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of the
Great Plains/North Central Region

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Graduate Student Paper Competition

The Microcomputer as a Tool in Improving the Quality of Scientific Papers

Barbara Whitis Kuyper, J. Quentin Kuyper, and Victor N. Lambeth, University of Missouri, Columbia, MO 65211

A disjointed, illogical, or carelessly prepared written presentation often undermines the validity and significance of scientific studies. Since most of the 70 deadly writing sins, Improvement In writing style and to print out as many drafts as there are reviewers. If propagules of woody plants for bioenergy plantations were propagated, to make and verify calculations, to store the material, usage. Once a scientist's peculiar writing problems have been identified, the microcomputer can be enlisted to scrutinize the manuscript for these lapses and correct them in a microflash, to make and verify calculations, to store the material, and to print out as many drafts as there are reviewers. If the tedious, time-consuming aspects of editing and revising a manuscript can be relegated to a computer, researchers will be far more likely to prepare papers for publication that are as accurate and well-written as possible.

Propagation of Woody Plants for Bioenergy Plantations in Minnesota

Stephen Garton and Paul E. Read, Department of Horticultural Science and Landscape Architecture, University of Minnesota, St. Paul, MN 55108

Propagation methods to expedite large-scale production of propagules of woody plants for bioenergy plantations were investigated. Larix Salix clones were studied, using both micro and macropropagation methods. Rooting of cuttings of most clones of Salix was rapid, but for the slow-rooting Salix and for Alnus, which are difficult to root, the in vitro methods which we developed appear to be efficient propagation methods. Lateral buds excised from greenhouse grown plants were excised to proliferate. Once a clone with a low salt woody plant medium containing 1 micromolar 6-benzylaminopurine. Microshoots were removed from the proliferating tissues and rooted in a conventional potting medium under high humidity prior to establishment in a greenhouse and subsequent transplantation to field sites.

Patterns of Staminate Flower Expression in Hermaphroditic Pickling Cucumber Induced by Silver Nitrate

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A series of experiments was conducted to examine the effects of silver nitrate (AgNO3) on conversion to staminate flowering in two hermaphroditic pickling cucumber lines used in the production of gynoecious X hermaphroditic F1 hybrids. The stage of plant development at which treatments were initiated strongly influenced the effectiveness of both silver concentration and application number upon a variety of parameters. Based upon days to conversion, duration of conversion and total number of staminate flowers, the optimum conversion for hybrid seed production purposes was achieved by three applications of 200 mg/l AgNO3 at four day intervals beginning at the first true leaf stage. Evidence for super-numerary floral bud development is presented.

Reculture of In Vitro-derived Shoots of Hardy Deciduous Azaleas for Microcutting Production

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Excised shoots from 3 clones (SP3, D214E, and A2) of the University of Minnesota deciduous azaleas (Rhododendron spp.) were recultured for 6 weeks in a modified Murashige/Skoog (MS) nutrient medium with very low levels of mineral salts and addition of different concentrations of 2-isopentenyladenine (2ip). The most productive concentration was 10 mg/l 2ip. We compared 3 different explant sources (in vitro-derived shoots, shoot tips, and lateral buds) of the clone SP3 on shoot proliferation in the same modified MS medium supplemented with 10 mg/l 2ip and transferred onto a medium at the end of a 10 wk period of culture. The in vitro-derived shoots were found to yield 5 times more shoots than the other 2 kinds of explant sources used and were contamination-free. The same stock cultures were recultured again, after the 1st harvest, for 5 weeks. Double the shoot yields were obtained from stock cultures of the initial in vitro-derived shoots when compared to the stock cultures of the recultured shoot tips and lateral buds.

The Effect of Cytokinins and Environmental Conditions upon the Reproduction of Begonia x Hiemalis Leaf Cuttings

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Regeneration of plantlets from Begonia x hiemalis leaf cuttings varied depending upon the season, with summer being the least difficult time of year. Propagation due to temperatures and light intensities. 'Renaissance' stock plants were grown at 21°C and 31°C in growth chambers under 2000 and 4000 ft-c leaf cuttings produced more shoots. The leaf size of the cutting became a critical factor at 31°C, with the larger leaf cuttings producing more shoots. In a second experiment 'Renaissance', 'Schwenken Red' and 'Balaieka' leaf cuttings were sprayed or dipped in solutions of the cytokinins, kinetin and 2-isopentenyladenine. In ethanol, to encourage plantlet development. In all cases the ethanol controls produced the highest fresh weight of shoots. Differences in varieties also affected the ability to regenerate.

