

FRI Project Record

No. 20749

**TRIALS DESIGNED TO QUANTIFY GROWTH AND YIELD GAINS
FROM GENETICALLY IMPROVED RADIATA PINE
-- THIRD REVISION --**

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N.B. The addendum replaces all Tables and Appendices in Stand Growth Modelling Cooperative Reports No. 24, No. 24a and No. 40.

***Forest Research* /INDUSTRY RESEARCH COOPERATIVES**

EXECUTIVE SUMMARY

Stand Growth Modelling Cooperative Report No. 24 (October 1991) outlined the permanent sample plots in genetic trials being supported by the Cooperative. Details of trial design, including experimental design, silviculture and seedlots were presented in a series of Tables and Appendices. Report No 24a (March 1994) and No 40 (June 1995) documented modifications and corrections which were made between 1991 and 1995.

This report gives another updated overview of all trials supported by the Cooperative and documents current plans for these trials, establishment information to date and modifications in trial designs since previous reports. There are also corrections to some seedlot identifications. It presents a comprehensive summary of the status of all trials and permanent sample plots supported by the Stand Growth Modelling Cooperative as at August 1998.

The number and timing of measurements carried out under the umbrella of this Cooperative has been revised to reduce time spent on plot measurements. The 1998/99 schedule reflects the current policy. Further rationalisation has been requested by Industry, consequently the projected work programme (Table 6) may change in the future.

The addendum replaces all Tables and Appendices in Stand Growth Modelling Cooperative Report No. 24, it's 1st revision (Report No. 24a) and it's 2nd revision (Report No. 40).

1. INTRODUCTION

Measurement and establishment of permanent sample plots (PSP's) has progressed on schedule since issue of Report No. 40. Documentation of the current status for each trial is presented in Appendices 1-30 (updated versions of Appendices in Report No. 40). In addition, summary tables from Report 40 are included in this report with appropriate updates. This report presents a comprehensive summary of the status of all trials and permanent sample plots supported by the Stand Growth Modelling Cooperative as of August 1998.

2. OVERVIEW OF COOPERATIVE TRIALS

PSPs in genetic gain trials represent a wide range of regions and sites, as well as comparisons among seedlots and silvicultural treatments.

The trial design of this series falls into two categories:

- Plots superimposed on existing trials (Tables 2a, 2b & 2c).
- Plots designed with a wide range of spacing treatments, planted specifically for provision of genetic gain data for growth models and called Silviculture/Breed trials (Tables 3a & 3b). The Silviculture/Breed trials have been planted to represent a matrix of site qualities, regions, breeds and treatments (Table 4).

A summary of the site categories and GF ratings of seedlots represented in all of the trials is presented in Table 5. The silviculture, planting stock and measurement information is updated for each trial in Appendices 1-30.

The statistical analysis ANOVA tables (Appendices 23-29 in Report 24a) have not been updated to accommodate the changes made to the Silviculture/Breed trials. These tables are not printed here, but will be reviewed when data analysis begins.

3. MODIFICATIONS IN COOPERATIVE TRIALS

Changes in Silvicultural Treatments

Two additional treatments have been added to Silviculture/Breed trials FR77 and FR78. These trials originally had three replications of each treatment (pruned and thinned to 400 and 200 stems/ha). Two additional silvicultural treatments were added with one replication of each. The number of replications of the original treatments were reduced from three to two. The additional treatments are:

- 1) unpruned and unthinned, and
- 2) pruned with a late thinning to 200 stems/ha at 20m MCH (Appendices 20 and 21).

Changes in Measurement Schedule

The current recommendation, in order to minimise the cost of remeasurement but maximise the pool of genetic gain data available, is that trials receive annual remeasurements up to and including age 20, followed by 2-3 yearly remeasurements. The projected work programme to the year 2002 (Table 6) shows the current schedule and how much time is required for each financial year. The initial stocking trial, RO972, has been clearfelled in 1998 and has been removed from the work programme.

Currently plots planted in 1975 are on a three yearly remeasurement schedule. Plots planted between 1978 - 1980 are on a two yearly remeasurement schedule. Annual remeasurements are to continue in the Silviculture/Breed trials until 2007.

The reduction in manweeks from the projected work programme in Report No. 40 is due to both the changes in timing of remeasurements and improved measurement techniques.

Late Thinning Treatments

There are twelve trials with plots requiring a late thinning. These are being carried out at the appointed time, by *Forest Research* staff, which is at 20m MCH. The first of these thinnings was completed in January 1998 in the 1984 genetic gain trial, RO1897. Twelve plots were thinned from 700 to 400 stems/ha and a further 12 plots from 700 to 300 stems/ha. The second trial to have a late thinning is the 1989 Silviculture/Breed trial at Kawerau, FR84. Twelve plots are scheduled to be thinned from 600 to 250 stems/ha in October 1998.

Table 7 schedules the late thinnings required, giving an estimated date of thinning. This will need to be revised after each annual re measurement using the current age and MCH.

Summary of Unscheduled Silvicultural Treatments

Treatment 6 (to be pruned with a production thin at 20m MCH) is no longer possible in the two Silviculture/Breed trials FR8 (Tahourakuri) and FR10 (Glengarry). Eight plots at each trial were thinned in error at plot establishment (MCH 6.2m), which means these plots are now equivalent to Treatment 2 (see Appendices 11 and 13).

The Silviculture/Breed trial FR8 (Tahourakuri), was given an unscheduled 2nd prune at the time the surrounding stand (October 1993, age 6) was given a pruning. All trees in the pruned plots were given a variable height prune to leave 4m of crown (see Appendix 11). The average prune height of the pruned plots is now 4.5m. One plot (treatment 5a) which was to have been unpruned was also pruned in error (Appendix 11). In addition, unscheduled thinning occurred during the regeneration cutting before plot establishment (Appendix 11). One plot (treatment 4a, Appendix 11) was thinned to 400 stems/ha instead of 600 stems/ha. The other plot (treatment 3a, Appendix 11) was thinned to 500 stems/ha. This plot was thinned to 400 stems/ha at the time of plot establishment according to the original plan.

In Silviculture/Breed trial FR78 two plots (treatment 1) were accidentally pruned after PSP plot establishment (Appendix 21) by local staff. Due to the pruning and mortality, these plots are now equivalent to treatment 4 (pruned and thinned to 400 stems/ha).

In Silviculture/Breed trial FR84 one plot (treatment 3) was accidentally pruned after PSP plot establishment (Appendix 22) by local staff. This plot is currently equivalent to treatment 4 (unthinned and pruned), but it is scheduled for a late thinning.

In Silviculture/Breed trial FR86, one plot (treatment 2) was accidentally pruned after PSP plot establishment (Appendix 24) by local staff. This plot is now equivalent to treatment 3.

Summary of plots abandoned or not established

All plots with seedlot FRI78/2299 in the 1979 genetic gain trial series were abandoned as this seedlot was found to be highly inbred and not representative of a GF14 rated seedlot.

Several plots in the Silviculture/Breed trial series did not have PSP plots established or plots were abandoned at a later stage for various reasons. Trials with abandoned plots are listed in Table 1.

Table 1. Trials with abandoned plots

Trial	Location	No. Plots	Reason for Abandonment
RO2103/1	Kaingaroa	5	seedlot inbred
NN530/1	Golden Downs	6	seedlot inbred
SD562	Dean	5	seedlot inbred
FR 11	Ditchlings	1	unusual spacing and mortality problem
FR 11	Ditchlings	1	plot trees felled to clear power lines
FR 12	Otago Coast	1	not established, unable to distinguish plot trees
FR 56	Dalethorpe	1	unusual spacing and mortality
FR 56	Dalethorpe	5	poor tree quality and mortality
FR 57	Tikokino	2	high mortality
FR 77	Tikokino	1	unable to locate plot trees
FR 78	Gwavas	12	high mortality (root trainer and directly planted field cuttings had a very low survival rate)
FR 121/5	Hokonui	27	the whole trial was abandoned due to heavy mortality throughout the majority of plots

Full details for these plots are documented in their respective appendices.

