D-fir plantings in 2000

The figures quoted are derived from sales data obtained from the major nurseries growing D-fir. At the time of writing, the D-fir seedling sales are being prepared for the year 2000 — they should be out soon.

Co-op members P.F. Olsen and Co., and prospective new members Wrightsons Forestry and M.Belron and Associates have been major players as far as D-fir plantings have been concerned. For example, Wrightsons established 1400 ha of new plantings over the winter, and Beltons were responsible for almost 1700. Virtually all of this estate was in the inland regions of the mid to southern South Island.

A moist winter and early spring bodes well for a good strike, but integral to any success will be quality control systems specifically devised for D-fir seedling quality, storage, transport and planting.

For Beltons, Gordon Baker has had a big input into their system, which will be described at the Naseby meeting. Gordon recently left ***Forest Research*** after some decades of working on nursery techniques and establishment strategies to ensure seedling success in the high country environment. (It is very pleasing to see this research experience being put to practical use at the large-scale operational level - *Editor*.)

A total of 224 families and 33 D-fir seedlots are present in this progeny trial (in middle ground of above photo) planted in 1996 at Ernslaw One's Gowan Hills in Southland. The trial was assessed for growth and form in October, 2000. The largest seedlot were from control-pollinated plus trees growing in the Waikuku seed orchard, with the individual pictured at right being the tallest at 3.9 m (also note coning). The taller trees tended to have the most current leader sinuosity.

Chairman's comment *by* Phil De La Mare

Co-op membership is still small and static, but there has been renewed interest of late, from both previous and potential new members. Even with small numbers, Co-op progress has been maintained, as remaining members believe the research is too important to remain only half completed. More recently, we have been buoyed by the increasing interest in our programme (and D-fir in New Zealand generally) from Pacific North West growers in the United States. We think this interest will continue to grow.

As detailed elsewhere in this Newsletter, in 2001 the Co-op will meet in Naseby, which will give members the opportunity to visit Ernslaw One's new addition to its estate. Part of the field trip will include visiting a production thinning operation using a small Hitachi digger with a Valmet processing head. This operation has been set up to assist in supplying a new sawmill currently being constructed on site in Naseby Forest, which will saw small diameter logs (down to 12 cm SED) from D-fir thinnings. There will also be an opportunity to look at other minor species, particularly Corsican and ponderosa pine, growing well in Naseby's semi-continental climate – plus an interesting collection of trials with other species.

I am particularly looking forward to the first opportunity to discuss results from first measurements of the extensive provenance trials established by the Co-op in 1996. These could reset the direction of D-fir breeding in this country.

Douglas -fir
RESEARCH CO-OPERATIVE
Newsletter
No 2, December 2000

Co-op meeting in Naseby

The venue for our next Co-op meeting is Naseby, hosted by the new owner, Ernslaw One. The date was set for February 21-22, but this has been brought forward to Wednesday/Thursday, Feb 7/8. The reason is that Co-op Manager, Leith Knowles, is off to work on D-fir in the UK in mid-February (see page 2), and we wish to have the meeting before he leaves.

The meeting promises to be one of the more informative, as there will be presentations of results from recent measurements of the 1996 seed source trials, and from investigations into stem malformation.

In the 1996 trials, interesting differences between the 224 families and 33 seedlots involved appear to be emerging. Nick Ledgard and Charlie Low spent some days measuring the Gowan Hills trial last October. Some trees have grown exceptionally well (and are even producing cones), while others have been much slower. In Kaingaroa, a marked difference in susceptibility to *Phaeocryptopus* has been observed. It is still early days for these trials, but they should complement results from the 1957 and 1959 provenance trials, from which the data is being reworked to give an interim ranking for seedlot choice in New Zealand, which will be presented at the Naseby meeting.

The debate about the seriousness, causes and effects of malformation continues. In the photo alongside, a 4-year-old tree of Ashley Forest origin is being assessed for malformation. The aim of these measurements on trees planted near Lake Coleridge is to follow leader deformation over time. Will the deformation shown here correct itself? What degree of grain deviation will there be in the mature log? There is evidence to suggest that there is some correction over time, but will it be sufficient to avoid the downgrading of sawn timber? To help answer these questions, more logs are being assessed, and

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The degree of leader sinuosity in these 4-year-old trees of Ashley origin near Lake Coleridge has been quantitatively assessed and photographed. This will be continued over 3 years to determine what degree (if any) of self-correction is taking place, in an investigation of the link between juvenile stem form and grain deviation in mature trees.

forest research
creative wood-based solutions

[from front page]

when these results are combined with past research findings, a much clearer picture should emerge.

