forestry report

PRAIRIES REGION, CANADIAN FORESTRY SERVICE

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ADVANCES IN SILVICULTURE

Canada's forested areas, whether used for the production of lumber and other wood products, water and wildlife or for recreation is a renewable resource and should be managed as such. This has been said many times in many different ways, but it bears constant repeating in a society seemingly devoted to demanding the greatest return for the least amount of money and effort invested without consideration of the long term values and social goals.

The second issue of Forestry Report deals primarily with Silviculture – the art and science of cultivating a forest – with emphasis on current developments in regeneration. This is not by chance, for in management of the renewable resource the re-establishment of productive areas that have been disrupted by utilization or abuse, is fundamental. There is also some urgency in this task, as evidenced by growing conflicts in land use. The rapidly increasing demand on the fixed amount of available land, by all resource sectors – wood fibre, water, minerals and recreation can only be satisfied by better management.

Some of the silviculture research and development projects and their application in better management of the forest estate are described in this report. It may also be of interest to note some recent developments in staff and program structure designed to achieve greater efficiency with limited manpower and funds. One approach being tested is the formation of multi-discipline teams of scientists, each with a projects co-ordinator and each committed to the solution of the highest priority problems within a well-defined program area. One team, the "Stand Establishment Group" has been formed and is now operational under the leadership of Mr. F. Endean. This team, committed to the solution of problems associated with stand establishment after harvest and fire, includes specialists in silviculture, ecology, soils, land classification, tree physiology, pathology and economics. They are now actively engaged in-programs, or they are developing programs in conventional planting, container planting, nursery management, control of vegetative competition, biological and economic evaluation of reforestation programs, and techniques. Another group being formed will be known as the "Growth Group". This team will be committed to the task of increasing the productivity of various forest areas and will be involved with problems of site preparation, fertilization, tree spacing, and tree improvement.

Another significant development in our program and staff structure is the formation of the Appraisal Crew. A very important function of this unit is to obtain hard data on the state of the forest resource and on the nature and scope of problems faced by the resource managers. The data obtained will provide a factual basis for program planning and selection of problems for the attention of research teams such as the Stand Establishment and Growth Groups.

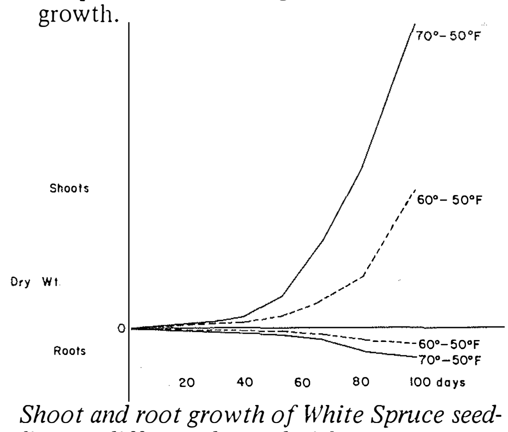
IN THIS ISSUE... SILVICULTURE

CONTAINER SEEDLING DEVELOPMENTS

Approximately 3,000,000 container seedlings will be planted this year in Alberta, and smaller numbers in pilot projects in Saskatchewan and Manitoba.

The Canadian Forestry Service has been monitoring and investigating the performance of container seedlings in greenhouse and field since 1966. These studies are now beginning to bear some fruit and the results are relevant throughout the Prairies Region. At a recent meeting with the Alberta Forest Service and the Alberta Research Council (who are conducting contract research on a new container system for the Forest Service) the following important points were made:-

1. Standard plant nutrient solutions are adequate for rearing conifer container seedlings. Patent horticultural mixtures such as RX15 and RX30 are not recommended because of nutrient imbalance and vague instructions for this application. (For specifications of nutrient solutions contact the Canadian Forestry Service, 5320 - 122 Street, Edmonton.)
2. As far as possible greenhouse rearing temperatures should be kept down to 60 - 65°F during the day since higher temperatures encourage excessive shoot growth.



Shoot and root growth of White Spruce seedlings at different day and night temperatures.

3. Field survival and growth in the rigid styrene ¾" x 3¼" tube are generally not satisfactory and it is no longer recommended.
4. Rooting volume has a strong effect on the size of the seedling produced in a given time. Recent trials on 15 week old seedlings show the following growth for seedlings of the same age.

Container Type	Rooting Volume (cu. in.)	Seedling Dry Wt. (mgs.)
½" x 3"	0.62	0.09
¾" x 3¼"	1.43	0.13
1" x 3"	2.37	0.25

A full investigation on the effect of rooting volume on seedling size is planned, in the meantime a minimum of 2.0 - 2.5 cu. inches has been suggested for operational use.

5. Seedlings where containers are removed before planting perform considerably better in terms of growth and establishment than when planted in the containers.

6. None of the containers tested so far have produced satisfactory survival on dry subalpine sites where fall droughts are common. This type of site should be avoided for the present.

7. There is a large reduction in survival figures for the same type of stock between research and operational planting. It seems that there is not enough care taken in operational work, perhaps due to lack of supervision.

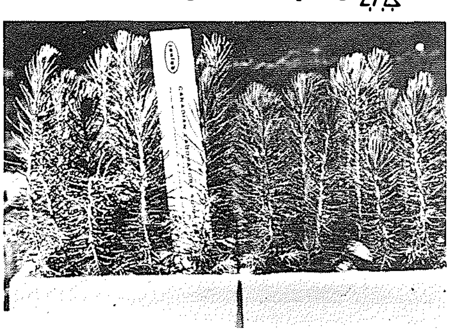
8. Of all containers tested, the ¾" x 3¼" styrene container shows poorest root development outside the container after planting. This varies between 10 - 20% of total root system for pines.

