components. Changes in the students’ perceptions of the three learning methods were gathered using a pre- and post-survey instrument. Student performance was measured by an identification exam of live plant material. Test performance was significantly higher (t 46 = 2.11, P < 0.05) for students studying live plant materials as compared to the other learning methods. There was no significant difference in student study times. Students preferred learning plant materials in the classroom rather than by computer (z = 5.40, P < 0.001). Analysis of student study times revealed significantly more time spent studying plant materials by computer than live plants (z = -2.45, P < 0.02); however, students in the computer-enhanced group reported spending more study time on the live materials than on the computer supplement. This contradiction may be a result of the computer platform software reporting downloading and printing of images for later study, rather than actual student study time. This hypothesis is confirmed by the nonsignificant Spearman coefficients determined between student time and test performance on several of the studies (r = -0.20, NS; r = 0.04, NS, r = 0.01, NS; and r = 0.02, NS). The survey revealed 82% of the computer-based students felt connected to their instructor while 45% felt connected to other students taking the course. In addition, 95% of the students agreed the convenience of an online course was important to them.

**Development of a Mentoring Kit for Traditional and Nontraditional Students in Landscape Architecture and Horticulture**

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The Landscape Architecture and Horticulture Program at North Carolina A&T State Univ. has a broad mix of traditional and nontraditional students in a racially diverse student body. This provides opportunities for faculty and staff to explore different mentoring techniques, including the use of the more mature nontraditional students as mentors for the traditional students. We have developed a mentoring kit to bridge the gap between traditional and nontraditional students, which greatly strengthens our mentoring efforts. This kit will help mentors focus on the
six behavioral activities known to have positive motivation outcomes. The kit describes those processes that energize behavior and give direction or purpose to behavior.

**Advanced Horticultural Studies: Cutting-edge Education for Green Industry Personnel**

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The Extension Service does an admirable job in providing early career training, but needs to strengthen its advanced offerings to highly motivated, experienced professionals in the green industry. The goal of the Advanced Horticultural Studies Program is to offer highly focused, in-depth study that challenges students to expand their scientific and professional horizons. The curriculum is designed to provide a post-baccalaureate level of instruction, and the class size is limited to promote close student/instructor interaction. Top professionals from universities, botanic gardens, and leading retail/wholesale nurseries provide the teaching expertise. The duration of these short courses is 4–6 days, depending on the topic. A written examination coupled with the creation and class presentation of an original landscape design solution utilizing course principles provides the evaluation of student progress. Participants in the workshop receive a notebook of fact sheets and supplemental materials along with a specially selected textbook covering the course topic. Students successfully completing the short course are awarded a certificate from Texas A&M naming them a “Specialist” in the featured topic. To date, short-course topics have included annuals and herbaceous perennials. Future offerings include roses, trees and shrubs, natives, and environmental landscape management. One benefit of this type of programming is the development of closer ties between future industry leaders and university research and extension faculty. In addition, students receive the latest information on current and future industry trends plus a credential to assist in their professional advancement.

**Challenges of a Gringo Teaching Plant Propagation in South America**

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There are tremendous opportunities in teaching and doing research internationally. Faculty developmental leave (sabbaticals) are an excellent vehicle to gain these professional experiences. This paper describes the experiences and preparation of the author in teaching and doing research at the National Agrarian Univ. (UNALM) in Lima, Peru. There are a number of organizations that give financial support for faculty and research programs, including the Fulbright program, J.S. Guggenheim Foundation, USDA–Foreign Agricultural Service, and other institutions. Before submitting a proposal it is very important to have made contacts with personnel at the host institutions, preferably visiting their locations and developing a plan with them that also fits their host-country and institutional needs. Letters of support to come to their institutions as a visiting professor and/or visiting scientist are crucial for successful proposals. It is important to arrive “self-contained,” having pre-purchased the majority of important items necessary for planned teaching and research activities. Students are not accustomed to lectures in English, so it is necessary to lecture in Spanish. Brushing up on Spanish and taking refresher courses prior to arrival helps. So does the use of visuals: overhead transparencies, slides, gestures, and hand language. Unless extremely fluent, it takes longer to get points across, so patience is needed between professor and students. With minimal library and laboratory resources and the high cost of textbooks, it is important to teach with and get the students to use and access the Web (red) for semester-long independent literature/research projects. While there was some initial resistance, a goal was also to get the students to routinely use e-mail (correo electrónico), construct a course and departmental web pages, and publish their projects on the web.

**Using WEB CT to Train Landscape Professionals**

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The Georgia Certified Landscape Professional program is a joint project of the Georgia Green Industry Association, the Georgia Turfgrass Association, the Metro Atlanta Landscape and Turf Association, and the Univ. of Georgia. It is composed of four written components and nine outdoor, hands-on components and requires 2 days to administer. In 2000 a web site was initiated to assist landscape professionals in preparing for the exam. It includes streaming video that provides an overview of the test. Another component includes narrated Power Point lectures on each of the 15 chapters in the certification manual. After viewing each lecture, the user is encouraged to complete a multiple-choice exam pertaining to the lecture. His test results are printed instantaneously, and he can see which questions he missed. In another component of the site, called Plant Take-off and Plant Selection, the user prints a landscape blueprint and answers questions relative to plan. This practice problem simulates one given on the actual exam. Another written component requires participants to identify 50 common ornamental plants, weeds, and turfgrasses from a list of 274 plants. The study site will include several images of each of the 270 plants that participants can view. The web site also includes images of many common insect, disease, and environmental problems, another component of the exam. Persons enrolling in the test will be provided a user ID and password to access the study site. It is our goal to have the site available by 1 July 2001.

**Posters**

**The Effects of Ethephon and Pinching on Vegetative Cutting Quality and Quantity of *Scaevola aemula* Stock Plants**

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Five ethephon foliar sprays were applied at 250, 500, 750, or 1000 mg L–1 to *Scaevola* stock plants and an untreated control that were trimmed to 7.6 or 15.2 cm (Expt. 1) or 0.0 or 12.7 cm (Expt. 2). The objective of the study was determine the effects of trimming and ethephon foliar sprays on cutting quantity and quality. There was a significant difference in cuttings harvested from stock plants that were trimmed at 15.2 cm (56) vs. 7.6 cm (22), and total cutting dry weight and shoot length were greater from stock plants trimmed to 15.2 cm vs. 7.6 cm, while cutting stem caliper was not affected. Ethephon foliar sprays had no effect on cutting quantity, but improved cutting quality, so 250 to 750 mg L–1 should be used. Commercially, the density of stock plants/m2 of bench area should be considered. In Expt. 2, the first harvest produced 281.4 cuttings/m2 of bench area from stock plants trimmed to 12.7 cm, and 164.9 cuttings were produced from the untrimmed stock plants. Commercial propagators should trim *Scaevola* stock plants to 12.7 cm (5 inches) in order to increase stock plant density/m2 of bench area, resulting in 70% more cuttings being produced.

**Mississippi Wildflower Seed Program—A Partnership Between the USDA–NRCS Jamie L. Whitten Plant Materials Center and the Mississippi Soil and Water Conservation Commission**

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In 1996, the Mississippi Legislature authorized implementation of the Wildflower Seed Revolving Fund. This fund was created to allow the Mississippi Soil and Water Conservation Commission (MSWCC) to purchase wildflower seeds from the USDA–NRCS Jamie L. Whitten Plant Materials Center (PMC), thus establishing the Native Wild-
flower Conservation Program. This program allows the Soil and Water Conservation Districts within the state to distribute wildflower seeds to the public and acts as a source of funding for the districts. It also allows seed production costs to be returned to the PMC to supplement funds received for operating costs and has provided invaluable experience in production techniques. Currently, six species are in major production, with three additional species either being increased or in smaller-scale production. All wildflowers were originally collected from Mississippi populations and are often more suitable than seeds available from non-local commercial producers.

**Plant Growth Regulators for Perennial Production**

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Three perennial species received treatments of seven plant growth regulator products with two application methods. Foxtoglow (Digitalis purpurea 'Foxy'), hollyhock (Alcea rosea), and lobelia (Lobelia splendens 'Queen Victoria') received treatments of ancymidol, chloromequat, paclobutrazol, and uniconizole spray and drench applications at three rates. Spray applications of daminidoxide, chloromequat and daminidoxide, and paclobutrazol and daminidoxide were applied at three rates. The single application of daminidoxide had no effect on size. On foxglove, uniconizole drench and spray, paclobutrazol spray and drench, and ancymidol spray at all rates were too strong. Plants did not grow normally when transplanted to the landscape. Chloromequat spray and drench at all rates reduced size of foxglove 5 WAT but not at 8 or 14 WAT. Hollyhock size was reduced by paclobutrazol drench at 20 mg/L at 5 WAT but not at 8 or 14 WAT. Uniconizole spray and drench applications of lobelia and hollyhock were too strong for normal plant growth after transplanting to landscape. Lobelia size was not affected consistently by any plant growth regulator treatment.

**The Effects of Dry-down Date and Temperature During Dry-down on Flowering of 'Apple Blossom' Amaryllis**

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A 2-year study using Hippeastrum x hybrida 'Apple Blossom' was conducted to try to get locally grown Amaryllis bulbs to bloom during the month of December. In year 1, bulbs were dug sequentially from 30 July until 18 Nov. at 2-week intervals. These bulbs were stored for either 6 or 10 weeks at either 0 or 20 °C before being forced. Only four of the bulbs from the earliest lifting dates bloomed in December. Bulbs lifted after 1 Oct. tended to bloom freely and in high numbers regardless of the rest treatment imposed or the length of storage. In year 2, post-grown bulbs were sequentially dried down on 1 Aug., 1 Sept., or 1 Oct. The bulbs were stored at 15, 25, and 30 °C during the dry-down phase, which lasted for 2 months. A group of bulbs which were never dried down was used as a control for each group. Bulbs dried down on 1 Aug. and given the 7 °C treatment bloomed during December, but the number of bulbs was reduced. Blooming was fastest, regardless of treatment, for bulbs which received the 1 Oct. dry-down treatment. Blooms usually were produced in 60 to 65 days after the resumption of watering if all conditions were correct for rapid forcing.

**In Vitro Propagation of Four Species of Itea L.**

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In vitro propagation was used to produce six Itea virginica L. cultivars: 'Henry's Garnet', 'Saturnalia', 'Sarah Eve', 'Long Spire', 'Merlot', and 'Theodore Klein' and three evergreen species of Itea, I. oldhamii K.F.R. Schneider, I. ilicifolia Oliv. and I. chinensis Hook. et Arn. Three concentrations of BA, (1.4, and 10 µM) in combination with three concentrations of NAA (0.01, 0.1, and 1.0 µM) were evaluated in this study. For all Itea species and cultivars, acceptable proliferation occurred on a Murashige and Skoog medium with 4 µM BA and 0.1 µM NAA. Microshoots rooted readily, and tissue culture-produced plantlets of I. virginica flowered 1 year after removal from culture. Chemical names used: N-benzyladenine (BA); 2-methyl-1-naphthylacetic acid (NAA).

