

# Douglas-fir

RESEARCH CO-OPERATIVE

## Newsletter

No 5, July 2002

### Co-op to meet in Queenstown, February, 2003

Planning is underway for the next New Zealand Douglas-fir Research Co-operative meeting, to be held in Queenstown on February 10/11. The focus will be the Annual General Meeting, followed by business and technical sessions for members. We will be joined for the technical sessions by a contingent of overseas visitors. Our Manager, Leith Knowles, has recently returned from meeting Douglas-fir research colleagues and forest managers in North America, and many expressed interest in visiting New Zealand early next year. If this eventuates, they will be invited to address members on key D-fir topics during the technical sessions, plus accompany us into the field.

Our AGM/business session will start at 1pm on Monday, February 10, with the technical session following at 3.30pm. In the early evening we will walk up to view the huge 120-year-old conifers in the Kellogg plantings just behind the town, before meeting back at the hotel for dinner.

On Tuesday morning, the technical session will continue. We will travel up the Gondola at midday to inspect D-fir on the upper slopes above Queenstown. Discussion will focus on the environmental impacts of these stands, as well as the management and returns associated with recent thinnings. After lunch we will drive around to the Coronet D-fir plantation alongside the road to Arrowtown. This is owned by the Queenstown / Lakes District Council, and managed by one of our members, Dennys Guild of Wrightson Ltd, who will describe the history and tending of the trees. The plantation is based on Beaumont (ex Washington) seed and whilst it demonstrates excellent growth and form, seed from the Californian 'fog belt' would be expected to produce considerably more volume.

For those who don't have to leave early, we are planning an activity for the last evening. This has yet to be finalised, but we hope to organise a dinner/cruise on the steamship Earnslaw.

*Backdropped by Douglas-fir forests, Queenstown is the venue for the next Co-operative meeting in February, 2003. Of interest, not only to the tourist, but also to connoisseurs of D-fir ecology and silviculture.*



## Research on the move

The Co-operative serves as a very useful network for those interested in Douglas-fir investment and management, but its main purpose is still directing research and disseminating results. To this end, members are offered research proposals for acceptance, amendment or rejection. Members are also encouraged to submit additional topics. This year there are a range of topics on offer, and these are outlined briefly below:

### **Influence of site factors on growth rate**

For better predictive modelling, more knowledge is needed on the influence on D-fir growth of site factors, particularly moisture availability. This is mainly governed by rainfall, but slope, aspect and soil type are important where precipitation is below 1000mm annually.

### **Developing a prototype individual tree growth model**

Individual tree growth models offer advantage in projecting inventory information, as the data collected on individual stems and wood quality is not lost by an amalgamation to stand level averages.

### **Develop methods for the rapid screening of MoE in standing trees**

A set of 30 trees in a seed stand at Rotoehu will be used to compare SilviScan prediction of modulus of elasticity (MoE) with measurements of sound velocity using recently purchased German equipment. The goal will be to develop cost effective, non-destructive techniques for the rapid assessment of MoE in standing trees.

### **Application of rapid screening methods for MoE to 'plus' trees and seed stands**

The most appropriate methods developed from the study above will be applied to:

- The original Douglas-fir 'plus' trees, which will be assessed in the field to identify those with high MoE. CP seedlots will be produced from Co-op archives using material with superior wood properties.
- A stand of Californian origin at Tapanui, which will be similarly assessed and then thinned to favour the best trees for the production of superior seed.

### **Provenance variation in susceptibility to Swiss needle cast (SNC)**

There is much current interest in the impact of this disease. Although excellent data exists on the susceptibility to SNC of a range of provenances at seven locations in NZ, it has never been analysed and fully reported. This proposal seeks funding to do just that.

### **Variation in bark thickness between provenances**

Visually, the bark of the favoured coastal Californian provenances is more furrowed than those from further north. Growers of D-fir are interested in wood not bark. This proposal will determine how bark features in the higher volume growth shown by the faster growing provenances.

### **Influence of D-fir plantations on soil properties**

In terms of long-term sustainable land use, how we look after our soils is very important. This proposal explores the impact of D-fir plantations on soil properties, particularly in comparison to radiata pine.

### **Biodiversity in Douglas-fir forests**

When considering the impacts of forests on the environment, the effects on biodiversity are amongst the hardest to quantify. This proposal aims to assist Co-op members to set up simple, long-term monitoring systems for assessing biodiversity changes associated with D-fir forestry.

