with and without preplant methyl bromide fumigation at the same field site in 2007. Overall, most entries of *C. lanatus* var. *citroides* performed similarly with and without preplant methyl bromide treatment in regard to root galling, visible egg masses, root vigor, and root mass. In both years of field evaluations, most *C. lanatus* var. *citroides* lines showed lesser degrees of nematode reproduction and higher root vigor and root mass than *C. colocynthis* and watermelon cultivars, with USVL-303 consistently being one of the best performers. The results of these two field evaluations suggest wild watermelon populations may be useful sources of resistance to southern root-knot nematode.

Is Grafting Useful for Managing Root-knot Nematodes in Watermelon?

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Five *Citrullus lanatus* var. *citroides* germplasm lines, four *Lagenaria siceraria* cultivars, one *Cucurbita moschata C. maxima* hybrid, and one commercial wild watermelon (*Citrullus lanatus* spp.) cultivar were evaluated as rootstocks for watermelon in a field infested with the southern root-knot nematode, *Meloidogyne incognita*, in Charleston, SC. 'Fiesta', a diploid watermelon (*C. lanatus* var. *lanatus*) grafted on the rootstocks was transplanted to the field on 30 July 2007. On 8 Oct. 2007, roots of all plants were dug and evaluated for percentage of root system galled by *M. incognita*. Root galling was severe in rootstocks of *Lagenaria siceraria* (80% to 96%) and *Cucurbita moschata C. maxima* hybrid (98%), and was moderately severe (40%) for non-grafted 'Fiesta' watermelon. Root galling of germplasm lines derived from *Citrullus lanatus* var. *citroides* ranged from 11% to 34% and galling of the commercial wild watermelon rootstock was 24%. Four of the *C. lanatus* var. *citroides* germplasm lines and the commercial wild watermelon rootstock had significantly less ($P < 0.05$) root galling than 'Fiesta', and than the *L. siceraria* and *C. moschata C. maxima* hybrid rootstocks. Selected germplasm lines of *C. lanatus* var. *citroides* may provide a source of resistance that will be useful in development of root-knot nematode resistant rootstocks for watermelon.

Planting Density and Its Effects on Yield and Quality of Grafted Triploid Watermelon

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The use of grafted vegetable plants is not common in the United States because most growers can rotate their crops, thereby reducing the incidence of disease. Increased cost of grafted plants is another constraint to commercial adoption of the practice. In spite of these barriers, there is interest in commercial watermelon production using grafted plants because they can provide resistance to a number of diseases, increased drought and salinity tolerance, increased nutrient uptake efficiency, increased yield and improved fruit quality. The goal of this study was to reduce planting density without sacrificing yield, thus reducing propagule costs. We evaluated two rootstocks ['Emphasis' (*Lagenaria*) and 'Strongtosa' (interspecific *Cucurbita* hybrid)], two watermelon scions ('Tri-X-313' and 'Matrix') at four planting densities (12, 24, 36, and 48 ft^2 per plant) for their effects on yield and quality of watermelon. A nongrafted treatment of 'Tri-X-313' at a representative commercial planting density of 36 ft^2 was used as the comparison treatment. The tests were conducted at five locations Kinston, NC; Charleston, SC; Blackville, SC; Tifton, GA; and Quincy, FL in a randomized complete-block design with four replications. Plots contained six plants, and SP-4 was used as a pollinizer in quantities that provided sufficient viable pollen for pollination. Cultural management practices were followed according to recommendations within each state. Four harvests were obtained in three of the five locations, three in another, and only one in North Carolina due to severe hail damage. Fruit quality measurements were taken during second harvest and included total soluble solids, average fruit weight, hard seed, and hollow heart incidence and severity. Yields were measured on a per area and per plant basis. Fruit traits such as total soluble solids, hollow heart, and hard seeds were not influenced by treatment. Yields, both fruit number and mass, increased as planting density increased for both root stocks, while yields were superior at the highest planting density compared with the nongrafted 'Tri-X-313' control treatment. Fruit size was reduced 1 lb with 'Emphasis' root stock and 1.5 lb for 'Strongtosa' root stock when planting densities were increased. On a per plant basis, low planting densities of grafted planted resulted in increased yields. Optimum planting density for yields on a per plant basis was 36 ft^2 for 'Emphasis' root stock and at least 48 ft^2 for 'Strongtosa'. Growers needing resistance to root diseases or environmental stress can use grafted plants at a density of 36 to 48 ft^2 for optimum crop production.

