

“Box Cutting” Containerized Root Systems: *A Quick Fix for a Long-term Problem*



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The Problem

Trees or shrubs that are grown in plastic containers - specifically smooth plastic containers – have a bad habit of producing roots that grow in a circular pattern within those containers. Often referred to as “pot-bound” root systems (Figure 1), they can end up shortening a plant’s life within a few years if not corrected at planting time.



Figure 1. A typical pot-bound root system of an Arborvitae.

How It Happens

When roots grow through the soil and come in contact with the inside of those containers, they turn and grow parallel to the containers’ inside walls in a circular pattern. If the roots are fine and light-colored, it’s usually not a big problem – they will quickly grow out into the landscape soil once they are correctly planted and watered (Figure 2).



Figure 2. Thin, light-colored encircling roots of an oak...no problem.

However, if those encircling roots enlarge and become darker colored and woody, about the thickness of a pencil, they develop a "memory" for that growth habit and it sticks with them (Figure 3). Even when they are planted in a good soil, those roots keep growing and enlarging in that circular fashion.



Figure 3. Encircling woody roots near the end of the pointer. These birch roots have developed an encircling root pattern "memory."

What Happens If They Are Not Corrected?

Roots are meant to grow out and away from the tree or shrub stems, “mining” the landscape soil for water and minerals and creating a wide, stable root system. If they stay in a tight, circular pattern, they don’t have the chance to find and absorb water and minerals very well. They also tend to become unstable since their root system is so small. Too often, these trees and shrubs die slowly within a few years (Figure 4).



Figure 4. This Amur maple was planted without correcting the woody encircling roots problem and died five years later in the landscape.

The Quick Fix – “Boxing”

Research at the University of Minnesota’s Urban Forestry, Outreach, Research and Extension nursery from 2005-2010 discovered a fail-safe technique for correcting the problem simply and quickly without harming the plants. Using hand saws, the outer one inch of each side of the pot-bound root systems of 72 trees (maples, arborvitae and crabapples) were physically removed along with the encircling, woody roots -“boxing” the root system (Figures 5 and 6). At the end of the five-year study, none of the “boxed” trees were dead or had pot-bound roots. The control trees (no boxing) all had confined root systems as well as the other trees where the root systems had only been sliced.



Figures 5 and 6. "Boxing" the root system of a badly pot-bound birch. Figure 5 demonstrates the cut using a pruning saw and removing about one inch of soil ball on one side. Figure 6 shows the completed operation, illustrating why it is called "boxing" the root system.

Since Then

The procedure has been repeated literally hundreds of times with pot-bound trees at the University. Whether it was done in the spring, in the summer or in the autumn, there

has yet to be a tree that has died from the procedure or redeveloped an encircling root system. This 2-4 minutes procedure does not kill trees...it saves them (Figure 7).



Figure 7. The same birch with the boxed root system demonstrated in Figures 5 and 6, eight weeks later. The new roots are growing out into the landscape soil instead of staying in an encircling pattern.

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Urban Forestry Outreach Research and Extension Lab and Nursery

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