Many people believe that we are seeing much more stem deformation in young trees than we used to a few decades back. Why is it that malformation is often one of the first aspects to grab the attention of present day visitors, whereas back in 1978 it hardly warranted a mention in FRI Symposium No 15 '*A review of Douglas-fir in NZ,*' which included the results of a 'comprehensive evaluation' of the 1959 provenance trial at age 13? Maybe part of the answer is the faster early growth, promoted by good establishment techniques on good sites. Certainly, at Naseby we will see slower-growing D-fir of excellent form, with the same genetic background as trees of much poorer form growing on moister, more fertile sites elsewhere.

There is little doubt that in 3 months time D-fir enthusiasts will leave Naseby a lot wiser about issues concerning genetics and malformation.

Douglas-fir Research Co-operative

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Annual base fee: $5000
Annual area levy: $1.20/ha of D-fir estate

National D-fir growth model

Using FRST funding, Leith Knowles, Mark Kimberley and Mina Budianto have been continuing work on developing and extending the analysis of D-fir sample plot data to produce an improved growth model.

- ***Mortality.*** Mark has fitted an improved mortality function, based on an adaptation of the 3/2 self-thinning rule, initially suggested by Dave Marshall, a mensurationist with the US Forest Service at Olympia, Washington.
- ***Crown length.*** As the new model uses crown length as the main variable to predict basal area increment, it is important that its prediction is as accurate as possible. Consequently, an improved crown length function has been developed by Dr K. Lee, a visiting research fellow from South Korea.
- ***Phaeocryptopus*.** Forest Health reports on the progressive entry dates for the Swiss Needle Cast fungus to forests throughout New Zealand have allowed us to segregate the PSP data into pre-and post- infection sets. These data have been used to calibrate the model to reflect the growth characteristics of stands prior to and post infection. In many forests these differences are significant.
- ***UK growth modelling***. From mid-February, 2001, Leith Knowles will be on sabbatical leave for 4 months to study D-fir growth in Britain. He will be based at the Forestry Commission's research centre at Alice Holt in Surrey. In preparation for this, Leith has been reviewing UK sample plot data, and has identified the need for improved prediction at low productivity sites. This has resulted in an amended basal area increment function which not only fits UK data, but has also helped to improve the New Zealand model.

FRST progress

Over the past year, work has continued in the following areas. Results will be presented at the Naseby meeting.

PSP measurements

These continue annually, with particular emphasis on the silvicultural trials (containing over 100 plots) in Kaingaroa and on Ribbonwood Station near Omarama.

Provenance trials

1959 series. Recent data from trials at Kaingaroa, Golden Downs and Hanmer are being analysed in order to calibrate the national growth model for growth relative to provenance. Leith explained how this could be done in his paper "Calibrating the D-fir EARLY growth model for genetic effects," presented in the 1998 Rotorua Co-op proceedings.

1996 series. Co-op seed source trials at Kaingaroa, Golden Downs and Gowan Hills have been measured for the first time. Good early growth has allowed this indicative measurement, although a clearer picture of performance differences will have to wait for a few years yet.

Stem sinuosity

Anecdotal evidence suggests that currently recommended New Zealand seed sources may be linked with observations of increased stem sinuosity. As a result, off-shore seed is being imported in the belief that these will give better form. More information is being gathered on stem sinuosity issues such as:

- Definitions. Definitions for the various types of stem deformation are being formed, so that better records of stem deviation can be gathered from PSPs and incorporated into growth models.
- Timber studies. Timber from recently sawn logs has been inspected for pith deviation, and any evidence that the resulting sloping grain degrades timber out-turn.
- Deviation correction. Leader deformation in a 4-year-old stand has been quantified for further study in successive years – to detect suspected self-correction. Hopefully, we can then evaluate juvenile stem sinuosity in the right light relative to its longer term impact on timber grades.

