BULLETIN
OF THE
Ohio Agricultural Experiment Station

NUMBER 302 AUGUST, 1916

MARKETING OF WOODLOT PRODUCTS

J. W. CALLAND

Usual selling methods.—The average woodlot owner has but an indefinite idea of the contents of his woodlot, or of how best to market his woodlot products. Instances of woodlots selling for less than one-half their true value are common in most communities. Usually the farmer sells his timber "by the lot" to a portable-sawmill owner or timber buyer, receiving a lump sum for all the timber on the area. Being unfamiliar with timber values and of how they are determined he has, at best, but a vague idea of what the timber standing in his woodlot is worth. The buyer being experienced in timber-estimating and marketing can go through the woodlot and determine the amount and value of the timber before making his offer. This condition of affairs naturally leaves the owner on unequal terms with the buyer, and he frequently sells his timber for a price decidedly unfavorable to himself.

Another serious objection to the method of selling timber "by the lot" is that no provision can be made to save any desirable trees for a second crop. The buyer paying a fixed sum for everything on the area will cut every stick that offers a chance for profit and will naturally take no care of what he cannot use. What is left to the owner is, indeed, a decidedly poor tract of woods.

Such mistakes should be avoided. Woodlot owners should abandon the practice of selling the entire lot for a lump sum. The principles of forestry should be applied when timber is cut. The manner in which cutting is done determines the future condition of the woodlot.

Better selling methods.—Sales should be based upon an accurate knowledge of values. The stumpage value, which is the price that can be obtained for standing timber, depends upon the quality of the material and its nearness to market. In order to arrive at a

fair stumpage value for timber, the owner must determine what the logs or other products would sell for delivered at some factory or shipping point, what it would cost to cut and deliver them, and what amount of each product can be cut from the area. The most satisfactory method, in nearly every case, is to sell by the unit; that is, so much per thousand feet of lumber; so much per tie, pole, cord, linear foot, etc., based on the amount actually cut or estimated to be in the lot, with a definite agreement as to what trees are to be left standing and the extent to which reproduction and young growth are to be protected. For the best results the owner should do the work in the woods himself, or at least have it done under his direct supervision. When the work is done by contract, careful provisions should be made to prevent careless operations and unnecessary injury to the future stand.

Many times it is not necessary for the farmer to sell the products of his woodlot to a portable-sawmill operator or to the local timber buyer. If he secures some special market for his material; does the cutting, logging, hauling, etc., with his own help and teams, he not only receives the value of his timber, but also saves for himself the profit of the buyer who generally figures on at least 20 percent margin. To be able to sell his products in some form which pays not only a fair stumpage value but also day wages for himself and team is often a great advantage to the farmer. But in order to determine the most profitable form into which his trees may be worked, he should consider every available special market for his products.

It is therefore well worth while for the woodlot owner to familiarize himself with the ordinary methods of timber-estimating, and to inquire carefully into the matter of timber values and markets before disposing of his product.

METHODS OF MEASURING WOODLOT PRODUCTS

Lumber.—Lumber is almost always sold by the thousand feet board measure (M feet B. M.). The board foot, the unit of board measure, is the equivalent of a board 1 foot wide, 1 foot long and 1 inch in thickness. Dimension timbers, planks and other pieces more than 1 inch in thickness are also measured by the board foot. The rule for finding the board-foot contents of any regular stick or sawed timber may be stated as follows: *Multiply the width of the stick by its thickness in inches; multiply this product by the length, in feet, and divide the result by* 12. Thus a plank 2 inches thick, 6 inches wide and 8 feet long, contains $\frac{2 \times 6 \times 8}{12} = 8$ board feet.

Lumbermen generally use a "scale stick" for measuring lumber. This stick is so made that it shows at a glance the contents in board feet of any regular piece of sawed lumber when the length, width and thickness are known.

Wood for paper pulp, excelsior, fuel, handles and similar products.—Wood for paper pulp, excelsior, fuel, handles, etc., is usually worked into a form too small to be scaled by the board foot. Such material as this is measured by the cord. A cord may be defined as 128 cubic feet of stacked wood. It is generally understood to be a pile of wood cut into 4-foot lengths and stacked 4 feet high and 8 feet long. Frequently, however, wood is worked into shorter lengths. When this is done it is piled 4 feet high and 8 feet long and passes as a "short cord."

Crossties, posts, poles, piles and mine props.—Such products as ties, posts, poles, piles and mine props are sold by the single piece. The market calls for these materials to be of different sizes and the value per piece is determined by the size and quality. Specifications for these products will be given later.

Logs.—The contents of logs are measured in board feet. The entire contents of a log are not measured, however, but only the amount of lumber which can be sawed from it.

FACTORS INFLUENCING THE CONTENTS OF LOGS IN BOARD FEET

The number of board feet which can actually be cut from logs of a given size will vary under different circumstances because of variation in the several factors which determine the amount of waste. These factors are as follows:

1. *Thickness of the saw.*—The thickness of the saw used at the mill will affect the actual amount of lumber that can be cut from a log. The ordinary circular saw in use at small portable-sawmills is from one-fourth to five-sixteenths of an inch thick and may cut from 10 to 20 percent less from a log in inch boards than could be cut from the same log with a band saw, because the waste in saw kerf with the band saw is only one-half as great.

2. *Width of smallest boards.*—If no boards less than 6 inches wide are sawed from a log, the number of board feet obtained will be less than if boards 3 inches wide are sawed. When a log is slabbed for sawing boards 6 inches wide, material is thrown away which would produce four 3-inch boards. The percent of loss is of course greatest with small logs.

3. *Skill of sawyer.*—A skillful sawyer by taking advantage of the irregularities of logs and carefully sawing each log in such

a manner as to get the maximum amount of lumber from it can secure a greater yield in board feet than if the logs are cut through carelessly with little regard to form and shape.

4. *Condition of logs.*—The logs cut from the average woodlot are not usually perfect. There is certain to be more or less waste due to decayed spots, crooks, knots and other defects.

5. *Thickness of boards.*—If logs are sawed into boards 1 inch or less in thickness, there will be a greater loss in saw kerf than if 2-inch planks or other thick material is sawed. Hence, the number of board feet obtained will be less when logs are sawed into thin material.

6. *Efficiency of machinery.*—If saws are properly filed and set, and good, well-regulated machinery is used about the mill, the total cut from a given lot of logs is, of course, greater than could be obtained with a poor saw and inferior machinery.

