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FARM FORESTRY



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FARM FORESTRY

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INTRODUCTION.

Every farm should have its woodland to enable the owner not only to supply his own needs but also to increase the farm revenue and use labor and teams during periods when they are not engaged in crop work. Timber growth on many farms has been so often sacrificed in clearing new land and so long been looked upon as a hindrance to farm improvement, that almost every farmer has come to believe the farm forest is practically valueless. The abundance of timber for local and domestic uses, long distances from timber markets with resultant excessive freight charges, poor roads, and the low prices offered by wood users and manufacturers have resulted either in the practice of destroying the timber or in selling the farm forest products at prices which do not warrant the attendant labor. Unfortunately these conditions prevail in certain sections and farmers elsewhere suppose they exist, although a little investigation would show that a profitable market is obtainable. Values of wood products are now high, both in well-developed agricultural sections and where the supply of virgin timber is exhausted. This is especially true in the immediate vicinity of wood-using industries. In sparsely wooded regions there has always been a ready market for wood products for local use. Proof of this is found in the high cost of such materials, even fuel wood, in the prairie belts and plains regions. Prices are likely to continue to rise and sections where timber from farm forests has hitherto had little value may expect a better market in the future.

The farm forest, in general, should occupy land which it is not profitable to maintain as improved land. Every farmer knows the areas on his farm which should not be cleared. These should be recognized as the farm forest. In agricultural communities which have long been settled and where little new clearing is being done, the woodland area of each farm is well defined. There is scarcely an agricultural section in the United States too fertile for at least one per cent of the area to be profitably used as woodland. In many prosperous sections of the country as much as 50 per cent of the farm area is woodland. Whether the area is to be 1 or 50 per cent, or more, must be determined by the lay of the land, the productiveness of the soil, and the necessity for tree growth.

The average farmer knows less about the contents and value of his woodland than of any other portion of his farm. Furthermore, it seldom occurs to him to study the possible outside markets for his forest

products. The result is that the buyer, familiar with the value of the timber, generally gets the better of the bargain and the farmer sells for less than his products are worth. Oftentimes if the farmer secures day wages for his labor and teams he is satisfied. He fails to see that he has received no compensation for the product itself. In many cases, also, the farmer deadens and burns large quantities of valuable timber for which he might have received a handsome return had he placed it on some readily accessible market.

The purpose of this bulletin is to encourage among Texas farmers an interest in their woodlands, and give them a better knowledge of farm forest values and of the means of handling and marketing the wood products.

FARM FORESTS IN TEXAS.

Texas is primarily an agricultural State. However, every county east of the one hundredth meridian, except certain black land and coastal prairie counties, has 15 per cent or more of the total farm acreage in woodland. The majority of these counties contain from 25 to 75 per cent of their farm land area in forest. A number of the counties immediately west of the one hundredth meridian support a large acreage of woodland. Although a great deal of such woodland in Central and South Texas is mesquite and other scrubby growth, recognized as inferior, yet it has a distinct value for the production of fuel and fence posts. In the post oak belts of East-Central Texas, in the eastern Edwards Plateau counties, and in the breaks and along the stream borders in other counties, the woodlands are important. At least 100 counties of the 252 in the State can produce forest products which are not only of great value for home use but which can also be marketed at a profit. More than 50 per cent of the area of 30 counties in the East Texas Timber Belt is woodland.

According to census statistics for 1909, the value of all firewood, fencing, logs, railroad ties, telegraph poles, staves, and other forest products cut and used on the farms of Texas, or sold from these farms, amounted to \$8,925,662. In 1899, ten years earlier, their value was only \$3,520,033. These figures refer only to farm forest products and do not include the value of products from large timber holdings not attached to farms. They indicate clearly the advance both in the price and the volume of the output.

In many eastern counties of the State lumbering takes precedence over any other industry or occupation. In the majority of East Texas counties, however, agriculture now dominates, and in time will become the chief industry of every county. Now, forests exist on good agricultural soils as well as on poor soils. In other sections of the State, where desirable agricultural lands are more easily recognized and have long been in cultivation, the rough hillsides, eroded stream borders, and other types of naturally existing forest land are looked upon for the most part as true forest soils. Areas of post oak and of live oak and mesquite occupying or encroaching upon level, fertile lands must inevitably be cleared for cultivation. There will eventually be a

readjustment, as agricultural development becomes more complete, whereby lands which lie well and are suitable for cultivation will be so used, and soils too steep, gullied, or sterile to be improved will be used for pasture or farm forests. As a result of the readjustment there will remain permanently in forest many thousands of acres in nearly every county. These areas are logically the farm forests with which this bulletin is concerned.

PRINCIPAL WOODS AND WOOD-USING INDUSTRIES.

