Update on the Growth and Yield of the Rockland Red Pine Plantation

by

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In the autumn of 1981 the Rockland red pine (*Pinus resinosa* Ait.) plantation plots were remeasured for the ninth time. Since this stand is the oldest managed red pine plantation in Ontario for which detailed growth records have been kept, the results obtained provide a unique comparison of long-term yields from managed and unmanaged portions of the same plantation.

Planted in 1914, the stand has been intensively managed for the last 43 years. Two permanent sample plots were established in 1938, one of which was thinned in 1938, 1951, 1961 and 1971 while the other was left undisturbed. Diameter

and height of trees in both plots were measured in 1938, 1943, 1951, 1956, 1961, 1966, 1971, 1976 and 1981. Seven publications have described stand development to 1976 (Sisam 1939, Mulloy 1943, 1946, Stiell 1953, 1957, von Althen and Stiell 1965, von Althen, Stiell and Foster 1978).

In 1981, the height and diameter of the tree of average basal area were 89 ft and 12.3 in., respectively, in the thinned stand and 88 ft and 9.4 in. in the control. The average height of dominants and co-dominants combined was 93 and 92 ft, respectively, in the thinned stand and the control. The tallest tree was 96 ft high and was located in the control.

Growth data for the thinned and unthinned plots are given in Table 1. In the control plot a maximum basal area of 231 ft² was reached at 52 years from planting. For the last 15 years natural mortality in this plot exceeded growth for a net

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Table 1. Summary of growth data per acre for the thinned stand and the control.

Age	Year	Number of trees		Basal area (ft ²)		Total vol (ft ³)		Merch. vol (ft ³) ^a		Merch. vol (fbm) ^b	
		Thinned	Control	Thinned	Control	Thinned	Control	Thinned	Control	Thinned	Control
24	1938										
	BT ^c	912	976	193	201	3681	3820	2349	2364	1488	2096
	T ^d	322	—	53	—	1000	—	488	—	90	—
29	AT ^e	590	976	140	201	2681	3820	1861	2364	1398	2096
	BT	582	884	157	208	3408	4475	2547	3032	5353	4366
	GPI ^f	—	—	18	20	752	896	703	676	3955	2270
37	m ^g	8	92	1	13	25	241	17	8	0	0
	1943										
	BT	566	802	184	212	4725	5366	3825	4059	13406	9018
42	T	162	—	40	—	1001	—	719	—	1422	—
	AT	404	802	144	212	3724	5366	3106	4059	11984	9018
	GPI	—	—	30	17	1385	1179	1303	1178	8067	4652
47	M	16	82	3	13	68	288	25	151	25	0
	1956										
	BT	404	730	161	216	4609	5949	3925	4702	17963	13790
52	GPI	—	—	17	15	885	849	819	827	5979	4772
	M	0	72	0	11	0	266	0	184	0	0
	1961										
	BT	400	678	179	223	5476	6753	4704	5470	23309	20250
57	T	82	—	32	—	968	—	816	—	3575	—
	AT	318	678	147	223	4508	6753	3888	5470	19374	20250
	GPI	—	—	19	16	891	1047	798	937	5346	6460
62	M	4	52	1	9	24	243	19	169	0	0
	1966										
	BT	318	630	165	231	5457	7380	4770	6173	25711	26378
67	GPI	—	—	18	17	949	895	882	899	5977	6220
	M	0	48	0	9	0	268	0	196	0	92
	1971										
	BT	314	550	180	224	6211	7625	5405	6557	30812	31228
72	T	154	—	73	—	2468	—	2113	—	11366	—
	AT	160	550	107	224	3743	7625	3292	6557	19446	31228
	GPI	—	—	16	11	791	783	665	795	5217	5094
77	M	4	80	1	18	37	538	30	411	116	244
	1976										
	BT	158	512	117	227	4291	8175	3839	6942	22612	35736
82	GPI	—	—	11	13	590	858	583	625	3378	4850
	M	2	38	1	10	42	308	36	240	212	342
	1981										
	BT	158 ^h	460 ⁱ	130	219	4844	8190	4398	7137	26382	38892
87	GPI	—	—	13	6	553	496	559	563	3770	3890
	M	0	52	0	14	0	481	0	368	0	734

^aTrees 6 in. DBH and larger, ^bTrees 8 in. DBH and larger, ^cBT — before thinning, ^dT — thinning, ^eAT — after thinning, ^fGPI — gross periodic increment, ^gM — mortality, ^hincludes 2 trees cut by vandals, ⁱincludes 10 trees cut by vandals.

loss of 12 ft², and during the last 5 years natural mortality nearly equalled total volume growth. Since this mortality occurred in only the smallest trees, the 5-year growth in merchantable cubic and board foot volume increased by a net 195 ft³ and 3156 fbm, respectively. At the same time the net increase in the thinned plot was 559 ft³ and 3770 fbm.

The economic analysis of the 1971 data showed that the financial maturity at 4% and 6% was highest in year 47 in both thinned and control stands. However, physical growth has continued and the thinned stand and control have produced an additional net merchantable board foot volume of 18 374 and 18 642 fbm, respectively, during the last 20 years. Therefore, value is still increasing, although height growth has recently fallen off markedly in both plots.

Stand conditions in the control are poor because most small trees have made little or no diameter growth, crowns are short and stems show excessive sweep or lean. Mortality continues at more than 2% per year and the risk of mass collapse from a fall of wet snow seems high. Nevertheless, the merchantable volume of this untreated plantation exceeds by 40% that given for Site Class I of natural red pine stands of the same age (Plonski 1960). This is an excellent example of the superior productivity made possible in plantations by uniform spacing and high stocking alone.

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