In future there will be an increasing emphasis on the use of larger container seedlings produced by larger rooting volumes and longer rearing periods, and planted in plug form (i.e. without containers). They are expected to show much more rapid establishment and early growth when planted under favorable conditions. Indeed, planting conditions for container seedlings have often been ignored in the past. in favor of rigid adherence to schedules and quotas. This must change. Container seedlings are still living trees and as such, must perform better when planted in cool, moist conditions than when planted in warm, dry conditions.

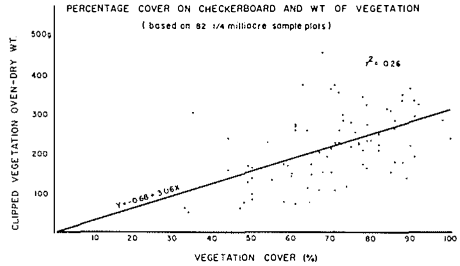
One of the rearing systems which will be tested extensively in the prairies region was developed by the C.F.S. in B.C. and has been christened the "B.C. plug".

In this system the seedling is grown in peat in tapered sockets in a styrofoam block. For planting it is pulled out and plugged tightly into a dibbled hole complete with its rooting medium.

Pilot plantings of this type and of a type being developed by the Alberta Research Council will be established by the C.F.S. on selected representative sites in the Prairies Region this spring.



Spruce seedlings in BC/CFS styroblock.



Vegetation cover % is directly related to weight of vegetation.

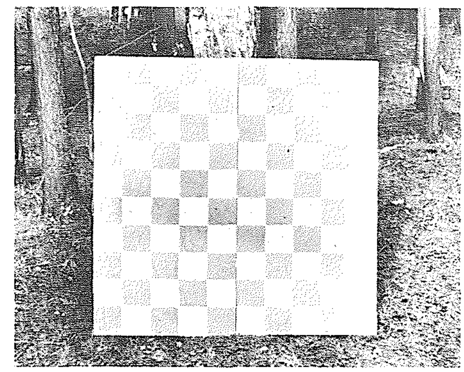
VEGETATION COMPETITION AND REGENERATION CHANCE

To evaluate and compare sites for regeneration chance, a simple and effective means of assessing vegetation competition is being tested in Alberta's mixedwood. It involves the elements of key species, density and height growth. A 4 x 4 foot checkerboard with 100 squares is set up vertically at sample stations and sighted from a distance of ½ chain. Squares not covered by stems or foliage are counted to give a total percentage covered.

Competition from ground vegetation is a serious threat to the successful establishment of conifer seedlings and transplants. Canopy manipulation and site preparation to improve survival and growth of conifer stock also favours the proliferation of ground vegetation. Conditions are often aggravated by a rise in the water table following logging. Grasses quickly re-invade cleared areas when underground rootstalks respond to increased temperature and light. Assessment of existing and potential competition is part of the appraisal of "regeneration chance" on logged and burned-over areas. The severity of competition will limit the choice of regeneration methods and set the cost of site preparation.

Under test conditions the checkerboard as shown has been used to relate oven-dry weight of all vegetation clipped on a ¼ milliacre plot at each sample station i.e. at the foot of the board. The resulting regression is illustrated. Further testing of the techniques for sighting on the board, distance from the station and size of board are required to help explain a greater percentage of variation. However the present 4 x 4 board was used to compare vegetation competition on 6 - 10 acre cut blocks and 3 - 10 acre control blocks in a spruce-aspen shelterwood study area at Smith, Alberta. Summary figures in the accompanying table show that it may be possible to relate % cover to competition, canopy density and seedling growth. Vegetation cover is greater, seedlings fewer but larger on the cut blocks. These seedlings are truly "survivors".

Vegetation competition is the object of an increasing research effort by the Stand Establishment Research Group, at the Forestry Research Lab in Edmonton.



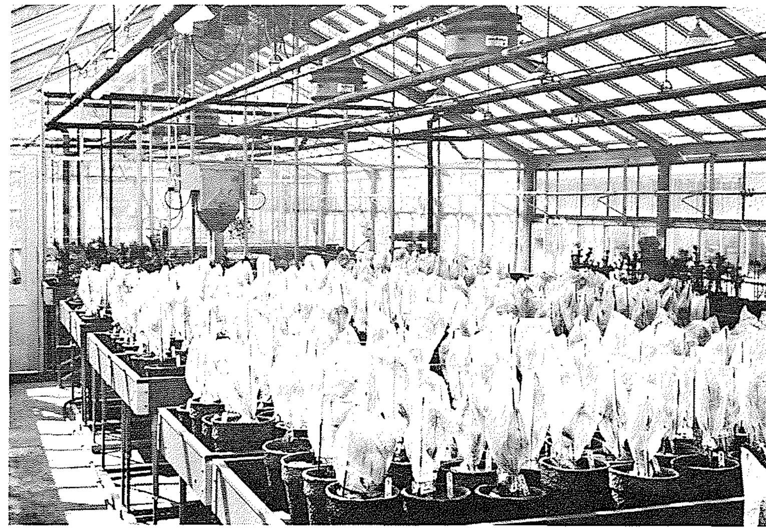
The 4 x 4 foot cover board has 100 squares.

