technical notes

Growth of White Spruce Planted in the Turtle Mountains

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The Turtle Mountains, located on the Canadian-United States border in southwestern Manitoba and in North Dakota, form a hilly area rising as high 700 feet above the surrounding plains. The forest is classified as being an outlier of the Boreal Mixedwood Forest: natural stands are composed entirely of deciduous species, of which aspen (*Populus tremuloides* Mich X.) is the most important. Between 1912 and 1925 some white spruce (*Picea glauca* (Moench) Voss) and Scots pine (*Pinus sylvestris* L.) plantations were established on the Canadian side to determine if these species would be suitable for reforestation purposes. Originally timber-growing and erosion control were the main objectives, but because of the need for outdoor recreational areas, planting for aesthetic purposes is perhaps more important now.

Results of all planting in the Turtle Mountains to 1958 are included in Jarvis *et al.* (1966). This report is concerned only with the two oldest white spruce plantations but the growth information shows that the species has great potential for reforestation.

The two plantations were set out in 1912 on fresh clay-loam till soils that had previously been under cultivation. Four-year-old white

spruce seedlings and two-year-old Scots pine seedlings were planted in alternate rows at 4-by 4-foot spacing in furrows plowed in an east-west direction. At the time of planting, ground cover between furrows consisted of grasses, some roses and a few small aspen. The soil around the young trees was cultivated for six years after planting.

Rabbit browsing in 1913-15 and 1923-24 killed most of the pine and caused serious damage to the spruce, retarding their growth and resulting in the formation of many double-stemmed trees. The least desirable stems of these malformed trees were later removed in stand-improvement operations along with other poorly formed trees.

The 1966 data were obtained on three ¼-acre plots established in parts of the plantations where the crown canopy was closed. Measurements included a diameter tally of all living trees by 1-inch classes, height measurements and radial-growth measurements at breast height on 15 to 20 trees per plot, and height-growth measurements on two dominant trees per plot.

In 1966, at a total age of 58 years, the mean dominant heights were 56 and 58 feet (Table

1), corresponding to Quality Class I for Saskatchewan (Kirby, 1962). However, because of a greater number of trees per acre and a more regular stem distribution than normal in stands, the average basal-area of 182 square feet and volume of 4,000 cubic feet per acre in the plantations are twice as high as those shown for natural stands in Quality Class I.

Observations indicate that the plantations at present are generally healthy, except for a few instances of white pitted trunk rot caused by *Fomes pini* (Thore) Lloyd, which has probably become established as a result of past injuries. Trees show good form, with dead lateral branches persisting on the stem almost to the ground.

Good diameter, height and volume growth indicate favourable growing conditions for white spruce on the Turtle Mountain even though no spruce occurs in natural stands. In addition to wood-production potentials, this conifer has special aesthetic values in this area that make it very desirable for planting.

Figure 1. A 1912 white spruce plantation. The trees have good form, but no self-pruning is evident.

Table 1.

1966 Stand Statistics for Two Turtle Mountain White Spruce Plantations Established in 1912
(Per Acre Values)

Plantation	Stand	Number of trees	Basal area (sq. ft.)	Volume (cu. ft.)	Mean DBH (in.)	Mean Dominant Height (ft.)	Years to breast height	Mean annual volume (cu. ft.)
I ¹	Total	752	172	3,890	6.5	56	12	67
	Merch. ³	728	171	3,400	6.6			59
II ²	Total	776	193	4,633	6.7	58	14	80
	Merch.	736	191	4,072	6.9			70

¹Average of two plots. Differences between them in basal area and volume were less than 5 per cent.

²Only one plot.

³Merchantable stand includes trees above 3.5 inches in DBH, and volume from 1-foot stump to 3-inch top, diameter inside bark.

References

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