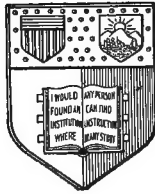


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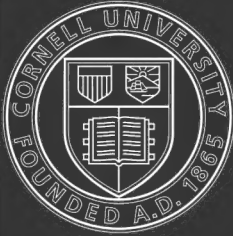


SELLING WOODLOT PRODUCTS ON MICHIGAN

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UNITED STATES DEPARTMENT OF AGRICULTURE
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OF THE
STATE OF MICHIGAN

SELLING WOODLOT PRODUCTS ON MICHIGAN
FARMS

By E. H. FROTHINGHAM,
FOREST EXAMINER, FOREST SERVICE.
JULY 10, 1915.



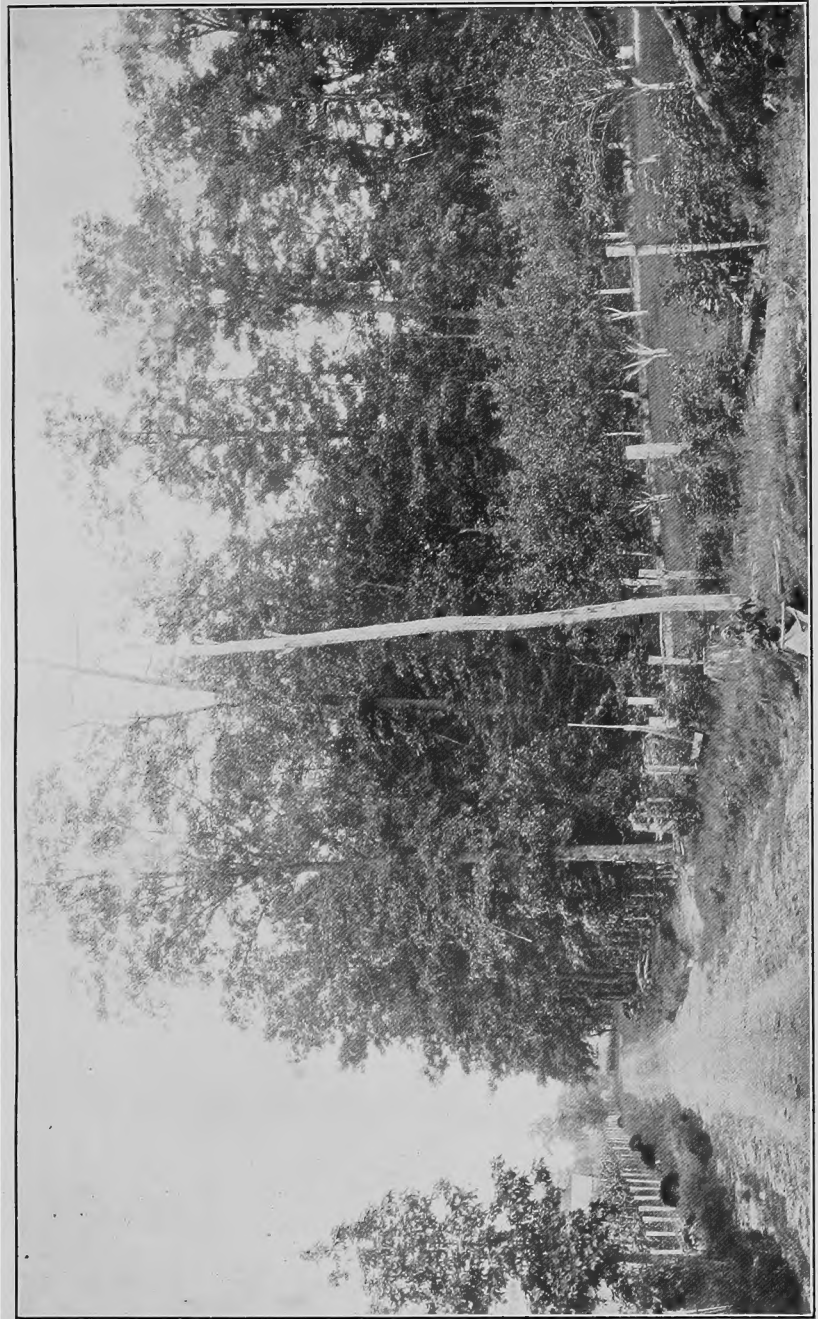
To the Farmers of Michigan:

It is always a pleasure for the Public Domain Commission to cooperate with any of the United States departments in giving to the people of this State information which will be of benefit to them. This publication entitled "Selling Woodlot Products on Michigan Farms" is the result of such cooperation, and we feel that the data which has been so carefully gathered and intelligently compiled by the Forest Service of the United States Department of Agriculture will be of untold value to the farmers of Michigan, not only in advising them as to how best to harvest and dispose of the products of their woodlots, but in stimulating a greater desire for larger and better woodlots.

Very respectfully yours,

JUNIUS E. BEAL,
ALFRED J. DOHERTY,
ORAMEL B. FULLER,
FRED L. KEELER,
WILLIAM KELLY,
COLEMAN C. VAUGHAN,

Members of the Public Domain Commission.



A woodlot serving a double purpose: Protection to the orchard and wood production.

SELLING WOODLOT PRODUCTS ON MICHIGAN FARMS

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SELLING WOODLOT PRODUCTS ON MICHIGAN FARMS

PURPOSE OF THE BULLETIN

One of the essentials of successful farming is to know how, when, and where to market crops. Farmers are all deeply interested in this; yet when it comes to selling wood products, most of them are at such a disadvantage through ignorance of markets and methods of estimating and selling, that they lose sometimes two-thirds the value of their timber. Many Michigan woodlots still contain timber which represents the growth of a century. No farmer should let this valuable possession pass from him "for a song."

The advantage to be gained through knowledge of marketing timber is best shown by an actual example. An 80-acre farm in south central Michigan had on it a 10-acre woodlot containing about 48,000 board feet of basswood and about 12,000 feet each of hard maple, soft maple, red oak, soft elm, ash, and beech. The trees were overmature, many of them were hollow, and the owner knew he ought to "sell them to save them." Timber on an adjacent 10 acres had previously been sold for \$100 per acre, or a total of \$1,000. Instead of selling on the first bid made, the owner, acting on the advice of an expert attached to a nearby forestry school, wrote to a number of wood-using firms in different cities, from some of whom, after examination of his timber, he secured bids on the different species in his woodlot. As a result of his bargaining he received stumpage values amounting, in the aggregate, to nearly \$2,000. For his red oak, bought for quarter-sawing by a firm outside the State, he received \$21 per 1,000 board feet. His other trees were purchased by a veneer company, the basswood returning \$19 per 1,000 board feet, ash \$16, elm and hard maple \$14, soft maple and beech \$12.

Few farmers are so situated as to be able to secure the assistance of capable, impartial advisors; and this bulletin is an attempt to supply the deficiency by acquainting them with the uses of different kinds of woodlot timber, the location of some of the principal Michigan markets, and the more important details in the sale of the products.

THE WOODLOT SITUATION IN MICHIGAN.

Michigan farms which cut woodlot products in 1910 (43.7 per cent of the farms) sold on an average about \$50 worth apiece and consumed about the same amount.* The total value for the State was over \$7,900,000 (not including maple sugar), or about one-twentieth of the aggregate income from all Michigan crops. The total area of Michigan farm woodlots is nearly three million acres, which is 15.5 per cent of the total farm area. Woodlots will therefore continue for some time to be important sources of income to the State and to the farms on which they exist.

*Bureau of Census Reports.

In spite of this evident importance to the State, woodlots are being cleared at a rate which would threaten their virtual extinction if continued for the next half century. In the 30 years between 1880 and 1910 the decrease was over $1\frac{1}{2}$ million acres, or at a rate of more than 1 per cent per year, so that while in 1880 the average area of woodland on each farm was about 29 acres, in 1910 it was only 14 acres. This process of clearing was inevitable and perfectly natural wherever it opened up good tillable soils for cultivation. On poorer soils financial necessity often compelled farmers to cut their timber. There has, in fact, been little or no inducement to hold salable timber or even to protect and care for young growth for the uncertain value it might have 40 or 50 years in the future.

The only efficient means of stemming the tide of forest destruction seems to be organized community or State effort directed toward promoting the private holding of woodlots on poor lands by equitable tax laws or to establishing community or State forests by the purchase of existing woodlots or of land which should be in woods. The State is already providing for future forest growth through the holding of lands which have reverted for taxes. It is probable that a more general appreciation of the value of woodlots on poorer soils would go a long way toward perpetuating them. The best way of bringing this home to the farmers is to give them the information necessary to get the highest returns from their salable wood products.

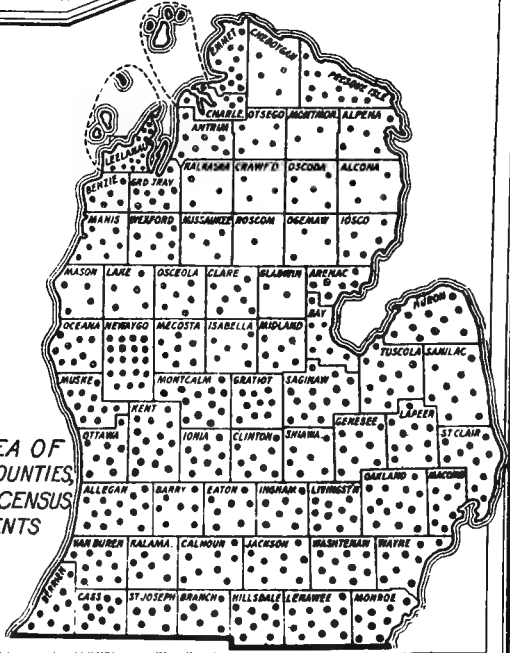
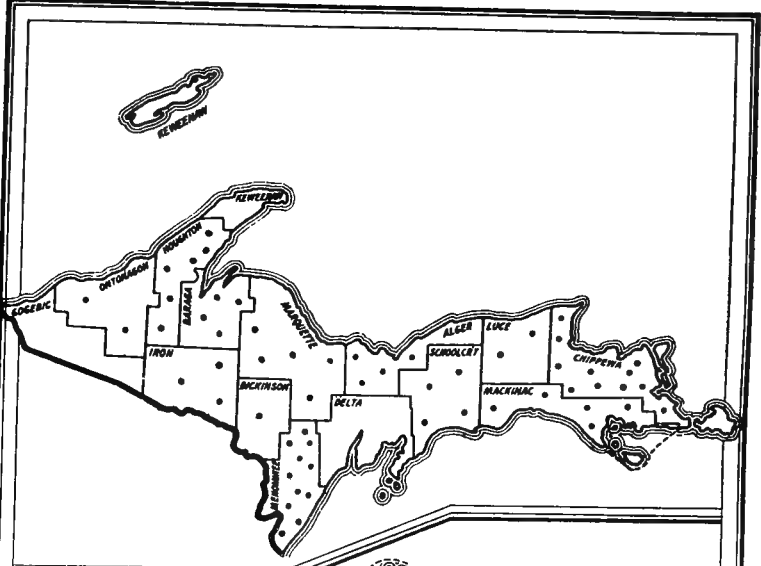
THE COMMON WOODLOT TREES.

In general, oaks and pines are the commonest species in woodlots on dry, sandy soils. The pines—white, Norway, and jack,—are unimportant or entirely lacking south of an east and west line drawn through about the middle of the lower peninsula. The oaks are most important south of this line, though some small species grow abundantly on sandy lands to the north of it. On heavier or moister soils throughout the State, maples, birches, elms, and basswood, and, in the north, hemlock are the species which predominate in the majority of the woodlots. In the swamps, tamarack is found throughout the State, while arborvitae (white cedar) and a little black spruce occur in the North. On cut-over and burned lands in the North, aspen and sometimes paper birch often form dense thickets, usually too small to be of any immediate value, but sometimes big enough to supply excelsior stock, box lumber, etc.

These are the prevailing species, but there are others which, though less abundant, may be much more valuable, among them white ash, black walnut, butternut, hickory, and (very sparingly in the South) yellow poplar. Merchantable trees of these species are becoming very scarce. They are eagerly sought out by buyers for special industries; and the farmer who owns good trees may, in prosperous times, expect good prices for them, even when at a considerable distance from the point of utilization.

MARKETING WOODLOT PRODUCTS.

The woodlot owner should not allow valuable trees to deteriorate on his hands, but he should fully satisfy himself that the deterioration has actually started before accepting a low bid for the timber. Even if signs of damage are found it should be remembered that timber does not



FARM WOODLOT AREA OF MICHIGAN IN 1910, BY COUNTIES, ACCORDING TO THE 13th CENSUS. EACH DOT REPRESENTS 5000 ACRES

SCALE - MILES
0 10 20 30 40 50

•

"go back" very rapidly except when the process is already far advanced. When the signs of decay are unmistakable, therefore, a postponement of the cutting for a year or two can usually be made with safety, so as to allow a poor market to "pick up," or in order to make further inquiries into the manner of disposal. Young, thrifty timber should be held as long as possible. It should not be sold unless the money or the land is urgently needed, or unless the owner is sure that an exceptional price is being offered for it. There is little risk in holding good, sound, young or medium-sized timber. It is yearly increasing in amount and value; and if it is cut and sold too early, a sacrifice is involved.

Woodlot sales may include the whole or the greater part of the stand, or may take only selected trees here and there. In the former case, a good market for each kind of material, including the cordwood, should be found. The case mentioned on page 7 illustrates how several different markets can be found for the different trees in a given woodlot. When only certain kinds of material are to be sold from the woodlot and the rest of the timber is to be left standing, the owner should take care not to injure the woodlot any more than is unavoidable through haphazard selection of the trees to be taken out. Sometimes it is even best not to permit the removal of all of the salable trees, when to do this would leave the stand ragged and would expose large patches of soil to sun and drying winds. Before culling the woodlot, it is a good plan for the farmer to consult the State Forester or some other person experienced in this work, or to obtain suggestions from one of the many publications relating to the care of forests. One such publication is U. S. Department of Agriculture Farmers' Bulletin 711, "The Care and Improvement of the Woodlot" by C. R. Tillotson, which can be obtained free of charge on application to the Forester, Forest Service, Washington, D. C.

Assuming that the farmer does not own a portable mill and wishes to secure the best possible return for his rough products, the steps which he will take are (1) to size up the woodlot and determine the kinds, quantities, and qualities of the salable trees; (2) to choose the markets which, considering prices and costs of shipping, will give the best returns for the material; and (3) to arrange for and conduct the sale.

Sizing up the Woodlot

Every woodlot owner should have a good general idea of what he has in his woodlot, whether he intends to sell it at once or not. In writing to dealers for bids or in advertising timber for sale, it is necessary to state what the kinds are, and in general the amounts, sizes, and qualities of each kind. This information should be explicit as to the number and size of each form of product, such as logs, poles, piling, cross-ties, bolts, cordwood, etc. A general idea of the quality of the product should also be given; this is especially important where the timber is fit for veneer, quarter-sawing, or other high grade uses.

The units in which timber is usually estimated are the board foot, the cord, and the piece. It is not hard to tell how much a tree contains of the products sold by the piece; but where logs are to be sold by board measure their contents, especially in the standing tree, are more difficult to estimate. Furthermore, it is hard to tell how much to deduct from the contents and quality of logs for hidden defects. If the timber

is to be sold by the log, at fixed prices per thousand board feet or other unit, no very precise estimate is necessary; but if it is to be sold "by the lot" or by "acreage," the owner should protect himself by making as careful an estimate as possible.

A simple and practical method of woodlot stocktaking is given in the next few pages of this bulletin. The main steps are as follows: estimate the top-end diameters and lengths of all the possible logs which the woodlot, or a measured sample of it, contains, recording the sizes and numbers separately for each species;* add up separately the number of logs of each species, each diameter, and each length;* deduct an inch or two from the diameter to eliminate the bark thickness (logs are always scaled inside the bark); and multiply the number of logs in each of the totals by the lumber volume for a log of the same diameter and length, to be found in either Table 6 or Table 7.

While close results in estimating can not be expected without considerable experience, an untrained observer can, with ordinary care, secure figures reasonably close to the actual contents of the stand. In small woodlots every tree may be sized up separately; in larger ones the trees on a known portion of the tract can be measured, and the volume of the whole stand found by multiplying the volume of the logs on the sample by the number of times the sample is contained in the whole area. This method is, of course, less accurate than the measurement of all the trees, and care must be taken that the sample is an average one. The bigger the sample the more accurate the results, especially when the stand contains a number of different kinds of trees in mixture; in any case, at least a quarter of the stand should be actually gone over, tree by tree. To be sure of securing an average, it is a good plan to estimate a number of scattered samples in different parts of the tract, using care not to place them where the timber is either heavier or lighter than the average. The samples can be either strips, squares, or circles of known area. The strip and the circle are usually the most convenient forms. A strip $\frac{1}{4}$ rods wide and 40 rods long contains an acre; its width and length can be paced off, the observer advancing 2 rods and after that stopping every 4 rods, estimating each time the trees on the imaginary square, four rods on a side, at the center of which he stands. Another convenient sample plot is a circle about 20 paces (59 feet) from center to circumference, containing a quarter acre.