80% Cover

TABLE: Regeneration on logged-over and uncut stands (white spruce seedlings 1959-1969)

Parameter assessed	Site	Logged-over	Uncut
Vegetation Competition (% cover)	Dry	70	51
	Moist	77	51
	Wet	76	44
	Mean	74	48
Regeneration Stocking (%, milliacre)	Dry	17	32
	Moist	17	43
	Wet	15	25
	Mean	16.3	33.3
Mean height ins. (tallest seedling each quadrat)	Dry	15.5	9.4
	Moist	14.4	10.5
	Wet	14.2	7.4
	Mean	14.7	9.4
Mean leader length ins. (tallest seedling each quadrat)	Dry	1.9	1.0
	Moist	2.2	1.4
	Wet	2.6	1.0
	Mean	2.2	1.2

GREENHOUSE FACILITIES PROVIDE A RESEARCH OPPORTUNITY



It is always growing season in the greenhouse.

A long required service area for forestry research in this region is now a reality with the construction of greenhouse facilities at the Canadian Forestry Service Research Laboratory in Edmonton. We now have three greenhouses, each with 1827 sq. ft. of area under glass and approximately 920 sq. ft. of bench space. Accompanying the greenhouses is a large headerhouse containing 1814 sq. ft. of open preparation area, four laboratories (1102 sq. ft.) and a greenhouseman's office (120 sq. ft.).

Forest seedling research, can now be carried on throughout the year. In the seedling damping-off control study, one year in the greenhouse can be equivalent to 8 years in the field. This means that research information can be obtained and released quicker to give the forest manager more information in a shorter time.

The greenhouses are equipped with both city and demineralized water, an air supply, humidifiers and summer coolers. Each greenhouse has five compartments, 2 large and 3 smaller ones. At present there is fluorescent lighting in each of the smaller compartments. It is hoped that these compartments will soon be equipped with diurnal temperature controls. Future plans call for complete lighting of the greenhouses and day-night temperature controls for all compartments, thus expanding the total area that can be used for controlled environment studies. Features such as fluorescent lighting, day-night temperature controls, and humidity controls allow the researcher to carry on studies under simulated summer conditions though it is winter outside the glass.

At present space in the greenhouses is assigned to 16 of the 40 research scientists and encompasses silviculture, tree biology, tree improvement, pathology, FIDS, and soils. Much of the work is directed at rearing seedlings for lab research and for field experiments.

In addition to the area under glass, the accompanying headerhouse offers adequate space for preparation of soils and soil amendments to be used in the greenhouse experiments. It is equipped with a large soil sterilizer, a necessity in work where asceptic conditions are required. In any headerhouse area cleanliness is a virtue, but not always easily obtained. The present headerhouse has a large central wash-down drain channel making it fairly easy to clean. The complementary headerhouse laboratories equipped with adequate services offer a unique advantage. They will literally save miles of walking from greenhouse to the labs in the main building.

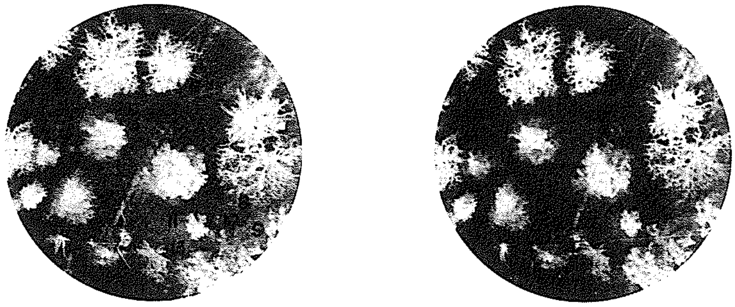
FOREST PROGRAM APPRAISAL CREW ACTIVITIES

In recent re-organization of the Canadian Forestry Service a forest appraisal crew was created within the Liaison and Development Section. The Appraisal group is comprised of 1 forester and 4 experienced technicians. They are responsible for a variety of forest surveys and assessments that will provide the basis for analyses of major forestry problem issues raised by Provincial resource management agencies and industry in the Prairie Region.

In 1970, this group took a look at the impact of overstocked lodgepole pine on stand productivity on a representative area near Rocky Mountain House. Ground sampling was conducted prior to aerial photography to ensure photo coverage of the greatest diversity of age and density classes. Hopefully a definition of specific stand densities related to the over-stocking problem can be obtained. In addition an assessment of the economic impact on productivity of these overstocked stands will be available for forest management agencies. Therefore we will know the result of non-treatment and the benefits of taking corrective action.

Stem counts per acre from ground sampling and from large scale false-colour aerial photograph (1" = 200') interpretation were compared but the degree of error has been high. In fact, better photo quality and perhaps larger scales (1" = 50', in black and white photography) are now being considered before wrapping-up this project. However, on black and white photography, scale 1" = 1320', tonal differences of forest cover types provided a further differentiation of the current criteria (degree of crown closure) used to denote types in the R-9 unit. This work is continuing and promises to show the merits of large scale photography to obtain acceptable counts of stems per acre.

RECENT MANAGEMENT APPLICATIONS OF PHOTOGRAMMETRY



Tenth-acre plot enlarged from 1:2400 photography.

