U.S. Department of Agriculture
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Nursery and Ornamental Crop Growth and Physiology

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School of Plant, Environmental, and Soil Sciences
Agricultural Experiment Sta, Louisiana State Univ

9. Cooperating Departments within State Performing Institution
a. Hammond Research Station

10. Multistate Project No.

11. Cooperating States
AL Alabama; MS Mississippi

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Goals/Objectives/Expected Outputs

Objectives 1-Nursery Media Components: To determine the feasibility of using alternative media components for nursery crop production using by-products of rice hulls as a component of nursery media. The rice hull ash, wood ash and wood by-product analysis has nutritional and physical characteristics that would benefit ornamental growth. To evaluate bark particle size distribution for the proper physical characteristics for plant growths. Combinations of <#35 USDA sieve to 1" bark are blended for the purpose of growing nursery crops. To establish accelerated composting methods for pine bark and hardwood bark for the purpose of nursery production. However; there are many challenges associated with processing and composting these products into a suitable medium for nursery crops. Research comparing composting and incorporating fertilizer amendments will establish BMP's for these medium for low, medium and high pH loving crops. Objectives 2-Irrigation: To establish efficient irrigation practices for container nursery crops. This will be established by comparing traditional practices with digital monitoring systems. There will be comparisons of growth and water usage using a digital input output system controlled by a computer program. This will regulate irrigation based on leaching fraction. Objectives 3-Fertility: Establishing fertilizer release patterns is the basis to fertilizer management for growers and fertilizer manufacturers. Our climate is demanding since most fertilizers are based on average soil temperatures. This research will provide this data. To provide lime and magnesium release curve patterns for nursery crops. New slow release products provide growers and fertilizer product that will allow single application of Ca and Mg fertilizers. To determine the feasibility of extracting fertilizer from turkey and poultry manure. Objective 4-Environmental stresses: To determine the effect of waterlogging on production of wetland nursery crops. Little has been published on wetland nursery plant production. To determine the effects of saline environments on the production of nursery crops and subsequent survival. Objectives 5-B & B Production: To determine the benefits of root pruning effects on root architecture on nursery production and post-harvest. Large trees will be root pruned over a 5-year period and harvested to evaluate the improvement of growth, mortality, and vigor.

Methods

Objective 1: Alternative medium components will be analyzed for physical and chemical properties to produce a suitable media for producing a wide range of ornamental crops. Physical properties will be measured using USDA sieve screens and chemical analysis will be estimated using a malic extraction method to simulate nutrient availability. These factors will determine the treatments for nursery crops. Plant growth will be measured using a growth index [(height+width1+width2)/3)] and plant dry weight. Plant tissue nutrient analysis will also be

determined. Data will be analyzed using an ANOVA at the .05 level. These results will be published in refereed journals popular magazines and talks at nursery meetings and extension training meetings. Objective 2: Irrigation requirements based on leaching fraction will be determined using a previously developed tree stand which provides a method of collecting and measuring leachate from irrigation and rainfall. Nutrient load and partitioning irrigation events will establish a tool for irrigation best management practices for large nursery containers. Plant growth will be measured using a growth index [(height+ width1+ width2)/3)] and plant dry weight. Plant tissue nutrient analysis will also be determined. Data will be analyzed using an ANOVA at the .05 level.These results will be published in referred journals popular magazines and talks at nursery meetings and extension training meetings. Objective 3: Monitoring leachate nutrient loads using the adjusted Virginia Tech Extraction method can give us an indication of fertilizer availability for nursery crops. Total water use and nutrient load for each treatment will be measured. Plant growth will be measured using a growth index [(height+width1+width2)/3)] and plant dry weight. Plant tissue nutrient analysis will also be determined. Data will be analyzed using an ANOVA at the .05 level. These results will be published in refereed journals, popular magazines and talks at nursery meetings and extension training meetings. Objective 4: Monitoring the effects of salinity and waterlogging can improve plant growth. Non-traditional crops actually benefit from flooding and saline conditions. Using Ebb and flow tables, Tobacco float systems and saline gradients will give a wetland nursery industry basic information for mass propagation of wetland breeding lines. Plant growth will be measured using a growth index [(height+width1+width2)/3)] and plant dry weight. Plant tissue nutrient analysis will also be determined. Data will be analyzed using an ANOVA at the .05 level. These results will be published in refereed journals, popular magazines and talks at nursery meetings and extension traing meetings. Objective 5: Traditional balled and burlapped crops will be harvested once each plant acquires the correct diameter and height.

23. Non-Technical Summary

Objective 1: Decreased wood products use due to the decreasing housing market has created a shortage of bark for the nursery industry. Also, the increase in fuel prices has encouraged related industries to burn the bark for fuel. This has decreased the availability of wood by-products for media use. This research will expand the media components for nurseries to use for crops. This could stabilize the cost of nursery plants. We hope to provide growers with viable alternatives for media and possibly increase plant growth. Objective 2: Water has become an important commodity for both communities and nursery crops. Maximizing efficiency is even more important than in past years due to declining water resources available for agriculture. Water management is essential for the future of agriculture. Efficient irrigation can reduce water use and increase productivity by lowering nutrient leaching. This research has a far reaching approach to agriculture and water usage across the United States. Objective 3: Understanding how fertilizers release there nutrients is critical in a nutrient management plan. Proper fertilization practices increase plant growth and reduce off-site run-off. Proper placement and fertilizer choice provide a grower the tools to efficiently fertilize for plant growth. This can be a powerful tool in a management plan. Objective 4: Environmental conditions can significantly influence plant growth and development of any crop. Non-traditional crops can survive in difficult environments. In many ways, these crops may provide answers to traditional crops. Producing and re-introducing these crops into a saline or flooded environment can be challenging. These crops offer many benefits to our coastlines and mitigation to our coast. Determining the most appropriate way to rapidly produce these crops and acclimate them for maximum survival is essential for our battle with the eroding coastlines. Objective 5: Balled and burlapped trees can provide immediate shade and landscape features. However, root management of these crops is essential in decreasing post-harvest mortality. By using root management techniques, we can increase adaptability and increase vigor. This research can reduce time of acclimation for consumers and nurserymen.

24. Keywords

nursery irrigation; nutrient release curve; water usage; tissue analysis; phosphorus extraction; root prunning; irrigation management; best management practices;

****** The Original signed document is on file at this institution. ******

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