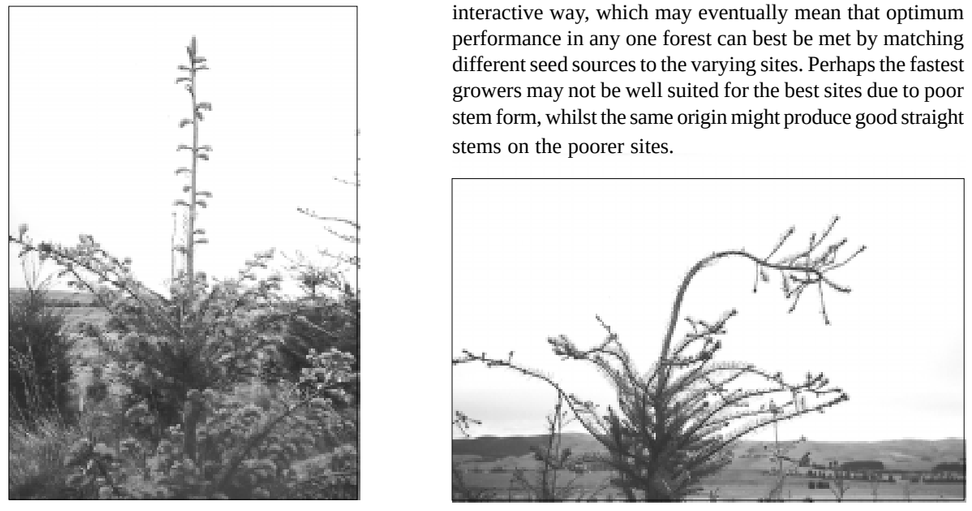
Malformation and wood quality

The issue of malformation in D-fir continues to attract increasing attention, and will be a focal topic at the Co-op's February's meeting in Naseby Forest. The latest issue of the Canadian Journal of Forest Research contains an interesting article on the matter. The paper, by Spicer, Gartner and Darbyshire, looks at stem sinuosity and its impact on growth patterns and wood quality. The study trees were selected from a progeny plantation at Coyote Creek in the Noti Breeding Unit of the D-fir Progressive Tree Improvement Program in the central Oregon Coast Range near Eugene, Oregon. The trees had been scored for sinuosity at age 10, with the destructive sampling for wood quality analysis taking place at age 25.

They found that trees noted as highly sinuous in one year were more likely to be sinuous in other years, but that there was no relationship between degree of sinuosity and internode length, indicating that growth rate was not a factor. This is interesting, as there are indications that faster growth rate and stem deformation are linked here in New Zealand, both in radiata pine and D-fir. In Kaingaroa, ***Forest Research*** scientists found a negative correlation between straightness and stem diameter in D-fir trees aged 5 (indicating that the faster growing trees were more deformed), but these trees seemed to cover their youthful indiscretions as they got older, as the correlation had turned positive by age 10.

Perhaps the result of most interest to D-fir practitioners from Spicer *et al's* work, was the finding that "except in severe cases, sinuosity has a minor impact on wood quality". They assessed grain deviation in the 25-year-old trees at 7° and 14° relative to the cambium, and found that "the occurrence of 14° slope-of-grain was rare". This may be the case in New Zealand, for although stem leader deviation in young stands may well exceed 14°, preliminary investigations indicate that it is not so common in older stems. On this score, we await the findings from current New Zealand research with considerable interest.

In conclusion, the exact causes of sinuosity and stem defects in general, and their resulting impact on timber grades, remain unclear. There are studies which both support and negate the influence of genetics, site and silviculture. The most likely answer is that all three factors are involved in an interactive way, which may eventually mean that optimum performance in any one forest can best be met by matching different seed sources to the varying sites. Perhaps the fastest growers may not be well suited for the best sites due to poor stem form, whilst the same origin might produce good straight stems on the poorer sites.



In the Gowan Hills progeny trial, leader deformation in young D-fir was assessed using a subjective score from 1 (worst) to 9 (best). The good tree on the left had a score of 9, whilst that on the right scored 1. The causes of such malformation are thought to be a combination of genetics, site and silviculture – current research hopes to sort this out over the next few years.

Which seedlot should I plant?

This is a question on many minds at present, but it is far from new. It was the reason for the comprehensive provenance trials set up in 18 New Zealand sites in 1959. Mike Wilcox evaluated these trials in 1973. He ranked the top 15 provenances using an index which measured relative aggregate economic value based on genetic and economic weightings. The index incorporated height, diameter, stem straightness and wood density.

The best provenances were all from low elevations close to the coast in fog-belt localities in northern California and southern Oregon. The best four Californian provenances averaged 30% more volume than the 'local' Kaingaroa provenance in the North Island and 9% more in the South Island. Some high ranking provenances were outstandingly good in some characteristics but poor or only average in others. For example, the southern-most major stand of D-fir in California, at Santa Cruz, grew very rapidly, but had very low wood density. On the other hand, the Californian origin from slightly further north at Stinson Beach was not quite so vigorous but had high wood density. Wilcox's index gave Stinson Beach top ranking with Santa Cruz at number 5.

It will be most interesting as to just how much difference there is between Wilcox's ranking and that derived from more recent evaluations.