Heating With Wood:
Producing, Harvesting and Processing Firewood

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This NebGuide explains the basics of producing, harvesting and processing firewood.

Why Heat With Wood?

Our forefathers heated their homes with wood because it was the only energy source available. Today, most people heat their home with electricity or natural gas, but wood heat remains a viable home heating alternative.

Heating with wood provides several advantages over other sources of energy. Wood heat does not stop working when there is a blackout. With electric heat, you may find yourself in the cold when severe winter weather interrupts electrical service.

Heating with wood is also environmentally friendly. Burning wood produces little pollution, especially with modern high-efficiency stoves. Additionally, ashes from your fireplace or wood stove may be used in your garden to prevent pests and enrich the soil.

Wood is a renewable resource, as compared to finite fossil fuels, such as coal or gas. Fuelwood can be harvested from low-quality trees in woodlands, providing more space for the remaining healthier, higher quality trees.

Species Characteristics

Each species of wood differs widely in its characteristics (see Table I on page 2). For example, a cord of white oak firewood produces 29 million BTUs of heat, while one cord of linden firewood produces 13.8 million BTUs. High-density hardwoods, such as hickory, oak, ash, red elm and walnut, produce the most heat per cord and burn slowly and cleanly. In general, if heating efficiency is important, high-density woods, particularly hardwood species, are more desirable. Softwoods, such as most spruces, pines and junipers, and low-density hardwoods, such as cottonwood and willow, burn quickly and produce less heat per cord than dense hardwoods.

Because of resins in softwoods, they tend to smoke and spark and may present safety hazards. Softwoods also produce more creosote, a sticky tarlike substance that clings to chimneys and increases the risk of chimney fires.

How Firewood Is Measured

The standard measure for firewood is the “cord.” A cord may be either a full cord or a face cord. A full cord is a stack of wood 4 feet tall, 8 feet wide and 4 feet deep (128 cubic feet). The weight of a cord of wood varies by species (Table I).

A face cord is a stack of wood 4 feet high, 8 feet long and approximately 12 to 18 inches deep. The weight of a face cord also varies by species.

Firewood may also be measured by the “pickup load.” This measure is imprecise, but a full-sized pickup with an 8-foot bed will hold approximately one-third to one-half cord of wood, depending on how it is loaded. A pickup bed will hold more when wood is stacked, rather than thrown.

How Much Wood Will You Need?

The number of trees per cord depends on the size of the tree (Table II). A tree’s diameter is measured at a height 4 1/2 feet from the ground. This measure is called diameter at breast height (DBH). If trees 5 inches DBH are harvested for firewood, it will require 46 to 55 trees to make one full cord of firewood. However, one tree 22 inches DBH will produce one full cord of firewood.

Table II. Firewood cutter’s rule of thumb.

<table>
<thead>
<tr>
<th>Tree Size (diameter at breast height)</th>
<th>Number of Trees Per Cord</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>46-55</td>
</tr>
<tr>
<td>6</td>
<td>21-33</td>
</tr>
<tr>
<td>7</td>
<td>14-18</td>
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<tr>
<td>8</td>
<td>9-14</td>
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<td>9</td>
<td>6-9</td>
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<tr>
<td>10</td>
<td>4-6</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
</tr>
</tbody>
</table>

Depending on the type and quality of wood stove used; the type of wood burned; and the size, insulation and desired temperature of the area to be heated, you may need 4 1/2 to seven full cords of wood per year to heat your home. If you use wood heat as a partial heat source for your
The species composition of a woodland will determine its growth rate. An oak-hickory forest can grow an average of 27 cubic feet per acre annually; a cottonwood forest can grow up to 24 cubic feet per acre annually; and eastern redcedar and maple-basswood forests can each grow up to 22 cubic feet per acre annually. These rates are averages and will vary depending on many factors, such as weather, soil and the woodland’s condition.

The rate of a woodland’s growth can be increased through proper management. By determining the primary objectives for your woodland, taking an inventory of tree species in the area and identifying appropriate management practices, your woodland can become a highly productive, sustainable resource. For more information on woodland management, see NebGuide G97-1329, How to Manage Your Woodlands for Sustained and Maximum Benefits (http://ianrpubs.unl.edu/forestry/g1329.htm).
can improve the quality and growth rate of the remaining trees (Figure 1). To maximize the value of trees in your woodlot, first identify high-quality trees of the better timber species. Then, create space around these trees by removing poor quality trees that are crooked, diseased, decayed or of low commercial value. These diseased, dead or damaged trees can be used as firewood unless they are valuable to wildlife.

To improve the quality and growth rate of the remaining trees, it is important to remove poor quality trees. These trees can be used as firewood unless they are valuable to wildlife.

**Safety**

For safety, you should have a hard hat, ear protection, safety shoes, safety glasses and chain saw chaps (to prevent leg injuries). Never work alone in the woods. It is also a good idea to have a first-aid kit and cellular phone with you when cutting timber.

Cutting standing trees requires skill and the proper equipment. You will need a chain saw, extra sharpening chains, chain sharpening and saw maintenance tools, gas and oil and possibly wedges, mauls and an axe.