Instability of Resistance in Pisum sativum to Stem Root Rot Diseases

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Resistant and susceptible peas were inoculated in the greenhouse in pasteurized soil beds with Rhizoctonia solani (1) and in combination with Alternaria solani, Pythium ultimum, and Fusarium solani. Standardized inoculation procedures were used. CIT temperature was (23°C) day and (15°C) night. Inoculation with both R. solani and F. solani sharply reduced plant growth as reflected by dry weight and increased plant mortality, compared to either alone. Similar results were obtained after inoculation with all 4 pathogens. P1257593, which has moderate to partial resistance to stem root rot, failed to stem rot alone. Inoculation with both Rhizoctonia and Fusarium solani, or with all 4 pathogens, inoculation with either Rhizoctonia or F. solani alone, caused more damage than any of the other treatments. Additive infection on the stem by more than one pathogen may be responsible for increasing root rot susceptibility and plant mortality. Stem/root rot pathogen interaction may be the main cause of resistance instability.

Leaf Area Estimation in Bush Beans (Phaseolus vulgaris L.)

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Three methods of leaf area determination in bush beans, namely, the disc method, length x width measurements, and the use of leaf dry weight were carried out to develop an accurate and less laborious method. Only discs devoid of large veins furnished an unbiased estimate of leaf area. An accuracy of 9% was obtained using 88 discs, whereas 150 discs were required to obtain a 99% confidence level. Product of length and width and the actual leaf area were linearly correlated. The value of the intercept was not significantly different from zero, as such, this component could be safely omitted and the resulting regression equation was Y = 0.66403 (L x W) for Topcrop. A line through the origin was used in the first method. The regression coefficients calculated over these stages were homogeneous. The regression equations for Topcrop and Harvester for the two field experiments were not significantly different to zero. However, in the greenhouse trial with Topcrop, the intercept was found to be a significant component in the regression equation.

The Use of Chromatography in Evaluating the Effects of Schefitiera, Brassaia actinophylla (Endl.), Harms, on Animals

Vernon C. Quam, Leo J. Schenmeister, and N. S. Tanner, Horticulture Department, North Dakota State University, Fargo, ND 58102

Freeze-dried leaflets of Brassaia actinophylla (Endl.) Harms, on Animals

Arthur C. Petersen, Jr. and David W. Davis, Department of Horticultural Science and Landscape Architecture, University of Minnesota, St. Paul, MN 55108

Freeze-dried leaflets of Brassaia actinophylla (Endl.) Harms, were extracted with solvents of varying polarity. The presence of the major types of chemical compounds in the leaflets was determined, thin-layer chromatography, with water fractions containing specific chemical groups were screened in mice for pharmacological effects. A subfraction of the water extract showed toxic neurological effects. A similar toxic action may be the main cause of resistance instability.

Effects of Water Stress on Phaseolus acutifolius and P. vulgaris L.

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Arthur C. Petersen, Jr. and David W. Davis, Department of Horticultural Science and Landscape Architecture, University of Minnesota, St. Paul, MN 55108

A combined field and greenhouse study was conducted to compare the yield, physiology and plant water relations of tepary bean (Phaseolus acutifolius) a drought resistant species to five cultivars of common beans (P. vulgaris L.) in non-irrigated plots, tepary maintained higher predawn leaf water potential than P. vulgaris cultivars. The predawn leaf water potential also recovered more rapidly in the early evening.
than P. vulgaris cultivars increasing from -11 bars at 1200 hr to -6 bars at 1900 hr whereas P. vulgaris increased only 1 bar during the same time period. The leaf area/plant was three times greater and total seed dry weight was 50 to 100% greater in non-irrigated tepary as compared with non-irrigated P. vulgaris cultivars. In a separate greenhouse experiment water stress during pod development reduced P. vulgaris yield 30% whereas, tepary yield and pod number increased 100% or more per plant. Midday abaxial leaf diffusive resistance was also higher in water stressed tepary than in P. vulgaris cultivars.

POLYSTAND. Turfgrass quality was more seriously reduced with poly stand than P. vulgaris cultivars increasing from -11 bars at 1200 hr to -6 bars at 1900 hr whereas P. vulgaris increased only 1 bar during the same time period. The leaf area/plant was three times greater and total seed dry weight was 50 to 100% greater in non-irrigated tepary as compared with non-irrigated P. vulgaris cultivars. In a separate greenhouse experiment water stress during pod development reduced P. vulgaris yield 30% whereas, tepary yield and pod number increased 100% or more per plant. Midday abaxial leaf diffusive resistance was also higher in water stressed tepary than in P. vulgaris cultivars.