Summary of Trials Abandoned

Three trials, FR58, FR59 and FR60 (Appendices 6, 7 & 8), were removed from the Cooperative trial remeasurement programme in 1995. These trials do not have any genetic comparisons, and therefore, cannot be used directly for quantifying genetic gain.

The Silviculture/Breed trial at Hokonui Forest, FR121/5, was abandoned due to extensive mortality, in November 1997, because of dense gorse and natural regeneration, the extent of the mortality was not realised fully until plot establishment at age 7. At other trials where there was mortality, the prescribed final crop stocking was achieved, sometimes without additional thinning. However, mortality was so extreme in this trial that no plots could be established at the prescribed stocking. Factors affecting the mortality seem to be the absence of land preparation, poor planting and poor root establishment.

4. SPECIFIC CORRECTIONS AND CHANGES TO APPENDICES 1-30 IN REPORT NO. 40

Appendix 1

Trial RO972 will be clearfelled in 1998. Measurements of 10 of the 16 plots were completed in May 1998. Six plots were not measured as these plots had been partially felled for skid sites. No further measurements will be taken.

Appendix 2

The seedlot composition of the polycross seedlings has been corrected and the GF rating reassigned to be GF14.

Appendix 9

The cuttings at this trial (originally GF16) have now been identified as seedlot 9/4/80/11, with a GF17 rating .

The second thinning was carried out as prescribed (at MCH 20m) in January 1998.

Appendix 16

The long internode seedlot (LI23 (GF9)) has now been identified as seedlot 9/3/86/170.

Appendix 17

The GF16 seedlot has now been identified as seedlot 2/3/87/34.

Appendix 18

The long internode seedlot (LI23 (GF9)) has now been identified as seedlot 9/3/86/170.

Appendix 19

The long internode seedlot 3/3/87/3 has now been identified as seedlot LI20 (GF7).

Appendix 21

Plots that were not established due to mortality are now correctly identified. None of the plots with the root-trainer seedlings (seedlot 88/1) or the directly planted field cuttings were established as PSPs due to excessive mortality.

Appendix 22

The second thinning was carried out as prescribed (at MCH 20m) in September 1998.

Appendix 25

Treatments 5,6 and 7 were incorrectly recorded as being pruned. These treatments are in fact unpruned.

Appendix 27

The final crop stocking of treatment 2 is 200 stems/ha, not 1200 stems/ha.

Appendix 30

The GF25 seedlings identified as seedlot 90/294. The long internode seedlings, GF13, have now been identified as seedlot 89/15.

5. WORK PROGRAMME FOR COOPERATIVE TRIALS

A work programme (Table 6), for all the trials under the umbrella of the Cooperative, projects the resources required for remeasurement and establishment for the years 1998 to 2002. The manweeks of work include those for *Forest Research* staff and 'in kind' help from local field staff. The table shows the total input required currently from *Forest Research*.

This table reflects a fairly accurate estimate of time taken over the past two measurements seasons to measure trials given the number of plots, the location and the amount of hindrance from undergrowth.

Due to the cost of plot remeasurement, industry have requested further rationalisation to be carried out in regard to the time interval between measurements, the information collected and the number of trials required. The 1998/99 work programme reflects the current policy but future remeasurement programmes are likely to be amended.

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TABLE 2a. Genetic Gain Trials supported by the Stand Growth Modelling Cooperative which were established in existing GTI trials.
Location details

PSP Expt No.	Planted Trial No.	Trial name ¹⁾	Forest name	Forest code	Cmpt No.	Forest Owner (as @ 1998)
RO972	R972	EFM Init. crop stocking	Rotoehu	ROEU	122	Fletcher Challenge Forests Ltd
AK1056	A622/1	GTI 850 polycross	Woodhill	WOOD	225, 230, 231	Carter Holt Harvey Forests Ltd
RO2098	R664/1	GTI 850 polycross	Kaingaroa	KANG	327	Fletcher Challenge Forests Ltd
NN529/1	N330/1	GTI 850 polycross	Golden Downs	GDNW	345	Weyerhaeuser NZ Ltd
CY597	C463	GTI 850 polycross	Eyrewell	EYWL	32	Carter Holt Harvey Forests Ltd
AK1058	A772/1	GTI 1978 genetic gain	Aupouri	AUPO	92	Juken Nissho Ltd
RO2103/1	RO1664/1	GTI 1978 genetic gain	Kaingaroa	KANG	1210	Fletcher Challenge Forests Ltd
RO2103/2	RO1664/2	GTI 1978 genetic gain	Kaingaroa	KANG	1210	Fletcher Challenge Forests Ltd
WN377	WN305	GTI 1978 genetic gain	Mohaka	MOHA	205	Hawkes Bay Forests Ltd
NN530/2	N405/1	GTI 1978 genetic gain	Golden Downs	GDNE	66	Weyerhaeuser NZ Ltd
CY421/1	CY421/1	GTI 1978 genetic gain	Waimate	WMTE	2	Crown Forestry Management Ltd
SD564/1	S564/1	GTI 1978 genetic gain	Longwood	LONG	62	Rayonier NZ Ltd
SD564/2	S564/2	GTI 1978 genetic gain	Longwood	LONG	62	Rayonier NZ Ltd
NN530/1	N405/4	GTI 1979 genetic gain	Golden Downs	GDNW	26	Weyerhaeuser NZ Ltd
RO2013/3	RO1664/6	GTI 1979 genetic gain	Kaingaroa	KANG	1218	Fletcher Challenge Forests Ltd
SD682	S425/2	GTI 1979 genetic gain	Dean	DEAN	251	Rayonier NZ Ltd
RO1897	RO1897	GTI 1984 genetic gain	Kaingaroa	KANG	327	Fletcher Challenge Forests Ltd

1) EFM = Exotic Forest Management; GTI = Genetics and Tree Improvement

TABLE 2b. Genetic Gain Trials supported by the Stand Growth Modelling Cooperative which were established in existing GTI trials
Planting details

PSP Expt No.	Planted trial No.	Trial Name ¹⁾	Growth Region	Site category ²⁾	Planting workplan	Mth/year planted	Reports/publications ³⁾
RO972	R972	EFM Init crop stocking	Central North Island	High SI	604	7/70	PR1560, PR2501, PR2013, James (1979)
AK1056	A622/1	GTI 850 polycross	Sands	Med SI	GTI2095	7/75	WP1379, PR91, PR944, PR35, PR2013
RO2098	R664/1	GTI 850 polycross	Central North Island	Med SI	GTI2095	7/75	WP1379, PR91, PR944, PR35, PR2013
NN529/1	N330/1	GTI 850 polycross	Nelson	Low SI	GTI2095	7/75	WP1379, PR91, PR944, PR35, PR2013
CY597	C463	GTI 850 polycross	Canterbury	Low SI	GTI2095	6/75	WP1379, PR91, PR944, PR35, PR2013
AK1058	A772/1	GTI 1978 genetic gain	Sands	Low SI	GTI20212	8/78	WP1448, PR1689, PR478, PR2013
RO2103/1	RO1664/1	GTI 1978 genetic gain	Central North Island	High SI	GTI20212	7/78	WP1448, PR1689, PR478, PR2013
RO2103/2	RO1664/2	GTI 1978 genetic gain	Central North Island	High SI	GTI20212	7/78	WP1448, PR1689, PR478, PR2013
WN377	WN305	GTI 1978 genetic gain	Hawkes Bay	High BA	GTI20212	7/78	WP1448, PR1689, PR478, PR2013
NN530/2	N405/1	GTI 1978 genetic gain	Nelson	Med SI	GTI20212	8/78	WP1448, PR1689, PR478, PR2013
CY421/1	CY421/1	GTI 1978 genetic gain	Canterbury	Med SI	GTI20212	8/78	WP2071, PR1689, PR478, PR2013
SD564/1	S564/1	GTI 1978 genetic gain	Southland	High BA	GTI20212	8/78	WP2071, PR1689, PR478, PR2013
SD564/2	S564/2	GTI 1978 genetic gain	Southland	High BA	GTI20212	8/78	WP2071, PR1689, PR478, PR2013
NN530/1	N405/4	GTI 1979 genetic gain	Nelson	Med SI	GTI20177	8/79	WP1448, PR1633, PR2013
RO2103/3	RO1664/6	GTI 1979 genetic gain	Central North Island	High SI	GTI20177	7/79	WP1448, PR1633, PR2013
SD682	S425/2	GTI 1979 genetic gain	Southland	Med SI	GTI20177	8/80	WP1448, PR1633, PR2013
RO1897	RO1897	GTI 1984 genetic gain	Central North Island	Med SI	GTI20284	7/84	

