FIELD SURVEY OF PLANTATIONS IN THE STANLEY MANAGEMENT UNIT, HANTS COUNT, NOVA SCOTIA

by

K. J. Roller and S. Hunter

Maritimes Forest Research Centre
Fredericton, New Brunswick

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ABSTRACT

This report presents results of an assessment of 26 red pine plantations in the Stanley Management Unit, Hants County, Nova Scotia, established in various types of humic podzolic soil. Data on survival, spacing, height, height increment, and diameter are presented and discussed. Although seed source, treatment of seedlings and plantations, method of planting, and age class of the planting stock probably all affected the growth of the trees, soil conditions are considered the primary cause of significant differences in growth rate. Three categories of soils were defined on the basis of drainage conditions; results indicate that red pine is extremely sensitive to soil moisture differences and that it grows best on well-drained soils. This soil drainage classification should help forest managers implement a program of reforestation in Stanley to produce red pine of merchantable quality.

RESUME

Le présent rapport fait état des résultats d'une évaluation de 26 plantations de Pins rouges au Stanley Management Unit, comté de Hants, Nouvelle-Ecosse, établi dans divers types de sols humiques podzoliques. Des données concernant la survie, l'espacement, la hauteur, la croissance en hauteur et le diamètre sont présentées et élaborées. Même si les sources de semences, le traitement des semis et plantations, la méthode de plantage et la classe d'âge des essences à planter sont tous des facteurs ayant probablement influé sur la croissance des arbres, on considère les conditions du sol comme la cause principale des différences significatives du taux de croissance. Trois catégories de sols furent définies en se fondant sur les conditions de drainage; les résultats indiquent que le Pin rouge est extrêmement sensible à l'humidité du sol et qu'il pousse mieux dans des stations bien drainées. Cette classification de drainage du sol devrait aider les gestionnaires forestiers à mettre sur pied un programme de reforestation à Stanley permettant la production de Pin rouge d'une qualité vendable.

CONTENTS

INTRODUCTION

This is the fourth report in a series on the assessment of forest plantations in southwestern Nova Scotia (Roller and Hunter 1972*, 1974, 1975). Previous reports have presented data on most of the plantations established during the last 30 years within the counties in question, but this report deals with data from only the red pine plantations in the Stanley Management Unit, Hants County. The other plantations in Hants County were not assessed because they are small, widely scattered, privately owned, and contribute little information toward the improvement of reforestation practices.

The 26 red pine plantations occupying 121 ha (299 acres) in the Stanley Management Unit were established by the Nova Scotia Department of Lands and Forests between 1953 and 1972. The plantations were assessed in 1973 for tree survival and growth, soil quality, and site conditions. This report compares the growth of red pine in the various plantations, during the juvenile and early pole stages, and relates growth to differences between sites. Recommendations are made for improving reforestation success. Plantation data are summarized in tabular form in Appendix A.

THE STUDY AREA

General Description

The plantations are located in the central part of the Stanley Management Unit, an area of about 18000 ha located between Windsor and Kennetcook, Hants County, (Fig. 1). The Unit was taken over from the Royal Canadian Air Force by the Nova Scotia Department of Lands and Forests in 1946, and since then has been restored to productive forest (G.D. Dwyer 1975). Most plantations were established between 1953 and 1963, but some as recently as 1972. Their locations are shown in Fig. 2.

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* A Field Survey of Plantations in Queens and Lunenburg Counties, Nova Scotia. Maritimes For. Res. Cent. Int. Rep. M-74.