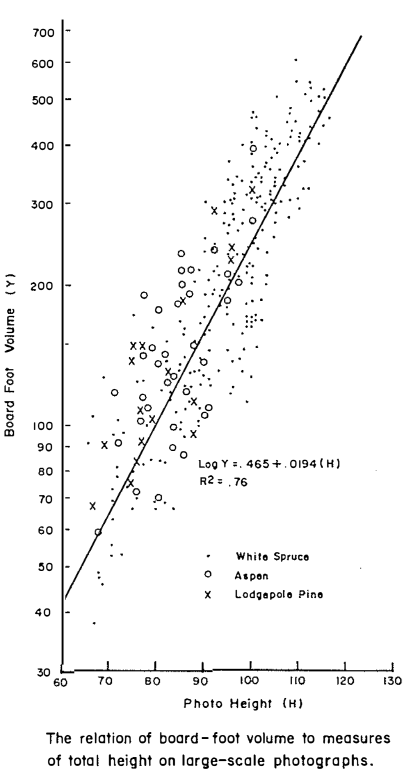
The old-time timber cruiser who spoke little and walked a lot, and who needed no more than his bedroll and pack of beans to live, is gone. To replace the work of these rugged men, and hopefully to improve upon their estimates of timber volumes, the use of aerial photography is increasing.

The C.F.S. Prairie Region, in co-operation with the Alberta Forest Service, Alberta Research Council and the University of Alberta, is developing improved forest and land inventory methods for the boreal forest region. A pilot project in the Peace River Forest in management unit P-6 (1200 square miles) has been initiated.

Large-scale (1:1200 to 1:2400) photography may become the economical way of sampling forests, especially for remote areas. The best results to date for large-scale photo sampling of timber volumes have been achieved in Alberta with a Vinten 70 mm camera, 12-inch lens, Super XX black-and-white film with no filter, at a scale of 1:1200 to 2400 for merchantable stands with 1000 stems per acre or less. Denser stands require larger scales. The photography in the stereo pair is an example taken in mid October. Accurate scale control is essential. The forestry radar altimeter shown was tested by the Alberta Forest Service with the technical assistance of Dr. U. Nielsen of Canadian Forestry Service, Forest Management Institute and of Mr. R. L. Westby of the National Research Council of Ottawa. Accuracy checks in the Alberta trial indicate the radar altimeter was within ± 1 per cent of the flying height at 2400 feet above the ground. With such accurate scale control tree heights based on parallax measurements are usually within ± 5 feet of the ground measurement and from photo measures of crown area and tree height, it is possible to estimate tree diameter to a percision of ± 2 inches at high statistical confidence levels. The high correlation of tree volume to tree height in a mature spruce-aspen stand in the Peace River pilot project is shown.

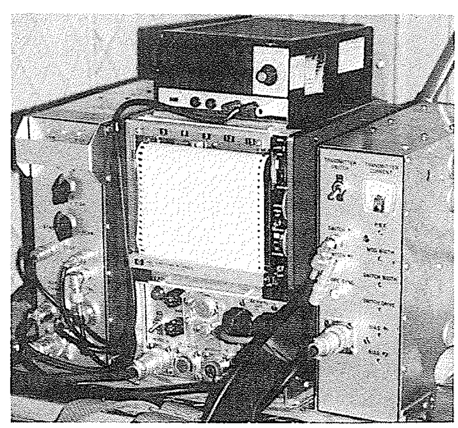
In addition, photography taken with 9 x 9 inch aerial survey camera using Ektachrome color and infrared films is being evaluated. Species differentiation between white spruce and lodgepole pine at a scale of 1:1200 to 1:2400 is made possible. Cone crops, and insect and disease damage are also detected. On Ektachrome infrared photography at scales of 1:2400 and 1:20,000, aspen clones and/or areas where trees are under moisture stress appear to show up, and the possibility of mapping these features will be evaluated in 1971. In addition scales at 1:50,000 and 1:100,000 will be tested.

The amount of detail that may be observed and measured appears to be best on positive transparencies (diapositives) produced from the black and white negative or directly from the Ektachrome film. Positive transparencies of Ektachrome infrared for mapping at a scale of 1:20,000 provide a great deal of detail and it now appears that scales smaller than 1:20,000 may be suitable for many forest and land inventory projects. This rapidly developing technology is a valuable tool in Canadian land-use planning and assignment.



The relation of board-foot volume to measures of total height on large-scale photographs.

A.F.S. aircraft with radar dish and Vinten camera mounted.



Strip chart recorder and electronic package for radar altimeter.

STRIP THINNING IN PINE

Mechanical strip-thinning is an effective and low cost method of density control in young pine stands. Diameter growth rate of the largest trees as much as doubled on moist and fresh sites within five years after strip-thinning dense, young (approximately 10 years old), jack pine stands of fire origin in south-eastern Manitoba. A report published recently (Bella and DeFranceschi, Can. Forest. Serv., Inform Rep., A-X-40, 1971) further states that trees in less dense stands responded better. An exploratory study of strip-thinning 25-year-old lodgepole pine stands in the foothills of Alberta also showed doubling of diameter growth rate for all tree sizes within four years after treatment.

Over-dense jack pine and lodgepole pine stands that often become established after forest fires require thinning at an early age to maintain rapid tree growth. Low cost mechanical strip-thinning with a drum-chopper appears to be an economic solution to density control in young stands.