**Performance of 33 Garden Roses in North Central Texas Under Minimal Input Conditions**

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To enlarge the palette of environmentally responsible landscape plants, 33 garden rose cultivars were evaluated under minimal input conditions. Other than mulching and irrigation, no other inputs were provided, including no fertilization and no pesticide applications. Plants were established in Spring 1998, with data collection beginning in 2000. Data on overall performance (an index comprising flower number, percentage of plant covered with flowers, and plant growth) and relative chlorophyll content were collected the first and third week of each month from April through October. Disease ratings or incidence ratings were collected monthly for Diplocarpon rosae Wolf (black spot), Alternaria sp. (petal blight), and Sphaerotheca pannosa (powdery mildew). Statistical analysis was performed on the mean data of all dates. 'Livin’ Easy’ was among the top roses in overall performance and disease tolerance. Similar to the other top-performing rose cultivars in this trial, ‘Livin’ Easy’ dropped black spot–infected leaves and quickly developed new healthy foliage during the hot, dry, Texas summer conditions. ‘Livin’ Easy’ also flowered continuously from spring through late fall, making it one of the top plants for flower production. Good foliage color was also important in the overall performance rating and ‘Livin’ Easy’ was in the top third of the ratings for relative leaf chlorophyll levels. Other top-performing cultivars were ‘The Fairy’, ‘Caldwell Pink’, ‘Sea Foam’ and ‘Perle d’Or’. Overall, black spot had the greatest effect on reducing plant quality, with some reduction in overall plant quality due to the highly alkaline, poorly aerated clay soils. Cultivars exhibiting the poorest performance were ‘Lindee’ due to powdery mildew and poor soil tolerance and ‘Chrysler Imperial’ due to black spot.

**Influence of Soil Mixes and Hormones on Vegetative Propagation of Herbaceous Perennials and Annuals in Late Summer**

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The vegetative propagation time frame for many annuals and perennials is late spring and/or summer. Extending the propagation time frame would benefit growers by allowing rooted liners to be overwintered, then salable the following spring/summer. Also, there is less environmental stress on plants in late summer vs. midsummer. Many commercial mixes (peat-based) are used for propagation, with many regional alternatives existing, so media comparisons must be continued. Hormone diversity and selection need to be refined and optimized for many new and old species entering the market. This study used three soil mix treatments [1 pine bark : rice hulls, 1 pine bark : 1 perlite, 1 pine bark : 1 peat moss (v/v)] and five hormone treatments [IBA 1000 ppm, K-IBA 1000 ppm, Hormodine 1 1000 ppm, Wood’s 1 1000 ppm, and 0.1 µM ] in combination with three hormone concentrations (BA and 0.1 and 1.0 µM) were evaluated in this study. For all Itea species and cultivars, acceptable proliferation occurred on a Murashige and Skoog medium with 4 µM BA and 0.1 µM NAA. Microshoots rooted readily, and tissue culture-produced plantlets of I. virginica flowered 1 year after removal from culture. Chemical names used: N-benzyladenine (BA); 2-methyl-1-naphthylacetic acid (NAA).
Hosta Cultivar Evaluation for Coastal Southeast Georgia

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This project focused on evaluating different hosta varieties for potential use in southeast coastal Georgia. Fifteen hosta varieties were selected and tested at the Coastal Research Station in Savannah, Ga. Each planting bed replicate had different degrees of shade as well. Data was collected quarterly on the general growth and appearance of each variety. Deer damage posed an early threat to the project but was eliminated through repellants. Results showed the plants receiving heavy shade performed poorly. Beds that received an even amount of sunlight and shade faired the best. Individual varieties that did well included ‘Alba Marginata’, ‘Blue Cadet’, ‘Siegildiana Elegans’, and ‘Birchwood Parkys Gold’. The dwarf varieties, such as ‘Wogon Gold’ and ‘Kabitan’, had the most trouble sustaining good overall health. After 3 years of testing it appears that several varieties mentioned above show great promise in the Georgia coastal region. This hosta evaluation will provide important information to both the industry as well as local homeowners.

Testing Consumer Preferences Between ‘Silver Queen’ and Supersweet Corn Varieties

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North Georgia sweet corn producers grow predominantly ‘Silver Queen’ sweet corn, a standard (st) variety. Their markets include local sales and regional farmers markets. Supersweet (sh2) varieties lack name recognition and have not been accepted by buyers and consumers. This project was initiated to test consumer and buyer preferences of various sweet corn varieties and introduce them to supersweet varieties. In Spring 2000, five supersweet varieties were grown under recommended cultural practices at the Georgia Mountain Branch Experiment Station in Blairsville. The corn was harvested at maturity and ‘Silver Queen’ was obtained from a local producer. All corn was frozen on the cob until prepared. On 22 Aug., all varieties were prepared identically by boiling them on the cob. The varieties were coded, and a taste panel of consumers and buyers sampled each of four varieties. One group sampled A–D and the second group C–F. Each participant rated each variety on sweetness, flavor, acceptability, moisture, hardness, starchiness, and color. After completion of the test, participants voted in a “straw poll” as to which corn they preferred. Participants selected ‘Silver Queen’. Due to the characteristic, fuller appearance of ‘Silver Queen’ when compared to supersweet varieties, many participants probably identified Variety C as ‘Silver Queen’. However, on analysis of the data, two supersweet varieties ranked higher than ‘Silver Queen’ for sweetness (‘Sensor Bicolor’ and ‘GSS 0966’) and color (‘Summer Sweet Brand #7630’ and ‘GSS 0966’). Also, ‘GSS 0966’ was rated higher than ‘Silver Queen’ for flavor and acceptability. Based on these findings, growers should continue to try to introduce buyers and consumers to supersweet varieties, since they compare favorably to or are preferred over ‘Silver Queen’.

Triploid Watermelon Trials in Central and Northern Mississippi

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Twenty entries of triploid watermelon were evaluated during Summer 2000 in northern Mississippi at Verona. Fifteen of these entries were also evaluated in central Mississippi at Crystal Springs. W5052 produced significantly greater marketable melons (93,000 lb/acre) than any other entry at Verona. Yield of ‘Millionaire’, an entry with the second highest yield (75,700 lb/acre), was not significantly different than 15 other entries. Only ‘Diamond’, ‘Gem-Dandy’, and Asgrow 9024 produced yields significantly lower than ‘Millionaire’. At Crystal Springs, ‘Constitution’, ‘Millionaire’, and ‘Tri-X Brand 313’ were the highest-yielding entries; however, these yields were not significantly different than the other entries. W5052 was not entered at Crystal Springs. W5052 produced significantly larger melons (15.1 lb) than any other entry at Verona. Average weight of ‘Millionaire’, the second largest melon (14.4 lb), was significantly greater than all other entries except Asgrow 9033 (13.8 lb). At Crystal Springs, ‘Diamond’ and ‘Seedway 4502’ were the largest melons (12.0 and 11.8 lb, respectively) and were significantly larger than seven other entries. The lowest-yielding entries, in general, were the earliest to mature and produced the smallest melons. Soluble solids content, and incidence of rind necrosis and hollow heart were also measured in these studies. For more information, see: www.msstate.edu/dept/nmrec/pubs/art00/cushman08.htm

‘Green Dixie Blackeye’, A Green Cotyledon, Blackeye-type Southernpea

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The USDA has released a blackeye-type southernpea cultivar that is homozygous for the gc gene conditioning the green cotyledon trait. The new cultivar, named ‘Green Dixie Blackeye’, can be harvested at dry-stage maturity without loss of the pea’s fresh green color. ‘Green Dixie Blackeye’ originated as a bulk of an F3, ‘Bettergro Blackeye’ × ‘Bettergreen’ population grown in 1994. ‘Green Dixie Blackeye’ has a high, bushy plant habit. It produces dry pods at Charleston, S.C., in 7 to 11 days, 9 days later than ‘Bettergro Blackeye’. The oblong shape of dry ‘Green Dixie Blackeye’ peas is quite similar to the shape of dry ‘Bettergro Blackeye’ peas. ‘Green Dixie Blackeye’ peas have a smooth seedcoat and are somewhat larger than ‘Bettergro Blackeye’ peas (weight per 100 dry peas: ‘Green Dixie Blackeye’, 15.6 g; and ‘Bettergro Blackeye’, 14.4 g). The results of replicated trials conducted at Charleston, S.C., indicate that the yield potential of ‘Green Dixie Blackeye’ is much greater than that of ‘Bettergro Blackeye’. Dry pea yields of ‘Green Dixie Blackeye’ were 116% and 151% of the ‘Bettergro Blackeye’ yields in 1997 and 1998, respectively. ‘Green Dixie Blackeye’ is the first blackeye-type southernpea to be released that exhibits the green cotyledon phenotype. It is recommended for use by home gardeners and the dry-pack bean industry.

Effect of Light Intensity on Snap Bean Performance

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Two snap bean cultivars, ‘Strike’ and ‘Carlo’ (Phaseolus vulgaris L.), were planted into a Hebbronville sandy loamy soil on 22 Feb. 2000 and grown under 0%, 30%, and 70% of ambient daily light (shade) throughout the 65-day growing season. Although yield was linearly reduced with respect to increased shading, first harvest and season yields were not significantly affected by a 30% reduction in incident light. Light reduction tended to decrease the larger pod sieve sizes, but increased pod dry-matter content in ‘Carlo’. Plant biomass was reduced by shading as was leaf greenness, but leaf area and chlorophyll content (dry-weight basis) were increased by shading. The incidence of powdery mildew occurred late in the season and was linearly increased by reduced light. Prior to irrigating, leaf transpiration was highest in the unshaded treatment. After irrigating, increased light interception increased stomatal conductance but did not affect leaf transpiration rate. Rhizobium nodulation of ‘Carlo’ roots was greater under reduced light. Pod mineral nutrients varied between cultivars, but generally were not affected by light intensity. Trifoliate leaf AL, Fe, and Na levels were linearly increased, and B and Cu levels reduced by reduced light intensity. Leaf, air, and soil (at 10-cm depth) temperatures were reduced by increased shading.
Evaluation of Southern Highbush Blueberry Cultivars for Production in Southwest Arkansas

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Traditionally, rabbiteye (Vaccinium ashei) cultivars dominated blueberry production in southwest Arkansas due to their adaptation to the region. However, rabbiteyes are susceptible to frost damage during bloom and they tend to ripen later in the season than highbush blueberries (V. corymbosum). The need for an earlier-ripening blueberry has been met by the southern highbush blueberry, a hybrid of northern highbush (V. corymbosum) and one or more southern Vaccinium species (most commonly V. darrowi). Cultivar testing has been necessary to determine the cultivars of southern highbush best adapted to southwest Arkansas. In our 4-year study, several southern highbush cultivars were evaluated for productivity and reliability of cropping at the Southwest Research and Extension Center in Hope, Ark. ‘Ozarkblue’ and ‘Legacy’ showed the most promise at this location, yielding on average 10,990 and 10,306 lb/acre, respectively, compared to 4871 lb/acre for ‘Premier’ (rabbiteye). ‘Ozarkblue’ and ‘Legacy’ also rated well for plant vigor and fruit quality. ‘Ozarkblue’ was developed at the Univ. of Arkansas.