As a guide in estimating the top (small-end) diameters of the logs in a tree it is well first to measure the diameter of the trunk at about breast-height.† Then estimate and deduct the number of inches taper between the breasthigh point and the end of each successive log. It will be a great help in judging the rate of taper of the standing trees if a few down trees of different kinds and sizes can be found and measured at regular intervals of 8 or 10 feet along the trunk from the breasthigh point, noting the number of inches difference between successive measurements. If there are no down trees available for measurement, the farmer must size up the taper for himself.

The taper varies more with the size of the trees than with the species. A short, thick tree which will cut only one or two logs may have 4 inches of taper in the distance between breastheight and the small end of the

*Forms for recording the logs and finding the totals are shown on pp. 12 and 14.

†Breast height is preferable to stump height because it avoids the pronounced swell at the base of most trees.

first 16 foot log; and the taper of the top log may be nearly as great. A tall, slender tree may have $2\frac{1}{2}$ or 3 inches taper between breastheight and the top of the first log, $1\frac{1}{2}$ inches in the next 16 feet, and $2\frac{1}{2}$ inches in the third log. The taper is normally greatest in the bottom and top logs.

The best instruments for measuring diameters are a diameter tape or a pair of calipers. The diameter tape is a short steel tape in a case, one side graduated in inches or in tenths of feet, the other in intervals such that the exact diameter of any cylindrical object measured can be read off directly in inches. A twenty foot diameter tape can be obtained for approximately \$1.75 or \$2 through a local dealer in hardware or surveying instruments. The same local dealer will be able to procure tree calipers for from \$3.15 to \$4.50, depending on the size. This is a beam graduated in inches and tenths, with a fixed arm at one end and a sliding arm which indicates on the beam the diameter of a tree held snugly between the two arms.

In the absence of a diameter tape or calipers, diameters can be obtained with sufficient accuracy by taking the girth of the tree with an ordinary tape, graduated in inches and fractions, and dividing by 3. The results obtained by dividing the girth by 3 will be slightly greater than the actual diameters, so that it will be necessary to subtract a small amount for trees over 7 inches in diameter. Thus $\frac{1}{2}$ inch should be deducted for trees between 8 and 16 inches in diameter; 1 inch for trees from 17 to 24 inches; $1\frac{1}{2}$ inches for trees from 2 to 3 feet; and 2 inches for trees of larger size. If the thickness of the trees is fairly regular throughout the woodlot, the measurement of a number of them from time to time will train the eye of a close observer so that the diameters of the rest can be estimated with approximate accuracy. An ordinary two foot rule held at arms length against the tree will assist the eye in estimating diameters.

Although the lumber contents of cut logs are measured *inside the bark*, it is usually easier and as accurate, in sizing up standing trees, to estimate the diameters *outside the bark*, and then to deduct an inch or two for the double thickness of bark when the tallies are added up on the summary sheet. The bark thickness can be determined, roughly, by removing and measuring a few samples from about breastheight on standing trees which are to be cut. The thickness should of course be doubled before subtracting from the outside bark diameter.

The majority of logs are now cut 16 feet long where possible, with a few inches extra to allow for injuries to the log ends in handling. Where 16 foot logs can not be obtained because of some defect or crookedness of the tree trunk, 14, 12, 10, or even 8 foot logs can often be cut, and these should be included in the list. When 16 feet is the standard length, 8 foot logs can be recorded as "half-logs." Allowance must be made for the stump, which will usually vary in height from 6 inches to 2 feet, depending on the size of the tree. For medium sized trees a good rule is to make the stump height about equal to its diameter.

In tallying, the logs should be kept separate by species, by diameter, by length, and preferably by quality. A simple and accurate method is to record on a tally sheet like the one shown the logs in each tree as the estimator comes to it. It is especially desirable to note the quality of the logs when they are fit for veneer, quarter-sawing, or other high-

grade uses. The grading must be an arbitrary one, depending on the farmers' judgment and experience. Large, straight, smooth ("surface clear") logs which appear to be sound can be classed as grade 1; sound logs of fair size, with a slight crook, or with a branch or two near the end, fall into grade 2; all other salable logs belong to grade 3. The grade number 1, 2, or 3, can be put in parenthesis in a corner of the space provided for log lengths on the tally sheet.

TALLY SHEET FORM

Species.	Diameter breast-high of tree. Inches.	First log.		Second log.		Third log.		Fourth log.	
		Length and grade.	Diameter at small end.*	Length and grade.	Diameter at small end.*	Length and grade.	Diameter at small end.*	Length and grade.	Diameter at small end.*
		Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.
Hard maple.....	18	16(3)	16	12(3)	15	.....	.....	.....	.....
Beech.....	12	16(2)	9	8(3)	8	.....	.....	.....	.....
Hard maple.....	12	16(2)	9	10(3)	8	.....	.....	.....	.....
Hard maple.....	15	16(1)	12	8(2)	11	12(2)	9	12(3)	8
Red oak.....	19	16(1)	16	16(1)	13	16(1)	10	12(2)	8
Rock elm.....	14	16(1)	11	16(2)	9	8(3)	8	.....	.....
Hard maple.....	13	16(1)	10	12(2)	8	.....	.....	.....	.....
Hard maple.....	10	12(3)	8	.....	.....	.....	.....	.....	.....
Hard maple.....	11	16(2)	8	14(3)	8	.....	.....	.....	.....
Beech.....	10	16(3)	8	12(3)	8	.....	.....	.....	.....
Hemlock.....	18	16(1)	15	16(1)	12	16(3)	8	.....	.....
Hard maple.....	16	16(1)	14	16(1)	12	.....	.....	.....	.....
Hard maple.....	10	12(3)	8	.....	.....	.....	.....	.....	.....
Hard maple.....	14	16(2)	11	16(2)	8	.....	.....	.....	.....
Etc.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*Either outside or inside bark, as the estimator prefers. It is probably simpler to make the estimate outside bark, deducting the double bark thickness when the logs are added up for scaling. The form on page 14, which shows the above logs added and scaled by species, size, and grade, assumes that the tally was made outside bark, and that 2 inches were deducted for double bark thickness.

When the tally is complete for the whole stand, or the measured sample of it, the number of logs of each kind, size, and grade must be added up; and if, as in the example just given, the diameters of the logs were estimated outside the bark, the double bark thickness must be deducted. It is usually sufficiently accurate to assume a fixed deduction for bark (say 2 inches, as in the form on page 14), for all species and sizes of log, based on the average thickness of bark actually cut from different parts of a number of trees.* The form on page 14 is a convenient one for adding up the logs according to kind, size, and grade, and recording their lumber contents. The logs of each class are read off from the tally sheet, and recorded (after subtracting the double bark

*This arbitrary deduction may be justified on the ground that the diameters of the log ends are estimated and not measured, are expressed in inches and not fractions, and can therefore be regarded only as fairly close approximations.

thickness) by dots or short lines in the appropriate space.† The lumber contents of all the logs of each class can then be easily determined by (1) finding in Table 6 or 7 the board foot volume of a log of the same length and diameter *inside bark*; and (2) multiplying this figure by the number of logs. The total volume for each class may conveniently be written into the proper space, as shown in the form, and these totals may be added across so as to give the total volume in board feet of the logs of each species and each grade. The form may be extended to provide for any number of species and diameters; it may be simplified by omitting the columns for grades if a graded estimate is not desired.

†A compact method is to record the first four logs by dots forming the corners of a small square; the next four by straight lines completing the square; and the next two by diagonals, thus:



(1 log),

(4 logs),

(6 logs),

(8 logs),

(9 logs),

10 logs)

The logs thus grouped by tens can be easily counted.

When the woodlot consists of only two or three species and it is not necessary or practicable to grade the logs, a more compact form of recording is possible as indicated below, which largely does away with the second operation of totaling. Where the owner knows that two or more of the species have closely similar values, they may be grouped together; but the general proportion of each should be kept in mind, since in bargaining it may happen that other prices will be offered than those which the owner contemplates.

Log :	Pine and hemlock logs on 1 average acre				
Diameter (outside bark, small end):	Length in feet				
	16	14	12	10	8
Inches	☒☒☒☒	☒☒	☒☒☒☒☒☒	☒☒	☒☒☒☒
6	:32	:20	:49	:19	:27
7	:44	:31	:22	:21	:6
8	:77	:28	:17	:9	:8
9	:50	:3	:18	:7	:5
10	:42	:6	:2	:	:
11	:16	:	:	:5	:
12	:23	:7	:3	:	:1
etc.	:	:	:	:	:

A rough estimate of the cordwood contents of woodlots can be obtained by tallying the number of trees of each diameter and dividing by the number of trees per cord shown for different diameters in the following table. The table is compiled from existing tables for northern hardwood trees, but will apply roughly to softwoods as well:

TABLE 1.—NUMBER OF TREES TO MAKE A STACKED CORD OF UNPEELED SPLIT AND ROUND WOOD IN 4 FOOT LENGTHS, 3 INCHES AND OVER IN DIAMETER AT THE MIDDLE.*

Diameter breasthigh of tree—inches.	Number of trees per cord.	Diameter breasthigh of tree—inches.	Number of trees per cord.
3.....	66	17.....	1.7
4.....	40	18.....	1.5
5.....	24	19.....	1.3
6.....	20	20.....	1.2
7.....	15	21.....	1.0
8.....	11	22.....	.9
9.....	8	23.....	.75
10.....	6	24.....	.6
11.....	5	25.....	.5
12.....	4	26.....	.4
13.....	3.5	27.....	.37
14.....	3	28.....	.34
15.....	2.5	29.....	.32
16.....	2	30.....	.3

*Compiled by G. N. Lamb, from various tables for forest grown northern hardwood trees.

Choosing the Market

After finding out what the woodlot contains, the next thing to do is to ascertain for what uses each kind of material will bring the best price. An index showing the uses of each species is given on pages 39-40. The farmer should look up all the local wood using industries like sawmills, firewood dealers, pulp mills, fruit box and basket factories, railroads, etc., and obtain the prices they will pay for the various kinds of timber he has to sell. It is a good plan to inquire of neighbors who have had dealings with local buyers.

It is very often possible to get better prices than those offered by local dealers, however. The woodlot owner should investigate the available markets not only within wagon haul of his lot but also at points some distance away; valuable logs can often be shipped 100 miles or more with profit. It is easy to secure prices for different products by writing to all the firms in towns and cities not too far away which are manufacturing special articles and which seem to offer a good market. In such letters, the kinds, amounts, and general qualities of the timber available should be stated as clearly as possible, and inquiry should be made about the point of delivery,—whether on board cars at the shipping point or at the destination. In the latter case, the shipper pays the freight, and this amount must be deducted from the price offered in comparing the returns to be derived with those which local sales would yield. In most shipments, carload lots are required. When buyers are sent by the firms in response to letters, however, they may accept less amounts, making up the carload from other farms in the vicinity. It is, of course, possible for two or more farmers to combine and make up carload lots, sharing the freight charges between them.

On pages 41 to 46 is given a directory of Michigan industries which buy wood in rough forms—logs, bolts, billets, ties, posts, poles, etc. While this list is necessarily not quite up to date, most of the establishments are probably still in the market. For convenience in reference, the firms are arranged by towns, and the towns by counties, in alphabetical order for the upper peninsula and for the northern and southern parts of the lower peninsula. This will make it easy for the farmer to find out what firms buy rough wood in his own and adjacent counties. In writing for bids he should not confine himself to these, but should also approach firms manufacturing specialized articles, like veneer, handles, etc., in any part of the State.

The directory does not include sawmills or wood yards, since it is assumed that the farmer is already acquainted with such of these establishments as are in his vicinity. It is rarely practicable to ship any great distance for these uses. In the list, the kind of product sold precedes the name of the company or buyer; wherever possible the species dealt in are specified.

Prices and specifications for different uses can not be given to good advantage because they vary constantly. A general idea of the usual forms and grades required and of the relative values of the different species can, however, be given, and these will be useful in determining what firms to write to. It should be borne in mind that, unless otherwise specified, prices are for materials delivered f. o. b. mill; in other words, the seller bears the freight charges. For some rough products, like pulp wood, excelsior wood, ties, etc., there are standard prices per

cord, per thousand board feet, etc. This is less true of log sales for veneer and other uses; buyers usually secure these at lowest prices, and it is best to obtain bids from a number of different sources. As a rule, the larger the size of a sound, high-grade log, the higher the price it will bring.

Lumber.

Among lumber dealers there is a strong prejudice against farm lumber, due to the fact that it is commonly poorly manufactured and poorly graded as compared with the lumber cut in the larger stationary sawmills. Most of the farm lumber is sawed in small portable mills with circular saws, and the work is paid for at so much a thousand board feet—usually \$3.50 or \$4. It is of course to the advantage of the sawyer to turn out as many thousand feet a day as the capacity of his mill will permit. Getting the best lumber out of a log requires considerable judgment and necessitates a frequent turning of the log, which materially reduces the daily output. It is probable that a good sawyer could, by taking care as to grades, save as much as \$10 per day over what ordinary portable mill lumber is worth. Most of the larger plants which use lumber, therefore, get it from the big sawmills or from wholesalers who are able to supply well manufactured stock of specified grades in the amounts and at the times required.

There are many establishments in the State which do, however, buy lumber from farmers, and even fairly high grade lumber. Usually this lumber is bought "log run" (No. 2 common and better) or No. 1 common and better. Woodworking companies usually buy sawed lumber on delivery. Local lumber yards often prefer to buy standing timber "by the lot" or by "acreage," either hauling the logs to a mill in town or sawing them out on the spot in a portable mill. In such deals there are apt to be no standard grade values, the lumber being purchased at prices reached in bargaining.

Lumber is put to a great many different uses, each having different requirements which can not be stated to advantage in a bulletin of this size. It is necessary, however, to be thoroughly aware of such requirements, so that as much as possible of the material can be sawed to fit them, and as little as possible rejected at the yard after being hauled. This applies both to grade and to size. Some plants want 1-inch lumber, others thicker material. Plants which require lumber only for such purposes as furniture, finish, etc., usually require only the higher grades. It is usually best, when possible, either to sell such companies in the log—observing, of course, the points regarding competitive bargaining already mentioned—or to haul the logs to some established mill accustomed to producing high grade lumber, and have them sawed out there. Where lower grades are purchased, as for example No. 2 common and better, a good portable mill, operated by an experienced sawyer, may be secured, and the cull lumber rigidly graded out. By grading rigidly the farmer may avoid loss through the rejection of culls at the point of delivery.

Much high grade lumber undoubtedly goes into the construction of farm buildings. The farmer should look on this as a distinct loss until he has proved to his own satisfaction that he could not get better value from the logs or lumber either from local or from distant buyers. It is

usually a distinct misuse of good material to put hard woods into scantlings, rafters, etc. Softwoods are much preferable for these purposes, and as a rule only the lower grades are necessary, which, if the woodlot itself does not supply enough, can almost always be bought at low prices from local dealers. Culls left in portable mill work can, of course, be used to advantage for such purposes, especially when of hemlock, pine, or other softwood. Some small mill operators make a business of buying up farm logs and selling the culls to farmers for about \$17 per thousand feet.

The following figures, gathered at random from a few firms in the southern part of the State, show prices paid in 1914 for different species and grades of farm lumber delivered at the company's yards:

TABLE 2.—PRICES PAID FOR FARM LUMBER BY A FEW FIRMS IN SOUTH CENTRAL MICHIGAN, 1914.

Oak, red and white, 1sts and 2nds, 1 inch lumber.....	\$37-39
Oak, red and white, No. 1 common, 1 inch lumber.....	28
Oak, red and white, No. 2 common, 1 inch lumber.....	23
Oak, red and white, No. 1 common and better, 1 inch lumber.....	30
(1½ inch and 1½ inch oak lumber, 1sts and 2nds, \$2 or \$3 more).	
Oak, white, 1sts and 2nds, 3-3½ inch plank.....	38
Oak, white, No. 1 common, 3-3½ inch plank.....	28
Elm, rock, 1sts and 2nds, 3-3½ inch plank.....	38
Elm, rock, No. 1 common, 3-3½ inch plank.....	24
Elm, soft, 1sts and 2nds, 3-3½ inch plank.....	25
Elm, soft, No. 2 common, 2 inch plank.....	20
Elm, soft, No. 2 common and better, 1 inch lumber.....	20
Maple, hard, 1sts and 2nds, 4 inch plank.....	45
Maple, hard, 1sts and 2nds, 3-3½ inch plank.....	35
Maple, hard, No. 1 common, 3-3½ inch plank.....	25
Maple, hard, No. 2 common and better, 4 inch plank.....	32
Maple, hard, No. 2 common, 2 inch plank.....	20
Maple, hard, No. 2 common and better, 1 inch lumber.....	22
Maple, soft, 1sts and 2nds, 3-3½ inch plank.....	25
Maple, soft, No. 1 common, 3-3½ inch plank.....	20
Maple, soft, No. 2 common and better, 1 inch lumber.....	23
Basswood, No. 2 common and better, 1 inch lumber.....	25-26
Beech, No. 2 common and better, 1 inch lumber.....	16
Black ash, No. 2 common and better, 1 inch lumber.....	23
White pine, No. 2 common and better, 1 inch lumber.....	25
Poplar, No. 2 common and better, 1 inch lumber.....	27

Sawlogs

Selling logs by the thousand board feet is a very desirable method, since by it may be avoided the errors usually incident to estimating and the uncertainties introduced in the sawing operation. The prices paid for logs of a given species depend on the size and quality of the logs, and are usually fixed by bargain. The farmer should protect himself by finding out what prices have been obtained by neighbors who have sold logs, and also by correspondence or interview with dealers in logs for other purposes than lumber, such as veneer, handles, etc.

