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**Production and Marketing
of Plantation Grown
Christmas Trees in Michigan**

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SUMMARY AND CONCLUSIONS

AN ESTIMATED 12,740 persons are growing Christmas trees in Michigan plantations. This is nearly 40 percent of all owners of evergreen tree plantations in the state. Christmas tree growers comprise many occupational groups, but half of them are businessmen or professional workers. Total Christmas trees growing are estimated at 160 million, half of all evergreen trees in privately owned plantations.

Scotch pine, accounting for 58 percent of all Christmas trees planted, is the most popular species in Michigan. Red pine, in second place, accounts for 19 percent of the total. All other species—mainly jack pine, Austrian pine, white pine, white spruce, blue spruce, Norway spruce, Douglas fir, and white fir—are relatively minor.

Christmas tree growing has been increasing rapidly. Annual planting rose from 3.5 million trees in 1948 to 30.1 million trees in 1957. The most significant increase has been in Scotch pine—from 1.0 million trees in 1948 to 18.1 million in 1957. With the exception of red pine, planting of all species is still trending upward.

Aspects of Production

Spacing in plantations varies. Pines are usually stocked from 1,000 to 1,200 trees per acre. Spruces and firs are usually planted more closely together. Usually less than 50 percent of the trees planted reach salable condition.

Shearing and shaping are commonly needed to improve the quality of Christmas trees, but a substantial majority of growers still do no shearing. Of those who shear, a large percentage do it inadequately with only one treatment. Spraying for insect control is becoming increasingly necessary for the production of quality trees, but again, an excessively large number of growers overlook this need. The need for fertilizing and controlling weeds and brush is probably far greater than the practice. Fertilizing is extremely limited, and nearly 90 percent of the growers of all species ignore weeds and brush throughout the rotation.

The number of years required to bring Christmas trees from planting to harvest varies by species. Scotch pine usually requires 5 to 8 years to reach salability; red pine, 5 to 9 years; spruce, 7 to 12 years; and Douglas fir, 9 to 13 years.

Harvests from sale areas are spread over a number of years. Two years is usually the minimum; and 3- and 4-year periods are more common for most species. In some instances, harvesting periods may be extended over 9 or more years.

Aspects of Marketing

Christmas tree sales from Michigan plantations reached 1.2 million trees in 1957. Some 2,200 growers (18 percent of the total) made 4,660 sales, averaging 259 trees per sale. Nearly 90 percent of the sellers, each with less than 1,000 trees to sell, accounted for 24 percent of the total trees sold. Growers with more than 10,000 trees to sell (1 percent of the growers) sold 24 percent of the Christmas trees.

Stumpage sales offer growers less control over the selection of trees for harvest than cut-tree sales, but 26 percent of the trees are sold as stumpage. Cut trees offer more advantages to growers when sold on a delivered basis rather than at the plantation. However, more trees are sold at the plantation than delivered. Growers having more than 10,000 trees to sell avoid stumpage sales entirely and rely mainly on sales of delivered trees.

Small sellers make greater use of truckers and direct consumer sales than large sellers. Growers whose sales exceed 10,000 trees sell almost exclusively to wholesalers or retailers.

Michigan trees are beginning to move beyond local markets. Six percent of the trees sold go to buyers more than 500 miles distant from plantations; 32 percent, from 201 to 500 miles; and 37 percent, from 101 to 200 miles. Small sellers tend to sell their trees closer to home; large sellers reach for the more distant markets.

Wholesale stumpage prices show Douglas fir to be consistently the highest-priced species, averaging \$2.50 per tree. White spruce, Scotch pine, and Norway spruce are closely grouped, averaging from \$1.20 to \$1.30. Other major species sell at substantially lower prices, ranging from 80 cents for Austrian pine to 45 cents for jack pine. Retailers and truckers frequently pay 10 cents more per tree than wholesalers.

Cut-tree prices at plantations average about 20 cents per tree higher than stumpage. Delivered-tree prices include the cost of transportation and sometimes an additional profit margin, particularly on deliveries to more distant markets.

Size and quality of trees have an important bearing on prices.

Scotch pine stumpage, for example, shows average price for sheared and sprayed trees increasing from 85 cents for 4-foot trees to \$1.50 for 7-foot trees.

Projected Tree Sales

Aggregating the planned marketings of individual growers indicates a phenomenal increase in tree sales to 7.4 million trees by 1960. This is probably an overly optimistic view of what the market can readily absorb. If it can be assumed that the ratio of trees harvested to trees planted will not change (the ratio has actually been increasing), sales of Christmas trees in the years ahead can be projected on the basis of trees already in plantations. The projection indicates an increase in sales from 1.2 million trees in 1957 to 1.8 million in 1958 and successive increases to 4.0 million in 1962.

Projected sales are far below the aggregates based on growers' planned marketings. Nevertheless, sales of 4.0 million plantation trees in 1962 will be difficult to achieve. Having trees available for sale does not insure that they will be sold. Growers must consider that year-to-year expansion in American Christmas tree use is not rapid, that current demand is being met, and that other states and regions are also increasing their Christmas tree plantings. It is difficult to avoid the conclusion that Michigan growers face the spectre of oversupply.

Merely maintaining the present ratio of trees harvested to trees planted in Michigan in the years ahead will require accelerated efforts by growers both in production and marketing. Some of the more obvious approaches to the problems shaping up are along the following lines: (1) Increase per capita consumption of Christmas trees at home; (2) Expand out-of-state markets; (3) Focus more attention on determining the Christmas tree characteristics wanted by consumers; (4) Diversify species in plantations; (5) Grow trees whose usefulness is not limited to Christmas trees; and (6) Produce quality trees which can compete successfully in the state and national markets.

Production and Marketing of Plantation-Grown Christmas Trees in Michigan

By LEE M. JAMES

INTRODUCTION

THIS REPORT PRESENTS the results of a statewide survey of Christmas tree growers in Michigan. The study was conducted by the Department of Forestry, Michigan State University, and represents a cooperative effort between the Michigan Agricultural Experiment Station, the North Central Regional Technical Committee¹ and the Lake States Forest Experiment Station of the U. S. Forest Service.²

Two populations of tree growers were considered in this study: (1) members of organized Christmas tree grower associations; and (2) tree growers, unaffiliated with grower organizations, who had purchased evergreen trees from the Michigan Division of Forestry or Michigan State University within the past 10 years.