1) EFM = Exotic Forest Management; GTI = Genetics and Tree Improvement

2) SI = site index; BA = basal area

3) WP = Work Plan; PR = FRI Project Record or Internal Report (many are also Forest Research/Industry Research Cooperative Reports)

TABLE 2c. Genetic Gain Trials supported by the Stand Growth Modelling Cooperative which were established in existing GTI trials
PSP details

PSP expt. No.	Planted trial no.	Trial name	Type of comparison	No. plots	PSP estab workplan	PSP estab date	1st Assessment date ¹⁾	Current Measurement schedule	Expt. Design Details 2)
RO972	R972	EFM Init Crop Stocking	Init stocking/breeds	16	604	5/75	6/76	Clearfell 1998	1
AK1056	A622/1	GTI 850 polycross	Final crop stocking	24	1379	2/86	4/86	Biennial from 1994	2
RO2098	R664/2	GTI 850 polycross	Final crop stocking	23	1379	1/86	6/86	Biennial from 1994	2
NN529/1	N330/1	GTI 850 polycross	Final crop stocking	24	1379	2/86	5/86	Biennial from 1994	2
CY597	C463	GTI 850 polycross	Final crop stocking	24	1379	3/86	5/86	Biennial from 1994	2
AK1058	A772/1	GTI 1978 genetic gain	Genetic gain	18	1448	8/86	8/86	Biennial from 1998	3
RO2103/1	RO1664/1	GTI 1978 genetic gain	Genetic gain	24	1448	8/86	7/86	Biennial from 1998	3
RO2103/2	RO1664/2	GTI 1978 genetic gain	Genetic gain	24	1448	8/86	7/86	Biennial from 1998	4
WN377	WN305	GTI 1978 genetic gain	Genetic gain	18	1448	8/86	10/86	Biennial from 1998	3
NN530/2	N405/1	GTI 1978 genetic gain	Genetic gain	18	1448	8/86	9/86	Biennial from 1998	3
CY421/1	CY421/1	GTI 1978 genetic gain	Genetic gain	12	2071	12/91	5/92	Biennial from 1998	3
SD564/1	S564/1	GTI 1978 genetic gain	Genetic gain	12	2071	12/91	5/92	Biennial from 1998	3
SD564/2	S564/2	GTI 1978 genetic gain	Genetic gain	11	2071	12/91	5/92	Biennial from 1998	4
NN530/1	N405/4	GTI 1979 genetic gain	Genetic gain	18	1448	9/86	9/86	Biennial from 1998	5
RO2103/3	RO1664/6	GTI 1979 genetic gain	Genetic gain	15	1448	4/86	11/86	Biennial from 1998	5
SD682	S425/2	GTI 1979 genetic gain	Genetic gain	19	1448	6/86	7/86	Biennial from 1998	5
RO1987	RO1987	GTI 1984 genetic gain	Genetic gain	66	20284	1/90	1/90 ³⁾	Yearly from 1990	9

1) Height and diameter measured

2) Appendices 6, 7 & 8 detail trials FR 58, 59 & 60 respectively. These trials have been taken out of the Stand Growth Modelling Cooperative programme.

3) Twelve plots of the 66 were established and measured in 1991. See Appendix 9 for details

TABLE 3a. Silviculture/Breed Trials supported by the Stand Growth Modelling Cooperative
Location details

Trial No.	Planting year	Forest	Forest code	Cmpt No.	Forest Owner (as @ 1998)	Growth Region	Site category
FR7	87	Woodhill	WOOD	86	Carter Holt Harvey Forests Ltd	Sands	Med SI
FR8	87	Tahorakuri	TAHO	8342	Fletcher Challenge Forests Ltd	Central North Island	Med SI
FR9	87	Kaingaroa	KANG	481	Fletcher Challenge Forests Ltd	Central North Island	Low SI
FR10	87	Glengarry	GLNG	180	Carter Holt Harvey Forests Ltd	Hawkes Bay	High BA
FR11	87	Ditchlings	DTLG	26	Weyerhaeuser NZ Ltd	Nelson	Low SI
FR12	87	Otago Coast	OTCO	170	Wenita Forestry	Southland	High BA
FR54	88	Mamaranui	MMRN	0	Carter Holt Harvey Forests Ltd	Auckland Clays	High BA
FR55	88	Eyrewell	EYWL	33	Carter Holt Harvey Forests Ltd	Canterbury	Low SI
FR56	88	Dalethorpe	DALE	0	Selwyn Plantation Board	Canterbury	Med SI
FR57	88	Tikokino	TIKO	0	NZ Forest Research Institute Ltd	Hawkes Bay	High SI
FR77	89	Tikokino	TIKO	0	NZ Forest Research Institute Ltd	Hawkes Bay	High SI
FR78	89	Gwavas	GWAV	59	Hawkes Bay Forests Ltd	Hawkes Bay	Med SI
FR84	89	Kawerau	Kawe	7	Carter Holt Harvey Forests Ltd	Central North Island	High BA
FR85	89	Kaingaroa	KANG	1187	Fletcher Challenge Forests Ltd	Central North Island	Med SI
FR86	89	Golden Downs	GDNW	112	Weyerhaeuser NZ Ltd	Nelson	Med SI
FR121/1	90	Tungrove	TGRV	3148	Carter Holt Harvey Forests Ltd	Auckland Clays	Med SI
FR121/2	90	Atiamuri	ATIA	7316	Carter Holt Harvey Forests Ltd	Central North Island	Med SI
FR121/3	90	Gwavas	GWAV	45	Hawkes Bay Forests Ltd	Hawkes Bay	Low SI
FR121/4	90	Tairua	TIRU	120	Carter Holt Harvey Forests Ltd	Auckland Clays	High SI
FR121/5	90	Hokonui	HOKO	3	Rayonier NZ Ltd	Southland	High SI
FR121/6	90	Tarawera	Tawe	30	Fletcher Challenge Forests Ltd	Central North Island	High SI
FR121/7	90	Huanui	HNUI	18	Hikurangi Forest Farms Ltd	East Coast	High BA
FR121/8	91	Mangatu	MANT	10	Rayonier NZ Ltd	East Coast	Med SI
FR121/9	91	Santoft	SANT	108	Enslaw One Ltd	Sands	Low SI
FR121/10	91	Blue Mountains	BLUE	325	Enslaw One Ltd	Southland	Low SI
FR121/11	91	Shellocks	SHEL	36	Selwyn Plantation Board	Canterbury	Low SI
FR121/12	91	Ashley	ASHY	19	Carter Holt Harvey Forests Ltd	Canterbury	High SI
FR121/13	91	Golden Downs	GDNE	133	Weyerhaeuser NZ Ltd	Nelson	High SI

