RESEARCH NOTE NC-20

NORTH CENTRAL FOREST EXPERIMENT STATION, FOREST SERVICE—U.S. DEPARTMENT OF AGRICULTURE

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Establishing Mixtures of Redcedar In Poor Oak-Hickory Forests

Oak-hickory forests on the poorest sites in the Upper Mississippi Valley have both low productivity and little esthetic appeal. A mixture of the native evergreen redcedar would add beauty and increase wildlife values.

METHODS OF STUDY

During the spring of 1949 redcedar (*Juniperus virginiana* L.) and shortleaf pine (*Pinus echinata* Mill.) were planted in openings cut in oak-hickory stands on ridgetops and upper south slopes in southern Illinois. The height of the mature dominant hardwood trees was 50 to 60 feet. The chief species were black oak (*Quercus velutina* Lam.), post oak (*Q. stellata* Wangenh.), blackjack oak (*Q. marilandica* Muenchh.), white oak (*Q. alba* L.), and hickory (Carya sp.).

Three sizes of openings were cut. The diameters, from crown edge to crown edge, were one-half, the same as, and twice the height of the overstory trees. Eight openings of each size were completely cleared and half of these were planted at a 6- by 6-foot spacing to redcedar and half to shortleaf pine.

In June 1950 and May 1956 all hardwood sprouts in the openings were cut off near ground level; but the stumps were not poisoned, and new sprouts and oak seedling sprouts developed. The planted trees were measured 3, 8, and 16 years after planting.

RESULTS

Early survival of the planted trees was good, and growth of shortleaf pine in the 100- to 120-foot openings was satisfactory; but redcedar grew slowly as is normal for this species.[1] Subsequently, many pines were killed by pine sawfly larvae. In the smaller openings partial shade from perimeter overstory trees killed some trees. And although released twice, some redcedar and pine were inhibited and killed by direct competition from hardwood brush.

After 16 years redcedar had survived and grown better in the small openings than had pine (table 1). In the large openings, survival and height growth were about the same for redcedar and pine; and the redcedar was vigorous and healthy (fig. 1). In the open, however, shortleaf pine characteristically grows much faster than redcedar. The relative success of redcedar in the forest openings, even when hardwood sprouts were not killed, was probably related to four factors: (1) it is native to the region; (2) it is moderately shade tolerant; (3) it characteristically tolerates poor sites; and (4) it has no serious insect enemies.

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[1] *Minckler, Leon S. 1953. Poor oak sites may grow good pine. U.S. Forest Serv. Cent. States Forest Exp. Sta. Tech. Pap. 134, 6 pp., illus.*

Table 1.—*Survival and height growth of redcedar and shortleaf pine by opening sizes 16 years after planting*

Original diameter of forest opening[1/]	Redcedar			Shortleaf pine		
		Top-free trees			Top-free trees	
	Percent survival	Number per opening	Height (feet)	Percent survival	Number per opening	Height (feet)
1/2-size (25-30 ft.)	28	9	6.4	13	4	1.2
1-size (50-60 ft.)	49	21	9.0	5	4	6.2
2-size (100-120 ft.)	34	47	11.8	32	50	13.6

1/ Openings were cut to a diameter one-half, the same as, and twice the height of the overstory trees.

Figure 1.—Redcedar in forest opening on poor oak-hickory site 16 years after planting. Original diameter of the opening was about 100 feet.

CONCLUSION

Redcedar can be successfully interplanted in oak-hickory stands on poor sites. Openings should be cut with a diameter of one to two times the height of the surrounding trees, and the seedlings should be planted inside the crown perimeter in the openings. Ideally, all hardwood brush should be killed with herbicides before planting. After planting, redcedar trees should be kept free of overtopping by hardwood brush.

Successful conversion of poor oak-hickory forests in southern Illinois to the non-native shortleaf pine would require larger clearcut areas, more intensive control of hardwood competition by use of herbicides, and protection from insect attacks. This appears to be a questionable practice. Stand conversion to pine in southern Illinois is expensive and the results are uncertain.

The introduction of redcedar into poor oak-hickory forests would increase cover and food for wildlife and improve the beauty of the usually drab oak-hickory forest, particularly in the winter when it would provide a touch of green among the leafless hardwoods and in the spring when it would provide background for the dogwood (*Cornus florida* L.) and redbud (*Cercis canadensis* L.) trees that are native on many of these sites. The improved esthetic and wildlife values may be the most desirable product on such sites.

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