As a rule, there are no standard grades of logs, but the price is fixed on inspection by the purchaser. If possible, this should be done before delivery. Otherwise the seller is at the buyer's mercy.

The best prices are those paid for select walnut logs, oak and sycamore for quarter-sawing, cherry, etc. A moderate market has existed in the southern part of the State for export logs of hard maple, rock elm, oak, etc.; but this market is very limited at the present time. Maple logs for export have been bought at about \$35 per thousand board feet, f. o. b. shipping point; especially fine maple and elm logs brought



Farm logs and lumber hauled to the railroad for shipment.

as high as \$40 per thousand. The minimum size of such logs is 24 inches inside bark at the small end; and the requirements are about the same as for veneer logs—they must be sound and surface clear, but a slight crook is allowed.

In the southern part of the State, high grade hard maple logs, 20 inches and more in diameter, often bring from \$23 to \$26, delivered at the mill. In 1914, some buyers paid for the common species, such as hard and soft maple, soft elm, and basswood, a fixed price of \$20 per thousand board feet, delivered, for good logs, and \$10 for poor logs. One such company paid from \$20 to \$25 per thousand for good white ash logs. Where the farmer has ash, oak, walnut, cherry, basswood, or especially good logs of hard maple and elm, it is decidedly advisable to consider the special uses for which such logs might be suitable before selling to sawmills. Veneer and handle companies are often able to pay considerably more for them than sawmills will,—often enough to make shipment profitable. There are certain defects which are apt to be overlooked and which unfit apparently good logs for the most paying use. White oak, for example, is apt to be wormy in some parts of the State, which spoils it for quarter sawing. Wormy logs can often be sold to advantage to vehicle manufacturers for wagon rims.

Veneer

Veneer logs must be sound, so that they can be held firmly at the ends in the machines. They must be at least 10 inches in diameter inside bark at the small end; and some companies specify minimum diameters of 12 or 14 inches. Often two grades are specified: No. 1 logs, which must be surface clear, straight, and with not over two knots; and No. 2 logs, including all usable logs that fall below these specifications. In dealing with veneer companies at a distance the farmer should take pains to find out just what the minimum requirements are for logs of the second grade; otherwise he will be in danger of having his lower grade logs graded out and refused at the destination, which would involve either the complete loss of the logs or a payment of shipping charges in returning them.

Standard log lengths, with a minimum of 8 feet, are usually required.

Average prices paid for veneer logs by Michigan buyers in 1914 were as follows:

TABLE 3.—VENEER LOG PRICES PER 1000 BOARD FEET, F. O. B. MILL, 1914—MICHIGAN.

Species.	Diameter at small end, inside bark.					
	All sizes 10 to 14 inches and up.	17 inches and under.	18 to 24 inches.	25 to 28 inches.	29 to 34 inches.	35 inches and up.
Maple.....	\$18 30					
Yellow poplar.....	35 00					
Birch.....	24 66					
Elm.....	20 80					
Basswood.....		\$20 00	\$21 80	\$21 80	\$22 90	\$23 45
White oak.....		24 25	25 25	29 50	32 75	36 75
Red oak.....			17 50	19 50	25 50	29 50
Sycamore.....	14 00					
Ash.....	19 20					
Cherry.....	20 00					
Birds-eye maple.....	135 00					

These were average prices. Sometimes dealers in veneer logs receive as high as \$45 or \$55, depending on size and quality, for mixed oak logs, but the dealers rarely pay more than the above prices for their material. Farmers favorably situated may be able to command better prices for large, sound, symmetrical logs. The veneer industry requires the highest class of logs and on an average pays a better price for such logs than other industries. An exception is high grade oak and sycamore logs for quarter-sawing, which may bring even higher prices.

Nearly all the native species are used for veneer. Veneer from such woods as basswood and elm is used chiefly for the manufacture of boxes, crates, and other packages. The furniture and finishing industries pay higher prices and use the high-class finishing woods, such as oak, walnut, and cherry. Several companies make both kinds of veneer.

Handles

The factories manufacturing wooden handles of various kinds are one of the very best markets for farm hardwoods. Hickory and ash bring the highest prices, but maple and beech furnish the greatest amount of raw material. In 1911, according to reports received from Michigan handle manufacturers by the Forest Service, the following prices were paid for the rough materials (logs, bolts, and split billets). The proportion which each species formed of the total cut is also shown:

TABLE 4.—SPECIES USED FOR HANDLES AND THEIR PRICES IN 1911.

Species used for handles.	Percent of total consumption.	Value of raw material, per thousand board feet.
Maple.....	69	\$9-35
Beech.....	14	8-16
Hickory.....	8	20-50
Ash.....	5	25-40
Birch (yellow and sweet).....	3	9-13
Oak.....	} 1	16-35
Elm.....		16-35
White birch.....		8
Basswood.....		15-16

Undoubtedly other species, like basswood, cherry, applewood, etc., were used in small amounts, but these were not listed by the firms which reported.

The form of raw material required by establishments manufacturing different kinds of handles naturally differs a great deal. Hickory, for example, goes into short and medium length handles, such as axe, pick, and hammer handles; ash is used for longer handles requiring greater stiffness, such as those for forks, hoes, and rakes. Broom handles take a large part of the maple and beech logs. Small tool handles are made of a variety of woods, some of them requiring special kinds; plane handles, for example, are made very largely of applewood. Where strength is a requisite, second-growth wood is often specified. Thus, in the manufacture of cant hooks and peaveys, second-growth maple and

rock elm are usually required, and the billets for the handles are, as a rule, split in order that no cross-grain may be left in them. Some beech is also used in making logging tools.

Handle companies buy very largely in the log or bolt through buyers who get the material from farmers. Firms using hickory have to go to other States for the bulk of their raw material, since there is comparatively little good hickory timber left in Michigan. Farmers owning good young stands containing considerable hickory can well afford to hold them and care for them in view of the steadily decreasing supply and increasing demand. The same is true of thrifty, rapidly growing, young ash timber. For fork and hoe handles, the specifications often designate only second-growth ash. The requirements are high, and as a rule the smallest sizes taken are: length 4 feet and a few inches, diameter 6 inches at the small end. The logs must be nearly straight, and with no knots or branches showing on the surface.

Manufacturers of scythe snaths use elm and white ash, with some beech and maple for tholes. The elm is mostly rock elm, with some tough soft elm. The log requirements of one company were: diameter (small end) 12 to 30 inches, length 5½ feet and up, logs to be straight and smooth. This company paid a good price for farm timber, on the stump, with the understanding that it must be good to be accepted. Top logs of inferior grade were left in the woods.

Vehicles and vehicle parts

Vehicle manufacturers draw the greater part of their supplies from the general lumber market; much of it—especially hickory and white oak—is supplied by southern jobbers in roughly shaped sawed products and split billets. Nevertheless, some vehicle makers draw largely from farm woodlots, and when this is the case it usually constitutes one of the desirable markets for the farmer to investigate. Most of the material thus bought, however, is in the form of rough planks from portable mills.

Some of the uses to which the various species are put in vehicle making are as follows:

Rock elm—sleigh runners, sled beams, sled poles, eveners, single-trees, brake blocks, etc.

Soft elm—wagon box bottom cleats, etc.

Hard maple—wagon axles, plank for wagon and sled bodies and beams, bolsters.

Soft maple—wagon box bottom cleats, etc.

Oaks—gearings, sills, bed pieces.

White oak—reaches, tongues, etc.

Birch—hubs.

Basswood—wagon box boards.

White ash—wagon poles and bodies.

Shagbark hickory—axles, single trees.

Second-growth hickory—spokes.

Whitewood (yellow poplar)—wagon bodies.

White pine—wagon box bottoms.

Norway pine—wagon box bottoms.

The grades demanded vary considerably, some firms taking No. 3 common and better, others only clear lumber. As a rule, planks are specified, but some 1-inch lumber is also taken.

The proportionate amounts taken by companies which used local rough products in 1911, and the prices paid for them are as follows, for a few of the native species:

TABLE 5.—PRINCIPAL MICHIGAN WOODS USED IN VEHICLE MAKING AND THEIR PRICES, 1911.

Species.	Percent of total consumption.	Value per thousand board feet.
Maple.....	96	\$12 (logs)
Oak.....	3	13-30 (logs and plank)
Ash, white.....	1	25-30 (logs)
Elm, rock.....		30 (plank)
Hornbeam.....		30 (logs)
White pine.....		30 (plank)

These prices are, of course, obsolete, and are only inserted to give a general idea of the values of the species by reference to the lists given on other pages of this bulletin.

Vehicle manufacture affords a good market for hornbeam, which however, is a small tree not commonly found of sufficient size to produce the 7 inch, 16 foot logs required. It is used for tongues for the "big wheels" used in logging in the northern part of the State and elsewhere. Blue beech (sometimes called hop hornbeam or water beech) is occasionally bought, when of sufficient size, for making spokes, felloes, and other parts of heavy wagons. The common beech is also used for felloes.

Cooperage

Slack barrel cooperage offers a much larger market for Michigan woodlot trees than tight barrel cooperage. Many different species are used for the former, but the latter takes only white oak, both for staves and headings. The following specifications published by a firm outside the State will serve to show what the requirements are, in general, for tight barrel stave and heading bolts.

SPECIFICATIONS FOR WHITE OAK STAVE BOLTS.

All stave bolts to show a 3-inch heart face.

White oak stave bolts to be made full 36 inches long, not over 6 inches from heart to sap, and not under 4½ inches from heart to sap; to be made from sound green trees, not under 18 inches in diameter. Timber must be straight and all defects worked out. Knot, seed and worm holes, windshakes, splits, dead timber, pecks, and short bolts will be classed as culls. Bolts to be ricked close. All bolts must be barked.

SPECIFICATIONS FOR WHITE OAK HEADING BOLTS.

Bolts shall be full 22 inches long, and measure 10 inches from heart edge to outside of sap; to be not less than 10 inches across sap side. Bolts shall be ricked close. Knots, seed holes, wind shakes, splits, dead timber,



Getting out barrel stave stock. Method of splitting the tree sections into "quartered" bolts.



Barrel stave stock. Bolts piled in woods, ready for hauling to the mill.

pecks, and short bolts will be classed as culls. Bolts with five to ten straight worm holes will be accepted.

For slack barrel cooperage the specifications are similar, but not so severe. For example, the stave bolts do not have to be quartered, as they do for tight barrel cooperage, for which the staves must be straight grained. Cross grained or twisted grained bolts are acceptable for slack stave and heading manufacture, unless the defect is sufficient to weaken the product materially. Bolts containing sound knots, bird pecks, sap stain, and other minor defects, which would cause their rejection for tight barrel staves and headings, are accepted for slack cooperage.

Slack cooperage establishments turn out large quantities of lime, cement, apple, potato, and other fruit and vegetable barrels, butter tubs, etc. In order of the amounts used the species made into staves in 1912* were pine, beech, elm, maple, birch, basswood, spruce, ash, oak, cottonwood, tamarack, hemlock, and balsam fir. The species used for heading, also in order of amounts used, were pine, beech, basswood, maple, cottonwood, elm, ash, birch, oak, hemlock, chestnut, sycamore. For hoops, the species used were elm (95 per cent), beech, ash, oak, maple, and basswood. Head linings—thin strips used to hold the heading in place—were mostly of elm, rock elm being preferred.

Railroad Ties

The demand for ties fluctuates considerably, but there are usually standard prices offered which are much the same for the different roads. Many different species are used, including white oak, walnut, and cherry. For these valuable species better prices can ordinarily be obtained for some other use; but when the logs are knotty and crooked no other use may be possible. The hearts of logs, which contain the lower grades of lumber, can often be utilized for this purpose, although it is questionable whether the value would not be greater in low grade lumber than in ties.

Regular No. 1 ties are 8 feet long, 8 inches wide, and 6 inches thick. The ties used on the Lake Shore Railroad are 8½ feet long, 9 inches wide, and 7 inches thick. Switch ties are 7 by 9 inches in end dimensions and of different lengths. The requirements of the company and the prices paid should be ascertained before a sale is made or the timber is cut. The best prices are those paid for white oak ties, which are used by the railroad without preservative treatment, and ordinarily bring from 55 to 60 cents apiece when cut to standard specifications and delivered along the right-of-way. "Treatment ties" are mostly of beech, birch, hard maple, and tamarack. Before using they are treated with a wood preservative. No. 1 treatment ties, hardwood, brought in 1914 about 48 cents apiece; No. 2 ties, hardwood and tamarack, for use on side tracks, brought about 38 cents.

Quantities of white cedar ties are bought by railroads in the northern part of the State. The Northwestern Cedarmen's Association specifications for 1912 require that "a standard tie shall be 6-inch face and wider, 12 inches from small end, 6 inches thick and 8 feet long, sawed ends. Ties made different from these specifications shall be regarded as special contracts."

*"Wood-using Industries of Michigan," by Hu Maxwell; 1912. Published by the State of Michigan in cooperation with the Forest Service.

Ties are either sawed or hewed. Hewing is wasteful, since a good deal of the best wood in the log, suitable for lumber, is chipped off, the amount of waste being greater, of course, with large than with small logs. Furthermore, tie hewing is a difficult job for an untrained axeman, and it is doubtful if farmers not already experienced would be wise in attempting it. Before deciding to have his logs sawed into ties the farmer should satisfy himself that the value in ties is at least as great as that in lumber. A good deal depends on the quality of the sawing. Logs of desirable species, well sawed into graded lumber, will undoubtedly bring better prices than if sawed into ties, although the log hearts may in some cases have a higher value as ties than as low grade lumber. For less desirable lumber species such as beech, on the other hand, ties at 48 cents apiece may afford the best possible use.

Poles and Posts (white cedar)

Of the native trees, white cedar (*arborvitae*) is the only one used extensively for poles. This is a common swamp tree in the northern part of the State. It combines the qualities of durability, lightness, strength, and form, which are requisites of poles and posts. Fall and winter, when the swamps are frozen up, are the best seasons in which to cut cedar. The stumps should be cut high enough to avoid any pronounced crook. Peeling is most easily done in the spring, but it is better to do it in the winter to facilitate drying. Poles cut and peeled during the late fall and winter should be laid in a single layer on a pair of skids large enough to keep them well off the ground. By the first of May a large part of the moisture will have dried out, and the weight of the poles thus considerably reduced. The reduction in freight weight will more than equal the expense of holding, and in addition the poles will gain in strength and durability. Spring and early summer offer the best conditions for maximum seasoning in the shortest time, but checking during seasoning is greatest in poles cut during these seasons. It does not materially affect the strength of the poles, however, and can largely be prevented in the ways mentioned on page 38.

The standard specifications of the Northwestern Cedarmen's Association for 1912 may be summarized as follows:

All posts and poles must be cut from live timber and peeled, and must be reasonably sound. In posts, "pipe rot" and other rot defects that do not impair the strength for use in fences are allowed. In large poles a certain amount of butt rot is allowed, not exceeding 10 per cent of the area of the butt, provided it does not plainly impair the strength of the pole above ground. The tops of poles must be reasonably sound.

Three classes of materials are recognized: "posts," 7 and 8 feet long; "large posts and small poles," from 10 to 20 feet long by 4 or 5 inches top diameter; and "standard telegraph, telephone, and electric poles," 25 feet or longer, by 4 inches or more in top diameter. Some latitude is allowed in the size specifications: posts may be 2 inches less in length, and, if seasoned, $\frac{1}{4}$ inch less in diameter; poles may be $\frac{1}{2}$ inch short for each 5 feet in length, and 6 inches short for any length greater than 20 feet; and the top diameters of seasoned poles may be slightly less than specified— $\frac{1}{4}$ inch less for 4 and 5 inch poles, $\frac{1}{5}$ inch for 6 inch poles, and $\frac{1}{10}$ inch for 7 inch poles. No such latitude in diameter



Tight barrel stave bolts hauled to the stave mill by farmers. (From U. S. Department of Agriculture farmer's bulletin 715, "Measuring and Marketing Wood-lot Products.")



is allowed, however, for green, fresh-cut, or water-soaked material which must come up to, or exceed, the full diameter specifications.

"Sweep" or crook, one way, is allowed, but must not exceed 4 inches for posts and for poles up to 16 feet long. For 18 and 20 foot poles a 4 inch crook, one way, is allowed, and it may be measured from a point 4 feet from the butt. For larger poles, a one way crook of 1 inch for every 5 feet in length is allowed, and it may be measured from a point 6 feet from the butt. The crook is measured by tightly stretching a tape line from top to bottom or other specified point (4 or 6 feet from the butt) on the post or pole, on the side where the sweep is greatest, and then measuring the distance, at the point where it is greatest, between the tape and the pole.

