

TECHNICAL NOTE

WOODLAND TECHNICAL NOTE NO. 40

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TREE AND SHRUB PRUNING

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WHY PRUNE TREES AND SHRUBS

Pruning may be done for safety, to improve the health or appearance of a tree or shrub, or to increase a tree's commercial value. Pruning is not difficult if you understand the basics, and learn why, when, and how to prune.

In a home landscape, proper pruning is an essential maintenance practice for trees and shrubs. The main reasons for pruning ornamental trees and shrubs are to remove dead, diseased, or injured branches; to improve the health or appearance of the plant; to improve form, shape, or size; to rejuvenate older shrubs; and for safety. Pruning shade trees in your yard controls the trees size or shape, removes undesirable branches, or reduces a hazard posed by dying or broken branches.

In a woodlot or forest, pruning is done to repair storm damage, to maintain a single central leader, or to increase a tree's commercial value by improving the chance of a clear bole to produce a higher grade of lumber or veneer.

Windbreaks and shelterbelts are planted to protect farmsteads, feedlots, or cropland fields from high winds; and to control snow deposition. Density is a key consideration for windbreaks, so for the most part, pruning is not necessary. Shelterbelts and forest trees grow quite well with only nature's pruning and do not require the high level of care as landscape plants do. The main reasons for pruning in a shelterbelt would be to correct storm damage, remove injured or diseased branches, or in a few specialized cases, to alter the density.

Christmas tree producers prune to remove double leaders and shear the trees to produce a full, symmetrical crown with dense foliage and a shape desired by their customers.

Whether in a forest setting or home landscape; start pruning early in the life of a tree and continue as necessary as the tree grows. Too often, needed pruning is ignored for several years. Drastic measures are then needed to bring the plant back to usefulness.

WHEN TO PRUNE

While conifers and dead branches may be pruned at any time of year, it is best to prune live branches during the dormant season (late fall or early spring). This is particularly true for hardwoods, as their wounds may exude excessive sap or become vulnerable to disease causing insects or pathogens such as oak wilt or Dutch elm disease. Even with conifers there are advantages both for the trees and for those doing the pruning to work during the cooler, less busy, more insect-free months of fall and winter.

Examine trees and shrubs annually, especially when young. Any needed pruning will be a lot easier to do and the plants will recover a lot quicker.

Most routine pruning to remove weak, diseased, or dead limbs can be accomplished at any time during the year with little effect on the tree.

For pruning storm damage, it is best to prune soon after the storm to reduce the area of jagged, open wounds and reduce the potential for disease infestation. Another reason to prune storm damage immediately is to reduce hazards to life and property from weakened and damaged limbs. Attempt only those pruning jobs that commensurate with skills, experience, and equipment of the person doing the pruning. Pruning can be hazardous to those not properly prepared.

Heavy pruning of live branches just after the spring growth flush should be avoided. At that time, trees have just expended a great deal of energy to produce foliage and early shoot growth. Removal of a large percentage of foliage at that time can stress the tree.

Trees and shrubs that flower early in the year should be pruned immediately after flowering if a showy display is desired the following spring. Spring flowering trees and shrubs such as lilac, forsythia, viburnums, plums, serviceberry, spirea, and crabapples develop flower buds during the previous season's growth and over-winter in the bud. If pruned during the dormant season, the flower buds will be removed.

For hardwood trees and shrubs without showy flowers, prune in the dormant season to maximize wound closure in the growing season after pruning, to discourage excessive sap flow from wounds, and to reduce the chance of transmitting disease.

Other trees and shrubs that flower after the end of June should be pruned in winter or early spring before new growth starts. These plants develop flower buds during the spring of the flowering season. Examples of this type of tree and shrubs include: hydrangea, sumacs, and roses.

Prune trees susceptible to fire blight only during the dormant season.

PRUNING TOOLS

When pruning trees, it is important to have the right tool for the job. Whatever tool you use, make sure it is kept clean and sharp. For small trees and shrubs, cuts up to one-half inch can be made with hand pruning shears. The scissor-type, or bypass blade hand pruners are preferred over the anvil type. They make cleaner, more accurate cuts. Cuts larger than one-half inch in diameter should be made with lopping shears or a pruning saw.

Never use hedge shears to prune a tree and never prune with an ax.