About 129 different species of wood are used for manufacturing purposes within the State of Texas.* All but 10 of these are native to the State, although at least 18 cannot be obtained locally in sufficient quantities for commercial purposes. Of the total number of species used, 48 are reported by manufacturers. The following are among the most commonly used Texas woods, arranged in the order of their importance: longleaf, shortleaf, and loblolly pines, white, Texan (red), post, overcup, and other oaks, the various species of hickory, cottonwood, red or sweet gum, black walnut, white ash, elm, tupelo, black gum, willow, osage orange (Bois d'Arc), red and mountain cedars, cypress, magnolia, holly, hackberry, and mesquite. Many other kinds of wood reach the factory under various names or without classification and are extensively used. Among the most important of these are soft maple, dogwood, black locust, honey locust, hornbeam, persimmon, mulberry, prickly ash, sassafras, sycamore, and chittimwood.

Thirteen kinds of wood-using establishments are recognized in the census and Forest Service reports as operating in Texas. Planing mills are nearly always operated in connection with sawmills. When rough lumber has been seasoned and planed, it is considered a finished commodity. Planing mill products represent 77 per cent of all the manufactured wood output. The three native species of yellow pine (longleaf, shortleaf, and loblolly) contribute nearly all the wood used. The most important products are flooring, ceiling, and siding.

Sash, door, blind and general mill-work operations are closely related to the preceding, but the line of products is more highly specialized. Shortleaf and longleaf pines hold chief place while other native woods used in this industry are cypress, tupelo, loblolly pine, sweet gum, white oak, Texan oak, white ash, and evergreen magnolia. Some other woods are imported.

Packing boxes and crates are made mostly from sweet gum, although pine, cottonwood, ash, elm, magnolia, black gum, willow, hackberry and several oaks are also used. Much of the material is handled as cut veneers in the manufacture of boxes, crates, and baskets for shipping fruits and vegetables. The purposes for which the products are used make this a very important industry in eastern Texas.

For car construction 24 species of wood are used. Of these, 17 are

*"Wood-using Industries of Texas," published by the Lumber Trade Journal, New Orleans, Louisiana, 1912.

native to Texas, but not all of them are found in sufficient quantities to meet the demand. Nearly four-fifths of the material is supplied by the three yellow pines. Longleaf pine is used for framing and shortleaf and loblolly pines for siding and decking. White oak supplies heavy timbers for freight cars and interior finish for passenger coaches. Black walnut, ash, and other species are also used. Hickory goes into railway velocipedes. Texas produces nearly two-thirds of the wood of all species used in her car factories.

Furniture construction offers a large opening for the use of Texas woods. Sweet gum supplies nearly one-half of all the wood used for this purpose, and can be made to imitate many rare and expensive woods. Next to sweet gum, white oak and Texan oak are by far the most important; yellow pine, magnolia, ash, cottonwood, and black gum follow in the order named. Drawers and shelving are made from cottonwood, black gum, magnolia, elm, and ash. Probably more than 16 species of native Texas woods are used in this industry.

The Texas products classed as agricultural implements consist largely of cotton gins and presses, others being plows and well-boring apparatus. Three-fourths of the wood used is longleaf pine. Hickory, for use in this industry, brings the highest price, and loblolly pine the lowest. Oak is used for plow beams and cypress for windmill construction.

Office, bank, store, and hotel fittings, consisting of showcases, counters, and the like, are considered in a group by themselves under the term "fixtures." The leading species are white oak, yellow pine, ash, and sweet gum. Although most of the species used are native to Texas, not more than one-half of the raw material used in the manufacture of fixtures is produced in the State.

Tanks, cisterns, and reservoirs made of wood are chiefly from cypress, most of which is imported from Louisiana.

Of the vehicles used in the State probably less than five per cent are of Texas manufacture. Vehicle repairing is a larger industry than vehicle manufacturing. Chief among the 12 woods used in the local factories are white and other oaks, white ash, longleaf pine, osage orange, hickory, and sweet gum. Oak is used extensively for those parts where strength and wearing quality must be combined. Ash and longleaf pine are used for the frames of tops, and hickory for shafts, poles, spokes, and rims. Felloes are often made from osage orange, the waste being used for turning out insulator pins as a by-product.

Handle making is not an extensive industry in Texas. Although handles are made of white ash, hickory, and white oak, all three species native to Texas, this State supplies but a small proportion of the handles for the local demand. Ash and oak are used for farm and garden tools, while hickory is the wood for axe and hammer handles. About 70 per cent of the hickory used in Texas is made into handles.

The trunk and valise industry utilizes four Texas woods, sweet gum, cottonwood, elm, and cypress, but the raw material, except a part of the sweet gum, is imported from other states. These woods are used principally in the form of slats and veneers.