Beginning 1963, a large-scale program of thinning was initiated by the Manitoba Operations Branch in young (9 to 17 years old) jack pine stands of fire origin growing on light, sandy soils in south-eastern Manitoba. In 1965, the Alberta Dept. of Lands and Forests started a similar program in 25-year-old lodgepole pine stands growing on fairly deep, loamy soils in the foothills. The chopper used for "thinning" was dragged by a crawler type tractor, that cut trees in an 8-foot swath. Thinning was done in parallel strips – 8-foot cleared swath alternating with about 10-foot-wide reserve strips in Manitoba, and with 4-foot reserve strips in Alberta. It was not known at the start of these programs, how effective the treatment was likely to be for increasing the growth of residual trees; whether the chopper would cause excessive damage (wounds, breaks) to trees; and if the treatment would increase the incidence of insects and disease. It was also necessary to find out at what age, stand densities, and site types would such thinning be most effective and economical. To answer these questions for jack pine, the Canadian Forestry Service and the Manitoba Operations Branch undertook a co-operative study. The first study plots were established in the spring of 1964 in stands thinned in the previous fall. Additional plots were established in the spring of 1965 and 1966 and 1967, covering a range of site and stand conditions. Remeasurements were conducted on the plots at two and five growing seasons after treatment; future remeasurements will be in five-year intervals.

Manitoba Study

The highlights of the results obtained to date (for details see Bella, Can. Dept. Forest., Inform. Rep. MS-X-3, 1966; Bella and DeFranceschi, Can. Forest Serv., Inform. Rep., A-X-40,1971) include:

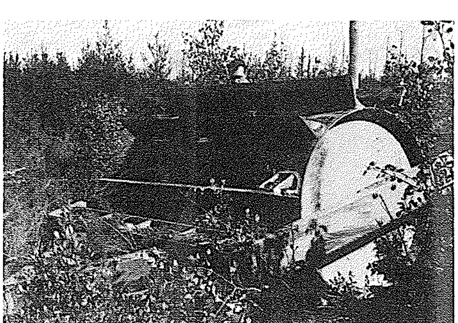
1. Breast-height diameter increment of the largest trees as much as doubled on moist and fresh sites within five years after strip thinning 10-year-old jack pine stands.
2. Less-dense stands on moist sites showed substantial increase in diameter growth within two growing seasons after treatment.
3. The amount of mortality on fresh and moist sites was low and was not affected by treatment.
4. The crowns from reserve strips were gradually filling in the crown space over the cut-strips at such rate that complete closure is likely within 10 to 15 years after thinning on these better sites. Organic debris from thinning in the cut-strips is decomposing rapidly.
5. Only limited response in diameter increment has been observed on dry sites.
6. Height increment was generally not affected by treatment.
7. The chopper did not cause excessive damage (wounding, bending or breaking) to trees on thinning borders. Treatment did not increase the incidence of insects or disease in the reserve strips, nor did it increase the occurrence of physical damage to residual trees.
8. The cost of treatment prior to 1967 was between $2.10 and $3.50 per acre (excluding capital cost of the chopper) and depended mainly on the equipment used and the size of the area treated.

A 15-year-old jack pine stand in south-eastern Manitoba: above average site (fresh), thinned at nine years of age. Note debris conditions on the ground and crown encroachment over cut strip.

These results suggested even earlier treatment – between 5 to 10 years – especially in denser jack pine stands, and only on above-average sites, like fresh and moist, in the area.

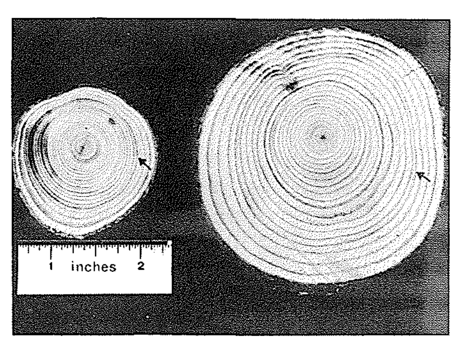
Alberta Study

The exploratory study to determine growth response to thinning in lodgepole pine was based on stem analysis of seven sample trees cut in the fall of 1970. The stand was thinned four years earlier at 25 years of age and located in the Bow River Forest at Teepee-Pole Creek. Nearly 50% increase in root-collar radial increment of the larger trees was observed in the first two growing seasons following treatment while there was no response higher up the stem, nor in the growth of smaller trees. However, four growing seasons after treatment the stem radial increment from stump-level to the base of crown approximately doubled for all tree sizes. The sample trees were selected on what appeared to be average sites in the thinned area. Spruce advanced-growth that escaped the chopper blades in the cut strips shows strong release-response and with maintained vigorous growth it will likely form a second story in these stands. A more detailed study will follow this exploratory work in the summer of 1971.



The fluid-filled drum-chopper.

A 29-year-old lodgepole pine stand thinned four years earlier, Bow River Forest, Alberta. Note debris conditions and spruce advanced growth in cut strips.



Base stem-sections from a small and a large lodgepole pine tree. The arrows indicate the time of thinning. Note the increase in ring width after thinning.

PRESCRIPTION FOR JACK PINE REGENERATION

Jack pine *(Pinus banksiana Lamb.)* is the most widely distributed pine species in Canada and is a favored pulp and lumber producer in the Prairies Region. In southeastern Manitoba the species has been the object of intensive regeneration research. Site preparation by burning and scarification has been successfully developed to an operational technique.

Most of the productive pine land in S.E. Manitoba is contained within the boundaries of the Sandilands Provincial Forest.

The pine stands have a long history of fire. Large burned areas either regenerate too densely or are understocked. Improvements in fire protection have reduced wildfire to a minimum, but old burns still remain as regeneration problem areas. Increased harvesting pressures now necessitate an intensive reforestation program and complementary research. A C.F.S. survey of problem areas began in 1950. Site amelioration for seeding and planting had high priority. Regeneration surveys (1955-56) on wildfire areas and on plowed areas indicated that improved site preparation including slash treatments could provide adequate restocking but that scarification techniques then in use were inadequate.