For the first population, all known Christmas tree organizations in the state were invited to submit lists of their membership. Of the 19 organizations, 16 (with a total of 704 members) furnished lists of members.³ For the second list, card files of the Michigan Division of Forestry and Michigan State University were checked. These files contained 28,900 names of growers who had obtained evergreen nursery stock within the past 10 years.⁴

Detailed questionnaires were sent to all known members of Christmas tree organizations. A total of 704 questionnaires was mailed; 274 usable returns were received. Similar questionnaires were sent to a systematically drawn sample of about 3 percent of the 28,900 unaffiliated growers in the card files of the Michigan Division of Forestry and Michigan State University—849 questionnaires were

¹This project has been supported in part by regional research funds provided under federal acts authorizing cooperative research by state agricultural experiment stations. It has been approved by the North Central Regional Technical Committee as a contribution to NCM-20, the Cooperative Regional Research Project on Christmas Tree Marketing.

²Funds for this project have also been provided by the U. S. Forest Service's Lake States Forest Experiment Station, St. Paul, Minnesota, to facilitate compilation and analysis of data.

³The total membership of all Christmas tree organizations at the beginning of 1958, eliminating duplications, is estimated at 900.

⁴The total population of unaffiliated evergreen plantation growers can be approximated only roughly. Most plantation growers, regardless of main sources of tree stock, have purchased some tree stock at some time from public nurseries; therefore, their names appear on the list of 28,900 growers recorded. A reasonable total of unaffiliated plantation growers is estimated at 32,000.

mailed and 281 usable returns were received. The degree of response was strikingly similar for both populations sampled.

No attempt was made to subsample nonrespondents, but such a procedure was adopted in a similar study of Christmas tree growers undertaken in Ohio in 1956.⁵ The Ohio study found no significant difference between the populations of respondents and nonrespondents.

In expanding questionnaire data to a statewide basis, the two populations of affiliated and unaffiliated growers were considered independently. The 274 members of the Christmas tree growers' associations who replied to the questionnaire were considered representative of the estimated total of 900 members. The 281 unaffiliated plantation growers who replied were considered representative of the estimated total of 32,000 unaffiliated plantation growers in Michigan.

Christmas Tree Growers

The number of Christmas tree growers in Michigan has been expanding rapidly. At the beginning of 1958, some 900 growers were members of the 19 Christmas tree grower associations active in the state. Unaffiliated growers are estimated to total 11,840, making a grand total of 12,740 Christmas tree growers in Michigan. This represents nearly 40 percent of all growers of evergreen tree plantings in the state.

Size of Christmas tree plantings varies greatly (Table 1). Many plantation-holdings are measured by hundreds of trees, but at the upper end of the scale, a few holdings exceed one million trees.

⁵Quigley, K. L. and G. H. Mitchell (1958). Ohio-grown Christmas trees—production and marketing. Central States For. Expt. Sta. Tech. Paper 152, U.S.D.A. Forest Service. 17 pp

TABLE 1—Numbers of growers and Christmas trees planted, by size of holding, 1957

Size of holding (thousand trees)	Growers		Christmas trees planted	
	Number	Percent	Number (thousand trees)	Percent
1— 10.....	9,320	73	37,800	24
11— 50.....	2,950	23	55,700	35
51—100.....	355	3	18,400	11
Over 100.....	115	1	48,100	30
Total.....	12,740	100	160,000	100

Approximately one percent of the growers have 30 percent of the trees growing in holdings of more than 100,000 trees.

Christmas tree growers comprise many occupational groups (Table 2). Surprisingly, farmers and part-time farmers account for only 16 percent of the plantings. Business and professional men have planted half of all Christmas trees, and wage earners have planted another 15 percent.

TABLE 2—Christmas trees planted by grower occupation, 1957

Grower occupation*	Christmas trees planted	
	Number (thousand trees)	Percent
Farmers.....	22,400	14
Part-time farmers.....	3,200	2
Business-professional workers.....	80,000	50
Nurserymen.....	9,600	6
Christmas tree farmers.....	11,200	7
Wage earners.....	24,000	15
Retired.....	6,400	4
Miscellaneous.....	3,200	2
Total.....	160,000	100

*Occupations are defined in the Appendix.

Christmas tree growers number 12,740 in contrast to 32,900 holders of all evergreen tree plantations. Christmas tree plantings are larger than plantings for other purposes. Fully half of the estimated 320,000,000 evergreen trees planted on private lands in Michigan are considered to be Christmas trees by their owners.

Although members of the Christmas tree grower organizations number less than 8 percent of the total population of Christmas tree growers, they account for nearly 45 percent of the Christmas trees planted.

	Christmas trees planted (million trees)	Total trees planted (million trees)
Affiliated growers	70	95
Unaffiliated growers	90	225
Total	160	320

Christmas Trees Planted

Species^o

Scotch pine is preeminent among the Christmas tree species in Michigan (Table 3). It comprises 58 percent of the total of all Christmas trees planted, and has been planted in equal numbers by affiliated and unaffiliated growers. Red pine, in second place, accounts for 19 percent of the Christmas trees planted. All other tree species are relatively minor.

TABLE 3—Species distribution of Christmas trees and all evergreen trees planted on private lands in Michigan, 1957

Species	Christmas trees planted		All trees planted	
	Number (million trees)	Percent	Number (million trees)	Percent
Scotch pine.....	93.0	58	122.3	38
Red pine.....	30.5	19	103.5	32
Norway spruce.....	7.5	5	11.9	4
White spruce.....	8.0	5	18.2	6
Jack pine.....	6.1	4	23.5	7
Douglas fir.....	7.6	5	11.1	3
Austrian pine.....	4.8	3	9.6	3
White pine.....	*		14.5	5
Other.....	2.5	1	5.4	2
Total.....	160.0	100	320.0	100

*Negligible.

Table 3 also makes it plain that there is no species which can be regarded as exclusively a Christmas tree species. Scotch pine, for example, is sometimes thought to be exclusively a Christmas tree species, but some 30 million Scotch pine have been planted by private landowners for miscellaneous purposes such as esthetics, windbreaks, game production, soil stabilization and wood production.

