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WOOD ASH: ITS CHEMICAL ANALYSIS AND EFFECT ON SOIL pH AND SNAP BEAN GROWTH

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Elemental content and alkaline influences were determined for ash from four different species of wood plus a mixture of species. Soil pH was monitored in field plots amended with 5 levels of wood ash. Soil pH readings were taken just prior to ash addition and at 1, 20, 58, and 93 days after wood ash application. Seeds of Phaseolus vulgaris L. 'Provider', were sown in these plots 20 days after the wood ash was applied. Ash from the 4 pure species averaged 25% Ca, 6.5% K, 1% P and smaller amounts of Mg, Mn, Fe, B, Cu, Zn, Pb, Cd, Ni, Cr, Al and Na, with some variation among the species. The mixture of species was lower in Ca and K but higher in most of the other elements than the pure species. The total neutralizing power (TNP) of the wood ash ranged from 83% to 116% as compared to $CaCO_3$. Wood ash significantly increased soil pH. The maximum increase in pH was 1.04 pH units for the 0.97 kg/m^2 treatment with the mixed species of ash. No significant effects of wood ash were found on snap bean germination, leaf area, leaf number, plant height, fresh weight, dry weight, yield or leaf tissue elemental analysis at the rates investigated.

MINIMUM LABOR HOME GARDEN ESTABLISHMENT

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Vegetable garden establishment in suburban living environments usually begins with an existing turf area. Conventional practices include laborious hand spading or tillage with costly power equipment. This experiment studied the use of black polyethylene mulch with minimum seedbed preparation as an alternative to conventional tillage. Warm season garden crops studied were: sweet corn, summer and winter squash, and tomatoes. Soil preparation treatments prior to placement of black polyethylene included no disturbance of turf, turf removal, application of glyphosate, and rototilling. Conventional tillage without polyethylene mulch provided a control comparison. Data for total yield showed no differences among treatments. This suggests that satisfactory home garden performance can be obtained with a minimum of labor devoted to soil preparation. Such an approach has application among older gardeners or those with physical impairments.

MEDIA MICROELEMENT ANALYSIS TECHNIQUES FOR FLORICULTURAL CROPS

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Improved analytical methods for determining micronutrient content of greenhouse media are urgently needed because of increasing use of soil-less media, interest in utilizing industrial and agricultural wastes as substitutes for peat and rising production costs which do not permit less than optimum inputs. A study was made to develop a testing method based on saturation extract procedures. Fifteen extractants were tested for their ability to remove micronutrients from a one to one peat to vermiculite mix which had been amended with three levels of added micronutrients. DTPA was found to be the best overall extractant. This procedure was tested on two other growth media, composed of equal parts of peat and pine bark, and soil, peat and vermiculite.

SURVIVAL OF IN VITRO CULTURED TISSUE OF MALUS DOMESTICA 'JONATHAN' EXPOSED TO -196°C

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Shoot tips (1 mm in length) taken from shoot proliferating cultures of 'Jonathan' apple were frozen to -196°C in the presence or absence of various concentrations and combinations of DMSO and glycerol. Regrowth was obtained when shoot tips were frozen to -40°C at 0.75°C/min, subsequently immersed directly into liquid nitrogen, and thawed at 10°C/min. Increasing periods of culture at 4°C in the dark (up to 6 weeks) prior to freezing increased survival in all cryoprotectant combinations. Highest survival (72%) was obtained from shoot tips held at 4°C for 6 weeks before being frozen in 10% glycerol. Regrowth was in the form of callus growth and to date organized shoot growth has not been obtained. This observation suggests that the apical meristem and lateral bud primorida probably did not survive freezing.

EFFECTS OF MECHANICAL LOADING ON 3 SPECIES OF TREES

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Branches of pin oak (Quercus palustris), silver maple (Acer saccharinum) and Japanese zelkova (Zelkova serrata) were loaded with a winch until the branch failed. The point of failure was noted. Branches of pin oak failed more often at the crotch when the branch angle was less than 35°. Zelkova branches failed consistantly along the branch, while silver maple branches failed at the crotch. The regression equation describing the weight required to cause failure in silver maple is Moment=-199 + 2.9 branch diameter.crotch angle (DCA) + 128 branch diameter (diam)-34.3 branch diameter squared. The regression equation for zelkova is Moment = -150.2 + 29 DCA + 127.8 diam -34.3 $diam^2$. The regression equation for pin oak is Moment = 69 + 2.9 DCA + 127.8 diam -34.3 $diam^2$. The moment required to cause failure was greatest for pin oak and least for silver maple.

