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Release from an Aspen-pine Overstorey

by

A.B. Berry

Abstract

Seedlings of white pine, red pine, and white spruce which had germinated in a spot-seeding experiment, and which had been suppressed for 27 years under a mature aspen-pine stand were released in 1950. The development of a new dense stand of aspen suckers permitted conifer growth rates of about 0.3 m per year for the next 30 years (not as rapid as for open grown trees) yet limited white pine weevil damage. The stand was thinned in 1980 to remove the aspen and all but the best stem of the coniferous species at each seed spot.

Résumé

Des semis de pin blanc, de pin rouge et d'épinette blanche qui avaient crû dans des plateaux expérimentaux et qui avaient été dominés durant 27 ans par un peuplement de trembles et de pins adultes ont été dégagés en 1950. À la suite de la formation d'un nouveau peuplement dense de drageons de tremble, la croissance des conifères a été de 0.3 m par an durant les 30 années subséquentes (ce qui est moins rapide que pour les arbres croissant à découvert), mais les ravages du charançon du pin blanc ont été restreints. Le peuplement a été éclairci en 1980; dans chaque plateau, on a enlevé les trembles et gardé seulement les conifères qui avaient le meilleur tronc.

Introduction

This paper describes the response to release of seedlings of three coniferous species that had been badly suppressed for 27 years. These seedlings had been regenerated on prepared seed spots in 1922.

Stand History

In 1922 a natural stand of aspen (*Populus tremuloides* Michx. and *P. grandidentata* Michx.) and scattered red pine (*Pinus resinosa* Ait.) was thinned to approximately 1 500 trees per hectare (with a basal area of 8.5 m²/ha) and spot seeded (3 450 spots per hectare) the following year with white pine (*Pinus strobus* L.), red pine and white spruce (*Picea glauca* [Moench] Voss) in consecutive rows. Germination and survival were good over the first two years with 79%, 62% and 83% of the spots supporting one or more seedlings respectively of white pine, red pine and white spruce. Survival of the white pine and spruce was still over 55% in 1950, but that of red pine had decreased to only about 25% of the spots with one or more stems. The average number of stems per spot was 1.7 for white pine, 1.4 for red pine and 2.3 for spruce, with average heights of the tallest stem per spot 0.5 m, 0.6 m and 0.8 m respectively. Figure 1 shows the aspen overstorey in 1950 and some of the suppressed seedlings.

Treatment

After the 1949 growing season the overstorey, which at that time consisted of about 750 trees per hectare with a basal area of 24 m²/ha, was clear-cut to release the seedlings. A dense crop of aspen suckers then developed, overtopping the seedlings by the end of the first (1950) growing season. These suckers were removed during the summer of

1951 from half the area (hereafter referred to as the treated area), but were succeeded the following year by a second crop, less dense than the first. No further cutting was done until 1980.

Survival and growth of the conifer seedlings were recorded in 1950, 1955, 1960, 1970 and 1980. Differences in average height between treated and untreated areas were assessed for each species by t-test.

In 1980 all aspen were cut and the seed spots were thinned to leave only the tallest individual conifer in each (Figure 2).

Figure 1. Stand before cutting overstorey and suppressed 28 year-old conifers.

Figure 2. Conifer stand after release and thinning in 1980.

Results

Fears that the conifers had been suppressed too long to respond to release, or alternatively that aspen suckers would continue to suppress them severely, were unfounded as indicated by the results obtained. Within 5

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Figure 3. Average height related to age for trees released in 1950.

years of cutting in 1950, height growth of all three species increased dramatically on both the treated and untreated areas as shown in Figure 3. Growth prior to the release cutting had been about 3 cm per year but after cutting it increased to about 30 cm per year and in 1980 height averaged about 10.5 m. Although growth was accelerated ten-fold current rates of growth are still only about half that shown by open grown plantations on similar sites at Petawawa, indicating that the conifer seedlings had not had complete release or were unable to respond fully.

Aspen suckers developed differently on the two areas (Table 1). By 1980 the untreated stand maintained a 3 m height advantage over the treated stand, had about the same mean dbh, but about three times as many stems and much higher basal area.

Figure 3 indicates average stand height by treatment and species, at 10-year intervals. Although the average height of the conifers up to 1970 did not differ significantly between the treated and untreated areas for any species, the height increment of all three species between 1960 and 1970 was significantly greater on the treated area. The 1980 average height was still significantly greater on the treated area for the white pine and spruce, but not for the red pine. The 1970-80 height growth was also significantly different for the first two of the species but not for red pine. This is clear evidence that the one-shot removal of aspen suckers had no early influence on seedling growth but at greater heights of the conifers the denser aspen overstorey on the untreated area was having an adverse effect. There is evidence, also, of whipping damage to the leaders, particularly on white pine.

More than 90 per cent of the white pine had been attacked by the white pine weevil (*Pissodes strobi* Peck.) by 1970. Nevertheless, damage has been slight, particularly when compared with the stem formation usually experi-

enced in this part of Ontario by plantation-grown white pine, having no overhead canopy protection. It is noteworthy that the only pine which were severely deformed were those growing in small openings where aspen suckers had not developed. There was little differences in intensity of weevil attack between the treated and untreated areas.

Table 1. Development of aspen overstorey

		Untreated	Treated
Trees/ha	1970	3950	1050
	1980	2185	600
Mean height (m)	1970	12.0	9.0
	1980	17.4	15.6
Mean dbh (cm)	1980	17.4	11.9
Basal area (m ² /ha)	1980	25.0	5.5

Conclusions

The capacity of long suppressed white pine, red pine and white spruce to respond to release should be considered when clear-cutting stands containing advance growth of these species. If the regeneration is already present, it makes more sense to preserve than to destroy it and then have to expend time and money in scarifying and planting to reforest the area.

Subsequent dense sprouting of aspen suckers may not drastically impede growth of seedlings with well developed root systems for a prolonged period. It may even be beneficial to white pine by offering protection from weevil attack and subsequent deformity of the main stem. However, closure of the overhead canopy may eventually reduce height growth, and cause whipping damage to occur to conifer leaders as they penetrate the hardwood crowns, perhaps necessitating another release.