

Lesson 4: Forestry Tools and Equipment

If you use forest tools properly with safety in mind, they are valuable to your success in the forest industry. Safety is the key. A careless mistake could mean serious injury to you or your co-workers.

Tools for Pruning and Planting

See Figure 4.1 for an illustration of the following tools.

Tree saw: This hand saw with its curved blade is maneuverable to aid in making smooth, flush cuts on small branches. It is used in pruning trees such as black walnuts.

Hedge shears and hand pruners: These tools are commonly used to shape plantations of Christmas trees. Always keep tools sharp to facilitate clean cuts.

Planting tools: There are two commonly used tools for planting forest seedlings – the planting machine and the tree planting bar. The planting bar is one of the best tools. It is inexpensive, allows for speed in planting, and can be used to compact soil around roots.

Tools for Harvesting Trees

Axe: Many a felling and bucking crew now go into the woods without the once all important tool of the wood-cutter – the axe. Its absence is a testimonial to the utility and versatility of the chain saw.

Nevertheless, a light single-bit axe is still a highly useful tool for felling and bucking. Such an axe with a 2-1/2 to 3-pound head and a 24 inch handle can be a useful tool in cutting small brush and limbs that interfere with the job. It is safer to use an axe rather than a chain saw to clear such obstructions. The poll (back) of the axe can be used to drive wedges and the blade can chop out a chain saw that gets stuck.

The axe blade should be kept sharp and properly tapered for both efficiency and safety. A dull axe is an unsafe tool because it requires harder blows and is more likely to glance off the material being cut.

The poll end of an axe should never be used to drive a steel wedge. Steel splinters can break off and be projected into the eyes.

Wedges: Wedges may be used to keep chain saws from being pinched in the cut and to start the tree falling in the right direction. Steel wedges should never be used in a chain saw cut. Even slight contact with the running chain will ruin the chain and possibly the bar of the saw. Plastic, wood, or soft metal wedges should be used.

Woodchoppers maul: Another commonly used tool, particularly for hand spitting fuelwood, is the splitting maul. For short pieces of wood that are relatively easy to split, it is the only tool needed. Such woods would include clear pieces of practically all softwoods except hemlock and a vast majority of hardwoods such as oak, ash, maple, cherry, and beech. A few hardwoods such as elm, sycamore, and blackgum, have an “interlocked grain,” which makes them difficult to split. Also, the presence of knots makes the splitting of almost all woods difficult. In such cases, the splitting maul can be embedded in the piece of wood with a sharp blow and then pounded in further with a wooden headed maul.

