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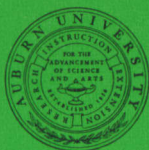
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CHRISTMAS TREE PRODUCTION In Eastern Redcedar and Arizona Cypress Plantations



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CHRISTMAS TREE PRODUCTION

In Eastern Redcedar and Arizona Cypress Plantations

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EASTERN REDCEDAR (*Juniperus virginiana* L.) has long been a popular species for Christmas trees throughout the South. This species along with native pines, accounted for 36 per cent of Christmas tree sales in Alabama in 1956, (1). A 1962 report from Tennessee, shows eastern redcedar accounted for 10 per cent of sales, (5).

Arizona cypress (*Cupressus arizonica* Greene) has been grown for Christmas trees in Alabama since World War II. By 1956 it appeared in markets in sufficient quantity to account for 0.6 per cent of the sales, (1). This tree, introduced into Alabama from Western United States, is similar in appearance to the eastern redcedar. The two trees are distinguished from many other conifers, such as pines, by the fact that they produce closely spaced scales rather than needles. The crowns of slender, flexible branches are quite dense. When considered for Christmas trees, these two trees belong to the same general class. Customers preferring eastern redcedar for their Christmas trees will usually accept Arizona cypress as a substitute. To some extent, therefore, these two trees are in competition with each other.

According to the 1956 investigation (1), imported conifers, spruce and fir, accounted for 63.5 per cent of Christmas tree sales in Alabama. These species are the most popular Christmas trees throughout the United States but cannot be successfully grown in Alabama. If Alabama is to become less dependent on Christmas trees imported from the other states, the growing of pines, redcedar, and Arizona cypress must play a larger part in supplying the State markets.

ESTABLISHMENT OF EXPERIMENTAL PLANTATIONS

Experiments by the Auburn University Agricultural Experiment Station in growing Christmas trees on sloping land under soil-conservation methods were started in 1940, (4). Fifteen different species of trees were planted to investigate their survival and growth. Only four exhibited satisfactory growth and other characteristics that made them promising for Christmas tree production. Top ranking was given to Arizona cypress and eastern redcedar. In order that a more thorough comparison of their relative growth rates and yields could be made, a new plantation of these two species was established in 1945.

Planting stock, which consisted of 1-0 seedlings, was grown from seed by the Horticulture Department at Auburn University. Seed of eastern redcedar came from local sources. Arizona cypress seed was purchased from a dealer in Arizona where it was collected. The seedlings were hand planted during the middle of February.

A plantation of these seedlings was located in central Alabama in Autauga County. A level area of land, recently cultivated and not susceptible to erosion, was used. The soil was a deep Norfolk loamy sand of relatively low fertility. The two species of trees were planted on adjacent areas of land at a 4 x 4-foot spacing. Two hundred fifty redcedar seedlings were planted on a little less than 0.1 of an acre of land. Four hundred Arizona cypress seedlings were planted on approximately 0.15 of an acre.

SURVIVAL AND UTILIZATION OF GROWING SPACE

The first record of plantation survival was made in December 1948. At that time 83 per cent of the redcedar seedlings were living. Later, additional trees died or became diseased and 79 per cent of trees were harvested by the end of the study in 1962, Table 1. Survival of Arizona cypress was 71 per cent in 1948. Later mortality and disease reduced harvested trees to 65 per cent of those planted, Table 2.

Some trees of both species developed conspicuous discoloration of portions of the foliage. The exact nature of the disease responsible was not investigated, but, as a practical measure, badly discolored trees were cut and destroyed. Trees that were harvested or lost from miscellaneous causes were not replanted. As a consequence some open spots developed in the original 4 x 4-foot spacing and their number increased through the life of the plantation. The yields of Christmas trees in this report reflect the numbers and percentages that resulted from the trees planted at the beginning of the experiment, Table 3.