Plant Reservoirs of Squash Vein Yellowing Virus, Causal Agent of Viral Watermelon Vine Decline, and Other Whitefly-transmitted Cucurbit Viruses in Florida

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Squash vein yellowing virus (SqVYV) was identified in cucurbits in Florida in 2005 and shown to be sufficient to induce a watermelon vine decline and fruit rind necrosis that had been observed for several years previously. This novel virus species was shown to be whitefly-transmissible and has now been isolated from declining watermelons for the past six growing seasons in southwest and west-central Florida where it has caused significant economic impact to watermelon production. The virus disease situation in watermelon (and cucurbits in general) recently worsened in Florida with the detection of two additional whitefly-transmitted viruses. *Cucurbit leaf crumple virus* (CuLCrV) was found in squash in north-central Florida in the fall of 2006 and in watermelon in southwest Florida in Spring 2007. *Cucurbit yellow stunting disorder virus* (CYSDV) was found in watermelon in west-central Florida in Fall 2007. Prior to the discovery of CYSDV in Florida, cucurbit weeds were examined as potential reservoirs of SqVYV and CuLCrV. Balsam-apple (*Momordica charantia*), a common cucurbit weed in south Florida was collected and tested for SqVYV and CuLCrV. Over 40% of the 86 balsam-apple plants collected from watermelon growing areas with previously reported cases of vine decline were found to be infected with SqVYV. A single balsam-apple plant was found to be infected with CuLCrV. A second common cucurbit weed, creeping cucumber (*Melothria pendula*) was determined to be an experimental host for SqVYV. In addition, green bean (*Phaseolus vulgaris*) plants with virus-like symptoms in southwest Florida collected in Dec. 2007 were determined to be infected with CuLCrV. Collectively, these results show that in Florida cucurbit weeds can provide reservoirs for SqVYV and CuLCrV, and that green beans can also provide a reservoir for CuLCrV.

Patterns of Multi-virus Infections of Watermelon at the Plant and Field Levels in Florida

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The whitefly-transmitted viruses squash vein yellowing virus (SqVYV) and *Cucurbit leaf crumple virus* (CuLCrV) have had serious

impact on watermelon production in west-central and southwest Florida in recent years. We collected plants randomly from a commercial watermelon field in southwest Florida showing symptoms of SqVYV and CuLCrV and cut cross-sections from each vine on every plant from the crown to the vine tip. The cross-sections were blotted onto nitrocellulose membranes and nucleic acid hybridization was used to test for the presence of SqVYV and CuLCrV. Results showed that SqVYV and CuLCrV were present in the field in approximately 38% and 45% of the plants collected in the field, respectively. In plants diagnosed with SqVYV, the presence of SqVYV in vine tissue decreased proportionately with increasing distance from the crown. In contrast, the growing tip was the single best tissue for detection of CuLCrV in plants diagnosed with CuLCrV. The results show that SqVYV and CuLCrV are spatially separated in watermelon plant tissue. In a separate study, we monitored the progress of SqVYV and CuLCrV in a 2.5-acre experimental field of 'Fiesta' located in Immokalee, FL. Symptoms of CuLCrV were present soon after planting. Symptoms of SqVYV first appeared 7 weeks after planting and by week 12 the field was fully collapsed from disease. Analyses indicated that the degree of association between the two diseases was not greater than what would be expected from random, and that SqVYV was distributed randomly at low incidences, but became progressively more aggregated as disease incidence increased. These results are an indication that the viruses are being introduced independently by whiteflies, although the whiteflies may be emigrating from the same source, with secondary spread being dominated by local or within-field populations of whiteflies. This is conceivable based on the spatial separation of the viruses in individual watermelon plants from the commercial field. Additional field surveys are in progress to verify and extend these findings.