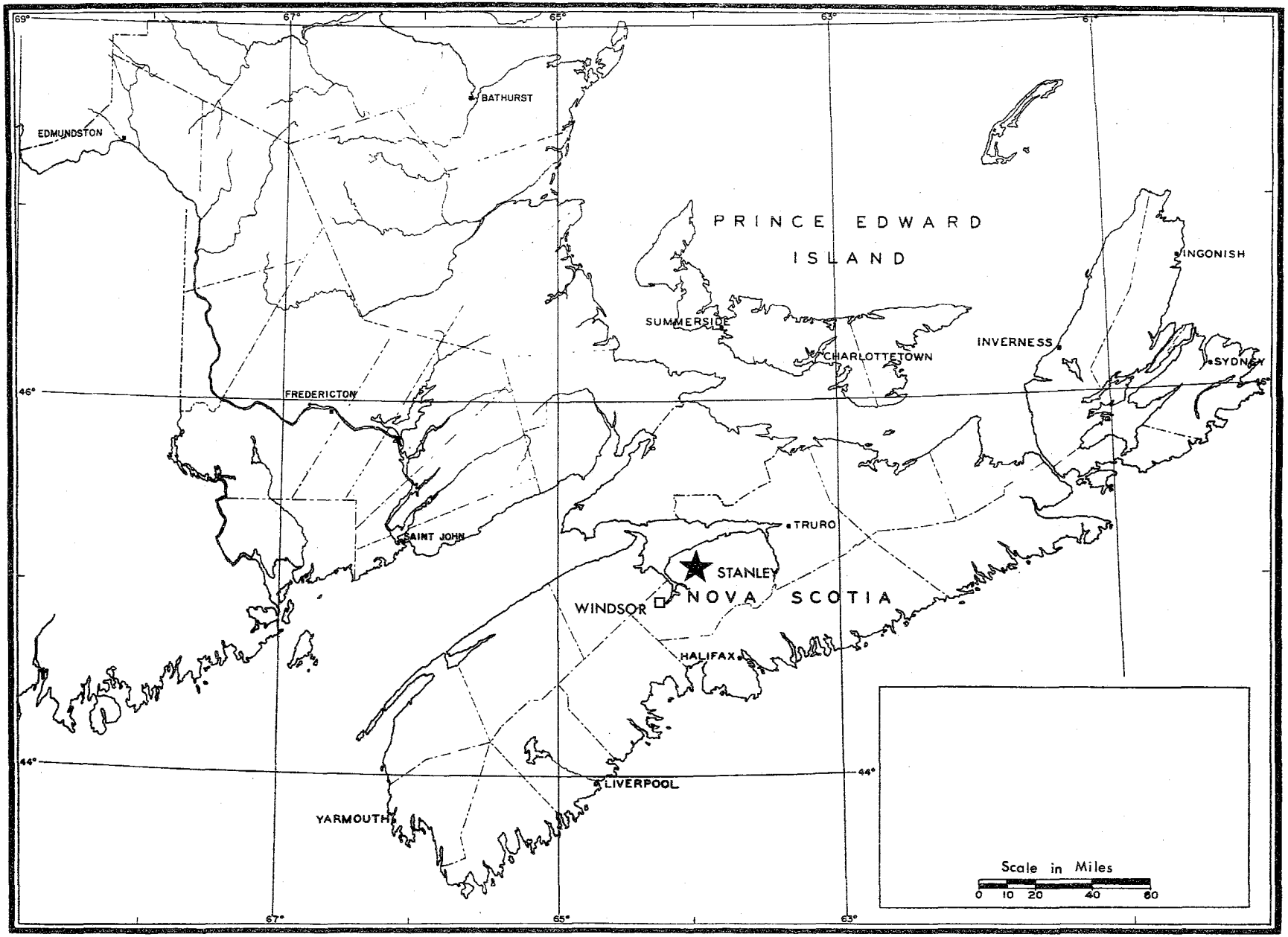

Fig. 1. Location of the study area (Stanley, Hants County)

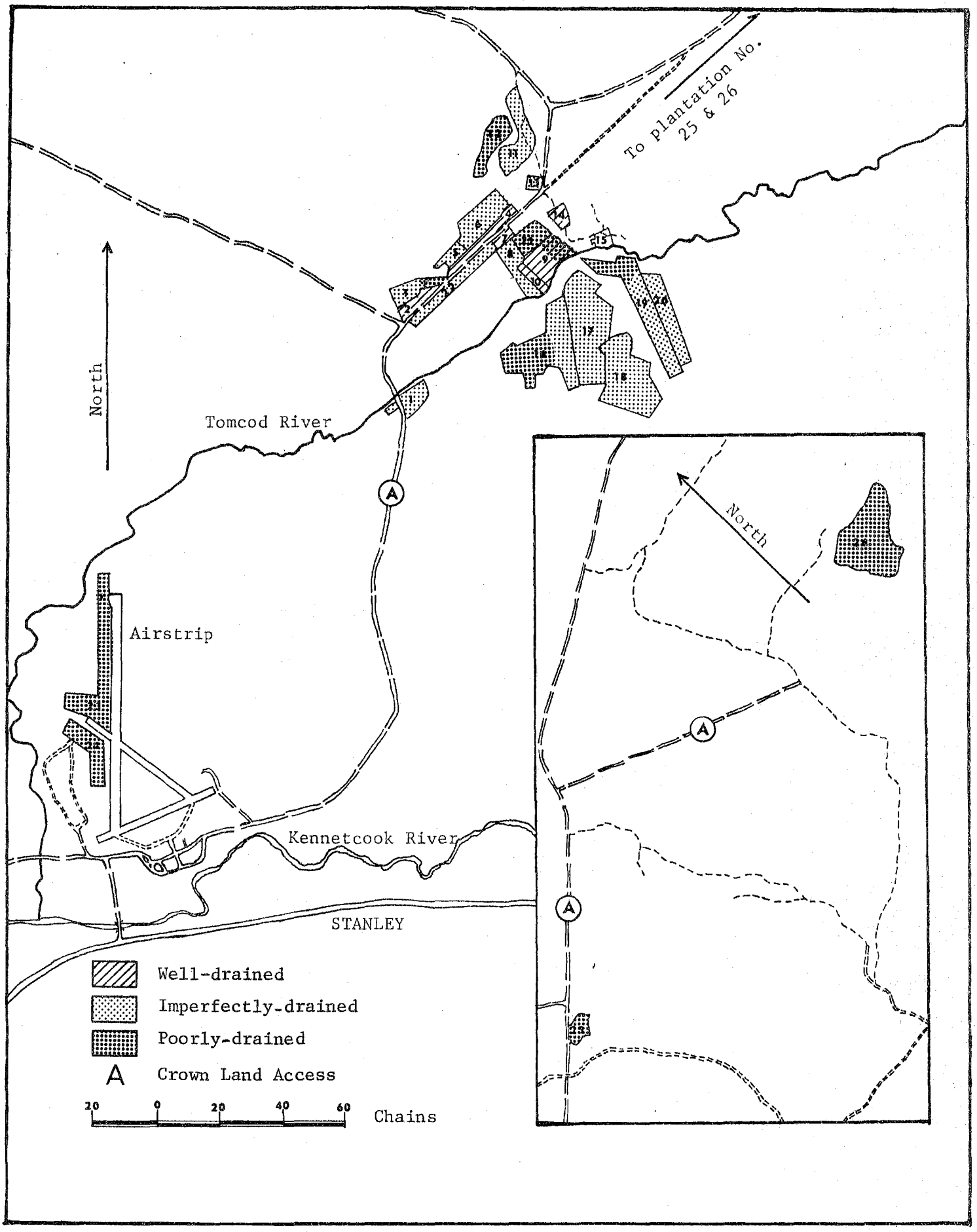

Fig. 2. Locations and soil drainage conditions of plantations assessed in the Stanley Management Unit, Hants County.

Climate

The Stanley Management Unit lies within the humid temperate zone, with a moisture index varying from 80 to 100. The climatic data were recorded (36 years) at the weather station in Windsor about 32 km south of the plantations. The mean annual temperature is about 11°C, with an average minimum of -10°C in February and an average maximum of + 24°C in July. The annual average precipitation is 1196 mm which includes 1755 mm of snow. The frost-free period is about 120 days.

Soils

The assessed plantations are located on Queens soil series according to maps prepared by Cann, Hilchey, and Smith (1954). In general, soils of the Queens series have a thick layer of poorly decomposed organic matter on the surface; the A horizons are pinkish-grey and have a sandy loam texture; the B horizons are reddish-brown sandy clay loam to clay loam, usually compact down to the C horizon, and are heavily mottled with grey and yellow streaks; the parent material is coarse, highly mottled, and impervious. These soils remain wet most of the year.

