The Abstracts that follow are arranged by type of session (Posters first, then Orals, Colloquia, and Workshops). The Poster abstract numbers correspond to the Poster Board number at which the Poster will be presented.

To determine when a paper is to be presented, check the session number in the Program Schedule or the Conference at a Glance charts. The Author presenting the paper is indicated by an asterisk.

48 POSTER SESSION 1A (Abstr. 001–006)
Culture & Management—Small Fruit/ Viticulture

001 Nitrogen Transformation in Low pH Soils for Cranberry
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Cranberry plants exclusively utilize ammonium forms of nitrogen. Nitrification of applied ammonium and subsequent leaching through sandy soils is a potential problem for growers. Peat, sand, and striped soils were collected in cranberry beds in central Wisconsin and soil pH was adjusted to 3.5, 4.5, or 5.5. Twenty-five grams of dry soil was placed in flasks and half the flasks were sterilized. Distilled water was added to half of the samples, and the other half received 15N-labeled ammonium. Flasks were incubated at 20°C for up to 70 days. Striped soils showed no nitrification at pH 3.5 or 4.5 during the 70 day incubation. At pH 5.5, nitrification began at 20 days and was almost complete at 70 days. Nitrification did not occur at any pH in sandy soils. This research suggests that ammonium fertilizer applied to cranberry is likely taken up before nitrification would occur.
Living Mulch for Strawberry Production Fields

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Annual ryegrass (Lolium multiflorum), which grows prolifically during the strawberry production season in the Gulf South, has the potential to serve as a living mulch if its growth is controlled. Sublethal dosages of Poast, a plant growth regulator, and the herbicides Poast and Rely were determined on ryegrass. Growth retardation was rated from 0 = none to 6 = dead. In 1993, all Poast dosages (1/8X - 1X, where X = 8 ml L-1) were lethal. Embark regulated ryegrass growth, but its study was discontinued because of the unlikeliness that it could be labeled for use on strawberries. Results of the 1994 study suggested that prime oil in the spray may cause an inordinate amount of vegetative browning. In 1995, three levels of oil (1/25X, 1/64X, and 1/32X, where X = 8 ml L-1) were used with each of four levels of Poast (0, 1/32, 1/64, and 1/128X). Increased levels of oil generally caused increased browning at each level of Poast, but no browning occurred where oil only was applied in the spray. In contrast to results in 1995, oil at 1/32X with no Poast caused considerable browning (score = 3.25) in 1996. The most desirable control (score = 2.75) was accomplished by a spray containing 1/128X Poast and 1/64X oil. The most desirable control by Rely (score = 3.25) was accomplished by 1/64X and 1/32X sprays. Rely is not labeled for straw-
berries although it is labeled for other fruit crops. Chemical names used: 2-[1-(ethoxylmino)butyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one (Poast); Paraffin Base Petroleum Oil + polyol Fatty acid Esters (Prime oil); N-[2,4-dimethyl-5-[(trifluoromethyl)-sulfony]amino]phenyl]acetamide (Embark); ammonium-Di-homocelan-4-yl-(methyl) phosphate (Rely).

Root Distribution of ‘Gulfcoast’ Southern Highbush Blueberry

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A field study was conducted to evaluate individual and collective influences of three soil moisture-supplementing practices (irrigation, incorporated peatmoss, and mulching) on root system development in ‘Gulfcoast’ southern highbush blueberries. Root growth was least in plants not mulched and greatest in plants receiving all three supplements. Ranking of individual treatments on root dry weight production was mulch > incorporated peatmoss = irrigation. Mulching resulted in uniform root distribution from the plant crown outward and in root growth concentrated in the upper 15 cm of soil. Other practices (peatmoss > irrigation) in greater root depth. Soil moisture appeared to be the major factor influencing root distribution.