Poles must be reasonably sound and well proportioned for their length. Large, sound knots are allowed, if trimmed smooth. "Wind twist" is no defect unless very unsightly and exaggerated.

Prices of cedar poles and posts vary, and should be learned immediately before the sale.

Practically all the Michigan species are used for posts, the values of the different kinds depending on durability. Next to cedar, white oak is probably the most durable of the more common species. Where obtainable, black locust makes extremely durable posts; and black walnut, also, is a good post tree. But since these species are usually of much greater value for other uses, it is a mistake to use them for posts except as a means of utilizing rough or small material good for nothing else except fuel. The greatest consumption of posts cut from woodlots is on the farms themselves. Considered as a source of posts alone, a small, thrifty woodlot often proves a valuable adjunct to the farm.

Small rough products

In the northern part of Michigan the industries which draw their supplies wholly or partly from farm woodlots are much less numerous and less specialized than in the southern part of the State. The prices are lower, since the supply is greater, the demand less, and the length of railroad haul to the consumer so great as, in many cases, to impose prohibitive freight charges. The products used are apt to be in the form of relatively short bolts, though considerable quantities of logs are also taken. Among the industries which take quantities of rough products otherwise of small value are pulp mills, excelsior factories, wood-distillation plants, and lime kilns. The market is not, of course, limited to the northern part of the State. With the possible exception of wood distillation, these industries are represented also by firms in central or southern Michigan. One of the features of these markets is that they afford a means of disposing not only of small trees but also of large, straight, sound branches of big trees cut for other purposes. This is especially the case with hardwood trees, whose tops often afford large quantities of cordwood, salable for fuel and distillation, and sometimes for excelsior and pulpwood.

The importance of these markets to woodlot owners in northern Michigan lies in the fact that they present a source of income during the period in which the lands are being cleared and put on a productive basis; a period often of great financial hardship. Even when the farmer can get only the equivalent of day wages for his products these markets

are distinctly useful; and since wood can be cut often to better advantage in the winter than in the summer, a means of securing an income during the unproductive season and at the same time clearing the productive areas for cropping is presented. When the early struggle of clearing is over, however, the woodlot assumes the same importance to the farm that it has farther south,—for shelter from hot and cold winds, supply of fuel, posts, etc., for the farm, and eventually as the source of a recurrent income from the sale of the products to specialized industries which may spring up in the vicinity or within a profitable shipping distance.

Wood for pulp.—Industries reporting the manufacture of wood pulp in Michigan have in the past specified only softwoods—spruce, balsam, hemlock, white pine, jack pine, tamarack,—to which may be added a little “poplar” or aspen. There is a likelihood that certain other hardwoods besides aspen will be used in the near future, as is now being done in many other States. Pulpwood dealers buy either unsplit bolts, by the cord, or logs, by the thousand board feet or cord. The wood is taken either peeled or unpeeled, some companies specifying one or the other, but many of them taking both at a difference of a dollar a cord in favor of peeled material. Bolts are bought in 4-foot lengths, with diameters at the small end of 4, 5, or 6 inches. The cord is the standard cord of 128 cubic feet—a stack 8 feet long, 4 feet wide, and 4 feet high, with usually 3 or 4 extra inches in height to allow for settling. Logs may be 8 or 16 feet long.

Spruce is the most valuable of the pulpwoods, but the amount of spruce in Michigan is so small that it is doubtful whether it will figure to any extent in woodlot sales. At northern points prices of from \$5 to \$6.50 per cord f. o. b. shipping point were offered for unpeeled spruce bolts in 1912, while spruce delivered at Detroit brought \$9.85 per cord. Hemlock pulpwood sold for \$3.50 rough and \$4.50 peeled, balsam for \$4 or \$5 rough, tamarack for from \$3.25 to \$4, and white pine for about \$3.25 per cord.

Excelsior.—Excelsior manufacturers buy chiefly basswood and aspen, or poplar. Some spruce, balsam, “whitewood” (yellow poplar), willow, and Balm of Gilead, is also bought, and often a little tamarack and birch is accepted, although these are inferior species for the purpose and are not wanted in any amount. The preferred species is basswood, which comprises about half the wood used for excelsior. For the northern farmer, however, it is in reference to aspen that the excelsior market is most important. Aspen (“popple” or “poplar”) is a small tree which has sprung up in great quantities over cut and burned areas in the north. Twenty-five or thirty years after a fire the aspen is about large enough for excelsior bolts, although much more can be cut from stands 10 or 15 years older. When farm lands contain stands of small, thrifty aspen not yet big enough for bolts, it is decidedly worth while to hold them for the comparatively short period necessary to give the trees value.

Excelsior wood is bought in bolts 37 or 55 inches long, either peeled or unpeeled. Specifications usually require the bark to be removed “unless otherwise agreed in writing.” Bolts from 4 to 8 inches in diameter are taken unsplit; from 8 to 12 inches in diameter they should be split in two; and when over 12 inches they should be split to the heart into pieces 6 to 8 inches wide on the bark side. Further requirements are



A woodlot in process of clearing for agriculture. Where soil will pay better for crops than for timber, clearing is justified, and the farmer's problem is how to dispose of his trees most profitably. (Photograph by Michigan Agricultural College).

that the bolts be "cut from live timber, free from gnarls, doze, rot, and large knots...Bolts should be piled up in ranks with a space of about two feet between piles and on poles to keep them up from the ground until they are seasoned and ready to ship. All culls and bolts under 4 inches in diameter will be thrown out."*

Prices paid for 37 inch excelsior bolts in 1914, delivered to factories in Grand Rapids, were about as follows:

Basswood (peeled), per cord	\$5.50-\$6.00
Aspen (peeled), per cord	5.00
Aspen (unpeeled), per cord	4.00

At Grand Rapids there is a limited market† for 36-inch bolts of soft elm, basswood, and soft maple for the manufacture of fiber "binder," to be used in place of hair in plaster block making. These bolts must be between 8 and 36 inches in diameter, with solid centers to take the dogs of the lathe; pieces with "dozy" centers are culled out and rejected. The bolts may be limby, if the limbs are trimmed flush with the bark, but they must be straight and the ends must be square. Double heart is no defect. The bolts are bought from farmers or jobbers; and in 1914 the prices offered, delivered at the factory, were \$6 when the bolts were mainly soft elm, and from \$5 to \$5.50 when mainly basswood and soft maple.

Wood for distillation.—Hardwood distillation for the manufacture of charcoal, wood alcohol, and acetates consumes a large amount of cordwood of maple, beech, and birch, and offers a means of disposing of the top wood, small trees, and low grade logs left after disposing of the more valuable products. This material is taken with the bark on in lengths of 4 feet or 50 inches, and to minimum diameters of usually 3 or 4 inches. The price paid per standard cord of distillation wood delivered at the factory is in the neighborhood of \$3 or \$4. Most of the companies get their material largely from the cutover areas of the big lumber companies, and some of them require that the wood shall be "body-wood," with only a small mixture of branches. Pieces over 6 inches in diameter must be split in a manner generally similar to that described under "Excelsior."

Firewood.—Probably no other form of woodlot material has brought such large aggregate returns as firewood; and yet this is, in the majority of cases, the least paying use to which good log timber can be put. It offers, however, practically the only means of disposing of branch and top wood, defective logs and slabs, of some species throughout the State and of all species in some parts of the State.

The best fuel wood is hickory; high prices are paid for it, but its promise for much more exacting and remunerative uses is so great that the farmer who has it in his woodlot should hesitate to sell for firewood any but the lowest grade timber and the refuse left in logging. This is also true of other woods, such as ash, oak, walnut, cherry, basswood, rock elm, and even thrifty second-growth hard maple, yellow birch, and soft elm. Beech is generally less valuable than most of the other species for many uses, and second growth and defective beech trees can often be cut from a woodlot and sold to advantage as cordwood. This affords a means of improving overstocked woodlots by thinning out the trees and giving the most desirable of them more light and growing

*From printed specifications furnished by the Excelsior Wrapper Co., Grand Rapids, Mich.

†The Alabastine Co., Grand Rapids; associated with the Michigan Gypsum Co.

space. Thinnings should not, however, be made so heavy as to admit a great deal of light into the woodlot, except when the soil is plentifully stocked with young trees which will shade the ground.*

In selling fuel wood there are two units, both called "cords," which are apt to be confused, with danger of loss to the seller. These are the "standard" cord and the "stove-wood" cord. Both are piles 8 feet long and 4 feet high, but the standard cord consists of 4 foot lengths, so that the pile is 4 feet wide; while the stove-wood cord consists of 16 inch lengths, so that the pile is 16 inches wide. The solid volume of a cord of stove-wood is thus only about a third that of a standard cord. Since the shorter the pieces, the less the amount of crookedness, a cord of stove-wood will actually contain a little more than one-third the volume of a standard cord. Cords made up of thick pieces contain more wood than those of small pieces, while round sticks give a higher wood volume than split ones of about the same size. Considerable maple and beech body wood is shipped from upper Michigan ports in 4 foot lengths, but in the southern part of the State stovewood lengths are more often understood in woodlot sales.

The price of wood for fuel depends on its heating value, the rate at which it burns, and its abundance and availability. Compared with coal, the heating value of different species is about as follows: one ton of coal is equal to a standard cord of hickory, oak, beech, birch, hard maple, ash, elm, locust, or cherry; a cord and a half of sycamore or soft maple; and two cords of cedar, poplar, or basswood. The greater abundance of wood and the smaller population in the northern part of the State give it a somewhat lower value than in southern Michigan.

Wholesale values for stove wood in some of the cities in the central and southern counties average from \$2 to \$2.50 per cord. Retail prices run from \$3 to \$3.75 per cord. By working up a direct market for his wood among town consumers the farmer can frequently better his sales by 50 cents or \$1 a cord.

Stove wood of beech, birch, and maple usually brings from \$2.25 to \$2.50 per cord, wholesale. The best second-growth oak and hickory often sells to dealers for no more than \$2.50 per cord. Elm and other softer woods usually sell for from \$2 to \$2.25 per cord. Except where sawmills have accumulated slab-wood in excess of the demand, hardwood slabs from portable mills can often be disposed of for from \$2 to \$2.25 per cord.

Lime kilns and brick yards use a great deal of wood, which they buy in 4 foot lengths. They can use very low grade material, and since the shipment must often be for long distances, do not pay high prices for it. Low as the prices are, however, they may make it possible for farmers to clean up their clearings and make day wages in doing it. The prices are apt to be from \$2 to \$2.75 per cord of 4 foot lengths.

CONDUCTING THE SALE.

Timber may be sold either standing ("on the stump") or felled and cut into logs, bolts, ties, or other products. Standing timber may be sold either by "the lot," by "acreage," or by "stumpage." Selling by the lot or by acreage is the easiest method, but it presents the greatest like-

*See U. S. Department of Agriculture farmer's bulletin 711—"The Care and Improvement of the Woodlot," which can be obtained free of charge on application to the Forester, Washington, D. C.



Portable sawmills cutting 5,000 or 10,000 board feet a day, do not as a rule manufacture lumber of as good a quality as they should. The quality could usually be much improved by efficient handling, careful sawing, and attention to the grade.

likelihood of the farmer losing a large part of the value of the timber. He is very apt to sell for what he thinks a "good offer" without taking the trouble to find out for himself just how much of each species of tree the woodlot contains, and what the best market for it is. The buyer naturally pays as little as possible for it, and since he is experienced in sizing up timber he is much better prepared than the farmer to estimate at a glance the value of the woodlot. In some regions "acreage" prices of from \$50 to \$100, according to the amount, quality, and situation of the timber, are customarily offered by portable mill operators. The acreage price may be all that the stand is worth, and the buyer may be perfectly honest in computing for himself only a fair profit. On the other hand, if the buyer is unscrupulous the farmer who does not know his timber is at a very great disadvantage in this method of selling. Furthermore, much is usually to be gained if the farmer, instead of selling through a "middleman," deals directly with the manufacturer for whatever materials he can, and sells the rest, in the log or by stumpage, to a local sawmill, wood yard, or other purchaser.

Sales of stumpage (standing timber) are much preferable, since these involve an actual estimate of the standing timber, which is paid for by the tree, or by estimated contents in board feet or other unit. The owner should protect himself by making his own estimate of the stand, in some such way as described on pp. 9 to 15. Having done so, and having found out for himself what values he can command for his rough products in different markets he is, of course, in a position to bargain with local buyers for a lump sum, on the basis either of acreage or of the entire lot. As a result of such an investigation he will often prefer to sell parts of his stand to a number of different dealers in specialized industries, such as veneer, handle, or woodenware manufacturers.

In most cases, probably, the sale of cut products will be the most satisfactory method of all. Such sales are made either on delivery by the farmer of material cut by himself, or on the scale or tally of timber which is being cut in his woodlot by the buyer. In either case a unit price for each species and form of material is agreed upon in advance. When logs are sold the unit is the thousand feet, board measure, scaled according to a specified log rule. The Doyle and the Scribner rules are those most used, and of these the Scribner is preferable, since it gives more accurate results with the smaller logs. These rules are given on pp. 31 and 32. To protect himself the farmer should check all scaling, and an understanding as to deduction for defects should be reached in advance of cutting. This is discussed on p. 33 under the heading of "Scaling." In selling to portable mill operators a good basis is the thousand feet of lumber, actually sawed out at the mill.

The sale on delivery of timber cut by the farmer himself has a great deal to recommend it. The farmer pays the cost of cutting and delivery, and the prices he receives should therefore be greater by the amount of the labor cost, often a considerable item. Since woods work can be done in the winter and at odd times when the regular farm work is not pressing and teams and men otherwise idle can be used, the difference in price to be realized may be considered a clear gain. By doing his own cutting the farmer may also conduct it in such a way as to improve the condition of his woodlot, a matter in which the contractor or sawmill employee would have no interest.

Contracting for the sale

Even in small sales, it is always best to put the agreements into writing. In this way a great deal of disagreement and financial loss may be avoided. In making the contract the seller must have fully in mind the terms of the sale; and the contract may call to the farmer's attention important details which would otherwise have been overlooked. The essential conditions of a complete contract relate to (I) description and location of the timber, (II) price and manner of payment, (III) conditions of cutting and removal, and (IV) title and means of settling disputes. Under the third heading comes the duration of the contract, the size and character of the timber to be cut, and the method of marking to designate it, method of scaling, designation of what material is to be considered merchantable and must be removed from the woods (to prevent the leaving of any more low grade or refuse stuff than necessary or desirable), and protection against injury to any trees left standing.

The contract should prescribe the estimated amount of timber to be sold, and its condition, whether living or dead or both. It should specify the unit of sale—1,000 board feet of logs or lumber, cords, ties, poles, etc.,—and the amount to be paid, per unit, for each species of timber sold. Such items as the kind of log rule to be used, and the size of the cord (16-inch or 4-foot lengths, etc.,) should be clearly designated, and the time at which the payment shall be made, should also be entered. The contract should give the amount to be allowed for trimming log ends, in excess of which the logs are to be scaled as though a foot longer. If the timber to be sold is to be marked, the contract should prohibit the removal of unmarked timber. If only the trees above a certain diameter are to be sold, this diameter should be specified, as well as the height at which it is to be measured, as "1 foot above the ground" or "at breast height (4½ feet)." Low cut stumps and close utilization into the top should be required, together with the exercise of due care on the part of the purchaser to prevent fire from spreading. A provision retaining title to all timber covered by the agreement should be included.

Other clauses which might be included are those requiring that the timber shall be scaled in the presence of the seller or his authorized agent; that log lengths shall be varied so as best to utilize the timber; that unmarked trees, if cut, shall be paid for at double the stated price; that tops left in logging shall remain on the tract for the use of the seller (or, if desired, shall be utilized by the purchaser). In selling by lump sums the provisions relating to scaling and unit prices may, of course, be omitted, but not the total amount to be paid. It is assumed that the farmer will precede any lump sum sale by a careful estimate of his stand and an inquiry as to the price, on the stump, which he should receive for each kind of product; with this knowledge he will be prepared to sell "by acreage" or "by the lot."

A sample contract for woodlot sales is contained in U. S. Department of Agriculture farmer's bulletin 715, "Measuring and Marketing Woodlot Products," which can be secured free of charge on application to the Forester, Forest Service, Washington, D. C.

Scaling the logs

“Scaling” logs means determining their approximate contents in lumber by measuring them and applying volume figures already worked out. Tables containing these figures are called log rules, and the two in most common use are the Scribner and the Doyle log rules. The Scribner is undoubtedly the better rule for woodlot use, since it gives a fairer scale to the small logs. These rules are given in Tables 6 and 7.

TABLE 6.—SCRIBNER LOG RULE.

