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TREE FUND Report

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Research Update: Solving Mysteries in the Texas Sun

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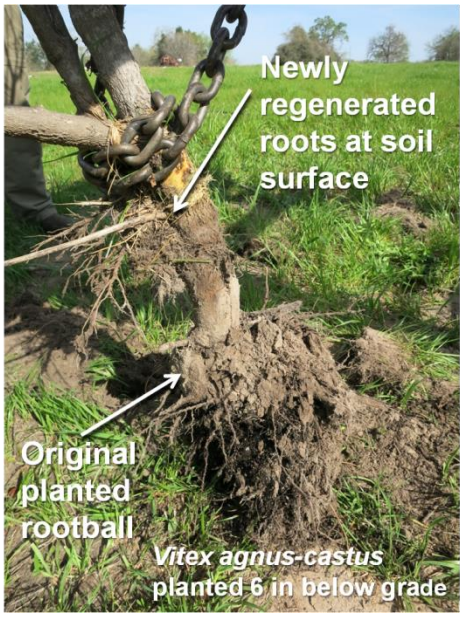
As a recipient of multiple Hyland R. Johns and John Z. Duling research grants, Dr. Arnold has provided an update on his work and the impact this funding from the TREE Fund has made on his research.



Welcome to the world of short winters with wide temperature swings, and long, hot, dry summers with a sun so intense we can fry eggs in the parking lot. Texas arborists consider it a great place to grow trees, although we do have to work a bit harder to get them established than some of our compadres in mesic climates. To this end our lab group has been working on a wide range of container tree establishment problems over the years, including circling/girdling root issues, mulch and container substrate impacts, fertility responses, irrigation regimes, and planting depth issues. Our most recent projects have investigated the differential responses in landscape establishment associated with propagation, production, and provenance decisions associated with container production of trees. Yes, decisions as simplistic as the choice between growing plants from seed versus rooting trees from cuttings can impact responses to planting depth and other establishment issues years later in the landscape.

Another aspect of arboricultural research we are studying is associated with the impacts of provenance selection on cold hardiness, drought, salinity, and alkaline soil tolerances on baldcypress, Montezuma cypress, and pond cypress selections. We have also investigated the root system qualities and rooting propensity from clonal propagation of these genotypes on landscape establishment. Three or four cultivars of *Taxodium* are nearing release with tolerances to many of these environmental stresses. While our attempts to screen for knee development were not successful, we did come up with some very useful ways to screen for flood tolerance that will be useful in screening selections of other tree and shrubs species.

The TREE Fund's assistance allowed us to ship materials to ten cooperating universities and research stations across the country—from the deserts in El Paso to muggy central Florida, and from baking central Texas north through Dallas, Lubbock, Arkansas, Kansas, to Iowa and Ohio. We found baldcypress that took -27^{0}F in Iowa and Montezuma cypress that survived as far north as Kansas! One of our more exciting projects at present is to develop predictive measures for the time required to establish container grown trees from containers ranging from 1 gallon to 45 gallons. We are growing three different clonally propagated trees (*Acer rubrum* var. *drummondii*, *Taxodium distichum*, and *Vitex agnus-castus*) in one, three, seven, 25 and 45 gallon containers at our research nursery using consistent substrates, containers, pruning and transplanting practices, etc. Thus we hope to be able to attribute transplant responses directly to the size of the planting stock as opposed to differences in production practices among different nurseries or genetic variation among seedling materials. We will track numerous physiological and growth parameters as well as irrigation frequency. These trees are

ready to go and will be established in our field facilities here in Texas; for comparison, Dr. Geoff Denny at Mississippi State University is coming to take a set for a trial under the more mesic conditions in Mississippi. Dr. Denny is also one of our co-conspirators in developing the stress tolerant *Taxodium*. We are looking forward to comparing differences between the xeric and mesic sites, seeing if smaller size trees catch up over time, and perhaps even including some economic analysis of cost / benefits of smaller versus larger stock.

Without the financial assistance from the TREE Fund, we could never have accomplished these studies. This seed money helps to leverage additional resources, including matching funds from other sources, and additional funding for teaching assistantships or fellowships. My colleagues and our students thank the TREE Fund and its supporters, and we promise to be the best stewards possible of the resources you have entrusted to us!