

211 ORAL SESSION 57 (Abstr. 499-505)
Floriculture: Postharvest Physiology

499
LOW-TEMPERATURE STORAGE OF ALYSSUM, VINCA, NEW GUINEA IMPATIENS, AND TUBEROUS BEGONIA PLUGS
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Alyssum, vinca, New Guinea impatiens, and tuberous begonia seedlings in plug cells were stored in coolers to determine the effects of temperature, light, and storage time on growth and forcing time of seedlings after transplanting. Optimum storage temperatures for each crop were also determined. Photosynthetic photon flux densities of 0, 1, and 5 $\mu\text{mol m}^{-2} \text{s}^{-1}$ were combined with temperatures of 0.0, 2.5, 5.0, 7.5, 10.0, and 12.5C to create 18 storage environments. Sample plants were removed from each treatment at 1-week intervals for 6 weeks, and were forced into flower. Temperatures of 5°C or less caused chilling injury on New Guinea impatiens and vinca. No chilling injury occurred on Alyssum at any temperature while chilling injury occurred on tuberous begonia after 3 weeks at 0C. Flowering of New Guinea impatiens and vinca was not delayed on plants not damaged by chilling injury. Increasing duration of dark storage resulted in flowering delay of alyssum and tuberous begonia. As dark-storage duration increased, alyssum plants elongated, etiolated, and then died. In general, all plants stored better in the light than in darkness. Optimal storage temperatures were 0-5C for alyssum, 7.5-12.5C for vinca and New Guinea impatiens, and 5 to 7.5C for tuberous begonia.

500
ACCLIMATIZATION OF *CHRYSALIDOCARPUS LUTESCENS* WENDL.
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A 3x3 factorial experiment in a split-plot design was conducted to evaluate interior performance of *Chrysalidocarpus lutescens*. Treatments included three irradiance levels (481, 820 and 1241 $\mu\text{mol m}^{-2} \text{s}^{-1}$) and three fertilizer rates (440, 880 and 1660 mg/23-cm pot, weekly). Plants were grown for 8 months under greenhouse conditions. Afterwards, plants were placed indoors (20 $\mu\text{mol m}^{-2} \text{s}^{-1}$ for 12 hr daily, 21 \pm 1C and relative humidity of 50 \pm 5%) for 3 months. At the end of the production phase, light compensation point (LCP) varied from 243 $\mu\text{mol m}^{-2} \text{s}^{-1}$ at the high irradiance level to 140 at the low irradiance level. Dry weight and nonstructural carbohydrates were lower and chlorophyll content was higher as irradiance levels were reduced. Increasing fertilizer to the highest rate decreased dry weight and nonstructural carbohydrates. After 3 months indoors, LCP declined to 126 $\mu\text{mol m}^{-2} \text{s}^{-1}$. Number of fronds increased in all treatments at the expense of reserved carbohydrates. However, the drastic carbohydrate depletion observed after the interior holding period (97% in stem starch and 62% in root starch) indicates that *C. lutescens* is not a species for extended use under very low interior conditions.

501
FACTORS ASSOCIATED WITH REDUCED POSTPRODUCTION QUALITY OF CHRYSANTHEMUM FOLIAGE PRODUCED UNDER HIGH NUTRITIONAL REGIMES
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Dendranthema grandiflora Tzvelev., 'Spirit' and 'Torch' were produced under three water-soluble fertilizer (WSF) and one controlled-release fertilizer (CRF) regimes, with or without weekly CaCl_2 sprays during the last three weeks of production to evaluate their influence on postproduction foliar longevity. Foliage of plants produced with 400 mg-liter⁻¹ N (Peter's 20N-4.4P-16.6K) declined 1 to 2 weeks earlier than those produced with 400 mg-liter⁻¹ N (Hydro-sol + NH_4NO_3), and 3.5 to 5 weeks before plants fertilized with 100 mg-liter⁻¹ N (Hydro-sol + urea + NH_4NO_3) or 1 kg N-meter⁻³ growing medium (Osmocote 14N-6.2P-11.6K). Calcium chloride had no influence on foliar longevity. Plants receiving either 400 mg-liter⁻¹ N treatment were generally larger (plant height and diameter), fuller (total and average leaf area), more vigorous (leaf dry weight per unit leaf area), and darker green in color ('Spirit' only, chlorophyll content per unit leaf area). Plant receiving WSF treatments had less than 0.5x the root system (dry weight) of CRF plants at harvest. Postproduction foliar longevity was most significantly and consistently correlated with foliar and growing medium nitrogen content. Relationship of postproduction foliar longevity with leaf soluble protein, carbohydrate, and starch content will be presented.