Strawberry Cultivar Evaluations in Northern Mississippi

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Strawberry cultivars were evaluated in an annual production system for 3 years at the North Mississippi Research and Extension Center on a Quitman silt loam soil. In 2000, ‘Camarosa’ and ‘Chandler’ produced significantly greater total marketable yields than ‘Diamante’, ‘Seascape’, ‘Sweet Charlie’, ‘Earliglow’, ‘Gaviota’, and ‘Cardinal’. Yields of ‘Diamante’ and ‘Seascape’ were low, but yields of the remaining entries were even lower. Average fruit weight and percent marketable yield of ‘Diamante’, however, were significantly greater than those of ‘Camarosa’ or ‘Chandler.’ In 1999, ‘Camarosa’ and ‘Chandler’ produced significantly greater total marketable yields than ‘Pelican’, ‘MSU-572’, ‘Sweet Charlie’, and ‘Gaviota’. The entries ‘Sweet Charlie’ and ‘Gaviota’ again performed poorly in our trials. In 1998, only three cultivars were compared. ‘Chandler’ produced significantly greater marketable yield than ‘Pelican’ and MSU-572. For more information, see: www.msstate.edu/dep/nnrec/pubs/ar00/cushman06.htm

Evaluation of a Proprietary CompoundPreservative Plant Mixture (PPM) in Alfalfa (Medicago sativa L.)

Marihelen Kamp-Glass, Natural Resources and Environmental Design, North Carolina A&T State Univ., Greensboro, NC 27411

We evaluate Plant Cell Technology’s new proprietary chemical in alfalfa tissue culture. PPM is a clear, low-toxicity liquid with a mild, inoffensive odor. It is moderately flammable. PPM may be added pre- or post-autoclaving, to prevent airborne contamination and endogenous contamination. We evaluated this produce and compared rates of contamination with traditional methods of contamination control, i.e., rigid aseptic techniques and a commercially available antibiotic-antimycotic mixture. PPM was as effective as the antibiotic-antimycotic mixture and cheaper to buy.

Potential for Field Establishment of Mayapple (Podophyllum peltatum) for Commercial Production

Muhammad Maqbool, Kent E. Cushman, and Rita M. Moraes; 1North Mississippi Research and Extension Center, Mississippi State Univ., Verona, MS 38879; 2Natural Center for Natural Products Research, Univ. of Mississippi, Univ., MS 38677

A partnership was formed in 2000 between the National Center for Natural Products Research (Univ. of Mississippi) and the North Mississippi Research and Extension Center (Mississippi State Univ.) to study field establishment of selected medicinal herbs. Long-term research plantings of the American mayapple (P. peltatum) were established in

Fungicides for Tomatoes

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Early blight is a severe disease problem in tomato production in eastern Tennessee. Fungicide trials with tomatoes have been conducted at the Univ. of Tennessee Plateau Experiment Station at Crossville for several years. Recent trials indicate that the early blight organism has mutated and different strains are now present in the tomato-growing area. High use rates or a combination of one or more of the standard fungicides used for many years have been necessary for effective control of early blight in tomatoes. Quadris (azoxystrobin) was highly effective for control of early blight in the trials, and has been labeled for tomatoes for ≈4 years. Trials have indicated that Quadris is effective for longer periods than the 5–7 days of application frequency necessary for the standard older fungicides. Trials with newer fungicides that are similar to Quadris have been highly promising. BAS 510 was highly effective for early blight control in trials in 2000, using an application frequency of 21 days. Trials indicate that newer fungicides can be used at low rates and at reduced frequencies, thus reducing total fungicide usage for control of early blight of tomatoes.

Lycopene from Watermelon: Research and Possibilities

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Watermelon contains high amounts of lycopene, a powerful antioxidant found in only a few plants. Currently, our lab is identifying lycopene and related carotenoids from watermelon and determining the potential for health properties. Past research was conducted to determine the effects of germplasm, fruit maturity, and storage on watermelon lycopene content. Lycopene was found in sizable amounts (mean of 50 µg/g) in 15 red-fleshed watermelon cultivars, including diploid, triploid, and hybrid melons. Two yellow-fleshed genotypes (‘Hopi Yellow’ and ‘Solid Gold’) contained 0–5 µg/g lycopene. Fresh unripe (≈4–7 days from full ripe) watermelons had slightly less lycopene (10%) than did fully ripe fruit. Uncut ripe fruit had <10% loss of lycopene after 2 weeks of storage at 5 or 13 °C, while cut fruit had a 10% to 15% loss of lycopene after 7 days of storage at 2 or 5 °C.

Levels of Carotenoids in Fruit from Pungent and Non-pungent Peppers Grown in the Greenhouse and Field

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Carotenoids in edible portions of plants can provide benefits to the human diet. The effect of growing conditions on carotenoid levels in maturing pepper fruit is not well understood. Five bell pepper cultivars (‘Bell Captain’, ‘Melody’, ‘North Star’, ‘Ranger’, ‘Red Beauty’), and five cultivars of pungent type peppers (‘Anaheim’, ‘Ancho’, ‘Cayenne’, ‘Pimento’, ‘Red Cherry’) were grown in a greenhouse and in the field. Fruit were harvested at the green, turning (50% green), and mature red stages, and analyzed for the carotenoids, beta-cryptoxanthin, alpha-carotene, beta-carotene, capsanthin, lutein, zeaxanthin, and their total. Levels of most carotenoids were higher in fruit from greenhouse-grown plants, and in fruit at the red stage. Fruit of the ‘Ancho’ type had the most beta-cryptoxanthin, alpha-carotene, beta-carotene, and total carotenoids. ‘Red Cherry’-type fruit had the most capsanthin and zeaxanthin, and fruit of the bell pepper cv. Bell Captain had the most lutein. Interactions of the main effects variables, i.e., location of production environment (field vs. greenhouse), stage of development, and cultivar, indicated that patterns of carotenoid levels were different for the various cultivars. The more protected and consistent greenhouse environment benefited carotenoid production.

Plant and Soil Sciences, and Entomology and Plant Pathology, Univ.

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Non-pungent Peppers Grown in the Greenhouse and Field.
Vegetable Crops

The Effects of On-farm–produced Compost on Transplant and Field Production of Bell Pepper
Darbie M. Granberry*, William Terry Kelley, David B. Langston, Jr., Juan Carlos Diaz-Perez, and Keith S. Rucker, Univ. of Georgia, Dept. of Horticulture, P.O. Box 1209, Tifton, GA 31793

Seed of Bell pepper cultivar X3R Wizard were planted in Styrofoam flats (two hundred 1.25-inch cells per flat) on 24 June 2000. Transplants were grown in a greenhouse using current commercial transplant recommendations for production of Bell pepper transplants. The two treatments were: 1) commercial transplant-growing media routinely used by plant growers; and 2) identical media amended with 20% by volume on-farm–produced, high-quality compost. Compost-amended media significantly increased plant height, stem diameter, leaf area, leaf dry weight, stem dry weight, shoot dry weight, and root dry weight. Transplants were transplanted to the field on 10 Aug. on 5-foot centers and grown using plastic mulch and drip irrigation. Univ. of Georgia–recommended cultural practices for pepper production were followed. After four harvests, the total marketable yield from transplants grown in compost-amended media yielded 20% more pepper by weight compared to transplants grown in media not amended with compost.

Yield and Harvest Ratings of Okra Varieties for Plasticulture Production in North Florida
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Growing okra on black plastic could be beneficial for earliness, improved weed control, and increased economical return in double-cropping. On 7 Apr. 2000, 16 okra varieties were transplanted in double-staggered rows 30 cm apart at a within-row spacing of 30 cm (8700 plants/ha). Immature pods were harvested 21 times between 15 May and 10 July. In July, plant height was determined and a harvest quality rating (HQR) was determined by rating each variety on a 0 to 2 scale for ease of finding pod in foliage, ease of snapping pod off the plant, and plant spinniness. Plant height ranged between 150 cm for ‘Louisiana Green Velvet’ to 43 cm for ‘Baby Bubba’. ‘Mita’ had significantly higher total yield, and ‘North & South’ had significantly higher early yield. Overall, hybrids were earlier and yielded more than OPs. Significant differences were also found in HQR, which ranged between 0.3 for ‘North & South’ (highest quality) to 4.8 for ‘Baby Bubba’ (lowest quality). The unusually large pods of ‘Big Un’ made this variety a specialty okra. Based on these results, best-performing okra varieties for plasticulture production were

‘White Half Runner’ Bean Breeding Lines
Charles A. Mollins, Jim Wyatt, J. Rennie Stavely, and David L. Coffey*, Univ. of Tennessee, Dept. of Plant and Soil Sciences, Knoxville, TN 37901-1071

‘White Half Runner’ is a popular green bean cultivar in the southern Appalachian area of the United States. Excellent flavor is the main reason for popularity of ‘White Half Runner’, which has many production problems, including a semi-determinate plant growth habit that complicates machine harvest, susceptibility to rust, and susceptibility to at least three viruses. The cultivar had not been improved by breeding efforts for several years until a USDA and Univ. of Tennessee breeding program was initiated in 1990. Numerous selections were screened, and three breeding lines with resistance to rust were released in 1995. One of the released breeding lines was selected by a major seed company and was named ‘Volunteer White Half Runner’. The new strain is very similar to the Mountaineer strain of ‘White Half Runner’ in plant and pod characteristics. It was resistant to rust in the 1998 and 1999 trials at the Univ. of Tennessee Plateau Experiment Station at Crossville. Tolerance to viruses is unknown, but laboratory tests indicate that the selection has the homozgyous f gene for tolerance to common bean mosaic virus, which attacks ‘White Half Runner’. Seed of ‘Volunteer White Half Runner’ is available from several commercial sources. Other advanced lines were evaluated alongside ‘Volunteer White Half Runner’ in 1998 and 1999 trials.

Assessment of the Potential for Sweet Onion Production in Southeast Oklahoma
James W. Shrefler and Wes Watkins, Agricultural Research and Extension Center, Oklahoma State Univ., P.O. Box 128, Lane, OK 74555

Farmers in southeastern Oklahoma are looking for alternative crops and have expressed interest in sweet onion production. Previous studies showed that onions could be established by seeding directly to the field in September. With this system, onion seeds germinate and seedlings emerge during the year of planting. Onion continues growth and matures during the following year. Attempts were made in 1998 and 1999 to produce onion of the cultivar Walla Walla by seeding directly in the field in September. Results for the 2 years differed in that ≈90% of onion planted in 1999 bolted prior to harvest. Only traces of onions planted in 1998 bolted. Other difficulties were also encountered. Satisfactory control of winter annual weeds was not achieved with approved herbicides, and stand establishment was erratic. Attempts were also made to produce onion established from transplants. For transplanted onions, satisfactory control of winter annual weeds was obtained with herbicides applied after transplanting. In summary, it was found that onion was most easily established when grown from transplants. The culture of onion plants established from seed sown directly to the field was found to be more complicated. In particular, the development of methods of weed control and stand establishment are needed.

