

TECHNICAL NOTE

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE
STATE OFFICE STILLWATER, OKLAHOMA 74074

PLANT SCIENCE TECHNICAL REFERENCES - FOR IN SERVICE USE ONLY

TECHNICAL NOTE - Woodland OK-11

December 22, 1977

Re: Wood as a Fuel

Planned firewood cutting can be a good forestry practice. Land clearing frequently leaves considerable unused hardwood which may be available for working up into firewood if the owner plans ahead or an individual wanting the wood inquires early enough. Reducing the overstory of trees on native grasslands may increase native grass production. Wood is a renewable resource and unlike the fossil fuels can be replenished.

A cord of oak, hickory, or black locust wood produces approximately the same amount of heat as 150 gallons of fuel oil, 23,000 cubic feet of natural gas, or just over a ton of coal.

A standard cord of wood is a stack of wood 4 feet by 4 feet by 8 feet, (sticks of wood 4 feet in length stacked 4 feet high and 8 feet long). A standard cord contains 80 to 90 cubic feet of solid wood.

The terms rick or face cord are often used as a standard of measure for buying and selling fuel wood. The stick length varies by local conditions or as per agreement between buyer and seller; however, the pile of wood is still 4 feet high and 8 feet long or the equivalent of.

Having agreed on a stick length one may determine the number of ricks in a stack of wood by multiplying the length in feet times the height in feet then dividing by 32 the result will be the number of ricks.

The heat value of wood varies directly with its weight. Species which are heavy produce more heat. Individual trees, of course just like people, vary genetically in their characteristics. Table 1 shows approximate fuel values for 13 species of trees occurring in Oklahoma. The table reflects heat produced by combustion in a modern wood furnace.

TABLE 1 - APPROXIMATE FUEL VALUES FOR 13 OKLAHOMA TREES

<u>Species</u>	<u>Available Heat Units</u>	
	<u>Air-Dry</u>	<u>Green</u>
	(Million BTU/90 cu.ft. wood)	
Ash, White	20.0	18.0
Hickory, Shagbark	25.4	23.8
Hophornbeam	24.7	23.5
Locust, Black	26.5	24.4
Maple, Sugar	21.8	19.6
Oak, Red	21.7	19.6
White	23.9	20.4
Cherry, Black	18.5	17.3
Elm, White	17.7	15.8
Maple, Red	19.1	17.6
Silver	17.9	16.4
Basswood	12.6	11.0
Willow, Black	13.5	10.9

The relative heat value depends on the way wood is burned. Wet wood usually burns poorly in an open fire and produces less heat. Moisture causes incomplete combustion with open burning, while modern slow combustion furnaces with a long flame path recover most of the potential heat energy as table 1 indicates.

Table 2 reflects the generalized relationship between seasoning wood, moisture content and heat value of hardwoods when burned in other than a modern efficient furnace.

TABLE 2 - GENERALIZED EFFECTS OF SEASONING OF HARDWOODS
ON MOISTURE CONTENT AND HEAT VALUE

<u>Condition of Wood</u>	<u>Moisture Content</u> (% of oven-dried weight)	<u>Relative Heat Value</u> (% of Value for air) dry;
Green in fall, winter or	78	65
Green in summer	64	-
Trees leaf-felled in summer after 2 weeks	45	-
Spring wood seasoned 3 months	35	85
Spring wood seasoned 6 months	30	93
Dry wood seasoned 12 months	25	100

Fireplaces are a common way of burning fuel wood. The selection of wood to burn in a fireplace is a highly individual matter and often the selection of a certain species is for different reasons. Table 3 rates some of the characteristics of fireplace wood:

TABLE 3 - FIREPLACE WOOD CHARACTERISTICS

Species	Starting Spark		Fragrance	Coal Generation	Heat Value (Hickory=10)
	Ease	Output			
Apple	Poor	Few	Excellent	Excellent	83-84
Ash	Fair	Few	Slight	Good	81-82
Cherry	Poor	Few	Excellent	Excellent	70-71
Elm	Fair	Very Few	Fair	Good	71-80
Hickory	Fair	Moderate	Slight	Excellent	100
Locust (Black)	Poor	Very Few	Slight	Excellent	95-102
Maple (sugar)	Poor	Few	Good	Excellent	67-73
Oak	Poor	Few	Fair	Excellent	86-99

A recent trend in buying and selling wood is to buy or sell by weight. Table 4 shows the pounds of wood per cubic foot for selected

TABLE 4 - POUNDS OF WOOD PER CUBIC FOOT

Species	Weight	
	<u>Air-Dry</u> - (lb./cu.ft.) -	<u>Green</u>
Ash, White	41	48
Hickory, Shagbark	51	63
Locust, Black	48	58
Maple, Sugar	44	56
Oak, Red	44	64
White	47	63
Cherry, Black	35	45
Elm, White	35	54
Maple, Red...	38	50
Silver	33	45
Basswood	26	42

Hardwood produces approximately 60 pounds of ashes per cord. The ashes can be used to improve a garden soil. They add calcium, magnesium, potash, phosphate, and trace amounts of many other nutrients.

/s/ Roland R. Willis
Roland R. Willis
State Conservationist