TABLE I.—COMPARISON OF THE DOYLE AND SCRIBNER RULES

Doyle Rule					Scribner Rule				
Diameter of log at small end (Inches)	Board feet when log length is				Diameter of log at small end (Inches)	Board feet when log length is			
	10 feet	12 feet	14 feet	16 feet		10 feet	12 feet	14 feet	16 feet
6	2.5	3.0	3.5	4	6	10	12	14	18
7	5.6	6.8	7.9	9	7	16	18	24	28
8	10	12	14	16	8	20	24	28	32
9	16	19	22	25	9	25	30	35	40
10	23	27	32	36	10	31	40	45	50
11	31	37	43	49	11	40	50	55	65
12	40	48	56	64	12	49	59	69	79
13	50	61	71	81	13	61	73	85	97
14	62	75	88	100	14	71	86	100	114
15	75	91	106	121	15	88	107	125	142
16	90	108	126	144	16	100	119	139	159
17	106	127	148	169	17	115	139	162	185
18	122	147	171	196	18	133	160	187	213
19	141	169	197	225	19	150	180	210	240
20	160	192	224	256	20	175	210	245	280
21	181	217	253	289	21	190	228	266	304
22	202	243	283	324	22	209	251	292	334
23	226	271	313	359	23	235	283	330	377
24	250	300	350	400	24	252	303	353	404
25	276	331	386	441	25	287	344	401	459
26	302	363	423	484	26	313	375	439	500
27	330	397	463	530	27	343	411	479	548
28	360	432	504	576	28	363	436	509	582
29	391	469	547	625	29	381	457	533	609
30	422	507	591	676	30	410	493	575	657
31	456	547	638	729	31	443	532	622	710
32	490	588	686	784	32	460	552	644	736
33	526	631	736	841	33	490	588	686	784
34	562	675	787	900	34	500	600	700	800
35	601	721	841	961	35	547	657	766	876
36	640	768	896	1,024	36	577	692	807	923
37	681	817	953	1,089	37	643	772	901	1,029
38	723	867	1,011	1,156	38	667	801	934	1,068
39	765	910	1,070	1,225	39	700	840	980	1,120
40	810	972	1,134	1,296	40	752	903	1,053	1,204

LOG RULES

Tables have been prepared which show the estimated number of board feet that can be cut from logs of different sizes. Such tables are called log scales, log tables or log rules. There are a number of these log rules in use in various sections of the country, but in Ohio the Doyle rule is generally employed. This rule is accurate only for logs of medium size, or from about 20 to 30 inches in diameter. It gives an extremely small scale for logs of small diameter, and woodlot owners selling small-sized logs by this scale will give much more material than they are paid for. For large logs, however, it gives too large a scale. A comparison is given between the Doyle and Scribner rules in Table I. The Scribner rule gives a more just scale for small logs.

For use in the actual work of scaling logs, scale sticks are made for each of the common log rules. The scale stick has printed on it numbers which show the board-foot contents of logs of different sizes.

SCALING

Scaling consists in determining, with the aid of a scale stick, the contents in board feet of a given log. If all logs were regular and perfect, scaling would be a simple process; but since very few logs are perfect the scaler must make allowance for all sorts of defects. The knowledge of how to allow for defects can be acquired only by practice and observation. The figures on the scale stick show the contents of straight, sound logs, according to diameter and length. The stick should be applied to the average diameter inside the bark at the small end of the log.

No hard and fast rules can be given for scaling, but the following are some of the visible defects in logs for which the scaler must make allowance:

1. *Crooks.*—Generally a certain percent is deducted for crooks, but for a specified log the scaler may sight along the log and calculate how much the small end must be reduced so as to contain just the largest square stick which can actually be cut from the log.

2. *Shakes.*—By "shakes" is meant cracks in timber, generally caused by wind or frost. These may either follow the annual rings of growth or cross them. If such shake cracks are confined to the heart of the log and the grain is straight, only the center need be thrown out. Still, shaky logs are usually worthless for lumber if the crack is extensive.

3. *Dote.*—This term is generally employed by lumbermen to denote decay, or rot, in timber. This may occur in any part of the

log, but is often at the center. Sometimes the sapwood is decayed or wormy while the heartwood is good. In this case only the heartwood is scaled. If a doty or rotten spot appears at one end of a log, it is generally safe to deduct that area through the entire length of the log.

4. *Cat-face.*—Cat-face is a term generally applied to partly healed scars on the trunk of a tree caused by fire, sun scald or mechanical injury. Unless decay has developed, a cat-face is not usually considered a serious defect. However, it may cause the removal of a wide slab.

5. *Mechanical injury and other defects.*—Splits and other injuries may be caused by careless felling. Checks may occur while the log is seasoning. Insect injury and various other defects are frequently encountered. For all of these the scaler must make allowance according to his best judgment.

If it is desired to find the board-foot contents of a log by the Doyle rule, without the aid of a scale stick or log table, the rule may be stated as follows: *Deduct 4 inches from the diameter of the log; square one-fourth of the remainder, and multiply the result by the length of the log in feet.*

Example: A 16-foot log is 24 inches in diameter. 24—4 = 20; ¼ of 20 = 5; 5 squared = 25; 25 x 16 = 400. Therefore, a 16-foot log 24 inches in diameter contains 400 board feet by the Doyle rule. In scaling long logs by this rule either the diameter should be taken at the middle of the log or the average diameter of the two ends should be used.

ESTIMATING THE AMOUNT OF TIMBER IN THE WOODLOT

It is quite possible for the woodlot owner to estimate his own timber fairly well. The average woodlot is not large and much more thorough methods of estimating may be employed than would be practicable on large timber tracts. However, the owner must remember that to make an accurate estimate of standing timber requires skill and experience. Therefore, if his woodlot is large and contains considerable valuable material, it will pay best to secure the services of an experienced estimator, preferably a forester who can at the same time make out a plan for the future management of the woodlot.

Only a few practical methods of estimating will be described here. They are not intended for large areas where it would be impossible to count all the trees.

The single-log method.—A method frequently used is that of estimating the entire merchantable portion of the tree as one log.

Proceed as follows: Estimate the entire length of the merchantable section of the tree; then estimate the top and bottom diameters; average these diameters, and find the contents by the Doyle rule. For example, if the length of the merchantable portion of the tree is 42 feet, the top diameter 12 inches, and the bottom diameter 20 inches, the average diameter would be 16 inches, and the board-foot contents of the log would be, by the Doyle rule, 378 feet.

The tree-to-tree count.—This method involves the use of a "tally sheet" and a log table, and requires the ability to judge diameters at different places on the tree. It is one of the best methods for the inexperienced estimator, provided he does his work carefully. By this method the estimator approaches each tree, determines the lengths of the various logs which should be cut from it, estimates the top diameter inside the bark of each log and enters it in the proper place on the tally sheet according to diameter and length.

TABLE II.—SAMPLE TALLY SHEET FOR ESTIMATING LUMBER

Diameter at small end of log inside the bark (Inches)	Length of logs in feet							
	10		12		14		16	
	Log tally	Total board feet	Log tally	Total board feet	Log tally	Total board feet	Log tally	Total board feet
8	⁘	30					⁘	64
10	⁘	138	⁘	54	⁘	64	⁘	36
12	⊠	400	⊓	336	□	448	⁘	128
14	⁘	186	⊠ ⁘	975	⧅	792	⊓	700
16	⁘	180	⁘	324	⁘	378	⁘	720
18	⁘	122	⁘	147	⁘		⁘	1176
20	⁘	640			⁘	224	⁘	512
Total		1696		1836		1906		3336

The "dot and line" system of tallying used here is one which enables the estimator to record a large number of logs on a single sheet. The value of each symbol is shown by the following:

Since they are arranged in blocks of ten, they are quickly and easily read.

After all the logs have been entered on the tally sheet, the board-foot contents of each sized log is found in Doyle's log table and multiplied by the number of logs of that size, and this product entered in the next column to the right. The total at the bottom of the right-hand column is the board-foot contents of all the logs

of that length, and the sum of the totals for the different length logs gives the entire estimate. With this form of tally sheet a separate page must be used for each species estimated, and the totals of all the species are added for the complete estimate of the woodlot.