An Interdisciplinary Approach to Medicinal Plant Production and Physiology
James W. Rushing, Robert J. Dufault, B. Merte Shepard, Richard L. Hassell, Gloria S. McCutcheon, Anthony P. Keinath, Alvin Simmons, and J. David Gangemi, Clemson Univ., Coastal Research and Education Center, Charleston, SC 29414

In 1998, an interdisciplinary research project was initiated with industry funding to identify the production and marketing potential of medicinal plants in the coastal region of the Southeast. Our research team consists of two horticulturists, three entomologists, a plant pathologist, a microbiologist, and a postharvest physiologist. In initial trials, five species of plants were investigated: Echinacea purpurea (purple coneflower), E. pallida (pallida), Tanacetum parthenium (feverfew), Hypericum perforatum (St. John’s wort), and Valeriana officinalis (valerian). St. John’s wort was highly susceptible to southern blight; valerian demonstrated good resistance and is very promising for on-farm production. Podophyllum peltatum is a herbaceous, rhizomatous perennial found in North America from Quebec and Minnesota to Florida and Texas. Leaves of this species contain podophyllotoxin in sufficient amount to be of commercial interest. Research-based knowledge is needed, and is being pursued, in the following areas: 1) breaking of bud dormancy with chilling; 2) optimum type and size of rhizome propagule and time of planting; 3) soil properties and fertilization; 4) weed control and mulching techniques; 5) production in full sun or under various levels of shade; 6) leaf removal and subsequent regrowth potential; 7) pest control; and 8) potential variation of podophyllotoxin content as affected by production methods. For more on mayapple, see: www.msstate.edu/dept/nmrec/pubs/ar00/cushman03.htm

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the hybrids ‘Annie Oakley’, ‘North & South’, ‘Mita’, ‘Spike’, ‘SOK-601’, and the OPs ‘Clemson Spineless’, ‘Clemson Spineless 80’, and ‘Penta Green’.

Response of Sweet Onion to the Use of Plastic Mulch and Drip Irrigation
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Drip irrigation alone or in combination with plastic mulches is widely used for vegetable production, particularly for tomatoes, peppers, or melons. However, drip irrigation and plastic mulches are not utilized for sweet onion (‘Vidalia’) production in Georgia. Sweet onions are typically grown on bare soil and irrigated with high-pressure systems, such as sprinklers or center-pivots. The objective of this study was to determine onion plant growth and yield as affected by mulch and irrigation method. The experiments were conducted in Tifton and Reidsville, Ga. The experimental design was a split plot, where the main plot was the irrigation system (sprinkler or drip) and the sub-plot was the type of mulch (bare soil, black plastic, or wheat straw). Fertilization of sprinkler-irrigated plants was according to UGA extension recommendations. Drip-irrigated plants were fertilized (N and K) weekly through the drip tape. The results indicated that root dry mass was heaviest under bare soil and lightest under straw. Shoot dry mass under bare soil was similar to that under plastic, while it was lightest under straw. At both locations, bolting incidence under bare soil was similar to that under plastic, and it was highest under straw. Plants grown under bare soil or plastic had similar yields, while plants under straw had the lowest yield at both locations. Plant growth and yield were similar between irrigation systems. Plants under drip irrigation required less water compared to plants under sprinkler irrigation. Bolting incidence was higher under drip than under sprinkler irrigation. In conclusion, plastic and straw mulches did not increase plant growth or yield compared to bare soil. However, drip irrigation may be an option for sweet onion production.

Effect of Liming Materials and Fertilization on the Nutrition, Yield, and Grade Distribution of Double-cropped Tomato and Cucumber Grown with Plasticulture
Joshua L. Mayfield*, E.H. Simonne, J.L. Sibley, and C.C. Mitchell, Dept. of Horticulture, Auburn Univ., Auburn, AL 36849

In the Alabama–Georgia–Florida area, the long growing season allows sequential production of vegetables using plasticulture. However, fertility conditions for the second crop may not be optimal due to depletion of soil nutrient reserves. A study was conducted in 1998 and 1999 to determine the effect of carbonate and calcium oxide (CaO) liming materials and nitrogen (N) fertilization regimes on a drip-irrigated tomato–cucumber double-crop system on plastic mulch. ‘Mt. Pride’ tomatoes and ‘Thunder’ cucumbers were produced in sequence. Fertilization and liming practices followed preplant soil test recommendations. Harvests were collected and soil and leaf samples taken following each crop. All liming materials raised soil pH over the unlimited control. CaO-based materials provided comparable pH adjustment, as well as soil and leaf Ca and Mg levels as ground carbonate limestone commonly available to producers. Therefore, no changes in current liming recommendations were suggested. Yields produced using NH₄NO₃ proved to be equal to sidedress fertilization with Ca(NO₃)₂ for tomatoes and slightly better for cucumbers in 1999. However, regardless of liming or fertilization regime, soil and foliar potassium (K) levels fell below sufficiency for this double-crop system. A proposal for future work is made, to reevaluate K soil test recommendations for Alabama crops, establish tomato and cucumber responses to K application rates and scheduling, and investigate K fertilization for other double-crop systems in Alabama.

Preliminary Results on Short-day Onion Variety Selection and Fertility Management in Southeast Georgia
George E. Boyhan*, William M. Randle, Reid L. Torrance, David E. Curry, Robert T. Boland, C. Randy Hill, M. Jeff Cook, and Myron D. Graham, Dept. of Horticulture, Georgia Cooperative Extension Service, and Georgia Agricultural Experiment Station, Univ. of Georgia

Japanese overwintering onions have recently been introduced to the Vidalia-growing region of southeast Georgia. These onions have been controversial among growers. These new varieties are early-maturing, disease-resistant varieties that many consider too pungent to be called Vidalia onions. Japanese overwintering varieties evaluated in trials include ‘WI-609’, ‘WL-3115’, ‘Georgia Pride’, ‘SSC 6436 F1’, ‘SSC 6372 F1’, and ‘SSC 6371 F1’. These varieties are 1–2 weeks earlier than any previous short-day onions grown in the Vidalia-growing region. Disease resistance among these varieties is particularly pronounced to bacterial diseases. High pungency as measured by the pyruvate pungency test are ambiguous among these varieties. Although measured pyruvate was high among these varieties in one variety trial, they were not in another. In both trials, the majority of Japanese overwintering varieties did not differ statistically from ‘Sweet Vidalia’, which represents close to 50% of onions produced as Vidalia onions. In addition, preliminary test panel evaluations did not show these varieties as more objectionable.

Studies in Plastic Mulch for Multiple Cropping
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Using plastic mulch for multiple crops will spread the installation and removal costs of plastic mulch and drip irrigation over two or more crops, thus reducing the cost per crop. A study was conducted to determine the effect of the amount of white interior latex paint used to coat black plastic mulch on production of yellow summer squash. Paint: water ratios of 1:1, 1:2, and 1:4 were applied at 10, 20, and 40 gal/acre. Early summer and late summer plantings of ‘Lemon Drop’ squash [Cucurbita pepo var. melopepo (L.) Alef.] were seeded through the painted mulch. Yield results indicated that the rate of paint per acre was the critical factor, regardless of mix rate or overall application rate of mix. Regardless of paint: water ratio or application rate of the dilute mix, actual paint amounts of 8–10 gal/acre or more were required to obtain crop yields from the painted mulch plots, which were equivalent to the yields from white mulch plots. A second study evaluated the long-term durability of 1.00- and 1.25-mL black plastic mulch. No differences in ultimate tensile force were noted between mulch thicknesses, and there were no reductions in ultimate tensile force after 9 months in the field. During the colder fall months, ultimate tensile force increased while ductility decreased. There were no observable differences in ease of removal of the two thicknesses after 6 months; both thicknesses tore easily during removal and were very difficult to remove efficiently.

Pumpkin Research in Tennessee
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Pumpkins have become very popular for ornamental usage, and Tennessee production is estimated at 4500 acres. Eighteen cultivars with varying fruit characteristics are recommended for production in Tennessee. Trials of new cultivars, fungicides, and herbicides have been conducted at the Univ. of Tennessee Plateau Experiment Station at Crossville for several years. Several new pumpkin cultivars showed promise in recent trials. Some of the newer lines have resistance to powdery mildew, an annual disease problem in Tennessee. The most promising new, large-fruited cultivars, with average fruit weights of 18 to 23 lb, are ‘Autumn King’, ‘Gold Rush’, ‘Mother Lode’, HMX 6689’, and ‘HMX 9698’. The most promising medium-sized cultivars, with average fruit weights of 10 to 15 lb, are ‘Gold Fever’, ‘Gold Standard’, and ‘Howdy Doody’. Quadrin (azoxyostrobin) and Nova (myclobutanil) fungicides performed well in the trials, and were
labeled for use on pumpkins in 2000. Quadris is broad spectrum and Nova is specific for powdery mildew. Sempra (halosulfuron) was promising for broadleaf weed control in the Tennessee trials, but caused injury in other locations in an IR-4 supported trial. A tolerance has been established for Permit on pumpkins, but the company has been reluctant to pursue registration.

**Aeration in Float-bed Vegetable Culture**

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In nine cultivars of lettuce, aeration of the nutrient solution through the use of compressed air resulted in significantly more leaf and root growth than allowing the nutrient solution to remain static. In the aerated beds, the leaf weights at harvest were about three times higher than the leaf weights of the nonaerated beds. The differences in weight of heads and roots between aerated and nonaerated float-beds for five cultivars of radicchio were significant but not so pronounced as in lettuce. In an experiment to determine if recirculation of the solution would improve plant growth over static solution, plant growth was actually slightly less for the float-beds with recirculated solution than for those with static nutrient solution. The plants were grown on 2′ × 2′ Styrofoam sheets 1 inch thick with 18 plants per sheet for radicchio and 33 plants per sheet for the lettuce. Further investigation is needed to determine the optimum amount of aeration.

**Influence of Plant Density on Pumpkin Yield**

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Pumpkin cultivars Aspen and Howden Biggie were planted in northern Mississippi during Summer 2000 to investigate the effect of plant density on yield. The summer months were unusually hot and dry, but plantings were drip-irrigated. Four plant densities of ‘Aspen’ were tested: 3068, 2045, 1361, and 908 plants/acre (14, 21, 32, and 48 ft²/plant, respectively). In a separate experiment, four plant densities of ‘Howden Biggie’ were also tested: 2045, 1361, 908, and 605 plants/acre (21, 32, 48, and 72 ft²/plant, respectively). There was a significant linear relationship (P = 0.05) for both cultivars between increasing plant density and decreasing average fruit weight (lb/fruit) and decreasing number of fruit per plant. There was a significant linear and quadratic relationship (P = 0.05) for ‘Howden Biggie’ between increasing plant density and decreasing yield (fruit/acre), with maximum yield for the quadratic effect occurring at 908 plants/acre. Plant density did not affect yield (lb/acre) or fruit size (inches²/fruits) for either cultivar. For more information, see: www.msstate.edu/dept/nmrec/pubs/ar00/cushman05.htm.