ASPARAGUS SEASON OF HARVEST

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Asparagus (asparagus officinalis) is traditionally an early spring crop, but interest has always been present to extend or modify the harvest season. Cultivar Mary Washington was seeded in 1977, transplanted in 1978, and harvested as either a spring or fall crop in 1980 and 1981. Fall yields were very poor and in 1982, each of the above treatments were divided in half, one half harvested during the first six weeks of spring and the other half, after close mowing, harvested the following 6 weeks. Almost no regrowth occurred after the above mowing and harvest was discontinued after 10 days. In 1983 and 1984 all plots were harvested during the first six to 8 weeks of spear emergence. Yield data had been maintained on 4 treaments: early spring harvest 1980-1984; fall 1980-1981, early spring 1982-1984; early spring 1980-1981, 1983-1984, late spring 1982; fall 1980-1981, late spring 1982, early spring 1983-1984. Yields in lbs. per acre for 1983 for these respective treatments were 2,692, 2,161, 1,655 and 1,342, and for 1984 2,921, 2,515, 2,271 and 1,791. This data indicates the permanent effect of plant stress during previous harvest seasons.

BLUEBERRY GERMPLASM RESOURCES IN MICHIGAN

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The germplasm base of cultivated highbush blueberries is quite narrow. In fact, 70% of the genes in 63 varieties originated from only four wild selections from the East Coast. This situation has resulted in a loss of additive genetic variation, inbreeding and poor adaptability. The germplasm base is now being expanded at several locations, but the potential of wild tetraploid material has not been adequately accessed. Here we report on a 3 year investigation of Vaccinium resources in Michigan. A total of 23 natural populations of V. corymbosum and V. angustifolium throughout the state were examined for partitioning patterns, yield, yield components, component interactions and physiological traits. In addition, several traits were examined in more than 100 genotypes from diverse environments grown in a common environment for one year. We conclude that tremendous potential exists for both yield improvement and range expansion if wild Michigan germplasm is exploited.

GENETIC, ENVIRONMENTAL, AND PATHOGENIC ASPECTS OF APPLE RESISTANCE TO CEDAR-APPLE RUST

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Propagated trees of 13 apple cultivars and/or selections were grown in the greenhouse in a randomized complete block design with 3 replications. Shoots were inoculated with a suspension of G. juniperi virginianae and later data were collected on the number (N) and diameter (D) of pycnial lesions. Seven cultivars were resistant to cedar rust; whereas, the remaining cultivars/selections showed significant differences for the variables N, D and IR (infection rating = ND^2). From our growth chamber studies where day temperature was set at 24°C in one experiment and at 29.5°C in the second experiment, no genotype X environment interaction was observed. Rust populations collected from 6 different regions were inoculated on 7 apple cultivars in a split-plot design experiment with 3 replications. Five physiological races were identified based on the presence or absence of pycnial and aecial lesion. A significant race X cultivar interaction indicated that different genes were involved in the resistance mechanism.

ASPARAGUS LENGTH OF HARVEST SEASON

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Asparagus (asparagus officinalis) is traditionally field planted from one-year old crowns with commercial harvest beginning with a 2 week harvest the third year after planting. The F-2 of asparagus cultivar UC 157 was seeded in 1980, transplanted to the field in 1981, and subjected to one of the following harvest sequences in 1982-83-84 (weeks of harvest); 6-6-8, 4-6-8, 2-6-8, 0-6-8, 0-4-8, 0-2-8 or 0-0-8. The industry standard was considered to be the 0-2-8 treatment and yielded 3,335 lbs. per acre in 1984 and 4,719 lbs. in 1983-84 combined. While the 6-6-8 and 2-6-8 treatment had cumulative 3 year yields of 6,236 and 6,196 lbs. respectively, the 1984 eight week yields were 2,632 and 3,040 lbs., indicating a more vigorous crown with a shorter first year harvest. The 0-0-8 harvest sequence had the poorest yield, 2,451 lbs., while the 0-2-8 sequence had the highest, 3,335. It appears that a short harvest period the first year after field setting crown is not detrimental to plant growth and can provide the earlier cash flow than traditional methods.

EFFECT OF FERTILIZER LEVELS AND PLANT SPACING ON GROWTH AND YIELD OF CAULIFLOWER PLANT (Brassica Oleracea var. botrytis)

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In the fall of 1981 and 1982, Cauliflowers cv. "Snowball" were grown under Iraqi field conditions. Fertilizer rates were 0,200,400 and 600 kg N-P-K (18-18-5) per ha. Plant spacings were 30,45 and 60 cm between plants. As the fertilizer level was increased from 0 to 600 kg per ha, number of leaves per plant and leaf contents of N,P,K, chlorophyll a, chlorophyll b, and total chlorophyll were increased. The linear relationship between total yield of curds was positive with level of fertilizer ($P<0.01$) and negative with plant spacing ($P<0.01$). Fertilizer level or plant spacing had little or no effect on curd quality.