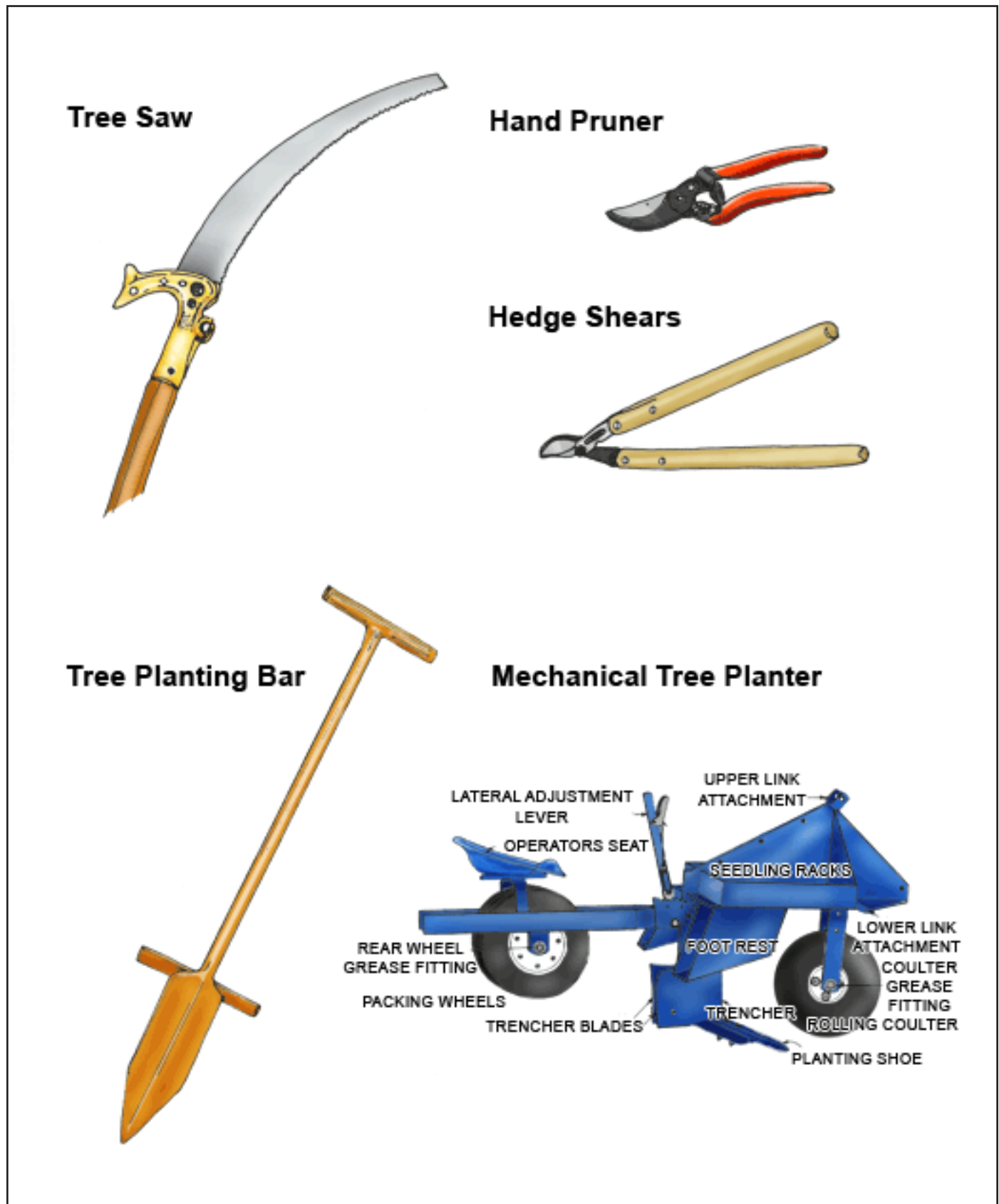
Peavey or cant hook: The cant hook is used to pry or roll logs. When using the cant hook, logs should be rolled away from the user to avoid logs rolling onto the feet. See Figure 4.2.

The cant hook is also used as a lever in lifting logs and is handy for prying logs onto blocks to keep the saw from pinching in bucking. Also, fallen trees can be pried away from stumps with a cant hook.

Chain saw: The gasoline-powered chain saw has become the most widely used and indispensable tool in today's logging operation. Probably 90 percent of the wood-cutting jobs, including timber felling, limbing, and bucking, are done with the chain saw. However, in the hands of a careless or inexperienced operator, chain saws can be dangerous. If you want to get the best out of your chain saw, always treat it with respect.

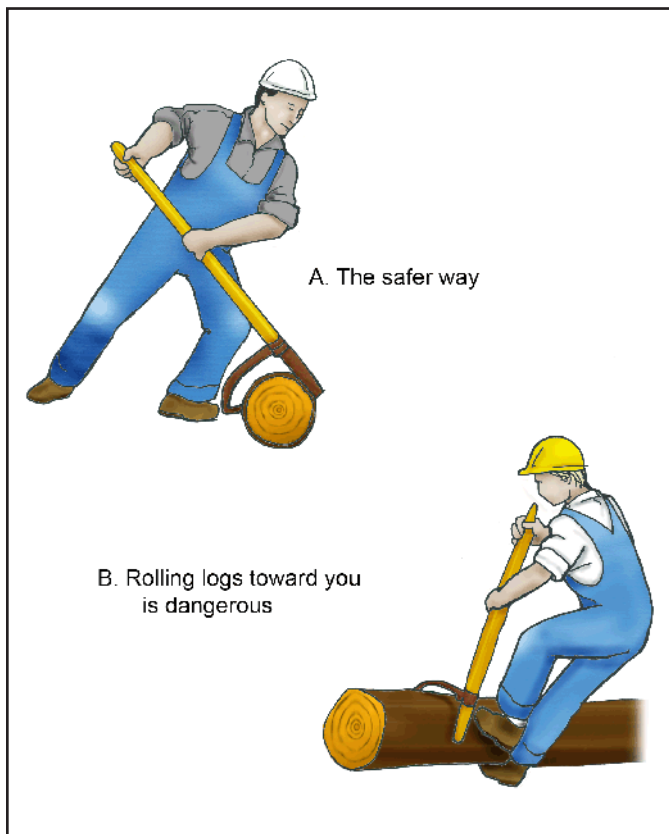
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Figure 4.1 – Tools for Pruning and Planting



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Figure 4.2 – Using the Cant Hook



Before you cut firewood or timber, outfit yourself with proper clothing and protective equipment that will reduce the possibility of serious injury. See Figure 4.3.