Diameter inside bark, small end of log.	Length of log, in feet.							
	6	8	10	12	14	16	18	20
Inches.	Contents in board feet.							
6.....	4	7	10	14	16	18	21	24
7.....	6	10	14	18	22	24	28	30
8.....	10	13	17	23	28	32	36	40
9.....	14	19	25	30	35	42	48	54
10.....	19	26	33	38	45	54	62	70
11.....	24	32	41	48	56	64	72	80
12.....	30	39	49	59	69	79	88	98
13.....	36	49	61	73	85	97	109	122
14.....	43	58	72	86	100	114	129	143
15.....	53	71	89	107	125	142	160	178
16.....		79	99	119	139	159	178	198
17.....		93	116	139	162	185	208	232
18.....		106	133	160	187	213	240	267
19.....		120	150	180	210	240	270	300
20.....		140	175	210	245	280	315	350
21.....		152	190	228	266	304	342	380
22.....		167	209	251	292	334	376	418
23.....		188	235	283	330	377	424	470
24.....		202	252	303	353	404	454	505
25.....		230	287	344	401	459	516	573
26.....		250	313	375	439	500	562	625
27.....		274	342	411	479	548	616	684
28.....		290	363	436	509	582	654	728
29.....		305	381	457	533	609	685	761
30.....		329	411	493	575	657	739	821
31.....		355	444	532	622	710	799	888
32.....		368	460	552	644	736	828	920
33.....		392	490	588	686	784	882	980
34.....		400	500	600	700	800	900	1,000
35.....		438	547	657	766	876	985	1,095
36.....		462	577	692	807	923	1,038	1,152
37.....		515	644	772	901	1,029	1,158	1,287
38.....		535	669	801	934	1,068	1,201	1,335
39.....		560	700	840	980	1,120	1,260	1,400
40.....		602	752	903	1,053	1,204	1,354	1,505
41.....		636	795	954	1,113	1,272	1,431	1,590
42.....		672	840	1,007	1,175	1,343	1,511	1,679
43.....		698	872	1,046	1,222	1,396	1,571	1,745
44.....		740	925	1,110	1,295	1,480	1,665	1,850

TABLE 7.—DOYLE LOG RULE.

Diameter inside bark, small end of log.	Length of log, in feet.							
	6	8	10	12	14	16	18	20
Inches.	Contents in board feet.							
6.....	1.5	2.0	2.5	3.0	3.5	4	4.5	5.0
7.....	3.4	4.5	5.6	6.8	7.9	9	10.1	11.3
8.....	6	8	10	12	14	16	18	20
9.....	9	12	16	19	22	25	28	31
10.....	13	18	22	27	31	36	40	45
11.....	18	24	31	37	43	49	55	61
12.....	24	32	40	48	56	64	72	80
13.....	30	40	51	61	71	81	91	101
14.....	37	50	62	75	87	100	112	125
15.....	45	60	76	91	106	121	136	151
16.....	54	72	90	108	126	144	162	180
17.....	63	84	106	127	148	169	190	211
18.....	73	98	122	147	171	196	220	245
19.....	84	112	141	169	197	225	253	281
20.....	96	128	160	192	224	256	288	320
21.....	108	144	181	217	253	289	325	361
22.....	121	162	202	243	283	324	364	405
23.....	135	180	226	271	316	361	406	451
24.....	150	200	250	300	350	400	450	500
25.....	165	220	276	331	386	441	496	551
26.....	181	242	302	363	423	484	544	605
27.....	198	264	331	397	463	529	595	661
28.....	216	288	360	432	504	576	648	720
29.....	234	312	391	469	547	625	703	781
30.....	253	338	422	507	591	676	760	845
31.....	273	364	456	547	638	729	820	911
32.....	294	392	490	588	686	784	882	980
33.....	315	420	526	631	736	841	946	1,051
34.....	337	450	562	675	787	900	1,012	1,125
35.....	360	480	601	721	841	961	1,081	1,201
36.....	384	512	640	768	896	1,024	1,152	1,280
37.....	408	544	681	817	953	1,089	1,225	1,361
38.....	433	578	722	867	1,011	1,156	1,300	1,445
39.....	459	612	766	919	1,072	1,225	1,378	1,531
40.....	486	648	810	972	1,134	1,296	1,458	1,620
41.....	513	684	856	1,027	1,198	1,369	1,540	1,711
42.....	541	722	902	1,083	1,263	1,444	1,624	1,805
43.....	570	760	951	1,141	1,331	1,521	1,711	1,901
44.....	600	800	1,000	1,200	1,400	1,600	1,800	2,000

The ordinary way of using these rules is by means of "scale sticks," which are thin strips of hickory, with the log volumes in board feet corresponding to different lengths of log burned into the two sides of the stick. In scaling, the stick is laid across the average diameter of the log at its small end inside the bark, and the figure nearest the bark which corresponds to the estimated or measured log length is the contents in board feet according to the particular rule used. Scale sticks for either the Scribner or the Doyle rule can be purchased for \$1.50 or \$2.

While the use of scale sticks makes it possible to read off the volumes directly and thus save some time in scaling, it is by no means necessary to have one. It is a simple matter to measure the average inside bark diameter with an ordinary rule, and refer to the tables here given for the corresponding volume. In measuring the diameters, fractions of an

inch should be disregarded; for example, if the actual diameter is $7\frac{1}{2}$ inches, the volume used should be that of a 7-inch log. The length of the log can be measured conveniently by means of a stick 8 feet long, marked at every foot or two. Logs should be cut about 3 inches longer than the specified length, so that the rough end may be trimmed at the mill. Three inches is as much as is necessary for this; larger amounts constitute a direct waste.

The volume of each log should be immediately entered in a notebook, together with the species, and the log should be marked with a lumber crayon to avoid danger of rescaling it. A convenient way to record the volumes is to put them in columns under the name of the species. It is a good plan to number the logs with the lumber crayon as they are scaled, and to record the same number opposite the respective volumes in the notebook. This makes it possible, in case of dispute, to go back to any individual log for the purpose of remeasurement.

“Scaling out” defects

Log rules are made for sound logs and do not take into account defects; consequently the amount of defect must be estimated and deducted from the full scale. When the defect is rot or hollow at the center of the log it may be “scaled out” either (1) by giving the log a volume corresponding to that of a log an inch or more smaller or a foot or two shorter, the amount to be gauged by the estimated amount of the defect; or (2) by deducting from the full scale the amount of board feet which would be contained in a board as long as the log and a little wider and thicker than the defect. Where the log is hollow or badly rotten at the heart, as is apt to be the case in old basswood trees, the defect may be scaled as though it were a small log, and the volume then subtracted from the full scale of the log. When the heart is sound but the sapwood is rotten or badly checked, only the heart should be scaled.

Crooked logs cut out a large per cent of short and bark-edged pieces of very little value, and it is necessary to deduct from the full scale the amount which in the opinion of the scaler would be lost in cutting. The scaler should sight along a curved log, noting where the saw will square it sufficiently to cut boards on both sides affected by the curve. Curve is much more serious in short than in long logs. In crooked logs 16 feet or more in length, little need be deducted from the full scale, since most of the shorter boards manufactured will still be long enough for sale.

Shipping by railroad

The two essentials in determining the cost of shipping woodlot products are the rate per 100 pounds to the destination and the weight of the materials to be shipped. The shipping charge, as for any other farm product, is simply the rate multiplied by the number of 100 pounds in the weight. Freight rates on wood products are low; since different roads have different rates, and these are not strictly uniform according to distance, they should be ascertained in advance of the sale from the local freight agent. At the same time the minimum carload weight to which the rate applies should be ascertained. The minimum weight usually exceeds 30,000 pounds and is sometimes as great as 60,000

pounds. Less than carload lots can, of course, be shipped, but at a greater expense per 100 pounds. When one farmer has less than a carload to sell, two or more may combine in order to take advantage of the lower rate. Freight rates over two or more lines are higher than when the same distance is covered by only one railroad. Such combined rates can be worked out and other information secured on inquiry of freight agents. The approximate weights per 1000 board feet of lumber and logs, and per cord of bolts, for different species of trees are shown in table 8. Table 9 gives the weight per stack of green and air-dry bolts of different species and different lengths. The advantage of shipping air-dried material is at once apparent. Not all the native species are given in the table, but their weight may be quite closely estimated by comparison with some of the others. For instance, the weight of aspen would be about the same as that of cottonwood, that of soft maple about the same as that of cherry, etc. The figures in these tables are not given as weights adopted by any railroad company, but only as average weights upon which the timber owner may base his preliminary estimates of the cost of shipping.

TABLE 8.—WEIGHTS OF VARIOUS WOODLOT PRODUCTS.

Species.	Lumber (per 1 000 board feet.)		Logs per 1,000 board feet log scale. Doyle rule.						Cordwood, bolts, butts, etc., 90 cu. ft. per cord.	
	1 inch thick.		Diameter inside bark at small end, 12 inches.		Diameter inside bark at small end, 18 inches.		Diameter inside bark at small end, 24 inches.			
	Green.	Air Dry.	Green.	Dry.	Green.	Dry.	Green.	Dry.	Green.	Dry.
	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.
Ash, white.....	4,000	3,500	11,100	9,700	7,700	6,800	6,600	5,700	4,300	3,800
Basswood.....	3,400	2,100	9,500	5,900	6,600	4,100	5,600	3,500	3,700	2,300
Beech.....	4,600	3,600	12,700	10,100	8,900	7,000	7,500	6,000	5,000	3,900
Birch, yellow.....	4,800	3,700	13,200	10,300	9,200	7,200	7,800	6,100	5,100	4,000
Cherry, black..	3,800	3,000	10,500	8,300	7,300	5,800	6,200	4,900	4,100	3,200
Chestnut.....	4,600	2,500	12,600	7,000	8,800	4,900	7,500	4,100	4,900	2,700
Cottonwood.....	3,600	2,200	10,700	6,300	7,500	4,400	6,300	3,700	4,200	2,500
Elm, soft.....	4,000	2,900	11,200	8,000	7,800	5,600	6,600	4,700	4,400	3,100
Elm, rock.....	4,600	3,300	12,600	9,200	8,800	6,400	7,500	5,500	4,900	3,600
Gum, red.....	3,900	2,800	10,700	7,800	7,500	5,500	6,300	4,600	4,200	3,100
Hickory.....	5,200	4,300	14,700	11,900	10,300	8,300	8,700	7,000	5,700	4,600
Locust, black..	4,800	4,100	13,300	11,400	9,300	7,900	7,900	6,700	5,200	4,400
Maple, sugar..	4,700	3,600	12,900	10,000	9,000	7,000	7,600	5,900	5,000	3,900
Maple, rock..	4,300	3,000	11,900	8,200	8,300	5,700	7,100	4,900	4,700	3,200
Maple, silver..	3,800	2,800	10,500	7,800	7,300	5,400	6,200	4,600	4,100	3,000
Oak, red.....	5,400	3,600	14,800	10,100	10,300	7,000	8,800	6,000	5,800	3,900
Oak, white.....	5,200	4,000	14,400	11,000	10,000	7,700	8,500	6,500	5,800	4,300
Sycamore.....	4,300	3,000	12,000	8,300	8,400	5,800	7,100	4,900	4,700	3,200
Yellow poplar..	3,200	2,400	8,800	6,500	6,100	4,500	5,200	3,900	3,400	2,500
Tupelo.....	5,600	3,000	15,100	8,400	10,500	5,900	8,900	5,900	5,900	3,300
Walnut.....	4,300	3,000	11,900	8,200	8,300	5,700	7,100	4,900	4,700	3,200
Willow.....	4,300	2,100	11,800	5,900	8,200	4,100	7,000	3,500	4,600	2,300

TABLE 9.—WEIGHTS PER STACK OF BOLTS, GREEN AND DRY, OF DIFFERENT LENGTHS AND DIAMETERS AND DIFFERENT KINDS OF WOOD.

Species.	Dia- meter.	Length of bolt—feet.								Weight per cu. ft.
		2½ (¾ cord).	3 (½ cord).	3½ (⅔ cord).	4 (1 cord).	4½ (1½ cords).	5 (1¾ cords).	5½ (1⅞ cords).	6 (2 cords).	
	Inches.	Weight per stack—pounds.								Pounds.
Ash, white:										
Green.....	6	2,600	3,200	3,700	4,200	4,800	5,300	5,800	6,300	48.1
	9	2,800	3,300	3,900	4,400	5,000	5,500	6,100	6,600	
	12	2,900	3,400	4,000	4,600	5,100	5,700	6,300	6,900	42.1
Air dry.....	6	2,300	2,800	3,200	3,700	4,200	4,600	5,100	5,600	
	9	2,400	2,900	3,400	3,900	4,400	4,800	5,300	5,800	
	12	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000	
Basswood:										
Green.....	6	2,300	2,700	3,200	3,600	4,100	4,500	5,000	5,500	41.3
	9	2,400	2,800	3,300	3,800	4,300	4,700	5,200	5,700	
	12	2,500	2,900	3,400	3,900	4,400	4,900	5,400	5,900	25.8
Air dry.....	6	1,400	1,700	2,000	2,300	2,600	2,800	3,100	3,400	
	9	1,500	1,800	2,100	2,400	2,700	3,000	3,300	3,600	
	12	1,500	1,800	2,100	2,500	2,800	3,100	3,400	3,700	
Cottonwood:										
Green.....	6	2,600	3,100	3,600	4,100	4,600	5,100	5,600	6,100	46.5
	9	2,700	3,200	3,700	4,300	4,800	5,300	5,900	6,400	
	12	2,800	3,300	3,900	4,400	5,000	5,500	6,100	6,600	27.3
Air dry.....	6	1,500	1,800	2,100	2,400	2,700	3,000	3,300	3,600	
	9	1,600	1,900	2,200	2,500	2,800	3,100	3,500	3,800	
	12	1,600	1,900	2,300	2,600	2,900	3,200	3,600	3,900	
Elm, rock and white:										
Green.....	6	2,700	3,200	3,700	4,300	4,800	5,300	5,900	6,400	48.6
	9	2,800	3,400	3,900	4,500	5,000	5,600	6,100	6,700	
	12	2,900	3,500	4,000	4,600	5,200	5,800	6,300	6,900	34.6
Air dry.....	6	1,900	2,300	2,700	3,000	3,400	3,800	4,200	4,600	
	9	2,000	2,400	2,800	3,200	3,600	4,000	4,400	4,800	
	12	2,100	2,500	2,900	3,300	3,700	4,100	4,500	4,900	
Hickory, shagbark:										
Green.....	6	3,500	4,200	4,900	5,600	6,300	7,000	7,700	8,400	63.8
	9	3,700	4,400	5,100	5,900	6,600	7,300	8,100	8,800	
	12	3,800	4,500	5,300	6,100	6,800	7,600	8,300	9,100	51.5
Air dry.....	6	2,800	3,400	4,000	4,500	5,100	5,700	6,200	6,800	
	9	3,000	3,600	4,100	4,700	5,300	5,900	6,500	7,100	
	12	3,100	3,700	4,300	4,900	5,500	6,100	6,700	7,300	

Stacks are 4 feet high by 8 feet long, made up of bolts of different sizes. Bolts 4 feet long make a standard cord, while shorter lengths make "short cords," and longer lengths a cord and over.

Tables 10 and 11 give the approximate cost per 1000 board feet of shipping green and air dry logs and lumber, respectively, to distances such that the freight rates per 100 lbs. are from 2 to 10 cents.

TABLE 10.—COST OF SHIPPING GREEN AND AIR DRY LOGS, PER THOUSAND BOARD FEET (DOYLE SCALE), WITH RATES OF FROM 2 TO 10 CENTS PER 100 POUNDS.

(Costs given are for logs measuring 18 inches in diameter at the small end. For 12-inch logs add 40 per cent, and for 24-inch logs subtract 15 per cent of the costs given. Weights used are those shown in Table 8.)