In addition to the above general classification based on maps, one soil profile from a pit dug in each plantation was examined. Observations of the soil pits showed differences in the thickness of the horizons, moisture content or level of ground water, depth of compaction, and depth of rooting. The topography is undulating with differences of less than 3 to 5 m in elevation. The micro-relief of the sites was responsible for the formation of the soil profile characteristics and moisture content. Water moves over and through the soil very slowly and lies for long periods on the level areas, but generally percolates more rapidly on sloping sites. Within the Queens soil series, three classes of soils were recognized; (A) well-drained, (B) imperfectly-drained, and (C) poorly-drained. The surface soil and subsoil of the three types showed varying degrees of mottling and stoniness, and different textures (Fig. 3). The differences between the well-drained (A) and imperfectly-drained (B) soils were due to differences in the level and nature of the

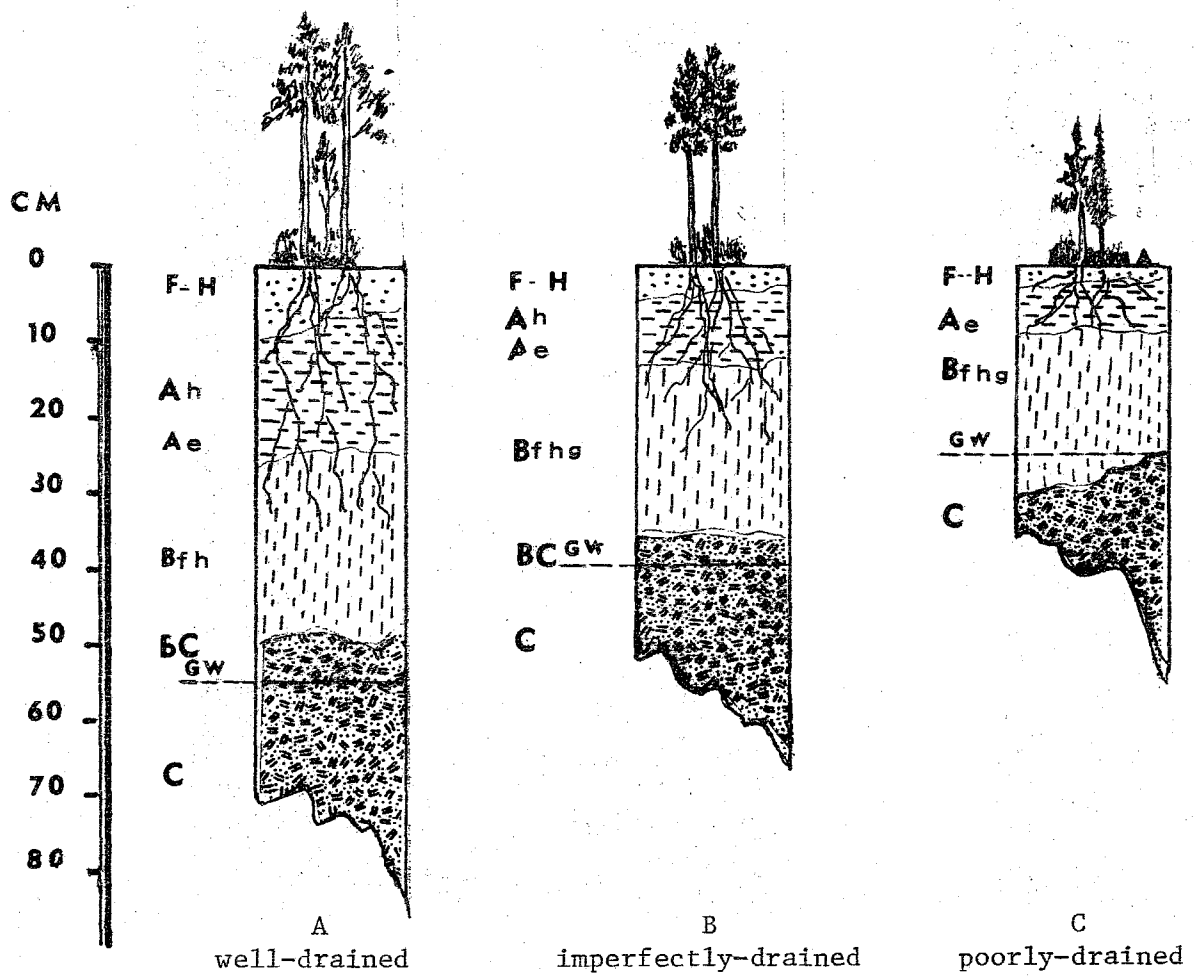

Fig. 3. Schematic presentation of humic podzolic soils of different drainages classes in the Stanley Management Unit.

Fig. 4. Profile of No. 14 plantation, having a well-drained, deep podzolic soil; Aeh - silty clay loam, Bfh - sandy clay loam, and BC - clay loam down to 50 cm.