Location

Michigan's current centers of Christmas tree plantations are shown in Fig. 1. It cannot be presumed that planting estimates for individual counties are highly accurate, but the map may be taken as a good in-

^oThese are the predominant plantation species used for Christmas trees in Michigan: Scotch pine (*Pinus sylvestris*), red pine (*Pinus resinosa*), jack pine (*Pinus banksiana*), Austrian pine (*Pinus nigra*), white pine (*Pinus strobus*), white spruce (*Picea glauca*), Norway spruce (*Picea abies*), Colorado blue spruce (*Picea pungens*), Douglas fir (*Pseudotsuga menziesii*), and white fir (*Abies concolor*).

dication of the general pattern of Christmas tree planting. Earlier plantings were concentrated in a few counties on the west side of the state, but it is apparent from Fig. 1 that planting is being extended widely throughout Lower Michigan.

Planting By Years

Christmas tree planting in Michigan has been increasing at a strikingly fast rate over the past 10 years (Appendix Table 1). Annual planting has shot upward from 3.5 million trees in 1948 to 30.1 million

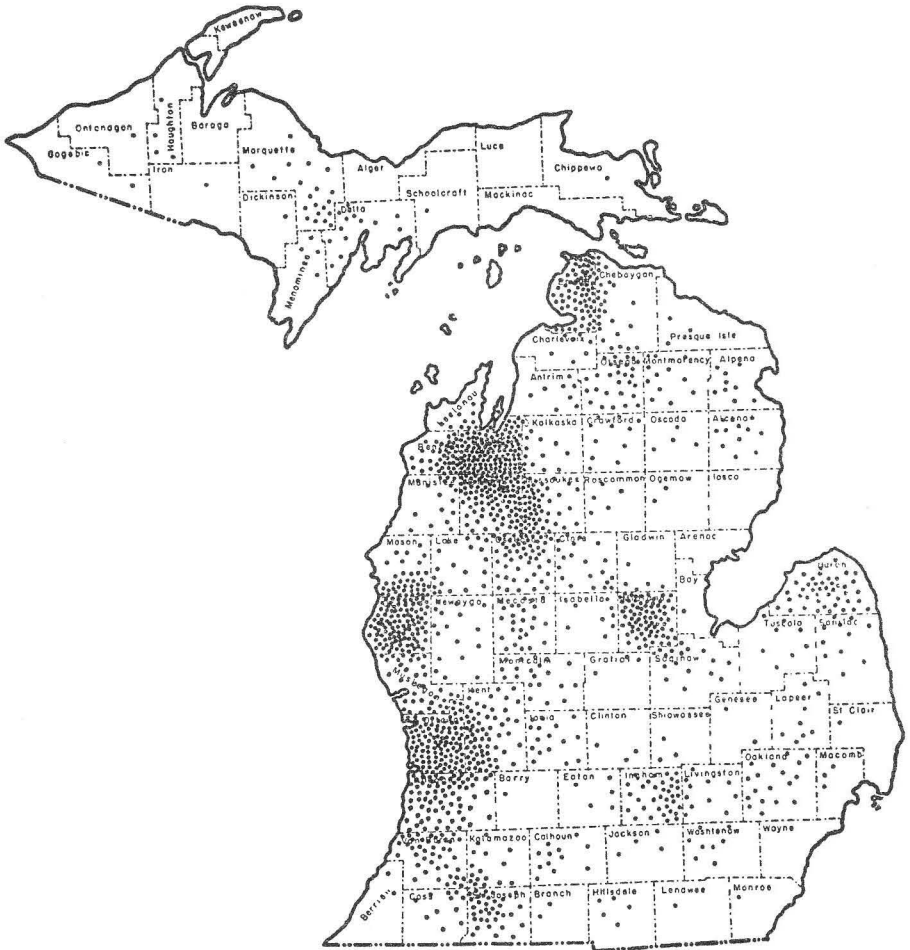


Fig. 1. Location of Christmas trees planted in Michigan during the 10-year period 1948-57. (Each dot represents 100,000 trees.)

trees in 1957. Public lands have been omitted from this study since public forest management produces relatively few Christmas trees.

Trends in Christmas tree planting by species are summarized in Fig. 2. Most striking is the phenomenal increase in Scotch pine planting from 1.0 million in 1948 to 18.1 million in 1957. And there is no reason to presume that the increase in Scotch pine planting has come to an end. In fact, the planting of all Christmas tree species, with the exception of red pine, is still trending upward. Red pine planting for Christmas trees reached a peak of 6.3 million trees in 1955, but has since dropped to 2.6 million trees in 1957. Total red pine planting has actually increased, but growers are becoming more aware of a

