

TRAINING YOUNG TREES¹

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In many cases, directing the growth of young trees is essential if mature trees are to perform properly in the landscape. This discussion will provide information to help you achieve desirable branch placement and structural strength in trees and may also be useful in training plants to other forms and shapes.

The growth habit of a plant and its landscape use determine how and to what extent you must prune the tree to train it to the desired form. Trees with a strong central leader and a conical shape like conifers, Liquidambar and pin oak, may need little or no pruning. On the other hand, trees with irregular growth habits like Chinese pistache, with poor branch structure like Modesto ash or with vigorous laterals as in flowering fruit trees may need considerable training. Street trees should have higher scaffold branches than trees used for visual screening or wind-breaks. Pruning is usually the most effective way to direct the growth of a plant.

Prune a tree only enough to effectively direct its growth and to correct any structural weakness. With light pruning, the dwarfing influence will be minimal.

Branches selected for permanent scaffolds should have wide angles of attachment with the trunk and be smaller in diameter than the trunk. Height of first permanent branch above the ground will depend on the tree's use in the landscape. The position of a limb on a trunk remains essentially the same throughout the life of the tree. In fact, as a branch increases in diameter, the distance between it and the ground actually decreases.

The height of the lowest permanent branch can be a few inches from the ground to more than 12 feet depending on how the tree is to be used. Even though a certain clearance is needed

over a street or a patio, a lower height may be selected if the limb is growing in a direction that will not interfere with traffic or use of the area under the tree.

Vertical branch spacing is important in many species for future leader dominance, structural strength, and appearance of the tree. Two or more vigorous branches arising at or near the same level on the trunk are apt to "choke" the leader and limbs above. This is especially true in "fast-growing" trees whose laterals grow from buds formed the previous season—such as flowering fruit trees, mulberry, and zelkova.

Often, on lightly or unpruned trees, the more vigorous branches will be naturally well-spaced while the other branches become relatively weak. Little or no pruning may be needed.

On mature trees closely spaced scaffolds may break out more easily than those with wider spacing. Closely spaced scaffolds will have fewer laterals, resulting in long, thin branches with little structural strength.

Vertical spacing should be greater on a tree that will develop into a large tree with large diameter branches than on a tree of smaller mature size.

Major scaffold branches should be spaced at least 18 inches vertically and preferably 18 to 24 inches. Many mature trees have branches 4 to 12 feet apart.

Radial branch distribution should allow 5 to 7 scaffolds to fill the circle of space around the trunk. This can be done in one or two rotations around the trunk. Although an ascending spiral may appear more symmetrical and pleasing, branches will grow equally well and be as strong even though their origins on the trunk depart from a spiral.

Radial spacing should prevent one limb from

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being over another when neither limb can develop properly. The lower one may be shaded out with no ascending branches. The upper one may be less vigorous in the presence of the lower which competes with it for water and nutrients.

Direct growth during the growing season as well as when the tree is dormant. Direction during the growing season is usually confined to shoots and branches that are temporary. Pinching the growing point (heading) or complete removal of a shoot (thinning) will reduce its competition with the leader or shoots selected for scaffold limbs. Pinch or remove shoots that are too low, too close, or too vigorous in relation to the leader and shoots selected to become the scaffold branches.

During the first and possibly the second growing season, more shoots should be left unpruned than will finally be selected for scaffolds. This will allow later selection of the best branches when they are more developed, the elimination of unwanted branches, and provides some insurance against wind and pest damage.

Shoots of many species do not branch the season they form. Even the second year, some of these may not develop more than a few or no laterals except near the previous season's terminal. To induce branching, pinch the leader of such plants when the growing point reaches a height at which a lateral branch is desired. Remove 1 to 2 inches of the tip. Buds below the pinch will grow. One usually grows more vigorously than the other shoots. This will become the leader, although it may need encouragement. You can select as a lateral a second developing shoot growing in a desired direction by pinching the tips of the other shoots that were forced. It is better to leave too much space between laterals than to have them too close.

In one season a vigorous tree may permit the forcing of as many as three well-spaced laterals where they are wanted. Without such pinching, the leader would require severe heading during the dormant pruning—to the height at which the lowest lateral is desired.

The development of scaffold branches may be kept in balance with the rest of the tree either by thinning laterals on, or pinching the tips of, the most vigorous ones (or both) during the growing

season.