CONTRIBUTED PAPERS

What is the Minnesota Agricultural Interpretive Center?
James Gauss, The Minnesota Agricultural Interpretive Center, Waseca, MN 56093

Concept: The master plan concept, based on "time lanes" and with emphasis on the PEOPLE of Minnesota agriculture, portrays the evolution of Minnesota agriculture from 1858 through the Farm of the Future. Underground corridors provide year-round use of the interpretative exhibits and preserve the land surface for "living history farms" of the selected time periods. Farmscapes will provide visitors a sense of participation in the activities of the communities, present and past. Goals and Objectives: 1) Education/Interpretation: to tell the story of Minnesota agriculture as it has developed from the first 100 years of settlement. Interactions of time, land and the environment will be dramatically depicted. 2) People/Participation: to show the interaction of farmer, family, consumer and agri-business is the predominant theme throughout the many displays and exhibits; to provide the opportunity for all to participate. 3) Historical authenticity: to accurately portray the stages of development of Minnesota agriculture and do it in the authentic rural environment of each time period. 4) Attraction/Support: to provide year-round interest for individuals, families, groups and organization; to encourage continuing support from a variety of sources to provide for desirable growth and operation of quality facilities.

Karl L. Ruser and Donald B. White, Department of Horticulture, University of Nebraska, Lincoln, NE 68583

The common problem of heat accumulation in harvested sod was investigated. The sod used for this study was Kentucky bluegrass (Poa pratensis L.) sod grown on peat soil. The increase in temperature of the sod was found to occur when the respirational heat evolved from the organisms in the sod community could not escape. The insolation of the stacked sod mass itself, weather conditions at harvest and during storage, amount of green vegetation present and level of microbial activity all had an effect on the extent of the heating. Cool weather, minimum top growth and fungicidal treatments resulted in cooler storage temperatures of the sod.

Dull Mower Effects of Turfgrass Quality, Disease Incidence, and Water Use Rate
D. H. Steininger, R. C. Shearman, T. P. Riordan, and E. J. Knibecher, Department of Horticulture, University of Nebraska, Lincoln, NE 68583

Dull versus sharp mower blade effects on turfgrass quality, disease incidence, and water use rate were compared in this study. The study was conducted on a monostand of 'Park' Kentucky bluegrass and a polystand of 'Baron', 'Adelphi', and 'Glade' Kentucky bluegrass. Mowing height (3.8 to 7.0 cm) and frequency (weekly and biweekly) were also compared. Continuous mowing with a dull mower blade resulted in decreased turfgrass quality, increased Helminthosporium sp. (chinch spot) incidence and increased disease water runoff when compared to turf cuts with a sharp mower blade. The polystand turf was not affected by leaf spot. Turfgrass quality was influenced more in the polystand turf than in the monostand turf and the polystand. Turfgrass quality was more seriously reduced with the dull mower at the low height of cut than at the higher cutting height. Decreased water uptake associated with a dull mower was associated with a reduction in verdure. Seedhead incidence and thatch accumulation were not influenced by mower blade conditions.

Effect of 45 Days of Plus 36-degree Celsius Temperatures on Selected Potato Cultivar Yields
Thomas J. Schuenerman and Charles W. Marr, Department of Horticulture, Kansas State University, Manhattan, KS 66506

Since the Kansas growing season in 1980 was one of the warmest and driest on record, the normal cultivar trials were subjected to extreme stresses. Potato cultivar trials are conducted with the expressed purpose of selecting heat tolerant lines of both round white and russets. Because of recent interest by west coast companies in growing russets in Kansas, emphasis was placed on non-irrigated P. vulgaris cultivars as compared with non-irrigated P. vulgaris cultivars. In separate greenhouse experiments water stress during pod development reduced P. vulgaris yield 30% whereas, tepary yield and pod number increased 100% or more per plant. Midday abaxial leaf diffusive resistance was also higher in water stressed tepary than in P. vulgaris cultivars.