Ice-nucleation-active (INA) Bacteria: A Detriment to Strawberry Flower Survival during Low-temperature Exposure

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Experiments were conducted to determine the temperatures at which different densities of INA bacteria incite ice crystallization on ‘Totem’ strawberry flowers and to determine if there is a relationship between densities of INA bacteria on strawberry flowers and floral injury. Primary flowers were inoculated with Pseudomonas sivungae at 10⁶ cells/ml buffer, incubated at 25°C/day/10°C night and 100% RH for 48 h, and exposed to -2°C. No ice nucleation occurred on these inoculated flowers and all of the flowers survived. However, when inoculated flowers were subjected to lower temperatures, ice nucleation occurred at 2.2°C and few of the flowers survived. In contrast, ice crystals formed on the surface of most non-inoculated flowers at -2.8°C and 21% of the flowers survived exposure to -3.5°C. When INA bacterial densities were >10² colony forming units/g dry wt, floral injury occurred at a warmer temperature than to flowers that had lower bacterial densities.

Study of the Regular and High Application of Water with Drip Irrigation and Its Effect in the Floral Buds of ‘Thompson Seedless’ Grapes

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The region of Caborca is actually the largest grape-growing area in Mexico, with 14,000 ha. The main problem in this zone is the lack of water, and it is important to use this resource rationally. During 1990 and 1991, a drip irrigation experiment of ‘Thompson Seedless’ table grapes was conducted. The four treatments were 120%, 166%, 206%, and 250% of the evaporation from a evaporation pan type A. The crop coefficients (Kc) applied were 7.5%, 15%, 52.5%, and 80% from the beginning of budding until 1 week after harvest, and 7.5% after harvest (postharvest). The results indicated that the best treatments were 120% (105 cm of total water applied) and 166%, with no reduction in the floral buds (5.4 per cane for 120); however, 206% and 250% (202 cm of total water applied) got the lowest number of floral buds (0.80 per cane) for the following year, and, because of that, the lowest clusters per cane.

Watermelon Weed Control: Current and Future Possibilities

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Watermelon is the major fresh-market vegetable grown in Oklahoma, but growers have few labeled herbicides from which to choose. Grower surveys in Oklahoma have identified weed control as the major production problem facing watermelon producers. In 1995 and 1996, various mechanical and chemical weed control strategies have been explored. ‘Altsweet’ watermelons were grown with various combinations of labeled and unlabeled herbicides, as well as mechanical control treatments. Treatments included bensulide, clomazone, DCPA, ethalfluralin, glyphosate, halosulfuron, papropamide, naphtalan, paraquat, pendimethalin, sethoxydim, and trifluralin. Certain chemicals were used in combination. Paraquat and glyphosate were used as wipe-on materials. Glyphosate and paraquat could not be applied until weeds were taller than the watermelon foliage, causing serious weed competition. In general, superior results were obtained from hand-weeded plots, trifluralin, and DCIPA. Halosulfuron gave superior control of broadleaf weeds, but had a negligible effect on grasses. Naphthalan gave good control of grasses and broadleaf weeds other than solanaceous weeds. No chemical, when used alone, gave satisfactory control throughout the growing season. Early cultivation, followed by chemical application at layby, appears to be one of the better treatments.
101 POSTER SESSION 3B (Abstr. 159–164)
Culture & Management—Woody Ornamentals/Landscape/Turf

159 Recycled Paper as a Growth Substrate in Container Production of Spiraea
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Wet Earth (WE) is a recycled paper product being tested as a potential plant growth substrate. It is composed of 80% recycled paper, 18% diatomaceous earth, 1% CaO, and 1% humic acid by volume. Use of WE by commercial growers would reduce demand for both landfill space and for slowly renewable resources such as peat and pine bark. Evidence also suggests that WE reduces nitrate runoff. Objectives included: determining effects of WE on plant growth, examining effects of WE on NO3 and NH4 runoff from container plant production, and determining the chemical and physical properties that characterize WE as a growth substrate. Ratios of pine bark to WE tested were 100% pine bark, 1:3, 1:1, 3:1, and 100% WE by volume. Fertilizer treatments included: 100% of the recommended rate of controlled release fertilizer (CRF), 50% CRF plus 50% liquid fertilizer (LF) and 100% LF. Plant heights, widths, and visual quality ratings were obtained monthly throughout the 16-week experiment. Leaf, shoot and root dry weights were determined at harvest. Nitrogen content of roots, shoots, and substrates were determined at planting and harvesting, while NO3 and NH4 content of leachate was determined at each irrigation. All substrates were analyzed at planting and harvest for pH, soluble salts, exchangeable cations, and CEC. Changes in volume, bulk density, porosity, and air space were also measured. Plant size and quality varied significantly between substrate mixes. Mortality was significantly higher in mixes containing 75% and 100% WE. Changes in volume, bulk density, and percent air space were also significant and inversely related to WE concentration.