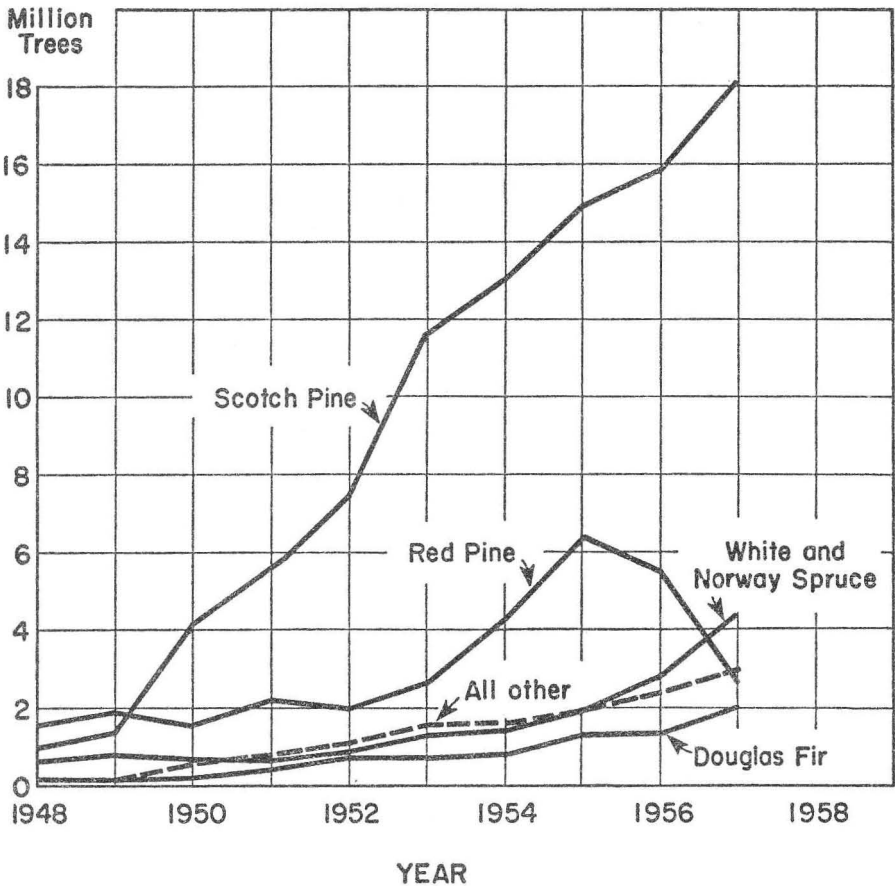


Fig. 2. Ten-year record of annual Christmas tree planting by species, 1948-57.

possible limitation to the Christmas tree market for this species. Only the trees considered to be Christmas trees have been recorded in Appendix Table 2 and Fig. 2.

Aspects of Production

Planting Per Acre, Survival, and Salability

Spacing in Christmas tree plantations varies considerably (Table 4). It varies in practice by species and contrasts interestingly between members of the grower associations and nonmembers. Pines are usually stocked from 1,000 to 1,200 trees per acre, but closer spacing has been used for Austrian pine. Spruces and firs are usually planted more closely together than pines on the assumption that they will crowd less before reaching merchantable sizes.

TABLE 4—Average number of Christmas trees planted per acre, by species, 1948-57

Species	Trees planted per acre	
	Affiliated growers	Unaffiliated growers
Scotch pine.....	1,170	1,210
Red pine.....	1,090	1,140
Norway spruce.....	1,740	1,250
White spruce.....	1,750	1,510
Jack pine.....	1,160	1,020
Douglas fir.....	1,980	1,650
Austrian pine.....	1,390	1,275
Other.....	1,750	1,320

A 6 x 6 spacing (1,210 trees per acre) permits most trees to reach 6 to 7 feet in height before crowding takes place. Close spacing is desirable for full utilization of the land area available, but growers obviously consider the advantages of a network of lanes for fire protection, spraying, and harvest and sufficient space for shearing and treatment of individual trees.

Survival of trees 3 years after planting is shown in Table 5. Except for jack pine, the survival rate is considerably higher for pines than for other species. It is also interesting to note that among affiliated growers, whose plantations are generally the more carefully tended ones, survival rates are consistently higher than they are for the unaffiliated growers.

TABLE 5—Average number and percentage of Christmas trees per acre surviving 3 years after planting, by species, 1948-57

Species	Plantations of affiliated growers		Plantations of unaffiliated growers	
	Number of trees surviving	Percent of trees planted	Number of trees surviving	Percent of trees planted
Scotch pine.....	1,090	93	975	81
Red pine.....	920	84	890	78
Norway spruce.....	1,300	75	800	64
White spruce.....	1,270	73	780	52
Jack pine.....	900	76	780	76
Douglas fir.....	1,590	80	1,100	67
Austrian pine.....	1,250	90	1,090	85
Other.....	1,140	65	770	58

Table 6 carries the summarization forward to the time of harvest. This does not refer to the number of trees sold, merely the number of trees in salable condition. It will be noted that more salable trees per acre are obtained, on the average, by members of the grower associations than by nonmembers. Nevertheless, with the notable exception of Scotch pine planted by the affiliated growers, usually less than 50 percent of the trees planted reach salable condition.

TABLE 6—Average number of salable Christmas trees grown per acre, by species, 1948-57

Species	Plantations of affiliated growers		Plantations of unaffiliated growers	
	Number of salable trees	Percent of trees planted	Number of salable trees	Percent of trees planted
Scotch pine.....	750	64	550	45
Red pine.....	450	41	420	37
Norway spruce.....	870	50	575	46
White spruce.....	800	46	500	33
Douglas fir.....	925	47	(a)	(a)
All other.....	900	55	(a)	(a)

(a) Insufficient sample for computation.

Shearing and Shaping

Shearing and shaping of trees is an important phase of Christmas tree management. It raises the quality and value of salable trees and converts cull trees into salable ones.

All species need some treatment, although the degree of treatment required may vary. Tables 7 and 8 indicate the extent to which Michigan plantation trees are sheared. Members of the grower associations shear and shape trees to a greater extent than nonmembers, but a substantial majority of all growers still do no shearing. Scotch pine receives more attention in regard to shearing than any other species.

TABLE 7—Percentage of growers shearing and shaping Christmas trees in plantations, by species, 1948-57

Species	Affiliated growers	Unaffiliated growers
Scotch pine.....	55	26
Red pine.....	41	19
Norway spruce.....	28	24
White spruce.....	31	26
Douglas fir.....	26	10
All other.....	14	5

Bell⁷ recommends 3 shearings during the rotation for most species. More frequent shearings may offer better opportunities to improve the quality of trees, but less frequent shearings will usually fail to produce top-quality trees. Table 8 summarizes the current practices of Michigan growers. Members of grower associations who shear trees usually provide at least 2 shearing treatments during the rotation. They shear more frequently than the unaffiliated growers.

Spraying

Since considerable damage occurs to trees from insects, their control has become increasingly necessary to the production of quality trees. Generalizations about the need for spraying to protect quality trees are difficult to make. Many variables, such as tree species, insect species, and severity of insect attack influence recommendations

⁷Bell, Lester E. (1958) Shearing and shaping Christmas trees. Mich. Cooperative Extension Service Extension Bulletin 359.