In 1960 an intensive study was begun. Site classification, jack pine seedling autecology and harvest cutting methods and site preparation were examined. Slash treatments, seeding and planting after scarification with the newly devised middlebuster plow were initiated. Regeneration responses were very favorable on most sites and the major factors limiting regeneration on the more difficult sites were isolated. However, two problems associated with the treatment were limited exposure of mineral soil from scarification prior to harvesting, and difficulties in subsequent logging. The introduction in 1964 of prescribed burning along with the drum chopper and shark-finned barrel scarifier, helped solve both of the problems. Severe burning alone provided adequate mineral soil exposure but seeding and planting on the burned areas met with limited success. However less severe burns followed by scarification with the shark-finned barrel scarifiers provided both fire hazard reduction and promising results from seeding and planting trials. In some instances the drum chopper is used instead of burning prior to scarification.

The Manitoba Forestry Branch planting program now has expanded. Research in problems associated with prescribed burning and dispersal and germination of seeds from cone-bearing slash will continue to provide some answers needed for trials of direct seeding.

PRESCRIBED BURNING RESEARCH IN ALBERTA

Some Silvicultural Aspects

In 1967 a co-operative prescribed burning research programme was initiated between C.F.S., A.F.S. and Northwestern Pulp & Power Co., Hinton. The intention was to test this treatment as a possible means of improving site preparation for regeneration on deep duff sites on overmature Spruce/Fir cutovers at Hinton, Alberta.

The fire behaviour results have been reported by Dave Kiil. Following the burning of 20 acre blocks at three different hazard levels in 1968, the blocks were planted in 1969 with five different types of seedlings of both lodgepole pine and white spruce. (Bare rooted stock, ¾" container stock, ¾" plugs, overwintered ¾" stock, stock in 'Conwed' Containers.)

First year survival and growth figures have just been analysed. In pine there is very little difference in survival between the five types of seedlings tested, all are over 85%. (A total of 1200 of each type were planted.) Spruce survival is poorer varying between 67% and 87%. Generally degree of burn has had little effect on survival in either pine or spruce.

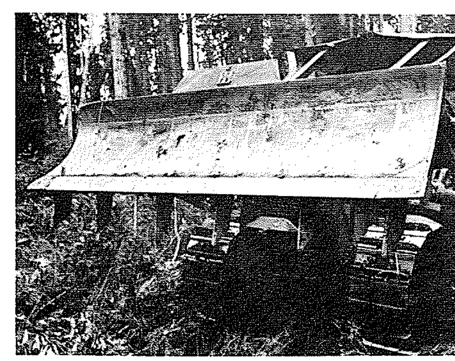
It is too early to make firm judgements on growth but in terms of increment from initial planting size ¾" containers and plugs have performed best and open rooted stock poorest.

Two main physical benefits from the prescribed burns are immediately obvious. There is generally better mobility and much greater ease of planting on the burned blocks, and an appreciable rise in soil temperature in the upper soil layers. The temperature rise is important since spring soil temperatures in cutover conditions in the foothills at 4,000 ft. or more are very low and not conducive to rapid root development of seedlings.

PUTTING SOME TEETH INTO SITE PREPARATION

Experience in site preparation for regeneration dates back to 1950 in Alberta's Mixedwood Forest. A receptive seedbed for spruce regeneration and a degree of control of vegetation competition can be achieved by scarification. Well drained soils are easily treated but sites with impeded drainage, and these comprise a large proportion of the Mixedwood, remain a problem. A toothed blade or mixing device is necessary to prevent compaction of the heavy textured B soil horizon which is often exposed in scarification.

The Grey Wooded soils are typical of the Mixedwood. A distinct organic layer up to 12 inches deep develops under the spruce-aspen canopy. The soils are cold and moist, supplied with telluric water as well as precipitation. The organic layer acts as insulation and humification is slow. During hot dry spells however the surface layers quickly dry out and temperatures peak at levels lethal to the shallow rooted spruce seedlings. Scarification effectively removes this barrier to regeneration and when deep enough to remove underground rootstocks, it prevents vegetation competition for 3 to 4 growing seasons. On the Grey Wooded soils this treatment tends to expose, compact, and even polish the heavy textured B soil horizons. As a result, water collects on these seedbeds and floods out seedlings. Frost heaving is common and severely affects performance of container seedlings when either the container or container complete with seedling is popped out of the ground. Experience from operational trials of scarification by the Alberta Forest Service in the Peace River, Grande Prairie, Slave Lake and Lac La Biche Forests supports these research observations.



The 6-toothed scarification blade is an effective seedbed cultivator.

The toothed bulldozer blade for scarification, as shown, was first recommended and successfully tried in 1959 at Smith, Alberta. Other machines have since been tried and compared – Imsett scarifier, Athens plough and Seamen rotary tiller, to get some teeth into the operation. Regeneration assessments are now complete. The toothed blade is most effective.

Where only a straight blade is available, however, a useful mixing effect can be achieved by alternately dozing a bladeful to left and right leaving behind a gently zig-zagging clear scarified strip. Development trials continue with Vee blades, rakes and fire-line ploughs.

DEMONSTRATION AREAS IN TREMBLING ASPEN

The poplars (trembling aspen and balsam poplar) represent about one-third of the commercial forest cover in the Prairies. Regionally the percentage of poplar increases from 23 in Manitoba to about 50 in Alberta. By far the greater part of this poplar component is made up of trembling aspen. The abundance, its ability to regenerate with ease and its relatively fast growth make trembling aspen, in light of projected wood shortages, a species of economic importance.