160 Tree Growth in Potting Media Made with De-inked Paper Sludge
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De-inked paper sludge from a newsprint mill was evaluated as a substitute for softwood bark in container media. Whips, 1.2 m tall, of 'October Glory' red maple (Acer rubrum L.), European birch (Betula pendula Roth), and 'Royalty' crabapple (Malus L.) were planted in 15-L plastic pots that contained potting media amended with 0%, 20%, 40%, 60%, 80%, or 90% paper sludge and 80%, 60%, 40%, 20%, 0%, or 0%, respectively, bark (by volume). All media contained 10% sand. After 22 weeks, plant heights, trunk diameters, and shoot dry weights were determined. Initial pH of media increased as the amount of paper sludge in the media increased, with the 80% sludge mix having pH 7.2. Paper sludge had a low initial CEC. Physical properties of all sludge-amended media were suitable for tree growth, but media containing 80% or more paper sludge shrunk in volume by 10% to 12% by the end of the study. All maple and crabapple trees grown in all sludge-amended media grew as well as those in 80% bark (control mix). In fact, maple and crabapple trees in 40% sludge produced at least 10% and 35% more total shoot biomass, respectively, than trees in 80% bark. Although birch trees grown in 40% or 60% paper sludge grew as well as control plants, those grown in 80% or more sludge were at least 11% shorter and produced 24% less total shoot biomass (leaves, stems, and trunk dry weight) than control trees. These results demonstrated that de-inked paper sludge was a worthy substitute for up to 40% of the bark in a container medium for the three species tested.

161 Effect of Nursery Stock Type and Size on Growth of Three Deciduous Shrub Species in Containers
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Rewholesalers, garden centers, and other sellers of deciduous shrubs routinely receive bare-root stock in late winter or early spring for potting; however, bare-root plants are sometimes slow to establish in containers. Potted liners with well-developed root systems show potential for shortening the production cycle and permitting the development of higher-quality plants earlier in the growing season. To study the effect of nursery stock type and size on subsequent growth, two bare-root sizes and one potted liner size of 'Cardinal' red osier dogwood (Cornus sericea L.), 'Goldflame' spirea (Spiraea x bumalda Burv.), and 'James MacFarlane' lilac (Syringa x pseudostjoeanae McKelv.) were grown in polyethylene containers of different sizes. Bare-root plants (15 and 30 cm in height) were grown in 2.7-, 6.1-, and 6.1- and 10.3-L containers, respectively. Potted liners (0.4-L container size) were grown in 6.1- and 10.3-L containers. Plant performance was evaluated 10 and 20 weeks after potting. In general, plant quality ratings increased with container volume for all species. For 'Goldflame' spirea and 'James MacFarlane' lilac, best plant quality ratings occurred with 30-cm plants grown in 10.3-L containers. But for 'Cardinal' redosier dogwood, plant quality ratings were highest and not significantly different for 30-cm bare-root plants and potted liners grown in 10.3-L containers.

162 Comparison of Pour-through and Ceramic Cup Methods of Extracting Nutrients from a Pine Bark Substrate
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The pour-through (PT) nutrient extraction method involves collection of leachate at the container bottom that results from displacement of substrate solution by water applied to the substrate surface. The PT is a convenient and effective means of monitoring the nutritional status of the soilless container substrates used in the nursery industry, but is less convenient for large containers, particularly those used in the "pot-in-pot" system of growing trees in production containers within in-ground socket containers. We describe a simple vacuum method of extracting solution from pine bark in containers using ceramic cup samplers. When N was applied to a pine bark substrate at 56–280 mg/L, extractable N was slightly higher for the PT than for the ceramic cup method. The correlation between applied and extractable N was 0.99 for both methods. Further comparison of pine bark extract nutrient and pH levels for PT and ceramic cup methods will be presented.

