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## **W179 Wood Products Information - Moisture Content of 'Seasoned' Firewood**

The University of Tennessee Agricultural Extension Service

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# WOOD PRODUCTS INFORMATION

## Wood Products Test Results

# Moisture Content of 'Seasoned' Firewood

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## Firewood and 'Moisture content'

A wood fire is a pleasant, inexpensive and environmentally friendly way to heat a home. Tennessee is fortunate to have an abundant supply of tree species with dense wood that potentially makes good firewood. However, the most important factor in determining firewood quality is the **moisture content**, or the amount of water that is in the wood. Wet wood of any species makes poor firewood.

The "green" wood in living trees contains large amounts of water. The moisture content of wood (the amount of water) is expressed as a percentage of the dry wood weight. The green moisture content of wood is normally above 60 percent, and can range as high as 120 percent for some species. Moisture content of greater than 100 percent means that there is more water in the wood than there is dry wood substance.

Some species are relatively dry when green and some species dry faster than others. Furthermore, species like oak and hickory are high in density, which means that there is more fuel per piece of firewood than in lower-density species. However, all wood species can be acceptable firewood if they are dry. Even low-density species such as poplar and softwoods such as pine will burn well when properly dried.

## Seasoned Firewood

'Seasoning' refers to the drying of firewood over time. Firewood should be as dry – or 'seasoned' – as possible. Firewood that is prepared in the spring should be dry enough to burn the following fall. However, the passage of time alone is not enough to ensure proper seasoning; firewood needs to be cut-to-length, split, stacked and exposed to drying breezes. Logs, un-split firewood, pieces that are touching the ground or pieces that are deep inside a firewood pile will dry very little, even after many months.

Properly seasoned (moisture content below 20 percent) wood is critical to getting the most from firewood. Dry firewood delivers more heat, because less heat is used up evaporating water. Dry wood also burns more completely, ensuring a cleaner and safer



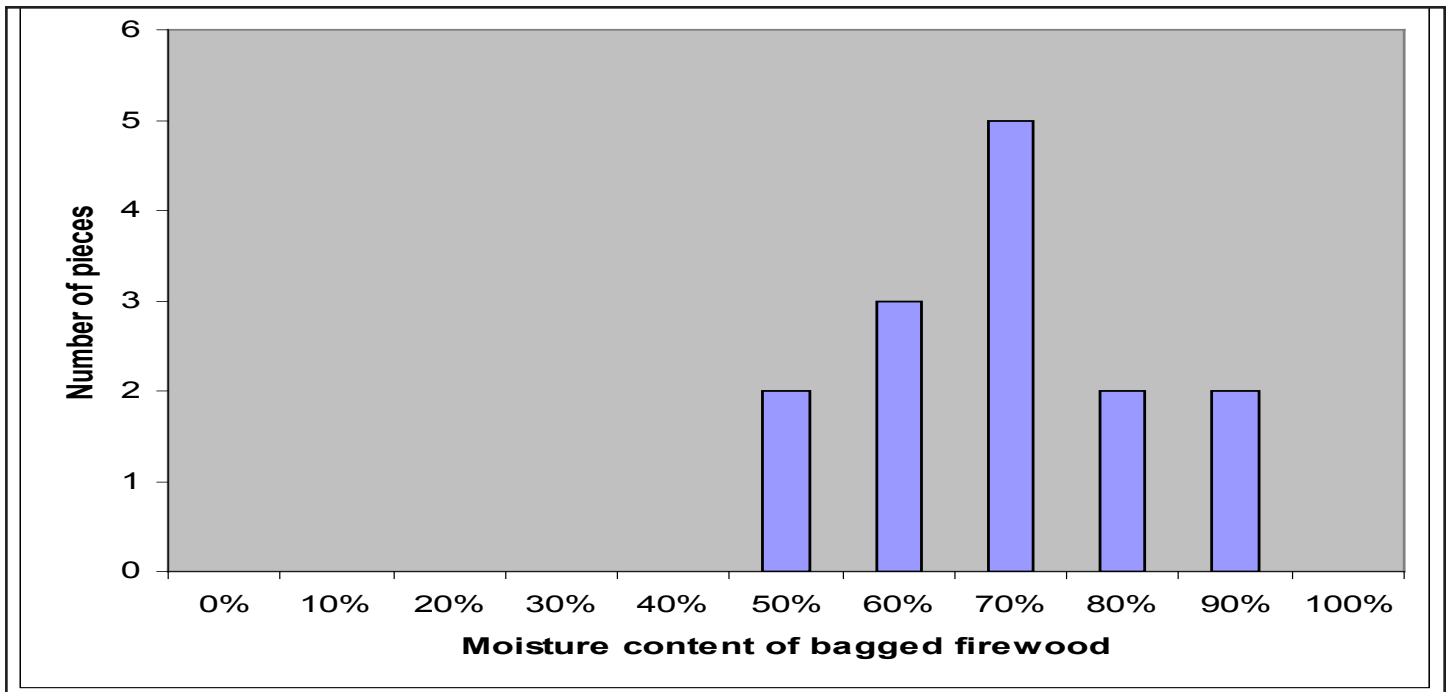
*The condensation inside this bag of firewood is a bad sign – it suggests that there is a lot of water in the wood and that the wood is not yet properly seasoned.*

