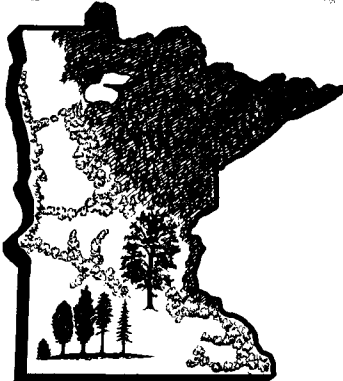


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MINNESOTA FORESTRY NOTES

COPY 2

UNIVERSITY OF MINNESOTA
OCT 12 1970

No. 79
April 15, 1959

SURVIVAL AND GROWTH OF SOME WILDLIFE COVER PLANTINGS IN MINNESOTA

L. W. Krefting¹

To improve the winter habitat for the northern white-tailed deer (Odocoileus virginianus borealis Miller) and ruffed grouse (Bonasa umbellus Linnaeus), five experimental conifer cover plantings were made in the spring of 1934. All of the plantings were located in northeastern Minnesota in Cook County near Tofte on the north shore of Lake Superior. Three of the plantings consisted of 302 wilding balsam fir (Abies balsamea (L.) Mill.) 6 to 8 feet tall and two of them were composed of 147 wilding spruce about 8 feet in height. Black spruce (Picea mariana (Mill.) B.S.P.) was used in one of the plantings and the other one was a mixture of both black and white spruce (Picea glauca (Moench) Voss). All of the trees were taken from natural stands in the general vicinity of the planting sites. Each tree was balled to facilitate handling and to reduce mortality. Four of the plantings were about two-thirds of a square chain in size and one covered about a half of a square chain. The spacing was variable and ranged from 3 X 3 feet to 4 X 6 feet. Two of the fir plantings were located at the edge of open areas and one was planted in a mixed stand of quaking aspen (Populus tremuloides Michx.) and paper birch (Betula papyrifera Marsh.). The black spruce plot was located in an upland aspen stand and the mixed spruce planting was established nearby in a low-ground alder thicket. A total of 160 man days was used to establish all of the plantings. The plantings were visited and remeasured in 1958, 24 years after they were established, with the following results:

Plot No.	Species	Average D.B.H. (Inches)	Average Height (Feet)	Spacing (Feet)	Survival (Per cent)
1	Balsam Fir	3.1	22.2	3 x 3	85
2	Balsam Fir	3.3	28.6	4 x 5	60
3	Balsam Fir	3.2	25.0	4 x 6	42
4	Black Spruce	3.2	23.4	4 x 4	84
5	Black and White Spruce	3.5	20.2	3 x 4	36

Although deer browsed all of the balsams the first two winters, the survival for the 302 balsam trees was 93 per cent in the fall of 1936. Later tallies showed the survival was 87 per cent in 1938 and 79 per cent in 1946. In 1958 survival was 63 per cent and for the three plots ranged from 42 to 85 per cent. Measurements in 1946 showed that the diameters ranged from 0.5 to 2.7 inches and averaged 1.6 inches. Heights ranged from 5 to 18 feet and averaged 12.7 feet. In 1958 the balsams ranged from 10 to 33 feet and averaged 25 feet in height. The average diameter was 3.2 inches with extremes of 1.4 to 4.8 inches.

The varying hare (Lepus americanus phaenotus J. A. Allen) clipped many of the spruce in the alder thicket planting the first two winters, but none of the spruce in the aspen stand was damaged by deer or hares. The survival in the two spruce plantings was 99.3

¹/ Wildlife Research Biologist, U. S. Fish & Wildlife Service, School of Forestry, University of Minnesota, St. Paul, Minnesota

per cent in 1936, 98.7 per cent in 1938, 77.6 per cent in 1946, and 68.7 per cent in 1958. However, the survival in the alder thicket planting in 1958 was only 36 per cent as compared with 84 per cent for the planting in the aspen stand. Diameter measurements in 1946 indicated the plants ranged from 1 to 3 inches and averaged 2 inches. The heights varied from 8 to 21 feet and averaged 15.3 feet. By 1958 these trees were 18 to 35 feet tall and averaged 22.6 feet. The average diameter was 3.2 inches with extremes of 2 to 5.1 inches.

Observations over the past 24 years have shown that deer, ruffed grouse, varying hare, red squirrel (Tamiasciurus hudsonicus hudsonicus (Erxleben)) and moose (Alces alces andersoni Petersen) have made use of the plantings as protective covering especially during the winter months. The plots have been particularly attractive to deer in winter presumably because of the reduced wind velocity and snow depth. A winter visit to one of the balsam plantings in 1955 revealed the snow depth was only 8 inches in the center, 12 to 14 inches in a nearby stand of mature white cedar, and 30 inches in a nearby opening.

The results of this study show that it is possible to transplant large wilding balsam fir, black spruce, and white spruce successfully. In this instance the survival was high for most plantings, and also in this case, observations indicated that the best winter protection and use of the cover plantings may be obtained when the plots are at least a tenth of an acre in size and the spacing is about 4 by 4 feet. At this spacing the crown closure was good and natural pruning was speeded up. Balsam fir appeared to be a better species to plant than either black or white spruce. The deer not only browsed on the lower branches but there are indications that balsam sheds its lower branches sooner. This permits earlier use by deer and grouse. The varying hare benefits most before the trees lose their lower branches.

Balsam fir plot No. 2 at four and twenty-one years after planting is shown in Figures 1 and 2 below.



Fig. 1. Balsam fir cover planting establishment May, 1934. Straggly appearance is due to deer browsing. Photo taken January 27, 1938.



Fig. 2. Same balsam fir planting 21 years later. Photo taken Feb. 3, 1959.

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