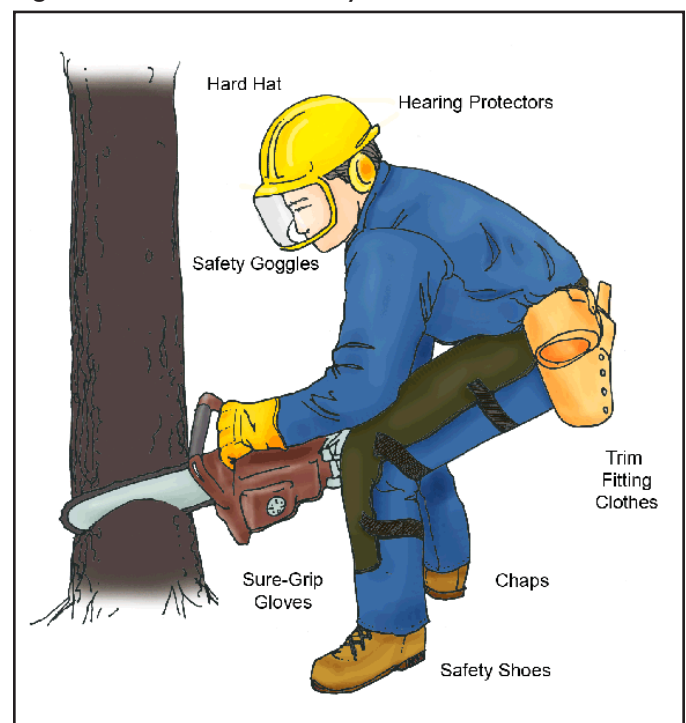
- ◇ Clothing should be well-fitted and free of dangling or ragged edges which could become tangled in the saw. Avoid scarves and be sure to tie back long hair. For additional protection, the use of nylon mesh protective leg chaps and/or knee pads can provide increased protection for your legs.
- ◇ A hard hat protects your head from falling limbs or branches. A properly fitted hat is cool, comfortable, and provides important protection from serious head injury.
- ◇ Safety goggles or safety eye glasses with side shields prevent injury from flying wood chips, twigs, and sawdust.
- ◇ Comfortable ear muffs or ear plugs protect your ears from the 95+ decibel noise level from the saw.
- ◇ Light-weight, non-slip gloves protect hands from abrasions and wood cuts.
- ◇ Safety boots with good gripping soles to prevent falls, high tops to protect ankles, and steel toes to protect feet are necessary equipment.

Using Chain Saws With Safety in Mind

In the hands of a careless or inexperienced operator, chain saws can be deadly. The U.S. Product Safety Commission, in a recent survey, estimated approximately 50,000 people required hospital treatment for injuries associated with chain saws. In these accidents, the operator made a careless move such as reaching across the saw or losing saw control. Loss of balance due to loss of footing accounts for one out of every six accidents with kickback being another major chain saw hazard. Safety awareness can sharply reduce the incidence of injury.

Safety begins before actual saw operation begins. First, in preparing to operate a saw safely, read and study the owner's manual. Even if you are an experienced operator, you should periodically review safe operational procedures. If you buy a used saw, ask the previous owner for the operator's manual or write the saw manufacturer for a copy.

Figure 4.3 – Chain Saw Safety



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A saw in good condition is safer and easier to operate. Preventative maintenance will allow you to cut more wood quickly and safely. Maintenance includes sharp teeth, correct chain tension, proper lubrication, and a properly turned engine. Check your operator's manual for this maintenance information.

If you notice that the chain tends to walk sideways while cutting, the cut shows fine powder instead of chips, you find yourself pressing down hard to keep cutting, or you smell burnt wood, your saw needs sharpening. Follow the instructions outlined in your manual when sharpening the chain. If you do your own sharpening, use the proper tools. Wear gloves or use a rag over the sharpened cutters.

