UNL Extension: Acreage Insights

Acreage eNews-October 2013

http://acreage.unl.edu

Heating With Wood: Tree Species Characteristics

Many Nebraskans use firewood as a supplemental heat source, but to use wood effectively its important to understand tree species characteristics and the wood they produce.

Species Characteristics

Firewood, from different species or types of trees, varies widely in heat content, burning characteristics and overall quality. The table below presents several important burning characteristics for most species used in Nebraska.

Green weight is the weight of a cord of freshly cut wood before drying. Dry weight is the weight of a cord after air drying. Green firewood may contain 50 percent or more water by weight. Green wood produces less heat because heat must be used to boil off this water before combustion can occur. Green wood also produces more smoke and creosote than dry wood. Firewood always should be purchased dry or allowed to dry before burning.

Dry wood may cost more than green wood because it produces more heat and is easier to handle.

A wood's dry weight per volume, or density, is important because denser or heavier wood contains more heat per volume. Osage-orange is the densest firewood available in Nebraska. It contains almost twice the heat by volume as cottonwood, one of our lightest woods. It is best to buy or gather dense woods such as oak, ash or mulberry.

Hardwoods, or woods from broadleaved trees, tend to be denser than softwoods, or woods from conifers. Some firewood dealers sell "mixed hardwood" firewood. This may or may not be desirable, depending on the proportion of low-density hardwoods, such as cottonwood, that are included.

The amount of heat per cord of dry wood is presented in Table I. Heat content is shown as a percent of dry green ash, a common Nebraska firewood. Values above 100 signify higher heat content than green ash and values below 100 lower heat content.

Table I also contains information on other characteristics that determine firewood quality. Ease of splitting is important because larger pieces of wood usually must be split for good drying and burning.

Fragrance and tendency to smoke and spark are most important when wood is burned in a fireplace. Woods that spark or pop can throw embers out of an open fireplace and cause a fire danger. Conifers tend to do this more because of their high resin content.

Woods that form coals are good to use in wood stoves because they allow a fire to be carried overnight effectively.

Species	Weight (lbs./Cord)		Heat per Cord (Million BTUs)	% of Green Ash	Ease of Splitting	Smoke	Sparks	Coals	Fragrance	Overall Quality
	Green	Dry								
Apple	4850	3888	27.0	135	Medium	Low	Few	Good	Excellent	Excellent
Ash, Green	4184	2880	20.0	100	Easy	Low	Few	Good	Slight	Excellent
Alder		2540	17.5		Easy		Moderate	Good	Slight	
Ash, White	3952	3472	24.2	121	Medium	Low	Few	Good	Slight	Excellent
Basswood (Linden)	4404	1984	13.8	69	Easy	Medium	Few	Poor	Good	Fair
Birch	4312	2992	20.8	104	Medium	Medium	Few	Good	Slight	Fair
Boxelder	3589	2632	18.3	92	Difficult	Medium	Few	Poor	Slight	Fair
Buckeye, Horsechestnut	4210	1984	13.8	69	Medium	Low	Few	Poor	Slight	Fair
Catalpa	4560	2360	16.4	82	Difficult	Medium	Few	Good	Bad	Fair
Cedar, Red		2060	13.0		Easy	Low	Many	Poor	slight	Fair
Cherry	3696	2928	20.4	102	Easy	Low	Few	Excellent	Excellent	Good
Coffeetree, Kentucky	3872	3112	21.6	108	Medium	Low	Few	Good	Good	Good
Cottonwood	4640	2272	15.8	79	Easy	Medium	Few	Good	Slight	Fair
Dogwood		4230	High		Difficult		Few	Fair		
Douglas-fir	3319	2970	20.7	103	Easy	High	Few	Fair	Slight	Good
Elm, American	4456	2872	20.0	100	Difficult	Medium	Few	Excellent	Good	Fair
Elm, Siberian	3800	3020	20.9	105	Difficult	Medium	Few	Good	Fair	Fair
Fir, White	3585	2104	14.6	73	Easy	Medium	Few	Poor	Slight	Fair
Hackberry	3984	3048	21.2	106	Easy	Low	Few	Good	Slight	Good
Hemlock		2700	19.3		Easy		Many	Poor	Good	

