

A NOTE ON THE EFFECT OF ROOT PRUNING AND AMMONIUM
NITRATE ON FLOWERING IN YOUNG JACK PINE¹

M. J. Holst²

In an earlier paper I reported on the effect of ammonium nitrate on flowering red pine (*Pinus resinosa* Ait.) and on the importance of proper timing of flower promoting or retarding treatments. ³ This present study concerns the effect of root pruning and fertilization with varying levels of ammonium nitrate, and their interactions with time, on floral stimulation in 4-foot-high plantation grown jack pine (*Pinus banksiana* Lamb.).

To study the interaction of application of fertilizer and time of root pruning, plants were given 50, 100, and 200 grams ammonium nitrate per plant on May 4 and then root pruned May 4, June 8, June 28 or August 4 during the 1955 growing season (table 1). On the same dates in a second experiment plants were given 100 grams of ammonium nitrate to study the timing effect of fertilizer application (table 2). Flowers were counted in 1955 and 1956.

Root pruning at all dates reduced the number of female flowers and the fertilizer enhanced this negative effect. Compared with the untreated controls, non-fertilized root-pruned trees produced only one-half the female flowers; fertilized trees produced respectively one-fifth, one-sixth and one-twentieth the female flowers for the 50, 100 and 200 gram doses of ammonium nitrate. There were no apparent differences among dates of root pruning indicating that buds were still growing actively on August 4 and that their development could have been altered or retarded even if flower primordia had been formed at an earlier date.

Table 1 also shows that early application (May 4) of 50 grams ammonium nitrate reduced female flowering by 33 percent while the 100-gram and 200-gram doses applied on the same date increased female flower number by 44 and 121 percent respectively.

Proper timing of fertilizer application was critical for flower induction (table 2). The 100-gram ammonium nitrate given May 4 increased female flowering by 42 percent, but had no effect on male flowering. The June 8 application resulted in a 30 percent increase in female flowering while male flowers returned to the level of the control treatment. This may indicate that female flower primordia are formed earlier and perhaps over a longer period than male flower primordia. It also seems that female primordia are more labile during the latter part of the growing season, since external influences apparently changed primordia from a potentially flowering to a vegetative condition.

If it is assumed that there is a time lag following the date of fertilizer application, female primordia were not formed later than the first week of July. Formation of male flower primordia appears to have been particularly active in the first week of July and they were not formed later than the last week of August.

Early spring application of high doses of ammonium nitrate are particularly effective in promoting female flowers. If a promotion of female flowers and a reduction of male flowers are required ammonium nitrate should be given about a month later,

¹ The original presentation included some data and discussion on other pine species.

² Department of Forestry and Rural Development of Canada, Petawawa Forest Experiment Station, Chalk River, Ontario.

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Table 1.--Effect of ammonium nitrate fertilizer and root pruning on flowering of 4-foot-high jack pine seedlings treated in 1955.

Date root pruned 1955	Ammonium nitrate per tree applied May 4, 1955	Average number of flowers per seedling ^{1/}				Male 1956
		1955		Female 1956		
		1955	1956	proportional to 1955	Fertilized proportional to non-fertilized control	
	Grams			Percent	Percent	
Control	0	8.2	19.0	232	100	8.0
May 4	0	8.1	2.2	27		0.0
June 8	0	6.6	9.2	139		3.2
June 28	0	8.8	5.6	64		0.0
August 4	0	1.4	2.2	157		0.0
Control	50	2.2	3.4	155	67	0.0
May 4	50	4.6	1.0	22		0.0
June 8	50	4.2	3.6	86		4.8
June 28	50	11.4	5.0	44		0.0
August 4	50	10.8	3.0	28		0.0
Control	100	3.6	12.0	333	144	10.0
May 4	100	7.6	5.4	72		0.0
June 8	100	8.0	6.4	80		0.0
June 28	100	2.4	0.0	0		0.0
August 4	100	13.4	2.2	16		0.0
Control	200	7.2	37.0	514	221	0.8
May 4	200	12.2	0.2	2		0.0
June 8	200	9.0	0.8	9		1.4
June 28	200	23.8	6.2	26		0.0
August 4	200	9.4	0.6	6		4.6

^{1/} Mean values from samples of 5 plantation grown trees.

Table 2.--Effect of date of application of 100 grams of ammonium nitrate fertilizer on the flowering of 4-foot-high jack pine seedlings.

Date applied 1955	Trees per treatment	Average number of flowers per seedling				Male 1956
		Year		Female 1956		
		1955	1956	proportional to 1955	Fertilized proportional to non-fertilized control	
	Number			Percent	Percent	
Control (not fertilized)	10	6.8	14.8	217	100	4.4
May 4	10	5.0	15.4	308	142	5.0
June 8	5	2.2	6.2	282	130	1.4
June 28	5	7.4	15.8	214	99	0.0
August 4	5	4.4	6.2	141	65	4.6