**Influence of Temperature Gradients on Diploid Watermelon Seed Germination**

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Seed of 25 diploid watermelon cultivars were germinated on a thermogradient table ranging from 62 to 94 °F (16.7 to 34.4 °C) to determine the ideal temperatures to produce highest germination within a minimum time. The rate of germination of all cultivars, determined using a germination index of all cultivars, was highest from 84 to 900 °F (29.4 to 32.2 °C), but 94 °F (34.4 °C) reduced germination. Temperature interacted with cultivars, however, indicating that germination indices of cultivars differed uniquely in response to temperature. Most cultivars germinated rapidly to a high germination percentage within 2 days after initiation of gradient testing, with minor increases in germination percentage after 7 d. The main effect of temperature (2 days after initiation of germination testing) indicated that, in general, highest germination occurred from 80 to 94 °F (26.7 to 34.4 °C), but temperature interacted with cultivar, indicating subtle differences among the cultivars. Although a variety of acceptable temperature ranges were identified for the cultivars, temperatures of 85 to 90 °F (29.4 to 32.2 °C) were common to all cultivars.

**Evaluation of Irish Potato Varieties for Production in North Florida**

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Potatoes were grown on 15,800 ha in Florida in the 1999–2000 season. The crop was valued at ≈$130 million. Potatoes are harvested within the state from mid-December in South Florida to late May in North Florida. The Univ. of Florida Potato Variety Selection Program has recently been implemented at the Hastings REC to find potato varieties that outperform current market standards. The program accepts potato clones from USDA, university, and private breeding programs. Potato clones enter the evaluation program in either the Early Line Chip or Fresh Market Trial. Selected varieties advance in the second year into either the Fresh White (W), Red (R), Russet (Ru), or Chip (C) Trial for 1 to 3 years of further evaluation. Successful clones advance to the Statewide Variety Evaluation Trial (SVET), a replicated trial on grower farms in four regions of the state. After the SVET, successful varieties advance to large-scale, on-farm demonstration plots. Numbered varieties from USDA (B) and Univ. of MA (AF) breeding programs that have advanced to the 2000–01 SVET include: B0178-34 (C), B1339-2 (C), AF1615-1 (W), B0564-8 (W), B0569-9 (W), B1425-9 (W), B1409-2 (Ru), AF1753-16 (Ru), B0984-1 (R), B1145-2 (R), and B1529-1 (R). Clone AF1615-1 (W) has advanced to farm demonstrations, where it will be grown on 9.4 ha on four farms. AF1615-1 has yielded 112% of ‘La Chiper’ (round white standard) in trials at the Hastings REC over the past 3 years, with 85% of tubers graded as USDA class “A.” Hollow heart has occurred in 0.1% of tubers over 3 years of testing, with no other internal problems.

**Controlling White-tailed Deer Feeding Damage to Sweetpotato**

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Because of the palatability of sweetpotato to white-tailed deer, feeding damage during field production poses a significant problem for commercial growers in the southeastern United States. Chemical repellency is one of the most effective approaches to controlling deer feeding damage, yet few products are labeled for edible crops. The objective of this study was to evaluate the efficacy of commercially available deer repellent products as feeding controls for white-tailed deer. Sweetpotato (*Impomea batatas L.*) cv. Beauregard slips were grown in trade-gallon pots following current production practices in June and July 1999. Groups of eight homogeneous plants =18 inches in length were sprayed with selected products outside the pens. A group of eight homogeneous plants were left unsprayed as a control. Selected treatments included Havahart putrescent egg spray, Grant’s, Ro-Pel, and Hinder. XP-20 (Thiram) was used as a reference product. Treatments were applied following the manufacturer’s recommendations once at the beginning of the test. A rating scale of 0–3 was established to determine damage (0 = no damage, 1 = 1/3 plant removed, 2 = 2/3 plant removed, 3 = plant removed to the potline or uprooted). All products tested provided some level of feeding deterrence compared to the untreated control. The egg-based Havahart spray provided the greatest protection for a longer period to sweetpotato than any other product in this test. The Thiram-based Havahart spray provided the greatest protection for a longer period to sweetpotato than any other product in this test. The Thiram-containing product, XP-20, also provided a high level of protection against deer feeding damage. There was not a significant difference in the level of protection provided by Grant’s, Ro-Pel, and Hinder.

**Optimizing Within-row and Between-row Spacing for Collard Production in North Georgia**

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Collard growers in north Georgia traditionally use wide plant spacings to produce heavy, large plants that are sold in bunches of whole plants. Since overall yields are traditionally lower than those
expected for collard production, this study was initiated to evaluate yield potential of collards with several different within-row and between-row plant spacings. Plots were established at the Georgia Mountain Branch Experiment Station (elev. 579 m) in Blairsville. Transplants were set into a Transylvania clay loam soil on 24 Aug. 2000. Between-row spacings of 91, 76, and 61 cm and within-row spacings of 23 and 30.5 cm were imposed for a total of six treatment combinations. Plots were 6 m long and consisted of a single row bordered on each side; they were replicated four times each. Otherwise normal cultural and pest control practices were employed. Collards were harvested on 17 Nov. 2000 at full maturity. A 1.5-m section of each plot was harvested and data collected from this sample. Plant circumference and leaf length were both reduced by closer plant spacings. Plant length and leaf width were not affected by varying plant spacings. Average plant weight was more influenced by within-row than between-row spacing. As within-row and between-row spacing decreased, respectively, average plant weight decreased as well. Total yield was more influenced by between-row than within-row spacing. The closer the between-row/within-row spacing combination, the higher the total yield. Growers should be able to increase yields by using higher plant populations while maintaining quality. However, larger-scale testing is necessary before making definitive recommendations.

**Fruit Crops**

**Effects of Rootstock and Tree Support on Growth and Productivity of ‘Gala’ Apples**

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‘Gala’ on M27EMLA, Mark, Bud.9, Ottawa 3, M26EMLA, and MAC39 and treated with one of three levels of tree support (no support, 1-m trunk support, and 2-m tree support) were evaluated for growth and productivity during a seven-season period. Analysis indicated very few interactions of rootstock and tree support treatments. Rootstocks accounted for 40% to 60% of the experimental variation for most variables, while tree support was the second greatest source of variation. After seven seasons, 75% of trees on Ottawa3 had died. Tree support also affected tree survival, with 57%, 33%, and 15% of trees with no support, 1-m, and 2-m support, respectively, dying during the study. Trees on M.26 had the greatest trunk cross-sectional area (TCSA), tree height, and yield, while trees on M.27 and Mark were significantly smaller and produced less fruit. Bud.9 was not statistically different than M.26 for tree size or yield variables. MAC39, M.26, and Bud.9 had the greatest yield efficiency during the study period. Tree support did not significantly affect TCSA, but trees that were not supported were significantly shorter than those which received support. Supported trees had significantly greater yield than nonsupported trees, and the trees with a 2-m support had 71% greater yield than nonsupported trees during the study. Trees with 2-m support had the greatest cumulative yield efficiency (CYE), while those without support had significantly lower CYE. Because of the lack of rootstock support interaction, it was concluded that all of the size-controlling rootstocks in this study benefited from tree support for tree height, yield, and yield efficiency.

**A Comparison of Airblast and Proptec™ Spray Technologies**

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Standard airblast pesticide application was compared to pesticide application with a rotary atomizer Proptec™ low-volume sprayer in Spring and Summer 2000. Shuck split through harvest, standard cover spray application of phosmet, sulfur, and propiconazole were made in a 6-year-old ‘Sunprince’ orchard using both technologies. Airblast cover sprays at 50 gal/acre were 100% of the recommended rate/acre, while Proptec™ cover sprays at 25 gal/acre were 80% of the recommended rate/acre. Airblast-treated trees were sprayed at 2 miles/hour and Proptec™-treated trees were sprayed at 5 miles/hour. Eighty fruit were randomly picked from each treatment in each of four blocks and rated for scab, brown rot, bacterial spot, insect damage, blemishes, percentage of redness, and peel discolorations. Only scab ratings indicated a difference between treatments, with airblast scab levels being 25% of Proptec™ scab levels (airblast, 0.31%; Proptec™, 1.25%). All other pests were managed similarly and there appeared to be no difference in effect on overall peel quality. We also tested coverage in two ways: dye (Rhodamine B) coverage and residue levels of phosmet. When dye was applied at the same concentration by the two methods, a similar density on the leaf structure was apparent in 1.5 n NaOH leaf rinses. Phosmet coverage studies indicated that drift was reduced 59% to 93% by Proptec™ use. However, residual levels of phosmet 6 days after application were reduced 59% to 60% by Proptec™ as with airblast application. This new low-volume technology holds intriguing possibilities for the southeastern peach industry.

‘Westbrook’, ‘Arrington’ and ‘Bradley’; New Nectarine Cultivars from the University of Arkansas

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Then Univ. of Arkansas released three nectarine cultivars in 2000. ‘Westbrook’ is a very early-ripening (9 June average at Clarksville, Ark., 3 weeks before ‘Redhaven’), melting-flesh nectarine. It has excellent flavor for very early ripening, and has mostly red skin color, is medium-firm, and has medium-sized fruit. Trees were free of bacterial spot in almost all years of evaluation (fruit always free of spot and leaves very slight infection, if seen at all). ‘Arrington’ is also early, ripening 24 June at Clarksville. Fruit has non-melting flesh, good skin color (good mix of red and orange/yellow background color), and good flavor. Fruit have an all-yellow or gold flesh, lacking red pigment. Fruit is medium in size, and has a mild nectarine flavor. Slight bacterial spot has been seen on leaves of ‘Arrington’ trees in some years, but not on fruit. Trees are very productive and have been reliable producers at Clarksville, and ‘Arrington’ has been one of the higher-yielding nectarines in trials. ‘Bradley’ ripens on average 29 June at Clarksville, near ‘Redhaven’ peach season. Trees of ‘Bradley’ are very productive, and bacterial spot has seldom been seen on leaves or fruit. In fact, ‘Bradley’ is one of the cleanest trees for bacterial spot ever observed in the Arkansas breeding program. Fruits have attractive skin color (good mix of red and orange/yellow background color), all-yellow or gold flesh, are medium to large, and have non-melting flesh. Flavor is good but has a strong processing peach component. The non-melting flesh provides excellent fruit firmness at or near maturity.