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SUPPLEMENTAL SUCROSE INCREASES LONGEVITY OF MINIATURE POTTED ROSE FLOWERS

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Potted 'Orange Sunblaze' miniature roses, were grown under long days by night interruption from 2200 to 0200 HR. Flowering plants were moved to interior conditions (12 $\mu\text{mol s}^{-1} \text{m}^{-2}$ from cool white fluorescent lights for 12 hr daily and 21 \pm 1C) when buds were showing color and sepals were beginning to unfold. A needle connected to a reservoir containing either water or a 3% sucrose solution was inserted into stems. One flower bud was selected on each plant and other buds and open flowers were removed. Flower longevity and amount of solution/water uptake were recorded. Flowers of plants receiving sucrose lasted 2 days longer than flowers receiving water (P=0.015) with longevities of 15 and 13 days for sucrose and water, respectively. Research is being completed to relate solution uptake to respiration and flower longevity. These data show that supplemental sucrose increases flower longevity in potted plants, similar to results with cut flowers.

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EFFECTS OF LOW O_2 ON SENESCENCE OF CARNATION FLOWERS (*DIANTHUS CARYOPHYLLUS* L. cv. ELLIOTT'S WHITE)

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Actions of adjuvants which inhibit the biosynthesis or action of C_2H_4 show that the climacteric rise in respiration during senescence of cut carnations is a facet of ethylene action and not senescence as such. The rate of CO_2 output of carnation flowers was diminished in a dose-dependent mode by low O_2 . The data indicate that the diminution of respiration by low O_2 may not be attributed to the restriction of either of the mitochondrial terminal oxidases. The steady-state concentration of ATP was similar in both air and 2% O_2 -treated flowers. 2% O_2 eliminated for 32 days any rise in C_2H_4 evolution. In addition the longevity of the flowers kept under 2% O_2 was longer than those which were treated with STS. The results are taken to indicate that hypoxia affects developmental events leading to the induction of C_2H_4 and/or the synthesis of transducer of C_2H_4 action.

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ACTIVITY OF ADH AND ETHANOL PRODUCTION IN CARNATION FLOWERS TRANSFERRED TO N_2 FROM AIR AND LOW O_2
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Freshly harvested carnation flowers (*Dianthus caryophyllus* L. cv. White's Sim) were kept for 4 days either in air or low O_2 before they were transferred to N_2 . Low O_2 in the range of 1.2-2.7% resulted, depending on the concentration, in a decrease in respiration and 3-5 fold increase in alcohol dehydrogenase (ADH) activity, without a concomitant increase in ethanol production. Anoxia initially, within 4 hours, depressed by about 40% the rate of CO_2 evolution in air, but had no effect on low O_2 -treated flowers. Anoxia induced in all treatments an increase in the activity of ADH, but the levels of ADH were 1.5 fold higher in the low O_2 -treated flowers than those kept in air. This difference increased to 10-fold after 6 days because by then, the air treated flowers were almost dead. Prior exposure to hypoxia enhanced the anoxic life of flowers by 3-4 days. Anoxia also induced an increase in ethanol production in both air and low O_2 treated flowers. The peak value of ethanol evolution was about 1.5-fold higher in the low O_2 than in air-treated flowers. The data are discussed in terms of the effect of hypoxia on carnation flower metabolism and longevity.

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INHIBITION OF ETHYLENE BIOSYNTHESIS AND ACTION IN CUT CARNATION FLOWERS BY AMINOTRIAZOLE
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Treatment of carnation flowers (*Dianthus caryophyllus* L., cv Elliott's White) with 50 or 100 mM aminotriazole (ATA) for 4 days postharvest results in suppression of the respiratory climacteric and significant extension of vase life. ATA inhibited ethylene evolution and the ethylene climacteric via inhibition of the biosynthesis of ACC synthase. The inhibitory effects of ATA increased with time of exposure and concentration. Flowers treated with 50 or 100 mM ATA for 2 days exhibited a dose dependent climacteric

increase in ethylene evolution and increased respiratory activity, in response to application of 10 μ L/L exogenous ethylene. Senescence associated morphological changes, increased ACC synthase activity, ACC content, and ethylene evolution were completely inhibited in flowers treated for 4 days with 100 mM ATA. Although treatment with 50 mM ATA for 4 days did not completely inhibit components of the ethylene biosynthetic pathway, application of 10 μ L/L exogenous ethylene failed to elicit any responses typically associated with carnation senescence, indicating that prolonged ATA treatment inhibited ethylene action. ATA may therefore serve as a useful tool in identifying molecular species involved in the perception or transduction of ethylene action.

212: ORAL SESSION 58 (Abstr. 506-512)

Cross-commodity: Extension

506

INITIATING A STATE-WIDE HOME COMPOSTING PROGRAM
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Sites in 12 locations throughout the state of Georgia were selected by the Department of Community Affairs. Each site contained up to eight types of composting bins and offered a self-guided tour with the appropriate signage at each of twelve stops.

The authors conducted meetings at 10 of the 12 sites. Using handouts, slide sets, videos, posters, hands-on demonstrations, and lectures, the demonstration team gave presentations designed to inform selected participants concerning the amount of home-generated compostable waste that currently goes into the landfills and the simple, "fail-safe" procedures they could use at home to turn this waste into an effective mulch/soil amendment for their yards and gardens.