Species.	Rate in cents per hundred pounds.									
	2.	3.	4.	5.	6.	7.	8.	9.	10.	
	Cost of shipping per 1,000 board feet.									
Ash.....	{ Green.....	\$1.54	\$2.31	\$3.06	\$3.85	\$4.62	\$5.39	\$6.16	\$6.93	\$7.70
	{ Air dry.....	1.36	2.04	2.72	3.40	4.08	4.75	5.44	6.12	6.80
Basswood.....	{ Green.....	1.32	1.98	2.64	3.30	3.96	4.62	5.28	5.94	6.60
	{ Air dry.....	.82	1.23	1.64	2.05	2.46	2.87	3.28	3.69	4.10
Beech.....	{ Green.....	1.78	2.67	3.56	4.45	5.34	6.23	7.12	8.01	8.90
	{ Air dry.....	1.40	2.10	2.80	3.50	4.20	4.90	5.60	6.30	7.00
Birch, yellow.....	{ Green.....	1.84	2.76	3.68	4.60	5.52	6.44	7.36	8.28	9.20
	{ Air dry.....	1.44	2.16	2.88	3.60	4.32	5.04	5.76	6.48	7.20
Cherry, black.....	{ Green.....	1.46	2.19	2.92	3.65	4.38	5.11	5.84	6.57	7.30
	{ Air dry.....	1.16	1.74	2.32	2.90	3.48	4.06	4.64	5.22	5.80
Cottonwood.....	{ Green.....	1.50	2.25	3.00	3.75	4.50	5.25	6.00	6.75	7.50
	{ Air dry.....	.88	1.32	1.76	2.20	2.64	3.08	3.52	3.96	4.40
Elm.....	{ Green.....	1.66	2.49	3.32	4.15	4.98	5.81	6.64	7.47	8.30
	{ Air dry.....	1.20	1.80	2.40	3.00	3.60	4.20	4.80	5.40	6.00
Hickory.....	{ Green.....	2.06	3.09	4.12	5.15	6.18	7.21	8.24	9.27	10.30
	{ Air dry.....	1.66	2.49	3.32	4.15	4.98	5.81	6.64	7.47	8.30
Maple, sugar.....	{ Green.....	1.80	2.70	3.60	4.50	5.40	6.30	7.20	8.10	9.00
	{ Air dry.....	1.40	2.10	2.80	3.50	4.20	4.90	5.60	6.30	7.00
Oak, red.....	{ Green.....	2.06	3.09	4.12	5.15	6.18	7.21	8.24	9.27	10.30
	{ Air dry.....	1.40	2.10	2.80	3.50	4.20	4.90	5.60	6.30	7.00
Oak, white.....	{ Green.....	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
	{ Air dry.....	1.54	2.31	3.08	3.85	4.62	5.39	6.16	6.93	7.70
Sycamore.....	{ Green.....	1.68	2.52	3.36	4.20	5.04	5.88	6.72	7.56	8.40
	{ Air dry.....	1.16	1.74	2.32	2.90	3.48	4.06	4.64	5.22	5.80
Yellow poplar.....	{ Green.....	1.22	1.83	2.44	3.05	3.66	4.27	4.88	5.49	6.10
	{ Air dry.....	.90	1.35	1.80	2.25	2.70	3.15	3.60	4.05	4.50
Walnut.....	{ Green.....	1.66	2.49	3.32	4.15	4.98	5.81	6.64	7.47	8.30
	{ Air dry.....	1.14	1.71	2.28	2.85	3.42	3.99	4.56	5.13	5.70

TABLE 11.—COST OF SHIPPING GREEN AND AIR-DRY 1-INCH LUMBER, PER THOUSAND BOARD FEET, WITH RATES OF FROM 2 TO 10 CENTS PER HUNDRED POUNDS.

Weights used are those shown in Table 3, columns 1 and 2.

Species.	Rate in cents per hundred pounds.									
	2.	3.	4.	5.	6.	7.	8.	9.	10.	
	Cost of shipping per 1,000 board feet.									
Ash.....	{ Green.....	\$0.80	\$1.20	\$1.60	\$2.00	\$2.40	\$2.80	\$3.20	\$3.60	\$4.00
	{ Air dry.....	.70	1.05	1.40	1.75	2.10	2.45	2.80	3.15	3.50
Basswood.....	{ Green.....	.68	1.02	1.36	1.70	2.04	2.38	2.72	3.06	3.40
	{ Air dry.....	.42	.63	.84	1.05	1.26	1.47	1.68	1.89	2.10
Beech.....	{ Green.....	.92	1.38	1.84	2.30	2.76	3.22	3.68	4.14	4.60
	{ Air dry.....	.72	1.08	1.44	1.80	2.16	2.52	2.88	3.24	3.60
Birch, yellow.....	{ Green.....	.96	1.44	1.92	2.40	2.88	3.36	3.84	4.32	4.80
	{ Air dry.....	.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	3.70
Cherry, black.....	{ Green.....	.76	1.14	1.52	1.90	2.28	2.66	3.04	3.42	3.80
	{ Air dry.....	.60	.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00
Cottonwood.....	{ Green.....	.72	1.08	1.44	1.80	2.16	2.52	2.88	3.24	3.60
	{ Air dry.....	.44	.66	.88	1.10	1.32	1.54	1.76	1.98	2.20
Elm.....	{ Green.....	.86	1.29	1.72	2.15	2.58	3.01	3.44	3.87	4.30
	{ Air dry.....	.62	.93	1.24	1.55	1.86	2.17	2.48	2.79	3.10
Hickory.....	{ Green.....	1.04	1.56	2.08	2.60	3.12	3.64	4.16	4.68	5.20
	{ Air dry.....	.86	1.29	1.72	2.15	2.58	3.01	3.44	3.87	4.30
Maple, sugar.....	{ Green.....	.94	1.41	1.88	2.35	2.82	3.29	3.76	4.23	4.70
	{ Air dry.....	.72	1.08	1.44	1.80	2.16	2.52	2.88	3.24	3.60
Oak, red.....	{ Green.....	1.08	1.62	2.16	2.70	3.24	3.78	4.32	4.86	5.40
	{ Air dry.....	.72	1.08	1.44	1.80	2.16	2.52	2.88	3.24	3.60
Oak, white.....	{ Green.....	1.04	1.56	2.08	2.60	3.12	3.64	4.16	4.68	5.20
	{ Air dry.....	.80	1.20	1.60	2.00	2.40	2.80	3.20	3.60	4.00
Sycamore.....	{ Green.....	.86	1.29	1.72	2.15	2.58	3.01	3.44	3.87	4.30
	{ Air dry.....	.60	.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00
Yellow poplar.....	{ Green.....	.64	.96	1.28	1.60	1.92	2.24	2.56	2.88	3.20
	{ Air dry.....	.48	.72	.96	1.20	1.44	1.68	1.92	2.16	2.40
Walnut.....	{ Green.....	.86	1.29	1.72	2.15	2.58	3.01	3.44	3.87	4.30
	{ Air dry.....	.60	.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00

The average amount of forest products of any kind contained in a carload varies with the size and load capacity of the car and the weight of the material. The following amounts may be considered roughly as a carload for the standard car of 60,000 pounds capacity:

Lumber (rough), 15,000 to 18,000 board feet.

Lumber (finished), 17,000 to 20,000 board feet.

Logs (large: 24 inches), 5,000 to 7,000 board feet.

Logs (small: 12 inches), 4,000 to 5,000 board feet.

Bolts or butts, 12' to 16 cords.

Cordwood (4 feet), 15 to 18 cords.

Stovewood (16 inches), 30 to 40 ranks.

Mine timber (see posts, poles, logs).

Poles or piling, 25 to 40 pieces.

Ties (6"x8"x8'), 350 pieces.

Ties (7"x9"x8½'), 300 pieces.

Ties (5"x6"x5½'; mine tie), 1,100 pieces.

Posts (4" top, 7 ft.), 800 pieces.

Posts (6" top, 8 ft.), 500 pieces.

Tanbark, 16 to 18 cords.

Sawdust, 12 to 18 tons.

The necessity of investigating shipping charges can sometimes be avoided by making the sale f. o. b. shipping point instead of at point of delivery. The buyer, instead of the farmer, thus handles the shipping end of the business, and this arrangement should be made wherever possible.

HOW TO PREVENT THE DETERIORATION OF CUT WOODLOT PRODUCTS.

It is often necessary or desirable to put off the delivery of logs, bolts, poles, etc., until some months after cutting, either in order to allow them to season, or because a good sale can not be arranged at once. A great deal of the weight of freshly cut products is due to the water they contain, and a few months seasoning will often reduce this to a marked degree, the amount of reduction depending, of course, on the climate, the weather, and the exposure to sun and air. At the same time, unless preventive measures are taken, the products are sure to deteriorate through decay, insect attack, checking, or some other agency. A certain amount of deterioration is apt to take place in any case if the delivery is put off for some time; but the amount can be greatly reduced, and the saving in weight and increase in strength due to seasoning is more than enough to counterbalance any small deterioration which may occur in spite of the preventive measures.

Logs should never be allowed to remain long in the woods after cutting. As soon as possible they should be taken to a dry, well-aired, and unshaded area, and placed on skids, well off the ground. The bark may be left on the logs, and the ends should be coated with paint, creosote, or tar. This will not only assist in preventing decay, but will also retard seasoning to some extent and thus keep the logs from checking badly.

Poles should be peeled, and hauled or dragged to a place free from debris or rank vegetation and freely exposed to sun and wind. There they should be rolled upon skidways not less than 18 inches high, so that no part of them will rest on the ground. There should be only one layer of poles on each skidway. When ties are cut, it is usually cheaper and most desirable to haul them, unseasoned, directly to the railroad, and there pile them according to the specifications furnished by the tie buyer.

Cordwood should be stacked in loose piles in a sunny well-aired and well-drained place free from rank vegetation. Two sticks on the ground running the length of the pile will keep it from contact with the soil and thus prevent decay in the lower layers.

SOME OF THE PRINCIPAL USES OF COMMON WOODLOT TREES.

The following list will serve as a rough index to the most important uses, aside from lumber and fuel,* of the common trees in woodlots, which are discussed on pages 16 to 28 under "choosing the market."

- Ash, black—handles; vehicle parts; baskets; tubs and pails; veneer for furniture; woven splint boxes.
- Ash, white—long handles; vehicle parts; singletrees; neck yokes, veneer; slack barrel staves and headings; pails and tubs; novelties; agricultural implements (rollers, etc.).
- Aspens ("popple")—boxes; excelsior; wood pulp; tubs and buckets.
- Balsam—(see fir).
- Basswood—veneer for packages; handles, woodenware and novelties; slack barrel staves, headings, and hoops; excelsior; baskets; tubs and pails.
- Beech—veneer for packages; handles; felloes; woodenware; pails and tubs; slack barrel staves, headings and hoops; railroad ties ("treatment"); chemical distillation.
- Blue beech—felloes; singletrees; spokes; small handles.
- Birch, paper ("white")—handles; agricultural implements; excelsior; boxes; baskets; clothespins; toothpicks; novelties.
- Birch, yellow and black ("sweet")—veneer for finish and furniture; handles; vehicle hubs; woodenware; novelties; spindles; slack barrel staves and headings; baskets; pails and tubs; railroad ties ("treatment"); chemical distillation.
- Butternut—veneer for finish, furniture, etc.
- Cedar, white ("arborvitae")—poles; posts; piling; railroad ties; shingles; net floats; woodenware.
- Cherry, black—veneer for finish and furniture; novelties.
- Elm, cork ("rock")—handles; vehicle parts; slack barrel staves, headings, hoops, and head linings; bicycle rims; basket hoops; bent-wood settees; insulator pins; tent pins and slides.
- Elm, white ("soft")—veneer for packages; handles; slack barrel staves, headings, hoops and head linings; boxes; baskets; bicycle rims; pails and tubs; singletrees and veneers.
- Elm, slippery ("red")—handles; plow handles; neck yokes; eveners and singletrees; saddle trees; wagon reaches.
- Fir, balsam—wood pulp; excelsior; boxes; slack barrel cooperage; pails and tubs.
- Hemlock—wood pulp; boxes; pails and tubs; slack barrel staves and headings; tanbark.
- Hickory—handles; axles, singletrees, and spokes; agricultural implements; vehicle parts; lumber and log rules; bicycle rims; machine axles; mallets and mauls.
- Hornbeam—logging tool handles; tongues for "big wheels;" axles; farm wagon felloes; garden hose reels; levers.
- Locust, black—posts; poles; insulator pins.

*Practically all the species contribute to lumber and fuel, which are omitted in order to simplify the list and because it is difficult to classify in short space the many uses to which lumber is put. This depends upon the size and quality as well as the kind of lumber. In general, softwood lumber (pine, hemlock, spruce, etc.) is used for building and rough temporary construction purposes, while hardwood lumber (oak, maple, birch, beech, etc.), goes largely into finish, flooring, and furniture. Both kinds supply large quantities of woodenware, novelties, agricultural implement frames, boxes, and crates. Much softwood lumber is used for cheap furniture and for furniture backing.

For a complete list of the uses of each species, see "Wood-using Industries of Michigan," 1912, obtainable from the Public Domain Commission, Lansing, Michigan.

Maple, sugar and black ("hard")—veneer for finish and furniture; handles; vehicle parts; agricultural implements; slack barrel staves, headings, and hoops; railroad ties ("treatment"); bicycle rims; woodenware; novelties; dishes; mallets; pails and tubs; skewers; spindles; toothpicks; levers; chemical distillation.

Maple, red and white ("soft")—veneer for boxes, crates, etc.; handles; slack barrel staves; headings and hoops; woodenware.

Oak, black ("yellow")—cultivator handles; plow beams; saddles; slack barrel cooperage; railroad ties ("treatment").

Oak, red—veneer for finish and furniture; handles; vehicle parts; slack barrel cooperage; railroad ties ("treatment").

Oak, white and bur—veneer for finish and furniture; handles; vehicle parts; agricultural implements; tight and slack barrel cooperage; railroad ties; car timbers.

Pine, jack, red, and white—boxes; buckets and kegs; slack barrel staves and headings; woodpulp.

Poplar, yellow—veneer for packages; excelsior.

Spruce, black and white—woodpulp; excelsior; boxes.

Sycamore—veneer for packages, finish, etc.; slack barrel headings; baskets.

Tamarack—boxes; pails and tubs; slack barrel staves; railroad ties ("treatment"); ship knees; woodpulp; excelsior.

Walnut, black—veneer for finish and furniture; woodenware and novelties; gun stocks.

DIRECTORY OF MICHIGAN FIRMS WHICH BUY WOOD PRODUCTS "IN THE ROUGH."

The following list of wood-using firms which buy rough products is supplied for the use of woodlot owners in finding the best markets for their timber. It is based partly on reports received by the Forest Service within recent years and partly on directories of firms compiled from other sources. The list is as complete as it could be made, without, however, including sawmills. These were omitted because of the large number scattered throughout the State, most farmers knowing already those in their immediate vicinity. A number of firms which might buy lumber sawed from farm woodlots are also unavoidably omitted. While the list is as nearly up to date as possible, there are probably a few of the concerns which have ceased operating.

The list is divided into three parts: the Upper Peninsula, the northern part of the Lower Peninsula, and the southern part of the Lower Peninsula. In each of these divisions the counties* are given in alphabetical order, and the cities and towns in each county are arranged, also in alphabetical order, beneath the county name. The woods used by each firm are given in the right hand column, so far as they could be learned from the reports submitted. The kind of industry and of wood used are indicated by abbreviations, the explanation of which is given at the head of the table.

*The location of the different counties is shown on the wood lot area map for 1910, page 8.

TABLE 12.—MICHIGAN FIRMS WHICH BUY WOOD PRODUCTS "IN THE ROUGH."

(Abbreviations used.)

Industries.

Agr. imp. = Agricultural implements.
Wd. ware = Woodenware and novelties, dairymen's supplies, etc.
Inst. = Instruments, professional and scientific.
Sl. coop. = Slack cooperage.
P. M. P. = Planing mill products, sash, door and blinds.

Pulpwd. = Pulpwood.
Sp.-Ath. = Sporting and athletic goods.
T. coop. = Tight cooperage.
Wd. dist. = Wood distillation.
Misc. = Miscellaneous.

Species.

<i>Asp.</i> = Aspen. <i>Bals.</i> = Balsam fir. <i>Bass.</i> = Basswood. <i>Bee.</i> = Beech. <i>Bir.</i> = Birch.	<i>B. eld.</i> = Boxelder. <i>But.</i> = Butternut. <i>Ced.</i> = Cedar. <i>Che.</i> = Cherry. <i>Hem.</i> = Hemlock.	<i>Hick.</i> = Hickory. <i>Ho.</i> = Hornbeam. <i>J. p.</i> = Jack pine. <i>Map.</i> = Maple. <i>N. p.</i> = Norway pine.	<i>O.</i> = Oak. <i>Pop.</i> = Poplar. <i>R. ced.</i> = Red cedar. <i>R. o.</i> = Red oak. <i>Sp.</i> = Spruce.	<i>Tam.</i> = Tamarack. <i>W. bir.</i> = White birch. <i>W. ced.</i> = White cedar. <i>W. o.</i> = White oak. <i>W. p.</i> = White pine. <i>Wil.</i> = Willow.
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County and town.	Industry.	Firm.	Wood used.
<i>Upper Peninsula.</i>			
Alger:			
Munising.....	Veneer.....	Great Lake Veneer Co.....	
Munising.....	Pulpwd.....	Munising Paper Co., Ltd.....	
Munising.....	Sl. coop., veneer.....	Superior Veneer & Cooperage Co.....	
Chippewa:			
Rudyard.....	P. M. P.....	Guis, Harry.....	W. p.
Delta:			
Escanaba.....	Veneer.....	Bird's-Eye Veneer Co.....	
Escanaba.....	Ties, poles, posts.....	Erickson & Bissell.....	Ced.
Escanaba.....	Wd. ware, veneer.....	Escanaba Mfg. Co.....	Map.
Escanaba.....	Poles.....	National Pole Co.....	Ced.
Escanaba.....	Sl. coop.....	Northwestern Cooperage & Lbr. Co.....	
Gladstone.....	Wd. dist.....	Cleveland Cliffs Iron Co., The.....	
Gladstone.....	Veneer.....	Northwestern Cooperage & Lbr. Co.....	
Masonville.....	P. M. P.....	Escanaba Lbr. Co.....	Hem.
Newhall.....	Cedar products.....	National Pole Co.....	Ced.
Wells.....	Wd. dist.....	Mashek Chem. & Iron Co.....	
Wells.....	Vehicles, P. M. P.....	Stephenson, I., Co.....	Ash, Elm, But., Wil., B. eld., Map., Bee., Bir., W. p., N. p., Hem., Sp., Bals., Ced., Bass., Asp., Ho., Pop.
Dickinson:			
Hardwood.....	Ties, poles, posts.....	Anderson, P. J.....	
Houghton:			
Oskar.....	Wd. dist.....	Burkman & Sons, Nels.....	
Oskar.....	Wd. dist.....	Eilola, Frank.....	
Luce:			
McMillan.....	Sl. coop.....	Northern Cooperage & Lbr. Co.....	
Newberry.....	Wd. dist.....	Newberry Chem. Co.....	
Mackinac:			
St. Ignace.....	Ties, telegraph poles.....	Connor & Bissell.....	Ced.
Marquette:			
Gwinn.....	P. M. P.....	Gwinn Lbr. Co.....	W. p., Hem.
Little Lake.....	P. M. P.....	Goodman, B. J.....	W. p., Sp., Hem., Bir., Tam., O., Bass.
Marquette.....	Wd. dist.....	Pioneer Iron Co.....	
Marquette.....	P. M. P.....	Consolidated Fuel & Lbr. Co.....	W. p., Sp., Hem., Map., Bir., Tam. O., Bass., Elm, Ash.
Marquette.....	Boxes.....	Sambrack, F. W., & Son.....	Hem., Bir., W. bir., N. p.
Menominee:			
Daggett.....	Poles, posts.....	Perrigo & Sons.....	
Hermansville.....	Ties, poles, posts.....	Waconsin Land & Lbr. Co.....	Ced.
Ingalls.....	Ties, poles, posts.....	Carley, Ira.....	
Menominee.....	Telephone poles.....	Crafton Cedar Co.....	Ced.
Menominee.....	Ties, poles, posts.....	Girard Lbr. Co.....	
Menominee.....	Poles.....	Huebel, C. J., Co.....	W. ced.
Menominee.....	Pulpwd.....	Marinette & Menominee Paper Co.....	
Menominee.....	Boxes.....	Peninsular Box Co.....	Hem., W. p., W. bir., N. p., J. p., Bals

TABLE 12.—MICHIGAN FIRMS WHICH BUY WOOD PRODUCTS "IN THE ROUGH."—Continued.