**TABLE 3b. Silviculture/Breed Trials supported by the Stand Growth Modelling Cooperative
PSP details**

Planting year	Trial No.	Forest	Planting Work Plan	Estab. Report	No. plots planted	Expt. design Details (App. No.)	First Height meas. (mth/yr)	First Winter Assessment	PSP estab. (P = planned)
87	FR7	Woodhill	1585	PR1767	54	10	5/89	6/93	11/92
87	FR8	Tahorakuri	1585	PR1767	54	11	9/88	5/92	3/92
87	FR9	Kaingaroa	1585	PR1767	48	12	7/89	5/94	2/94
87	FR10	Glengarry	1585	PR1767	54	13	7/89	6/92	2/92
87	FR11	Ditchlings	1585	PR1767	48	14	8/89	7/93	1/93
87	FR12	Otago Coast	1585	PR1767	48	15	8/89	6/94	3/94
88	FR54	Mamaranui	1633	PR2540	44	16	5/90	5/93	10/92
88	FR55	Eyrewell	1633	PR2540	22	17	5/90	5/95	12/94
88	FR56	Dalethorpe	1633	PR2540	44	18	5/90	5/95	3/95
88	FR57	Tikokino	1633	PR2540	42	19	8/91	6/94	12/93
89	FR77	Tikokino	1633	PR2544	30	20	8/91	5/95	11/94
89	FR78	Gwavas	1633	PR2544	30	21	8/91	6/95	1/95
89	FR84	Kawerau	1633	PR2544	36	22	6/91	4/94	10/93
89	FR85	Kaingaroa	1633	PR2544	42	23	5/91	4/94	1/94
89	FR86	Golden Downs	1633	PR2544	16	24	12/91	5/95	2/95
90	FR121/1	Tungrove	1633	PR2781	25	25	4/92	4/96	9/95
90	FR121/2	Atiamuri	1633	PR2781	32	26	5/92	7/95	2/95
90	FR121/3	Gwavas	1633	PR2781	22	27	6/92	5/96	12/95
90	FR121/4	Tairua	1633	PR2781	18	28	8/92	8/95	10/94
90	FR121/5	Hokonui	1633	PR2781	27	29	6/92	-	Aband 11/97
90	FR121/6	Tarawera	1633	PR2781	25	25	4/92	8/95	3/95
90	FR121/7	Huanui	1633	PR2781	18	28	6/92	7/95	11/94
91	FR121/8	Mangatu	1980	PR3027	25	30	12/94	8/96	1/96
91	FR121/9	Santoft	1980	PR3027	25	30	4/93	4/98	10/97
91	FR121/10	Blue Mountains	1980	PR3027	25	30	6/93	-	98/99 ^P
91	FR121/11	Shellocks	1980	PR3027	25	30	5/93	-	98/99 ^P
91	FR121/12	Ashley	1980	PR3027	25	30	5/93	5/97	11/96
91	FR121/13	Golden Downs	1980	PR3027	25	30	5/93	7/97	2/97

TABLE 4.

Planting year for **Silvicultural/Breed Trials**
representing a matrix of regions and site categories

Region	Site category ¹⁾			
	High basal area	High site index	Medium site index	Low site index
Auckland clays	'88	'90	'90	
Sands	NA ²⁾	NA	'87	'91
Central North Island	'89	'90	'87 , '89 , '90	'87
Hawkes Bay	'87	'88 , '89	'89	'90
East Coast	'90		'91	
Nelson		'91	'89	'87
Southland	'87	'90		'91
Canterbury	NA	'91	'88	'88 , '91

1) Classifications apply **within** Regions

2) NA = not applicable

TABLE 5. Seedlot comparisons in trials supported by the Stand Growth Modelling Cooperative

Growth modelling region	Site category	Year planted	PSP Expt. No.	Seedlot ratings	Appendix
Auckland Clays	High SI	1990	FR121/4	GF7, GF14, GF16, GF25	28
	Med SI	1990	FR121/1	GF7, GF14, GF16, GF25, LI25 (GF13)	25
	Low SI	-			
Sands	High BA	1988	FR54	GF14, GF17, GF22, LI23 (GF9)	16
	High SI	-			
	Med SI	1975	AK1056	GF14	2
		1987	FR7	GF7, GF14, GF19, GF21, LI28 (GF13)	10
	Low SI	1978	AK1058	GF2, GF7, GF14, GF22	3
		1991	FR121/9	GF6, GF14, GF16, GF25, LI25 (GF13)	30
	High BA	-			
Central Nth Island	High SI	1970	RO972	GF4, GF13	1
		1978	RO2103/1	GF2, GF7, GF14, GF22	3
		1978	RO2103/2	GF2, GF7, GF14, GF22	4
		1979	RO2103/3	GF7, GF8, GF14, GF18, LI19 (GF8)	5
		1990	FR121/6	GF7, GF14, GF16, GF25, LI25 (GF13)	25
	Med SI	1975	RO2098	GF14	2
		1984	RO1897	GF7, GF14, GF16, GF17, LI20 (GF10), LI25 (GF11)	9
		1987	FR8	GF7, GF14, GF21, LI28 (GF13)	11
		1989	FR85	GF2, GF16, GF18, GF22, GF23, GF25	23
		1990	FR121/2	GF7, GF14, GF16, GF25, LI25 (GF13)	26
	Low SI	1987	FR9	GF7, GF14, GF21, LI28 (GF13)	12
	High BA	1989	FR84	GF2, GF16, GF25	22
	High SI	1988	FR57	GF17, GF19, LI20 (GF7)	19
		1989	FR77	GF2, GF16, GF23, GF25	20
	Med SI	1989	FR78	GF2, GF16, GF23, GF25	21
Hawkes Bay	Low SI	1990	FR121/3	GF7, GF14, GF16, GF25, LI25 (GF13)	27
	High BA	1978	WN377	GF2, GF7, GF14, GF22	3
		1987	FR10	GF7, GF14, GF16, GF21, LI28 (GF13)	13
	High SI	-			
	Med SI	1991	FR121/8	GF6, GF14, GF16, GF25, LI25 (GF13)	30
East Coast	Low SI	-			
	High BA	1990	FR121/7	GF7, GF14, GF16, GF25	28
	High SI	1991	FR121/13	GF6, GF14, GF16, GF25, LI25 (GF13)	30
Nelson	Med SI	1978	NN530/2	GF2, GF7, GF14, GF22	3
		1979	NN530/1	GF7, GF8, GF14, GF18, LI19 (GF8)	5
		1989	FR86	GF2, GF16, GF23, LI27 (GF6)	24
	Low SI	1975	NN529/1	GF14	2
		1987	FR11	GF7, GF14, GF21, LI28, (GF13)	14
	High BA	-			
	High SI	1990	FR121/5	GF7, GF14, GF16, GF25, LI25 (GF13)	29
Southland	Med SI	1980	SD682	GF7, GF8, GF14, GF18, LI19 (GF8)	5
	Low SI	1991	FR121/10	GF6, GF14, GF16, GF25, LI25 (GF13)	30
	High BA	1978	SD564/1	GF2, GF7, GF14, GF22	3
		1978	SD564/2	GF2, GF7, GF14, GF22	4
		1987	FR12	GF7, GF14, GF21, LI28 (GF13)	15
Canterbury	High SI	1991	FR121/12	GF6, GF14, GF16, GF25, LI25 (GF13)	30
	Med SI	1978	CY421/1	GF2, GF7, GF14, GF22	3
		1988	FR56	GF14, GF17, GF22, LI23 (GF9)	18
	Low SI	1975	CY597	GF14	2
		1988	FR55	GF16, GF17, GF22	17
		1991	FR121/11	GF6, GF14, GF16, GF25, LI25 (GF13)	30
	High BA	-			

Table 6.