To assure good cutting action and a long chain life, check the chain tension. If it is too loose, the chain will derail; if it is too tight, the chain will bind. All chains stretch with use. Most of the stretch occurs during the first half hour of operation. Follow the manufacturer's recommendation of chain tension. Most manufacturers recommend that a cold chain be tightened to where the chain tie straps stand away from the bar rail about 1/32 inch at the center bar. A warm chain should be adjusted to 1/8 inch gap.

Lubrication will prolong a chain's useful life. On saws with automatic oilers, be sure the oiler is properly adjusted so it doesn't over oil and run dry during operation. Remember that automatic oilers need an extra squirt of oil occasionally.

At times the bar-oiling mechanism might plug up and serious damage to the saw can result if not corrected. If the chain smokes while operating, there is not enough lubrication.

Every owner should have a good tool kit to help assure continued safe operation of the saw. The kit should contain the following:

1. A few extra labeled cans of chain oil
2. Wrenches to fit all nuts and lugs on the saw
3. Screwdriver
4. Round file and guide for touching up chain
5. Flat file and depth gauge to file the depth guides

6. Small brush to clean away the sawdust and wood chips from around the gas cap and cooling fins
7. Extra spark-plug
8. Owner's manual (wrapped in a plastic bag)
9. Cleaning rags
10. Sharp axe (2-1/2 to 3 pound head, 24-inch handle)
11. Wooden maul and wedges
12. Multipurpose fire extinguisher
13. Shovel
14. Supply of fuel in a UL listed and/or FM approved safety can
15. First aid kit

Safe Operating Techniques

Since the chain saw engine is a two-cycle engine, use the manufacturer's recommended fuel mixture. When refueling the engine, use a funnel or flexible nozzle to avoid spillage on the engine.

Only refuel the engine when it is **cool**. If fuel is spilled, thoroughly clean the engine with the saw on the ground and in an area cleared of combustible materials.

Under **no** circumstances should you smoke during refueling.

Each time you refuel, refill the oiler, and check the air filter, chain tension, and all nuts and bolts for tightness.

The saw should be started on a firm base with the cutting teeth up away from stones, sticks, or other obstacles. With one foot placed in the bracket to the rear of the unit, set the starting controls. Grip the top handle of the saw firmly with one hand and use the other hand to pull the starting rope.

Never start the saw by letting it drop with one hand while the end of the starter cord is held with the other. This process, though commonly used, is an invitation to disaster.

Firm footing should be maintained by the operator while the saw is running. Turn off the saw while moving from tree to tree.

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The saw should be carried with the engine off, at the operator's side, and the bar to the rear.

While cutting, the saw should be held with **both** hands, the thumb firmly locked around the front handle, while the operator is standing with feet well apart and the body well-balanced. The operator stands to the side of the saw while cutting, **never behind it**.

The operator should keep clear of the work. Never cut above shoulder level. While bucking, work on the uphill side of logs. Always be aware of helpers and bystanders when using a chain saw.

Felling Trees With a Chain saw

Felling is probably the most difficult and dangerous part of the logger's job. The required skills and judgment cannot be attained solely by reading a few pages in a handbook. Working with an experienced woodsman plus knowing the general rules of felling is a good combination to have before attempting to fell trees.

Before you attempt to fell any tree, consider its characteristics. One tree may lean, while another tree might be unbalanced because of uneven top growth or breakage even though the trunk doesn't lean. Large diameter branches are also a good indicator of unbalance. Also, consider wind conditions, which can have a dramatic effect on the direction of fall.

Once the direction in which the tree is to be put down is decided, the working space around the tree should be cleared of low or dead limbs, underbrush, and other obstructions. Small wisps of brush are cleared by pulling on the stem with one hand while slicing the stem area closest to the trunk with the axe.

Small saplings are cut by a controlled one-handed chop on the strained fiber, cutting first on one side of the base as the sapling is bent over and then on the other side.

In advance, plan your escape route to either the rear or the side depending on the likely direction of the fall. Plan in advance what to do with the saw when the tree starts

to go. Shut the saw off and drop it in a safe place allowing an unhampered escape.