Effects of Silver Plastic Mulch and Chemical Treatments on Development of Whitefly-transmitted Viral Watermelon Vine Decline in Florida

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Watermelon vine decline (WVD) in Florida is caused by the whitefly (*Bemisia tabaci*) transmitted virus called squash vein yellowing virus (SqVYV, family: Potyviridae). WVD has been a major limiting factor in watermelon (*Citrullus lanatus*) production in southwest and west-central Florida for the past several years and losses of more than $60 to 70 million dollars due to this disease have been estimated. Symptoms of WVD typically manifest as sudden decline of vines at harvest time or 1 2 weeks prior to harvest and can also affect fruit quality. Fruits from declined plants are generally unmarketable and exhibit symptoms of rind necrosis and fruit decay. We evaluated the effect of reflective plastic mulch combined with chemical treatments for management of whitefly on WVD development during fall growing periods of 2006 and 2007. The chemical treatment consisted of drenching the plants with Admire (Imidacloprid) at transplanting followed by two sprays of Oberon (Spiromesifen). Virus inoculum was introduced by planting SqVYV infected squash plants at ends of each plot. No significant interactions between plastic mulches and chemical treatments to manage whitefly were observed on WVD development in either year. However, in 2006, the chemically treated plots had significantly (P – 0.038) less fruits with WVD symptoms compared to the untreated plots. In 2007 the areas under disease progress curves (AUDPC) for WVD was significantly lower for the plots chemically treated (P – 0.0038) for managing whitefly and the reflective plastic mulch plots (P – 0.0214) compared to the untreated and non-reflective mulch plots respectively. Similarly in 2007, the treated plots had significantly less fruits with WVD symptoms compared to the non-treated plots (P – 0.0124). Our results suggest that management of whitefly can help in managing WVD in Florida.

Watermelon Enhances Arginine Availability in an Animal Model of Type-II Diabetes

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Watermelon fruit contains lycopene, a red pigment known for its ability to scavenge free hydroxyl radicals. L-Citrulline, an amino acid that is a precursor of L-arginine, is found in all cucurbits but is most plentiful in watermelon. Humans and animals have a high capacity for converting L-citrulline into L-arginine, which is the physiological nitrogenous substrate for the synthesis of nitric oxide (a major vasodilator). In a study with Zucker diabetic fatty rats (an animal model of type-II diabetes mellitus), watermelon pomace (residual tissue following juice removal), synthetic arginine/citrulline, lycopene, or pectin were added to diets and the effectiveness of these substances on the function of cardiovascular biomarkers was tested. Diabetic rats fed the pomace or arginine/citrulline had a greater concentration of circulating arginine, a lower concentration of blood glucose, a reduced accretion of body fat, and a better relaxation of the aortic blood vessel, when compared with the other treatments. The results indicate that watermelon could improve cardiovascular health and glycemic control in diabetic animals, with effects most likely due to the citrulline/arginine component of watermelon. These novel data add to the growing body of scientific evidence demonstrating a measurable dietary value of fruits and vegetables, and also raises the possibility that watermelon may be useful in human clinical trials with populations at risk for some types of cardiovascular disease.

Poster Section

Viruses Affecting Blackberries in Alabama

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A survey to study the incidence and distribution of *Tobacco ringspot virus* (TRSV), *Tomato rinspot virus* (ToRSV), *Raspberry bushy dwarf virus* (RBDV), and *Impatiens necrotic spot virus* (INSV) in commercial blackberry plantations in Alabama was conducted in 2007. Blackberry plantings established at 13 growers' sites and two research stations throughout different locations were tested. A total number of 239 tissue samples from symptomatic and asymptomatic plants representing 14 blackberry cultivars were collected during mid July. Enzyme-Linked Immunosorbent Assay (ELISA) kits, (Agdia), were used to detect TRSV, ToRSV, RBDV, and INSV in blackberry samples. The results from our study suggest that 188 out of 239 samples tested positive for virus infection. Eighty-five samples tested positive for infection by a single virus, 85 tested positive for the presence of two viruses, 29 samples had three viruses, and two samples tested positive for all four viruses. Of the 239 blackberry samples tested, ToRSV was detected in 107 (45%), INSV was detected in 84 (35%), TRSV and RBDV were detected in 75 (31%) and 61 (26%) respectively. TRSV was detected in 13 of 15 sites tested, ToRSV was detected in 14 of 15 sites, while RBDV and INSV were detected in all of the 15 sites. Of the 14 blackberry cultivars tested, all four viruses were detected in 8 cultivars. More than 50% of infected plants consisted of more than one virus in the following blackberry cultivars: Navaho (60%), Apache (52%), and Ouachita (52%). Of the180 asymptomatic tissue samples collected, 138 tested positive for at least one virus. Symptoms observed in plants that tested positive include chlorotic spots on leaves, leaf veinal chlorosis, stunting and combinations thereof. No particular