**Yield and Disease Resistance of Asian and Bartlett-type Pears in South Carolina**

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Twenty-four Asian (*Pyrus pyrifolia*) and Bartlett-type (*P. communis*) pear varieties and selections were planted in 1996 near Clemson, S.C. Disease resistance, tree growth, phenology, precocity, and fruit yield were evaluated through year 2000. Among Asian varieties, the Chinese types ‘Ya Li’ and ‘Shin Li’ were more vigorous in growth and bloomed earlier than the Japanese types by 4 to 13 days. Mean fruit weight for 3 years ranged from 200 g (‘Hosui’) to 416 g (‘Shin Li’). Cumulative fruit yield per tree was significantly higher for ‘Shin Li’ (124 kg) among all Asian varieties. For the *P. communis* types, many exhibited leaf necrosis and leaf curling from midsummer onward most years. Selections 66131-021 and 66170-047 had the highest levels of necrosis and curling. Tree growth was greatest 6 days after application were reduced 59% to 60% by Proptec™ as with airblast application. This new low-volume technology holds intriguing possibilities for the southeastern peach industry.
than Chinese types, but similar to the Japanese varieties. Precocity or flower production in the third year (1998) was significantly higher in 76128-009 than all other P. communis varieties, but less than that of the Japanese types. Secondary or ratali flower production was also greatest in 76128-009, with ‘Potomac’ second highest. Cumulative fruit yields per tree were highest in 76128-009 (43 kg), 78304-057 (41 kg), ‘Moonglow’ (41 kg), ‘Orient’ (44 kg), and ‘Kieffer’ (44 kg). The largest mean fruit weights were from ‘Orient’ (453 g), ‘Kieffer’ (364 g), NY10346 (309 g), ‘Moonglow’ (286 g), and 67218-083 (260 g). ‘Maggness’ and ‘Warren’ were the least precocious varieties. Fireblight was present, but had not yet become a significant problem in this trial.

**Influence of Bed Height on Productivity in Annual Hill Plasticulture Strawberries**

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The response of strawberries in the annual hill plasticulture system to varying bed heights was examined. In this study, ‘Camarosa’ strawberries were planted at Brewton, Ala., in October on black plastic–mulched beds that were 10, 15, 23, and 31 cm in height. Overall, increasing bed height tended to increase yield. The 10-cm beds were consistently the worst performers, while the 31-cm beds consistently gave higher yields than 10- or 15-cm beds. The 23-cm beds were similar to the 31-cm beds in one year but were lower yielding in the other. We would recommend 31-cm-high beds where soil type is appropriate and equipment is sufficient for creating beds of this height.

**Response of Rabbit-eye Blueberries to the Growth Regulator CPPU**

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Experiments were conducted during 1999 and 2000 at Griffin, Ga., with rabbit-eye blueberries (Vaccinium ashei Reade) to determine how the growth regulator CPPU [N-(2-chloro-4-pyridyl)-N’-phenylurea] affected fruit set, berry size, and yield. CPPU (applied at two different timings) was used alone, and in conjunction with gibberellic acid (GA₃) on 7-year-old field-grown ‘Tifblue’ plants. A control treatment without either growth regulator was also included. The CPPU concentration used was 10 mg/L (a single application per treatment), and the GA₃ concentration used was 200 mg/L (two applications per treatment). Results from both years showed a positive benefit of CPPU with respect to fruit set and berry size, especially in the absence of GA₃. Depending on timing, berry number per plant was increased by >300% in 1999 using CPPU. Berry size during 2000 was increased by >30% when CPPU was applied at 17 days after flowering (DAF). Total yield per plant for 2000 was 5.0, 7.1, and 8.3 kg for the control, CPPU applied 17 DAF, and CPPU applied 17 DAF treatments, respectively. When CPPU was used with GA₃, much less increase of fruit set was observed. While CPPU did substantially increase fruit set, berry size, and yield of ‘Tifblue’, there was a delay in fruit ripening of up to 10 days. These results suggest that CPPU may be useful for increasing yield of rabbit-eye blueberries under conditions of inadequate fruit set (such as occurs in much of the Southeast), but a delay in ripening will likely result.

**Variation in Antioxidant Content in Blueberry Cultivars and Selections**

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Twenty-four Vaccinium genotypes were analyzed during two growing seasons for antioxidant capacity by measuring oxygen radical absorbance capacity (ORAC), in addition to total phenolics and total anthocyanins. Four of these genotypes were sampled both years. ORAC values varied from 14.4 to 76.3 mmol Trolox equivalents/g among genotypes. ‘Ocracblue’ had the highest average ORAC value among cultivars, 43.0 averaged for the 2 years. Two of the four genotypes had higher ORAC values in 2000, while two were higher in 1999. Overall, ORAC content varied by 4.5 mmol Trolox equivalents/g averaged across the four common cultivars for the 2 years. The highest ORAC values were found for the U.S. Dept. of Agriculture (USDA) selections US 497 and US 729, with 72.8 and 76.3 mmol TE/g, respectively. Correlations of ORAC and total anthocyanin and total phenolics were not consistent among years.

**Floriculture/Ornamentals**

**Estimating Irrigation Requirements of Large Container Nursery Trees**

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Large tree container production is sharply increasing due to demand by consumers. Container-grown trees >15 gal are difficult to manage because of the inherent weight. Monitoring irrigation effluent in large (32-gal) nursery containers presents a logistical challenge. The objective of this research was to evaluate methods of irrigation monitoring systems to produce commercially acceptable container grown trees. Two methods were tested for monitoring irrigation requirements in containers. A closed capture effluent system (20% leaching fraction) and switching tensiometers (7 cb) were monitored by a designed data acquisition system. Commercially acceptable bald cypress (Taxodium distichum) and river birch (Betula nigra) were produced using tensiometer control, presumably because of aggressive root growth. All plant species, including azalea (Rhododendron indicum ‘Formosa’), and Southern magnolia (Magnolia grandiflora ‘Little Gem’), maintained acceptable growth using a monitored closed capture effluent system. Irrigation requirements of ‘Little Gem’ ranged from 0.5 gal daily in January to 3.25 gal in August. Using a closed capture system to monitor effluent can be used successfully to adjust irrigation volume. Switch tensiometers were generally unreliable for monitoring irrigation requirement for all species evaluated.

**Origin of Multiple Trunks Affects Crape Myrtle Form in the Landscape**

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Bare-root Lagerstroemia indica L. ‘Sarah’s Favorite’ liners were grown in #3 (10.4-L) black plastic containers and trained to one, three, or five trunks by one of two methods. Half of the plants were established from multiple liners, with each trained to form one of the trunks. The others were established by planting a single liner in each container, pruning them back to within 5 cm of the substrate surface, and then training elongating buds or adventitious shoots to the desired number of trunks. Once plants reached a marketable size, they were transplanted to a field site for three growing seasons to determine if there were effects of the treatments on trunk survival or growth uniformity in the landscape. The study was replicated in time with containerized L. indica ‘Basham’s Party Pink’ liners, but only grown in the field for 2 years. Few meaningful differences in growth or quality were found at the end of nursery production for either clone, thus favoring recommendation of whichever treatment would be most economical to produce the desired growth form. However, in the landscape phase, survival of ‘Sarah’s Favorite’ and growth and uniformity of ‘Basham’s Party Pink’ were greater for several growth measures when multiple trunks were produced by training stems of the same plant as opposed to planting multiple liners. Trunk survival was generally good for three or fewer trunks, but significant losses often occurred when the planting units had five trunks, especially when grown from multiple liners. Growth and survival differences among treatments were more pronounced with increasing trunk number and length of time the planting units were in the field (landscape).
The Effect of Mulching Systems on Herbicide Mobility
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There is concern about fate of herbicides and potential accumulation in surface and groundwater supplies. Irrigated sandy soils have a high potential for certain herbicides to leach into groundwater. Therefore, the objective of this research was to evaluate the mobility of pendimethalin, isoxaben, and metolachlor when applied over recycled newspaper pellets, bark, and pine straw mulches vs. bare soil. Acetate tubing (5 cm × 30 cm) was filled with a sandy loam soil in 100-g increments. Two inches of mulch were placed over the soil. Columns were irrigated with 250 mL of deionized water under saturated-flow conditions and then allowed to drain for 24 hours before treatments were applied. All 14C-labeled herbicides were applied in 1000 L of deionized water to each column in a cross-hatch pattern. Following herbicide application, columns drained for 24 hours before leachate was recorded and subsamples taken. Two 1-L aliquots from each leachate sample were combined with scintillation cocktail and analyzed by liquid scintillation spectrometry. Columns were then frozen and sectioned with a 2-inch PVC cutter into the following increments: mulch if applicable, 0–5, 5–10, 10–15, 15–20, and 20–25 cm. Air-dried sections were mixed thoroughly, and three 2-g samples were taken from each soil section and combusted with a biological oxidizer at 9000 °C for 4 min. Mobility was determined by the percentage of herbicide collected at different soil depths and in the leachate relative to the amount applied. This 2 × 2 factorial experiment, consisting of four replications, was conducted twice. All data were subjected to analysis of variance to test for interactions between herbicide and mulch. All three herbicides had >85% recovery and showed no differences among herbicide treatments. Less 14C-herbicide moved from the point of application when a mulch was applied; herbicide pellets adsorbed more 14C-herbicide compared to any other mulch. The 14C-herbicide recovery was lower with pine bark compared to any other mulch. Compared with pendimethalin and isoxaben, metolachlor leached more from the mulch layer into the soil profile, indicating a higher potential for leaching. Therefore, we can conclude that newspaper pellets, pine bark, and pine straw did reduce leaching of pendimethalin, isoxaben, and metolachlor when compared to bare soil.

Growth and Nutrient Status of Roses in Relation to Rootstock Selection
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Yield, quality, and nutrient status of ‘Bridal White’ rose plants grafted on the rootstocks Rosa manetti, R. ×sororata, R. ×‘Natal Brier’ and R. ×‘Dr. Huey’ were evaluated under greenhouse conditions. Plants were grown in 20-L containers filled with apeat : bark : sand growing medium and fugged with a complete nutrient solution. Flower and dry samples were taken from each soil section and combusted with a biological oxidizer at 9000 °C for 4 min. Mobility was determined by the percentage of herbicide collected at different soil depths and in the leachate relative to the amount applied. This 2 × 2 factorial experiment, consisting of four replications, was conducted twice. All data were subjected to analysis of variance to test for interactions between herbicide and mulch. All three herbicides had >85% recovery and showed no differences among herbicide treatments. Less 14C-herbicide moved from the point of application when a mulch was applied; herbicide pellets adsorbed more 14C-herbicide compared to any other mulch. The 14C-herbicide recovery was lower with pine bark compared to any other mulch. Compared with pendimethalin and isoxaben, metolachlor leached more from the mulch layer into the soil profile, indicating a higher potential for leaching. Therefore, we can conclude that newspaper pellets, pine bark, and pine straw did reduce leaching of pendimethalin, isoxaben, and metolachlor when compared to bare soil.