NEW BREEDS TRIALS : PROJECTED WORK PROGRAMME 1998-2002*

Expt No.	Forest	Owner	Yr Pl	No. Plots	Meas Sched	Meas. Date	1998/99		1999/00		2000/01		2001/02	
							Mandays required for measurement							
							FRI	InKind	FRI	InKind	FRI	InKind	FRI	InKind
AK 1056	WOOD	CHHF	75	24	3 yr	April	7	1	0		0		7	1
RO 2098	KANG	FCF	75	23	3 yr	June	4	2	0		0		4	2
NN 529/1	GDNW	FCF	75	24	3 yr	May	10	2	0		0		10	2
CY 597	EYWL	CHHF	75	24	3 yr	May	8	2	0		0		8	2
AK 1058	AUPO	JUKN	78	15	2 yr	July	3		0		3		0	
RO 2103/1	KANG	FCF	78	24	2 yr	June	0		3	2	0		3	2
RO 2103/2	KANG	FCF	78	24	2 yr	June	0		3	2	0		3	2
WN 377	MOHA	HBH	78	18	2 yr	Aug	4	2	0		4	2	0	
NN 530/2	GDNE	WEYH	78	18	2 yr	July	4	1	0		4	1	0	
CY 421/1	WMTE	RMNZ	78	12	2 yr	May	0		5		0		5	
SD 564/1	LONG	RAYN	78	12	2 yr	June	0		3	1	0		3	1
SD 564/2	LONG	RAYN	78	11	2 yr	June	0		3	1	0		3	1
NN 530/1	GDNW	WEYH	79	18	2 yr	July	4	1	0		4	1	0	
RO 2103/3	KANG	FCF	79	12	2 yr	June	0		3	2	0		3	2
SD 682	DEAN	RAYN	80	19	2 yr	June	0		8	2	0		8	2
RO 1897	KANG	FCF	84	66	1 yr	July	8	4	8	4	8	4	8	4
FR 7	WOOD	CHHF	87	54	1 yr	June	6	4	6	4	6	4	10	6
FR 8	TAHO	FCF	87	52	1 yr	April	6	4	6	4	6	4	6	4
FR 9	KANG	FCF	87	48	1 yr	May	5	2	5	2	5	2	5	2
FR 10	GLNG	CHHF	87	54	1 yr	May	6	4	6	4	6	4	6	4
FR 11	DTLG	WEYH	87	46	1 yr	July	6	2	10	4	6	2	6	2
FR 12	OTCO	WENT	87	47	1 yr	June	10	4	10	4	10	4	10	4
FR 54	MMRN	CHHF	88	42	1 yr	May	6	2	10	4	6	2	6	2
FR 55	EYWL	CHHF	88	22	1 yr	May	4		4		4		4	
FR 56	DALE	SELW	88	36	1 yr	May	8	2	8	2	8	2	8	2
FR 57	TIKO	NZFRI	88	40	1 yr	May	7		7		7		10	
FR 77	TIKO	NZFRI	89	35	1 yr	May	6		6		6		6	
FR 78	GWAV	HBH	89	24	1 yr	June	4	2	4	2	4	2	4	2
FR 84	KAWH	CHHF	89	36	1 yr	April	16	10	10	6	10	6	10	6
FR 85	KANG	FCF	89	42	1 yr	April	6	4	12	8	6	4	6	4
FR 86	GDNW	WEHY	89	16	1 yr	July	4	2	4	2	4	2	4	2
FR 121/1	TGRV	CHHF	90	25	1 yr	April	7	2	7	2	7	2	7	2
FR 121/2	ATIA	CHHF	90	32	1 yr	Aug	6	4	6	4	6	4	6	4
FR 121/3	GWAV	HBH	90	21	1 yr	May	4	2	4	2	4	2	4	2
FR 121/4	TIRU	CHHF	90	18	1 yr	Aug	3	2	3	2	3	2	3	2
FR 121/5	HOKO	RAYN	90	-		not estab								
FR 121/6	TAWH	FCF	90	25	1 yr	Aug	3	2	3	2	3	2	3	2
FR 121/7	HNUI	HFF	90	18	1 yr	July	5	2	5	2	5	2	5	2
FR 121/8	MANT	RAYN	91	23	1 yr	August	5	2	5	2	5	2	5	2
FR 121/9	SANT	ERNS	91	25	1 yr	April	5	2	5	2	5	2	5	2
FR 121/10	BLUE	ERNS	91	25	1 yr	est 98/99	36	12	6	2	6	2	6	2
FR 121/11	SHEL	SELW	91	25	1 yr	est 98/99	32	12	6	2	6	2	6	2
FR 121/12	ASHY	CHHF	91	25	1 yr	May	8	4	8	4	8	4	8	4
FR 121/13	GDNE	WEHY	91	25	1 yr	July	6	2	6	2	6	2	6	2
Total Mandays							272	105	208	88	181	74	230	89
* Revision expected							54.4	21	41.6	17.6	36.2	14.8	46	17.8
Total Manweeks							54.4	21	41.6	17.6	36.2	14.8	46	17.8

* Revision expected

Table 7.

New Breeds Trials - Schedule of late thinnings

Timing of thinning 20 MCH

PLOT ID	Forest	Owner	Age @ 1998	Current MCH	Current Mean DBH	Current Site index	Initial Stocking	Final Stocking	No. Plots	Estimated	
										Thin Date	Thin Age
RO 1897	KANG	FCFL	14	20		32	700	400	12	Jan-98	14
							700	300	12	Jan-98	14
FR 7	WOOD	CHHF	11	14.7	23.5	30.2	500	200	8	Sep-01	14
FR 9	KANG	FCFL	11	10.4	20.8	23	500	200	8	Feb-06	19
FR 11	DTLG	WEYH	11	14.4	26	29.8	500	200	8	Nov-01	14
FR 12	OTCO	WENT	11	11	24.4	23.9	500	200	8	Aug-05	18
FR 54	MMRM	CHHF	10	15.8	31.6	34.7	500	200	6	Sep-00	12
FR 56	DALE	SELW	10	9.3	24.8	23	500	200	6	Feb-07	19
FR 57	TIKO	NZFRI	10	14.7	26.8	33	500	200	6	May-01	13
FR 77	TIKO	NZFRI	9	13.1	26	33.3	500	200	6	Feb-02	14
FR 78	GWAV	HBFL	9	12.4	26.3	31.9	500	200	6	Nov-02	14
FR 84	KAWA	CHHF	9	19.2	27.6	43	600	250	12	Sep-98	9
FR 85	KANG	FCFL	9	14.7	19.7	36.2	833	250	14	Nov-00	12

thinning completed

APPENDIX 1

Experimental design for completely randomised **Initial Crop Stocking Trial** planted in 1970 at **Rotoehu (RO972)**.

Each dot represents one large plot with a PSP.¹⁾

Trt	Pruning	Silviculture					Planting stock			
		Initial	1st interim	2nd interim	Final	Thinning	Seedlings	Cuttings ²⁾		
						1st MCH (m)	2nd MCH (m)	3rd MCH (m)	Ratio	
1	2.2m, 4.2m, 6m	250	250	250	250	-	-	-	1:1	••
2	"	500	500	500	250	-	-	12	2:1	••
3	"	750	750	500	250	-	8.2	12	3:1	••
4	"	1000	750	500	250	6.2	8.2	12	4:1	••
5	"	1250	750	500	250	6.2	8.2	12	5:1	••
6	"	1500	750	500	250	6.2	8.2	12	6:1	••

1) PSP's established 1975.

Data available: RO972: Height and diameter annually 1975-1983, then biennially from 1985-1995. Final measurement taken in 1998 for 10 plots only.

TRIAL CLEARFELLED in 1998

2) Cuttings from older trees (probably about 8-9 years old) of uncertain breed, probably unselected.