TABLE 1. EASTERN REDCEDAR CHRISTMAS TREES HARVESTED FROM
250 PLANTED SEEDLINGS CLASSIFIED BY HEIGHTS

Age at harvest	Classification of trees by heights in feet								Total harvested
	4	5	6	7	8	9	10	11	
Yr.	No.	No.	No.	No.	No.	No.	No.	No.	No.
8	2	7	2	1	1				13
9	1	2	1						4
10		1							1
11	6	16	5	3	1				31
12	6	17	4	3	1				31
13	5	16	4	3	1				29
14	6	5	2	4					17
15	4	13	4	2					23
16	14	10	1					1	26
17	1	3	8	4			1		17
18	1	3	2						6
Totals	46	93	33	20	4	0	1	1	198

In efficient management of Christmas tree plantations, a different practice would be applied to utilize the available land to its full capacity. All open spots created each year would be replanted at the next planting season. The harvest would be augmented by yields from the replanting of the open spots. The additional yield can be estimated by assuming that the seedlings used for replanting would follow a survival and growth pattern similar to that displayed in the original planting.

TABLE 2. ARIZONA CYPRESS CHRISTMAS TREES HARVESTED FROM
400 PLANTED SEEDLINGS CLASSIFIED BY HEIGHTS

Age at harvest	Classification of trees by heights in feet								Total harvested
	4	5	6	7	8	9	10	11	
Yr.	No.	No.	No.	No.	No.	No.	No.	No.	No.
4	10	4	6	2					22
5									
6	2	8	17	4	2				33
7	1	10	10	4	2	1			28
8	2	9	10	4	2	1			28
9	1	8	10	5	2				26
10	1	6	6	3	2	1			19
11	2	13	14	7	4	2			42
12	2	8	10	4	2	1			27
13	1	4	11	2	1	1			20
14			2			1			3
15			2	1			1	2	6
16		3	2					1	6
17		1				1			2
Totals	22	74	100	36	17	9	1	3	262

TABLE 3. YIELDS OF CHRISTMAS TREES FROM EASTERN REDCEDAR AND ARIZONA CYPRESS PLANTED AT A 4 X 4 FOOT SPACING (2,722 PER ACRE)¹

Age at harvest	Trees harvested and percentages of the total harvested during the study					
	Eastern redcedar			Arizona cypress		
	Number	Per cent	Cum. Per cent	Number	Per cent	Cum. Per cent
4				150	8.4	8.4
5				0	0	8.4
6				225	12.6	21.0
7				190	10.7	31.7
8	140	6.6	6.6	190	10.7	42.4
9	43	2.0	8.6	177	9.9	52.3
10	11	0.5	9.1	129	7.2	59.5
11	335	15.7	24.8	286	16.0	75.5
12	335	15.7	40.5	184	10.3	85.8
13	313	14.6	55.1	136	7.6	93.4
14	184	8.6	63.7	20	1.2	94.6
15	249	11.6	75.3	41	2.3	96.9
16	281	13.1	88.4	41	2.3	99.2
17	184	8.6	97.0	14	0.8	100.0
18	65	3.0	100.0			
Total	2,140	100.0		1,783	100.0	

¹ Figures were derived from an actual planting of 250 redcedar seedlings and 400 cypress seedlings on a total area of nearly 0.25 acres. Open spots developed by death and cutting of trees were not replanted during the life of the plantation.

PRUNING AND SHEARING

For Christmas tree production, it is essential that quality trees be produced. Only quality trees sell well and give any assurance of a profitable operation. Trees of high quality must possess certain characteristics as defined in U. S. Standards for Christmas Trees, (6). They must have the proper density, taper, balance, a straight stem, and they must be free of defects. Eastern redcedar and Arizona cypress grown in plantations, as a rule, are free of defects and have dense crowns. However, they require considerable attention for developing proper taper. This is accomplished by pruning and shearing, (2).

