



Arid Zone Trees



Pruning Practices for Desert Trees-2005

It is all together too common for the natural growth characteristics of arid region trees to be completely ignored when these species are pruned. Trees native to mixed conifer and hardwood forests have a generally upright growth habit, typically dominated by a strong central leader. In these forests, competition is primarily for sunlight. The ability to grow straight and tall give those trees a significant competitive advantage over trees with other growth habits. In the southwestern deserts, competition is primarily for water. In this habitat, trees are typically highly dispersed and tend to grow nearly as wide as they are tall, producing branches that often extend to the ground. This unique growth habit must be considered when developing pruning practices for desert region landscape trees. The goals of pruning desert trees must be to promote tree vigor and health and to enhance and compliment the natural form of these native species.

Successful pruning requires an understanding of the growth habits and unique horticulture of the tree being pruned. Most popular desert landscaping books dedicate at least one section to pruning. These books are excellent references that cover subjects like crossing branches, proper cutting techniques and tools. They also provide helpful diagrams and detailed descriptions.

Poor pruning can ruin landscape trees and cause damage that cannot easily be repaired. If you are not sure what to do, get a certified arborist's professional advice. Fortunately, extensive pruning is not required for most desert tree species when they are carefully located in landscape designs. Proper tree placement and growth management can significantly reduce the amount of pruning desert adapted trees require. When placing trees in the landscape consider the mature height and spread of the tree. If in doubt, mildly exaggerate the mature size rather than underestimate and risk having trees ultimately too close. Plant trees strategically around structures, play areas, pedestrian traffic and surrounding trees so that mature trees can provide maximum shade with minimal interference. Also, consider how mature trees will interact with other components and uses of the landscape.

Desert adapted trees with light colored trunks typically have small leaves that allow filtered light through the canopy while species with dark trunks develop heavier shade. When under story plantings are located beneath dense canopy trees (like mesquites), regular thinning of the trees will be needed to admit adequate sunlight for flowering and lush growth. Annually evaluating pruning of mature trees can reduce potential storm damage, simplify pedestrian access, improve seating and better accommodate play areas.

In the process of developing proper structure, caliper, branch and trunk taper nurseries encourage the growth of "temporary branches". These branches, usually removed when they are around a quarter to half inch in diameter, promote the development of caliper and branch thickening but are not a part of the mature tree. In the nursery, the process of shaping and structure development begins and must continue once the tree

is installed in the landscape. Care is required in selecting the correct limbs to prune during every growing season to determine the appropriate amount of wood to remove. Such pruning promotes proper growth of both feeder and stabilizing roots, keeps leaf and root mass in balance, and forms well defined branching structure.

Beyond this point, all that is required is maintenance pruning and thinning to compliment and reinforce the established form and remove potentially problematic branches. It follows then that, in locations where single leader, upright trees are required, the desired ultimate form will need to be established at the time trees are purchased and installed. To develop adequate taper and caliper, for single trunk trees to support the canopy, requires keeping lower temporary limbs on the tree perhaps for the first few growing seasons. This time frame depends on the tree size when planted and the rate of growth following installation. Rushing to raise the canopy height on single trunk trees by remove temporary or major limbs too soon will often encourage S or C shaped trunk.

Pruning always has some adverse effects on trees and should be evaluated from the prospective of its impact on the tree's growth and vigor. Pruning immediately following planting can delay or prevent successful establishment of transplanted trees. Studies on desert species, like Blue Palo Verde, suggest that as much as 60% of all photosynthesis occurs on the surface of young branches. Removing branches serves to limit the total surface area available for photosynthesis, lowering the plants capacity to manufacture "food". It also reduces the total amount of stored carbohydrates (particularly with trees transplanted while dormant) and results in less vigorous growth. Damaged or broken branches can and should be removed but pruning for shaping or form should be minimized at the time of transplanting.