Patterns for use in foundry work are made almost entirely from imported woods, white pine being unsurpassed for this purpose.

For the miscellaneous industries many kinds of wood are used. Insulator pins are made chiefly from osage orange and mountain cedar in this State. The use of the latter species, however, is over a restricted area in North-Central Texas. Tent poles are made of longleaf pine and tent stakes of white ash. Beehives are usually made from clear longleaf pine, while the frames or boxes for the honey are of cottonwood or some other odorless wood. Excelsior, mainly for packing purposes, is made in Texas from shortleaf pine. Paving blocks are made chiefly from yellow pine; cheap cigar boxes from sweet gum; chicken coops from white elm and yellow pine; butcher's supplies from oak; refrigerators from white ash and cypress; and caskets from red gum and cypress.

FARM FOREST PRODUCTS AND MARKET VALUES.

The products of the farm forest are generally marketed in the form of logs, bolts and blocks, mine props, poles, ties, posts, and cordwood.

Logs. Most of the logs from the farm forest are manufactured into lumber, but many are used for vehicle parts, furniture, and other special uses. Sometimes mills using the wood in bolt form buy the logs and cut them into bolts at the mills. Where logs have to be shipped by rail they are loaded on flat cars with about 7000 board feet, log scale, per car. Other than to distinguish the clear from the defective, little attempt is made to grade such logs. The Doyle rule is generally used in Texas to determine the board foot contents of logs. Since it yields an overrun when small logs or long logs with small top diameters are measured, this rule tends to favor the purchaser in such cases. It is important that the farmer bear this in mind when selling timber from the farm forest.

Logs are sold either delivered at some local mill or f. o. b. the cars at some shipping point. A better price may obviously be obtained at the local mill, due to the elimination of freight costs, but it is not always possible for the farmer to deliver the logs at a mill. The return which the farmer receives is generally none too high in any case to compensate for the labor entailed and for the value of the timber. The farmer has to accept the buyer's estimate, not only of the value of the logs but even of the amount of lumber which may be cut from them.

The following table gives the approximate current prices for logs in the East Texas Timber Belt. At present these prices are seldom actually obtained because of the low volume estimates upon which the majority of the sales are based. A better knowledge of values and volumes on the part of the farmer will tend to correct this condition.

TABLE 1.

Average Prices Per Thousand Board Feet for Logs, f. o. b. Cars at the Railroad Shipping Point.

Species.	Ungraded Logs.	Clear Logs.	Defective Logs.	Veneer Logs. Diameter 24. and Up.*
Yellow pine.....		\$ 5.00	\$ 3.50	
White and red oaks.....		15.00	7.00	\$25.00
Red or sweet gum.....		6.00	4.00	
Ash.....		20.00	13.00	
Hickory.....		18.00		
Elm.....	\$10.00			
Cottonwood.....		10.00		

*As used in the furniture industry.

Many small mills make a practice of custom-sawing for farmers of the communities in which they are located. Some mills saw for one-half of the lumber obtained; some for from \$4 to \$5 per 1000 board feet with the farmer furnishing one hand for tailman at the mill; others for from \$4.50 to \$5.50 per 1000 feet of lumber. The first plan is the least popular since the farmer has to cut enough logs for twice as much lumber as is needed for his own use.

Bolts and Blocks. Bolts and blocks are short pieces varying in length according to the use for which they are intended. Where straight grained, white oaks can be obtained, stave bolts constitute an important farm forest product. The clear, sound portion of the trunk is cut into bolts from 36 to 40 inches in length (or longer in some cases) and the bolts quartered. The quartered bolts are then shipped to a permanent mill to be sawed into staves, or else they are sawed by a portable stave mill, or are hand-split into rough staves. The cooperage companies buy raw material by the cord, either as quartered bolts for sawing out the staves or in the form of rough split staves. Quartered bolts bring from \$8 to \$12 per cord, first grade. Rough split staves bring correspondingly higher prices for the same grade of material. Where species other than oak, ash, and elm are used, prices may run as low as \$6 per cord for quartered bolts. If the bolts must be shipped, the producer really pays the freight charges since this amount is deducted from the market value of the raw material. For this reason better prices are obtained by holding the bolts for seasoning because of the reduction in freight charges through loss in weight.

Bolts for the manufacture of tool handles, implements, excelsior, and pencils vary with the specific requirements and are often cut to the proper length from logs at the mill.

House blocks vary in size and length according to the specifications for each house. A large number of blocks for this purpose in Texas are cut from trees near the site of the house. Decay resistant woods, such as osage orange, post oak, white oak, and cedar, are commonly used. Yard prices on cedar blocking material, delivered, average four cents per linear foot for logs 10 inches in top diameter and five cents per

linear foot for logs 12 inches and over in top diameter. To a large extent, however, concrete and brick are replacing wood as foundation material.