### **Carbon storage potential of D-fir**

Despite the current interest in the ability of trees to store carbon, there is not a lot of information on D-fir biomass in NZ, let alone how this is divided up between roots and shoot components. Much of the available data is unpublished, and will be collated and evaluated for presentation to Co-op members.

### **D-fir as an invasive weed**

#### **• Cone/seed production within stands**

The cone 'litter' on the ground under plantations will be assessed from the margins to the interior of Douglas-fir stands. Results will indicate if more cones are produced by edge trees, thereby justifying marginal plantings of less spread-prone species.

#### **• Threshold light levels for D-fir under native forest**

There are occasional risks of D-fir regeneration invading native forests, especially where canopies are opened by disturbance. This proposal will explore simple means to link light levels to wilding establishment.

#### **• Land management to minimise risks of wilding establishment**

Opportunities to minimise wilding risk will be explored, using fertiliser and seed to increase the competitive ability of surrounding vegetation.

### **Improvements and extensions to the D-fir calculator**

The current version of the D-fir calculator can be upgraded and extended according to members' requirements. This project will be scoped out once feedback is received from members, based on use of the current version.

### **Construction of a density management diagram for Douglas-fir**

Presently stand density is generally quantified using the number of trees per hectare. Stand density management diagrams graphically present the relationship between average tree size and the number of trees per hectare. The diagram can be used to develop silvicultural regimes as well gaining an insight into degree of canopy closure and the expected level of competition mortality.

## D-fir calculator

In conjunction with the New Zealand Farm Forestry Association and the MAF Sustainable Farming Fund, a simple calculator has been constructed. This links a range of input variables describing site and silviculture to output variables including yield-by-log-grade, costs, financial return, and log and stand quality. The calculator allows for optimisation in determining goals such as maximisation of NPV (net present value) whilst meeting certain yield and quality objectives. Following input by Co-op members at our February meeting, several major changes and improvements have been made to the calculator. These include:

- An addition to allow the prediction of stand mean Modulus of Elasticity (MoE, or stiffness) of the timber, based on wood density, and branch size. This facility will be extended to include new wood quality parameters such as microfibril angle (MFA) once their roles are determined in current research.
- Establishment costs (cents/seedling) are now input as a variable.
- Where stands receive both a waste and a production thinning, the 'optimum' weighting of the two operations can be simply evaluated.

Further improvements and modifications to the calculator can be made to suit members' needs. (See proposal on previous page.)

## New National Ht/Age curves

The development of a new national height/age equation for New Zealand Douglas-fir (equation T79) has been completed. The equation has been incorporated as the default in the new D-fir National growth model. The equation predicts Mean Top Height (*MTH*) of a stand for given Site Index (*SI*) and for a range of ages. The base age for *SI* is set at 40 years since planting.

The new equation was built using 9707 measurements of permanent sample plots from throughout New Zealand. Stand variables ranged from 2m to 57.8m *MTH* and 4 to 130 years *age*. Various mathematical functions were tested, with the Chapman-Richards function giving the best fit. A polymorphic form was used, as it showed a slightly superior fit compared to the anamorphic form. The polymorphic format of the fitted equation allows the slope parameter to vary with the *SI*.

There is no need for separate curves at a forest or regional level as this is taken care of by the polymorphic influence of *SI*.

## Wood quality research on D-fir

A collaborative study with CSIRO, Melbourne, and Fletcher Challenge Forests Ltd, seeks to identify the role of key wood quality parameters such as wood density, microfibril angle, and branch size in determining timber stiffness and strength.

Breast height core samples from 50 trees in a 42 year old stand of Coastal Californian origin were sent to Melbourne for SilviScan analysis. These showed a wide variation ( $\pm 30-40\%$ ) in predicted timber stiffness around the stand mean, largely due to variation in density and MFA. Now that a subset of 18 trees have been felled, patterns of variation in timber stiffness and strength within and between trees are also being investigated using small clear samples recovered from 400mm long billets, and from 4.8m length sawlogs. These results will be linked back to SilviScan analysis of strips taken at intervals up the trees, and to the breast height cores.

The study will provide important and immediate wood quality benchmarks leading to ongoing genetic improvement in product performance of the species. In the longer term, this knowledge will be essential to the profitable positioning of the species in international markets. Results will be reported at the Queenstown meeting.

### The demise of Douglas

David Douglas, the taciturn Scots botanical explorer and discoverer of the species named after him (Douglas-fir) was a tough man. In the early 1800s he travelled alone through the vastness of western North America. He endured great hardships amongst the native Indians, thereby gaining their respect and assistance. No doubt there were more significant plant discoveries for him to make, but before he could do so he was to meet an early demise. On a break from plant hunting, he went to see the volcanoes of Hawaii, only to die from being gored by a bull after falling into a pit trap set to catch wild cattle.