163 Water and Nitrogen Management to Reduce Nitrate-Nitrogen Leaching from Container Crops
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Plastic 208-L industrial barrels (14 total) were modified for use as soil-filled lysimeters to study the nitrogen dynamics of a typical container crop production system. The top of each barrel was removed and the bottom was fitted with a drain hole and filter fabric. The drain was then connected via tubing to a 2-L leachate collection vessel made from a length of 15.24-cm-diameter PVC pipe that had been capped on one end. All barrels and connected collection vessels were recessed into a grassed slope. Barrels were filled with homogenous B and C horizon soil to simulate soil conditions of a typical container nursery. Uniform Rhododendron 'Catherine Albument' plants in 4.5-L containers were arranged atop the barrel-lysimeters at four plants per barrel. Irrigation/fertilizer treatments included fertilized pulse trickle irrigation (four replications), fertilized overhead irrigation (four replications), and unfertilized controls corresponding to each irrigation treatment (three replications each). All fertilized plants received 10 g of 17N–6P–10K 8- to 9-month controlled-release fertilizer at the beginning of the crop cycle. Leachate from the barrels was collected weekly and total volume, total Kjeldahl N, nitrate-N, and ammonium-N were determined. Peak nitrate-N levels were well above the current drinking water standard for both irrigation treatments at certain times during the year. Cumulative nitrate-N mass output was similar for both irrigation treatments. A nitrogen balance for the complete production system including fertilizer and irrigation water input, plant material, potting media, soil in the lysimeter barrels and leachate output from the barrels has also been determined.

164 Using Cupric Hydroxide to Reduce the Rooting-out of B&B Stock During Storage
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Cupric hydroxide formulated as Spin Out™ [7% Cu(OH), in a latex carrier] was used to prevent the rooting-out of Taxus x media Rehd. 'Densiformis' root balls into surrounding mulch or soil during storage over a 4-month period. Treatments evaluated in one study included: painting the bottom of the root ball with copperpaint, setting the root ball on copper-treated burlap or ordinary copper-treated

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burlap; rewrapping the root ball with copper-treated burlap before mulching or burlapping with copper-treated burlap, with appropriate controls. All treatments provided good control of rooting-out after 12 to 16 weeks storage. The most effective treatments were setting the root ball on copper-treated burlap (unmulched; 92% reduction in root count after 16 weeks) and rewrapping or burlapping into copper-treated burlap (mulched; 90% and 86% reduction in root count after 16 weeks). A second study used TexR® Agroliner (Spin Out™-treated non-woven fabric), on which root balls were set (unmulched treatments), rewrapped or burlapped (mulched treatments). TexR® Agroliner stopped rooting-out completely without adversely affecting plant quality. Using copper-treated burlap to prevent rooting-out during storage can reduce the incidence of re-ballting and root removal prior to shipping and planting B&B nursery stock.

101 POSTER SESSION 3C (Abstr. 165–172)
Extension Education

165 Technology Transfer through the Use of Growers Clubs in Northwest Mexico
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The Growers Club provides a good alternative for technology transfer generation in experiment stations, universities, and other research institutions in Mexico. At this time, there are 10 Growers Clubs in northwest Mexico, mainly in Sonora and Sinaloa states. During 1995, in the agricultural area in Caborca, Sonora, the Grower Club “REMEX-SOCOADA was formed with 10 members—all of them are willing to adopt new technologies. The main goal of this club is to improve the yield using the validation of new agricultural practices and evaluation of genetic material from different crops (annual crops, vegetables, fruit trees, and forage). We have six demonstration lots in different locations and we are planning to increase these to 11 and we will publish the results that we are going to get from these lots.

166 Vegetable Crops Research and Information Center World Wide Web Site
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The Univ. of California’s Vegetable Crops Research and Information Center (VRIC) has developed a new World Wide Web site that allows the rapid development and peer review of multi-discipline, research-based information. The VRIC website (http://vrichome.ucdavis.edu) disseminates peer-reviewed fact sheets, research results, updated publications, and multi-media educational resources relating to critical issues, best management practices, postharvest handling, and marketing of vegetable crops. The website disseminates multi-discipline information originating from the Univ. of California, the USDA, and cooperating agencies and universities. The VRIC website proactively sends peer-reviewed critical issue fact sheets to selected news media, government, industry, and academic contacts. These fact sheets help personnel frequently contacted by the media during crisis to answer questions efficiently. The website directs visitors to additional agricultural information resources and contains information on careers and educational opportunities available in the field of vegetable crops.