Each participant received an information packet and a copy of The Home Composting Handbook, edited by the authors. During the meeting the demonstration team discussed composting structures, ways to build a backyard compost pile, and methods of maintaining the pile. Participants watched the actual building of a compost pile on site with materials typically found in local yards and gardens. Also, the demonstration team offered participants information on ways to involve the community and individuals within the community in implementation of home composting.

507

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The tremendous success of the Master Gardener Volunteer Program across the country, with more than 45,000 graduates, is a reflection of the nationwide interest in plants and gardening. Programs include students of all ages from diverse social, ethnic, and educational backgrounds.

The need for a model educational program to empower individuals and communities to assume responsibility for environmental stewardship has never been greater.

A new model program, The Master Gardener/Environmental and Community Stewardship Program, has been developed in order to incorporate environmental and horticultural topics and encourage successful environmental stewardship education for adults. Combining horticultural and environmental education with related community volunteer projects provides a logic vehicle to encourage practical environmental stewardship.

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PESTICIDE USE AND SAFETY PRACTICES OF INDIANA MASTER GARDENERS

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Indiana Master Gardeners were surveyed to determine their attitudes and practices related to pesticide use in the home garden and landscape. The data are of interest for the purpose of preparing educational programs for Master Gardeners and the public. Of the 1054 surveys mailed, 53.8% were returned with usable responses. When questioned about protective clothing worn during spray application of pesticides, most respondents indicated that long sleeves were not worn (57%), that

long pants were worn (71%), that protective shoes were worn (76%) and that hand protection was not used (80%). A median response of 0% of pesticides were reported to be stored in a locked cabinet. However, of those pesticides that were not in a locked cabinet, 74% were stored at least 4 feet off the floor. Master Gardeners with children reported locked storage of pesticides more often than those without children. Responses concerning disposal of containers indicate an area for future education. Only 10% of Master Gardeners reported rinsing their pesticide containers prior to disposal of them, while 73% indicated that the containers were included in the regular trash collection. Responses often varied with age, gender, and other demographic characteristics of the respondents.

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MAST GARDENERS' PERCEPTIONS OF ADEQUACY OF TRAINING IN PESTICIDE USE AND ORGANIC GARDENING
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Indiana Master Gardeners were surveyed to determine their perceptions of adequacy of training related to pesticide use in the home garden and landscape. Respondents were also asked to indicate their attitudes regarding "organic" gardening practices and education. Of the 1054 surveys mailed, 568 were returned with usable responses. Of these responses, 217 had received some advanced training. More than 75% of respondents felt that their MG training was at least adequate in the areas of problem diagnosis, pesticide selection & use, and pesticide safety. MG training in non-conventional pest control methods was deemed inadequate by 43%. Organic gardening information and techniques were described as at least somewhat important by 92% of the respondents. Organic gardening methods are always practiced by 10%, usually practiced by 49%. MG training in organic gardening was described as thorough by 10% of the respondents, adequate by 47%, inadequate by 30%. No training was received in this area by 12%. Responses often varied with age, gender, and educational and training background of the respondent.

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SAFE HANDLING OF PESTICIDES TRAINING IN COLORADO GREENHOUSES

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In late 1992, a grant was received from the National Institute of Occupational Safety and Health (NIOSH) to conduct training programs on Safe Handling of Pesticides for employees at ten Denver-area greenhouses. The training program met Occupational Safety and Health Administration (OSHA) requirements for employee right-to-know and Hazard Communication Standards. Sessions in Spanish and English were held, involving two video presentations, discussions of Material Safety Data Sheets, and procedures in each greenhouse for employees' health and safety. Before and after quizzes were given to the English-speaking participants and indicated an average increase of 5.2 points (out of 27 possible) after program participation. Evaluations indicated that, on a scale of 1 to 5 (5 high), participants thought the training would be "helpful when I handle hazardous materials" - 4.4; "presentation was clear and understandable" - 4.6; and "understand Hazard Communication Standard" - 4.5. Due to illiteracy among many in the Spanish-speaking sessions, evaluation was extremely difficult.

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DEVELOPMENT OF A COMPUTERIZED AGRICULTURAL WEATHER PROGRAM INCLUDING A FREEZE ALERT AND CHILLING ADVISORY

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An initial effort began in 1987 to provide limited freeze forecast information to the fruit industry using a computerized program. This initial thrust at providing timely weather information to county agents and growers resulted in development of a sophisticated, user friendly program presently providing over 900 weather files daily to users. This program operates with a 420 Sun Server that automatically downloads files from the NWS office across the AU campus and makes them instantly available to county agent (CEA) offices via the Extension Network (Acenet). Growers may obtain information from CEAS or use their personal computers to access a "Weather Board" which provides the same weather products. Chilling models have been developed to provide growers information and predict guides for applying chemicals needed during mild winters. A very helpful freeze alert program is in place which includes four separate products which provide freeze prediction forecasts and a commentary to supplement this information.