Honeylocust	4640	3832	26.7	133	Easy	Low	Few	Excellent	Slight	Excellent
Juniper, Rocky Mountain	3535	3150	21.8	109	Medium	Medium	Many	Poor	Excellent	Fair
Locust, Black	4616	4016	27.9	140	Difficult	Low	Few	Excellent	Slight	Excellent
Maple, Other	4685	3680	25.5	128	Easy	Low	Few	Excellent	Good	Excellent
Maple, Silver	3904	2752	19.0	95	Medium	Low	Few	Excellent	Good	Fair
Mulberry	4712	3712	25.8	129	Easy	Medium	Many	Excellent	Good	Excellent
Oak, Bur	4960	3768	26.2	131	Easy	Low	Few	Excellent	Good	Excellent
Oak, Gamble			30.7							
Oak, Red	4888	3528	24.6	123	Medium	Low	Few	Excellent	Good	Excellent
Oak, White	5573	4200	29.1	146	Medium	Low	Few	Excellent	Good	Excellent
Osage-orange	5120	4728	32.9	165	Easy	Low	Many	Excellent	Excellent	Excellent
Pine, Ponderosa	3600	2336	16.2	81	Easy	Medium	Many	Fair	Good	Fair
Pine, Lodgepole		2610	21.1		Easy		Many	Fair	Good	Fair
Pine, White		2250	15.9		Easy		Moderate	Poor	Good	
Poplar		2080	Low		Easy		Many	Fair	Bitter	
Redcedar, Eastern	2950	2632	18.2	91	Medium	Medium	Many	Poor	Excellent	Fair
Spruce	2800	2240	15.5	78	Easy	Medium	Many	Poor	Slight	Fair
Sycamore	5096	2808	19.5	98	Difficult	Medium	Few	Good	Slight	Good
Walnut, Black	4584	3192	22.2	111	Easy	Low	Few	Good	Good	Excellent
Willow	4320	2540	17.6	88	Easy	Low	Few	Poor	Slight	Poor

Firewood Volume

Though firewood dry weight is important for determining heat content, firewood is normally bought and sold by volume.

The most common unit of firewood volume is the cord, also known as a standard or full cord. A cord is an evenly stacked pile containing 128 cubic feet of wood and air space.

Though a cord can be piled in any shape, a standard cord is generally thought of as a stack of wood four feet tall, eight feet long, and four feet deep. To figure the number of cords in another size or shape pile, determine the pile's cubic foot volume and divide by 128. A randomly piled stack of wood generally will contain more air and less wood than one neatly piled.

Some dealers sell wood by the face cord or short cord. A face cord is a stack of wood four feet high, eight feet long, and as deep as the pieces are long. Pieces are commonly 12 to 18 inches long, so a face cord may contain 32 to 48 cubic feet of wood and air.

Another common firewood measure is the pickup load. This is an imprecise but common measure. A full-size pickup with a standard bed can hold about 1/2 of a full cord, or 64 cubic feet, when loaded even with the top of the bed. Small pickups hold much less. Random loading will decrease this amount further.

A randomly piled stack or pickup load of wood will contain more air and less wood than one neatly stacked. Crooked, small diameter, and knotty or branchy pieces also reduce the amount of wood in a pile.

Buying Firewood

Species, volume, dryness and need for splitting should be considered when buying firewood. Before buying firewood, it's important to learn the basics to become an informed buyer, but knowing your dealer is the best way to ensure that you are getting the best firewood value for your money.

Sources:

1. Mike Kuhns, and Tom Schmidt. *Heating With Wood I. Species Characteristics and Volumes*. Lincoln, Nebraska: University of Nebraska- Lincoln Extension, 1988, G88-881. Digital Commons. Web. 22 Aug. 2013 <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1858&context=extensionhist>.

2. Mike Kuhns, and Tom Schmidt. *Heating With Wood I. Species Characteristics and Volumes*. Utah State University Cooperative Extension. Web. 22 Aug. 2013 <http://forestry.usu.edu/htm/forest-products/wood-heating/>.