APPENDIX 2

Experimental design for randomised complete block Final Crop Stocking Trial planted in 1975 (as GTI "850 Polycross" trial) at Woodhill (AK1056), Kaingaroa Cpt 327 (RO2098), Golden Downs (NN529/1) and Eyrewell (CY597).
Each dot represents one large plot with a PSP.¹⁾

Trt	Pruning	Silviculture				Planting stock	
		Stocking (stems/ha)		Thinning		Seedlings	
		Initial	Final	MCH (m)	Ratio	GF14 polycross 2)	
1	2.2 m, 4.2 m ³⁾	625	100	12	6.25:1	...	
2	"	625	200	12	3.1:1	...	
3	"	625	400	12	1.6:1	...	
4	"	625	625	-	1:1		
5	"	625	100	20	6.25:1	...	
6	"	625	200	20	3.1:1	...	
7	"	625	400	20	1.6:1	...	

1) PSP's established 1986.

Data available: AK1056, RO2098, NN529/1, CY597; Height and diameter annually 1986-1994, then 1996, thereafter on a long term remeasurement schedule.

2) Single-tree-plot progeny trial consisting of offspring from 100 mothers (most are "850" series selections from both the North and South Islands) crossed with a pollen mix of 10 North Island "850" series parents, plus four controls, CY74/701 (Southland orchard - Amberley); CY74/700 (Canterbury orchard - Amberley); WN72/A2 (Gwavas seed orchard); R69/854 (Kaingaroa bulk unselected).

3) 200 stems/ha treatments pruned to 6 m at Kaingaroa (RO2098) and Golden Downs (NN529).

APPENDIX 3

Experimental design for randomised complete block 1978 Genetic Gain Trial (sawlog regime) planted in 1978 at Aupouri (AK1058), Kaingaroa Cpt 1210 (RO2103/1), Mohaka (WN377), Golden Downs (NN530/2), Longwood (SD564/1) and Waimate (CY421/1).
Each dot represents one large plot with a PSP.

Silviculture					Site		Planting stock				
Trt	Pruning	Stocking (stem/ha)		Thinning		Ratio	GF2 (R74/1027)	GF7 4)	Seedlings 3)		
		Initial	Interim	Final	1st MCH (m)					2nd MCH (m)	
1	2.2m, 4.2m, 6m	1111	600	300	6.2	12	3.7:1	Aupouri 1)	•••	••••••	•••
								Mohaka 1)	•••	••••••	•••
								Kaingaroa 1)	•••	••••••	•••
								Golden Downs 1)	•••	••••••	•••
								Longwood 2)	•••	•••	•••
								Waimate 2)	•••	•••	•••

1) Twelve PSP's were established at each of 4 sites in the GF7 and GF14 plantings in 1986, six PSP's in the GF2 and GF22 plantings in 1991-93 (Appendix 4a). Plot centres were moved in 1994 due to an establishment error (3 plots Golden Downs, 5 plots Longwood, 2 plots Mohaka and 1 plot Waimate).
Data available: AK1058, RO2103/1, NN530/2, WN377: Height and diameter annually 1986 to 1998, (GF2 & 22 1991 to 1998 only), biennially thereafter.
(Note: WN 377 not measured in 1989 and 1991)

2) Twelve PSP's were established at each of two sites in 1991 (Appendix 4a).

Data available: CY421/1, SD564/1: Height and diameter annually 1991 to 1998, biennially thereafter.

3) Three additional seedlots (6 reps) are included on all sites in this experiment but are not being monitored with PSP's. They are:
GF10 (GF13 in Southland), CY/C/75/52; GF8, CY/C/75/51; GF16, FRI 76/2052

4) Local climbing select seedlots have been arbitrarily assigned a GF7. They are:
Kaingaroa climbing select RO/C/76/1 at Aupouri (AK1058) and Kaingaroa (RO2103/1), Ngaumu climbing select WN/75/15 at Mohaka (WN377), Golden Downs climbing select NN/C/75/2 at Golden Downs (NN530/2), Balmoral climbing select CY/C/75/40 at Waimate (CY421/1), Rankleburn climbing select SD/C/75/27 at Longwood (SD564/1)

APPENDIX 4

Experimental design for randomised complete block 1978 Genetic Gain Trial (pulpwood regime) planted in 1978 at Kaingaroa Cpt 1210 (RO2103/2) and Longwood (SD564/2).

Each dot represents one large plot with a PSP. 1)2)

Silviculture					Site	Planting stock			
Trt	Pruning	Stocking (stems/ha)		Thinning		Seedlings 3)			
		Initial	Final	Ratio		GF2 (R74/1027)	GF7 4)	GF14 (WN76/2)	GF22 (850-55 x 850-96)
1	2.2 m	711	711	1:1	Kaingaroa 1)	••••••	••••••	••••••	••••••
					Longwood 2)	•••	•••	•••	•••

- 1) Twelve PSP's were established at Kaingaroa in the GF7 and GF14 plantings in 1986, six PSP's in each of the GF2 and GF22 plantings in 1991 (Appendix 4a). Five plot centres were moved in 1994 due to an establishment error.
Data available: RO2103/2: Height and diameter annually 1986 to 1998, (GF2 & 22 1991 to 1998 only), biennially thereafter.
- 2) Eleven PSP's were established at Longwood in 1991 (Appendix 4a).
Data available: SD564/2: Height and diameter annually 1991 to 1998, biennially thereafter.
- 3) Three additional seedlots (6 reps) are included on all sites in this experiment but are not being monitored with PSP's. They are:
GF10 (GF13 in Southland) - CY/C/75/52, GF8 (GF14 in Canterbury) - CY/C/75/51, GF16 - FRI 76/2052
- 4) Local climbing select seedlots have been arbitrarily assigned a GF7. They are:
Kaingaroa climbing select RO/C/76/1 Kaingaroa (RO2103/2)
Rankleburn climbing select SD/C/75/27 at Longwood (SD564/2)

APPENDIX 4A

Plots established in the 1978 Genetic Gain Trials by year.

Trial	Site	No. of PSP's Added				Year	No. plots
		GF2	GF7	GF14	GF22		
AK 1058	Aupouri	-	6	6	-	1986	12
		3	-	-	3	1992	6
TOTAL		3	6	6	3		18
RO 2103/1	Kaingaroa	-	6	6	-	1986	12
		3	-	-	3	1991	6
		3	-	-	3	1993	6
TOTAL		6	6	6	6		24
RO 2103/2	Kaingaroa	-	6	6	-	1986	12
		6	-	-	6	1991	12
TOTAL		6	6	6	6		24
WN 377	Mohaka	-	6	6	-	1986	12
		-	-	-	2	1991	2
		3	-	-	1	1992	4
TOTAL		3	6	6	3		18
NN 530/2	Golden Downs	-	6	6	-	1986	12
		3	-	-	3	1991	6
TOTAL		3	6	6	3		18
CY 421/1	Waimate	3	3	3	3	1991	12
TOTAL		3	3	3	3		12
SD 564/1	Longwood	3	3	3	3	1991	12
TOTAL		3	3	3	3		12
SD 564/2	Longwood	3	3	3	2	1991	11
TOTAL		3	3	3	2		11

APPENDIX 5

Experimental design for randomised complete block 1979 Genetic Gain Trial planted in 1979 at Kaingaroa, Cpt 1218 (RO2103/3) and Golden Downs (NN530/1), and in 1980 at Dean (SD682).
Each dot represents one large plot with a PSP. 1)

Silviculture							Site		Planting stock			
Trt	Pruning	Stocking (stem/ha)			Thinning		Ratio	GF7 2)	GF8 (CY/C/75/51)	GF14 4) (FRI78/2299)	GF18 5) (FRI78/2300)	LI19 (GF8) (FRI78/2301)
		Initial	Interim	Final	1st MCH (m)	2nd MCH (m)						
1	2.2m, 4.2m, 6m	1111	600	300	6	12	3.7:1	Kaingaroa	 3)	 3)	 3)	 3)
								Golden Downs	 3)	 3)	 3)	 3)
								Dean	 3)	 3)	 3)	 3)