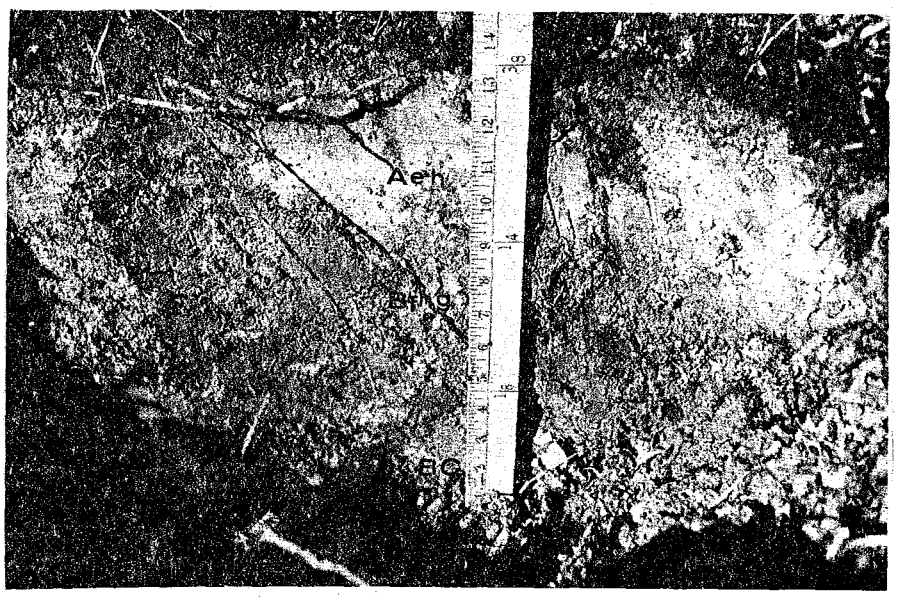

Fig. 5. Profile of No. 8 plantation, classified as imperfectly-drained, humic podzolic soil of moderate depth; Aeh - silty loam, Bfhg - stony clay loam, BC - stony clay loam, and C+ - compacted clay down to about 40 cm.

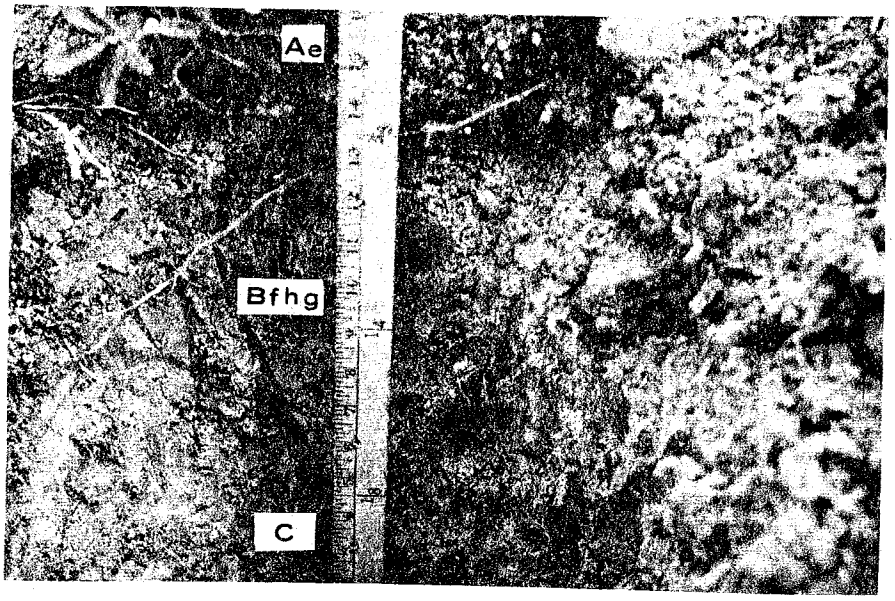

Fig. 6. Profile of No. 20 plantation classified as poorly-drained, humic podzolic soil of shallow depth; Ae - silty loam, Bfhg - mottled clay loam and stony clay down to C, C+ - compacted clay down to about 30 cm.

ground water. On till slopes and knolls the soils appeared to have good drainage (type A), but there was seepage farther down the slope due to water running along the impervious substratum (type B). In the poorly-drained soils (type C) the Ah horizon was usually lacking and under the Bfhg horizon was a 5- to 10-cm layer of clay. Iron-hardpan formation was not detected in any of the soil pits (Fig. 4, 5, and 6).

Vegetation

Poorly- and imperfectly-drained sites in the Stanley area support a black spruce-balsam fir forest often mixed with white spruce, red spruce, hemlock, tamarack, and several hardwoods such as red maple, white birch, and trembling aspen. On well-drained soils, naturally regenerated red pine thrives in productive pure stands. According to Dwyer (1975) "red pine is the most valuable species there. Red pine poles and pilings bring top prices".

Different ground cover species and communities are associated with the differences in site conditions. Each association has its characteristic plants and indicates the productive capacity of the forest stands. Most of the heath plants are represented in varying degrees, and generally dominate the area. Lambkill grows in abundance on the best to the poorest sites. Blueberry forms an important part of the shrub population and grows beneath the lambkill and other heath shrubs such as rhodora, Labrador tea, and huckleberry. Bracken is dominant on fresh, well-drained soils and sweetfern associates with it in varying abundance. Labrador tea, rhodora, and leatherleaf indicate poorly drained plantation sites. Heath plants probably have dominated this area for some time; fire has also swept the area frequently. Few grasses grow in the plantations. Nevertheless, manna grass, a remnant of cut-overs or fire, should be mentioned because it indicates poor drainage and low productivity on some sites.

Planting

All plantings were done in the spring by spade, using slit or hole planting. Stock was grown in the Forest Tree Nursery at Lawrencetown, Nova Scotia which is operated by the Department of Lands and Forests. The records of the origin of stock are incomplete but it is assumed that some of the seeds were from local sources for the earlier plantations; later seeds were purchased from Maine and Ontario sources.* There was no cultivation or treatment after planting except in No. 2 and 7 plantations which were fertilized with 220 kgm nitrogen per hectare and No. 23 plantation which has been treated with 450 kgm/ha of 60-20-10-10 fertilizers.*

STUDY METHODS

In August 1973, 10% of the trees in each plantation, in randomly selected rows, were measured to determine survival, height, height increment, and diameter (at breast-height if the tree was over 200 cm high and at the stump if under 200 cm). The survival figures include all planted trees which were living at the time of the survey,

*Written information from the Silviculture Section of the Department of Lands and Forests through G.D. van Raalte.

whether or not they had reached measurable diameter. In the analysis, mean diameters of trees over and under 200 cm in height in each plantation were calculated by the basal area method. Age refers to time since planting to avoid any confusion that might arise from the different age class of the seedlings. All plantations were examined for diseases, insects, and other forms of damage. Percentage cover of the dominant and other important ground vegetation species was also assessed. Detailed data are available from the study records filed at the Maritimes Forest Research Centre, Fredericton, New Brunswick.