167 Validating a Crop Production Budget for Containerized Specialty Vegetables
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Growers producing new crops often do not understand how to price individual items. The prices of common container nursery stock items may be listed in monthly trade publications. Prices for fruits and vegetables fluctuate on a daily basis. A production budget for containerized specialty vegetables was adapted from one developed for ornamental nurseries, using some specific costs for field-grown vegetables. This gave a realistic way to calculate prices for individual products. Once the crops had been sold, the authors were able to validate the model by comparing actual costs with projected costs.

168 Business Profile of Australian Nurseries
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We surveyed 22 Australian nurseries in 1995 to: 1) develop a profile of Australian nurseries from a production, management, and profitability perspective; 2) compare the data to relevant U.S. benchmarks; and 3) identify trends and potential areas of improvement in the management of Australian nurseries enterprises. The study confirmed that Australian nurseries incur high labor costs (38.8% of sales) that are comparable to United States nurseries, while costs of materials and supplies were lower than their U.S. counterparts. Overall, the costs of the surveyed nurseries appeared lower than their U.S. counterparts. Concerns of managers were directed towards recruiting and keeping labor and marketing rather than increasing capital investment to increase production efficiency. Capital expenditures tended to be funded from internal cash flows rather than external borrowings. Many of the nursery managers used relatively simple performance indicators and most business objectives were stated in general terms. Australian nurseries carried more diverse product ranges than the U.S. nurseries. Many of the nurseries adopted quite vigorous marketing strategies with a stronger emphasis on marketing than in those in the U.S. Concerns about the viability of the industry included oversupply, the growth in chain stores business, factors eroding the demand for nursery products and greater regulation.

169 A CIELAB Color Classification Scheme for Poinsettias
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Forty-two poinsettia cultivars were grown as a 15-cm single-plant pinched crop at 21/16.5°C (day/night) temperatures during Fall 1995 with standard commercial practices for irrigating, fertizling, and pest control. On 7 Dec., 156 consumers rated the cultivars for their overall appeal. On 11 Dec., color coordinate (CIELAB) readings for bracts and leaves were taken with a Minolta 200b colorimeter. The colorimeter was set to illuminate C and has a 6-mm aperture. Bracts and leaves were placed on a white tile background for colorimetric readings. In 1996, a similar evaluation was conducted with 55 poinsettia cultivars. Using the L-value of leaves as a criterion, cultivars were separated into medium green-leaved and dark green-leaved groupings. For bracts among the red types, hue angle values were used to separate cultivars into cool red types (hue angle 20-22°) and warm red types (hue angle 24-25°). Based on the 1995 study, cultivars within the cool red bracts and dark green foliage group—those that were darker, duller red (lower L and chroma)—were less attractive (lower consumer ratings) than lighter, more vivid red cultivars. For cultivars within the cool red bracts and medium green foliage group, consumers preferred the darker duller red cultivars. Perhaps dark foliage gives a more pleasing contrast with the more vivid cool reds than does the medium green foliage. In general, consumers rated red cultivars hire than non-red cultivars.

170 A Proficiency Testing Program for the Agricultural Laboratory Analysis Industry
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The accuracy of soil and plant analytical results are occasionally called into question by laboratory clientele. Although laboratories generally conduct internal quality assurance procedures, there are few external performance testing programs for the industry. In 1994, a proficiency testing program was initiated for soil and plant samples for agricultural laboratories in the western United States to provide an external quality control for the lab industry. The program involves the quarterly exchange of soil and plant samples on which soil salinity, soil fertility, and plant nutrition analyses are conducted. One hundred laboratories are annually enrolled in the program from 24 states and Canadian provinces. Results of 3 years of the program indicate soil nitrate, soil pH, extractable potassium, soil and...