

From Forest Nursery Notes, Summer 2011

12. Establishing vegetation in harsh climates. Lechner, H. L. and Stokes, D. Land and Water 55(1):35-38. 2011.

Establishing Vegetation In Harsh Climates

A major challenge in extremely hot and arid climates is successfully establishing vegetation. In areas like Maricopa County, Arizona, day time temperatures can reach 117 degrees and rainfall averages up to only two and a half inches during the summer season. Although most native species thrive in their natural environment, transplanting them exposes plants to the elements in a way that jeopardizes survivability. This challenge led the Flood Control District of Maricopa County (FCDMC) to use a technique for arid land vegetation projects called “Tall Pot” technology.

“Tall Pot” Technology Background

European forestry departments have used tube-growing methods for several decades and they have been used in the southeast United States for about 20 years. In the 1980’s Dr. David Bainbridge, a researcher from San Diego State University, began experimenting with using long tubes to grow arid land tree species while Joshua Tree National Park Nursery began growing plants in tall pots for projects in California. A decade later the Arizona Game and Fish Department and the Center for Native and Urban Wildlife at Scottsdale Community College

began growing tall pot trees in Arizona. In 2001, after seeing success on these projects, Theresa Pinto, Project Manager for the Flood District of Maricopa County, started the FCDMC’s Tall Pot Nursery. The nursery produced 1000 trees in its first year, FCDMC experimented with several layouts, germination and planting methods. The FCDMC has planted roughly 10,000 trees in more than a dozen revegetation projects with Tall Pot Trees planting technology since 2003. Steve and Julie Plath, owners of Signature Botanica in Morrissett AZ, recognized this as a great opportunity in 2006 and



Desert Willow in bloom while still in tall pot. Diana Stuart photo.



Typical 8-inch diameter auger used to drill tall pot planting holes. Theresa Pinto photo.

VEGETATION MANAGEMENT

began incorporating Tall Pot Trees along with other containerized materials grown at their nursery. They first began providing Tall Pot grown trees for FCDMC and

Although most native species thrive in their natural environment, transplanting them exposes plants to the elements in a way that jeopardizes survivability.



Caption

now they grow trees for a variety of local, state and federal agencies for restoration projects.

The Process

Native plants survive in the desert because they are able to find water deep in the ground. Traditionally nursery plants are grown in containers where the initial 'tap' root hits the bottom of the container and with nowhere to go begins to grow

around in a circular pattern. This eventually leads to root-bound plants that will take longer to establish and may never survive out in the field. Typically these plants also have larger upper biomass which means that the root to shoot ratio is not sufficient for sustainability once the plant goes into the ground. By using tall pot

trees you have a longer root mass and smaller upper plant body, therefore leading to quicker plant establishment and plants that thrive in there environment. If the vegetation is not irrigated, trees can become stressed or die before reaching soil moisture. "Knowing that plants drill a tap-root we thought why fight that by putting

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Case Study

A typical representation of a revegetation project done by the FCDMC was when the Arizona Department of Transportation (ADOT) extended the Loop 202 Red Mountain Freeway in the northeast portion of the Phoenix metropolitan area. The best alignment took the roadway through an existing flood retarding structure (FRS) owned and maintained by FCDMC.

According to Diana Stuart "The FRS had been in place several decades and dense native Sonoran Desert vegetation had established in the flood pool area behind the structure. As part of the Clean Water Act 404 Permit for the project, ADOT and the district were required to replace approximately 2000 native trees. Since State and County taxpayers ultimately foot the bill for such projects, eliminating expensive irrigation systems during vegetation establishment was essential to the acceptability of the project."

For this project FCDMC grew trees using Tall Pot technology by cutting 10-foot lengths (six inches in diameter) of #D2729 PVC, into 4 30-inch tubes. Squares of wire mesh hardware cloth were placed in the bottom to hold the soil and



FCDMC Tall Pot Nursery showing Ironwoods ready to deliver to project site. Diana Stuart photo.

them into a container where the tap root has to go around in circles, because that affects its survivability when we plant it out in a harsh environment." Diana Stuart, Environmental Program Manager for the FCDMC.

This risk of plants becoming root bound mean that they need to be

separated by hand where they are then exposed to the elements. "In extremely hot climates you have to keep throwing water on roots while you are in the transplanting process. The beauty of the tall pot design is that you don't have to handle the roots at all." Steve Plath, Signature Botanica.

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the plants in the tube were seeded and grown in these containers for no more than 18 months. Augers were used to dig deep holes for the tall pot containerized plants. Holes were filled with water and drained twice within 48 and 24 hours of planting. One pound of gypsum was placed at the bottom of each planting hole to compensate for caliche laden soils. Then mesh is removed from the bottom, the tall pot placed in the augured hole and the PVC tube delicately pulled up over the plant leaving just enough room for a small amount of soil to backfill.

Four DriWATER time released water gel containers were placed around the perimeter of the plant and the plants are then watered again. Specifications written by Diana Stuart call for the contractor to check the containers at 30-days. If the time released water gel is at 50% or less (see ASU research paper on the effects of temperature on time release water gel), the contractor is required to replace the gel by day 45. Plants on FCDMC sites are provided a time released water gel through the first summer of their growth and survivability is checked at year one. It has been almost three years since the project began and over 95% of the trees planted

are thriving.

The greatest challenge in successfully establishing sustainable plants in the desert is funding. At 20 to 30K dollars per acre to set up temporary irrigation, revegetation projects could be either eliminated or postponed. For this project using Tall Pot Trees irrigated with time release water gel the FCDMC was able to grow trees, plant trees, water trees and successfully establish trees for an average of \$100.00 per tree.

Conclusion

There is unlimited opportunity with this technology. Joe Paternoster, President of DriWater Inc. recently visited the Middle East where interest in the Tall Pot technology is strong. "The Middle East is working on "greening" their part of the world through large reforestation projects. It makes sense to use Tall Pot technology for their projects because of the harsh climate and lack of water resources. Not only is traditional irrigation expensive, but it is difficult to maintain in that environment."

Irrigation can be a challenge, especially in harsh climates. Water has become a worldwide commodity especially in arid

regions where irrigation is extremely challenging. The good news for vegetation and revegetation projects is that tall pot technology creates long term sustainability. Not only is the method green and cost effective, it is serving the bigger picture by giving trees a healthy start to thrive and survive. **L&W**

by Heidi Lynn Lechner and Debbra Stokes



Project location:
Latitude: 33.5
Longitude: 111.7

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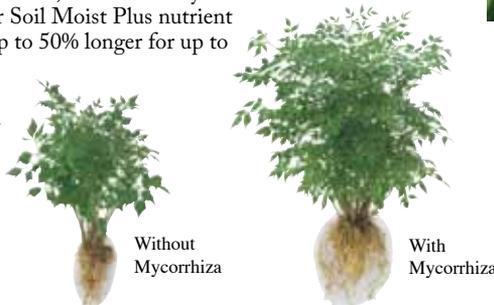
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