RESULTS

Spacing and Survival

The most common spacings used in establishing these plantations were 2.1 x 2.1 m, 1.8 x 2.1 m, and 1.8 x 1.8 m (Table 1), but 2.4 x 2.4 m, and 1.8 x 2.4 m were also used. There is neither record nor evidence that fill-planting was conducted in any plantation.

About 75% of the seedlings planted were 3 + 0 stock, and the remainder 2 + 2. The data suggest that survival rates are not related to the type of stock used (Appendix A, and Fig. 7) nor to the spacings. Weighted average survival for 3 + 0 material was 64% and for 2 + 2 material, 46%. If the four poorest plantations, Nos. 23 to 26 inclusive, are excluded, the survival percentage increases to 73% for 3 + 0 seedlings, and to 80% for 2 + 2 seedlings. The data indicate much lower survival rates for the younger plantations than for the older ones (Table 1), and a significant relationship was found between plantation age and survival (Fig. 7).

This relationship appears to be the result of relatively low survival of several young plantations, whose poor success can be attributed to inadequate soil drainage and aeration, and competition from grasses and heath shrubs, rather than from the condition of the seedlings at the time of planting or the quality of planting. For instance, plantations 23 and 24 where the lowest survival rates were recorded, were located on about 20 ha used until 1946 by the Air Force as the

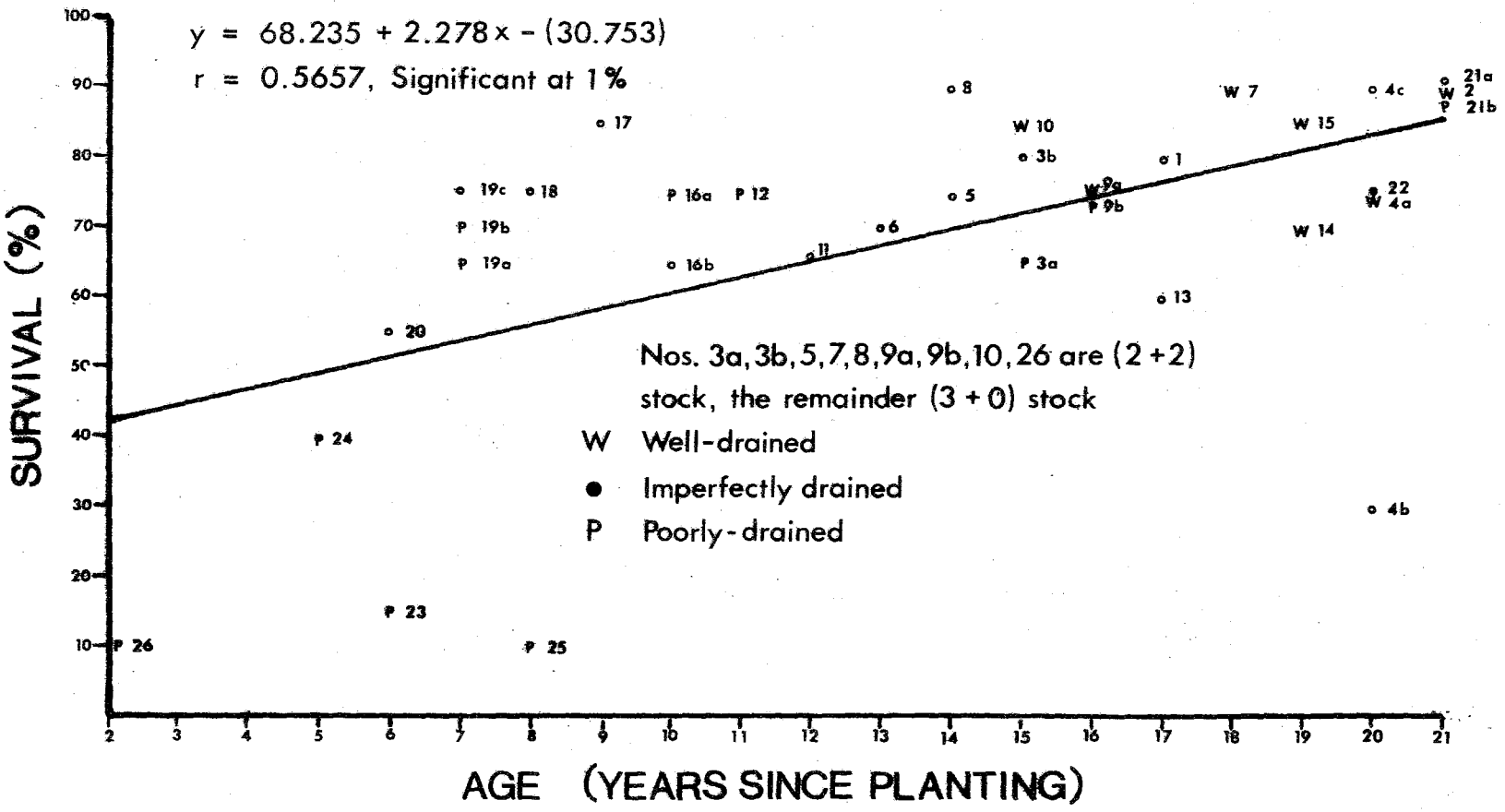

Fig. 7. Survival in Relation to Age for 3 + 0 and 2 + 2 stock.

runway of an airstrip. Because the ground had been compacted by heavy machines and airplanes, the seedlings were unable to extend their root systems into the compacted soil and could not compete with the dense cover of grasses. The other two plantations displaying very low survival, Nos. 25 and 26, were established in shallow, heavy, wet soil in about 3-m wide bulldozed strips. Substantial amounts of humus had been scraped off the surface, allowing water to lie in the low spots. On these sites the seedlings apparently failed because of excess moisture, frost heaving, late spring freezing, and poor soil aeration. One other plantation exhibiting a low survival rate, No. 4b, was also located in a clay loam soil with poor drainage. Survival rates for the different soil drainage classes ranged from 70 to 81% (Table 2). The estimated average number of trees planted in each drainage class (2.1 x 2.1 m spacing) was 1837 trees/ha for well-drained, 1670 trees/ha for imperfectly-drained, and 1580 for poorly-drained soils. These numbers of trees, especially in the poorer soil categories, are not sufficient to produce merchantable stands of red pine, based on current standards. Therefore, denser spacings are suggested for plantations if established in soils of low productive potential.

