

Arid Zone Times

An Arid Zone Trees Publication

www.aridzonetrees.com

2011 Volume 17 Issue 2

Quality Control: Principles and Practices

Arid Zone Trees employs quality checks within our production process to insure that the trees we grow and market have sound horticultural qualities, are uniform in appearance, vigorous and, with proper care after transplanting, longer-lived and an asset to the landscape. The challenges of quality control, when applied to horticultural crops, are unique. Quality control is a process used by all responsible manufacturers to monitor the production of



Arid Zone Trees

Dedicated to providing quality trees to the landscape industry, that are appropriate to the desert Southwest.

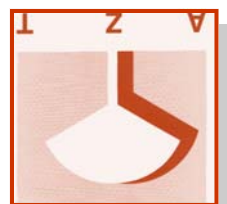
their product(s) and to insure that finished goods meet or exceed the quality parameters expected by the manufacturer and their customers. Quality is a fairly subjective term and can be applied to appearance, reliability, durability or simply consistency (e.g. all our leaves are the same color green). What makes horticultural "manufacturing" challenging is that the end products are living plants, with each species produced having individual horticultural requirements and unique characteristics.

Like most production lines there

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are steps involved in the process of producing trees and quality control measures are best applied at each production step. "Raw materials" like seeds or mother stock (for clonally produced trees), mulch and soil mixes, containers, fertilizer and watering schedules must be carefully selected with the market ready tree in mind. Horticultural practices, pruning, staking, transplanting (bumping from one container size to the next larger) and irrigation must be individually tailored for each specie grown.

Propagation Stock: Quality trees begin with well-selected and screened propagation stock. Vegetative (cloning) methods are used in the production of all **Variety AZT™** selections. Trees that will serve as "Mother" trees for our clonal propagation are evaluated for several years in our demonstration garden to assess horticultural qualities including form, growth rate, response to pruning, cold hardiness, root growth in proportion to canopy growth and water requirements. Additionally, with trees that are valued for their flowers (e.g. Desert Willow, *Chilopsis linearis*, Sonoran Palo Verde, *Cercidium praecox*), flower color, size, abundance and seasonality are also evaluated. New trees are added to the "Mother" block as they are identified, offering landscape design professionals an ever-expanding number of varieties to choose from. Just like seedlings, clone trees start in the greenhouse and remain there until rooted. They are then hardened off and, as they grow, are gradually transplanted through a series of increasingly larger root management containers until they are "market ready." While cloned trees address the desire for genetic uniformity, trees are continually evaluated for physical imperfections in form and structure at each transplanting.

AZT™ Root Management: Trees in the desert southwest are sold and priced by container size (15 gallon, 24" box, etc) and specified based on their height, width and caliper, relative to a particular box or container size. Of these criteria, tree caliper is the recognized indicator of root mass. It is the best and most visible way to determine if a tree is overgrown or that the structure of the root system has been compromised in the process of growing the tree in the nursery.

Bumping is a term commonly used in the nursery trade to describe the practice of moving plants that have reached their optimal size in one container and transplanting them into a larger container. Plants left too long in small containers can become overgrown and develop circling or bound roots. Root binding is a horticultural time bomb that, if allowed to develop when trees are young, will severely shorten the life of maturing trees by causing crown girdling or by significantly increasing the risk of wind-throw from poor or delayed root distribution. From the standpoint of production, root binding slows growth and development, increasing production time and costs. Quality control at this level of production involves taking steps to insure that the root system is vigorous, appropriate to the size and stage of development of the tree, and well distributed without being overgrown.

AZT has developed a "Root Management AZT Program" that utilizes an assortment of measures and inspections that are, collectively, designed to optimize root development throughout the growing process. Each time trees are bumped the roots are inspected with an eye for a well distributed root mass and a fine net of lateral roots. AZT's planting method uses specially designed air-root pruning containers. These containers have open spaces (holes) and indentations along their sides that create air spaces that, in effect, prune off the tips of the roots. This process also serves to stimulate the development of secondary and lateral roots behind the pruned root tip. The results of these root controlling containers are denser, radiating root systems that enhance the root architecture, eliminate circling roots, and support the overall growth of the trees.