Effect of Soil Mixes and Fertility Treatments on Coreopsis and Rudbeckia Production
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Two herbaceous perennial plants, Coreopsis grandiflora ‘Early Sunrise’ and Rudbeckia fulgida ‘Goldstrum’ were evaluated in five soil mixes and four fertility regimes. The soil mix treatments were pine bark (100%), 4 pine bark : 1 peat moss, 4 pine bark : 1 composted rice hulls, ProMix (100%), and 4 ProMix : 1 composted rice hulls (v/v). The fertility treatments were divided into two groups, controlled-release (Osmocote 14–14–14 and 18–6–12) and water-soluble (Peter’s 20–20–20 and 24–8–16). Perennial plugs were transplanted into 1-gal containers and grown for 9 months. Controlled-release fertilizers were applied after transplanting, with 14–14–14 reapplied at the midpoint of the study. Water-soluble fertilizers were applied weekly. Fresh weights, dry weights, and shoot heights were measured. For both species, the controlled-release fertilizer produced significantly taller plants, many excessively large and commercially unsalable. The mean heights of the Coreopsis were 47, 45.5, 31.4, and 30.5 cm in the 18–6–12, 14–14–14, 24–8–16, and 20–20–20 fertilizers, respectively. The Coreopsis fresh weight and root-weight means were significantly larger in the controlled-release fertilizer also. The highest fresh-weight mean of each perennial was in the ProMix soil. There was no significant difference in Coreopsis total fresh-weight means between the pine bark : peat, ProMix : rice hulls, and 100% pine bark soil mixes. In Rudbeckia, ProMix (100%) and ProMix : rice hulls were significantly different from the remaining soil mixes in total fresh-weight mean.

Identification of Optimum Potassium Nutrition in Greenhouse Plants Grown in Recirculating Subirrigation
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The greenhouse industry will need to focus more on depleting water supplies and contamination due to fertilizer overuse, in regard to both government regulations and the public’s outlook on the industry. Two experiments were designed to study the effect of K fertilizer rates on three varieties of New Guinea impatiens (Impatiens hawkeri), vinca (Vinca rosea), and petunia (Petunia hybridra) in a recirculating subirrigation system. The optimum K fertilizer rates were based upon the highest measurements of fresh and dry weight, leaf number, and height. For New Guinea impatients ‘Ovation Salmon Pink Swirl’, the optimum K fertilizer rate was 1–1.5 mM K, and for New Guinea impatients ‘Cameo’ and New Guinea impatients ‘Illusion’ the optimum rate was 2 mM K. The optimum K fertilizer rate for vinca ‘Pacifica Apricot’ was 2–8 mM K, and for petunia ‘Trailing Wave’, the optimum rate was 4–16 mM K. The growing soil was divided into three layers, the top, middle and bottom, mks all equal in size. The soil extracts were analyzed for electric conductivity (EC). The soil elect EC increased with increasing fertilizer levels. The bottom and middle layers were in an acceptable EC range. The top layer had a very high EC, in the range of 8–12 dS/m in the higher K fertilizer treatments. At the upper range of the optimum fertilizer levels, salinity was not a problem due to “upward leaching,” which sequestered the salts into the top layer out of the active root zone. At the lower range of the optimum fertilizer levels, results were similar to past nitrogen studies in subirrigation; you can use less fertilizer to obtain optimum growth.

Effect of Bicarbonate in Irrigation Water on Selected Greenhouse Crops
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Water availability and quality, mainly pH and alkalinity, will have important impacts on the ornamental industry. The major contributors to alkalinity in water are HCO3− and CO32−. This research was carried out to determine the effects of bicarbonate concentration in irrigation water on the growth of selected greenhouse ornamental plants, in an attempt to identify acceptable and harmful levels. Rose ‘Pink Cupido’, vinca ‘Apricot Delight’ and hibiscus ‘Bimini Breeze’ and ‘Mango Breeze’ were planted in Sunshine #2 with an initial pH of 6.29. The treatments, prepared with sodium bicarbonate, were 0, 2.5, 5, 7.5, and 10 mM. Growing medium pH increased in the four crops as bicarbonate concentration increased. In the no bicarbonate control, the growing medium pH increased. The bottom and middle layers were in an acceptable EC range. The top layer had a very high EC, in the range of 8–12 dS/m in the higher K fertilizer treatments. At the upper range of the optimum fertilizer levels, salinity was not a problem due to “upward leaching,” which sequestered the salts into the top layer out of the active root zone. At the lower range of the optimum fertilizer levels, results were similar to past nitrogen studies in subirrigation; you can use less fertilizer to obtain optimum growth.
cant reduction of all the parameters studied, but for ‘Bimini Breeze’ only chlorophyll content was affected significantly at 7.5 and 10 mM. Chlorophyll content was negatively correlated with growing medium pH in the middle layer. The relationship was quadratic for vinca and rose and linear for both cultivars of hibiscus. The chlorophyll content of ‘Bimini Breeze’ was less affected than ‘Mango Breeze’. The levels of bicarbonate that caused significant reduction in growth and chlorophyll content was 7.5 and 10 for hibiscus ‘Bimini Breeze’, 10 for vinca, 5.0 mm for hibiscus ‘Mango Breeze’, and 5.0 for rose.

Efficacy of Plant Growth Regulators on the Growth of Vigorous Cultivars of Osteospermum ecklonis
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Vigorous osteospermum cultivars were treated with foliar sprays of daminozide or daminozide + chlormequat (Expt. 1) or paclobutrazol or uniconazole foliar sprays or substrate drenches (Expt. 2). Both cultivars responded similarly to the PGR treatments in Expt. 1. A limited amount of growth control occurred at the highest tank mix concentration of daminozide at 5000 ppm (mg·L–1) + chlormequat at 1500 ppm (mg·L–1). Flowering was delayed, phytotoxicity was observed, and flower stalk ate that caused significant reduction in growth and chlorophyll content. ‘Breeze’ was less affected than ‘Mango Breeze’. The levels of bicarbonate composition and nutrient content of slices during storage.

Comparation of Fermentation Enzyme Activities in ‘Beauregard’ and ‘Hernandez’ Sweetpotatoes
Y.H. Huang*, D.H. Picha, and E. Ertur, Dept. of Horticulture, Louisiana State Univ., Baton Rouge, LA 70803

Roots of two sweetpotato (Ipomoea batatas L. Lam) cultivars (‘Beauregard’ and ‘Hernandez’) were used to determine varietal differences in pyruvate decarboxylase (PDC) and alcohol dehydrogenase (ADH) activities under controlled-atmosphere (CA) storage over a 2-week period. PDC and ADH activities were assayed at harvest and after 1 and 2 weeks of storage at 0%, 1.5%, 5%, 10%, and 21% oxygen. PDC activity was similar in ‘Beauregard’ and ‘Hernandez’ at harvest, after 1 and 2 weeks of storage at 0%, 1.5%, 5%, 10%, and 21% oxygen. PDC activity was similar in ‘Beauregard’ and ‘Hernandez’ at harvest, while ADH activity was 24% higher in ‘Beauregard’. One-week storage at 0% and 1.5% oxygen resulted in significantly higher increases in PDC and ADH activities in ‘Hernandez’ than ‘Beauregard’. One-week storage at 10% and 21% oxygen resulted in a greater decrease in PDC activity in ‘Beauregard’, and a greater decrease in ADH activity in ‘Hernandez’. PDC and ADH activities in ‘Hernandez’ and ADH activity in ‘Beauregard’ increased during 2 weeks of storage at 0% and 1.5% oxygen. PDC activity was correlated to ADH activity in both cultivars ($R^2 = 0.71$).

Postharvest/Biotechnology

Modified-atmosphere Packaging of Fresh-cut Sweetpotatoes
E. Erturk and D.H. Picha*, Dept. of Horticulture, Louisiana State Univ., Baton Rouge, LA 70803

Fresh-cut sweetpotato slices (3.2 mm thick) were packaged in three different semipermeable polyolefin film bags and kept at 2 or 8 °C for 14 days. In order of increasing permeability, the films chosen were Cryovac PD900, PD961, and PD941. About 350 mg of sweetpotato slices were put in 16 × 30-cm bags, which were partially evacuated prior to sealing. Only PD941 film bags maintained an aerobic atmosphere during the 14 days at both temperatures. However, weight loss of slices packed in PD941 film bags was the highest among the three films tested. Surface desiccation and tissue whitening was noticeable after 14 days at 8 °C on the slices packed in PD941 bags. This suggested that use of this film for fresh-cut sweetpotatoes should be accompanied with high relative humidity storage conditions. PD961 film bags were acceptable for packaging of fresh-cut sweetpotatoes at 2 °C for 14 days, but not at 8 °C due to anaerobiosis. PD900 film bags were not suitable for fresh-cut sweetpotato packaging because of anaerobiosis at both 2 and 8 °C. Between the two storage temperatures tested, 2 °C was superior for fresh-cut sweetpotatoes held for 14 days. Storage at 8 °C resulted in a higher rate of O₂ depletion and CO₂ elevation, accompanied by higher rates of PDC and ADH activities and acetalddehyde and ethanol production compared to 2 °C. Type of modified-atmosphere packaging did not significantly affect carbohydrate composition and nutrient content of slices during storage.

Compositional Profiles of Sweetpotatoes Marketed in the European Union
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Six sweetpotato cultivars from five leading exporting nations to the EU were analyzed for dry weight, sugar content, and nutritional quality. A wide range in composition existed among the principal cultivars marketed in the EU. The cultivars analyzed were: ‘Bushbuck’ (purple skin/white flesh from South Africa); ‘Rubina’ (orange skin/orange flesh from Israel); ‘Beauregard’ (orange skin/orange flesh from USA); ‘Abies’ (purple skin/white flesh from Egypt); ‘Mabrouka’ (purple skin/cream flesh from Egypt); and ‘Quarter Million’ (light brown skin/white flesh from Jamaica). Dry weight ranged from 33.7% (‘Quarter Million’) to 15.0% (‘Rubina’). Total sugar content of baked roots ranged from 13.9% (‘Quarter Million’) to 9.2% (‘Rubina’). Among individual sugars, ‘Quarter Million’ had the highest maltose content (8.5%), ‘Abies’ had the highest sucrose content (5.9%), and ‘Mabrouka’ had the highest glucose content (1.8%) and fructose content (1.1%). Total carotenoid content among orange-flesh cultivars ranged from 5.4 mg/100 gm for ‘Beauregard’, 4.0 mg/100 gm for ‘Rubina’, to 1.8 mg/100 gm for ‘Mabrouka’. Vitamin C content ranged from 5.9 mg/100 gm (‘Rubina’) to 2.0 mg/100 gm (‘Mabrouka’).