When pruning plants with a fungal disease infection, sanitize pruning tools after each cut with either a bleach/water solution (1 part bleach, 9 parts water) or with 70 percent denatured alcohol. Pruning tools should be thoroughly cleaned after each use.

The preferred tools for small and medium sized limbs are a hand or pole saw with a curved blade that cuts on the down stroke. Bow saws and chain saws are more appropriate for larger sized limbs. Chain saws should only be used to remove the major portion of large, storm-damaged limbs.

For safety, do not attempt to prune higher limbs with a power saw. Prune to the desired height with a pole pruning saw.

WOUND DRESSINGS

It is not necessary to paint or treat pruning cuts. Wound dressings were once thought to accelerate wound closure, protect against insects and disease, and reduce decay. Research has shown that wound dressings will not help and may even hinder the healing process.

GENERAL GUIDELINES FOR ALL PRUNING

The branch bark ridge is a raised ridge on top of the limb between the main trunk and the limb. It is a good indicator of the proper pruning position. The branch collar is a slightly swollen area around the base of the limb where it attaches to the trunk. The branch collar contains specialized cells that help the wound to close after a pruning cut. Trees do not heal the way people do. When a tree is wounded, it must grow over and compartmentalize the wound; and the wound is contained within the tree forever. Small cuts do less damage to the tree than large cuts. For that reason, proper pruning of young trees is critical. Waiting to prune a tree until it is mature can create the need for large cuts (wounds) that the tree cannot easily close.

Avoid leaving branch stubs. Avoid damaging the branch collar or branch-bark ridge, as the wound will take much longer to callus over.

If possible, prune branches when they are small, less than two inches in diameter. Support small branches while cutting.

For larger limbs that cannot be supported by one hand, prune trees according to the following steps to prevent tearing the bark:

Locate the branch bark ridge:

1. Find **A** (outside edge of branch bark ridge).
2. Find **B** (swelling where branch meets branch collar. If **B** is difficult to determine, drop a line from **A**: the angle **XAC** is equal to the angle **XAB** (see figure 1). Stub the branch to be pruned using a first cut from below and a second cut from above.
3. Make the final cut on line AB.

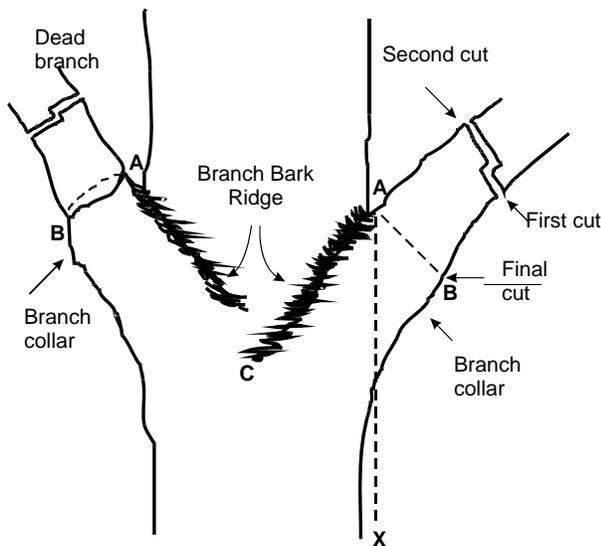


Figure 1 – Hardwood pruning

Do not cut behind the branch bark ridge.

Do not leave stubs.

Do not cut into the branch collar.

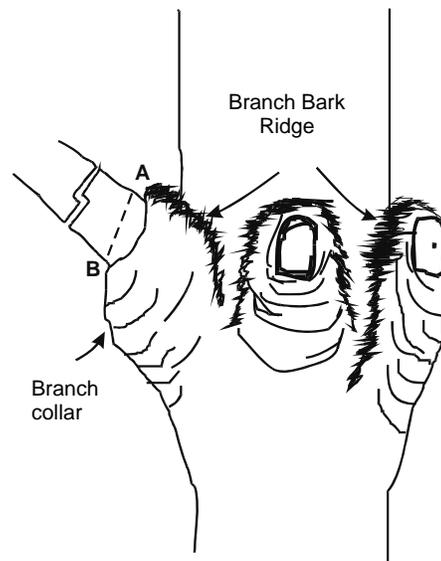


Figure 2 – Conifer pruning

ADDITIONAL GUIDELINES FOR LANDSCAPE PLANTS

Proper pruning is essential in developing a tree with a strong structure and desirable form. Trees that receive the appropriate pruning measures while they are young will require little corrective pruning when they mature.