If the estimator uses but one standard log-length, he will be able to lessen greatly the number of computations necessary to arrive at the final estimate, and a single tally sheet will serve for several species. The single tally sheet is generally used by experienced estimators because it greatly simplifies the tallying and scaling of the logs. The 16-foot log is the standard length commonly used. However, the inexperienced worker in a small woodlot will generally find it more satisfactory to use two or more log-lengths. Table III shows a tally sheet for use with the single log-length.

TABLE III.—SAMPLE TALLY SHEET FOR ESTIMATING TIMBER
(16-foot logs)

Diameter at top of log inside bark (Inches)	Oak	Maple	Beech	Ash	Elm	Totals		
						Total logs	Scale	Total board feet
8							16	32
10							36	72
12							64	256
14							100	400
16							144	288
18							196	196
20							256	256
Totals	3	3	3	5	2	16		1,500

N. B. If desired extra columns may be inserted in the tally sheet for recording the number of trees of each species.

Considerable skill is required to judge the top diameters of logs. Thus it is necessary for the inexperienced estimator to use either a pair of calipers[1] or a tape to measure the diameter of the tree at a point breast high, or about 4½ feet above the ground. This measurement will be above the root swellings and will afford a

[1]Tree calipers may be purchased from Keuffel & Esser Co., 127 Fulton Street, New York, N. Y. 18-inch size for $3.15 and 36-inch size for $4.50.

valuable check in judging the top diameters of the logs to be taken from the tree. If a tape is used, the distance around the tree is read and multiplied by 7/22, or divided by 3.1416, to get the diameter. If calipers are used, the diameter is read directly from the graduated arm. It is also a good plan to use a light 10-foot pole having attached across one end a small stick marked off in inches by prominent notches, which an assistant can hold against the tree with the cross-stick at the point where the first log would come. The diameter can be determined with fair accuracy from the notched rule. After taking a diameter measurement at a point breast high with the calipers, and another at the top of the first log, as just explained, the top diameters of the other logs in the tree may be estimated by comparison.

The average thickness of the bark at different heights on the tree must be allowed for. Taking a few measurements of the bark on felled trees will give the operator a good idea of the amount to deduct to get the inside diameter.

The advantage of this method of timber-estimating is that the operator can make allowance for all such physical defects as crooked, diseased and defective portions of the tree, and allow for excessive taper and thickness of bark before making his entries on the tally sheet.

The average-tree method.—Another method which is sometimes used is to go through the woodlot and count all the trees, determine the board-foot contents of the average-sized tree and multiply this by the total number of trees in the lot. It is important that particular care be used in selecting the average-sized tree and in determining its contents.

The diameter-class method.—A method generally more practicable than the average-tree method is to take the breast-high diameters of all the trees in the lot and tally them in inch diameter-classes, keeping the different species separate if desired. Then determine the contents of the average tree in each diameter-class; multiply the contents of the average tree of each diameter-class by the number of trees in that class, and add the results obtained for each class to secure the total volume of the entire lot. The diameters should be measured with calipers or tape, and trees should be marked in some way in order to avoid counting any of them more than once. Plain chalk or crayon may be used for marking the trees as they are counted.

MARKETS

The principal markets for the products of the farm woodlot are for lumber, building and construction material, logs, crossties, poles,

piling, posts, firewood, and frequently for round cord-wood for use in paper-pulp plants, pail factories, box factories, excelsior plants and handle works. But for such woods as white oak, yellow poplar, walnut, cherry, elm, hickory and ash, there are a great number of special markets, as veneer mills, furniture factories, vehicle factories, etc. These special markets generally demand a certain quality of material, and the price paid for it is considerably above the "log run" value of lumber. Therefore, owners are again reminded that they should inquire with particular interest into all available special markets, not only to locate markets for the different species but also to determine the most profitable form into which the various trees may be worked.

However, the woodlot owner must bear in mind that a market for rough forest products, as logs, ties, poles, etc., will be more to his advantage than one for sawed material to be sold on grades, unless he is able to secure the services of an exceptionally good portable mill with a sawyer who thoroughly understands how best to saw such material from the different logs.

PRINCIPAL PRODUCTS AND PRICES

Lumber.—The principal uses of each kind of wood are given later in this bulletin. Large quantities of the lumber sawed by small sawmills is not sold on grades, but by the "log run," which is the average value of all the products sawed from the log. The prices given later are the "log run" values, under average woodlot conditions. The average "log run" value of the lumber cut from woodlots of Ohio is about $20 per thousand feet board measure.

Logs.—In this State large quantities of logs are purchased annually by sawmill companies, veneer mills, lumber companies, etc. The price paid by these firms for logs delivered at their yards depends largely upon the size and quality of the material. Generally logs are graded according to quality, as "firsts," "seconds" or "thirds." Frequently the price of a log falling in one of these grades is determined by its diameter, the large logs bringing a higher price per thousand feet than the smaller ones.

The price of logs varies over the State, depending largely upon the nature of the industries and the available supply of suitable material. However, the following values may serve as a guide. The prices given here are for a thousand board feet delivered at the yard of the purchaser.

Green hardwood logs frequently average 10 pounds in weight per foot board measure, and, therefore, cannot be profitably shipped when the market is too far distant. From 3,000 to 7,000 feet make

an average carload. Logs should be cut 10, 12, 14 or 16 feet in length unless otherwise specified. They are usually cut 4 inches over the specified length to allow for trimming.

TABLE IV.—PRICES OF DIFFERENT KINDS OF LOGS (per M bd. ft.)

Wood	No. 1 Grade	No. 2 Grade	No. 3 Grade
Ash	$40 to $ 45	$30 to $40	$25 to $30
Basswood	25 to 35	20 to 25	18 to 20
Chestnut	30 to 35	20 to 30	16 to 18
Elm	25 to 30	20 to 25	15 to 18
Oak	25 to 50	20 to 40	16 to 25
Yellow poplar	35 to 45	30 to 35	20 to 25
Maple	20 to 30	18 to 25	14 to 16
Walnut	50 to 100	35 to 75	20 to 50
Beech	20 to 25	18 to 20	12 to 15

Poles.—Most telephone, electric light, power and traction companies, and railroads buy chestnut poles on their own specifications. Telephone companies carrying only a few wires often accept small poles. Poles should be made from sound, live chestnut, squared at both ends, reasonably straight, well proportioned from top to butt, peeled, and with knots trimmed close to the surface.

The following specifications and prices are about the average for a good grade of chestnut poles.

TABLE V.—CHESTNUT POLE SPECIFICATIONS AND PRICES

Length	Diameter 6 feet from butt	Diameter at top	Price delivered at pole yard
Feet	Inches	Inches	Dollars
25	10	7	2.75
30	10	7	3.25
35	12	7	4.50
40	14	7	5.75
45	14	7	6.50
50	18	7	8.75
55	18	7	10.50
60	22	7	11.00
65	22	7	15.00

Piling.—Most companies classify piling as permanent or temporary. The following specifications will show the usual requirements for piling.

Permanent piles must be white oak and must be peeled. Temporary piles may be red or black oak, beech, sycamore, black gum, maple, elm, hickory or chestnut, and need not be peeled. The diameter at the middle of the pile shall be not less than 12 inches, and the maximum diameter at the butt 20 inches. The minimum diameter at the top shall be 9 inches for piles up to 30 feet in length, 8 inches for lengths between 30 and 50 feet and 7 inches for lengths over 50 feet. A line from the center of the butt to the center of the top shall lie within the body of the pile.