County and town.	Industry.	Firm.	Wood used.
<i>Upper Peninsula.—Continued.</i>			
Ontonagon:			
Ewing.....	P. M. P.	Leech, M. F.	Hem., Map., Bir., Tam.
Ontonagon.....	P. M. P.	Noble-Corwin Lbr. Co.	Hem.
Schoolcraft:			
Manistique.....	Boxes	Goodwillie Bros.	Hem., Map., Bass, W. p., W. bir.
Manistique.....	Ties, poles, posts	White Marble Lime Co.	Ced., Hem., Tam.
<i>Northern part of Lower Peninsula.</i>			
Alpena:			
Alpena.....	Ties	Eales Bros. & Co.	
Alpena.....	Pulpwd.	Fletcher Paper Co.	
Alpena.....	Veneer	Michigan Veneer Co.	
Alpena.....	Handles, Fixtures, P. M. P., vehicles, Misc.	Northern Planing Mill Co.	W. bir., Ash, W. p., N. p., Sp., Hem., Map., Bir.
Alpena.....	Veneer	Walker Veneer & Panel Works.	
Antrim:			
Elk Rapids.....	Wd. dist.	Lake Superior Iron & Chem. Co.	
Mancelona.....	Wd. dist.	Antrim Chemical Co.	
Mancelona.....	Wd. dist.	Antrim Iron Co.	
Arenac:			
Au Gres.....	Sl. coop.	Goodchild, E.	
Au Gres.....	P. M. P.	Herman Bros.	Tam.
Au Gres.....	Sl. coop.	Herman Bros. & Johnson.	
Omer.....	Sl. coop.	Rouse, E. J.	
Standish.....	Sl. coop.	International Milk Products Co.	
Standish.....	Sl. coop.	Michigan Cooperage Co., Ltd.	
Benzie:			
Benzonia.....	Sl. coop.	Sweltzer & Maisie.	
Frankfort.....	Wd. ware.	East Shore Woodenware Co.	Map., Bee.
Honor.....	Ties.	Guelph Patent Cask Co.	
Honor.....	Veneer.	Seymore & Peck Co.	
Lake Ann.....	Sl. coop.	Habbler, Wm., Co.	
Thompsonville.....	Wd. dist.	Desmond, F. C.	
Thompsonville.....	Veneer.	Dixon, E. M., & Co.	
Thompsonville.....	Wd. ware.	National Wood Dish Co.	Map., Bee.
Thompsonville.....	Handles.	Piqua Handle Mfg. Co., The.	Map., Bee., Bass.
Charlevoix:			
Baysboro.....	Sl. coop.	Elk Cement & Lime Co.	
Boyne City.....	Wd. dist.	Boyne City Chemical Co.	
Boyne City.....	Sl. coop.	Elm Cooperage Co., The.	
Boyne City.....	Ties, posts.	White, W. H., & Co.	Ced.
Boyne Falls.....	P. M. P.	Newson, James	W. p.
Boyne Falls.....	Wd. ware.	Williams, G. G., Woodenware Co.	Map.
Charlevoix.....	Wd. ware, P. M. P.	Wallace, Wm.	Ced., W. p.
East Jordan.....	Chairs, handles.	Bennett Handle Co.	Bir., Map., Bee.
East Jordan.....	Handles, ties.	Black Land & Lumber Co.	Bir., Map., Bee.
East Jordan.....	Wd. dist.	East Jordan Chemical Co.	
East Jordan.....	Sl. coop.	East Jordan Cooperage Co.	
East Jordan.....	Sl. coop.	Haight, A. M., Co.	
Cheboygan:			
Cheboygan.....	Boxes, P. M. P.	Cheboygan Novelty Turning Works.	W. bir., Ced., Pop.
Cheboygan.....	Pulpwd.	Cheboygan Paper Co.	
Cheboygan.....	Ties, poles	Lombard & Rittenhouse.	Ced.
Cheboygan.....	Sl. coop.	Nelson Lumber Co.	
Cheboygan.....	Ties, poles, posts.	Rittenhouse, John, Co.	Ced.
Tower.....	Sl. coop.	Forest Lumber Co.	
Tower.....	Handles.	Stratton, D. A.	Bee., Bir., Map.

TABLE 12.—MICHIGAN FIRMS WHICH BUY WOOD PRODUCTS "IN THE ROUGH."—Continued.

County and town.	Industry.	Firm.	Wood used.
<i>Northern part of Lower Peninsula.—Continued.</i>			
Clare:			
Clare	Sl. coop	Rhoades & Shafer	
Temple	Sl. coop, ties	Temple Mfg. Co	
Crawford:			
Frederick	Sl. coop	Walsh Mfg. Co	
Grayling	Wd. dist	Crown Chemical Co	
Grayling	Dowels	Grayling Dowel Co	Bee, Map, Bir.
Grayling	Wd. dist	Grayling Wood Products Co	
Grayling	P. M. P.	Salling & Hanson Co	Hem., Map., Bir., Bass., Bee.
Emmet:			
Alanson	Ties	Markham, M. S.	
Carp Lake	Sl. coop	Hunt, M. M.	
Cecil	Sl. coop	Emmet Lumber Co	
Harbor Springs	Handles	Clark, W. J., & Sons	Bir., Bee, Map.
Harbor Springs	Sl. coop	Harbor Springs Lbr. Co	
Harbor Springs	Handles, P. M. P.	Harbor Springs Woodware Co.	Bir., Bee., Bass., Map.
Levering	Sl. coop	Levering Stave Mfg. Co	
Pellston	Sl. coop, handles	Jackson & Pindle	Map.
Pellston	Wd. ware, handles	Pellston Turning & Mfg. Co	Ced.
Petosky	Pulpwd.	Bear River Paper & Bag Co.	
Petosky	Wd. ware	Washburn Mfg. Co	Map.
Van	Ties, posts	Van Every Bros.	
Gladwin:			
Butman	Wd. dist	Thomas, Arthur E.	
Grand Traverse:			
Interlochen	Sl. coop	Wylie Cooperage Co., Ltd.	
Traverse City	Veneer	Beitner, Wm., & Son (estate)	
Traverse City	Wd. ware, boxes, veneer	Oval Wood Dish Co	Map., Bir., W. p.
Traverse City	Boxes, P. M. P.	South Side Co	W. p., Hem., Tam.
Traverse City	Veneer	Wells-Higman Co	
Iosco:			
Au Sable	Ties	Loud's, H. M., Sons Co	
Iosco	Wd. dist	Iosco Turpentine Co	
Oscoda	Foles, posts	Loud's, H. M., Sons Co	
Whitmore	P. M. P.	Leslie Bros.	W. p., Hem., Bee., Tam.
Kalkaska:			
Kalkaska	Handles	Kalkaska Handle Co	Bir, Map., Bee.
Rapid Run	Shingles	Madden, Jerry, Shingle Co	
Leelanau:			
Suttons Bay	Boxes	Denster, Leo	Bass., Pop.
Manistee:			
Arcadia	Veneer	Arcadia Furniture Co	
Eastlake	Sl. coop	Peters, R. G., Salt & Lbr. Co	
Filer City	Sl. coop	Filer & Sons	
Manistee	Sl. coop	Buckley & Douglas Lbr. Co., The	
Manistee	Vehicles	Overpack, S. C.	Ash, W. o., Elm, Ho., W. p.
Manistee	Sl. coop	Sands (Louis) Salt & Lumber Co.	
Manistee	Sl. coop	State Lumber Co	
Mason:			
Ludington	Veneer	Carron-Archarena Co	
Ludington	Veneer	Ludington Basket Co	
Ludington	Wd. ware	Ludington Woodware Co	Map., Bee.
Ludington	Poles, Sl. coop	Stearns Salt & Lbr. Co	
Missaukee:			
Jennings	Wd. dist	Cadillac	
Montmorency:			
Atlanta	Sl. coop	Wyllyo, Charles	
Ogemaw:			
Marion	Sl. coop	Walsh Mfg. Co	
Rose City	P. M. P.	Joslin & Stark	N. p.
Rose City	Sl. coop	Rose City Mfg. Co	
Rose City	Wd. dist	Rose City Wood Distillation Co.	
West Branch	Sl. coop, P. M. P.	Batchelor Timber Co	Map., W. p.
West Branch	Shoe	Chicago Last & Die Co	Map.

TABLE 12.—MICHIGAN FIRMS WHICH BUY WOOD PRODUCTS "IN THE ROUGH"—Continued.

County and town.	Industry.	Firm.	Wood used.
<i>Northern part of Lower Peninsula.—Continued.</i>			
Oscoda:			
Evart.....	Handles.....	Champion Tool & Handle Co.....	Map., Bee., Elm.
Evart.....	Handles.....	Evart Tool Co.....	Map., Bee.
Otsego:			
Gaylord.....	Shoe.....	Crawford, McGregor & Canby Co.,	Map., Bass.
Gaylord.....	Shoe.....	Dayton Last Block Co.....	Map.
Salling.....	P. M. P.....	Jensen, L.....	Map., Hem., W. p.
Vanderbilt.....	Handles.....	Olds & Hixson.....	Bee., Bir., Map.
Waters.....	P. M. P.....	Stephenson, Henry, Co.....	Hem., W. p.
Presque Isle:			
Onaway.....	Handles, P. M. P. vehicles	American Wood Rim Co.....	Map., Bir.
Onaway.....	Ties, posts, poles.....	Chandler, Geo. M.....	W. ced.
Onaway.....	Sl. coop.....	Gardner Peterman & Co.....	
Onaway.....	Sl. coop.....	Lobdell & Churchill Mfg. Co.....	
Rogers.....	Sl. coop.....	Fuhrman, Gustave H.....	
Rogers.....	Sl. coop.....	Loud-Haett Lbr. Co.....	
Wexford:			
Cadillac.....	Wd. dist.....	Cadillac Chemica Co.....	
Cadillac.....	Handles.....	Cadillac Handle Co., The.....	Ash, Bee., Bass., Che., Elm, Bir., Map Hem
Cadillac.....	Sl. coop.....	Cadillac Mfg. Co.....	
Cadillac.....	Veneer.....	Cadillac Veneer Co., The.....	
Cadillac.....	Wd. dist.....	Cummer-Diggins Co.....	
Hattietta.....	Sl. coop.....	Fellers Bros.....	
Manton.....	Shoe.....	William Bros. Co.....	Map., Bass.
Mesick.....	Handles.....	Mesick Turning Works.....	Map.
Mesick.....	Sl. coop.....	Tripp, L. J.....	
<i>Southern part of Lower Peninsula.</i>			
Allegan:			
Douglas.....	Veneer.....	Weed, E. E., & Co.....	
Hooper.....	Sl. coop.....	Deal, Jas.....	
Barry:			
Hastings.....	Wd. ware.....	Hodge, E.....	Ash
Bay:			
Bay City.....	Wd. ware, Sl. coop.....	Bonsfield & Co.....	W. p., Bass., Map., Bir., Bee., Hem., Tam., Pop., Ash.
Bay City.....	Misc.....	Goldie Mfg. Co.....	Map.
Bay City.....	Veneer.....	Hanson Ward Veneer Co.....	
Bay City.....	Ties, poles.....	Michigan Cedar Co.....	
Bay City.....	Ties, poles, posts.....	Michigan Pipe Co.....	
Bay City.....	Wd. dist.....	Michigan Turpentine Co.....	
Bay City.....	Vehicles.....	Severance, H. B.....	Ced.
Bay City.....	Sl. coop.....	Standard Hoop Co., Ltd.....	
Kawkawlin.....	Sl. coop.....	McGinness, John.....	
Pinconning.....	Sl. coop.....	Jennings, Edward.....	
Pinconning.....	Sl. coop.....	Sandusky Cooperage & Lbr. Co.....	
Berrien:			
Benton Harbor.....	Boxes.....	Colly Hinckley Co.....	Bee., Hem., Elm, Map., Pop.
Benton Harbor.....	Veneer.....	Thayer, Geo. B., Co.....	
Niles.....	Pulpwd.....	French Paper Co.....	
Branch:			
Athens.....	Sl. coop.....	Snyder & Bisbee.....	
Bronson.....	Veneer.....	Frederick, W. H., & Co.....	
Coldwater.....	Sl. coop.....	Calkins, B. H., & Son Co.....	
Coldwater.....	T. coop.....	Coldwater Cooperage Co.....	
Coldwater.....	Handles, Sp.-Ath.....	Nellenberg, J. B., & Sons.....	Hick., Map., Elm, Bass.
Sherwood.....	P. M. P.....	French, J. W., & Sons.....	W. o., R. o.

TABLE 12.—MICHIGAN FIRMS WHICH BUY WOOD PRODUCTS "IN THE ROUGH."—Continued.

County and town.	Industry.	Firm.	Wood used.
<i>Southern part of Lower Peninsula.—Continued.</i>			
Cass:			
Dowagiac.....	P. M. P.....	Doal & Murphy.....	W. p., Pop., Bass.
Glennwood.....	Sl. coop., T. coop.....	Hampton Stock Farm Co.....	
Eaton:			
Charlotte.....	Handles.....	Fenn Mfg. Co.....	Map., O., Ash, Elm.
Genesee:			
Clio.....	P. M. P.....	Stevens, C.....	W. p., O.
Gratiot:			
Middleton.....	Sl. coop.....	Middleton Cooperage Co.....	
Huron:			
Sebewaing.....	Sl. coop.....	Liken & Bach.....	
Ionia:			
Belding.....	Veneer.....	Belding Basket Co.....	
Ionia.....	Veneer.....	Stafford, E. H., Mfg. Co.....	
Lyons.....	Agr. imp., handles, Sp-Ath.....	Lyons Handle Co.....	Ash, O., Hick.
Matherton.....	Sl. coop.....	Middleton Cooperage Co.....	
Isabella:			
Mt. Pleasant.....	Veneer.....	Gorham Bros. Co., The.....	
Shepherd.....	Sl. coop.....	Bell, Edwin, Co., The.....	
Jackson:			
Jackson.....	Handles.....	American Fork & Hoe Co.....	Ash.
Kalamazoo:			
Augusta.....	Veneer.....	Augusta Basket Co.....	
Kent:			
Ada.....	Veneer.....	Kent Basket Co.....	
Algoma.....	Sl. coop.....	Curtis, G. S.....	
Edgerton.....	Sl. coop.....	Rice, Geo.....	
Grand Rapids.....	Ties, poles, posts.....	Dregge, Groover Lbr. Co.....	
Grand Rapids.....	Veneer.....	Grand Rapids Veneer Works.....	
Grand Rapids.....	Wd. ware.....	Rex Mfg. Co.....	Bass.
Grand Rapids.....	Ties, poles, posts.....	Union City Lbr. Co.....	
Grand Rapids.....	Ties, poles, posts.....	Warner-Newton Lbr. Co.....	Ced.
Kent City.....	Coffins.....	Side, R. J.....	W. p., ash.
Lowell.....	Wd. ware.....	Michigan Bent Rim & Basket Mfg. Co.....	Bass., Map., Bee., Ash, Elm, W. o., R. o.
Lenawee:			
Adrian.....	Handles.....	Cherry, J. M.....	Ash.
Fairfield.....	Veneer, Sl. coop.....	White Bros.....	
Palmyra.....	Boxes, Handles, P. M. P. Sp-Ath.....	Eringer Vogt Co., The.....	Map., Hick., Ash, Bass., O., Pop.
Macomb:			
Lenox.....	Sl. coop.....	Harr, F.....	
Lenox.....	Sl. coop.....	Lenox Hoop Co.....	
Mt. Clemens.....	Sl. coop.....	Snook & Mark.....	
Mt. Clemens.....	Sl. coop.....	Snook, T. W., Son.....	
Richmond.....	Sl. coop.....	Haar, A.....	
Romeo.....	Sl. coop.....	Struthers Cooperage Co.....	
Mecosta:			
Big Rapids.....	Veneer.....	Hood & Wright.....	
Monroe:			
Monroe.....	Ties, poles.....	Sterling, W. C., & Sons.....	
Montcalm:			
Vickeryville.....	Sl. coop.....	Chittenden, C. E., & Co.....	
Muskegon:			
Montague.....	Veneer.....	Miller Package & Fruit Co.....	
Muskegon.....	Pulpwd.....	Central Paper Co.....	