Hardiness, Growth, and Leaf Water Potential of Blue Holly Cultivars Grown under Various Microclimate Exposures
John C. Pair and Steven M. Still, Departments of Horticulture, Kansas State University, Manhattan, KS 66506 and Ohio State University, Columbus, OH 43210, respectively

Blue holly, Ilex verticillata cultivars, Blue Angel, Blue Maid, Blue Prince and Blue Princess were planted in typical landscape sites around especially designed buildings to check tolerance to summer and winter stress as affected by sun, shade and wind patterns. Pressure bomb measurements indicated greatest moisture stress in the mornings on the east and southeast although plant damage was minimized by afternoon shade. Greatest loss of plants occurred on the south and southwest where leaf temperatures reached 47°C. All cultivars showed -23°C in winter but Blue Angel received considerable damage. Blue Princess was the hardest and most fruitful cultivar. Shoot growth was greatest on Blue Prince, a male clone, followed closely by Blue Maid, the most vigorous female. All plants performed best on cooler exposures of north, northeast and northwest. This new species expands the list of hardy holly for potential use in areas where winter temperatures have limited the planting of more tender holly.

The Effect of Cytokinins on Organogenesis of Leatherleaf Fern (Rumohra adiantiformis) Rhizome Tips Cultured in Vitro
Summer S. Y. Chen and Paul E. Read, Department of Horticultural Science, University of Minnesota, St. Paul, MN 55108

Leatherleaf fern explants responded differently when cultured on a modified Pragras medium containing different types of cytokinins, BA, kinetin, zeatin, each at 1 or 10 mg/L. BA retarded the growth at both levels. With 10 mg/L of 2iP or 10 mg/L of kinetin in the medium, 20 to 25 fronds were obtained after 9 weeks culture in light (12 hr, 70-100+/-2°C). Zeatin at 1 mg/L gave the same effect as 10 mg/L of kinetin or 2iP. With 1 mg/L of 2iP, the development of new rhizome mass which facilitates the sub-culturing. The suppression of the elongation of fronds caused by cytokinin can be released easily with subsequent transfer of the culture to a liquid medium containing no growth regulator.

POSTER SESSION

Relationship between 2nd Brood European Corn Borer Resistance and Several Morphological and Quality Characters in Sweet Corn
Winarno and D. W. Davis, Department of Horticulture and Landscape Architecture, University of Minnesota, St. Paul, MN 55108

Random sets of 28 F6 and 20 F7 inbred derived from hybridization of 1963, a susceptible germ plasm, and 1977 resistant germ plasm, showed significant negative correlations (P<.01) between kernel damage (KD) from European corn borer (Ostrinia nubilalis Hubner) and slk length (2c) and length of field corn inbred showed significant negative correlations between KD and refractive index. FR index evaluations were based on 72-76 moisture content of cut kernels. Significant negative correlations between KD and slk length (2c) were also found on 30 random S2 and S3 families derived from 'Apache', a moderately resistant sweet corn hybrid, with r = -.45 and r = -.37 respectively. There were no significant correlations between KD and husk number in all families studied. A study to determine whether slk length plays a role in the mechanism of 2nd brood European corn borer will be conducted on several inbreds and hybrids.

Variation in Cold-hardiness of White Ash according to Geographic Origin
Nancy L. Alexander and Harrison L. Flint, Department of Horticulture, Purdue University, West Lafayette, IN 47907

White ash (Fraxinus americana L.) seeds from 9 geographic origins distributed throughout eastern North America were grown in a provenance planting to determine the presence and extent of variation in cold hardiness. Plants from more northern sources withstand lower temperatures than southern plants in controlled freezing tests. In October, December and January, 65-91% of the variation in cold tolerance among sources was accounted for by variables unique to seed source in stepwise multiple regression. Latitude, longitude, elevation, estimated extreme minimum temperature, estimated average annual minimum temperature and frost-free period have predictive value in determining the survival of plants transplanted to new localities.

ENVIRONMENTAL STRESS SYMPOSIUM

The Use of Plant Tissue Culture for Plant Selection and Breeding
Ray A. Bressan, Department of Horticulture, Purdue University, West Lafayette, IN 47907

For many years there has been need to link more directly the efforts of plant physiologists and plant breeders. The breeder has often expressed the desire to be able to select for physiological traits which form the basis for elusive characters e.g. high yield and stress resistance. Unfortunately the physiological bases for such characteristics remain obscure. In particular, the specific metabolic changes and the associated differential enzyme activities and gene expression responsible for such characters as stress resistance are only now known. We have developed in vitro systems of higher plant cells using polyethylene glycol (PEG) which allow detailed comparisons between water stress resistant and sensitive cells to be made. Growth analyses indicate the resistant cells have highly enhanced abilities to grow in the presence of low water potentials and this enhancement is associated with considerable osmotic adjustment by the cells. Particular metabolic changes associated with this osmotic adjustment are being investigated. Preliminary evidence indicates that specific changes in sugar metabolism and accumulation of certain salts have occurred.