Eastern redcedar grown in the open tends to lack a pointed top and develops a globular shape, (3). To produce proper taper and to develop a conical shape, the trees were periodically sheared. This practice was attempted on a trial basis and proved to be advantageous to achieving well-shaped trees. Shearing was begun when the trees were about 3 feet in height and repeated twice a year until harvest. One shearing was done in the winter and the other in the middle of the growing season. The rapidly growing trees had to be sheared for only 2 or 3 years before they reached harvesting size but others



Fig. 1. Eastern redcedar after 13 years of growth with some trees removed and others shaped to produce good quality Christmas trees.

took longer. Trees were harvested only after they were properly shaped to meet high quality specifications, Figure 1.

Arizona cypress is quite variable in appearance. A small portion, perhaps 10 to 15 per cent of the trees, develop a normal good taper and do not require pruning. In most cases it develops a candlestick taper, Figure 2. Drastic pruning of the main stem is required to correct this feature. Pruning reduces the length of the crown and is followed by shearing the lateral branches to develop a conical shape tapering to a point at the tip of the stem. The desired taper was maintained by light periodic shearing. Pruning and shearing were begun when the trees were 3 to 5 feet in height. As with redcedar, treatment was repeated twice a year until high quality trees developed, which took 1 to 3 years.

STUMP CULTURE

A practice known as a stump culture has been successfully applied to several species of trees grown for Christmas trees, (7). It has been recommended as a method of producing additional Christmas trees in a short time utilizing the old root system.

In some species of trees, one branch can be left on the stump and it will grow into a new Christmas tree very rapidly. When this was tried with the two species under investigation the branches invariably died. After this experience, if several branches were left on a stump

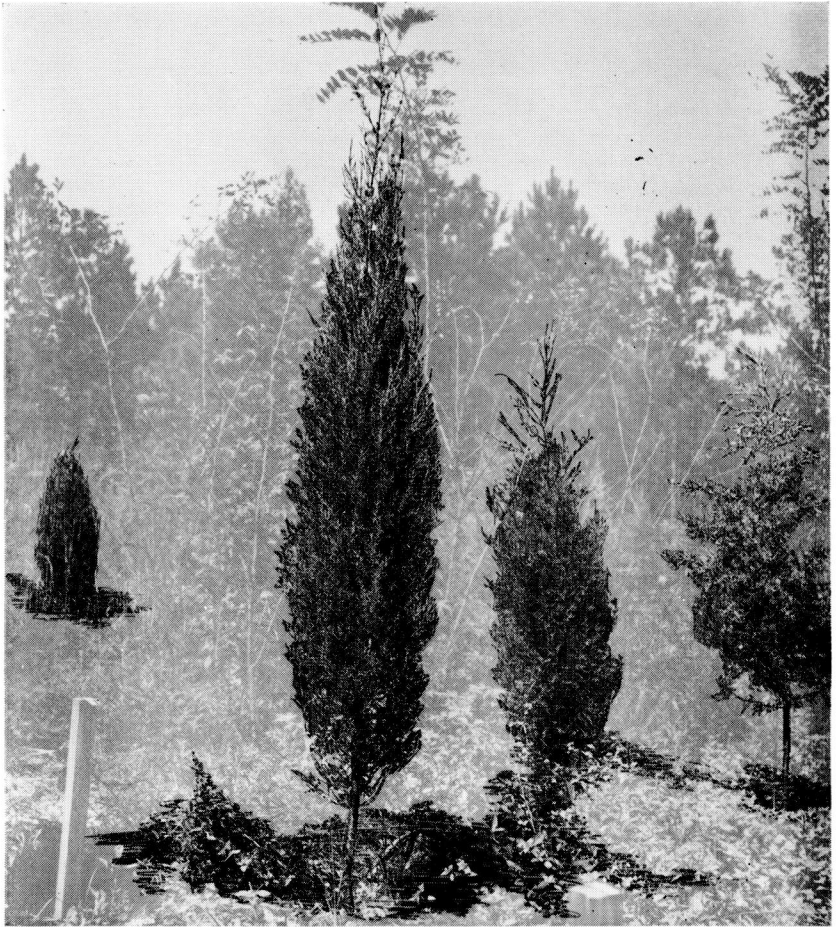


Fig. 2. Arizona cypress developing a candlestick taper results in inferior grade Christmas trees that cannot be marketed successfully