TABLE 8—Percentage of growers who shear and shape Christmas trees in each number-of-treatments category, by species, 1948-57 (See Table 7 for percentages)

AFFILIATED GROWERS

Number of treatments	Scotch pine	Red pine	Norway spruce	White spruce	Douglas fir	All other species
1.....	15	20	10	10		20
2-3.....	45	45	50	50	50	40
4-5.....	35	35	25	25	20	20
6-10.....	3		15	10	20	10
11-15.....	1			5	10	10
Over 15.....	1					
Total.....	100	100	100	100	100	100

UNAFFILIATED GROWERS

Number of treatments	Scotch pine	Red pine	Norway spruce	White spruce	Douglas fir	All other species
1.....	30	30	25	50		10
2-3.....	35	30	75	40	50	70
4-5.....	30	40		10	50	10
6-10.....	5					10
11-15.....						
Over 15.....						
Total.....	100	100	100	100	100	100

that might be made. However, the following figures make it clear that too many growers overlook the need for spraying at some time during the tree rotation:

Species	Percentage of growers spraying Christmas trees, 1948-57
Scotch pine.....	28
Red pine.....	15
Norway spruce.....	13
White spruce.....	10
Douglas fir.....	10
All others.....	5

The frequency of spraying by Michigan growers is summarized in Table 9. Members of the grower associations spray much more frequently than nonmembers. This probably indicates a higher level of management, but no comment can be offered here as to the number of spray treatments that is desirable for quality-tree production.

TABLE 9—Percentage of growers who spray Christmas trees in each number-of-treatments category, by species, 1948-57 (See tabular matter on page 16 for percentages)

AFFILIATED GROWERS

Number of treatments	Scotch pine	Red pine	Norway spruce	White spruce	Douglas fir	All other species
1.....	5	10	10	10		
2-3.....	30	15	30	40	30	40
4-5.....	20	10	25	20	20	20
6-10.....	30	55	20	10	20	20
11-15.....	10	5	15	20	20	20
Over 15.....	5	5			10	
Total.....	100	100	100	100	100	100

UNAFFILIATED GROWERS

Number of treatments	Scotch pine	Red pine	Norway spruce	White spruce	Douglas fir(a)	All other species(a)
1.....	20	30	30	50		
2-3.....	40	30	40	40		
4-5.....	25	40	30	10		
6-10.....	5					
11-15.....	10					
Total.....	100	100	100	100		

(a) Insufficient sample for calculations.

Fertilizing

Knowledge about the worth of fertilizers in promoting good Christmas tree growth and development is extremely limited. Nevertheless, 2 to 4 percent of the growers of spruce and 1 to 2 percent of the growers of all other species have used fertilizer on their plantations. When fertilizing has been done, it has usually been limited to a portion of the plantation with only one treatment made.

Weeds Mowed and Brush Controlled

Mowing weeds and controlling brush in the plantation is an operation of highly variable utility. It is needed most on the better soils, where trees have been planted on cutover forest land or brushy fields, or where the species planted are slow-growing or are intended for early harvest. Control of weeds and brush may reduce the mortality and improve the form and growth rate of the surviving trees. In contrast, plantations on old pasture land or recently cultivated fields may not be invaded by weeds or brush sufficiently to justify the cost of control.

Close to 90 percent of the growers ignore weeds and brush during the rotation. Those growers who do mow weeds and control brush usually try more than one treatment, most commonly 2 to 3 treatments (Table 10).

TABLE 10—Percentage of all growers who mow weeds and control brush in each number-of-treatments category, by species, 1948-57

Number of treatments	Scotch pine	Red pine	Norway spruce	White spruce	Douglas fir	All other species
1.....	22	50	20	20	25	25
2-3.....	60	45	60	65	55	60
4-5.....	9	5	10	15	15	15
6-10.....	9		10		5	
Total.....	100	100	100	100	100	100

Height of Trees Sold

Size preferences in Christmas trees sold vary greatly. About half the trees found in Michigan retail lots are 5 to 6 feet in height; 30 percent are 7 to 8 feet; 10 percent are below 5 feet; and 10 percent are above 8 feet.⁸

With the large variation of sizes found in retail lots, individual growers can be expected to sell trees over a wide range of sizes. Moreover, the average height of trees sold by individual growers varies greatly (Table 11). Average tree heights in grower sales are usually 6 feet or 7 feet, the most popular heights for trees placed

⁸James, Lee M. (1957). Resurvey of Christmas Tree Marketing in Michigan. Mich. Agr. Expt. Sta. Spec. Bul. 419. 42 pp.

in homes; but numerous sales of plantation trees are also made with larger or smaller average heights. A few sales are made of trees averaging no more than 3 feet in height.

TABLE 11—Average height in feet of Christmas trees sold from plantations, by species, 1948-57

Height in feet	Scotch pine	Red pine	Norway spruce	White spruce	Douglas fir	All other species
	(Percent of trees)					
3 or less.....	1		2			1
4.....	4		3	2		4
5.....	25	10	10	15	10	5
6.....	50	40	50	45	50	50
7.....	15	40	35	35	40	40
8.....	5	10		3		
Total.....	100	100	100	100	100	100

Number of Years to Harvest

The number of years required to bring Christmas trees from planting to harvest varies greatly between species and within each species (Table 12).

Scotch pine usually requires 5 to 8 years to reach salability; red pine, 5 to 9 years; Norway spruce, 7 to 12 years; white spruce, 7 to 12 years, and Douglas fir, 9 to 13 years. Even these broad periods need to be widened to include all cases. Some spruce, for example, is

TABLE 12—Average number of years from Christmas tree planting to harvest, by species

Years to harvest	Scotch pine	Red pine	Norway spruce	White spruce	Douglas fir	All other species
	(Percent of trees)					
5 or less.....	20	20	3			5
6.....	25	25	2	5		10
7.....	35	25	5	5	5	20
8.....	15	15	10	5	5	20
9.....	5	10	10	10	10	20
10.....		5	35	40	35	15
11 or more.....			35	35	45	10
Total.....	100	100	100	100	100	100

harvestable in 5 years, and some is harvestable in 13 or 14 years. Some Douglas fir can be harvested in 7 years, and some, in 15 or 16 years.

Number of Years in Harvest

Whereas Table 12 shows the varying average periods required by different growers to bring Christmas trees to salable condition, Table 13 shows the number of years over which growers spread their harvests. Two years is the minimum period over which harvests are spread; and 3- and 4-year periods are the most common for most species. In a surprisingly large number of instances, harvest periods are extended to 8, 9, or even more years.