A significant portion of the structure and form of nursery-grown trees is usually firmly established in the three to four years before they are offered for sale. For these trees all that is required is maintenance pruning and thinning to compliment and reinforce the established form and the removal of potentially problematic branches. With younger, underdeveloped trees, branching form, removal of co-dominant branches, and many other pruning decisions will need to be made. Where single trunk, upright trees are required, this form should be well established at the time trees are purchased and installed. In these instances it maybe necessary to purchase larger box size trees. Attempting to substantially modify the structure of desert species (e.g. pruning a low branching multiple trunk tree into a more standard trunk form) is never successful. The typical result is trunks that have a corkscrew or highly twisted shape with large gaps between branches and numerous, large and unsightly pruning scars.

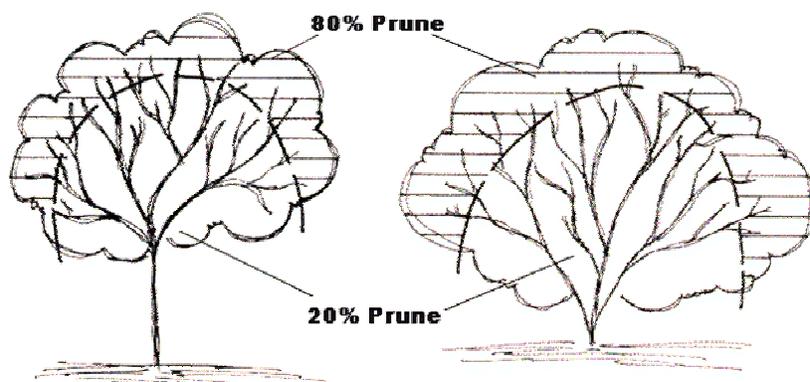
PRUNING PHILOSOPHY: It is ALWAYS preferable to regularly remove many small branches than to periodically remove a few larger ones. Removal of crossing and parallel branches and branches that pose hazards to foot traffic should be removed first. Both crossing and obstructing branches are best removed when they are relatively small twigs. By starting with "clean-up pruning" (the removal of small branches) the

general form of the tree is more apparent. Stop periodically and step back from the tree, like an artist working on a painting, and take in an overall view of the tree from ALL sides. Identify problem areas then begin pruning again. Repeat this process several times while pruning. Recall that excessive branch removal and improper or inappropriate pruning can act to stimulate additional unwanted growth. Corrective pruning can stimulate desired growth or reduce and better control growth and form.

The most common point where tree branches fail is at the junction of two or more co-dominant or adjacent branches. This failure usually is from an included bark branching juncture or from lion tailing the trees branching structure, over burdening the branching connection points. Included bark is bark embedded or a bark ridge turning inward between opposing branches, a branch and a main trunk or two co-dominant branches creating a structurally weak point in the tree. Included bark prevents strong attachments of branches, often causing a crack at the point where branches meet. An inward bark ridge line usually develops where they join and, more importantly, the included area declines or dies from to the cambium of both branches being squeezed and killed, weakening the branch or trunk. Trees with co-dominant leaders tend to have included bark and are more likely to split and ultimately fail. Included bark may be remedied by removing the smaller of the two branches or the one supporting less of the overall mass. Branches with wider or U-shaped angle of attachment should be retained. Good branch attachments have a raised ridge line or collar at the point where branches meet.

Periodic light thinning is the most desirable method of pruning. Such light thinning is especially important in June, July and August. Defining the trees landscape goal and outlining a growing season pruning plan synchronizes desirable light monthly thinning instead of an annual or bi-annual heavy pruning session. This managed pruning can reduce the number of wind-damaged branches and prevent uprooting of trees. Removal of large portions of the tree canopy (more than 30%) during any one pruning session in the summer growing season, can lead to aggressive, unwanted re-growth, limited root development and increased vulnerability to sunburn injuries that can be colonized by wood boring insects. No more than 20% of the tree foliage should be removed at any one time with 80% of this pruning concentrated on the new growth on the outer third of the canopy. The remaining 20% should be removed from the two thirds of the canopy removing succulent (“water”) growth and crossing branches (**Figure A**).