When you have determined a felling and safety plan, proceed as follows:

1. Hold the saw firmly in both hands; take a well-balanced stance.
2. Make the cut close to the base of the tree but high enough to conveniently avoid running the saw into the ground.
3. Cut through trees up to 8 inches thick using one cut.
4. On larger trees, notch (undercut) at least 1/3 of the trunk diameter on the fall side of the trunk. Make the lower cut first to avoid pinching the saw in the cut.
5. Make a felling or back cut on the opposite side of the trunk 2 inches above and parallel to the horizontal notch. Leave wood fibers to act as a hinge to keep the tree from twisting and falling in the wrong direction or kicking back on the stump.
6. Guide saw into the tree. Do not force it. The rate of feed will depend on the type of timber being cut.
7. Remove the saw from the cut and shut it off before the tree falls.
8. Cutting completely through the hinge may allow the tree to fall in any direction, possibly on the retreating operator. Move away from the tree at a 45° angle through the cleared retreat lane.

A well balanced tree may have to be wedged to fall in the right direction. Use two wedges rather than one to ensure that the tree falls forward. Use a sledge mallet or the poll of the axe to drive the wedge. Strike squarely with firm but not excessive blows. Careless blows may pop the wedge out, swinging the tree backward. Remember to use only wood, plastic, or soft metal wedges – never steel.

Limbing Using a Chain saw

Limbing is removing branches from felled trees. After the tree is on the ground, take a look at each limb before making the cut to be sure that cutting the limb off will not bind the guide bar or cause the trunk to roll toward the operator.

Figure 4.4 – Safe Bucking Procedures

Use these bucking procedures for safety.

A. Log Lying Flat

Cut from top (overbuck)
Avoid cutting into the earth



B. Work Supported at One End

First, cut underbuck
(1/3 of the diameter) to
avoid splintering



Second, cut overbuck (2/3 of the diameter)
to meet the first cut (to avoid pinching)

C. Work Supported on Both Ends

First, cut overbuck



Second, cut underbuck

Do not face the limb squarely. Stand at approximately a 45° angle so that if the saw slips or completes the cut sooner than expected, the chain will not strike your leg.

Sawing with the point of the guide bar (nose sawing) greatly increases the chance of chain saw kickback. If the chain suddenly hits a solid object or takes too large of a cut, then the saw may be forced backward and result in a serious accident. Do not saw with the point of the guide bar.

Bucking Logs Safely Using a Chain Saw

Bucking is the process of cutting the trunk into desired lengths. Special hazards of bucking that must be recognized are log roll, kickback, and backstrain.

The general procedure for bucking logs is as follows. See Figure 4.4.

- ◇ When log is supported along entire length:
 1. Cut from top.
 2. Roll over and cut from opposite side until free.
 3. Use care to avoid getting saw into ground.
 - ◇ When log is supported from one end:
 1. Cut 1/3 of diameter from one side.
 2. Cut 2/3 of diameter from top, meeting first cut.
 - ◇ When log is supported at both ends:
 1. Make first cut from top 1/3 diameter.
 2. Then cut 2/3 from underside, meeting first cut.
- ◇ Cutting firewood lying on the ground:
 1. Make cuts on side 3/4 of the way through log for each length.
 2. Roll log over and cut through to first cut for each length.
 3. A three-legged sawhorse is effective in steadying wood and making cutting easier and safer.

Summary

Know the right tools for planting, pruning, and harvesting forest trees. Always use them with safety in mind as they are valuable to your success in the forest industry.

Credits

Baker, D.E., and B.E. Cutter. *Basic Chain Saw Safety and Use*. (Guide G1959). Columbia: University of Missouri Extension, reviewed 1998. Accessed May 30, 2008, from <http://extension.missouri.edu/xplor/agguides/agengin/g01959.htm>.

Slusher, J.P., and G. Hoss. *Before You Order Tree Seedlings* (Guide G5006). Columbia: University of Missouri Extension, revised 2000. Accessed May 27, 2008, from <http://extension.missouri.edu/explore/agguides/forestry/g05006.htm>.

Slusher, J.P., and T. Robison. *How to Plant Forest Trees* (Guide G5008). Columbia: University of Missouri Extension, reviewed 1993. Accessed May 30, 2008, from <http://extension.missouri.edu/xplor/agguides/forestry/g05008.htm>.