TABLE 12.—MICHIGAN FIRMS WHICH BUY WOOD PRODUCTS "IN THE ROUGH."—Concluded.

County and town.	Industry.	Firm.	Wood used.
<i>Southern part of Lower Peninsula.—Continued.</i>			
Oakland:			
Holly	Vehicles, car	Holly Bending Co.	W. o., R. o.
Pontiac	Boxes, handles, Sp.-Ath.	Pontiac Turning Co.	Map., Hick., Ash, Elm.
Ottawa:			
Grand Haven	Veneer	Grand Haven Basket Factory	
Saginaw:			
Saginaw	Misc.	Berst Mfg. Co.	Bir.
Saginaw	Boxes, Wd. ware, Inst.	Lufkin Rule Co., The	N. p., Bass., Map.
Saginaw	Hd. ware	Palmerton, F. G., Woodenware Co.	W. p., Bass.
Saginaw	Poles, posts	Phillips & Seelye	
Saginaw	Poles, posts	Porter Cedar Co.	Ced.
Saginaw	Sl. coop	Saginaw Heading & Veneer Co.	
Saginaw	Sl. coop. Misc.	U. S. Tie Plug Co.	Elm, Map., O., Ash, Hick., Bass., Pop.
Saginaw	Sl. coop	Wylie, J. T., & Co.	
Saginaw	Sl. coop	Mead Cooperage Co.	
St. Clair:			
Marine City	Sl. coop	Baker, S., & Sons	
Port Huron	Posts	Hayes, T. J., Co.	
Port Huron	Pulpwd	Michigan Sulphite Fiber Co.	
St. Joseph:			
Wasepi	P. M. P.	Palmer, Geo. W.	W. p., W. o., R. o.
Shiawassee:			
Durand	Sl. coop	Hercules Hoop Co.	
Owosso	Boxes, handles, Sp.-Ath.	Turnerman, J. N.	Map., Elm, Ash.
Owosso	Agr. imp., handles	Wood, M., & Co.	Ash, O., Hick.
Tuscola:			
Mayville	Boxes	Haines, Arthur	Elm.
Reese	Sl. coop	Fardee, Lawson	
Vassar	Boxes	Butcher Folding Crate Co.	Bee., Map.
Van Buren:			
Decatur	Sl. coop	Decatur Hoop & Lumber Co.	
Decatur	Sl. coop., veneer	Hinckley-Roberts Co.	
Decatur	Sl. coop	Penninger, J. W.	
Hartford	Sl. coop	Hartford Stave Co.	
Hartford	Boxes, Sl. coop.	Walker, L. P.	Bee., Map., Bir.
Lawrence	Sl. coop	Wallace & Lockwood	
Lawton	Veneer	Lawton Basket & Box Co.	
Paw Paw	Sl. coop	Deal, Jos.	
South Haven	Boxes, veneer	Pierce-Williams Co., The	Bee., Map., Bass., Bir., Asp.
Washtenaw:			
Milan	P. M. P.	Lamkin, O. P.	W. o., Bass.
Ypsilanti	Agr. imp., handles, Sp.-Ath.	Deikuim, C. W.	Ash, Hick.
Wayne:			
Detroit	Telegraph poles	Brownlie & Co.	
Detroit	Ties, poles, posts	Detroit Cedar & Lbr. Co.	
Detroit	Ties, poles, posts	Detroit Lbr. Co.	
Detroit	Pulpwd	Detroit Sulphite Pulp & Paper Co.	
Detroit	Ties, poles, posts	Grace Harbor Lbr. Co.	
Detroit	Wd. ware	Perfection Mfg. Co.	Bass., Map., Bir.
Detroit	Sl. coop	National Mfg. Co.	

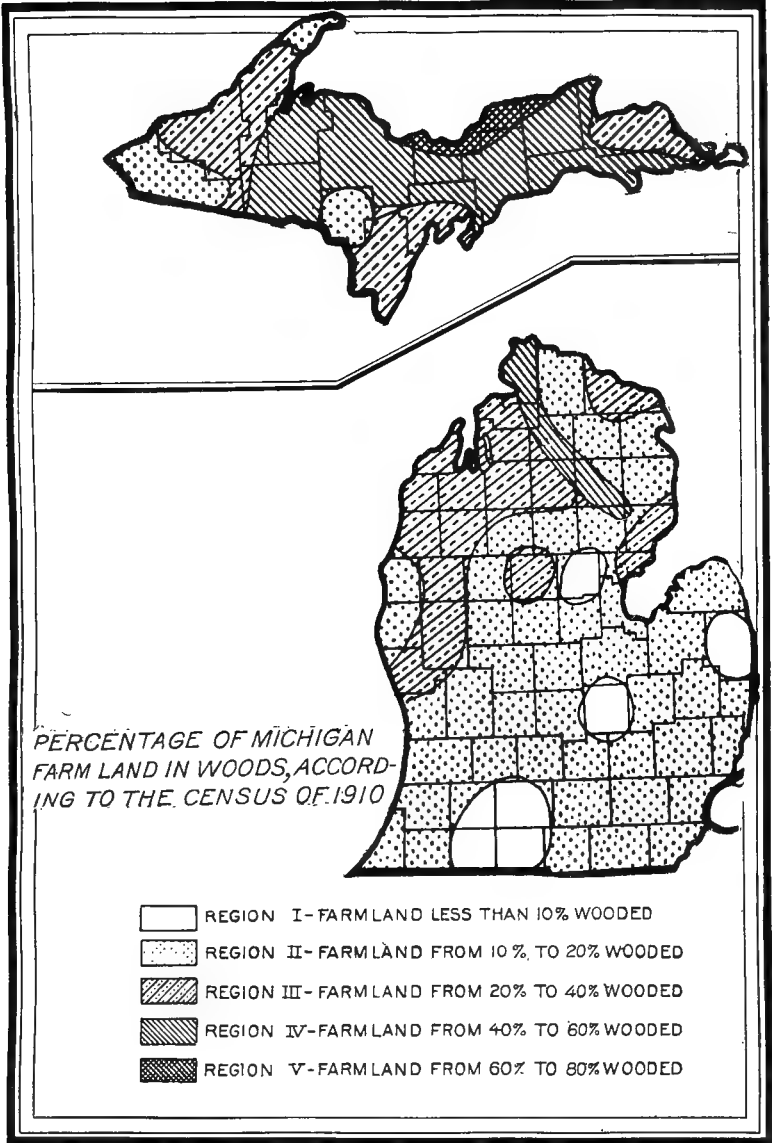


TABLE 13.—PRINCIPAL BUYERS OF BLACK WALNUT LOGS IN THE UNITED STATES.

State.	Town.	Firm name.
Connecticut.....	New Haven.....	Winchester Arms Co.
Illinois.....	Belvidere.....	National Sewing Machine Co.
Illinois.....	Cairo.....	Singer Mfg. Co.
Illinois.....	Chicago.....	R. S. Bacon Veneer Co.
Illinois.....	Kankakee.....	Foley & Williams.
Illinois.....	Rockford.....	Illinois Sewing Machine Co.
Indiana.....	Fort Wayne.....	Hoffman Bros. Co.
Indiana.....	Indianapolis.....	Indiana Veneer & Lbr. Co.
Indiana.....	Indianapolis.....	The Talge Mahogany Co.
Indiana.....	Lawrenceburg.....	Batesville Lbr. & Veneer Co.
Maryland.....	Baltimore.....	Williamson Veneer Co.
Massachusetts.....	Boston.....	Mason & Hamlin.
Massachusetts.....	Cambridge.....	National Casket Co.
Massachusetts.....	Chicopee Falls.....	J. Stevens Arms & Tool Co.
Massachusetts.....	Springfield.....	J. W. Stein Organ Co.
Michigan.....	Big Rapids.....	Hood & Wright.
Missouri.....	East St. Louis.....	East St. Louis Walnut Co.
Missouri.....	Kansas City.....	Penrod Walnut & Veneer Co.
Missouri.....	St. Louis.....	Pickrel Walnut Co.
North Carolina.....	Lenoir.....	Lenoir Veneer Co.
Ohio.....	Cincinnati.....	The Ohio Veneer Co., 2624 Colerain Ave.
Ohio.....	Dayton.....	H. C. Hossafores.
Ohio.....	Piqua.....	George W. Hartzell.
Pennsylvania.....	Philadelphia.....	A. H. Fox Gun Co.
Wisconsin.....	Oshkosh.....	Paine Lumber Co., Ltd.

APPENDIX.

FACTS RELATING TO THE WOODLOT SITUATION IN MICHIGAN.

The agricultural development of a heavily wooded region is a slow and difficult process. The first farms in southern and central Michigan, as throughout most of the East, undoubtedly contained a great deal more woodland than tilled land. As the zone of pioneering was pushed farther north, more and more of the woodlot area in the longer settled sections was cleared for cultivation. The progress of agriculture can therefore be roughly gauged by the proportion of the total farm land which is in woods. This proportion is shown for Michigan in the map of "woodlot regions" (page 48). Each of these "regions" consists of counties having similar proportions of woodland to total farm land, according to the 13th census (1910). The different regions are shown by shading, the heaviest shading representing that in which the farms are from 60 to 80 per cent wooded. Tables 14 and 15 and Diagram 1 are based on these regions, so that the chief facts relating to the status of woodlots in any part of the State can be easily ascertained after locating on the map the "woodlot region" in which the area falls.

TABLE 14.—CHARACTERISTICS OF THE WOODLOT REGIONS IN MICHIGAN, 1910 (SEE MAP OF "WOODLOT REGIONS.")—BASED ON STATISTICS COLLECTED BY THE 10TH AND 13TH CENSUSES.

Factors indicating the farm and woodlot situation.	Woodlot regions.											
	I.		II.		III.		IV.		V.		Total.	
	1910.	1880.	1910.	1880.	1910.	1880.	1910.	1880.	1910.	1880.†	1910.	1880.
Proportion of farm land to total land surface (per cent).....	85.5	72.4	71.4	57.0	30.4	11.9	8.9	2.5	5.0	.....	51.5	37.5
Average value of farm land per acre (dollars).....	34.74	35.73	35.73	30.1	18.68	18.68	15.25	.....	17.41	.....	32.48	.....
Proportion of farm land wooded (per cent).....	4.6	22.8	12.8	30.1	27.6	63.4	43.2	.....	68.6	.....	15.5	.....
Proportion of farm land improved (per cent).....	76.5	69.2	72.0	62.1	46.7	30.9	36.7	14.3	19.1	.....	67.7	60.1
Proportion of farm land unimproved and unwooded (per cent).....	18.9	8.0	15.2	7.8	25.7	5.7	20.1	4.6	12.3	.....	16.8	7.7
Average size of woodlots* (acres).....	8.8	21.7	11.4	26.2	27.1	65.7	43.8	105.5	72.9	.....	14.1	28.9
Average total value of woodlot products per farm reporting (dollars).....	75.87	86.75	86.75	.....	108.06	.....	185.84	.....	191.95	.....	98.77	.....
Average value of woodlot products used on farms (dollars).....	51.58	48.71	48.71	.....	42.50	.....	54.59	.....	30.08	.....	47.77	.....
Average value of woodlot products sold (dollars).....	24.29	38.04	38.04	.....	65.56	.....	131.25	.....	161.87	.....	51.00	.....
Proportion of total value of woodlot products to total farm income (per cent).....	4.1	4.7	4.7	.....	11.2	.....	20.2	.....	28.4	.....	6.4	.....

*Assuming that every farm has a woodlot.

†This region consists of Alger county which was not organized in 1880.

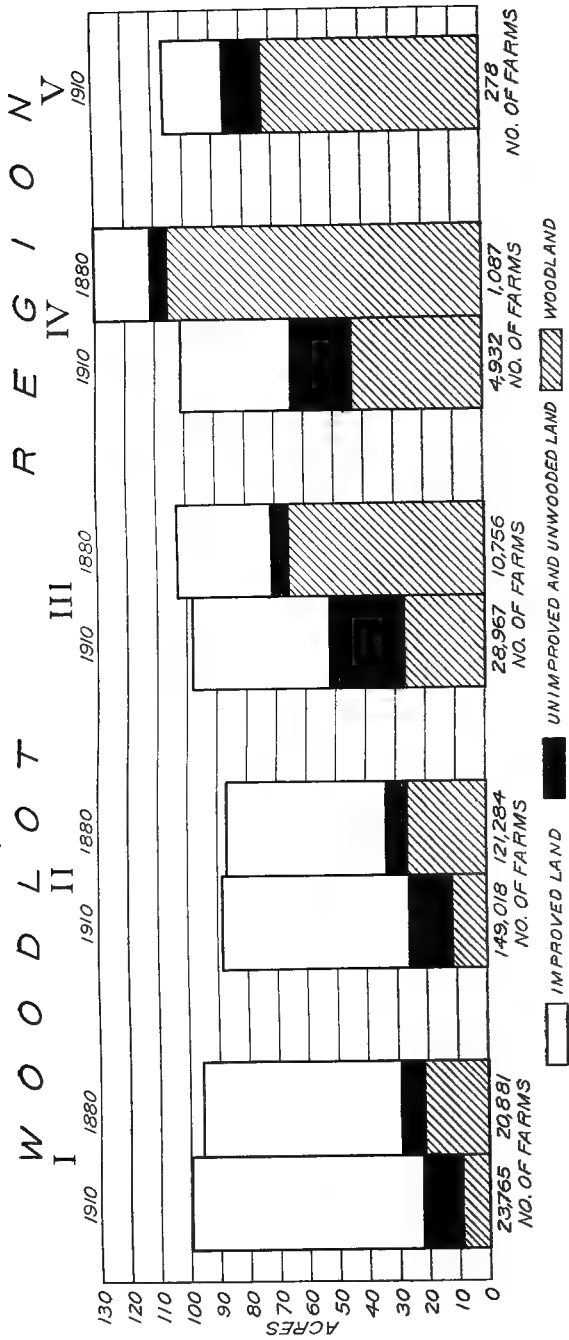


DIAGRAM I— SIZE OF THE AVERAGE FARM IN EACH OF THE "WOODLOT REGIONS" IN 1910 AND IN 1880
 EACH RECTANGLE SHOWS THE AVERAGE NUMBER OF ACRES IMPROVED, UNIMPROVED AND UNWOODED, AND WOODED

The table shows that where the woodlots are largest, farming is least important; land values are lowest; the percentage of improved farm land is least; and the value received for woodlot products on the average farm is greatest. Just the reverse is true of the regions with the smallest proportion of wooded farm land. The figures given in the last line of the table bring out forcibly the importance of the woodlot in the different regions. They show that while woodlot products comprised 6.4 per cent of the value of all farm incomes in the entire State, the woodlot income from region IV was over a fifth and that from region V over a fourth of the total farm income in these counties.

How the growth of farming has affected Michigan woodlots is shown in Table 15, which gives the actual acreage in farm woodland in 1910, and the per cent of increase or decrease in farm woodland area in the thirty years from 1880 to 1910.

TABLE 15.—FARM WOODLAND IN MICHIGAN, BY WOODLOT REGIONS, 1910, AND PER CENT OF INCREASE OR DECREASE IN AREA SINCE 1880.

Woodlot regions.	Farm woodland area, 1910.	Increase or decrease, 1880-1910.
	Acres.	Per cent.
I.....	209,209	53.9 decrease.
II.....	1,698,043	46.6 decrease.
III.....	783,836	11.0 increase.
IV.....	216,211	88.6 increase.
V.....	20,255	*
Total.....	2,927,554	34.2 decrease.

*Alger county, with 68.6 per cent of its farm land wooded, was not organized in 1880, and no comparison is possible.

The deduction which this table appears to justify is that for the present, at least, the farm woodland area can be expected to increase only in those regions where farming has not yet occupied large areas. Elsewhere the decrease will be rapid as more and more of the woodlot area is claimed for cultivation.