Figure A: 80/20 Pruning Practices for desert trees

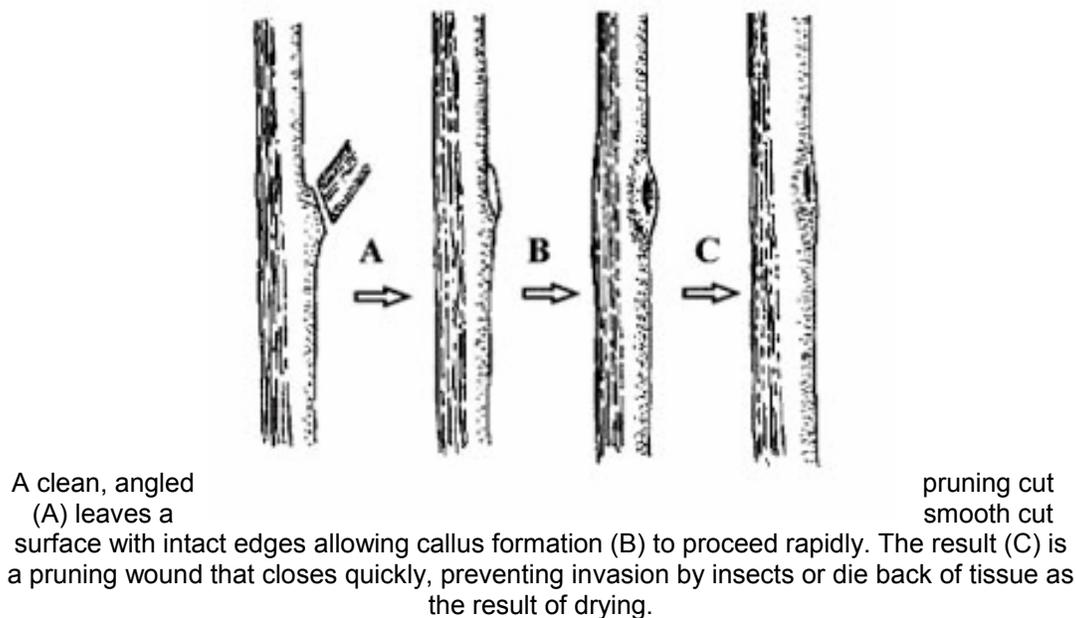


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PRUNING METHODS: It is well documented that sharper pruning tools make cleaner cut that generally heal rapidly. Keep pruners and saws sharpened and clean. Use the appropriate tool for the size of branch being removed. "Fine toothed" saws can be used on larger branches to finish the pruning process, leaving a smooth cut surface that will quickly heal. Removal of small branches can be done almost any time of year. Fall and winter have the advantage of giving the individual a better view of the structure of branches when leaves are shed.

The primary goals of tree pruning are to compliment the natural shape of the tree and to promote healthy, vigorous growth. Pruning can have a number of effects on trees. It can compensate for root loss, aid in maintaining health and appearance, control plant growth, influence vigor and re-invigorate stagnant trees. Two things should always be appreciated when pruning: 1) improper pruning can serve to stimulate additional unwanted growth; and 2) each pruning cut creates a wound in the tree's protective bark. Proper and selective cuts will enhance the appearance and health of tree and leave wounds that will heal rapidly. The angle and position of pruning cuts greatly influences the overall success of a pruning program and dictate how quickly wounds will "heal". Pruning cuts should be made close to, but not beyond, the branch bark ridge and the collar at the base of the branch (**Figure 1**).