- 1) PSP's established 1986.
Data available: RO2103/3, NN530/1, SD 682; Height and diameter annually from 1986-1998, biennially thereafter.
3 plots (1 GF7, 1 GF14, 1 LI19) at Kaingaroa were abandoned in 1994 due to *Dothistroma* mortality and poor form.
- 2) Local climbing select seedlots have been arbitrarily assigned a GF7. They are:
Kaingaroa climbing select, RO/C/76/1, at Kaingaroa (RO2103/3) and Golden Downs (NN530/1),
Rankleburn Cpt 17 climbing select, SD/C/76/2, at Dean (SD682).
- 3) Up to 6 replications of seedlot CY/C/75/51 are not being monitored at Kaingaroa (RO2103/3) and Golden Downs (NN530/1).
- 4) Seedlot FRI78/2299 was found to be highly inbred and plots (shown as ▲) were abandoned.
- 5) Seedlot FRI78/2300 has been considered to be equivalent to GF14 for growth modelling purposes (see Cooperative Report No. 35)

APPENDIX 6

Silviculture and seedlot for **Silviculture Comparison** established in the Best Practices trial planted in **1982** at **Riverhead (FR58)**.

Each dot represents one large plot with a PSP.¹⁾

Trt	Silviculture							Planting Stock
	Pruning	Stocking (stems/ha)			Thinning			Seedlings
		Initial	Interim	Final	1st	2nd	Ratio	GF14 (3/3/80/2)
1	250 stems to 3 m, 4.5 m, 6 m	1600	500	250	age 6	age 7-8	6.4:1	•••
2	250 stems to 4.5 m	1600	1000	250	3m	age 6	6.4:1	•••

1) PSP's established 1988.

Data available: FR58: Height and diameter 1988, 1989 and 1992-95.

Trial taken out of the New/Breeds remeasurement programme in 1995. No genetic comparisons, cannot be used directly for genetic gain. Plots are now being measured biennially as general growth monitoring plots.

APPENDIX 7

Silviculture and seedlot for **Silviculture/Site Comparison** established in "880" series progeny trial planted in 1981 at **Waiomio (FR59)**.

Each dot represents one large plot with a PSP.¹⁾

Trt	Silviculture				Planting stock	
	Pruning	Stocking (stems/ha)		Thinning		Seedlings
		Initial	Final	Age	Ratio	
1	2.2 m, 4.2 m, 6 m	816	350	8	5.1:1	...
2	2.2m	816	816	-	1:1	...

- 1) PSP's established 1988.

Data available: FR59: Height and diameter annually 1988-92 and 1994.

- 2) Single-tree-plot progeny trial consisting primarily of approximately 170 open-pollinated offspring from "880" series ortets. Ortets are in the "268" series progeny trial planted at Kaingaroa Cpt 1350.

Trial taken out of the New/Breeds remeasurement programme in 1995. No genetic comparisons, cannot be used directly for genetic gain. Plots are now being measured biennially as general growth monitoring plots.

APPENDIX 8

Silviculture and seedlot for **Final Crop Stocking Comparison** established in the '268 x 875' Paircross progeny trial planted in 1982 at **Weiti Station (FR60)**.

Each dot represents one large plot with a PSP.¹⁾

Trt	Silviculture					Planting stock
	Pruning	Stocking (stems/ha)		Thinning		Seedlings
		Initial	Final	Age	Ratio	GF16 (approx.) ²⁾
1	2.2 m, 4.2 m, 6 m	625	100	6	6.3:1	●●●
2	"	625	200	6	3.1:1	●●●
3	"	625	300	6	2.1:1	●●●
4	"	625	400	6	1.6:1	●●●

- 1) PSP's established 1988.

Data available: FR60: Height and diameter annually 1988-1994.

- 2) Single-tree plot progeny trial consisting primarily of 128 crosses of "268" series x "875" series parents.

Trial taken out of the New/Breeds remeasurement programme in 1995 No genetic comparisons, cannot be used directly for genetic gain. Plots are now being measured biennially as general growth monitoring plots.

APPENDIX 9

Experimental design for randomised complete block 1984 Genetic Gain Trial planted in 1984 at Kaingaroa Cpt 327 (RO1897).
Each dot represents one large plot with a PSP. 1) 2)

Silviculture				Planting stock ³⁾									
Trt	Pruning	Stocking (stems/ha)		Thinning ⁴⁾		Seedlings							Cuttings
		Initial	Final	MCH (m)	Ratio	GF7 (FRI79/2320)	GF14 (3/3/83/2)	GF16 (9/0/83/91)	GF17 (9/0/83/96)	LI25 (GF11) (9/0/83/99)	LI20 (GF10) (9/0/83/95)	GF17 (9/4/80/11)	
1	2.2m	700	300			•••	•••2)	•••	•••	•••	•••	•••2)	
2	"	700	400			•••	•••2)	•••	•••	•••	•••	•••	
3	"	700	300			••	••2)	••	••2)	••	••	••	
4	"	700	400			••	••2)	••	••	••	••	••	

- 1) Fifty four PSP's established 1990.
Data available: RO1897: Height and diameter annually from 1990.
- 2) Twelve additional PSP's were established in 1991: ten in GF14, one in GF17 seedlings, and one in the GF17 cuttings.
Data available: RO1897: height and diameter annually from 1991.
- 3) Four additional types of planting stock are included in this experiment but are not being monitored with PSP's. They are:
GF7(LI27) Bulked '870' crosses, 9/0/83/98 (10 reps)
GF7 1 year old cuttings from Kaingaroa climbing select seedlings in FRI nursery (2 reps)
GF16 (approx.) 1 year old cuttings from "880" seedlings in FRI nursery (2 reps)
GF16 Cuttings from 4 yr old trees in "875" diallel progeny tests at Kaingaroa Cpt 327 and Onepu (10 reps)
- 4) First thinning treatment (11.7m MCH) carried out in March 1993.
Second thinning treatment (20m MCH) carried out in January 1998.

APPENDIX 10

Experimental design for randomised incomplete block **Silviculture/Breed Trials** planted in 1987 at Woodhill (FR7).
Each dot represents one large plot with a PSP. 1)

Silviculture					Planting stock						
Trt	Pruning	Stocking (stems/ha)		Thinning		Seedlings					
		Crown remaining	Initial	Final	MCH (m)	Ratio	GF7 (FR179/2320)	GF14 (3/3/85/1)	GF19 (2/6/86/29)	GF21 (6/3/86/46)	L128(GF13) (9/3/86/166)
1	4m		500	100	6.2	5:1	••	••		••	••
2	"		500	200	6.2	2.5:1	••	••		••	••
3	"		1000	400	6.2	2.5:1	••	••		••	••
4	"		1500	600	6.2	2.5:1	••	••		••	••
5	Unpruned		500	500	-	1:1	••	••		••	••
6	4m		500	200	20	2.5:1	••	••		••	••
Additional at Woodhill (FR7):											
7	Best 250 s/ha		800	250	6.2	3.2:1			•		
7	Best 320 s/ha		800	320	6.2	2.5:1			•		
8	Best 250 s/ha		1000	250	6.2	4:1			•		
8	Best 320 s/ha		1000	320	6.2	3.1:1			•		
9	Best 250 s/ha		1200	250	6.2	4.8:1			•		
9	Best 320 s/ha		1200	320	6.2	3.75:1			•		

- 1) Fifty four PSP's established December 1992.

Data available: FR7: Heights only, age 2, pruning measurements 1992, height and diameter annually from 1993.

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 32.