As little as 1 to 2 inches is effective and will not drastically reduce total growth. In fact, it will make unnecessary the removal of a large branch later on when the dwarfing effect will be greater. Early pinching directs growth into the permanent leader and branches.

Shoots that are crowding desirable shoots should be removed completely. This can be done quickly, with little dwarfing, when shoots are less than 5 inches long.

Pruning during the growing season will reduce the amount of pruning needed during the following dormant period. Growth will be channeled where it will be most effective.

Pruning during the dormant season follows the same principles as those of the growing season. Some severe corrective pruning may be needed. This is more easily seen with deciduous trees when they are dormant.

When a tall upright trunk is desired, keep the leader dominant by preventing laterals from outgrowing it. The problem of laterals outstripping the leader is a common one with many species, especially those having a deliquescent form.

Temporary branches on the trunk will strengthen and protect the trunk. At planting time and during later dormant pruning, choose laterals of weak to moderate vigor to be left as temporary branches. Vigorous low-growing laterals should be removed if less vigorous ones can be selected. Short, horizontally growing laterals can be left unpruned. More vigorous laterals should be headed back to 2- to 3-bud spurs during dormant pruning.

Temporary branches can be spaced 4 to 12 inches apart. Closer spacing may unduly retard height growth. Temporary growth on the southwest side of the trunk also reduces the chance of sunburn injury.

During the growing season, pinching the tips of vigorously growing temporary branches may be necessary to keep them in bounds and reduce competition with the leader and permanent branches. Most trees should be visited at least 2 to 4 times. The first visit is best timed when new growth is 4 to 6 inches long. This requires little time per tree and provides an opportunity to check on any other problems that may be

developing.

As a young tree develops a sturdy trunk and a top that effectively shades the trunk, the temporary branches can be reduced in number and eventually eliminated. After two or three years, when the trunks of small trees (e.g. crape myrtle and Japanese maple) are 2 to 3 inches in caliper or larger trees (e.g. elm and sycamore) are 5 to 6 inches in caliper, the number of temporary branches can be reduced over a 2- to 3-year period. Remove the largest ones at each pruning to minimize the size of the pruning wounds.

A tree may not be tall enough when planted for the selection of any permanent lateral branches. If laterals are present or grow below where the lowest permanent branch is wanted, they should be handled as temporary laterals.

When the leader grows tall enough, select the permanent laterals. If the leader does not form branches the season it grows, pinch the growing point to force laterals at the desired heights.

Many times planting a healthy, moderate-size (1/2 to 3/4" caliper, 5 to 6' height) tree will result in a more rapidly growing, better structured plant than is obtainable with a larger (1 to 2" caliper, 8 to 10' height) tree that has been in a container too long.

Nursery trees with low laterals of large size are a problem. For most uses, don't choose such trees if others are available.

Many trees for landscape use are headed in the nursery when they become 4 to 5 feet tall. This forces laterals below the cut. These branches form a compact head giving the tree good proportions when small but with no leader. In many cases, these branches are too low and too close together.

At planting, it may be possible to select the most upright and vigorous branch to become the leader. A second branch may be chosen as the first scaffold if it is high enough above the ground. In some cases, only a leader can be selected. Other branches should be thinned and those remaining treated as temporary branches.

The sooner corrective pruning is done, the less dwarfing influence pruning will have. However, in some cases the pruning must be so severe, that it should be done over at least a 2-year period. This is more true for older nursery trees (3 to 4

years in 5-gallon containers) than for young nursery trees (1 to 2 years in 5-gallon containers).

An upright branch will usually be more vigorous than one that is less so and may be used as a permanent branch if its position is desirable. However, it may compete with the leader. If a more horizontal branch can be selected, it is usually wise to remove the more upright one. As many species of a diffuse or deliquescent branching habit mature, the leader becomes less dominant.

Occasionally, branches will grow vigorously upright on trees that normally have subdued horizontal limbs (many conifers and Liquidambar). Remove these or cut to an outward growing lateral as soon as they are spotted. Otherwise, they will upset the symmetry of the tree.

In contrast to upright branches, these growing more horizontally are usually of low vigor. Horizontal branches will seldom compete with the leader. These branches or twigs are desirable as temporary branches to protect and nourish the trunk. Unless they become too long, the smaller ones can be left unpruned.