Remove dead, diseased, or broken branches anytime you notice them. Pruning can also be used to maintain the necessary clearance from buildings and windows.

Generally, trees should be trained to have a single main stem without v-shaped branch angles on the main trunk. Double leaders and weak branch angles leave a tree susceptible to subsequent breakage, loss of function, and decreased life.

Properly trained young trees will develop a strong trunk with sturdy, well-spaced branches. A good structure of primary scaffold branches should be established. Branches selected as permanent scaffold branches must be well-spaced along the trunk (12 to 18 inches). Maintain radial balance with branches growing outward in each direction.

Good pruning techniques remove structurally weak branches while maintaining the natural form of the tree. Branches with narrow angles of attachment can become structurally weak as the tree matures. As the tree grows, bark can become enclosed deep within the crotch between the branch and the trunk. This included bark weakens the attachment of the branch to the trunk and can lead to branch failure. You should prune branches with weak attachments while they are young. For most young trees, maintain a single dominant leader growing upward. Do not prune back the tip of this leader, and do not allow secondary branches to outgrow the leader. Sometimes a tree will develop double leaders known as co-dominant stems. Co-dominant stems can lead to structural weaknesses, so it is best to remove one of the stems while the tree is young.



When co-dominant stems develop, bark may become "included" in the crotch. It is best to prune one of the stems while the tree is young.

The height of the lowest permanent branch is determined by the tree's intended function and location in the landscape. Trees that are used to screen an unsightly view or provide a windbreak may be allowed to branch low to the ground. Street trees on the other hand must be pruned so that they allow at least 16 feet of clearance for traffic. Most landscape trees require only about eight feet of clearance.



Cuts made along a branch should be made at a lateral branch or bud.

If a permanent branch is to be shortened, cut it back to a lateral branch or bud. If a larger branch is to be shortened, cut it back to a side branch at least one-third the diameter of the branch to be cut.

Pruning of newly planted trees should be limited to corrective pruning. Remove torn or broken branches; but save other pruning measures for the second or third year. Trees need their leaves and shoot tips to provide food and the substances that stimulate new root production.

Prune trees and shrubs to minimize the hazard of limbs interfering with overhead power lines and to open up blocked sight lines at driveways and street corners.

Avoid pruning elm trees when elm bark beetles are flying as the fresh cuts will attract beetles.

The live crown of any shade tree should not be decreased to less than two-thirds of the total tree height.

Prune shrubs to improve the visual balance or symmetry of the plant without changing their natural form. Pruning can be used to rejuvenate and restore old shrubs to vigorous growth.

For hazardous fuel reduction in the urban-forest interface, prune trees to three times the height of the surrounding shrubs.

Generally, the smaller a branch is when pruned, the sooner the wound created will seal. For branches two inches in diameter or smaller, prune as needed and necessary. For branches greater than two inches, up to four inches in diameter, think twice before pruning. For branches greater than four inches in diameter, have a real good reason to prune.

FORESTS AND WOODLOTS

Select only straight trees with small branches for pruning. Begin pruning while the tree is young. This will allow the most clear timber to grow on the bole; since knots form as each year's new growth surrounds a branch, living or dead. Also, it is easier, more efficient and healthier for the tree to prune small branches regularly than to prune large limbs.

Consider the expense of pruning forest stands. For pruning to be cost effective, it should be done on those trees which have the most vigor, best form, and the ability to produce quality veneer or lumber.

Prune ponderosa pine stands with a site index above 60. Select straight, dominant, or co-dominant trees, with healthy crowns free of disease, insects, forks, or other defects, and properly spaced.

Begin clear stem pruning when tree diameters are four to eight inches diameter breast height (DBH). Prune 100 to 150 well spaced crop trees per acre (approximately 18 ft. X 18 ft. spacing) where species and stem conditions permit.

From a work efficiency stand point, consider timing of forest pruning to coincide with a thinning, or other timber stand improvement activities managed for maximum growth. Hold crop trees at least 20 years after pruning.