National Cowpea Improvement Association

Root-knot Nematodes: Need for Host Plant Resistance in Cowpea
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Root-knot nematodes (Meloidogyne sp.) are severe pests of cowpea (Vigna unguiculata). Four species of root-knot nematodes (Meloidogyne incognita, M. javanica, M. arenaria, and M. hapla) are known to parasitize cowpea. Of these, M. incognita and M. javanica cause the greatest yield losses, although M. arenaria and M. haplal may reduce cowpea yields in local areas. Root-knot resistant cowpea cultivars are available; however, many horticultural-type cultivars are susceptible. Resistance in the majority of resistant U.S. cowpea cultivars is governed by the dominant gene Rk. The Rk gene is quite effective in most production areas. For example, seed yield of resistant ‘Tender Cream’ (Rk/Rk) was 22.4% greater than its susceptible isogenic parent ‘Carolina Cream’ (rk/rk) in a South Carolina field heavily
infested with *M. incognita*. The dominant gene *Rk2* (allelic to *Rk*) confers greater resistance than *Rk* to *M. incognita* and *M. javanica*, and is also effective against resistance-breaking isolates of these two *Meloidogyne* species. The recessive gene *Rk* (also allelic to *Rk*) confers an intermediate-type resistance in cultivars such as ‘Pinkeye Purple Hull’, compared to the highly susceptible reaction of the cultivar New Era. The gene *Rk3* (a recently discovered, single recessive gene that is independent of *Rk*) confers a high level of broad-spectrum resistance to *M. incognita* and *M. javanica* when it is present in combination with *Rk*. These known resistances should allow the development of new cowpea cultivars with high, broad-spectrum resistance that should be effective against all known virulent and avirulent isolates of root-knot nematodes.

### Nitrogen Fertilization Compared to Rhizobium Inoculation for Southernpea

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In southern states, extension recommendations for nitrogen fertilization of southernpea range from a low of 20 lb/acre to a high of 60 lb/acre, depending on climate and soil. Some recommendations mention *Rhizobium* inoculation and suggest that inoculation can increase yields of unfertilized plantings. Research reports have generally found no significant differences in yield between N-fertilized or *Rhizobium*-inoculated plantings. However, some reports have found significant yield improvements of N-fertilized compared to *Rhizobium*-inoculated plantings. A study was conducted in northern Mississippi in 1998 and 1999 with three commonly used cultivars in the southeastern United States, ‘Quick Pick’ (QP), ‘Texas Pinkeye’ (TxPE), and ‘Mississippi Pinkeye’ (MsPE). Plantings received either 30 lb/acre ammonium nitrate (NH₄NO₃) without seed inoculation or no NH₄NO₃ with *Rhizobium* seed inoculation. There was a significant cultivar × nitrogen treatment interaction for seed yield in 1998. MsPE produced significantly greater yield with inoculation than with NH₄NO₃, whereas QP or TxPE yield was not affected by nitrogen source. Yield was not affected by nitrogen treatment for any of the three cultivars in 1999. Yields were reduced both years due to hot, dry weather conditions during flowering and pod set. For more information, see: [www.msstate.edu/dept/nmrec/pubs/ar99/vg66an99.htm](http://www.msstate.edu/dept/nmrec/pubs/ar99/vg66an99.htm)

### National Sweetpotato Collaborators

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A 6-ha sweetpotato production field was divided into 0.81-ha grids and sampled in a diamond pattern with a differentially corrected global positioning system (DGPS). Soil and leaf tissue samples, as well as chlorophyll and penetrometer (compaction) readings, were taken within a 1.5-m radius of each georeferenced site. Soil properties and tissue nutrient levels were determined by the Mississippi State Univ. soil testing lab. Root harvest was taken from a 3-m² area of each georeferenced site. Harvested roots were hand-graded and weighed. Yield of U.S. No. 1 and total marketable sweetpotato was positively correlated to soil organic matter, calcium, sulfur, and pH with r values of at least 0.41. Percent clay (r = –0.29) was inversely related to canner yield. Penetrometer measurements at 5- and 10-cm depths were inversely related to canner yield and positively related to jumbo yield. Cull yield was positively related to all penetrometer measurements at 0, 5, 10, and 15 cm. This suggests that there can be an increase in cull amount with an increase in soil compaction. Total marketable yield was also inversely related to soil compaction at the 15-cm depth. Plant tissue nitrogen was inversely related to U.S. No. 1 yield (r = –0.67) and positively related to canner yield (r = 0.83). Plant tissue potassium was inversely related to canner yield. Canner yield was also positively related to plant iron (r = 0.83), and jumbo yield was negatively related to plant copper (r = –0.74).

### Watermelon Research Group

**Lycopene Stability in Stored or Minimally Processed Watermelon**

*P. Perkins-Veazie* and *J.K. Collins*, USDA–ARS, South Central Agricultural Research Laboratory, Lane, OK 74555

Watermelon contains high amounts of the antioxidant lycopene. Previous research has shown that lycopene content varies with maturity and germplasm. Lycopene is reported to be unstable once removed from the fruit or vegetable matrix. This experiment was done to determine how much lycopene is lost from uncut watermelon during storage and how much is lost after fruit is cut for fresh packs. Watermelon cultivars Summer Sweet 5244 (seedless) and Summer Flavor 800 (seeded) were harvested from a commercial grower and transported to Lane, Okla. Twenty melons per cultivar were harvested from a commercial grower and stored at 15 °C for 14 days (10 melons per temperature). Minimally processed packs of watermelon were made from an additional eight melons per cultivar by cutting placental tissue into 5-cm cubes and

**Effects of Spatial Variability on Sweetpotato Yield**

**Edward E. Carey,** Kansas State Univ., Research and Extension Center, Olathe, KS 66061

Sweetpotato is an important crop many places in sub-Saharan Africa, where it is grown by millions of small-holder farmers, using minimum inputs. A large number of locally adapted landrace varieties account for the bulk of sweetpotato production in Africa. However, sweetpotato breeding and formal and informal variety dissemination efforts are providing farmers with superior cultivars in a number of countries. In West Africa, varieties developed at the International Institute of Tropical Agriculture (IITA) have had an impact, particularly in Nigeria. Major production constraints, such as sweetpotato virus disease, which occurs in some agroclimatic zones, and consumer preference for high dry-matter content in storage roots, dictate the need for regional breeding efforts. In eastern, central, and southern Africa, these are conducted in part by the regional rootcrop research networks, PRAPACE and SARRNET, working in cooperation with international programs, such as the International Potato Center (CIP). Current breeding efforts give high priority to the development of high dry-matter, orange-fleshed varieties, to help sustainably combat vitamin A deficiency in children. Attention is also being given to the development of sustainable, community-based seed systems for the dissemination of new sweetpotato varieties.

**Insecticidal Compounds Isolated from Sweetpotato Cortex Tissues**

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Polar extracts from cortex tissue of the sweetpotato cultivar Regal were incorporated in an artificial diet for diamondback (*Plutella xylostella* L.) larvae. Crude extracts showed strong antibiosis properties. Total live weight after 6 days was reduced to 50% relative to the control by concentrations of ≈36% of those occurring in the cortex tissue. The extract, further fractionated by low-pressure preparative column chromatography, yielded three major fractions that interfered with larval growth and development. The least polar fraction consisted of a mixture of compounds previously shown to have very similar absorption spectra. This mixture, after further purification by semipreparative HPLC, was assayed for dose-response with respect to larval survival and weight gain. First instars were used for these experiments and data were taken 6 days later. The LD₅₀ was 520 μg/mL diet, and 50% reduction in total live weight was obtained at 230 μg/mL diet.

**Watermelon contains high amounts of the antioxidant lycopene. Previous research has shown that lycopene content varies with maturity and germplasm. Lycopene is reported to be unstable once removed from the fruit or vegetable matrix. This experiment was done to determine how much lycopene is lost from uncut watermelon during storage and how much is lost after fruit is cut for fresh packs. Watermelon cultivars Summer Sweet 5244 (seedless) and Summer Flavor 800 (seeded) were harvested from a commercial grower and transported to Lane, Okla. Twenty melons per cultivar were stored at 15 °C for 14 days (10 melons per temperature). Minimally processed packs of watermelon were made from an additional eight melons per cultivar by cutting placental tissue into 5-cm cubes and...**
storing cubes in polyethylene boxes at 2 and 5 °C for 2 and 7 days. Total lycopene content was determined by hexane extraction and was measured by spectrophotometer at 503 nm. Additional samples were analyzed by HPLC equipped with a photoiodide array detector and C18 column to determine carotenoid profiles. Lycopene content was initially higher for ‘Summer Flavor 800’, but was similar between cultivars after storage. Lycopene content was 6% to 10% lower in stored, uncut melons compared to fresh melons. Minimally processed watermelons were 6% to 15% lower in lycopene after storage compared to fresh melons. HPLC profiles of stored whole or cut watermelon indicated no shift in carotenoid profiles, with translycopene as the major carotenoid. These results indicate that lycopene is quite stable in watermelon when fruit are stored uncut or cut for fresh packs.

Resistance to Yellow Vine Disease in Watermelon PI Lines
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In Spring and Summer 2000, 105 Citrullus lanatus var. lanatus and C. lanatus var. citroides PI accessions from the USDA Germplasm Collection, Griffin, Ga., were screened for yellow vine resistance. Ten plants each of the 105 PI lines (most were African accessions) and two control watermelon cultivars, ‘Tri-X 313’ and ‘Royal Sweet’, which historically have been highly resistant and susceptible, respectively, to yellow vine disease, were planted 15 Apr. in Lane, Okla., in a nonreplicated study. Plants with vine decline symptoms were harvested on a biweekly schedule, and yellow vine disease (YVD) was assessed by observing a transverse section of the hypocotyl region under a microscope for discoloration of the phloem.

In our study, we found that the PI lines ranged in YVD incidence from 0% to 100%. Some of the PI lines (six had no YVD) appeared to be resistant to yellow vine disease, especially when compared to ‘Tri-X 313’ and ‘Royal Sweet’ (both were replicated five times in this study). In 2001, these lines will be re-tested in greenhouse and replicated field experiments to verify our preliminary results, and to analyze the source of resistance (i.e., decreased insect feeding or resistance to the yellow vine bacterium).

Evaluation of the USDA Watermelon Germplasm for Resistance to Fusarium Wilt and Root-knot Nematode
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A portion of the USDA watermelon collection was evaluated for both resistance to race 2 Fusarium wilt [Fusarium oxysporum Schlechtend. Fr. f.sp. niveum (E. F. Sm.) Snyd. & Hans.] and root-knot nematode [Meloidogyne incognita (Kofoid & White) Chitwood] race 3. In a randomized complete-block design (RCBD) with three replications, 1409 accessions were evaluated for resistance to Fusarium wilt. Watermelon accessions were evaluated on a 0–9 scale. The top 12 entries ranged from 0.9 to 3.4 in their reaction. Sixty-three individual plants were saved that showed no Fusarium wilt symptoms, to be selfed for inclusion in the root-knot nematode screening. One thousand three hundred and eighty-eight accessions were evaluated for resistance to root-knot nematode. Accessions were evaluated on a 0–3 scale in a RCBD with three replications. The top 14 entries had reactions to root-knot nematodes from 1.0–1.7. Eighty-four individuals that showed no nematode damage were saved for selfing and further testing.