Permanent piles usually bring from 14 to 18 cents per linear foot delivered at the railroad, while the average price for temporary piling is not more than 8 to 10 cents per linear foot.

Crossties.—The market for crossties is generally steady. Ties are purchased by most railroads and traction companies at any point along their right of way. Specifications and prices given by the different companies vary somewhat, but the following specifications are perhaps typical.

All ties shall be made from live timber, and shall be straight and free from soft or decayed knots, wind shakes, worm holes, checks or splits and other imperfections which impair the usefulness of the tie.

Ties may be manufactured out of the full-sized log by sawing or hewing parallel slabs from it to give the required thickness making pole ties; or by sawing or splitting sticks of the requisite size out of larger logs. If they are split out the top and bottom faces must be dressed parallel and smooth afterward in the same manner as pole ties.

All ties must be made of approximately straight grain timber; all ties except cedar must be entirely clear of bark before delivery; all cutting, sawing, hewing, splitting and barking must be done thoroughly and in a workmanlike manner.

CLASS A OR No. 1 TIES, 7 in. x 9 in. x 8½ ft.

All ties of this class whether sawed, split or pole ties, shall not be less than 9 inches wide through the body of the entire length of the tie, by not less than 6¾ inches nor more than 7¼ inches in thickness between parallel faces, which faces must be at least 8 inches wide under the rail and for 1 foot each way from the rail bearing.

CLASS B OR No. 2 TIES, 7 in. x 9 in. x 8½ ft.

All ties of this class shall be similar to Class A ties in every respect except that the parallel faces must be at least 7 inches wide under the rail and for 1 foot each way from the rail bearing.

CLASS C OR No. 1 TIES, 7 in. x 8 in. x 8½ ft.

All ties of this class whether sawed, split or pole ties, shall not be less than 8 inches wide through the body of the entire length of the tie, by not less than 6¾ inches nor more than 7¼ inches in thickness between parallel faces, which faces must be at least 7 inches wide under the rail and for 1 foot each way from rail bearing.

CLASS D OR No. 2 TIES, 7 in. x 8 in. x 8½ ft.

All ties of this class shall be similar to Class C ties in every respect except that the parallel faces must be at least 6 inches wide under the rail and for 1 foot each way from rail bearing.

CLASS E OR No. 1 TIES, 6 in. x 8 in. x 8 ft.

All ties of this class whether sawed, split or pole ties, shall be not less than 8 inches wide through the body of the entire length of the tie, by not less than 6 inches nor more than 6¼ inches in thickness between parallel faces, which faces must be at least 7 inches wide under the rail and 1 foot each way from rail bearing.

CLASS F OR No. 2 TIES, 6 in. x 8 in. x 8 ft.

All ties of this class shall be similar to Class E ties in every respect except that the parallel faces must be at least 6 inches wide under the rail and for 1 foot each way from rail bearing.

None of these ties are to vary in length more than 1 inch either way.

The following kinds of timber will be classed with white oak:

Post oak	Overcup oak
Bur oak	Black walnut
Chestnut oak or rock oak	Black or wild cherry
Chestnut oak or chinquapin	Yellow or black locust
Swamp white oak	Red mulberry
Cow oak or basket oak	Sassafras

The following kinds of timber will be accepted for creosoting:

GROUP No. 1

Red oak	Scarlet oak
Pin oak or swamp Spanish oak	Shingle oak or laurel oak
Black oak or yellow oak	Willow oak
Spanish oak	Honey locust

Water oak

GROUP No. 2

Beech	Sweet, red or black birch

GROUP No. 3

Sugar maple or rock maple	Mockernut hickory
White ash	Pignut hickory
Bitternut or swamp hickory	Hackberry or sugarberry
Shellbark hickory	Pecan hickory

GROUP No. 4

Yellow birch or gray birch	Cork elm, rock elm or hickory elm
Slippery elm or red elm	

The 7″ x 9″ x 8½′ ties contain 44.6 board feet apiece and make about 22.4 ties to the thousand board feet. At 75 cents apiece they bring about $17 per thousand feet.

The 7″ x 8″ x 8½′ ties contain 39.6 feet each and run about 25 to the thousand feet. White oak ties at 75 cents each bring about $19 per thousand feet. Treatment ties at 55 cents each bring about $14 per thousand feet.

The 6″ x 8″ x 8′ ties contain about 32 feet each and run 31¼ to the thousand feet. White oak ties at 65 cents each bring about $20 per thousand feet. Treatment ties at 45 cents each bring about $14 per thousand feet.

Cordwood.—In Ohio cordwood has a small market value. Except near a few large towns, a haul of 5 miles makes cordwood cutting unprofitable. For fuel it usually brings from $2 to $5 per cord delivered to the consumer. Hickory, oak and chestnut are preferred for firewood. Cordwood for pulp or excelsior is worth from $5 to $7 at the mill.

Posts and mine props.—Posts are usually either 7 or 8 feet in length and, if round, from 4 to 6 inches in diameter at the small end. If posts are split, the faces are usually required to be from 4 to 5 inches across. They must be free from shakes, rotten knots and bark. Chestnut posts frequently sell for 10 cents each at the woods. First-grade locust posts delivered to a shipping point bring from 13 to 17 cents each.

Mine props may be made from any kind of sound hardwood. If round they must be 4 inches or more in diameter at the small end. If split they must contain 16 square inches of material at the small end. Props are from 2½ feet up in length. The price for props up to and including the 5-foot length varies from ½ to 1 cent per linear foot. For props from 5 feet to 8 feet in length the price is usually 1 cent per linear foot plus 1 cent per prop. These prices vary greatly over the State, depending largely on the distance from the mines where they are to be used.

COST OF LUMBERING

The cost of lumbering as used here will mean the entire cost of converting standing trees into the various products, such as lumber, poles, ties, etc., and delivering them to a market or shipping point. The determination of lumbering cost is a problem into which a great many factors enter, such as the distance of the timber from the mill and market, the ease with which trees can be felled, cut into logs and hauled to the mill, the nature of the haul to market and the cost of team hire and labor.

Hauling.—The cost of hauling must necessarily vary with the distance, with the amount of material which can be hauled at a load, and with the rate of wages. The amount of material which can be hauled at a load, in turn, depends upon the condition of the roads, the topography of the country, and whether the material is seasoned or green.

It is ordinarily assumed with such figures that $4.50 per day is the average wage for a team and driver; that on ordinary roads the average load for a team is 1,000 board feet of lumber, 500 board feet of logs, thirty-two 8-foot ties, two 35- to 45-foot poles, four 30 to 35-foot poles, six 25- to 30-foot poles, or one cord of 4-foot wood; and that the ordinary team of draft horses on country roads will not average more than a 16- to 18-mile trip per day—loading, hauling and returning with the empty wagon.

Cutting.—The cost of felling trees and cutting them into logs varies with conditions in the woods, labor costs and the nature of the timber to be cut, but usually will average about $1.50 per thousand feet.

Skidding.—The cost of skidding necessarily varies with the distance to the mill, nature of the ground, rate of team hire, etc., but in case of a portable-sawmill in the average woodlot should not average more than $1.50 per thousand feet.