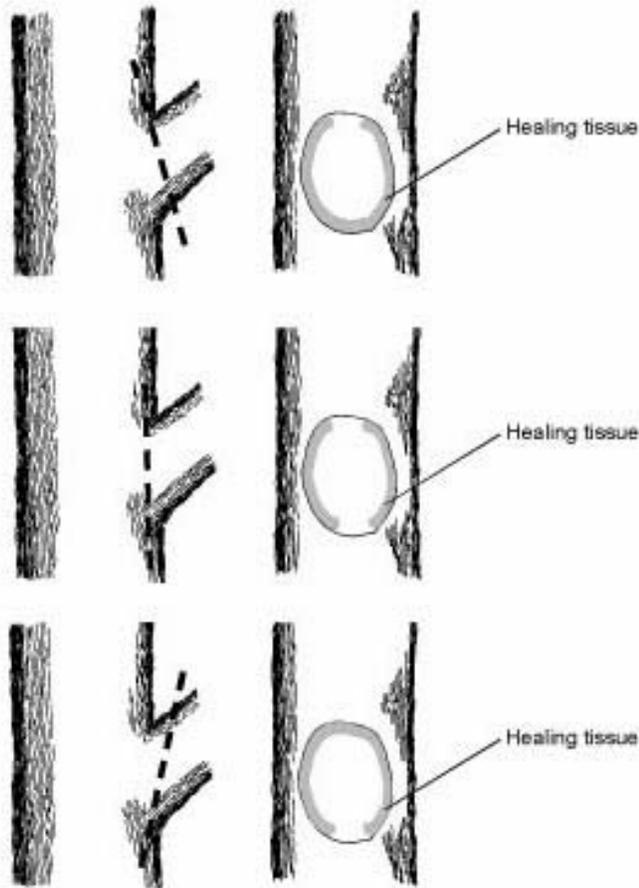
Figure 1: Proper Pruning and Healing



Sharp tools that make clean, smooth edged wounds will heal the quickest. These wounds don't "heal" like animal wounds. Instead trees produce callus tissue that es-

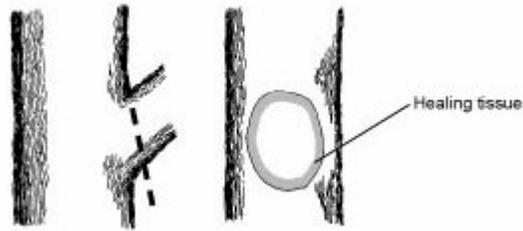
entially "re-cover" the open area (**Figure 2**). Wounds heal from the edges. This healing is easily seen by observing the ring of raised or swollen bark surrounding the edge of a healing wound. The bark tissue forms the callus, giving the edges of the cut this raised appearance. Over time, with growth and the subsequent increase in the branch diameter, the old wound is closed completely. Dull pruners and saws leave ragged edged cuts. Such cuts develop callus more slowly, delaying the healing process. Wounds that are slow to heal can be sources of oozing sap (that can stain hardscape elements and patio furniture) and serve as points of entry for insects, bacteria and fungi. These pests can cause additional damage and further delay healing.

Figure 2: Pruning Cut Angles Dictate the Pattern of Wound Tissue Formation



Improper pruning cut angles result in incomplete distribution of wound healing tissue that will slow the healing process and can lead to die-back, infestation by insects or infection by fungi and bacteria.

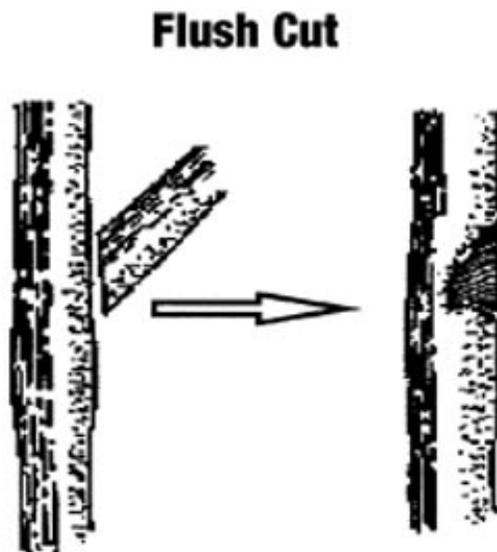
Correct Cut Results with Good Wound Wood Pattern



Cuts that preserve the branch collar form a complete ring of callus tissue, heal rapidly, help prevent invasion by pests and ultimately promote healthy growth.