Veneer bolts are mostly of sweet gum, cottonwood, pine, and ash, with sweet gum supplying by far the largest proportion. The bolts vary from two to four feet in length according to the requirements of the different mill equipments. Prices vary from \$10 to \$14 per 1000 board feet f. o. b. cars, and from \$12 to \$15 per 1000 board feet delivered at the mill. The differences depend upon the quality and length of the bolts and the distance of freight haul. Veneer bolts should be free from defects, particularly heart rot.

Shingle material in East Texas is generally from pine, although some oak and gum shingles are made. The raw product is delivered at the mill either in bolt length, 18 to 20 inches, or in logs to be cut into bolts at the mill. Prices range from \$10 to \$14 per 1000 board feet at the mill. A large proportion of the shingles made in Texas are for local use and are often custom-sawed at a rate of \$1 per 1000 shingles. The Pacific Coast, however, supplies shingles to many of the lumber yards in the cities.

Mine Props. In parts of the State the production of mine props, or stulls, is an important occupation for the farmer during slack seasons in other farm work. Pine and oak are the principal species used for this purpose. Straight, sound sticks with a top diameter of four inches or over are required. The length may vary from three feet up. Small sizes are often sold at from two to five cents per linear foot, but most of the stulls now produced are priced at an average of \$4 per 1000 board feet, log scale. At present Gregg, Harrison, Rusk, Upshur, and Wood counties in East Texas are producing the bulk of this product.

Poles. Telephone and telegraph poles are sold by the linear foot, the total length and top diameter being specified.

TABLE 2.

Specifications and Average Prices for Telephone and Telegraph Poles, f. o. b., Cars at Railroad Shipping Points.

Length. Feet.	Diameter at Butt. Inches.	Top Diameter. Inches.	Price.	Specifications.
25	10	7	\$.75	White oak, post oak, red oak, pin oak, locust, sassafras, sweet gum, elm, and all three kinds of pine are accepted. Almost all kinds are creosoted, even the better oaks. Poles must be straight and sound.
30	10	7	.90	
35	11	7	1.05	
40	11	7	1.20	
45	12	7	1.35	
50	12	7	1.50	
55	13	7	1.65	
60	13	7	1.80	
65	14	7	1.95	

The majority of local telephone companies pay little or no attention to the measurement specifications given above, provided the poles are

fairly straight and sound and have a top diameter of four inches or more. Such poles are bought for two cents per linear foot.

In certain sections of Central and West Texas cedar is used almost exclusively for telephone poles. The poles must be straight and sound. Standard lengths of 14, 16, 18, and 20 feet are recognized in the industry. Standard top diameters are 3, 4, and 5 inches. In this connection top diameter (as used) refers to the longest rather than the average diameter at or within six inches of the small end.

TABLE 3.
Average Line Yard Prices for Cedar Telephone Poles, Delivered.

Length. Feet.	Top Diameter. Inches.	Price.	Length. Feet.	Top Diameter. Inches.	Price.
14.....	3	\$0.14	18.....	3	\$0.25
14.....	4	.18	18.....	4	.35
14.....	5	.23	18.....	5	.45
16.....	3	.20	20.....	3	.35
16.....	4	.25	20.....	4	.50
16.....	5	.32	20.....	5	.53

Ties. The specifications for railroad cross-ties are variable, according to the type of railroad and the volume of traffic. In former years most of the ties were made from oak but since preservative treatment has become practicable many additional species are utilized. It is now becoming common practice to give oak, as well as other species of wood, preservative treatment. However, white oak and post oak are often used without treatment.

TABLE 4.
Specifications and Approximate Prices of Standard Cross-Ties Delivered on Railroad Right-of-Way.

Species.	Dimensions.	Price.	Dimensions.	Price.
White oak.....	6" x 8" x 8'	\$0.35-.45	7" x 9" x 8½'	\$.45
Post oak.....	6" x 8" x 8'		7" x 9" x 8½'	
Red oak.....	6" x 8" x 8'	.25-.30	7" x 9" x 8½'	.35
Pin oak.....	6" x 8" x 8'	.25-.30	7" x 9" x 8½'	.35
Pine.....	6" x 8" x 8'	.22-.23	7" x 9" x 8½'	.25-.27
Sweet gum.....	6" x 8" x 8'	.22-.25	7" x 9" x 8½'	.25-.27

Most of the ties produced in Texas are slabbed on four sides, although pole ties (slabbed on two opposite sides only) are sometimes used.