Sawing.—The greater part of the timber cut from the woodlots of Ohio is sawed by small portable-sawmills. The cost of moving one of these mills is not large, and from 50,000 to 75,000 board feet will warrant a "set-up." Often where the lots are quite small, two owners or more will combine to have a portable mill move in and saw their material. The price charged by such mills for sawing will vary from $3.50 to $4.50 per thousand feet, with $4 per thousand about the average. Where logs are hauled to a stationary mill, the price for custom sawing is frequently as high as $5 per thousand feet.

Piling.—Many times when sawing is done in the winter and the lumber delivered green, the piling cost is quite small, but if the lumber is to be loaded on cars at the railroad, a cost of at least 75 cents per thousand feet must be expected for piling and loading.

Production of lumber.—Assuming that the distance of a given woodlot from market is 8 miles, that the wage rate is $4.50 per day for team and driver, that 1,000 feet of lumber can be hauled at a load and that the sawing is to be done by a portable mill, the cost of operations will be about as follows:

	Per M bd. ft.
Cutting	$ 1.50
Skidding	1.50
Sawing	4.00
Piling	.75
Hauling	4.50
Total	$12.25

However, should the distance from the woodlot to the market be but 4 miles, the team could make two trips per day and the hauling cost would be but $2.25 per thousand feet, thus reducing the cost of operations from $12.25 to $10 per thousand feet. The owner must, of course, adapt these figures so as to apply to his particular case.

Production of logs.—At the same cost for cutting and skidding logs as has been given above for the production of lumber, and for a hauling distance of 7 to 9 miles, the probable cost of putting logs on the cars at the shipping point is indicated below.

	Per M bd. ft.
Cutting	$ 1.50
Skidding	1.50
Hauling	9.00
Loading on cars	1.50
Total	$13.50

If the hauling distance is short enough to permit of two loads per day, the hauling cost will be only one-half as large, thus reducing the cost of operations from $13.50 to $9 per thousand feet.

Production of poles and piling.—Pole cutting is a simple process. It consists in felling the tree, sawing off the top at a point which will give the specified top diameter inside the bark, trimming the branches close, and peeling. Usually the cost is 1 cent for each foot in length for poles up to 35 feet long, and 35 cents for poles from 35 to 50 feet long. The cost is less if poles are cut in the spring and early summer when peeling is an easy task. However, some companies specify winter-cut poles.

The cost of making piles is about the same as for poles, since they must be peeled if they are for permanent use. But temporary piling can often be cut at a cost of ½ cent per foot of length when peeling is not required. The hauling cost for poles or piles will usually be ½ cent per linear foot for each mile of haul.

Production of ties.—The cost of making ties will run from 10 cents per tie upward. To hew ties will usually cost from 10 to 12 cents for chestnut and from 12 to 14 cents for oak. One thousand board feet of ties make a good load and the hauling cost will depend upon the distance.

Ties should be sawed at less cost per thousand feet than lumber, since there is less labor and less waste involved. Assuming 33 ties to be the equivalent of 1,000 board feet, the cost of cutting and skidding to be $3, and the sawing $3.50 per thousand feet, we find that the cost of making ties will be about 21 cents each at the mill.

Production of cordwood.—The cost of cutting 4-foot cordwood varies from 80 cents to $1.20 per stacked cord. When oak or other tough wood predominates, the cost is higher than for wood more easily worked. One dollar per cord is the average cost for most cordwood contracts. One cord of wood makes a good wagonload, and the hauling cost will depend upon the distance.

Production of posts and mine props.—The contract price for cutting posts is usually from 2½ cents to 3 cents for each post. The cost of cutting is generally a little less for chestnut posts than for locust. From 60 to 80 posts can be hauled per load. So for a 2-trip haul it will cost about 3 cents per post to deliver them at the shipping point or market. This makes a total lumbering cost of 6 cents per post.

Mine props can be profitably cut only under favorable conditions. Most mine props are cut at the completion of lumbering operations and from material of small value. The hauling cost for

mine props is about the same as as for posts. The owner can generally expect to realize nothing more on mine props than good wages for himself and team, unless his haul to market or shipping point is unusually short.

DETERMINING THE STUMPAGE VALUE OF TIMBER

After the owner has determined the cost of lumbering his material and knows the market value of the products, he is in position to determine the amount of money he may realize on his standing timber by doing his own lumbering and marketing. If, for example, the market value of his lumber is $25 per thousand and the cost of lumbering $12.25 per thousand, the amount which he may realize on his standing timber is the difference between these two amounts, or $12.75 per thousand board feet.

This amount, however, cannot be considered the real stumpage value. The real stumpage value of timber is the sum for which the standing timber will sell, and not the amount which the owner can realize on it by doing his own lumbering and marketing. The purchaser is entitled to a fair profit on his investment. If the purchaser had to pay the amount for stumpage which is shown in the example above, he could not market his timber for more than enough to pay the costs of lumbering and stumpage. It is generally considered that 20 percent is a fair profit for the operator. Therefore, the real stumpage value is the difference between the market value of the product and the total lumbering costs, less a reasonable profit on the lumbering and stumpage. This is usually expressed by the equation: $S = \frac{M}{1.\ Op} - C$, in which S represents stumpage value; M, market value; C, cost of logging; and Op, percent of profit. Thus, the real stumpage value of the timber in the example given above would be computed as follows: $S = \frac{\$25}{1.20} - \$12.25$. And the real stumpage value thus found would be $8.58 per thousand, instead of $12.75. If the owner does his own lumbering, the stumpage value and the profit on the lumbering and stumpage will both be his. The following examples showing the results obtained by farmers who did their own lumbering may prove of interest in this connection.

In the first case the sale was for sawed material to be loaded on cars at the nearest shipping point, which was 4 miles from the woodlot. The stand was mostly oak with a sprinkling of hickory and other hardwoods. The owner hired a portable-sawmill and did

his own lumbering. The woodlot presented rather favorable conditions for lumbering, and the 4-mile haul to the railroad was over average country roads. The teams made two trips per day and averaged 1,000 feet per load. Lumbering costs were as follows:

	Per M bd. ft.
Cutting	$ 1.50
Skidding	2.00
Sawing	3.50
Hauling	2.25
Piling and loading on cars	.75
Total	$10.00

TABLE VI.—AMOUNTS OF MATERIAL SOLD AND PRICES RECEIVED

Materials	Amount (per B. M.)	Price per M bd. ft.	Total
Bending stock	8,600	$32	$275.20
Car stock	16,400	21	344.40
Ties	46,200	19	877.80
Side lumber	8,800	13	114.40
Total	80,000		$1611.80

At $10 per thousand the total lumbering cost for the operation amounted to $800. The total market value of the products was approximately $1,600. Thus, the market value of the products less the cost of lumbering left the owner $800, $10 per thousand, for stumpage and profit.

In the second example the woodlot was located but 3½ miles from the shipping point. The stand was largely maple and beech, but contained some oak, elm, yellow poplar and white ash, together with scattering trees of a few other species. The owner wished to sell his timber standing but was unable to get a stumpage price above $4 per thousand feet.

He found markets in the nearby city for his ash, elm and yellow poplar delivered in the log. Below are shown the amounts of the different woods sold and the prices received.