Table 1. Proportions of the plantations established at different spacings, and survival (%) by age and spacing

	Spacing (m)						Area
	1.8x1.8	1.8x2.1	1.8x2.4	2.1x2.1	2.4x2.4	Average	(ha)
			% by Area				
Proportion of plantations	22	26	1	44	7		
			% Survival				
Age of the plantations (yrs)							
>10	58	75		16	55	47	69.4
11-15	73			74		74	31.3
16-20	76	75	90	65		74	15.6
21-					90	90	4.6
Weighted average survival (%) for all plantations:						59	120.9

Table 2. Red pine growth and survival under three soil drainage conditions

Site	Mean height (cm)				Coeff. var. (C%)	Average age (years)	*Yearly height increment (cm)	Diameter dbh (cm)				Basal area/ha (m^2)	Survival (%)	Depth of ground water (cm)	Rooting depth (cm)	Plantation numbers
	Age (yr)							Age (yr)								
	<10	11-15	16-20	21-25				<10	11-15	16-20	21-25					
Well-drained			406	411	26	19	21			7	7	7.827	81	55	45	2, 4a, 9a, 7, 10, 14, 15
Imperfectly-drained	58	104	202	220	37	17	12		3.5	4.5	4.5	+ 2.602	74	40	30	1, 3b, 4b, 4c, 5, 6, 8, 11, 13, 21a, 22, 16b, 17, 18, 19c, 20
Poorly-drained	50	84	102	132	39	11	7		3.3	3.5	3.5	+ 1.537	70	25	15	3a, 9b, 12, 16a, 19a, 19b, 21b, 23, 24, 25, 26

* Height increment was computed for plantations over 12 yrs of age.
\+ Basal area was based on trees of over 3 cm dbh only.

Many trees had branches and tops dead or broken by wind and snow. Others were bent or damaged by porcupines, insects, or diseases. Red pine is presenting more problems in Nova Scotia than the other conifer species, possibly because it is being used widely and on unsuitable sites.

Pine shoot moth, *Rhyacionia buoliana* (Schiff) infestation was severe in plantation 6 and low to moderate in almost all other plantations. Needle cast (caused by *Lophodermium pinastri*) was common, the heaviest infection being in plantation 4. Shoot blight (caused by *Sirococcus strobilinus*) was recorded in plantations 2, 11, and 12 where about 50% of the trees were attacked; for additional information on shoot blight see Magasi (1975). Heavy porcupine damage was observed in plantations 10 and 15; both plantations were about 20 years old. None of these damaging agents were found in plantations 17, 18, and 20, which were less than 10 years of age.

Growth

Data on mean height, diameter, height increment, and basal area for different soil drainage classes and plantation ages are presented in Table 2. Mean heights showed a highly significant relationship with length of time since planting (Fig. 8.) All of the older plantations that were established in the well-drained area of the Management Unit showed above average height growth (Table 2). Many of the young plantings in the poorly drained area have below average height growth.

Mean diameters of trees more than 10 years old follow the same pattern as mean height, decreasing from the well-drained to the poorly-drained soils. Trees under 10 years of age showed inconsistent relationships between height and diameter. For instance, the mean height in plantation 17 was 82 cm and the diameter 2.5 cm, while the mean height in plantation 24 was 40 cm and the diameter 3 cm. Differences in soil drainage and other site conditions probably caused these wide differences in diameter growth of the younger trees.