Posts. Because the supply is generally abundant, by far the greater percentage of fence posts for use on eastern Texas farms are produced and sold locally. Farther west, however, where timber is less plentiful, more of the fence posts are imported. In the Panhandle region practically the entire supply is obtained from the timber belts farther east. Two counties in East Texas, Anderson and Tyler, together ship over 100,000 posts annually. The species used for telephone and telegraph

poles are suitable for posts. To these should be added osage orange and mesquite. Large numbers of posts are treated before using, but those made from cedar, osage orange, black locust, mesquite, and post oak are generally used untreated. White oak and red oak posts are priced at five cents each and up; osage orange, locust, and cedar posts bring more. Hardwood and pine fence posts must be seven feet long, and it may be said that four inches should be a positive minimum for the top diameter.

Cedar posts are not only used locally but are shipped to all sections of Texas and the adjoining states. Because of their extreme durability cedar posts, size for size, command higher prices than do untreated posts of other species. In sections where cedar posts are difficult to obtain, and consequently must be shipped or hauled long distances, they not uncommonly sell at prices ranging between 25 and 50 cents each. Cedar posts are of four classes:

(1) Yard fence posts. These shall be straight or not to exceed a sweep one way of three inches.

(2) Wire fence posts. These shall be reasonably straight but a sweep one way not to exceed ten inches is permitted.

(3) Split posts. These may be either halves or quarters. The circumference at or within six inches of the small end shall be three times the specified diameter.

(4) Corral and shed posts. These shall be straight or shall have one straight side. A sweep one way not exceeding six inches is permitted. Standard lengths for corral and shed posts are 8, 10, 12, and 14 feet.

TABLE 5.
Average Line Yard Prices for Cedar Posts, Delivered.

Length. Feet	Top Diameter. Inches.	Price.	Length. Feet	Top Diameter. Inches.	Price.
6 to 6½	2	\$0.02	10	4	\$0.12
6 to 6½	2½	.03	10	5	.15
6 to 6½	3	.04	10	6	.20
6 to 6½	3½	.05	12	4	.14
6 to 6½	4	.06	12	5	.18
6 to 6½	5	.07	12	6	.24
6 to 6½	6	.09	14	4	.18
8	4	.09	14	5	.23
8	5	.11	14	6	.30
8	6	.15			

Cordwood. Cordwood is in strong demand in a market extending over practically the entire State. Although oil is used for many purposes and natural gas is available in restricted sections of East Texas, cordwood is in general the cheapest and most easily obtainable fuel in the State. Local markets in the timbered belts admit several species according to their availability. Oak is the chief species used and at cordwood shipping points is practically without competition. Where cordwood is sold for local use it may vary in length from 16 to 48 inches, but four-foot

wood only is accepted for shipment. The average shipping price is \$2 to \$2.50 per cord f. o. b. cars. For local use from \$2 to \$5 per cord is paid, the price varying with the length of the wood and the number of times it is handled. The lower prices quoted are usually insufficient to yield any profit above the labor of cutting and hauling.

PREPARATIONS FOR MARKETING THE TIMBER.

A just return from the farm forest warrants as much care in the marketing of the timber as does the selling of any other farm crop or product. Usually the farmer notifies the nearest millman that he has some timber for sale. The millman, his long experience giving him a fairly definite idea not only of the amount of lumber the woodland will yield but also of the cost of cutting and hauling, makes the lowest offer he thinks the farmer will accept. The farmer, ignorant either of the actual value of his timber or of the amount it will cut, sells at a price which is comparable with that received in similarly conducted sales in the community. The result, however, is a sale which may figure as low as 50 cents per 1000 board feet, when the actual volume of the timber is considered.

When the timber is sold on the stump to an operator who does his own logging and either places a mill on the tract or hauls to a permanently located mill, the farmer partakes of none of the labor and the price received is the actual net price of the standing timber. If the farmer intends to do his own cutting and hauling, marketing the logs or other forms of forest products at a mill or shipping point, he should be able to add to the value of the timber on the stump the total cost of labor and team hire and refuse to sell at a figure which would yield no profit clear of costs. Obviously, then, the very basis for the marketing of farm forest products is an estimate of their value and amount and a definite knowledge of costs.

If the farm woodland is small enough, a count of all the trees with an estimate of the volume of each one is warranted. Where the farm forest is large a count of all the trees may make the cost prohibitive and it is better to estimate the volume on only a certain percentage of the area. This estimated volume will bear the same relation to the total volume on the tract as the area covered in the estimate bears to the total acreage of the tract. No estimate, however, may be considered accurate unless it gives a complete count of at least 10 per cent of the area. Three simple methods of measuring areas as a basis for estimating the volume of timber on a definite percentage of the woodland area are as follows:

Strip Method. A straight strip one chain (66 feet) wide and 10 chains (660 feet) long covers an area of one acre. A series of such strips, run parallel to each other and 10 chains apart, will cover 10 per cent of the area of the tract being estimated. To cover a larger percentage of the total area the strips must be proportionately closer

together. The strips are run between and terminate on opposite boundaries of the tract. The number of acres covered by the strips is equal to one-tenth of the total number of chain lengths contained in the strips.

