2013 CANR Grants

The Center for Applied Nursery Research (CANR) is a non-profit 501(c)(3), founded in 1997, to provide a managed facility and funding for ornamental horticulture research based on grower needs and conducted under commercial growing conditions. The goal of CANR is to generate information to keep growers in Georgia and the Southeast on the forefront of new ornamental plant breeding, evaluation and introduction, as well as, new nursery production techniques.

The grant process at CANR is industry-driven and directly tied to industry input. Members of the Green Industry are invited to visit this work in progress and present questions and needs for research projects every year during our annual needs meeting. The results of our needs meeting are sent out to researchers at universities around the southeast to solicit proposals. An Advisory Council of industry and university representatives review and rank submitted proposals for new research projects and present their findings to the CANR Board of Directors. The Board of Directors then decides on funding for the upcoming year's projects based on available funds. 250 projects from across the Southeast have been funded by CANR since 1997.

The Center For Applied Nursery Research is proud to announce the 2013 grant awardees.

- Preemergence Weed Control in Nursery Liners – Mark Czarnota – University of Georgia

There are several weed species that are encountered in woody nursery liner production, and they include: Oxalis (*Oxalis spp*.), Bittercress (*Cardamine spp*.), Mulberry weed (*Fatoua villosa*), and Spurge (*Euphorbia sp*.). Once these weeds have germinated, only one herbicide, oxyfluorfen, is labeled for selective control of emerged weeds in certain conifers. Along with the current preemergence herbicides on the market, several new preemergence herbicides have been introduced to the containerized nursery industry. Unfortunately, because of liability, most chemical companies are not interested in labeling their herbicides on high value crops during periods of potential injury (before plants are well established). Several of these herbicides have the ability to control a large spectrum of herbaceous weeds, but their use in liner situations have not been widely investigated. These herbicides include Casoron (dichlobenil), Dimension (dithiopyr), Broadstar (flumioxazin), Gallery (isoxaben), Pennant Magnum (metolachlor), Devrinol (napropamide), Surflan (Oryzalin), Ronstar (oxadiazon), Pendulum (Pendimethalin), and Barricade (prodiamine). The objectives of this study is to test these herbicides on weed infested liners to determine if an these products could potential provide a safe and effective weed control in select woody ornamental liners.

- Understanding the Impact of Systemic and Contact Insecticides on Beneficial Insect Populations: Possible Implications for Scale Problems during Nursery Production – Amy Fulcher & Bill Klingeman – University of Tennessee

The occurrence of scale pests during nursery production is increasing. Contact insecticides are widely used in nursery crop production to control pests (1,7). They can be broad spectrum and because they are applied to completely cover the plant they can cause non-target losses of natural enemies that would otherwise provide scale control. Some contact insecticides exacerbate pest problems by causing an outbreak of secondary pests (6,13). Systemic insecticides can offer selectivity by limiting insecticide exposure to insects feeding on plant tissue. However, beneficial insects can be exposed to systemic insecticides during applications, from residue, and by feeding on pesticide-exposed prey. For example, imidacloprid applications for Asian longhorned beetle control increased spider mite outbreaks on elm trees by poisoning natural enemies of the spider mite (14). Other experiments demonstrated varying effects of systemic insecticides on beneficial insects. During efforts to control brown planthopper, pymetrozine was moderately toxic to the natural enemy, *C. lividipennis* (5). Acephate, the active ingredient in Orthene, was found to be the least toxic aphicide to predators and parasites in a study of ten contact and systemic insecticides (2) and spirotetramat (Kontos Movento®) had low toxicity to natural enemies (3). However, imidacloprid, a common systemic insecticide, was highly toxic to adult and larval 12-spotted ladybird beetle, a natural enemy of many important pests, including scale (11). The objective of this research is to investigate the effect of systemic and contact insecticides on natural enemies

- Propagation, Evaluation, and Development of Superior Selections of the Stress-tolerant Conifer, *Keteleeria evelyniana* – Gary Knox – University of Florida - Quincy

Conifers are widely considered to be tolerant of abiotic and biotic stresses. Despite this stress resistance, conifers as a group are often underutilized in Southern landscapes because of perceptions they are unadapted to the region or are uninteresting because of the presumed similarity to ubiquitous native pines (*Pinus spp*.). The relatively recent 1997 establishment of a Southeastern Region of the American Conifer Society and this region's *2BO+* members suggest conifers are becoming popular and may be an emerging "new plant" group. New or improved conifer forms might appeal to consumers if nursery growers could economically propagate, produce, market and sell them.