Remember, one cord of freshly cut wood can weigh more than two tons, so you will also need heavy-duty hauling equipment and a strong back. Keep the axes and saws sharp and well maintained for easy, safe cutting. Sharp tools will also reduce user fatigue. Never let the chain oiler go dry, and keep the chain saw air filter clean. Refer to your chain saw owner’s manual for proper maintenance guidelines.

**Cutting Firewood**

**Felling**

There are a number of safety concerns involved with cutting trees. You need to consider factors such as wind direction, the natural lean and balance of the tree, location of large limbs and whether the trunk is hollow or partially rotted. When harvesting firewood, be careful not to scar or damage the timber trees that are left standing.

Before cutting, clear brush around the tree that could interfere with your work. Pick an escape route for when the tree begins to fall. Plan to move far enough away so the butt end of the tree will not hit you if it kicks back off the stump.

**A.** Make a horizontal cut about one-third of the way through the tree. This cut should be as low as possible and on the side toward the direction you want the tree to fall. This is the undercut (Figure 2).

**B.** Make a 45-degree downward cut into the horizontal cut to saw out a notch. The wedge of wood forming the notch can then be knocked out (Figure 2).

**C.** Make a horizontal backcut 1 to 2 inches higher than the first cut and on the opposite side of the tree from the first cut. Saw toward the notch you just cut in step B. This is the backcut. Leave 1 to 2 inches of uncut wood as a hinge to hold the tree as it falls. This hinge controls the falling tree (Figure 3).

**D.** If necessary, use a wedge in the backcut to start the tree falling.

**E.** Move away at a 45-degree angle from the direction of the falling tree to the side and rear of the tree as it falls (Figure 4).

**F.** If a tree becomes lodged in another tree while felling, the safest way to get the tree down is to pull it away from the other tree with a tractor or winch. Never attempt to cut the tree in which the felled tree is lodged, and do not climb either tree.
Limbing

Once the tree is on the ground, you can begin removing its branches. This process is called “limbing.” While limbing the tree, keep the tree trunk between you and the saw whenever possible. Begin limbing at the base of the trunk and remove limbs from the top of the tree before removing limbs resting on the ground. The likelihood of the tree rolling increases as more branches are removed. Branches resting on the ground help stabilize the tree and should be cut last. Be alert for any movement in the tree or the branches as they are cut and be ready to move away quickly if necessary.

Bucking

With all the limbs removed from the tree, you’ll need to cut the trunk and large branches into short, firewood-sized sections. Cut the wood about 4 inches shorter than the length of your firebox. Watch for metal in the wood, such as fence wire or nails, that will dull the chain saw. Cut logs on the pinching side first, then make the final cut on the opposite side. Avoid cutting into the ground, as this will quickly dull the saw.

Splitting

Wood dries more rapidly when a large amount of surface area without bark is exposed to the air. This is why it is important to split firewood. Split firewood also ignites easier and is lighter and easier to handle.

The least expensive, but hardest and slowest, way to split wood includes the use of axes, mauls and wedges. Stand pieces of wood upright on a solid block approximately 20 inches high and wider than the piece of wood to be split. Do not split wood directly on the ground, as you could hit your foot or leg. Split toward the center of the wood. You may need to use several wedges to complete the split (Figure 5).

Power log splitters can take much of the labor out of splitting, but the purchase cost of these wood splitters should be weighed against the amount of firewood to be split. Examples of power log splitters include hydraulic, mechanical jack and screw models, which can be operated from a tractor, automobile or independent power source. Power splitters also can be rented, reducing overall costs.

Reducing moisture in firewood increases burning efficiency because drier firewood uses less heat to change water to steam. This means less wood must be harvested, saving you time and money. Also, reducing the amount of moisture in wood decreases the occurrence of firewood ignition problems, creosote buildup in the chimney, wood decay and insect pests.

Proper splitting and storage are important to the seasoning process. Start harvesting and seasoning your firewood early; the fall is not the best time to build a firewood supply for the forthcoming winter. It is best to cut your firewood one year before you will need it. Some firewood cutters fell trees in the summer and leave them in place with the branches and leaves intact for two to four weeks. The branches and leaves draw moisture from the wood, accelerating drying.

Air drying firewood takes time and space. Freshly cut trees are higher in moisture and need six to 12 months to air dry before they will burn efficiently. Proper allocation of space for stacking and seasoning firewood will save you time and problems. Firewood stacks can be messy and present a fire hazard, so avoid stacking them too close to the house. Stacking firewood too close to the house will also cut down on circulation within the stack and could create insect problems inside the house.

Place firewood in an open area for rapid drying and to prevent deterioration of the firewood. Stacked firewood should be raised off the ground slightly to increase air circulation. Stacking wood under a well-ventilated shelter will reduce drying time by keeping outside moisture off the stack. Shelters made of clear plastic sheeting (4 millimeters thick) located in sunny places can be used to speed up the seasoning process by increasing the temperature within the shelter. However, shelters made of plastic sheeting need to have proper ventilation so moisture can escape.

Harvesting, hauling and preparing firewood generally take four to 10 hours of work per standard cord. Proper planning and organizing will save you time and headaches during the burning season. Technical assistance is available through your local forester.

Seasoning Firewood

The primary reason for seasoning firewood is to get the moisture content of freshly cut logs below 20 percent.

References


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