Aspects of Marketing

Number and Size of Tree Sales

Christmas tree sales from Michigan plantations reached an estimated total of 1,205,000 trees in 1957. This total is more than twice as much as previous estimates based on highway and railroad checks of trees in transit by the Michigan Bureau of Plant Industry.⁹

Christmas tree growers in Michigan are estimated to number 12,740, but only 18 percent of these growers made sales in 1957. Most plantations have not yet reached merchantable sizes. Some 4,660 sales were made in 1957, or an average of 2.1 sales per grower. The average sale was 259 trees.

Table 14 attempts to eliminate some of the obscurities of averages by segregating data on number and size of sales by size classes of sales. Eighty-seven percent of the growers making sales had less than 1,000 trees to sell; their average sale was based on 114 trees and they accounted for only 24 percent of the total plantation trees sold. At the other end of the scale, 1 percent of the growers had more than 10,000 trees to sell; they averaged 600 trees per sale and also accounted for 24 percent of all plantation trees sold.

⁹James, Lee M. (1957). Resurvey of Christmas Tree Marketing in Michigan. Mich. Agr. Expt. Sta. Spec. Bul. 419. 42 pp.

It was estimated in Spec. Bul. 419 that Michigan's population of 7.2 million persons in December 1956 used 1,600,000 trees (1 tree per 4.5 persons). A reliable estimate of imports totaled 672,000 trees, mostly wild. Exports were estimated at 56,000 wild trees and 156,000 plantation trees. Production within Michigan was thus indicated to be 1,140,000 trees. Using the Bureau of Plant Industry's records, Michigan's estimated production was broken down into 615,000 wild trees and 525,000 plantation trees.

The present production estimate of 1,205,000 plantation trees suggests two kinds of error in the previous estimates: (1) Christmas tree consumption within the state has been underestimated; and (2) Exports are greater than was previously estimated. It is not likely that the production estimate of 615,000 wild trees was too large since it was based largely on a check on trees in transit.

TABLE 13—Number of years over which Christmas tree harvest is spread in plantations, by species

Number of years	Scotch pine	Red pine	Norway spruce	White spruce	Douglas fir	All other species
	(Percent of trees)					
2.....	5	10	5			
3.....	50	50	30	25	20	20
4.....	25	15	15	20	25	20
5.....	10	10	10	15	15	25
6.....	10	5	10	10	10	15
7.....	*	5	10	10	10	10
8.....		5	10	10	10	10
9 or more.....		*	10	10	10	*
Total.....	100	100	100	100	100	100

*Negligible.

Types of Buyers

Market arrangements in channeling trees from the stump to consumers are sometimes simple, but often complex. Sales may be made directly to consumers, either at the plantation or in retail yards operated by the grower. More often, growers sell to intermediate market agents—wholesalers, retailers or truckers. The specific channels are difficult to trace since growers often assume the role of intermediate market agents and buyers may have several functions. A wholesaler may also be a grower, retailer or trucker. A retailer may serve as a wholesaler, grower, or trucker. A trucker, in turn, may be partly a wholesaler, retailer, or grower.

Nevertheless, Table 15 is a good indication of the importance of

TABLE 14—Number and size of Christmas tree sales from plantations, by size class of sales, 1957

Size class of growers' sales	Number of growers	Number of sales	Number of trees per average sale	Number of trees sold
Number of trees				
1,000 or less.....	1,955	2,553	114	291,000
1,001—5,000.....	250	1,310	345	452,000
5,001—10,000.....	10	309	550	170,000
Over 10,000.....	20	487	600	292,000
Total.....	2,235	4,659	259	1,205,000

various market agents in channeling trees from Michigan plantations to consumers. Fifty percent of the trees are sold to wholesalers; 35 percent, to retailers; 8 percent to truckers; and 7 percent directly to consumers. Small sellers make greater use of truckers and direct consumer sales than do the larger sellers. Growers whose sales exceed 10,000 trees sell almost exclusively to wholesalers or retailers.

TABLE 15—Number of Christmas trees sold to different types of buyers, by size class of sales, 1957

Size class of sales	Wholesalers	Retailers	Truckers	Consumers	All buyers
Number of trees	Thousand trees	Thousand trees	Thousand trees	Thousand trees	Thousand trees
500 or less.....	30	40	30	31	131
501— 1,000....	70	58	18	14	160
1,001— 5,000....	270	120	30	32	452
5,001—10,000....	105	45	20		170
Over 10,000.....	130	162			292
Total.....	605	425	98	77	1,205

Points of Sale

Stumpage sales offer growers less control over the selection of trees for harvest than cut-tree sales, particularly when trees are not marked for cutting. The residual stand may be such a poor mixture of qualities that the grower faces little opportunity for further sales. He may, in fact, be faced with abnormally large costs of clearing in preparation for the next planting. Sales of cut trees, on the other hand, offer the grower greater control over the mixture of tree qualities to be cut, the location of cutting areas within the plantation, and possible damage to the residual stand.

Where cut trees are offered for sale, the grower has the further problem of considering sales at the plantation or sales of delivered trees. The offer of delivery service has a number of possible advantages for the grower: (1) the opportunity to utilize trucks which may have been purchased for other purposes; (2) the possible widening of market outlets; and (3) as a consequence of widening market outlets, possible sales prices which add more to plantation prices than the actual costs of delivery.

Twenty-six percent of the trees sold from Michigan Christmas tree plantations are sold as stumpage; 45 percent are sold as cut trees at plantations; 29 percent are sold on a delivered basis (Table 16). Small sellers rely more heavily on stumpage sales than large sellers. The largest sellers (growers selling more than 10,000 trees) avoid stumpage sales entirely and rely mainly on sales of delivered trees.