TABLE VII.—AMOUNTS OF MATERIAL SOLD AND PRICES RECEIVED

Wood	Amount (ft. B. M.)	Market price	Total
Elm	40,000	$22	$880
Poplar	12,000	40	480
Ash	4 000	40	160
Total	56 000		$1520

Logging costs were as follows:

	Per M bd. ft.
Cutting	$ 1.40
Skidding	1.60
Hauling (2 trips per day, 500 feet per load)	4.00
Total	$ 7.00

He then had a portable-sawmill move in and saw the remainder of the stand. Below are shown the amounts of sawed material of the different kinds sold and the prices received.

TABLE VIII.—AMOUNTS OF MATERIAL SOLD AND PRICES RECEIVED

Wood	Amount (ft. B. M.)	Market price	Total
Oak	30,000	$22	$ 660
Maple, beech and other hardwoods	314,000	13	4,082
Total	344,000		$4,742

Lumbering costs were as follows:

	Per M bd. ft.
Cutting	$ 1.40
Skidding	1.50
Sawing	3.50
Hauling (2 trips per day, 1,000 feet per load)	2.00
Loading on cars	.50
Total	$ 8.90

It is readily seen that at $7 per thousand the total lumbering cost for the 56,000 feet sold in the log was $392. Likewise, at $8.90 per thousand the total lumbering cost for the 344,000 feet of sawed material was $3,061.60. The sum of these two amounts, or $3,453.60, represents the entire cost of the lumbering operations. The total market value of all the products sold was $1,520+$4,742=$6,262. Taking the cost of lumbering from the market value of the products leaves approximately $2,800, or $7 per thousand feet, for stumpage and profit.

This owner not only realized $1,200 more for his timber than he was offered for it as it stood in his woodlot, but he also received good day wages for himself and teams through the winter. Moreover, there were left in parts of the woodlot fine stands of selected young growth which had been protected from careless logging operations, and which will insure a future stand of timber in his woodlot.

USES OF PRINCIPAL KINDS OF WOODS AND PRICES

The most important uses of our principal woods and the average "log run" value for each kind, under average woodlot condition,

are given below. The reader should remember that the average "log run" values are generally considerably below the value of material for special uses.

Oak.—Oak is the most abundant of Ohio timber trees. The users of this wood recognize two kinds, white and red; but botanists divide these into a large number of species. The principal species included in the white oak group are white oak, bur oak, swamp white oak, chestnut oak, chinquapin oak and post oak. In the red oak group are red oak, black oak, scarlet oak, pin oak and shingle oak. There are a few other species of each group found in Ohio, but they occur only scatteringly and are not important commercially. White oak is first in utility and is generally superior to red oak, although the latter makes the more rapid growth. The average price of red oak lumber is below the price paid for white oak, but for certain special uses it is much in demand. Red oak is more easily worked and kiln dried, and on account of its porous structure takes stains and varnish more rapidly. This accounts for its being preferred by the furniture makers, including those in the chair industry. For vehicles, ship building, agricultural implements, machine construction, etc., white oak is preferred on account of its greater strength, hardness and density.

The average price of oak is about $20 per thousand feet, although good clear plank can generally find a ready market at $45. Large oak logs suitable for quarter-sawing often bring $50 per thousand feet when delivered at the veneer mills. Large quantities are disposed of as rough forest products, such as posts, crossties, piling and cooperage stock. These products are usually sold by the piece. In some localities as much as 75 percent of the oak goes into railroad material.

PRINCIPAL USES OF OAK

Planing-mill products	Furniture
Vehicles and vehicle parts	Car construction
Building and general construction material	Agricultural implements
	Boxes and crates
Crossties	Fixtures
Sash, doors, blinds and general mill work	Chairs
	Plumbers' woodwork
Handles	Ship and boat building
Refrigerators and kitchen cabinets	Cooperage stock
	Machine construction

Yellow poplar.—Next to oak, yellow poplar is perhaps the most important timber tree in Ohio. In different localities this wood is called whitewood, tulip poplar, yellow poplar and poplar; but yellow poplar is the most common name used for it in the market. For many purposes it is a highly valuable wood. It seasons well, takes

an excellent polish, possesses a fine grain and is unexcelled for painting. There is no better wood on the market for carriages and automobile bodies, and it has few rivals for panel work. In some localities the wood of yellow poplar, particularly in young and immature trees or second growth, is inclined to be white and hard, somewhat resembling hickory. Wood cut from such trees is generally called "hickory poplar" by mill men. No doubt the color and texture of the wood of the tulip tree is affected not only by age, but also by soil, rate of growth and climatic conditions.

The average price of yellow poplar is about $30 per thousand feet, but there is usually plenty of demand for good clear plank at $50. Veneer mills generally offer an excellent market for large clear logs.

PRINCIPAL USES OF YELLOW POPLAR

Planing-mill products	Boxes and crates
Sash, doors, blinds and general mill work	Bungs and faucets
Car construction	Vehicles and vehicle parts
Agricultural implements	Furniture
Pumps	Fixtures
Plumbers' woodwork	Refrigerators and kitchen cabinets
	Caskets and coffins
	Musical instruments

Elm.—There is usually no distinction made in the market between the four species of elm growing in Ohio. The white, or American, elm and the red, or slippery, elm are the most abundant; of these the former is the most important commercially. Rock elm is tougher than the others and is usually desired by vehicle makers. There is very little rock elm found in this State, but lumbermen often apply the term "rock elm" to tough wood cut from any of the species. The terms "hard," "soft," "red," "gray" and "swamp" are often applied to elm by lumbermen in different localities without much regard to species. Being heavy, hard, dense, tough and elastic, elm is well fitted for a number of special uses. It is preeminently the best wood for patent barrel hoops and bicycle rims. The average price for elm is about $20. It will generally pay well for the owner to look up a special market for his elm.

PRINCIPAL USES OF ELM

Vehicles and vehicle parts	Handles
Dairymen's, poultrymen's and apiarists' supplies	Furniture
	Planing-mill products
Trunks and valises	Fixtures
Hoops	Musical instruments
Ch irs	Playground equipment
Agricultural implements	Machine construction
Saddles and harness	Brushes
Refrigerators and kitchen cabinets	Woodenware and novelties
	Boxes and crates

Maple.—Lumbermen recognize two kinds of maple, hard and soft, although there are five species growing in Ohio. Sugar and black maple supply the hard maple, while the soft is contributed by red, silver and box elder, or ash-leaf maple. Sugar maple is commercially the most important and supplies practically all the hard maple sawed in Ohio. Its wood is called for by a greater number of users than any other wood grown in the State with the exception of white oak. The wood of the soft maple is softer than that of sugar maple and not so strong, but is strong enough for most purposes and is hard compared with such woods as basswood, yellow poplar and buckeye. The white, clean appearance of soft maple makes it desirable for furniture making, where it is sometimes stained in imitation of expensive cabinet woods. In many cases soft maple goes along with sugar maple and both are listed as hard maple, except when the strength and hardness of sugar maple is demanded as in the manufacture of vehicle parts, agricultural implements, etc. Basket manufacturers in northeastern Ohio employ maple extensively, maple and beech being the principal woods used. These two woods also supply much of the car blocking used by steel mills. Basket makers pay from $12 to $14 per thousand for logs delivered at their factories. Blocking generally brings from $13 to $15 loaded on the cars. The average price for maple lumber is about $15, with good clear plank bringing $25.