All dead branches should be pruned. Do not remove more than one-third of the live crown in any single pruning operation. Example: if 15 feet is the total length of the live crown, do not prune more than 5 feet of live branches. All branches should be removed to a height of at least 9 feet, but not more than 17 feet. If necessary, prune in several operations or height increments to reach a 17 foot height (one 16 ft. log, with a 1 ft. stump) where tree form and quality permit. The live crown of any tree should not be decreased to less than 50 percent of the total tree height.

Pruning can be completed at any time, but avoid pruning ponderosa pine from April 15 through July 15, if possible.

Onsite assistance for pruning high value hardwoods such as black walnut is available from the service forester, South Dakota Department of Agriculture, Division of Resource Conservation and Forestry. The advice of a professional forester can prove helpful with all phases of pruning your forest stands from selection of trees to the actual pruning.

Avoid pruning oak trees between March 1 and July 1 to reduce the risk of infection by the oak wilt fungus.

WINDBREAKS AND SHELTERBELTS

For safety concerns, remove branches that could fall and cause injury or property damage, trim branches that interfere with lines of sight on driveways and intersections and remove branches that grow towards utility lines.

Do not attempt to prune trees touching or close to utility lines. Contact the appropriate local utility for assistance.

Pruning of trees can be used to alter the density of a windbreak for wind and snow control.

- Pruning to reduce windbreak density can be done in two ways.

The first method involves removing all limbs from all trees to a predetermined height, usually three to five feet above the ground. This type of pruning is usually done on field windbreaks to address snow distribution. After a field windbreak has been pruned in this manner, the downwind snowdrift will usually be wider, not as deep, and farther away from the tree row. The down side to this method is that the protection to the crop during the growing season will be reduced, especially near the tree row.

The second method involves removing selected limbs throughout the canopy to reduce overall density of the windbreak to a desired level. This method will look more natural and would be appropriate where windbreaks are protecting specialty crops that need the proper mix of airflow and protection.

The zone of protection downwind from a windbreak pruned in this manner would be more uniform than for a windbreak pruned from the bottom up, though snow distribution patterns will be similar.

Best time for either type of pruning is when trees are dormant. (October to March)

Early spring after snow melt is a good time to inspect windbreaks for damaged limbs, double leaders and other deformities caused by weather or animals. Using proper pruning techniques, prune off the damaged branches in a way that encourages rapid callus formation and proper growth forms.

Pruning to a single leader at the correct time (when limbs are less than one inch in diameter) will result in taller trees that are more wind hardy and will result in fewer limbs falling into adjacent fields.

Windbreaks should be examined every year or after every major storm event to determine pruning needs. Remove dead, diseased, or broken branches.

PRUNING OR SHEARING FOR QUALITY CHRISTMAS TREES

Proper shearing or shaping is the most important cultural practice in Christmas tree production. By trimming the top and branches of a tree to control the shape and density of the foliage, the producer can produce a more marketable product.

Corrective pruning of multiple leaders should be done annually until the actual shearing for shape and density is begun. Shearing is done to regulate and direct the growth of individual trees to develop a symmetrical shape and increase foliage density.

The ideal Christmas tree has a two-thirds taper. A six-foot tall tree would be four feet wide at the base. Shearing of pines should be done to produce a taper of 40 to 90 percent. Taper is the base width in relation to the height.

Begin shearing trees 3 to 5 years after planting (approximately 3 feet in height) and terminal leader growth exceeds 12 inches. Continue shearing annually until the trees are marketed.

Pines must be sheared during the active growing season, when terminal growth is nearly complete. New buds develop at the base of needle fascicles near the cut end of the branch. Shear pines in late June through the last week in July. Cut the leader back to 10 to 12 inches after the new growth (the candle) is fully elongated but still tender and succulent. Cut at a 45 degree angle to the stem. Cut the laterals back to achieve the desired taper.

Firs and spruce grow with lateral buds along the twigs. Shearing should be delayed until late summer, when branches have stiffened and bud formation is complete. Shearing should begin late summer to early fall.

Cut the leader as necessary to control height growth to about 10 to 12 inches. Shear just above (1/4 to 3/8 inch) a single bud at a 45 degree angle.

All extra leaders shall be removed.

Cut the lateral branches of the top whorl from one-half to two-thirds the length of the leader. Side shearing should be done to obtain a 40 to 70 percent taper.

Basal pruning should be done to form a handle of 8 to 10 inches.