when a Christmas tree was harvested; they were left for a few months and then cut except for one or two. In this way second and third trees were successfully grown on the same stump from these branches.

Only a few stumps were suitable to this practice. In most cases in cutting a Christmas tree, the entire live crown is removed to avoid an unbalanced tree. Only a few trees permit leaving some branches below the handle of the harvested tree. Stump culture in this study was on a trial basis and the results are not indicative of what production can be expected from this practice. However, it demonstrated the possibility of successful development of this practice for commercial use by further study.



Fig. 3. Arizona cypress that has been pruned and shaped to produce a good quality Christmas tree.

Stump culture resulted in harvesting 17 additional eastern redcedar and 68 Arizona cypress Christmas trees, which were not included in tabulations. The yield of eastern redcedar was increased by 8.6 per cent and that of Arizona cypress by 26.0 per cent. The difference resulted from the fact that Arizona cypress grows more rapidly than cedar so that more branches developed into harvestable size trees during the study. Furthermore, Arizona cypress trees often have an upright branching habit and branches on such trees develop into new trees very readily.

HARVESTING

Merchantable trees were harvested about 2 weeks before Christmas each year. The first harvest was made when the plantation was 4 years old. At that time eastern redcedar was too small to yield any Christmas trees and only a few well shaped Arizona cypress met the quality requirements. After 6 years Arizona cypress trees were harvested annually until all had been cut in 17 years. Eastern redcedar was not ready for harvest until 8 years of age but was cropped annually thereafter until the final harvest completed at 18 years.

Only good quality trees were harvested at any time, Figure 3. Those that did not meet the specifications were pruned, sheared, and left to grow until they developed into quality trees. Trees varied considerably in growth rate. Slowest growing trees and those that required a number of years to develop a balanced taper were the last to be harvested.

At the time of harvest all trees were measured and recorded by heights to the nearest 0.1 of a foot. Proper allowances were made for handles and tips of the leader according to the established practice, (6). A small number of trees was occasionally stolen. Their heights were estimated from the available records and they were included with those that were cut that year. Records of trees harvested are shown in Tables 1 and 2.

YIELD OF CHRISTMAS TREES

The bulk of the harvested trees, 65.4 per cent, were in 5- and 6-foot sizes. The 4- and 7-foot size trees accounted for 28.3 per cent of the total. Only 6.3 per cent of trees were taller than 7 feet. On the average eastern redcedar trees were slightly shorter, 5.3 feet, than those of Arizona cypress which averaged 5.5 feet.

It was evident from the start that Arizona cypress grew at a faster rate. Because of its faster growth, 42.3 per cent of Arizona cypress trees were already harvested by the time the first redcedar trees reached crop size. At the peak of production of Arizona cypress when 75.4 per cent of the trees had been harvested, only 24.7 per cent of redcedar trees had been removed for the market. At the age of 13 years 93.3 per cent of Arizona cypress were harvested, while only 55.1 per cent of cedar trees were large enough to be cut. When the last redcedar trees were cut at 18 years of age some were still rather small.

MARKETING

Harvested Christmas trees were sold at a wholesale price in Auburn, Alabama. They ranged in price according to size from \$0.40 to \$2.50 per tree. Average price per standard bundle¹ (6) was esti-

¹ Standard bundle contains trees with following requirements:

<i>Height of Tree in Feet</i>	<i>Number of Trees Per Bundle</i>
2-4	7-8
4-6	5-6
6-7	4
6-8	3-4
7-8	3
8-10	2
Over 10	1

mated to be \$2.50. This price was lower than the market price in commercial channels if the quality of trees is taken into consideration. The small number of trees available each year made it impractical to sell them on the competitive bid basis.