INFLUENCE OF BRANCHING AGENTS ON THE GROWTH OF PROCESSING TOMATOES.

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Three weeks after transplanting, dikegulac aqueous sprays were applied at concentrations of 100, 500, and 2500 ppm. A hand-pinch treatment was also made at this time. Ten days later treatments of 7500 ppm methyl esters of fatty acids and 500 ppm dikegulac were applied. An increase in the degree of lateral branching was observed with the higher dikegulac concentrations. The fatty acid and hand-pinched treatments had no apparent influence on branching. The stimulation of branching increased the total number of clusters per plant. However, a lower percentage fruit set, smaller fruit size, and a delayed blooming period delayed fruit maturity and decreased yields from the fatty acid, 2500 ppm, and late 500 ppm dikegulac treatments. The other treatments were not different from the controls with respect to yields or time of fruit maturity.

SUPPLEMENTAL HPS LIGHTING AND ANCYMIDOL EFFECTS ON CALLISTEPHUS CHINENSIS.

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The effect of supplemental lighting and ancymidol application was demonstrated on 4 cultivars of Callistephus chinensis from the french Milady Series. Light treated plants were irradiated with 50 + 10 umol S^{-1} m^{-2} supplemental HPS lighting for 16 hours daily for the period between 35 and 70 days from sowing. Ancymidol was applied at 16.5, 33, and 66 ppm only once at 74 days. A cultivar by light interaction was significant for the final plant height at flowering and was highly significant for the number of branches per plant and the time to flower. A highly significant decrease in plant height occurred with an increase in ancymidol concentration. A second interaction of cultivar by ancymidol concentration was significant for time to flower. The main effect of ancymidol concentration on plant fresh weight was also significant.

WATER STRESS, ENDOGENOUS ETHYLENE, AND FICUS BENJAMINA L. LEAF ABSCISSION

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Ficus benjamina L. were subjected to 48 hours of polyethylene glycol (PEG)-induced water stress. Leaf abscission and concentrations of endogenous ethylene (C_2H_4) in the leaves were monitored. Leaf abscission began 24 to 48 hours after stress initiation, and most abscission occurred within the first 24 hours after water stress was relieved. PEG-stressed plants lost 35 to 47% of their leaves by 120 hours after the experiment was initiated. Older leaves abscised first and remained green throughout the abscission process. Endogenous C_2H_4 concentrations sharply increased and then declined during the first 6 hours of water stress. Endogenous C_2H_4 concentrations then increased gradually, and, by the time leaf abscission began, leaves contained 1.50 to 2.25 µl C_2H_4/liter.

USE OF SOME GROWTH REGULATORS IN RIPENING OF BANANA AND THEIR EFFECTS ON MARKETING PERIOD

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The results of this study showed that ethrel (2-chloroethyl phospnonic acid) and flordimex (B-ethyl chloride phosphoric acid) could be used for the ripening of banana (Musa sapientum. L. Cv. Gros Michel.) at concentrations of 500, 1000 and 2000 PPm of each. Ripening was faster at high concentrations than at low concentrations. Also, marketing period reduced with high concentrations. Flordimex reduced ripening time and marketing period if compared with the same concentrations of ethrel. Ripening time and marketing period also depend on the ripening date. Ripening time and marketing period at winter time (December and January) were longer than in spring time (April) in Iraq. Lower concentrations of both growth regulators were recommended during spring time while high concentrations were recommended during winter time. The effect of both growth regulators on development of ripening stages and the total soluble solids were discussed in the text. Use of growth regulators for the ripening of banana in Iraq gave longer marketing period than the use of acetylene gas. Also, it is more practical and does not need specialized facilities.

HORMONAL CONTROL OF PARTHENOCARPY IN 'SEVERIANIN' TOMATO

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Parthenocarpy in Severianin tomato is controlled by a facultative gene, PAT-2. Under glasshouse conditions, 50% of the flowers set fruit and 80% of these are seedless. Pollination and pollen tube growth in the style, followed by stigma removal or dead tomato pollen did not increase fruit set. Emasculation or stigma removal alone decreased fruit set to 25%. Emasculated flowers remained on the plant for a month before aborting, suggesting that high hormone levels occur naturally in the ovaries. When 200 µM NAA was applied to the stigmas at anthesis, 80% fruit set occurred with 90% seedless fruits. This suggests that 'Severianin' ovaries contain the minimal amount of hormone required for fruit set and that additional exogenous hormone results in maximum fruit set and development.