fire. Incomplete combustion of wet wood produces dirty smoke that can accumulate as creosote in the chimney. If this creosote builds up, it can eventually ignite and cause a chimney fire.

## Is Your Firewood Dry Enough?

Unfortunately, it can be difficult to know if firewood is properly seasoned. The length of time since the tree was cut is not a reliable indicator of how dry the firewood is. There are a number of possible ways to judge if firewood is properly seasoned:

- Dry firewood will be lighter weight than green wood, but natural density differences between wood species can make this weight difference difficult to judge.
- Wet wood will produce a dull thud when struck against another piece; dry wood will sound hollow.
- Dry firewood may (but may not) have many 'drying checks' or cracks on the ends.
- A moisture meter inserted into dry wood should



The moisture content of the tested firewood pieces was too high for seasoned firewood. While the wood may have been cut long ago, it has not been exposed to the drying conditions that allow proper 'seasoning.' The green moisture content of oak is approximately 75 percent. Properly seasoned firewood has a moisture content below 20 percent.

read below 20 percent. Hardware stores and woodworking suppliers sell moisture meters for checking the moisture content of lumber.

- The oven-dry method is the best way to determine wood moisture content. For this test, a small (1" thick) sample is cut from the middle of firewood sections and weighed (a kitchen scale will work). The samples are then placed in a ~220 degree oven until they achieve a constant weight (all the water has evaporated, leaving only dry wood behind, about 12-24 hours). The samples are then re-weighed and the original moisture content is calculated as

$$\text{Moisture Content} = \frac{(\text{Original} - \text{Dryweight})}{\text{Dryweight}} \times 100\%$$

### Test at the Tennessee Forest Products Center

Bags of firewood were purchased from a supermarket in Knoxville in October 2007. Each piece of firewood in the bags was measured for moisture content using the oven-dry method described above.

The wood tested was all oak, a dense wood that has the potential (if dry) to be excellent fuel. The pieces were cut and split to convenient sizes. However, despite being labeled as "Seasoned Firewood" all

of the wood was too wet to be good firewood. The average moisture content was 66 percent, which is only slightly less than the green moisture content of oak of 75-80 percent.<sup>1</sup> Properly seasoned firewood should have a moisture content below 20 percent.

### Take-home Message

The most important property of good firewood is moisture content. Firewood should be fully seasoned (to below 20 percent moisture content) before being burned. Because it can be difficult to ensure that purchased firewood is properly seasoned, the best approach is to buy and stack firewood well before it is needed. There is no danger in over-seasoning wood – drier is better. More information on firewood can be found on the Internet at <http://www.woodheat.org/firewood/firewood.htm>.

Some other tips on using firewood include:

- Any species of wood will make acceptable firewood, if it is dry.
- Clean lumber or plywood scraps can be safely burned.
- Don't burn painted or treated wood (lumber that has chemical preservatives)

<sup>1</sup> Forest Products Laboratory. 1987. Wood handbook: Wood as an engineering material. Agric. Handb. 72. Washington DC. U.S. Department of Agriculture. 466 p