Effects of 5-chloro-3-methyl-4-nitro-1*H*-pyrazole and Ethephon on Citrus Leaf Function and Water Relations

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To determine the effects of abscission compounds 5-chloro-3-methyl-4-nitro-1*H*-pyrazole (CMNP) and ethephon on citrus leaf function and water relations, we applied CMNP at 0, 200, 500, 1000, or 2000 ppm, or ethephon at 400 or 800 ppm, to canopies of fruiting potted and field citrus trees during the harvest season. Both compounds induced fruit and leaf drop after 3 days of application, especially at high concentrations. Low concentrations of CMNP (0, 200, or 500 ppm) or either ethephon treatments did not affect leaf photosystem II efficiency, as indicated by leaf chlorophyll fluorescence (*Fv/Fm*). High concentrations of CMNP (1000 or 2000 ppm) immediately reduced photosystem II efficiency in leaves and fruit peel. However, *Fv/Fm* of leaves remaining on the trees was gradually restored and close to the level of control after 4 days of treatment. Both compounds had little effect on chlorophyll content, ratio of chlorophyll a to chlorophyll b, leaf water content, and mid-day leaf water potential. The results suggest that CMNP at recommended concentrations (200 to 500 ppm) effectively reduced fruit attachment force with little herbicidal effect on leaves.

Yield of Citrus Trees with Foliar Urea as the Only N Source

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In order to evaluate possible reduced nitrate leaching while maintaining yield, 'Hamlin' orange and 'Flame' grapefruit trees on 'Carrizo' or 'Swingle Citrumelo' rootstocks were grown from planting using only foliar urea or soil-applied nitrate or ammonium N. An intermediate treatment of foliar and ground N was included also. From the 4th year, yields were recorded for 3 years. As previously reported, canopy growth was greater for the foliar urea treatment for the first 3 years. For 2 of the next 3 bearing years, the grapefruit trees in the foliar urea N treatment produced significantly less yield than the soil-applied treatment and the intermediate treatment was intermediate. The orange trees in the foliar urea treatment produced significantly less fruit than the soil N treatment in only 1 of 3 years, but the yields were numerically less every year. Results for fruit quality and nitrate leaching will be reported also. Foliar urea application alone was more costly and less productive than a soil N program.

Citrus Bioactive Limonoid Extraction using Environment-friendly Hydrotropy

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Citrus consumption has been shown to promote human health due to presence of several bioactive compounds. In the process of understanding the health benefits of citrus, we need to isolate and characterize these compounds. Limonoids are one of such prominent, but lesser-known phytonutrients that have been shown to prevent cancers of the mouth, skin, lung, breast, and colon. With the growing interest in the health-promoting properties of citrus limonoids, the demand for these bioactives has significantly increased. It has been critical to explore environment-friendly extraction methods rather than using hazardous organic solvents. A water-based hydrotropic extraction of limonoid aglycones from sour orange (*Citrus aurantium* L.) seeds was developed. Two hydrotropes, sodium salicylate (Na-Sal) and sodium cumene sulfonate (Na-CuS), were studied for extraction efficiency using the Box Behnken experiment design method. The extraction efficiency of prominent aglycone limonin was observed depending on hydrotrope concentration, extraction temperature, and percentage of raw material loading. Response Surface Analysis (RSA) of data predicted the optimum conditions for maximum yield. Recovery of aglycones from filtered extract is also easily achieved by mere dilution using water at pH 3 or 7 or by partitioning the extract with dichloromethane. At optimum conditions, limonin yield of 0.46 mg/g seeds in the case of Na-Sal extraction and 0.65 mg/g seeds in the case of Na-CuS extraction was achieved. The results demonstrated that the hydrotropic extraction process of limonoid aglycones has practical commercial importance. This project is based upon work supported by the USDA–CSREES IFAFS #2001 52102 02294 and USDA–CSREES #2005-34402-14401 "Designing Foods for Health" through the Vegetable and Fruit Improvement Center.

Oral Session 32—Ornamental/Landscape/Turf/Plant Breeding/Management

30 July 2006, 2:00–3:15 p.m. **Oak Alley**

Moderator: Timothy Rinehart

Intergeneric Hybrids between *Weigela* and *Diervilla* (Caprifoliaceae)

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Weigela Thunb. consists of 12 species distributed throughout Northeast Asia. *Diervilla* Mill. is a closely related genus containing three species endemic to North America. Taxa from both of these genera are important nursery crops. Hybrids between these genera could potentially combine the excellent cold hardiness and adaptability of *Diervilla* with diverse forms, foliage colors, and flower colors found in *Weigela*. Prior attempts to create intergeneric hybrids between these genera were unsuccessful and resulted in embryo abortion before seeds matured. To overcome this barrier, ovule culture and micropropagation procedures were used to develop intergeneric hybrids. Cleaved amplified polymorphic sequences (CAPS) analysis was used to verify hybrids. Intergeneric crosses, *D. lonicera* × *W. middendorfiana*, *D. sessilifolia* × *W. florida* (two clones), and *D. lonicera* × *W. florida* were attempted. Crosses of *D. lonicera* × *W. middendorfiana* did not produce viable hybrids. From the remaining three crosses, a total of 544 plants were obtained from 1278 ovules. About 85% of the 544 plants appeared very chlorotic or had low vigor, and senesced when transferred to multiplication medium. Only 80 of the 544 plants were successfully maintained in tissue culture, of which 10 have been successfully transferred ex vitro. CAPS analysis indicated that a majority of these plants were hybrids. Further studies are focused on improving tissue culture procedures and other methods to develop tetraploids to increase plantlet vigor and fertility.

Using SSR Markers to Verify Crapemyrtle Hybrids

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Crapemyrtles (Lagerstroemia) are deciduous shrubs or trees with prolific summer flowers. Their popularity is due in large part to low maintenance requirements in sunny climates, wide range of growth habits, disease resistance, and bark characteristics, as well as having a long flowering period (up to 120 days). Once well-established, they are extremely tolerant to heat and drought. Lagerstroemia was first introduced to the southern U.S. from southeast Asia more than 150 years ago, and is comprised of at least 80 known species. Most modern cultivars are *L. indica* and *L. fauriei* hybrids. *L. speciosa* is a tropical crapemyrtle with very large flowers, but lacks cold hardiness. It is a vigorous plant, but only when grown in Hardiness zones 9 or 10. We recently established microsatellite markers for Lagerstroemia and evaluated their utility for verifying interspecific hybrids. Here we verify F_1 hybrids between *L. indica* 'Tonto', 'Red River', and *L. speciosa*. We also genotyped two commercially available *L. speciosa* hybrids. Currently, we are using crapemyrtle SSRs for cultivar identification and germplasm conservation. Future research includes marker-assisted breeding to produce powdery