

1971

N

ortheastern Forest

FOREST SERVICE, U. S. DEPT. OF AGRICULTURE, 6816 MARKET STREET, UPPER DARBY, PA.

E

xperiment Station

EFFECT OF MOISTURE LOSS ON RED OAK SAWLOG WEIGHT

Abstract.—A study was made to determine the effect of moisture loss on the weights of red oak sawlogs. The logs, ranging from 9 to 21 inches in scaling diameter and from 8 to 14 feet in length, were dried for a 12-week period. The 21-log sample lost 7.6 percent of the total green sawlog weight. The weight loss for individual logs ranged from 5.3 to 14.5 percent. In general, as log size and weight increased, the percent of weight loss decreased.

Many sawmill operators and researchers are looking into the possibilities of weight-scaling hardwood sawlogs. A few sawmill operators are already buying hardwood logs by weight. All are asking: How does moisture loss affect hardwood sawlog weights?

We conducted an exploratory study of red oak logs to answer the following questions:

1. How much does moisture loss affect sawlog weights?
2. Does sawlog size affect moisture loss?

We conducted the study under extreme drying conditions, thus providing the maximum effect of moisture loss for the existing weather conditions found in southern West Virginia.

Method

To obtain a well-distributed sample of log sizes, we selectively chose 21 red oak sawlogs. These sawlogs, ranging from 9 to 21 inches in scaling diameter and from 8 to 14 feet in length, were cut and delivered to the study area on the same day to assure true green sawlog

weights. Upon delivery, we collected the following information about each log:

1. Scaling diameter (to nearest inch).
2. Log length (to nearest foot).
3. Green log weight (to nearest 5 pounds).

After taking these measurements, we placed the logs in a single tier on an asphalt slab. To increase the air circulation, we elevated the logs on 6- by 6-inch stringers. This arrangement allowed maximum drying, thus permitting more rapid moisture loss than any system of decking presently used in the woods or mill yards.

The logs were exposed to the weather from 30 May to 22 August 1969. During this 12-week period, we reweighed the logs every seventh day. The difference in the periodic sawlog weights represented moisture loss in pounds. To compare these moisture losses among logs of different sizes, we expressed the weight lost by each log as a percent of the green sawlog weight.

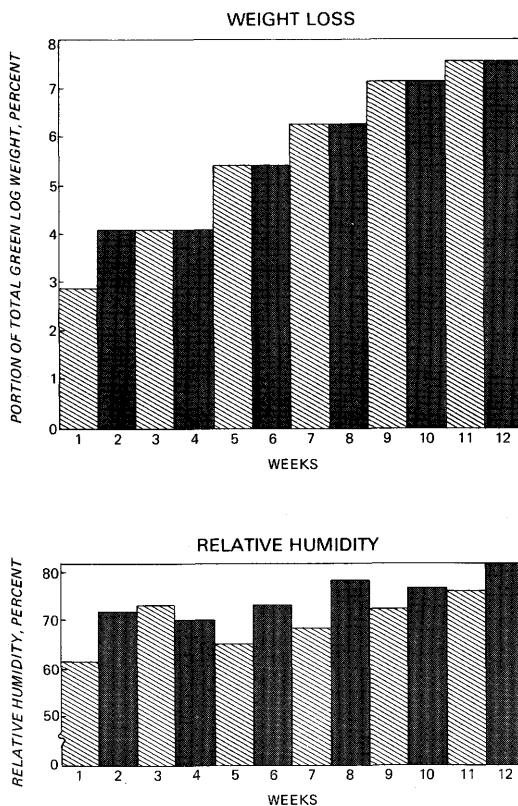


Figure 1.—Cumulative weekly weight loss due to moisture loss for 21 red oak sawlogs, and associated relative humidity record.

Along with the above measurements, we also collected information on the average weekly relative humidity, average weekly maximum and minimum temperatures, and weekly rainfall. However, since rainfall and temperature showed little relationship with moisture loss, they will not be discussed in this note.

Discussion

Since the study was based on freshly cut red oak logs only, the answers to the following questions cannot be confidently transferred to other species or localities.

Question 1.—*How much does moisture loss affect sawlog weights?*

Answer.—During the 12-week study period, the 21-log sample lost only 7.6 percent of the total green sawlog weight. Slightly over half of this total loss occurred during the first two weeks. For 6 of the remaining 10 weeks, the logs lost no moisture. These periods of no

Table 1.—*Total weight loss due to moisture loss for individual red oak logs during a 12-week period*

Log No.	Scaling diameter	Length	Green weight	12th week weight	Weight loss	Weight loss
	<i>Inches</i>	<i>Feet</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Percent</i>
1	10	8	340	305	35	10.3
2	10	9	345	295	50	14.5
3	9	10	350	315	35	10.0
4	10	9	380	335	45	11.8
5	12	12	675	605	70	10.4
6	11	12	680	605	75	11.0
7	14	10	745	665	80	10.7
8	12	11	755	675	80	10.6
9	11	14	790	730	60	7.6
10	12	14	995	920	75	7.5
11	15	12	1,020	935	85	8.3
12	16	14	1,425	1,320	105	7.4
13	16	12	1,525	1,405	120	7.9
14	17	14	1,620	1,465	155	9.6
15	17	12	1,920	1,815	105	5.5
16	18	14	1,945	1,805	140	7.2
17	18	13	2,055	1,895	160	7.8
18	18	14	2,245	2,100	145	6.5
19	21	14	2,395	2,240	155	6.5
20	20	14	2,405	2,255	150	6.2
21	20	14	2,550	2,415	135	5.3

moisture loss were closely related to periods of high relative humidity (fig. 1).

Question 2.—*Does size affect moisture loss?*

Answer.—As a result of moisture loss, the total weight losses in individual sawlogs ranged from 5.3 to 14.5 percent of the green sawlog weights (table 1). In general, as log size and weight increased, the percent of weight loss decreased.

Remember that the weight losses observed in this study occurred under extreme drying conditions. We would expect that logs piled in the woods or decked in the mill yard would lose less weight than our sample. Therefore we believe that if a sawmill operator is weight-scaling hardwood sawlogs or if he is considering this possibility, the effect of moisture loss should not be a major concern at this time.

As forest researchers learn more about other log weight relationships, they may find that moisture loss is one of the more important factors. However, we believe that additional studies on sawlog moisture loss should be delayed until the links between log weight and other elements such as bark loss, seasonal weight differences, and regional weight differences have been established.

—EDWARD L. ADAMS

Associate Economist
Forest Service, U.S. Dep. Agriculture
Northeastern Forest Experiment Station
Forest Products Marketing Laboratory
Princeton, West Virginia

MANUSCRIPT RECEIVED FOR PUBLICATION 18 Nov. 1970.