Circular Plots. A circular plot with a 59-foot radius covers an area but little larger than one-quarter of an acre. By taking as many such plots as will be necessary to cover the desired proportion of the total area of the tract to be estimated, a proper acreage basis may be obtained. Care should be exercised that the plots be taken on representative areas throughout the tract.

Rectangular Plots. A rectangular plot 104 feet on each side covers an area of approximately one-quarter of an acre. Rectangular plots are taken in the same manner and for the same purpose as the circular plots already mentioned.

Whichever method is used, all the merchantable trees on the strip, circle, or plot, should be counted and measured. The number of logs in each tree and the estimated top diameter of each log should be determined and carefully recorded. The diameters of the trees are measured four and one-half feet from the ground with a pair of calipers or a diameter tree tape. If these are not obtainable, the diameter may be approximated by encircling the tree with an ordinary tape, graduated in feet and inches, and dividing the circumference measurement by three. The length of the tree trunk may be estimated by comparison with an eight-foot pole stood beside the tree. The top diameters of the logs may be estimated by comparison with the measured diameter of the tree. The number of board feet in the logs is then read from a scale stick or tabulated log rule and the volumes of all the logs on the measured areas totaled. If 10 per cent of the area is used as a basis for the count, the totals obtained multiplied by 10 should give a good estimate of the total volume in board feet of the entire forested area.

Where the material from the farm forest is to be marketed in some form other than logs, the estimates may be made with the specifications for the particular products as a basis.

Once the farmer has determined the volume of timber in his forest crop, he should try several possible markets before selling. It is good practice to advertise in some of the lumbering publications, or similar journals. If the farm forest is too small to be marketed alone, it is advisable to group two or more tracts in the same community together and place them on the market under some co-operative agreement. Such an arrangement brings the opportunity of marketing farm forest products to the owners of small as well as large tracts of timber.

When a purchaser is found, it is highly advisable to make out a contract of sale. The contract should not only bind the purchase itself, but should also specify a cutting procedure which will continue the woodland in a productive condition.

The Department of Forestry will assist, in so far as is possible, in the profitable disposal of farm forest products.

DETERMINING THE VALUE OF STANDING TIMBER.

(Stumpage Value.)

Stumpage means standing timber in the woods and, as commonly used, refers to the value of uncut timber per 1000 board feet or cord. Stumpage value is the difference between the market value of the forest product and the total costs of lumbering, less a reasonable profit to the logger on the operation. The profit is commonly considered as from 20 to 25 per cent of the market value of the timber. It is, of course, obvious that when the farmer conducts his own lumbering operations he is the recipient of this profit and his stumpage value is correspondingly increased. With a knowledge of the market price and the cost of getting the timber from the stump to the market, the owner is in a position to determine by a simple calculation the value of his standing timber. This may be expressed by the following formula:

$$S = \frac{M}{1.0p} - C$$

In this formula S represents the stumpage value; M the market value of the product; C, the total cost of operating from the stump to the selling point; and Op, the per cent of profit.

For example: If cottonwood logs are worth \$12 per 1000 board feet delivered at the mill, the costs of cutting and hauling amount to \$6, and a profit of 25 per cent is allowed the logger on the operation, the stumpage value would be:

$$S = \frac{\$12.00}{1.25} - \$6 = \$3.60$$

Likewise, if the average value of white oak cross-ties, delivered and stacked on the right-of-way of a certain railroad, is 28 cents each, the combined costs of cutting and hauling are 16 cents each, and a profit of 25 per cent is allowed, the stumpage value of the timber would be 6 2-5 cents per tie.

The stumpage value of any timber depends upon certain conditions which vary with every forest tract. The distance from the tract to the market or railroad, the character and condition of the roads, the character of the timber with reference to species, form, size, and condition, the local wage of labor and teams, and the degree of economy and efficiency in the logging operation are factors which affect stumpage values. If good roads and a short haul permit two loads, instead of one, to be delivered daily to the railroad or mill, costs are decreased and the stumpage value of the timber correspondingly increased. Timber of high quality brings a better price than poor timber and thus increases the stumpage value.

Cooperative shipping by owners of small woodlots is often as valuable

as is cooperative selling to millmen. Where one owner has but 3000 or 4000 board feet of logs for shipment, another owner similarly situated may join with him in completing a carload and thus reduce freight costs and increase stumpage values.

COST OF MARKETING TIMBER.

Getting timber to market entails (1) cutting; (2) skidding; (3) hauling to the mill or railroad; and (4) additional costs sometimes borne by the producer, such as loading and freight charges.