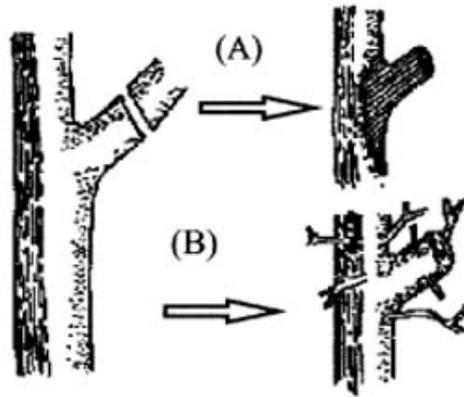
Another common mistake is leaving short stubs instead of pruning branches off just above the collar. Aside from being extremely unsightly (and unprofessional looking) these stubs can sunburn, dry out, cause die back and serve as entry sites for some wood boring insects, bacteria and fungi. Tree borer damage is often misidentified as being caused by tree stress or general decline when in fact it is the result of stub pruning. Secondly stubs can snag clothing or the skin of pedestrians. Most importantly, such cuts generate additional unwanted branches by stimulating both lateral and adventitious buds (bud arising from previously woody tissue) to produce numerous new branches. These additional branches must ultimately be removed by additional pruning (**Figure 3**).

Figure 3: Other Common Pruning Mistakes



Flush cuts cause underlying tissues to dry out slowing callous formation, are subject to insect invasion and promote tissue die-back.

Stub Pruning



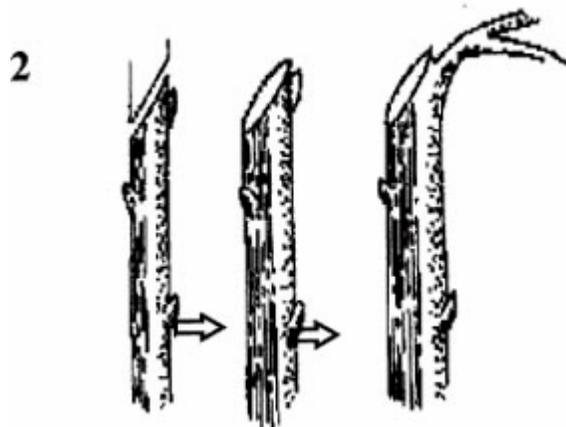
Pruning cuts that leave a branch stump can result in tissue die-back (A) or proliferation of unwanted branches (B). Stumps may also be a hazard to pedestrians by snagging clothing or causing injury to passersby.

Removing the branch at the collar serves to direct the subsequent growth towards the terminal of the remaining branch without excessively stimulating other buds to produce additional branches. Similarly, when heading back a branch, pruning back to a lateral bud seems to direct the branch growth through that bud making it the new terminal bud (Figure 4).

Figure 4: Pruning Cut Angle and Placement



1. If the cut angle is too steep (A) the tissue can dry before healing and cause die back. Too flat an angle (B) leaves a blunt surface that can collect water which slow wound healing and can promote decay. Cutting too far (C) from a lateral branch or bud can over stimulate new growth resulting in undesirable multiple, tightly packed branches, die-back and defeat the original purpose of pruning.



2. Make pruning cut directly above a bud or lateral branch at about a 45 degree angle. Such cuts result in controlled growth of the cut branch and healing of the pruning wound.

Growth Management: Growth management is the least exploited strategy to avoid pruning. Many established desert natives can be naturalized to where they can survive with little or no supplemental irrigation. The practice of limiting water and fertilizer serves to significantly slow growth and reduce the need for pruning and thinning. For species that cannot be entirely naturalized, limiting irrigation and nitrogen can reduce growth and the need for pruning.

Seasonal Pruning: Periodic thinning is the most desirable method of pruning. Thinning trees before the monsoon season can reduce wind damage to branches and uprooting of trees. Removal of large portions of the tree canopy (more than 30%) during the summer can lead to sunburn injuries that can later be colonized by wood boring insects. Avoid hedging or heading back desert species, as this will only stimulate excessive branching. For trees less than 7 years old, monthly light pruning (removal of no more than 20 to 30% of the leaf mass) during the growing season will keep the root to foliage mass ratio equal, not stimulate excessive flush growth, allow optimal photosynthesis to occur, initiate quicker root and tip branch growth, prevent sun burn injury and lessen the likelihood of wind damage. Always use clean, sharp tools that are regularly cleaned in a 10% solution of bleach.

