Evaluating Planting Season and Rootball Manipulation on Container-grown Tree Transplant Success

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Proper root architecture is critical for the long-term growth and survival of trees. Root architectural defects include circling, diving, kinking, or imprinting, which is when roots retain the shape of smaller containers when sized up to larger containers. Field grown, container grown or containerized, and bareroot trees all can have root defects resulting from standard nursery production methods. With the rising popularity of container trees, recent research has suggested rootball manipulation techniques, when transplanting trees into the landscape, ameliorates deleterious root architecture configurations imposed by container production.

Rootball shaving, which removes the entire rootball periphery and bottom, has been shown to have little to no impact on reduced top growth in the year or two after transplanting, while significantly reducing the incidence of circling roots. Most of the prior research on rootball shaving occurred in the southern United States, which does not have the limited and potentially shorter spring and fall transplanting windows as the upper Midwest. The goal of this study is to evaluate the effects of rootball manipulations and planting season on post-planting growth of three container-grown tree species, representing a range of relative intrinsic growth rates. This is an interim report of a multi-year trial. Research is being conducted at the Horticulture Research Station.

Materials and Methods

Production of research trees. The trees were successfully overwintered in pots from the 2020 growing season when they were containerized from bareroot trees obtained from the J. Frank Schmidt Nursery (Boring, Oregon). Overwintering included burying the trees in corn stover to insulate the rootballs and protect from rodent damage. Sixty trees of three tree species, 180 total trees, were used in this study: swamp white oak *(Queercus bicolor)*, Redmond American linden *(Tilia americana x euchlora* 'Redmond'*)*, and Shademaster thornless honeylocust *(Gleditsia triacanthos)*.

Rootball manipulation planting phase. The study is a randomized full-factorial design. Nine trees of each species were randomly assigned to one of three root ball manipulations at planting: 1) C=control, where no root manipulation occurs; 2) SL=slicing where a 2.5 cm deep vertical slit was cut every 10 cm around the rootball periphery; and 3) SH=shaving, where the outer 5 cm of the entire rootball periphery is removed (Figure 1).

Figure 1. Trees being removed from 15 gallon containers after being potted as bareroot plants the prior year (left). A pruning saw was used to conduct the rootball manipulation treatments (right). Shaving, shown in the photo, removes the entire outer perimeter and bottom of the rootball, while slicing involves vertical cuts into the rootball evenly spaced around the circumference.

Figure 2. Panoramic photo looking south and west of the fall tree block after planting on September 17 (left side), and the spring block (right side) after a summer of growth.

Trees were planted in two adjacent blocks; the spring block was planted May 17, and the fall block was planted September 17 (Figure 2 and Table 1). Trees were mulched to a depth of 2-3 in. with shredded wood mulch, avoiding the root flare. Automatic irrigation from the farm pond was applied at rate of six gallons per tree up to five days per week using Netafim, a pair of 3.2 GPH pressure compensating spray stake emitters.

Results and Discussion

No data was collected during the production phase of the project ending in 2020. Trees will be tracked through the 2021-2024 growing seasons for shoot tip extension, bidirectional trunk caliper, tree height, specific leaf area, and leaf dry matter content.

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Table 1. Planting plan with randomized rootball manipulation treatments within spring and fall planting blocks. Trees were assumed to be identical replicates for the sake of assigning to treatments and baseline tree size data were collected for comparison to subsequent growth during the establishment phase.

	NW corner SPRING BLOCK			NE corner FALL BLOCK		
Tree	Linden	Honeylocust	SW Oak	SW Oak	Honeylocust	Linden
	Row 1	Row 2	Row 3	Row 1	Row 2	Row 3
1	SH8	SH4	SH1	C9	SH4	SH6
2	C7	SH7	C6	C2	C6	SL4
3	C4	SH6	SL4	SL3	C3	SL6
4	SH9	SL1	C8	C7	SH9	C9
5	C1	SH8	SL3	C8	SH8	SL3
6	SL2	C7	SH6	SL7	SH1	SL7
7	SH5	SL8	SH3	SH5	C5	SH9
8	SL3	C1	SL2	SL9	SL5	C7
9	C5	C3	SL9	SL6	SL9	C2
10	SH2	SL2	SH8	SH7	SL4	SL5
11	C8	SL7	SH5	C1	C1	SH4
12	C6	C9	SL5	SL1	SH5	C1
13	SL5	C6	C2	C3	SL1	C3
14	SH4	SL5	SH4	C5	SH6	C5
15	C2	SL9	SH7	C4	C2	SH7
16	SL4	C4	C4	SL8	SL8	SL9
17	SL8	SH5	SL6	SL5	C7	SL1
18	SH6	SH1	C9	SH6	SL6	SH1
19	SL9	SL4	SH9	SH9	SH2	SH5
20	SL1	SL3	C1	SH3	SH3	C6
21	SL7	SL6	C5	SH1	SH7	C8
22	SH1	SH3	SL7	SH8	C8	SL2
23	SH7	SH9	SL8	SH4	C9	SH8
24	SL6	SH2	SL1	SL2	SL3	SL8
25	C9	C2	C7	SL4	SL2	SH3
26	C3	C8	SH2	C6	C4	C4

Treatments: C - control, SL - slice, SH - shaving depth.