PRINCIPAL USES OF MAPLE

Boxes and crates	Elevators
Planing-mill products	Laundry appliances
Furniture	Agricultural implements
Handles	Vehicles and vehicle parts
Fixtures	Musical instruments
Woodenware and novelties	Car construction
Machine construction	Chairs
Sash, doors blinds and general mill work	Refrigerators and kitchen cabinets
	Pulleys and conveyors
	Plumbers' woodwork

Ash.—There are five different kinds of ash growing in Ohio, but it is difficult to distinguish them in the wood. Lumbermen generally separate them into two general classes, white ash and black ash. Some manufacturers use both kinds indiscriminately, but for many purposes white ash is considered superior to black ash and commands a better price. The sawmills of Ohio report cutting annually 12 million feet of ash lumber, but much goes directly from the forest to the factories without passing through the sawmills. Much of the second-growth white ash used for handles is cut into logs, bolts or billets in the forest and shipped directly to the factories.

The average price of ash is less than $25 per thousand feet. The owner should look carefully into the matter of special markets for his ash before sawing it into lumber. Good clear ash logs frequently bring $40 per thousand feet when delivered at handle factories.

PRINCIPAL USES OF ASH

Handles
Car construction
Dairymen's, poultrymen's and apiarists' supplies
Woodenware and novelties
Sash, doors, blinds and general mill work
Vehicles and vehicle parts
Planing-mill products
Agricultural implements
Furniture
Ship and boat building
Saddles and harness
Musical instruments
Boxes and crates

Hickory.—The woods of the different hickories are similar and hard to distinguish. Consequently, lumber dealers and manufacturers generally make no effort to keep the species separate. Hickory products are cut in Ohio from shellbark, shagbark, pignut, bitternut, mockernut and the small fruited hickory. The hardness, strength, toughness and flexibility of hickory make it highly valuable for a variety of special uses. It possesses these qualities to a greater extent than any other of our domestic woods, and no substitute has been found for it in a number of its special uses. This fact combined with the growing scarcity of hickory makes the wood a valuable one.

Hickory is primarily a vehicle and handle wood and fully eleven-twelfths of the amount used by Ohio manufacturers goes into these products. Other things being equal, wood which has grown rapidly is best; such stock with its broad annual rings is called second growth. The heartwood is reddish and the sapwood white. Formerly there was a decided prejudice against heartwood or "red hickory." This prejudice still exists to some extent, but it has been proved by Forest Service tests that, weight for weight, heart is as strong as sap. Like white ash much hickory in the form of butts, bolts and billets goes from the woods directly to the factories without passing through the sawmills. The average price of hickory is about $18 per thousand feet, but good clear logs frequently bring $35 per thousand feet delivered at the factories.

PRINCIPAL USES FOR HICKORY

Vehicles and vehicle parts
Agricultural implements
Planing-mill products
Boxes and crates
Furniture
Woodenware and novelties
Handles
Sporting and athletic goods
Professional and scientific instruments
Brushes
Car construction

Basswood.—Lumbermen often refer to the basswood tree as linden and call the lumber "linn," but it generally goes under the name of basswood in the market. There are two species in Ohio, but the wood is so much alike that it would be exceedingly difficult to tell them apart in a lumberyard, and no practical purpose would be served. Basswood is the softest hardwood and has many qualities in common with yellow poplar. It is stiff, light and easily worked, does not stain, and is without taste or odor. These qualities put it in demand by manufacturers of kitchen furniture and shipping containers intended to hold food. Basswood is a favorite with woodenware manufacturers.

Most Ohio basswood is sawed into inch boards which sell for about $23 per thousand feet.

PRINCIPAL USES FOR BASSWOOD

Boxes and crates	Woodenware and novelties
Trunks and valises	Dairymen's, poultrymen's and apiarists' supplies
Furniture	Planing-mill products
Sash, doors, blinds and general mill work	Musical instruments
Handles	Fixtures
Agricultural implements	Frames and molding
Car construction	Vehicles and vehicle parts
Professional and scientific instruments	Refrigerators and kitchen cabinets

Chestnut.—The largest demand for chestnut is for rough forest products, as posts, crossties, telephone and telegraph poles, mine props and tanning extracts. Its attractive grain and beautiful figure have lately brought it into popularity for inside finish of houses and buildings, exterior trim and store and office fixtures. Being cheaper than oak it is frequently found in finish where oak was formerly demanded. The chestnut tree is subject to attacks by boring insects, which makes the wood usually defective and accounts for the presence on the market of the low-grade chestnut lumber known as "sound wormy." It is this grade which is used in such large quantities by the box makers and casket makers, and it is also this grade which the piano builders and furniture manufacturers use above any other wood for veneer backing and cases. Being light and porous, holding its shape well and having a special affinity for glue, it is admirably adapted for these purposes.

The most serious enemy of the chestnut tree and one which may cause its ultimate extinction in this country is the chestnut-bark disease or chestnut blight. This disease has already destroyed enormous quantities of chestnut in the eastern states but so far has not spread to Ohio, with the exception of one or two small infestations.

The average price for chestnut lumber is about $20 per thousand feet with good clear plank readily bringing $35. The average for sound wormy is about $12. Posts usually bring 10 cents at the woods. Poles are bought by the pole, or by the linear or "running" foot. A first-class 35-foot pole is generally worth $4.50 at the shipping point.

PRINCIPAL USES OF CHESTNUT

Boxes and crates
Caskets and coffins
Furniture
Sash, doors, blinds and general mill work
Agricultural instruments
Dairymen's, poultrymen's and apiarists' supplies
Plumbers' woodwork
Sporting and athletic goods
Car construction
Musical instruments
Planing-mill products
Fixtures
Crossties, poles and posts
Trunks and valises

Beech.—There is but one species of beech growing in this country, although users often speak of "white beech and "red beech." Both kinds come from the same tree, one being the sap and the other the heartwood. Some trees have a large percent of sapwood and others a large amount of heart. The beech tree seems disposed to decay as it gets older; much of the mature timber in this State is not sound. Until within recent years beech was considered of little value by manufacturers, and this, together with its tolerance of shade and rapid reproduction, accounts for the fact that it is found standing in nearly every Ohio woodlot, often to the exclusion of more important timber trees. Recently, however, beech has come into considerable favor as a flooring wood, and with the development of preservative treatment is becoming prominent in the production of "treatment" timbers, ties, posts, etc.

The average price of beech is about $14 per thousand feet.

PRINCIPAL USES OF BEECH

Boxes and crates
Handles
Planing-mill products
Woodenware and novelties
Machine construction
Musical instruments
Professional and scientific instruments
Vehicles and vehicle parts
Agricultural implements
Sash, doors, blinds and general mill work
Chairs
Playground equipment
Pulleys and conveyors
Furniture
Brushes

Walnut.—Black walnut is the most costly wood native to Ohio. Most of the available large trees have been cut, and the future supply must come largely from "second growth"—that is young trees which will grow up about farms and in the woods, as well as those planted in woodlots. The dark color of the heartwood gives the tree its name. The sapwood is white and not nearly as valuable as the heart. It should be remembered by those having walnut trees to sell that it is the heartwood which is valuable and that the

heart forms slowly. A tree must be of considerable size and age before the heart is sufficiently developed to be worth much as lumber. Black walnut is not generally highly figured, but often the junction of roots with the trunk, crotches and burls yield fine figures from which is cut the best of veneer. The average price for black walnut lumber is about $40. Much walnut is shipped in the log to veneer mills or for export trade and does not pass through the sawmills. Large logs cut from old mature trees frequently bring $75 to $100 per thousand feet.