Some desert species are slow to exhibit the effects of freeze damage. Branches that do not immediately bear leaves in spring may not be damaged. Delay pruning suspect damaged branches until the tree has begun producing new leaves. By then residual freeze damaged branches should be obvious and easily removed. Remember Spring pruning can reduce spring and summer flowering.

The old adage, "A craftsman never blames his tools," actually carries two distinct but important messages. The first is that a craftsman takes personal responsibility for the work he produces and second that he uses and maintains his tools in such a way that they only enhance the quality of his work.

All the information detailed above is of little value if the pruning tools used are not up to the task. Research has consistently shown that smooth-edged, clean pruning cuts heal quickest and are least prone to invasion by insect pests or disease organisms.

When selecting pruning tools, three key words to think about are **CLEAN, SHARP** and **APPROPRIATE**. These three ideas share the common purpose of producing clean, smoothed edged cuts. Pruning tools should be kept clean, should be sharp and should be the appropriate type for the limb size.

Cleaning pruning tool blades after each cut reduces the chance of spreading disease-causing organisms from one tree to another or to other parts of the same tree. To sanitize pruners, dip the blades in a solution that is 1 part bleach and 9 parts water (10 % solution). Bleach acts as a sterilizing agent and helps prevent the spread of diseases within and between trees being pruned. This cleaning solution should be refreshed by adding more bleach every 20 to 30 minutes, as it loses its disinfectant potency quickly. Remove debris (wood fibers, bits of debris) from the cutting edge as they serve to dull the cutting surface and prevent clean cuts. For greatest ease of use and long life, regularly oil the hinge and the blades of pruning tools.

Before each pruning session inspect the cutting surface of the pruners to see that they are clean and sharp. Consult the owner's manual or manufacturer's instructions regarding the appropriate sharpening tools and proper sharpening techniques. With some tools, particularly saws, it may be advisable to have them professionally sharpened.

Pruning and pole saws along with hand pruners and loppers come in many sizes and forms. Most pruning tasks can be accomplished with three basic tools. The tool ultimately selected is determined by the diameter of the branch being pruned. As a general rule, hand pruners (**Figure 5**) should be used for removing branches smaller than the diameter of your finger (about 1/2" in diameter), loppers (**Figure 6**) for branches slightly larger than your finger (about 1" in diameter) and pruning saws for anything larger (**Figure 7**). In spite of these rules, several other factors influence tool selection. Never force pruners through a cut. In these situations the blades do more crushing than cutting and the resulting wounds heal very slowly. If done correctly and regularly, pruning should only rarely (wind damage or other injuries excluded) require the removal of limbs larger than 2" diameter. To maintain greatest vigor, health and appearance, desert trees should be pruned lightly and regularly as opposed to heavily and infrequently.

The pruner used should easily cut the branches being removed. In some instances

green wood (young growth) may be quite soft and easily cut while hardened, dead, mature or dormant wood may prove more difficult. Most popular pruners and loppers are the "hook and blade" bypass type where both blades have sharp edges and the cutting edge of one blade passes underneath the other. Properly sharpened bypass pruners produce smooth cuts with minimal hand effort.

Arborist's saws range in size from 6 to 26 inches long with varying numbers of teeth per inch along the blade (**Figure 8**). Higher numbers of teeth per inch make for smoother, cleaner cuts. Such saws generally do not cut as quickly. Ideally, for cutting larger limbs, use a large toothed saw for the initial cut, then make a finish cut with a fine toothed saw to leave a smooth, clean, rapidly healing wound surface (**Figure 9**).

Most straight saws tend to cut on the forward or push stroke while most curved saws cut on the pull or back stroke. Curved saws are ideal for cutting branches that are above head level. Folding or fixed blade saws work equally well and selection is generally based on the users preference and ease of carrying. Avoid "bow" and chain saws for making finishing cuts. Both these saws are best adapted for felling trees or large branches, not careful pruning.