MUSKMELON ROOT SYSTEM DEVELOPMENT, PLANT GROWTH, AND YIELD AS AFFECTED BY DIRECT SEEDING VS. TRANSPLANTING WITH TRICKLE IRRIGATION AND NO IRRIGATION

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'Classic' muskmelon (Cucumis melo L.) was direct seeded and transplanted using black plastic mulch with trickle irrigation and no irrigation on loamy sand soils of southwestern Indiana. Direct seeded plants produced deep tap roots exhibiting geotropism, while transplants produced more extensive secondary or lateral, plagiotropic or geotropically insensitive roots. Direct seeded muskmelons produced significantly larger stem diameter (9 vs. 6mm) and leaf area (111 vs. 60cm^2), however, the differences in yield were nonsignificant.

Trickle irrigation decreased depth of penetration of roots as compared with nonirrigation which produced relatively extended, deeper, and diffused roots. Trickle irrigation decreased soluble solids (9.9 vs. 11.5%) and increased yield (44 vs. 31 MT/ha). The interaction between trickle irrigation and harvest periods was highly significant, trickle irrigation producing almost double early yield (30 vs. 16 MT/ha).

The results of this study demonstrate that depth, extent, and configuration of the muskmelon root system is unimportant and adequate root activity for high yield is possible with proper root environmental conditions.

BUSH STRUCTURE, YIELD AND FRUIT QUALITY IN THE HIGHBUSH BLUEBERRY

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Cane size class distributions were obtained for plots of the highbush blueberry (Vaccinium corymbosum L.) cultivar 'Jersey' and yield and fruit quality data were collected. The bushes were all fully mature, but the condition of the bushes varied over locations. In some fields pruning had been neglected. Others had received regular, moderate pruning. Some plots that had a history of neglect had recently been pruned severely.

Correlations between yield and amount of basal area in individual size classes were highest for moderately large canes (2.5 to 3.5 cm), while negative correlations were observed for canes below 2.0 cm in diameter. Soluable solids were positively associated with amounts of basal area in size classes below 2.0 cm., but negatively associated with basal areas in size classes above 2.5 cm. Berry weight was negatively associated with basal area in all size classes except the smallest, and pH was positively associated with all the size classes except the largest.

EFFECT OF TEMPERATURE FLUCTUATION ON DECAY OF POTATO DURING COLD STORAGE IN IRAQ

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Five large cold rooms, capacity of each room about 1000 tons, were used in the cold storage units in Baghdad. The cold rooms were filled with potato (Solanum tuberosum L. cv. Bintije) received from growers randomly. The crop was stored in mesh bags (25 kg). The bags were stored in piles (5x5m wide and 3m height) and 50cm between piles. Temperature was lowered to 3°C and recorded every 12 hours in each room. Samples of 10 bags were taken from each room randomly, one bag from each pile, then sorted and evaluated at the beginning of the storage period and after 3 months of storage and after marketing the crop. The results showed that the decay after 3 months of storage reached 35% during spring of 1979. During marketing, the decay reached 53 to 61%. The main cause of temperature fluctuation is the power shut-off which is a regular problem in the cold storage units in the area. The temperature fluctuation caused the growth of the following microorganisms: Erwinia carrotovora, which is the main organism, followed by Penicillium Spp, then Alternaria Spp. There was a significant positive correlation between the percent of decay and the total number of degrees above 4°C in each storage room.

THE EFFECTS OF HIGH IRRADIANCE AND TEMPERATURE ON FLOWERING IN PELARGONIUM X HORTUM, BAILEY.

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'Sprinter Scarlet' hybrid geraniums were grown in the greenhouse to different stages of maturity (18, 24, and 30 days from sowing) and were continuously irradiated at levels of 60, 120, and 240 $umS^{-1}M^{-2}$ for durations of 3, 6, 9, and 12 days in growth chambers using cool white florescent light sources. Temperatures during the high irradiance treatment were also studied. Days from treatment to anthesis and number of leaf nodes to emerge from treatment to anthesis were recorded. Node numbers decreased simultaneously with days to flower, indicating a photomorpogenic response. Significant differences in a HIGH IRRADIANCE INDUCTION RESPONSE (HIIR) were observed as a result of age of plants at treatment, irradiance level, and duration of treatment. Temperature also influenced the duration of treatment necessary to yield flower induction. More rapid induction responses occured at 30 than at 25 or 20 °C. Induction occured from as short as six days at 30°C on the most mature (30 day old) plants under continuous irradiance levels of 240 $umS^{-1}M^{-2}$. A hypothesis for a HIIR is proposed.