PRINCIPAL USES OF BLACK WALNUT

Planing-mill products	Musical instruments
Vehicles and vehicle parts	Furniture
Sash, doors, blinds and general mill work	Bungs and faucets
Machine construction	Caskets and coffins
Plumbers' woodwork	Fixtures
	Car construction

Sycamore.—Sycamore is found along banks of rivers and streams and along the edges of swamps and lowlands throughout Ohio, but is not an important tree commercially. Formerly it was used almost entirely for butcher blocks and lining for refrigerators, but now the largest demand is for veneer in built-up lumber. Quarter-sawed sycamore has a striking grain and is growing in popularity, being used largely for making sewing machine tables, cabinet work, furniture and interior finish. The trunk of this tree often attains an enormous size, but those more than 3 feet in diameter are generally hollow.

The average price for sycamore is about $16, but it frequently brings considerably more for some special use.

PRINCIPAL USES OF SYCAMORE

Planing-mill products	Boxes and crates
Agricultural implements	Sash, doors, blinds and general mill work
Musical instruments	Refrigerators and kitchen cabinets
Furniture	Brushes
Vehicles and vehicle parts	

Cottonwood.—Owing to the difficulty in seasoning cottonwood, it is better adapted for veneer than lumber. In trade two classes of cottonwood lumber, yellow and white, are often distinguished. The former refers to the heartwood and the latter to the light-colored sapwood. Cottonwood lumber has qualities similar to basswood and yellow poplar and is often used as a substitute for these higher-priced woods. In the form of veneer it is used largely by the manufacturers of built-up lumber which is used for trunks, vehicle bodies, drawer bottoms, veneer boxes, etc. A large quantity of cottonwood is used for making boxes and crates. There is an increasing demand for cottonwood in the form of cordwood to be used in making paper pulp, and since it is an exceedingly rapid

growing tree, easy to propagate and can be made to utilize waste places along streams and lowlands, it offers a favorable opportunity in many localities for commercial planting. The average price of cottonwood lumber is about $16 a thousand feet.

PRINCIPAL USES FOR COTTONWOOD

Boxes and crates	Agricultural instruments
Vehicles and vehicle parts	Car construction
Planing-mill products	Sash, doors, blinds and general mill work
Fixtures	Refrigerators and kitchen cabinets
Laundry appliances	Trunks and valises
Dairymen's, poultrymen's and apiarists' supplies	Paper pulp

Black cherry.—Several species of cherry are found in Ohio, but only one, the black or wild cherry, is important as a timber tree. Black cherry is one of America's finest cabinet woods. Its principal demand has always been for furniture, finish and trimming. It holds its shape well and works easily, which, together with its other excellent qualities, make it a favorite with the manufacturers of electrotype backing and account for its demand by makers of musical instruments, electrical appliances, etc. The forest-grown tree usually develops a long trunk free from limbs and knots, but trees growing in the open generally have too many limbs to be valuable for timber. Like other valuable trees, cherry is usually not present in sufficient amounts to enable the woodlot owner to market it to the best advantage. The average price is about $25 per thousand feet, with good clear lumber bringing $50 and better.

PRINCIPAL USES FOR BLACK CHERRY

Car construction	Musical instruments
Machine construction	Furniture
Sash, doors, blinds and general mill work	Plumbers' woodwork
Fixtures	Ship and boat building
	Vehicles and vehicle parts
	Planing-mill products

Table IX shows approximately the amount of material cut by Ohio sawmills in 1913 from each of our principal timber trees.

TABLE IX.—OHIO TIMBER PRODUCTION IN 1913

Species	Amount cut (ft. B. M.)
Oak	207,500,000
Yellow Poplar	47,900,000
Maple	36,300,000
Beech	33,800,000
Elm	19,300,000
Hickory	15,500,000
Ash	13,000,000
Chestnut	12,000,000
Basswood	8,800,000
Walnut	7,100,000
Sycamore	2,000,000
Cottonwood	700,000
Cherry	500,000

COOPERATIVE MARKETING

Farmers may well interest themselves in the question of community cooperation in the marketing of their woodlot products. There is in Ohio more than 4,500,000 acres of woodland. Fully 3,000,000 acres of this is in farm woodlots. With an average stand of only 3,000 board feet to the acre, these farm woodlots contain 9,000,000,000 board feet of lumber. Surely marketing the yield from our farm woodlots is a problem of importance. The farmers who own this timber want to make the most of it.

Many owners now feel that it is less important for them to learn how to make their woodlots yield greater crops of timber than it is to learn how to be sure of getting what their timber crop is worth. Generally the owner is not in a position to harvest and market his own timber. Lumbering is a business which requires expensive machinery, efficient operation, a knowledge of markets and ability to dispose of the product advantageously. The competition among local buyers and mill men is seldom active enough to afford the owner much protection against a losing bargain if he disposes of his timber on the stump.

A lumbering operation in the average farm woodlot is not on sufficiently large scale nor is the work done with adequate equipment to enable the owner to get their true value for his products. The ordinary portable-sawmill operation is likely to produce boards or dimension material of uneven thickness. Various sorts of lumber may be sawed in such a manner as to make grading and sorting for market almost impossible. A purchaser receiving a shipment of this sort finds it highly unsatisfactory compared with the standardized product of the large mills. The woodlot frequently contains different kinds of wood each of which would be quite valuable if it were present in sufficient quantity to be marketed advantageously, but due to the limited quantity present must be disposed of at a greatly reduced figure. These facts have caused many woodlot owners to wonder if by collective bargaining they cannot be able to secure decidedly better terms than when each sells independently of the rest.

The cooperative marketing of timber presents many of the same difficulties which are encountered when farmers organize to market other farm crops. But unlike most other farm crops, the timber crop need not be marketed in a hurry. Plenty of time may be used to investigate markets and determine what it should bring.

An association of farmers holding sufficient forest land to make a good working forest would be in a position to market a high-grade product and dispose of their timber to much greater advantage than they could do as individuals. Material demanded for special uses and bringing a high price could be harvested and marketed in carload lots. Such cooperation would permit of the best class of portable-mill operation, insure better utilization and should result in better prices to the owners of stumpage.

Such an association could secure the services of a trained forester who would act as advisor in the matter of lumbering and marketing, and who could also outline proper plans of woodlot management based on localized conditions. It must be recognized that a full utilization of the productive value of the farm woodlot can come only after those forestry principles intended to make the woodlot produce timber of the highest quality possible have been adopted and put into practice.

More and more it is going to pay the farmer to have high-grade woodlot products to market; and in order that the area devoted to the growing of timber may be producing the greatest amount possible of those kinds of wood that are most salable in his particular region, it must be managed and cared for according to the recognized principles of forestry.

Under such a system of cooperation which would include not only the harvesting and marketing of the woodlot products but also placing the woodlot under a sound plan of farm management much of good should come to Ohio woodlot owners.