EFFECTS OF PRUNING AND FERTILIZERS ON ESTABLISHMENT OF BAREROOT DECIDUOUS TREES

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Abstract. Bareroot deciduous trees of 11 species were planted with 0, 15, 30 or 45% of the tops removed immediately following planting. A total of 528 trees were evaluated over a 2-year period. Top pruning had no effect on survival or initiation of growth of any species except pecan which was slightly slower to break buds when the tops were not pruned. Likewise, adding fertilizer to the soil surface following planting had no detrimental effect to survival or initiation of the 6 species tested. There was no advantage of the indiscriminate pruning of tops of bareroot deciduous trees at planting time and pruning more than 15% of the top appeared to be detrimental to the structural development and natural form of the species. Apparently the moisture stress from leaving the entire plant top intact is offset by the more rapid development of a supporting root system from the additional carbohydrates produced.

Top pruning of bareroot and balled in burlap (B&B) trees at planting time is nearly a universal practice. The most common explanation offered for this practice is the need to balance the top with the roots lost at time of digging. Likewise, the recommendation to *not* fertilize newly planted trees or shrubs during their first growing season has been widely publicized. As with many general gardening recommendations, little or no experimental evidence exists to support either of these practices.

An experiment was set up in the spring of 1978 to evaluate effects of pruning and fertilizing at planting time of six bareroot deciduous species; pin oak, *Quercus palustris,* redbud, *Cercis canadensis;* Bradford pear, *Pyrus calleryana* 'Bradford'; Hopa flowering crab, *Malus spp.* 'Hopa'; Summit green ash, *Fraxinus pennsylvanica* 'Summit' and Kwanzan cherry, *Prunus serrulata* 'Kwanzan'. All plants were 6 to 8 feet tall, dormant, bareroot stock when planted on March 16, 1978. Treatments were removal of 0, 15, 30 or 45 percent of the plant height before the spring flush. Trees were fertilized or not fertilized at time of planting with 4 lbs. of N/1000 sq. ft. using a 10-20-10 analysis dry fertilizer (1742 lbs./acre) applied to the soil surface following planting. All treatments were replicated 12 times in a randomized complete block design. All trees were planted in a sandy loam soil and watered thoroughly following planting. Spring rains were accommodating, but after June 20, no further rain fell during the summer. Drought stress was allowed to progress sufficiently to defoliate some trees before any supplemental irrigating was done.

A second study was started on March 20, 1979 to confirm the findings from the previous season. Treatments were 0, 15, 30 and 45% removal of the crown of the dormant bareroot trees before the spring flush. However, no fertilizer treatments were used. Tree species were: red delicious apple, *Malus domestica* 'Red Delicious'; Keiffer pear, *Pyrus communis* 'Keiffer'; dwarf Alberta peach, *Prunus persica* 'Elberta'; Stuart pecan, *Carya illinoensis* 'Stuart' and Arizona ash, *Fraxinus velutina.* All trees were planted in a sandy loam soil and watered thoroughly following planting. The experiment was replicated 12 times in a randomized complete block design.

Pruning or fertilizer treatments had no effect on initiation of growth or survival of any of the tree species planted in 1978. Out of 288 trees planted 242 or 84% survived. Numbers of basal suckers on Bradford pear and crabapple increased significantly when tops were pruned back 30 or 45% (Figure 1). Pruning in excess of 15% reduced the visual quality (natural form and branch development) of all species.

All species planted in 1978 made similar flushes

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Figure 1. Hopa crabapple trees with 0, 15, 30 or 45% of the top removed immediately after planting. Note the suckers on the 30 and 45% pruning treatments. Pruning or fertilizer treatments had no effect on initiation of growth or survival of any of the 6 species tested.

of growth during the spring of 1979 regardless of pruning treatments. This suggests that all trees had recovered from the initial transplant disturbance and assumed normal growth. Except for some unnatural branch development from the severe pruning treatments, all plants were similar in size and vigor at the end of 2 growing seasons. Fertilizing at planting time had no effect on tree growth the first growing season and was only detectable as darker foliage color the second season. This was not surprising in this instance since the fertility of the field was high. The fact that no detrimental effect of the fertilizer could be detected is important in light of the widespread recommendation that no fertilizer be added at planting time. In good soils such as those used in this study, adding fertilizer at planting has little impact on plant growth.

Pruning treatments had no effect on survival of any of the species planted in 1979. Pecans broke buds slightly earlier when pruned 15% compared to no pruning. Plants pruned 30 or 45% developed slightly more branches as a result of more bud breaks as compared to the unpruned trees. At the end of the growing season, all leaves were stripped from the dwarf Alberta peach and Kieffer pear and weighed fresh. Weight of leaves per tree were similar regardless of the pruning treatment. The fact that all treatments had similar quantities of leaves at the end of the first growing season suggests a rapid recovery of the tree from the severe pruning treatments. There appears to be no advantage to pruning at planting time and pruning more than 15% of the top appears detrimental to the structural development and natural form of the species. These studies suggest only corrective pruning should be recommended since excessive pruning reduces visual quality, increases suckers on some species and does not aid in establishment or survival.

Initial root development of newly planted bareroot trees is supported by carbohydrates stored within the stem and root tissues. As soon as top growth begins, however, total carbohydrates within the plant are rapidly reduced. When a portion of the top of the plant is removed the leaf surface area and the capacity to replace carbohydrates used in the initial flush of growth is also reduced. Apparently the moisture stress from leaving the entire plant top intact is offset by the more rapid development of a supporting root system.

This study supports the hypothesis that the most important factor in transplanting is the internal condition of the plant when it is dug. All the lavish precautions such as soil amendments, "root stimulators," top pruning, and other practices are unlikely to help an unthrifty plant and a thrifty plant doesn't need it.

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ABSTRACTS

Chapman, Douglas. 1980. **European beech cultivars have advantage over American.** Weeds, Trees & Turf 19(5): 16, 18.

American beech should be strictly limited to naturalistic areas where lawn mowers and/or pruning shears never touch its bark. American beech is an exciting native tree which doesn't tolerate man and his manipulations of the landscape. European beech and its cultivars are far more diverse and adaptable to the American landscape scene. European beech transplants easier, establishes more rapidly, responds well to light pruning, and can be an exciting specimen plant when used in large landscapes, e.g., institutional grounds, parks, or golf courses.

Chapman, Douglas. 1980. **White oak resistance to wilt compared to red oak color, speed.** Weeds, Trees & Turf 19(8): 60-61.

Oaks are an exciting genus which could be more effectively used in the landscape. Their native range is extensive throughout the entire Northeastern and Eastern United States. They grow in soils ranging from heavy clays to well drained. Generally, many of the plants display good tolerance to urban conditions and are aesthetically outstanding. Quercus species are variably tolerant to urban stress, air pollutants (ozone and sulfur dioxide), salt (chlorides), and disease. The red oak group includes scarlet oak, northern red oak, black oak, pin oak, and English oak. In general, this group grows more rapidly with a shorter life span while showing acute susceptibility to oak wilt. The white oak group includes white oak, swamp white oak, and bur oak. This group is long-lived, fairly resistant to oak wilt, and adapts to a wide range of sites. We must realize that provenance, local adaption, plays an important role in the survival of many oak transplants. Oak should headline the list of desirable adaptive trees for landscape architects, nurserymen, and urban foresters.