Keteleeria evelyniana is a conifer in the Pinaceae Family native to southern China and northern Vietnam and Laos. Growing up to 100 feet tall with a broad crown, it is found in evergreen forests on neutral soils (Luu and Thomas 2004). Creech (2010) estimates it can grow in full sun to part shade to 100 feet tall and 40 to 50 feet wide in USDA Hardiness Zones 7-9. Tripp and Raulston (1993) consider *Keteleeria spp*. well adapted to the heat and humidity of the southern U.S. With an "uncanny" resemblance to fir (*Abies spp*.), they believe Keteleeria species are good alternatives for the South. They estimate a growth rate of 1 to 2 feet per year in soils and climates from the southeastern coast to the mountains. Other Pinaceae Family include Abies (Fir), Picea (Spruce), and Pinus (Pine). The objectives of this research are to develop propagation and production methods for two superior clones of *Keteleeria evelyniana*. Further objectives are to evaluate these clones in locations throughout the southeastern U.S.

- Pathogenicity of *Pythium*, *Phytophthora*, and *Phytopythium* Species – Jean William-Woodward – University of Georgia

Oomycete root disease pathogens, Pythium and Phytophthora, cause the greatest amount of plant loss in nurseries and greenhouses. Over the past several years, isolates of Pythium and Phytophthora recovered from GA nurseries and greenhouses were screened for mefenoxam (Subdue MAXX) resistance. On woody ornamental hosts, 36% of the Phytophthora isolates and 80% of the Pythium isolates were found to be resistant to mefenoxam. Within herbaceous hosts, 23% of the Phytophthora isolates and 31% of the Pythium isolates were resistant. It is generally considered that the Phytophthora species causing the most damage to ornamental plants are *P. cinnamomi* and *P. nicotianae*; however, in our study, the majority of the isolates recovered from symptomatic plants are the species: *P. pini*, *P. plurivora*, and *P. undulata*. The same is true for the Pythium species

recovered. Generally, *Pythium aphanidermatum* and *P. ultimum* are considered primary pathogens; however, the majority of species we recovered were *P. irregulare*, *P. myriotylum*, *P. helicoides*, and *P. diclinum*. In addition, the new taxonomic genus, Phytopythium (like a cross between a Pythium and a Phytophthora) was also recovered. The high level of isolates having insensitivity to mefenoxam is of great concern as Subdue MAXX is used extensively within the industry. However, the pathogenicity of the recovered isolates is still unknown. Many Pythium isolates are thought to be saprobic. Therefore, the objective of this study is to further elucidate the degree of mefenoxam resistance with the green industry in GA by testing the pathogenicity of the mefenoxam-resistant isolates to make sure they are truly pathogenic, as well as the pathogenicity of the lesser known species of Pythium, Phytophthora, and Phytopythium and the role these species may have in root disease incidence.

- Effect of Plant Species on Container Plant Water Usage – Thomas Yeager – University of Florida

Our research team has been developing and testing predictive web-based tools that provide irrigation recommendations for container nursery crops based on weather, plant canopy cover, container size, and container spacing. Preliminary results indicate that differences in plant species may be minor relative to the effects of plant size and container spacing. For example, *Ilex vomitoria* (Dwarf Yaupon) considered to be a low water-requiring species, was found to lose about the same amount of water as *Viburnum odoratissimum* (Sweet Viburnum) considered to be a high water-requiring species, when water loss (evapotranspiration or ET) was compared at the same percent canopy cover (percent of production area covered by dense foliage). The objective of the proposed research is to conduct further evaluations comparing other commonly-grown plant species and use the acquired information to improve irrigation Best Management Practices (BMPs) of the Southern Nursery Association.