(1) Cutting consists of felling the trees and cutting them into logs, bolts, poles or posts. It sometimes includes peeling the poles or the making of either quartered bolts or rough split staves.

(2) Skidding refers to dragging the logs to some convenient point (the skidway) where they may be loaded for the haul to market. In many cases, where it is intended to make bolts or posts from the trees, it is better to skid the logs to the open and further work them up at that point. The difficulty of reaching the trees over rough ground with a wagon or "boat" for bringing out smaller pieces is thus avoided.

(3) Hauling is the transporting of the product from the skidway to the mill or shipping point. Hauling is done with teams and wagons or big-wheels.

(4) In many cases the farmer selling the timber has to load the logs, bolts, or other forms of his product on the cars at the shipping point. In some cases he may even pay the freight from the shipping point to the mill, though this is rarely included in his bargain. In most northern states and in some parts of the South, farmers and small woodland owners frequently employ a portable mill to saw their timber into rough lumber, ties, or other products. A certain rate per 1000 board feet or per piece, as the case may be, is paid for the sawing. This is generally practiced when the owner desires to conduct the logging and marketing operations himself and permanent mills are too distant. In Texas the farmer generally sells his timber standing or in the form of logs, poles, posts, mine props, blocks, bolts, ties, and cordwood delivered at stated points. Not infrequently he hauls logs to a sawmill to be cut into lumber for his own use.

Each tract should be carefully examined with particular reference to possible markets. Where there is a choice in the utilization of the timber, judgment on the part of the owner will result in an increased revenue. For example, white oak of good quality should bring at least twice as much when sold to wagon or furniture factories as when hewn into ties.

TABLE 6.

Estimated Average Costs of Marketing Farm Forest Products.*

Product.	Unit.	Fell- ing.	Buck- ing.	Peel- ing.	Hew- ing.	Split- ting.	Skid- ding.	Haul- ing.†	Total.
Logs.....	M ft.	\$ 0.50	\$ 0.50	.....	.....	.....	\$ 0.45	\$ 0.90	\$ 2.35
Vener Bolts.....	M ft.	.50	1.50	.....	.....	.....	.70	.90	3.60
Shingle Bolts.....	M ft.	.50	2.00	.....	.....	.....	.70	.90	4.10
Quartered Stave Bolts.....	Cord	.40	1.50	.....	.....	\$ 0.50	.70	.45	3.55
Blocks.....	M ft.	.50	2.50	.....	.....	.....	.70	.90	4.60
Mine props.....	M ft.	.75	.....	\$ 1.00	.....	.....	.35	.90	3.00
Poles.....	Piece	.05	.....	.15	.....	.....	.05	.09	.34
Ties, pine.....	Piece	.02	.01	.....	\$ 0.05	.....	.02	.02	.12
Ties, hardwood.....	Piece	.02	.02	.....	.10	.....	.02	.03	.19
Posts, round.....	Piece	.02	.01	.....	.....	.....	.....	.02	.05
Posts, split.....	Piece	.01	.01	.....	.....	.02	.02	.03	.09
Fuel wood‡.....	Cord	.30	.35	.....	.....	.90	.70	.45	2.70

*Figured on the basis of labor at \$2.00 per day, team hire at \$4.50 per day, and the average ability of day labor.

†One mile haul. Amount must be increased proportionately for longer hauls.

‡Mixed split and round wood oak.

If the price the farmer receives for his product is f. o. b. the cars, he must do the loading. Logs, poles, and mine props of large size may be loaded with a cross-haul operated by one team and three men. The cost would be approximately 35 cents per 1000 board feet, or from one-half to one and one-half cents per pole. Bolts, small mine props, and poles, ties, and fuel wood may be loaded directly from the hauling wagon. Such material is of convenient size for loading by hand, and, except for the poles, is generally carried in box cars. When the cars are loaded directly from the wagon practically no additional expense is incurred; when the cross-haul is used two operations—unloading the wagon and loading the car—are necessary.

HANDLING THE FARM FOREST.

Where the land is to be eventually cleared for agriculture there is little reason to give the forest growth any special care beyond protecting it from fire and marketing the timber to the best advantage when it is removed. On true forest soil, however, or on that part of each farm to be kept for forest purposes, only marketable species should be grown, the area should be fully stocked, the lumbering operation carefully conducted, and the most favorable growing conditions maintained.

The farmer cannot be expected to handle his forest areas for the production of large timbers and high grade lumber because of the long period of time required. He can, on the other hand, very profitably grow small timber to supply the market for posts, poles, ties, and cordwood and should encourage in his woodland the growth of species suitable for their production. For each product it is best to select the fastest growing species which will produce it. In this connection, however, growth can be hastened by maintaining favorable growing conditions in the woodland.