Once planted into the next larger container or in the landscape, these tree roots are better adapted to explore surrounding soil and hasten the establishment of the tree. In addition, prior to bumping or planting, the root mass of each tree is examined and 1/4" of rootball is removed from the outer edge and bottom of the root-ball to encourage lateral root growth. This practice is followed when bumping all sizes of trees (liners to 48" boxes).

The ultimate goal of this process is to optimize the density and distribution of the root system, to eliminate kinked or girdling roots (especially those close to the trunk) and to promote healthy, vigorous growth both in the nursery and in the landscape. Such quality controls reduce production time and expense by accelerating growth, decreasing the need for staking and pruning, and reducing the number of cull or unmarketable trees.

In the pursuit of value, the motto "bigger is better" must be carefully applied when purchasing landscape trees. The notion that a large tree growing in a smaller box is a bargain is usually incorrect in the long run. Longevity, growth and the vigor of trees depend on a well developed and proportional root system.

Roots perform three essential functions for all landscape trees. They extract essential nutrients from the soil, are the point of absorption and conduction of water and they anchor the plant in the ground allowing them to resist the forces of wind, rain and the ever increasing weight and mass of the tree itself. It is easy, given the “out of sight, out of mind” nature of root system to not think critically about its health, vigor and development until it fails. A vigorous, well dispersed root system is critical to the long term growth and survival of any plant but especially trees. Just as we prune the above ground trunks and branches, particular attention must be paid to shaping and fostering a root system that is well distributed, vigorous and, to the extent possibly, free of potentially fatal defects (circling or girdling roots).

Planting Mix: The planting soil mix is adjusted to meet the needs of different desert tree species, using a homogeneous, blended soil at every stage of tree development. Early in the propagation process (greenhouse) soil mixes are lighter and inorganic. With most species, as trees are planted into larger containers and boxes, an industry standard ratio of native soil and organic material is used and for the few highly drought tolerant species pumice is added to increase the rate of water percolation and root exploration. The results of recent University research strongly cautions against the addition of organic amendments to the backfill soil when transplanting desert tree species. Consequently, we grow our trees in a mixture of native soil and mulch. Our experience has shown that this mixture promotes strong root develop in the nursery and encourages rapid rooting and aids in water penetration when trees are transplanted into the landscape (Arid Zone Times April 2002, "Tree Planting Practices an Overview").

As outlined here, quality control at AZT begins with the selection of propagation stock and continues until the tree is loaded onto a truck for delivery to the job site. The ultimate and final inspection of the root system should be done onsite at the time of transplanting. Upon inspecting, the root ball, the root ball sides should be trimmed to encourage vigorous rooting into native soils and eliminating potentially troublesome roots. In a sense our newsletter, Arid Zone Times, is an attempt to extend our commitment to quality control by offering readers state-of-the-art botanical and horticultural information that we believe will help them select the appropriate tree(s), use proven planting methods and maintain trees for vigorous growth and longer life.

Ed Mulrean Ph.D., Editor



The beginning of a good radiating root system can go unnoticed. At AZT, root management is vital to all trees success in the nursery and landscape. Root system “A” is from a propagation liner, “B” is from our stage two root management container, and “C” is from a 5 gallon root management container. No circling roots, the prolific dense fibrous rootball encourage vigorous growth and rapid establishment in the next container or landscape.



Root Management container with extracted rootball. Notice the vertical and horizontal grooves from the ridged container and network of non-circling feeder roots from air root pruning preventing circling roots.



Rootball with fine roots that will be trimmed before transplanting into next container size. This process doubles the root mass in the next container size allowing more nutrient and water uptake stimulating desirable foliar and root growth.



AZT™ Root Management Program after root pruning. Root pruning is one more step to ensure there are no circling roots and to encourage radiant root growth rapidly anchoring the tree in the next container size.



Here is a 24" box tree in the planting hole. It is recommended to shave 1/8-1/4 inch off the edges of the rootball sides to accelerate root development into the native soil.



Examine the rootball for potential problematic roots. Shaving the rootball edge maintains the root branching progression.



Rootball trimmed ready for planting. Notice how clean the rootball edge is, all fine and any larger roots are removed.