Horizontal or drooping limbs may, however, be a problem in some young trees. If they droop because of excessively vigorous growth, buds back from the top of the bend will often grow. The new shoots will usually be more upright. You can select well-placed shoots from these by thinning the lateral back to the selected shoot. Thin out other new shoots that might compete or interfere with the one selected.

If the horizontal or drooping limb has a no well-placed upright laterals, head the branch to an upward-pointing bud slightly back of the top of the bend or to where you want a lateral.

Certain trees are chosen for their drooping branching habit, e.g. weeping willow, Chilean mayten, etc. You may wish to exploit this characteristic.

Prevailing winds may deform trees so that most of the growth is on the downwind side. Depending on wind conditions and the kind of tree, the main leader may or may not be bent by the wind. Many trees, e.g. most conifers, Liquidambar, planetree, have the ability to resist being bent by moderately strong prevailing winds.

In windy locations open up the top of the tree

extensively on the downwind side. In certain situations, such a condition may be picturesque and desirable—if not, remedial pruning for more balanced growth can be done.

In windy locations open up the top of the tree by thinning out moderate-size branches. The tree will offer less wind resistance. Thin back branches on the downwind side to laterals to keep the tree more symmetrical.

You may need to head curving branches on the windward side near the point at which they begin to bend with the wind. Prune to a bud pointing into the wind. You may need to repeat this each time the endmost new shoot starts to be bent by the wind. Such a branch will be stockier and able to resist bending. One such pruning may correct the problem.

Weak young trees may result from a number of unfavorable growing conditions, either in the nursery or after planting in the landscape. If such problems as girdling or kinked roots, disease, insects, trunk sunburn, poorly drained soil, etc. are not limiting growth, severe pruning may be the last resort that will revitalize the tree. Because of the lack of latent buds, however, most conifers will not respond to such pruning.

Head the trunk 6 to 12 inches above the ground or graft union. Paint the trunk white to

prevent sun damage. New growth will come from latent buds below the cut. When the new shoots are 5 to 6 inches long, choose the one in the best position and pinch back the others. The trunk may need to be recut diagonally above the newly selected leader, which will protect the developing shoot, the new leader, and the base of the trunk. Often a vigorous well-branched leader will develop in the first year to revitalize the tree.

The leader may not maintain its dominance. If you want a new leader remove the original in favor of a strong upright growing lateral. The new leader should be the topmost lateral on the trunk. It is undesirable to leave part of the original leader above the new one because it creates unnecessary competition between the two. Thin back the original leader to the lateral selected as the new leader.

Late in the season several buds may begin growth near the tip of an otherwise branchless leader of scaffold branch. They may grow up to 6 inches in length and be about as large as the terminal. Unless they are thinned out, these branchlets and the terminal will grow weakly the next season. It is best to head to a bud below this tuft of branchlets or to thin the tuft, leaving one branch and the terminal.

ABSTRACT

Neely, Dan. 1974. **Iron deficiency chlorosis of shade trees.** Proc. Midwestern Chapter, I.S.T.C. 29: 2-8.

Iron deficiency chlorosis has been recognized in various parts of the world for over 100 years. It has been a problem of a wide variety of orchard, garden, and field crops in the western United States. The characteristic symptom of iron chlorosis in trees is a yellowing of the leaf blade in the areas most removed from the veins. As the deficiency becomes more severe, results of the shortage of chlorophyll and food production in the leaf become evident. Over a period of years, unless treatment is given, the trees die. The relationship between high soil pH and the unavailability of iron to plants is being extensively studied but is still not well understood. Susceptible plants growing in soils with a pH of 6.7 or above are frequently victims of iron chlorosis. Man learned over 100 years ago that adding iron to plants often corrects chlorosis. The iron source first and most often used in treatment of iron deficiency is iron sulfate. It is abundant, cheap, and readily available. Unfortunately, it is not the most effective iron source. The development of synthetic iron chelates in the 1950's has improved chlorosis control recommendations greatly. Correction of chlorosis by foliar sprays has been usually only moderately successful. Iron chelates for use in soil treatments have been given much attention in recent years. The remaining control measures for correcting iron chlorosis involves the injection or the implantation of iron salts into the trunks of affected trees. Soil injections and trunk implantation treatments have consistently given prompt and thorough correction of iron chlorosis.