Direct Marketing of Horticultural Crops through Farmers' Markets in West Central Nebraska
Dale T. Lindgren, University of Nebraska-North Platte Station, NE 69101

The number of Farmers' Markets in west central Nebraska has increased from one in 1977 to eight in 1980. A survey of these Farmers' Markets was made to determine the number of participants, sales, location, problems and needs for the future. The needs include vegetable variety recommendations, scheduling of vegetable planting dates, early season production, health department considerations and increasing the number of sellers. The greatest problem was with the establishment phase of the markets.

Horticulture in Nebraska
Roger D. Uhlinger, Department of Horticulture, University of Nebraska-Lincoln, Lincoln, NE 68583

The UNL Department of horticulture provides leadership in undergraduate and graduate training, research and cooperative extension for the state of Nebraska. 113 resident + 4 non-resident faculty form the academic cadre. Enrollment averages 100 undergraduate majors and 20 graduate students.

Turfgrass species, hardy perennials, native wild flowers, bedding plants, small fruits, pecans, dry beans, potatoes and winter squash receive primary emphasis In integrated research, extension and teaching programs of breeding, genetics, culture and management.

The specialists at 3 of 5 district locations have independent programs of research and extension which complement campus based activities. Public and commercial clients in the districts benefit from having scientists physically located nearby.

Relationship between Biological and Environmental Stress
Donald Shoeneweis, Illinois Natural History Survey, Urbana, IL 61801

Many pathogens associated with disease damage, particularly stem canker and dieback fungi and some root rot fungi, are weak or nonaggressive parasites that only attack plants under stress. The most common stresses that predispose woody plants to attack are drought, freezing and defoliation. With each of these factors, a threshold level of stress must be exceeded for plants to become predisposed. Water and defoliation stresses require exposures of days or weeks to predispose plants, while freezing predisposes stems whenever stem temperatures reach the threshold degree. Threshold levels of stress often do not cause visible stress symptoms and plants may recover without ill effects when stress is relieved. Water and freezing stresses affect different stem tissues and stress predisposition may vary with host species. Since most of the fungi that attach stressed plants are found as saprophytes on dead tissue, they are often referred to as secondary organisms or nonpathogens, yet they are an essential component and should be considered primary pathogens in stress-related disease syndromes. The effect of stress on host defense responses will be discussed along with methods to prevent or treat stress-related disease problems.

Plant Freezing Injury and Resistance
Conrad J. Weiser, Oregon State University, Corvallis, OR 97331

There have been significant advances in our understanding of plant freezing injury, resistance, avoidance and acclimation in plants. An overview of the current state of knowledge will be presented emphasizing the applications of physical and physiological principles to horticultural crop selection, production, protection and management. Topics discussed will include: Plant freezing processes, nucleation and supercooling--Low temperature stresses which limit crop productivity--Types and sites of freezing injury in plants--Physiological stages of growth and development as related to hardness--Environmental signals that trigger cold acclimation and deacclimation--Practices and potentials for reducing freeze injury.
Application for Membership in the North Central Region
American Society for Horticultural Science

Name ______________________________________________________
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☐ 3 Viticulture & Small Fruits
☐ 4 Tropical & Subtropical Fruits (including citrus)
☐ 5 Vegetable Crops
☐ 6 Floriculture
☐ 7 Ornamental & Landscape Horticulture
☐ 8 Bedding Plants
☐ 9 Turf Grass

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☐ 3 Growth & Development Physiology
☐ 4 Growth Regulators & Herbicides
☐ 5 Cultural & Management Practices
   (including mineral nutrition)
☐ 6 Environmental Factors (including climatology, energy use and conservation, forcing structures, environmental enhancement or quality, etc.)
☐ 7 Postharvest Physiology (including storage)
☐ 8 Food Science & Technology
☐ 9 Marketing & Utilization (including economics)

Membership dues for faculty and staff (full-time professionals): $5.00 per year
Student membership dues: $2.50 per year.

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In the interest of time and economy, it is requested that registration be made for 2 years ($10 faculty/staff; $5 students).

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Dr. Roger B. Uhlinger
Treasurer, North Central ASHS
Department of Horticulture
University of Nebraska
Lincoln, NE 68583

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