TABLE 16—Number of Christmas trees sold at different points of sale, by size class of sales, 1957

Size class of sales	Stumpage	Cut trees at plantation	Cut trees delivered	All locations
Number of trees	Thousand trees	Thousand trees	Thousand trees	Thousand trees
500 or less.....	50	52	29	131
501— 1,000.....	53	84	23	160
1,001— 5,000.....	184	168	100	452
5,001—10,000.....	25	145		170
Over 10,000.....		92	200	292
Total.....	312	541	352	1,205

Distance of Plantations to Market

Christmas trees are sold to buyers located over a wide range of distances from plantations (Table 17). Some 12 percent of Michigan plantation trees are sold to buyers within 50 miles of the plantations; 16 percent, within 51 to 100 miles; 37 percent, within 101 to 200 miles; 32 percent, within 201 to 500 miles; and 6 percent, over 500 miles. Thus it is apparent that Michigan trees often move well beyond local markets. Actually, they move much more widely in national markets than is apparent from Table 21, since the sales reported here are to first buyers. Many wholesalers who are located near plantations sell, in turn, to more distant markets.

Small sellers tend to sell their trees closer to home. In the size class below 500 trees, only 10 percent of the trees are sold to buyers beyond 200 miles. In contrast, sellers with more than 10,000 trees to market, sell nearly two-thirds of their trees to buyers beyond 200 miles.

TABLE 17—Number of Christmas trees sold to buyers at various distances in miles from plantations, by size class of sales, 1957

Size class of sales	1-50	51-100	101-200	201-500	Over 500	All distances
Number of trees	Thousand trees	Thousand trees	Thousand trees	Thousand trees	Thousand trees	Thousand trees
500 or less.....	37	24	58	12		131
501— 1,000....	30	21	58	45	6	160
1,001— 5,000....	68	81	167	118	18	452
5,001—10,000....	12	53	58	35	12	170
Over 10,000.....		10	102	150	30	292
Total.....	147	189	443	360	66	1,205

Tree Prices

Seven percent of the Christmas trees sold by Michigan growers in 1957 were direct sales to consumers. Prices for these trees were extremely variable. In general, although these prices were higher than wholesale prices, they tended to be lower than consumer prices at retail.¹⁰

The basic prices reported in this section are wholesale prices for uncut trees (Table 18). Douglas fir is consistently the highest-

¹⁰James, Lee M. Op. Cit., p. 28. Consumer prices in Michigan retail yards for principal plantation species averaged as follows in 1956: Douglas fir, \$5.50; Scotch pine, \$4.00; white spruce, \$3.50; Norway spruce, \$3.15; red pine, \$2.50; and jack pine, \$2.25.

TABLE 18—Wholesale stumpage prices in Christmas tree plantations, by species, 1957

Species	Usual range	Average
	Dollars per tree	Dollars per tree
Scotch pine.....	1.00—1.50	1.25
Red pine.....	0.50—0.85	0.60
Norway spruce.....	1.00—1.60	1.20
White spruce.....	1.00—1.60	1.30
Douglas fir.....	2.00—3.00	2.50
Austrian pine.....	0.60—0.90	0.80
White pine.....	0.50—1.00	0.70
Jack pine.....	0.25—0.50	0.45

priced species, averaging \$2.50. White spruce, Scotch pine, and Norway spruce are closely grouped, averaging from \$1.20 to \$1.30. Other major species sell at substantially lower average prices, ranging from 80 cents for Austrian pine to 45 cents for jack pine. These prices, it must be emphasized, are wholesale stumpage prices.

Distinctions among wholesalers, retailers, and truckers are difficult to maintain, and many growers make no attempt to differentiate prices on the basis of kinds of buyers. However, there is often a practical distinction in size. Wholesalers average larger purchases and often obtain trees for about 10 cents less than retailers and truckers.

Cut-tree prices at plantations average about 20 cents per tree higher than stumpage. Most growers add from 15 to 25 cents to cover cutting, dragging and loading costs.

Delivered-tree prices are usually based on the addition of freight cost to cut-tree prices, although frequently a further charge is made, particularly on long hauls to distant markets. For example, Scotch pine may be sold for \$1.25 uncut, for \$1.45 cut at the plantation, and \$2.00 delivered to an out-of-state market in a case where the freight cost is actually only 30 cents. Freight costs were not tabulated as part of this study, but some data on freight costs were reported in an earlier publication.¹¹

Size and quality of trees have an important bearing on price. This influence can be traced most clearly in consumer prices paid at retail yards,¹² but it is also obvious that both growers and buyers take cognizance of size and quality in arriving at agreed-upon average prices.

The influence of height, at least, can be shown from data collected in this study. Uncut Scotch pine prices at plantations were segregated for all sales based on sheared and sprayed trees. Average prices reported by growers were grouped by average tree heights reported, with the following results:

¹¹James, Lee M. Op. cit., pp. 26 and 27. The average freight cost by truck from Michigan sources to Michigan destinations was \$0.27 for pines, \$0.20 for spruces and firs. From Canadian sources to Michigan markets, truck costs averaged \$0.25 for pines, \$0.15 for spruces and firs; rail costs averaged \$0.28 for pines, \$0.23 for spruces and firs. In view of widely varying distances of haul, these costs are remarkably similar. They indicate the degree to which large loads can compensate for longer distances.

¹²James, Lee M. Op. cit., p. 34. In Detroit retail yards, standard quality Scotch pine increased in sales value an average of \$0.35 with each additional foot of height. Similarly, for any given height class, each increment of quality added substantially to average price. In 6-foot Scotch pine, for example, retail price averaged \$4.00 for standard quality trees, dropped to \$3.75 for utility trees, and increased to \$4.75 for premium trees.

SCOTCH PINE STUMPAGE

Average height in feet	Average price
4.....	\$0.85
5.....	1.02
5.5.....	1.10
6.....	1.25
6.5.....	1.30
7.....	1.50

The increase in price with increase in average height is a consistent relationship throughout the span of data available.

Bough Sales and Prices

The bough market is not always easy to distinguish from the Christmas tree market, since many buyers prefer to buy trees exclusively and to convert their poor quality trees into boughs. Nevertheless, a number of growers sell loads of boughs independently of their tree sales.

Some 14 percent of the growers who sold trees in 1957 made separate bough sales also. Their total output is estimated at 2,372,000 pounds. Members of the grower associations are much more active participants in the bough market than are the unaffiliated growers. Some 34 percent of the members of grower associations who sold trees in 1957 also sold boughs; they accounted for nearly 80 percent of all the boughs sold from Michigan plantations.