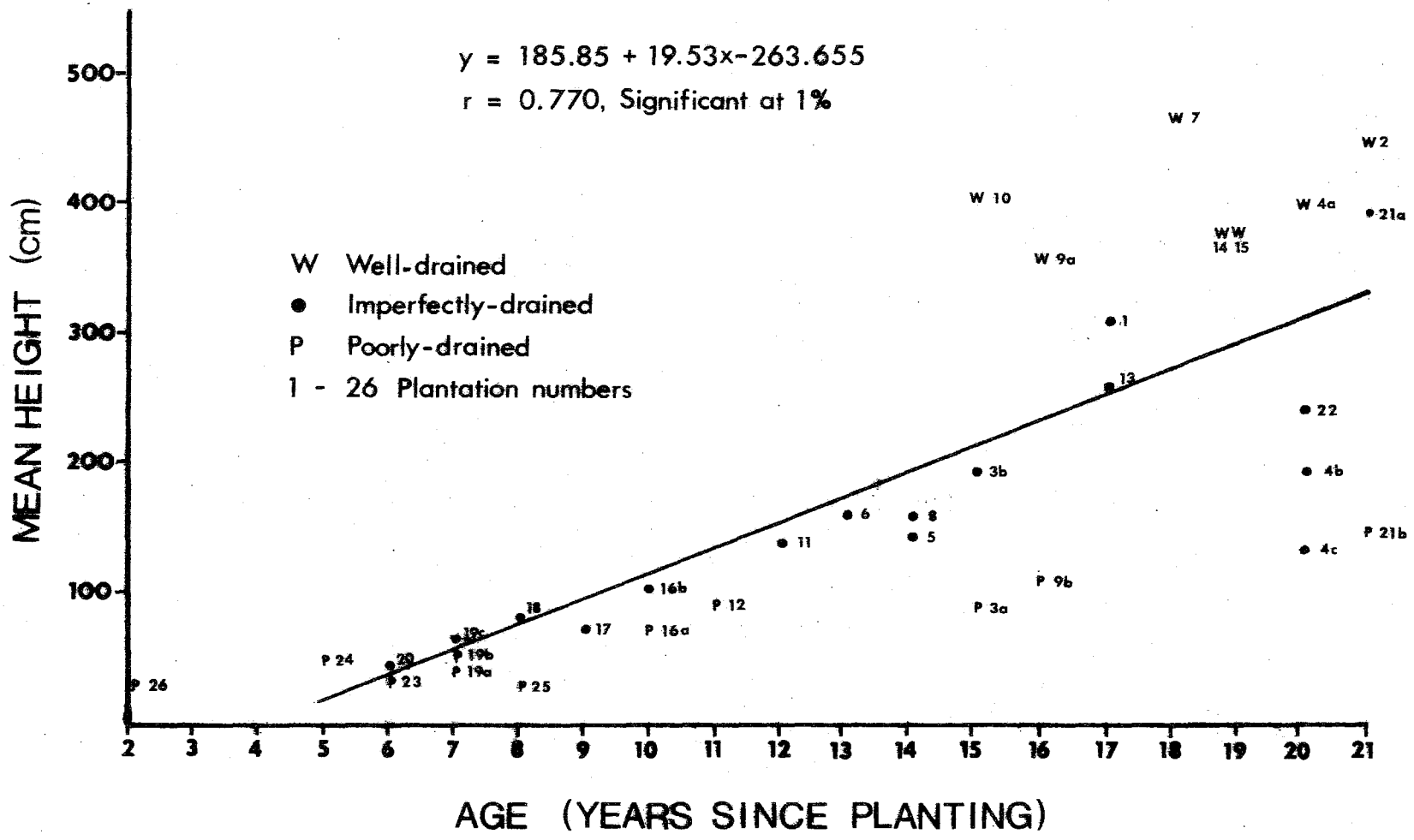

Fig. 8. Relationship between mean height and age of red pine growing on three soil drainage classes in the Stanley Plantations.

Annual height increment (Table 2) of plantations over 12 years old shows a similar relationship to that for total height; average increment was 21 cm on well-drained soils versus 7 cm on poorly-drained soils. Variability was also less on well-drained soils (coefficient of variation of 26%) than on poorly-drained soils (coefficient of variation of 39%). Greater basal area was always associated with better-drained soils and closer spacings.

CONCLUSIONS AND RECOMMENDATIONS

Differences in survival and tree growth in the Stanley red pine plantations were compared. Source of seeds, treatment of seedlings, method of planting, initial spacing, and age-class of the planting stock probably all affected growth but soil conditions are considered the primary cause of significant differences in growth rate. This indicates the great sensitivity of red pine to soil conditions, and its preference for well-drained soils.

There was no evidence of any relationship between spacing and growth rate nor between stock age and percent survival. Mean height, mean diameter, and annual height increment decreased with increasing ground water level and decreasing depth above the compacted horizon. In shallow soils, where the subsoil is underlain by a firm clay layer at a depth of 25-30 cm, drainage is restricted and this depresses tree growth. Differences in soil/micro-relief interactions also affected tree growth within a planting unit. Plantations 3, 4, 9, 16, and 19 exemplified the high variation in physiographic features that was possible within an area and the growth rates here varied extensively from good to poor. The annual height increment on such sites was erratic, indicating that factors other than soil moisture and depth, such as the yearly water fluctuation, diseases, insects, or other damaging agents also affected annual tree growth. Growth variations between the different sites were so distinct that prediction of tree growth (and hence appropriate stand treatment) could be made in individual plantations, e.g. a plantation in

well-drained soil with subsoil of sandy loam over clay loam and ground water at a depth of about 50-55 cm can be expected to provide a productive stand of red pine if early thinning for poles and pilings is undertaken. In contrast, on shallow coarse sand or on firm clay with ground water and compacted horizon at 20-25 cm depth, poor tree growth and little wood of merchantable size can be expected.

To make an overall comparison between plantations in the Stanley Management Unit and other red pine plantations in southwestern Nova Scotia and in Ontario, height and diameter data were taken from Hughes and Yarn (1963) and from Stiell and Berry (1973), respectively. Hughes and Yarn assessed plantations in Lunenburg, Pictou, Halifax, and Cumberland counties on deep silty loam or sandy loam soils and found the following growth rates:

in 16-20 year old plantations, average height = 427 cm, average height increment = 24 cm and average diameter = 7 cm at breast height,

in 21-25 year old plantations, average height = 732 cm, average height increment = 34 cm and average diameter = 15 cm at breast height.

They predicted that the above stands will produce merchantable volumes and about 9 m^3/ha annual increment at 35 years of age.

Similar data were given by Stiell and Berry who prepared yield tables of different site-index classes for unthinned red pine plantations at the Petawawa Forest Experiment Station. Trees in these plantations averaged 706 cm high and 10 cm dbh at 20-25 years from planting on sites rated as site index 50, which is the lowest site-index class in the region. The relatively high growth figures from the foregoing references can be largely attributed to the better site conditions as compared to the sites at Stanley. It appears that red pine plantations at Stanley cannot provide the same wood production as red pine plantations on better soils (see Table 2 for comparison). In the Stanley Management Unit more stunted, damaged, diseased, and dying trees were observed in the plantations than in average natural stands. The disturbances cannot be attributed primarily to pathogens or insect attacks but are more

probably related to the shallow and poorly-drained soil, which in turn leads to poorly developed root systems, root injuries, and a greater susceptibility to damaging agents. Available cultural methods appear ineffective in the poorly-drained soils of the Stanley Unit, and the only practical alternative is to select proper planting sites for red pine, and to plant species more suited to excess moisture and shallow soil on the poorly-drained sites.

Data analysed in this study suggest that red pine of merchantable size can be produced in the Stanley Management Unit, by selecting sites adequate for the species, and by varying the initial spacing and the time and intensity of thinning on the different sites. A more detailed study of growth rates in relation to such factors as initial stocking, fertilizer treatment, natural red pine stands in the area, is necessary to derive more specific information on the establishment and tend techniques that would best satisfy this objective.