In many parts of Texas there is little choice of species.* Where there is a choice the farmer should determine which species he wishes to grow. As is shown earlier in this bulletin, there are certain trees best suited for lumber, others for ties, and still others for posts and fuel. The owner may wish to retain several species in the farm forest in order that he have the best for each of several uses, or he may wish to supply only one product and buy any others he may need. In either case he should remove and keep out all species without a recognized value, for where there is one weed tree others will be constantly coming in from its seed. It is as important to keep undesirable species out of the farm forest as to keep weeds out of the corn or cotton field.

Just as it is necessary to have a good stand of cotton, or of corn, so is it necessary to have a full stand of trees in the farm forest. A fully stocked forest maintains the best growing conditions by protecting the soil from sun and wind, improves the quality of the forest product and gives the maximum return per acre. In a growing forest the trees should be closely spaced in order to shade and kill the lower branches. As a result of this natural pruning the lumber obtained from the mature trees is consequently much more free from knots than would be possible from an open grown forest. Close spacing also results in straighter trunks since the trees are forced to grow upward rather than sideways to reach the light. In a properly stocked, mature forest the crowns of the trees should completely shade the ground and yet not interfere with one another. When a tree is removed an opening is inevitably made, but the trees surrounding the opening and the young growth coming in quickly close the gap and the ground is again effectively shaded. If the young growth is too sparse it is often advantageous to plant young trees. Planting insures desirable species in the woodland and is inexpensive as compared with the resulting benefits.

A cutting is often advisable before the main crop is ready to market. Such a cutting should remove trees of undesirable species and unhealthy individuals of the desirable species. This gives the remaining trees an opportunity to grow unhampered and tends to eliminate from the forest for all time trees of low value. Too many trees should not be removed in such a cutting. There is danger of over-exposing the soil to the action of the sun and wind, and of depriving the remaining trees of the protection to which they have become accustomed. By gradually removing undesirable trees new growth is afforded an opportunity to occupy the openings and keep the ground protected.

Care should be exercised in the removal of the crop trees. The stumps should be cut low and each tree should be felled so that it will injure the smallest possible number of young trees. It is important to protect the young growth at the time of cutting because the small trees are needed immediately to take the places of the older ones in protecting the soil and to start the new crop. The felled trees should

*See Bulletin 2, Department of Forestry, College Station, Texas, entitled "Tree Planting Needed in Texas."

be completely utilized. The trunks should be made into logs, bolts, props, poles, and such other products as require clear material. The branches and tops should be cut into cordwood. It is common custom in Texas to select large, straight-grained, clear-boled trees for cordwood, the trunk only being used. This is a wasteful practice. The prices for cordwood hardly afford a profit above the cost of production and there is no valid reason for selecting the very best for that purpose. Such material will bring higher prices when sold for other uses and top-wood makes just as good fuel. The branches and tops are more difficult to work but the profit in selling the large-sized, clear logs for other purposes far outweighs the extra labor.

In order to reduce the danger from fires, all brush should be disposed of. In a hardwood forest the brush should be so scattered that it lies close to the ground. In this condition it soon rots and becomes part of the litter. In pine or cedar forests, however, the brush should be piled in small, compact piles and burned when the ground is wet. An excellent time for burning brush is immediately following a heavy rain. At such a time the fire may be confined to the brush pile where it does little damage to the litter. It is always advisable to burn only a few piles at a time as a guard against permitting the fire to get beyond control.

The woodland should be carefully watched for indications of disease or insect attack. Unhealthy foliage, the presence of fungi, or evidences of boring in the trunks or limbs are the danger signals. Defective timber, slow growth, and in many cases the death of the trees are the resulting evils. All unhealthy trees should be removed as soon as discovered to prevent the infection spreading to their neighbors.

The grazing of live stock is distinctly injurious to portions of the farm woodland where reproduction is desired. In the longleaf pine section of East Texas hogs are one of the chief obstacles to the reproduction of this species, since they not only eat most of the seed which falls but they grub out the succulent roots of the young seedlings. Goats will consume everything edible as high as they can reach. The damage from cattle grazing is chiefly by trampling. When the young growth is well developed and free from danger of trampling and browsing, comparatively little injury results. Conditions suitable to grazing are, however, not found on an area properly managed as a farm forest.

Fire prevention is the most essential step in the growing of timber crops. To obtain rapid growth and thereby shorten the time required to grow the trees, it is important that the soil be well covered with leaf litter and mold. This litter not only retains moisture, but, as it decays, furnishes fertilizer to the trees. Even the slightest surface fire removes a valuable portion of this litter. In addition, fires destroy the young growth, which is the foundation of the future forest, and often damage the merchantable timber.