Among the forest tree species of the Prairies the clonal habit of trembling aspen (and balsam poplar) is unique. The configuration of clones and their size may vary considerably. Clones up to several acres in size have been observed. Clones exhibit morphological differences while there is ample evidence that they also possess different growth characteristics and vary in their reaction to environmental conditions. Such differences are expressed in height growth, stem form and susceptibility to insect and disease attack, and will play an important role in the management of the species.

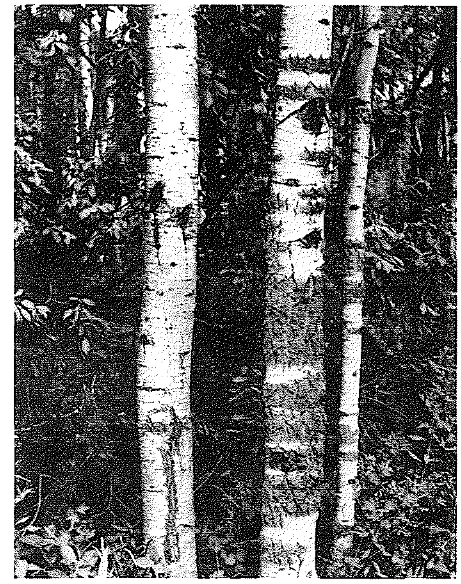
Much information on which to base good management practices, is already available for trembling aspen. Plans have now been proposed to lay out a number of demonstration areas in aspen stands of various age and structure. The purpose of these areas is to demonstrate some of the known characteristics of trembling aspen as well as the effect of certain management techniques on the residual stand and on regeneration. The demonstration areas will be of particular interest to the resource managers who are directly involved in the management and utilization of the species.

On the areas it is planned to demonstrate the following:

1. Clear and partial cutting on good and poor sites in winter and summer, and subsequent regeneration, which can be evaluated in terms of clonal variation.
2. Clonal differences in growth, tree form and quality on the same site.
3. Succession in aspen-white spruce cover types.
4. The effect of fire damage on subsequent disease infestation in the stand.

It is in addition intended to utilize part of the demonstration areas for trials of various cultural techniques such as fertilization, controlled burning, disking and stand density control work.

In the near future a start will be made to locate the required areas and carry out the necessary treatments. Co-operation is anticipated from Provincial agencies and local poplar-using industries in the planning and execution of certain aspects of the work. It is expected that work will be carried out both in Alberta and Saskatchewan.



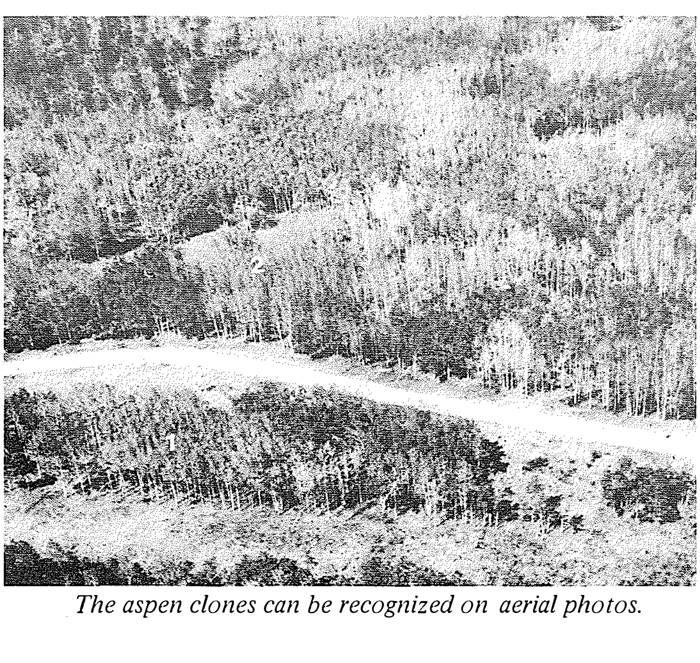
The bark can often be used to distinguish between clones.

QUALITY CONTROL IN NURSERIES

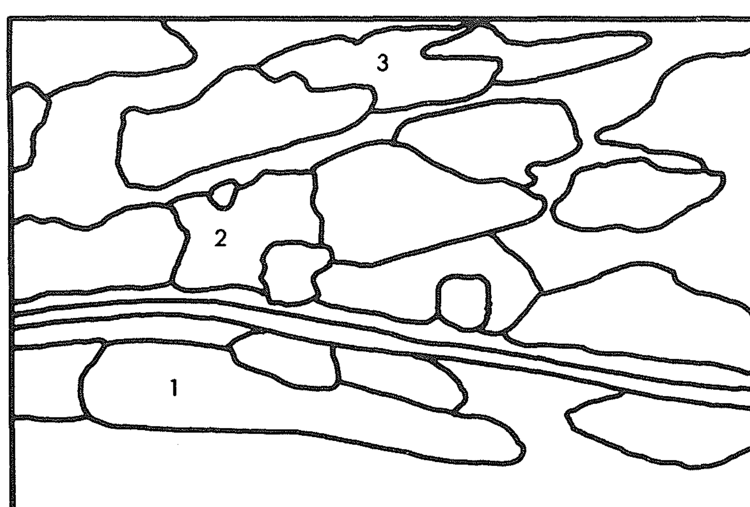
Varying quality of nursery stock, particularly in terms of size is a major problem in artificial regeneration research and in judging the performance of operational planting.