## Associate Co-op members

The Co-op actively seeks members to participate in Douglas-fir evaluation and research. At the moment we only accept Full Members, who pay an annual base fee and area levy (see Box below). However, we recognise that there are many small businesses and individuals who are very interested in Douglas-fir, and would like to join the Co-op – but cannot afford to be Full Members. To cater for such people the Co-op needs to offer a new category of Associate Member.

The benefits to Associate members would be regular updates of D-fir research results, priority access to the latest software and genetic material (but lower priority than Full Members), enhanced credibility in any sustainable certification process, and being part of an active network involved in the latest D-fir management issues. The benefits to the Co-op would be: increased ability to identify the most critical research issues; better potential to extend research results to end users; and enhanced research ability. Our dilemma centres around the amount of access to the intellectual property funded by Full Members, who have paid to date (and will pay in the future) considerably more than Associates.

It is envisaged that eligibility for Associate Membership would extend to small forestry consultants (with one or less FTE), and to nurseries, supply companies and individuals with D-fir estates of <500 ha. The subscription for New Zealand Associate membership would be \$NZ650 annually. We envisage the Co-op will also offer associate membership to overseas forestry management and consulting companies, with an annual flat fee of US\$1,000. Acceptance of Associates to the Co-operative would be at the discretion of Full Members.

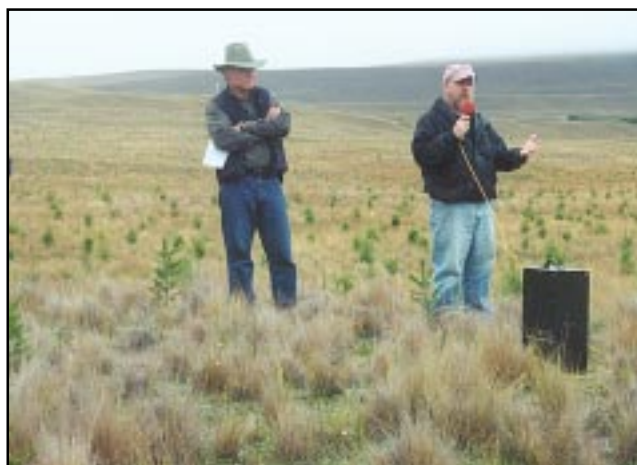
Anyone interested in applying for membership should contact the Manager, Leith Knowles (see Box below).

## Success of last AGM, seminar and field-day – plus new members

Last February in Christchurch, the Co-op held its annual AGM over a morning, followed by a public seminar in the afternoon. This was attended by 42 people, who expressed much satisfaction with what they heard, and were presented with. Most of the attendees came along for the evening BBQ held at the Staff Club's Ilam homestead.

The following day, 45 people travelled up the Rangitata River to inspect investment plantings on Forest Creek Station. Co-op member, Mark Belton and Associates (MBA), have co-ordinated the planting of around 900 ha of D-fir at Forest Creek over the last few years - in a part of the country unknown to most participants. In impressive surroundings (see photo) Mark and Gordon Baker, Project Manager, took us through their seedling quality, handling, planting and weed control procedures, which have ensured good survival, despite recent severe drought and frost events. We also visited older stands planted in 1952 and 1987, which showed the forestry potential of the area. We then viewed the huge, 135-year old D-fir at Mt Peel Estate.

There has been very good feed-back from these two days organised by the Co-op. They no doubt assisted in attracting two new members, plus inquiries from a number of others. We welcome Carter Holt Harvey Forest Resources, and Wenita Forest Products Limited, as full members to the Co-operative.



*Doug Harpur, owner of Forest Creek Station, and Mark Belton (left) addressing Co-op members at the February 2002 field-day.*

### New Zealand Douglas-fir Research Co-operative

**Chairman** – Phil De La Mare,  
Ernslaw One, Tapanui  
(Ph: 03 204 8061; Fax: 03 204 8067  
email: p.delamare@ernslawtap.co.nz)

**Manager** – Leith Knowles, Forest Research, Rotorua  
(Ph: 07 343 5648; Fax: 07 343 5332  
email: leith.knowles@forestresearch.co.nz)

**Secretary** - Nick Ledgard, Forest Research,  
Christchurch

(Ph: 03 364 2949; Fax: 03 364 2812  
email: nick.ledgard@forestresearch.co.nz)

**Annual base fee:** \$5000

**Annual area levy:** \$1.20/ha of Douglas-fir estate