In summary

1. Pruning can do as much harm as good to tree growth, form and vigor.
2. Select proper tree variety, trunk form, and tree spacing for landscape location.
3. Prune to compliment and reinforce the tree's natural form and shape.
4. Light (no more than 20-30% of leaf mass) and regular pruning is more desirable than heavy and infrequent.
5. Maintain temporary limbs to develop trunk caliper and taper.
6. Proper angle cuts accelerating healing of wound.
7. Use pruning tools that are appropriate to the size of branches being cut.
8. Always use sharp tools.
9. Clean tools with disinfectant at regular intervals during a pruning session.
10. Change or replenish disinfectant frequently during pruning session.

Figures 5 through 9

Common Pruning Tools

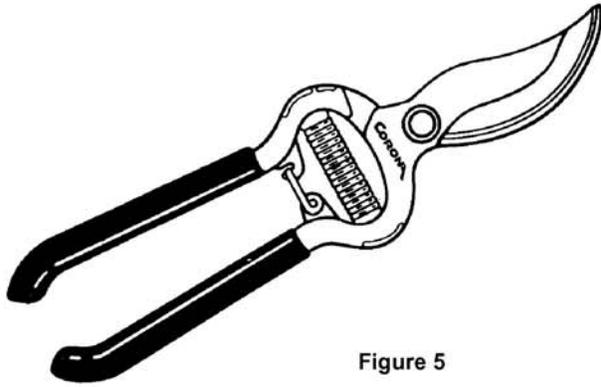


Figure 5

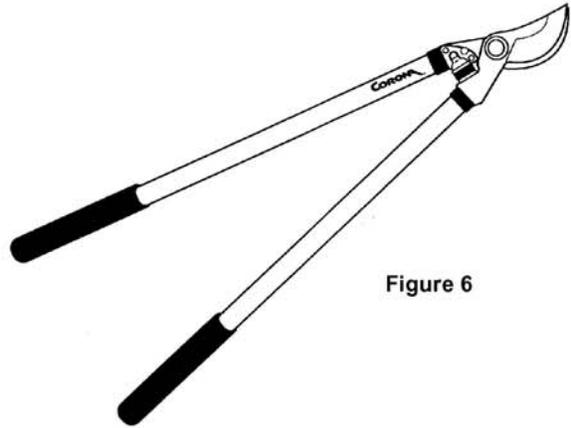


Figure 6

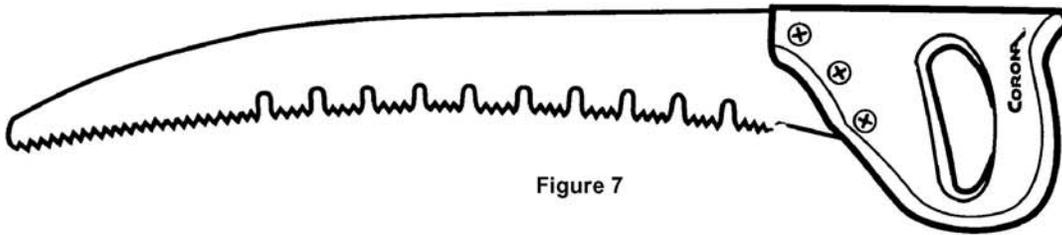


Figure 7

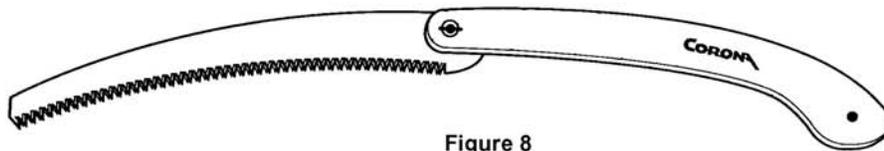


Figure 8

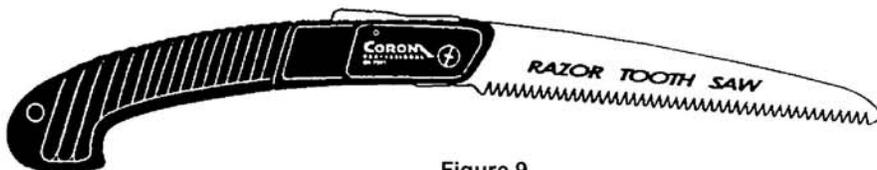


Figure 9

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