One retail outlet was partially supplied from the plantation under study. Customers' reactions to two species of trees were noted when they were retailed. In pricing by size no distinction was made between the two species of trees. Arizona cypress was offered in substantial numbers, whereas the supply of eastern redcedar was limited. In spite of this some difficulty was experienced in selling redcedar because of a definite customer preference for Arizona cypress. However, there always was a certain number of customers who wanted eastern redcedar for Christmas trees.

From customers' remarks it was learned that they liked the green or silvery-green color of Arizona cypress much better than the pale green or yellowish green color of eastern redcedar. Those customers who came back year after year stressed the fact that Arizona cypress had dull scales which do not irritate the hands when the tree is being decorated. Eastern redcedar, it was pointed out, has prickly, sharp-pointed scales that cause considerable irritation to hands while trees are handled or decorated. It appears, therefore, that in marketing Arizona cypress and eastern redcedar of about equal quality a greater demand can be expected for the former.

SUMMARY AND CONCLUSIONS

Eastern redcedar (*Juniperus virginiana L.*) and Arizona cypress (*Cupressus arizonica Greene*) were grown for Christmas trees on light sandy soil in central Alabama. The trees were planted at a 4 x 4-foot spacing. Open spots where trees died or were cut were not replanted. Trees were pruned and sheared to develop the desirable taper of high quality Christmas trees. They were harvested when they reached marketable size and sold locally. Customers' reactions to the two species of trees were noted.

1. Survival of trees reaching harvestable size was 79 per cent eastern redcedar and 65 per cent Arizona cypress.

2. Both species required some pruning and considerable shearing to develop desirable taper. Developing well proportioned trees was the most serious problem encountered in producing high quality Christmas trees. A number of Arizona cypress trees would never have become marketable without this practice.

3. Stump culture apparently can be used to increase the Christmas tree yields of both species. Arizona cypress shows a greater promise of increased production than eastern redcedar from this practice.

4. First trees were harvested from Arizona cypress at age 4, from eastern redcedar at age 8.

5. Arizona cypress reached peak of production at age 11 when over 75 per cent of trees were harvested. Eastern redcedar reached best production rate from age 11 to 16 with 75 per cent of trees harvested at 15 years of age.

6. Customers preferred Arizona cypress over eastern redcedar because of its more attractive color and dull scales which were not irritating to hands in handling.

LITERATURE CITED

- (1) ALVORD, B. F., *Marketing Christmas Trees in Alabama*, Agr. Expt. Sta. of the Ala. Poly. Inst. Bulletin 309, 1957.
- (2) BELL, LESTER E., *Shearing and Shaping Christmas Trees*, Mich. State Univ. Ext. Ser. Bulletin 359, 1962.
- (3) GARIN, G. I. and MOORE, J. C., *Christmas Tree Production*, Agr. Expt. Sta. of the Ala. Poly. Inst. Circular 92, revised 1951.
- (4) MOORE, J. C., *Christmas Tree Production*, Agr. Expt. Sta. of the Ala. Poly. Inst. Circular 92, 1945.
- (5) THOR, ELVIN, et. al., *Christmas Tree Production and Marketing in East Tennessee*, Agr. Ext. Ser., U. of Tennessee, Circular 598, 1962.
- (6) U. S. DEPT. OF AGRICULTURE, *U. S. Standards for Christmas Trees*, Agricultural Marketing Service, Washington, D. C.
- (7) WELLNER, C. A. and ROE, A. L., *Management Practices for Christmas Tree Production*, North. Rocky Mount. Expt. Sta. Paper No. 9, Missoula, Montana, 1947.

