# *Genetic, Genetic Improvement and Improved Production Efficiency of Nursery Crops*

**PRINCIPAL INVESTIGATOR:**
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**PROJECT OBJECTIVES:**
The broad objectives of the project are to develop economically feasible management practices that promote water conservation and protect water quality while maintaining crop quality, production, and profitability.

**ACCOMPLISHMENTS:**
Container nursery production requires large inputs of water and nutrients but often irrigation inputs have exceeded plant demand and lacked application precision. As a result of excess irrigation, excessive leaching of nutrients, such as nitrogen and phosphorus from container growing systems, occurs. During a 3-year test, plant response and irrigation efficiency of micro-spray stakes combined with time of day of irrigation for production of container grown trees was evaluated. The efficiency of irrigation is improved if applications are made in mid day or late afternoon with micro-spray stake irrigation for production of container grown trees. Due to increased plant water use of mid day or late afternoon irrigation, trunk diameter growth was significantly larger compared to plants that received only early morning irrigation. Height growth was similar when trees were irrigated in early morning, in late afternoon or a combination of both. Container leachate volume was greater with early morning and evening irrigation than mid day or afternoon irrigation. Micro spray-stake design affected irrigation efficiency. Double-sided stakes or rings had less overspray in #15 nursery containers than fan style stakes. Nutrient effluent was less in container leachate from mid day and late afternoon than early morning irrigation.

Container grown tree production has increased over two-fold in the last 10 years. With current environmental concerns, research efforts with container grown trees need to be more inclusive with inputs from nutrient sources, i.e., controlled release fertilizers, irrigation application and efficiency, and substrate source as well as plant response. Phosphorus inputs in controlled release fertilizers in conjunction with cyclic irrigation were evaluated for production of container grown trees. Phosphorus use efficiency increased with controlled release fertilizers containing 3 percent or less phosphorus. Plant growth was similar regardless of phosphorus level input. Most controlled release fertilizers used in container plant production are manufactured with about 5-6 percent phosphorus because of the economically available source of phosphorus. However, these results imply that phosphorus effluent levels can be reduced without impeding plant growth or quality.

**TECHNOLOGY TRANSFER/IMPACT:**
The results of this research can help container grown nursery facilities better utilize irrigation water and reduce irrigation effluent. Also, nutrient use in ornamental crop production needs to be species specific to ensure environmentally sound plant production. These results can assist

producers in developing nutrient management strategies that minimize nutrient effluent as well as produce a quality container grown tree.

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None