Quality monitoring should be an integral part of nursery stock production. It would allow the producer to assess better the effect of his methods in comparison with others and to detect annual variations in the quality of his own operations.

Monitoring for size is relatively easy and requires a truly random sample, for each seed lot at lifting time, of between 25 and 50 seedlings. The seedlings are then cut at the root collar with roots and shoots, oven dried at 85°F for 48 hours, and roots and shoots weighed separately to give average figures for the lot.



The aspen clones can be recognized on aerial photos.



In the spring clones may readily be identified due to differences in time of leaf flushing between clones.

LARGE BLOCK CLEARCUTS REVIEWED FOR THE ALBERTA FOREST SERVICE

Concern for the effect on our environment of large scale clearcutting has reached crisis proportions in some areas of North America. It seems that the population in some States in the U.S.A. and particularly in Montana and Alaska are not to be placated by statements of intent from the forest industry and Forest Services. At least one court case is now underway – but what are the facts? How much do we know about the factors involved and is there cause for such alarm?

A careful examination of the ecological implications of large block clearcutting was requested by the Alberta Forest Service, and the Liaison and Services Section of the Canadian Forestry Service applied themselves to this involved task. There are many facets to the problem. The research team assigned to a review and interpretation of available information, contained mainly in forest research literature, included specialists in several fields. They were: Mr. H. J. Johnson (Co-ordinator), Dr. H. F. Cerezke (Entomology), Dr. A.A. Loman (Pathology), Mr. A.D. Kiil (Fire research), Mr. G.R. Hillman (Hydrology), Mr. F. Endean (Silviculture), Dr. J. C. Lees (Silviculture), and Dr. J.M. Powell (Climatology). Library files were searched for information dating back to 1930, and research results from the regional laboratory were scanned. Discussion took place regularly between the research team members and their colleagues. Pertinent references found in Forestry Abstracts were traced to their source by the library staff.

The resulting review which took 4 months to complete will serve as a basis for a closer examination of the problem as it might relate to Alberta. Effects of clearcutting on climate, hydrology, stand establishment and protection from fire, insects and disease must be considered. These effects are modified by forest cover type, topography, soils and local climate. Stratification on at least a broad site basis is required before effects can be evaluated.

A long-awaited draft of the review has now been submitted to the Alberta Forest Service for their consideration. Preparation of an information report for general distribution will follow.

SASKATCHEWAN REFORESTATION ON INCREASE

Increased reforestation will take place in the province during 1971. The Prince Albert and Big River nurseries will distribute 1.6 million conventional seedlings for reforestation this spring.

A new irrigation system has been installed in the Big River Nursery, and an additional 30 acres will be added to the seedling production area in the Prince Albert Nursery.

The Forestry Branch will plant 800,000 conventional seedlings and 70,000 container grown seedlings. Scarification will be carried out on 3,000 acres in various regions.

The Saskatchewan Pulp Co. will plant 800,000 conventional seedlings and will scarify 5,000 acres on their limits.

In order to comply with the increased reforestation programme the Saskatchewan Forestry Branch decided to purchase and construct various implements (anchor chains, shark finned barrels) for scarification.

R. F. ACKERMAN — **(Advances in Silviculture)** Mr. Ackerman is Program Manager for resource management research in the Prairies Region. He joined the C.F.S. in 1952.

F. ENDEAN — **(Container Seedlings, Prescribed Burning, Quality Control in Nurseries)** Mr. Endean joined the C.F.S. in 1967 after 9 years silvicultural research experience in Zambia. He is a member of the Stand Establishment Group.

D. HOCKING — **(Container Seedlings)** Dr. Hocking, a pathologist who joined the C.F.S. in 1967, is involved in the program for assisted and container seedling development. He is a member of the Stand Establishment Group.

J. C. LEES — **(Vegetation Competition, Site Preparation)** Dr. Lees has worked with the C.F.S. in regeneration silviculture in Alberta's mixedwood since 1958. He is a member of the Stand Establishment Group.

L. W. CARLSON — **(Greenhouse Facilities)** Dr. Carlson joined the C.F.S. in 1966 after experience in control of plant pathogens with fungicidal chemicals in South Dakota. He is a member of the Stand Establishment Group.

R. E. STEVENSON — **(Appraisal Crew)** Mr. Stevenson has been with the C.F.S. since 1960. A forest biologist by training, he has recently lent his weight to problem appraisal.

C. L. KIRBY — **(Management Applications of Photogrammetry)** Mr. Kirby joined the C.F.S. in 1962 after service with the Saskatchewan Dept. of Natural Resources. He is a mensurationist assigned to Liaison and Services.

I. E. BELLA — **(Strip Thinning in Pine)** Dr. Bella has studied growth and yield since joining the C.F.S. in 1964. His current work is stand growth simulation models to provide a general tool for growth and yield prediction.

G. A. STENEKER — **(Trembling Aspen)** Mr. Steneker has worked with growth and competition relationships of spruce and aspen since 1960 and is now concerned with aspen ecology.

H. P. SIMS — **(Jack Pine Regeneration)** Mr. Sims joined the C.F.S. in 1961 and has studied aspects of Jack pine silviculture. He has experience with site preparation for regeneration and is a member of the Stand Establishment Group.

H. J. JOHNSON — **(Large Block Clearcut Review)** Mr. Johnson who heads the Liaison and Services Section in this Region, has been with the C.F.S. since 1950.