United States Department of Agriculture
NRCS Natural Resources Conservation Service
Plant Materials Program
Plant Technology Fact Sheet

# Tall-Pots

*Contributed by USDS-NRCS Los Lunas Plant Materials Center*

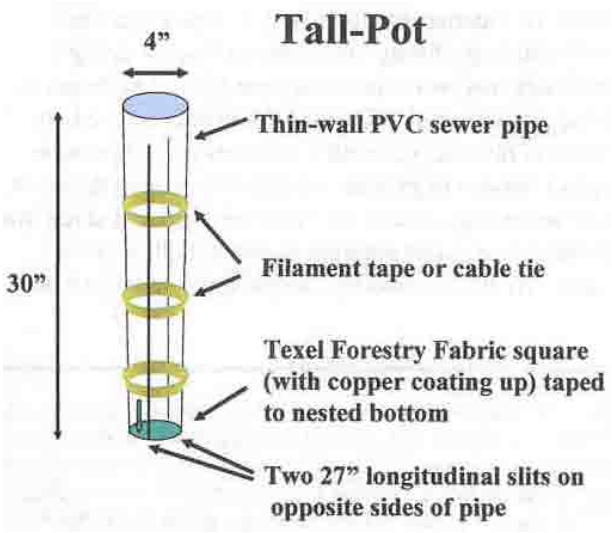
Tall-pots are being used by the Los Lunas, Los Lunas NRCS Plant Materials Center for revegetation of disturbed xeric sites which would require appreciable irrigation if conventional woody plant establishment methods were used. Pilot studies investigating tall-pot technology have been conducted on highway medians and along right-of-ways in semi-arid pinon-juniper zones, in disturbed riparian areas with deep (greater than four feet) water tables, and at other critical area planting sites where conventional irrigation is not technically or economically feasible.

Tall-pots allow the development of deep root systems capable of using subsurface soil moisture occurring in two contrasting situations:

1. arid sites with thick soil profiles and deep soil moisture (i.e., not subject to loss by surface evaporation) or
2. riparian areas where soil moisture is present in the capillary fringe above a relatively deep water table (e.g., the fringe extends from the water table to about three to four feet below the soil surface).

The Los Lunas PMC has modified traditional tall pot designs to reduce pot costs and improve plant growth in the nursery. Inexpensive thin wall four-inch diameter PVC sewer pipe is split lengthwise to provide a tapered pot for easy root-ball removal and to discourage root spiraling. The bottom of a tall-pot is covered with copper hydroxide coated spun-bonded fabric to control root egress and allow drainage. The Plant Materials Center tall-pots are typically 30” long (or four pots from a 10-foot pipe section).

The Plant Materials Center is investigating methods to enhance transplant survival in the arid Southwest while minimizing the expense of providing sufficient supplemental water to assure establishment. Beyond the benefits of a long root ball to access soil moisture deep in the soil profile, the use of a limited number of subsurface water applications has provided high survival rates of shrubs planted on and sites. In pilot projects on sites disturbed by highway construction near Santa Fe, New Mexico, thousands of native shrubs (including New Mexico olive, skunkbush sumac, and wavyleaf oak) were grown in tall pots and were planted with perforated watering tubes to allow the application of water deep into the soil profile. Several years after planting, the



survival rates for well-adapted species during the current drought exceed 95 percent.

A watering tube is placed adjacent to the root ball in an augered hole, which is two to five inches greater in diameter than the four inch mot ball. The goal of watering tubes is to apply sufficient water to produce a store of deep subsurface moisture not subject to surface evaporation. The bottom of the tube reaches the bottom of the planting hole. Perforations along the lower half of the tube allow water to move into the lower soil profile and result in minimal wetting of the soil surface to minimize weed growth and evaporation losses.

The planting hole containing the 30" root ball and watering tube needs to be backfilled with care. Voids in the backfill can be minimized by surface watering to wash soil into the void space, if irrigation water is readily available immediately after planting. Since fall plantings are generally preferred, the application of this surface water will not generally encourage troublesome weed growth except occasionally some winter annual weeds.

Larger diameter watering tubes (three to four inches) can accommodate the application of starch-based polymer hydrogels that provide a slow release of water to the subsoil that replenishes water used by plant transpiration. Smaller diameter one inch water tubes can be used for the application of plain water.

The advantage of using hydrogel is that fewer applications of water are needed to assure establishment but this must be weighed against the cost of the polymer and the greater difficulty in applying this gelatinous material.

In plantings using tall-pots, the number of water applications required depends on the ease and expense of providing water to the watering tubes, the drought tolerance of the species, the existing and expected drought conditions at the site, and the depth to ground water (in riparian situations only). Our experience with plantings during the recent multi-year drought indicates that two applications per year of hydrogel or three applications of water will probably assure high survival rates on xeric sites. On sites receiving some -runoff harvest or greater precipitation, one hydrogel or two water applications will probably be needed for two to three years after planting to obtain high survival rates. We have generally tried to apply water just as growth resumes in the spring and again in early fall to assure adequate soil moisture through the typically dry autumn period.

In some situations, an annual subsurface water application for a few years might be sufficient for acceptable survival percentages or even a single watering at planting might suffice. However, considering the expense of tall-pot plant material and the cost of installing tall-pots, adequate water application to maximize survival potential is usually justified. Successful plant establishment requires the propagation of roots into the capillary fringe for riparian plantings or the proliferation of roots capable of mining stored soil moisture for plantings on and sites.

In riparian areas with shallow ground water providing a capillary fringe at two to three foot depths, water tubes are not necessary. Other situations that may not require watering tubes would be semi-arid sites with appreciable rainfall harvest potential and porous soil allowing sufficient recharge of deep soil moisture. If precipitation levels return to the elevated averages of the recent past, only minimal subsurface water application may be required for plant establishment on many xeric sites.

Tall-pots require fabrication which is relatively expensive due to the labor involved compared with the cost of commercially available containers. The production of tall-pot plants takes considerable time so substantial lead-time is required to propagate appropriate species for each particular revegetation project. If large containerized or bare-root seedlings are available, tall-pot production will require at least one growing season for fast growing species (e.g., such as willows and cottonwoods), two to three growing seasons for many upland and riparian shrubs and trees (e.g., New Mexico olive, skunkbush sumac, shrub oaks), and as much as four years for slow growing desert species (e.g., yuccas, agaves, beargrass).

Although the production and initial maintenance of outplanted tall-pots requires a significant investment of time and money, there are many situations in arid and semi-arid regions of the Southwest where this technology will be more effective than other currently available establishment techniques.