Bough prices are far more variable than Christmas tree prices. The average price is \$3.95 per 100 pounds, but the absolute range reported was from 50 cents to \$10.00. The range in prices is summarized below.

Price per 100 pounds	Percent of total boughs sold
\$1.50 and less.....	3
1.51—3.50.....	10
3.51—5.50.....	85
5.51 and up.....	2
	100

Projected Tree Sales

Growers sampled in this study were asked to list their Christmas tree sales for 1956 and 1957 and to estimate what their sales would be in the next few years. Aggregation of the replies indicates an astounding increase in planned marketings from 946,000 trees in 1956 to 7,430,000 trees in 1960 (Table 19). For expectations to materialize, growers face a staggering problem of marketing trees on a large scale over a wide geographic area. The possibilities of expanding markets at home are limited; it would take a broad national market to absorb some 7.4 million trees from Michigan alone in 1960.

TABLE 19—Number of Christmas trees sold in 1956 and 1957 and growers' estimates of sales from 1958 to 1960, by species

Species	1956	1957	1958	1959	1960
	Thousand trees	Thousand trees	Thousand trees	Thousand trees	Thousand trees
Scotch pine.....	640	860	1,800	3,400	5,550
Red pine.....	180	170	650	830	1,200
Norway spruce....	40	35	80	100	180
White spruce.....	50	70	70	90	200
Douglas fir.....	15	25	35	60	135
Austrian pine.....	3	15	20	45	75
All other.....	18	30	35	45	90
Total.....	946	1,205	2,690	4,570	7,430

Each grower estimating his sales from 1958 to 1960 may have been reasonable in his estimates, but it is unlikely that the total expected sales could materialize. The national market increases regularly with population increase. It is also likely that per capita consumption of Christmas trees is on the increase. But the year-to-year expansion in American Christmas tree use has followed a fairly orderly pattern. It must be recognized that the existing market is being fully supplied from varied American and Canadian sources, and that expanded planting for Christmas trees is occurring in other states and regions as well as in Michigan.

Perhaps a more accurate picture of the prospective supply of Michigan Christmas trees can be gotten from a comparison of recent annual harvests with the volume of planting in the years from which

these harvests were obtained. These relationships can then be applied to the more recent plantings which will furnish the Christmas tree crops in the years immediately ahead.

The 1956 harvest of Scotch pine was obtained from trees planted largely in the period 1948-51; the 1957 harvest, from trees planted during 1949-52. Comparing the harvests with average annual planting during the periods from which the harvests were derived, it can be shown that about 20 percent of the Scotch pine planted for Christmas trees has actually been harvested in recent years. Extending the same procedure to other species permits the following estimates of the proportion of trees harvested:

Species	Percentage of trees planted for Christmas trees actually harvested
Scotch pine.....	20
Red pine.....	10
Norway spruce.....	10
White spruce.....	25
Douglas fir.....	25
Austrian pine.....	8
All other species.....	8

If it can be assumed that the ratio of trees harvested to trees planted does not change markedly, sales of Christmas trees in the years ahead can be projected on the basis of trees already in plantations. The assumption is a conservative one, since recent experience has indicated an increasing ratio of trees harvested to trees planted in Michigan.¹³

The resulting projection indicates an increase in the sale of Michigan Christmas trees from 1.2 million in 1957 to 1.8 million in 1958 and successive increases to 4.0 million in 1962 (Table 20). Of course, there is nothing automatic in the process of selling trees offered for sale. As more and more trees are offered for sale, the price may decline; but in view of the relatively slowly changing demand for Christmas trees, even a price decline may not enable all sellers to find buyers.

¹³James, Lee M. Op. cit., p. 41.

TABLE 20—Projected sales of Christmas trees based on past ratios of sales to plantings, by species, 1958 to 1962

Species	1958	1959	1960	1961	1962
	Thousand trees	Thousand trees	Thousand trees	Thousand trees	Thousand trees
Scotch pine.....	1,440	1,885	2,350	2,765	3,090
Red pine.....	210	255	350	415	425
Norway spruce....	50	55	60	65	80
White spruce.....	50	65	90	95	120
Douglas fir.....	25	30	50	85	115
Austrian pine.....	20	30	40	55	65
All other.....	35	45	55	70	80
Total.....	1,830	2,365	2,995	3,550	3,975

APPENDIX

APPENDIX TABLE 1—Annual Christmas tree planting on private lands in Michigan, by species, 1948-57

Species	Year										
	Total period	1957	1956	1955	1954	1953	1952	1951	1950	1949	1948
	(Million trees)										
Scotch pine.....	93.0	18.1	15.8	14.9	13.0	11.6	7.4	5.6	4.2	1.4	1.0
Red pine.....	30.5	2.6	5.5	6.3	4.2	2.6	2.0	2.2	1.6	1.9	1.6
Norway spruce.....	7.5	1.5	1.2	.9	.7	.7	.5	.5	.5	.6	.4
White spruce.....	8.0	2.9	1.6	1.0	.7	.6	.4	.2	.2	.2	.2
Douglas fir.....	7.6	2.0	1.3	1.3	.8	.7	.7	.4	.2	.1	.1
Austrian pine.....	4.8	1.1	1.1	.8	.6	.5	.3	.3	.1	*	*
All other.....	8.6	1.9	1.3	1.1	1.0	1.1	.8	.5	.5	.2	.2
Total.....	160.0	30.1	27.8	26.3	21.0	17.8	12.1	9.7	7.3	4.4	3.5

*Negligible.

Definitions

Grower Occupation Classes

Farmer: A person engaged in farming as his major occupation. The presumption is that he devotes at least three-fourths of his working time to farming.

Part-time farmer: A person engaged in farming, but who has other regular gainful employment as a wage earner, businessman, or professional worker.

Business-professional worker: A person engaged in ordinary business or a recognized profession. Political office holders are included.

Nurseryman: A person engaged primarily in producing ornamental trees and shrubs.

Christmas tree farmer: A person engaged primarily in producing Christmas trees.

Wage earner: Any worker in wage-earning status who is not engaged in farming.

Retired: A person who has dropped out of one of the above-listed occupation classes because of age.

Miscellaneous: Any person who is not classifiable under one of the occupation classes listed above.