ACKNOWLEDGMENT

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APPENDIX A: Summaries of Plantation Records

Plantation number	1	2	3a	3b	4a	4b	4c	5
Planting date	57	53	59			54		60
Stock age (year)	3/0	3/0	2/2			3/0		2/2
Spacing (m)	1.8x1.8	2.4x2.4	1.8x1.8			2.1x2.1		2.1x2.1
Survival (%)	80	90	65	80	75	30	90	75
Mean height (cm)	312	450	91	196	400	197	132	146
Mean diameter (cm)	5.5	7.5	2.5*	3.0*	6.0	4.5	3.5*	3.5*
Soil texture	scl	cl	sc	cl	cl	cl	fsl	cl
Rooting depth (cm)	38	52	20	36	40	30	25	20
Compacted at (cm)	46	55	25	44	50	40	35	30
Drainage	Imp	Well	Poor	Imp	Poor	Poor	Imp	Poor
Area (ha)	2.8	2.3	3.6			3.6		1.8
Status	Fair	V.good	V.poor	Good	Good	V.poor	Fair	Fair
Number planted	7930	5600	7500			7790		3900

Plantation number	6	7	8	9a	9b	10	11	12
Planting date	61	56	60	58		59	62	63
Stock age (year)	3/0	2/2	2/2	2/2		2/2	3/0	3/0
Spacing (m)	1.8x1.8	1.8x2.4	2.1x2.1	2.1x2.1		1.8x1.8	2.1x2.1	2.1x2.1
Survival (%)	70	90	90	75		85	65	75
Mean height (cm)	161	468	159	360	112	409	140	93
Mean diameter (cm)	3.0*	5.0	3.0*	9.0	4.0*	7.0	4.0*	2.5*
Soil texture	scl	sil	cl	sl	cl	scl	sc	scl
Rooting depth (cm)	55	40	30	60	20	45	38	34
Compacted at (cm)	60	55	36	Nil	48	50	43	45
Drainage	Imp	Well	Imp	Well	Poor	Imp	Imp	Poor
Area (ha)	5.6	1.4	3.2	5.1		1.0	6.5	4.5
Status	Fair	V.good	Good	V.good	Poor	Good	Poor	Poor
Number planted	16700	3100	8000	1400		3210	15000	11000

Plantation number	13	14	15	16a	16b	17	18
Planting date	57	55	55	64		65	66
Stock age (year)	3/0	3/0	3/0	3/0		3/0	3/0
Spacing (m)	1.8x1.8	1.8x1.8	1.8x1.8	1.8x2.1		1.8x2.1	1.8x2.1
Survival (%)	60	70	85	75	65	85	75
Mean height (cm)	263	378	381	75	105	72	82
Mean diameter (cm)	6.0	5.5	9.0	2.5*	3.0*	2.5*	2.5*
Soil texture	cl	sand	sl	scl		scl	cl
Rooting depth (cm)	35	50	50	30	40	30	30
Compacted at (cm)	50	80	80	40	50	45	40
Drainage	Imp	Well	Well	Poor	Imp	Poor	Imp
Area (ha)	0.7	1.2	1.0	8.9		8.9	8.5
Status	Poor	Good	Good	Fair	Fair	Fair	Fair
Number planted	2970	3630	3000	24600		25000	22000

Plantation number	19a	19b	19c	20	21a	21b	22
Planting date		67		68	53		54
Stock age (year)		3/0		3/0	3/0		3/0
Spacing (m)		1.8x1.8		2.4x2.4	2.4x2.4		1.8x2.1
Survival (%)	65	70	75	55	90		75
Mean height (cm)	40	55	60	46	394	150	243
Mean diameter (cm)	2.0*	2.5*	2.5*	2.5*	4.5	3.5*	4.5
Soil texture	stony and rock outcrop			sc	cl	cl	scl
Rooting depth (cm)	25	30	35	30	30-35		30
Compacted at (cm)	30	40	45	45	45-55		45
Drainage	Poor	Imp	Imp	Poor	Imp	Poor	Imp
Area (ha)		8.5		3.4	2.3		4.9
Status	Poor	Fair	Fair	Poor	V.good	V.poor	Fair
Number planted		25000		6300	4500		10500

Plantation number	23	24	25	26
Planting date	68	69	66	72
Stock age (year)	3/0	3/0	3/0	2/2
Spacing (m)	2.1x2.1	2.1x2.1	1.8x1.8	2.1x2.1
Survival (%)	15	40	10	10
Mean height (cm)	39	50	Irrelevant	30
Mean diameter (cm)	---------- No diameter was measured ----------			
Soil texture	cl†	cl†	cl†	cl
Rooting depth (cm)	10	10	10	10
Compacted at (cm)	Shallow	Shallow	Shallow	Shallow
Drainage	Poor	Poor	Poor	Poor
Area (ha)	10.1	4.5	2.0	14.6
Status	V.poor	V.poor	V.poor	V.poor
Number planted	18700	12000	3000	22500

Total area - 120.9 hectares (equal to 298.7 acres)

Legend: sl - silt loam, sc - sandy clay, scl - sandy-clay-loam, cl - clay loam, fsl - fine sandy loam

* Diameter was measured at stump (under 200 cm of height)
† Compacted surface caused by heavy machines

APPENDIX B: Common and Botanical Names of Species Cited in Text

Common and Botanical Names of Species Cited in Text

Blueberry	*Vaccinium augustifolium* L.
Bracken	*Pteridium aquilium* (L.) Kuhn.
Huckleberry	*Gaylussacia baccata* (Wong.) K.Koch
Labrador tea	*Ledum groenlandicum* Oeder
Lambkill	*Kalmia angustifolia* L.
Leatherleaf	*Chamaedaphne calyculata* (L.) Moench
Manna grass	*Glyceria canadensis* L.
Rhodora	*Rhododendron canadense* (L.) Torr
Sweetfern	*Camptonia peregrina* (L.) Coult.
Fir, balsam	*Abies balsamea* (L.) Mill.
Hemlock	*Tsuga canadensis* (L.) Carr.
Spruce, black	*Picea mariana* (Mill) BSP
Spruce, red	*P. rubens* Sarg.
Spruce, white	*P.glauca* (Moench) Voss
Tamarack (Eastern larch)	*Larix laricina* (Du Roi) K. Koch.
Aspen, trembling	*Populus tremuloides* Michx.
Birch, white	*Betula papyrifera* Marsh.
Maple, red	*Acer rubrum* L.