APPENDIX 11

Experimental design for randomised incomplete block **Silviculture/Breed Trials** planted in 1987 at **Tahorakuri (FR8)**.
Each dot represents one large plot with a PSP. 1)

Silviculture							Planting stock						
Trt	Pruning		Stocking (stems/ha)			Thinning		Seedlings					
	1st Gauge prune	2nd 2) Crown remaining	Initial	Interim	Final	1st MCH (m)	2nd MCH (m)	Ratio	GF7 (FR179/2320)	GF14 (3/3/85/1)	GF21 (Best 16 "268" series - NZFP)	GF21 (6/3/86/46)	LI28(GF13) (9/3/86/166)
1	10cm	4m	500	-	100	6.2		5:1	••	••		••	••
2	"	"	500	-	200	6.2		2.5:1	••	••		••	••
3	"	"	1000	-	400	6.2		2.5:1	••	•		••	••
3a	"	"	1000	500 ³⁾	400	4.5	6.2	2.5:1		•		••	
4	"	"	1500	-	600	6.2		2.5:1	•	••		••	••
4a	"	"	1500	400 ³⁾	400	4.5		3.75:1	•				
5	Unpruned	Unpruned	500	-	500	-		1:1	••	•		••	••
5a	"	4m	500	-	500					•			
6	10cm	4m	500	-	200	6.2 ⁴⁾		2.5:1	••	••		••	••
Additional at Tahorakuri (FR8):													
7	None		1000	-	1000	-		1:1			•••		
8	2.2m, 4.2m, 6m ⁵⁾		1000	-	375	20		2.7:1			••		
8a	400 stems to 2.2m		1000	-	400	6.2		2.5:1			•		

1) Fifty four PSP's established March 1992.

Data available: FR8: Heights only, age 1, pruning data 1992, height and diameter annually from 1992.

2) An unscheduled 2nd prune was carried out by local staff at 9.0m MCH in October 1993.

3) An unscheduled interim thinning was carried out by local staff during the regeneration cutting operation in 1991.

4) Treatment 6 was originally a production thin (at 20m MCH) but was thinned in error at plot establishment, now equivalent to treatment 2.

5) First pruning to 2.2m at 9.0m MCH in October 1993.

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 32.

APPENDIX 12

Experimental design for randomised incomplete block **Silviculture/Breed Trials** planted in 1987 at Kaingaroa Cpt 481 (FR9).
Each dot represents one large plot with a PSP. 1)

Trt	Silviculture				Planting stock				
	Pruning	Stocking (stems/ha)		Thinning		Seedlings			
		Crown remaining	Initial	Final	MCH (m)	Ratio	GF7 (FR179/2320)	GF14 (3/3/85/1)	GF21 (6/3/86/46)
1	4m	250	100	6.2	2.5:1	●●	●●	●●	●●
2	"	500	200	6.2	2.5:1	●●	●●	●●	●●
3	"	1000	400	6.2	2.5:1	●●	●●	●●	●●
4	"	1500	600	6.2	2.5:1	●●	●●	●●	●●
5	Unpruned	500	500	-	1:1	●●	●●	●●	●●
6	4m	500	200	20	2.5:1	●●	●●	●●	●●

1) Forty eight PSP's established March 1994.

Data available: FR9: Heights only, age 2, pruning measurements 1994, height and diameter annually from 1994.

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 32.

APPENDIX 13

Experimental design for randomised incomplete block **Silviculture/Breed Trials** planted in 1987 at **Glengarry (FR10)**.
Each dot represents one large plot with a PSP. 1)

Silviculture										Planting stock					
Trt	Pruning	Stocking (stems/ha)			Thinning			Seedlings							
		Gauge	prune		Initial	Interim	Final	1st MCH (m)	2nd MCH (m)	Ratio	GF7 (FRI79/2320)	GF14 (3/3/85/1)	GF16 (2/6/86/27)	GF21 (6/3/86/46)	LI28(GF13) (9/3/86/166)
1	10 cm				500	-	100	6.2	-	5:1	••	••	••	••	••
2	"				500	-	200	6.2	-	2.5:1	••	••	••	••	••
3	"				1000	-	400	6.2	-	2.5:1	••	••	••	••	••
4	"				1500	-	600	6.2	-	2.5:1	••	••	••	••	••
5	Unpruned				500	-	500	-	-	1:1	••	••	••	••	••
6	10 cm				500	-	200	6.22)	-	2.5:1	••	••	••	••	••
<u>Additional at Glengarry (FR10):</u>															
7	2.2m, 4.2m				500	-	200	20	-	2.5:1			•••		
8	2.2m, 4.2m, 6m				1000	300	200	18	28	5:1			•••		

1) Fifty four PSP's established February 1992.

Data available: FR10: Heights only, age 2, pruning measurements 1992, height and diameter annually from 1992.

2) Treatment 6 was originally a production thin (at 20m MCH) but was thinned in error at plot establishment, now equivalent to treatment 2.

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 32.

APPENDIX 14

Experimental design for randomised incomplete block Silviculture/Breed Trials planted in 1987 at Ditchlings (FR11).

Each dot represents one large plot with a PSP. 1) 2)

Trt	Silviculture				Planting stock				
	Pruning	Stocking (stems/ha)		Thinning		Seedlings			
		Initial	Final	MCH (m)	Ratio	GF7 (FR179/2320)	GF14 (3/3/85/1)	GF21 (6/3/86/46)	LI28(GF13) (9/3/86/166)
1	4m	500	100	6.2	5:1	●●	●▲	●●	●●
2	"	500	200	6.2	2.5:1	●●	●●	●●	●●
3	"	1000	400	6.2	2.5:1	●●	●●	●●	●●
4	"	1500	600	6.2	2.5:1	●●	●●	●▲	●●
5	Unpruned	500	500	-	1:1	●●	●●	●●	●●
6	4m	500	200	20	2.5:1	●●	●●	●●	●●

1) Forty eight PSP's established January 1993.

Data available: FR11: Heights only, age 2, pruning measurements 1993, height and diameter annually from 1993.

2) Row plots of each stock type were established adjacent to the large block trial.

▲ Plots abandoned in 1994 (mortality problem in one plot; trees close to power lines felled in other plot)

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 32.

APPENDIX 15

Experimental design for randomised incomplete block **Silviculture/Breed Trials** planted in 1987 at **Otago Coast (FR12)**.
Each dot represents one large plot with a PSP 1).

Silviculture					Planting stock				
Trt	Pruning	Stocking (stems/ha)		Thinning		Seedlings			
		Initial	Final	MCH (m)	Ratio	GF7 (FRJ79/2320)	GF14 (3/3/85/1)	GF21 (6/3/86/46)	LI28(GF13) (9/3/86/166)
1	4m	500	100	6.2	5:1	●●	●●	●●	●▲
2	"	500	200	6.2	2.5:1	●●	●●	●●	●●
3	"	1000	400	6.2	2.5:1	●●	●●	●●	●●
4	"	1500	600	6.2	2.5:1	●●	●●	●●	●●
5	Unpruned	500	500	-	1:1	●●	●●	●●	●●
6	4m	500	200	20	2.5:1	●●	●●	●●	●●

1) Forty seven PSP's established March 1994.

Data available: FR12: Heights only age 2 years, pruning measurements 1994, height and diameter annually from 1994.

▲ Plot not established, unable to distinguish plot trees.

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 32.

APPENDIX 16

Experimental design for randomised incomplete block **Silviculture/Breed Trials** planted in 1988 at Mamaranui (FR54).
Each dot represents one large plot with a PSP. 1)

Silviculture					Planting stock				
Trt	Pruning	Stocking (stems/ha)		Thinning		Seedlings		Cuttings	
		Initial	Final	MCH (m)	Ratio	GF14 (3/3/87/1)	GF22 (6/6/87/21)	LI23 (GF9) (9/3/86/170)	GF17 (9/0/83/96)
1	4m	250	100	6.2	2.5:1	●●	●●	●●	
2	"	500	200	6.2	2.5:1	●●	●●	●●	●●
3	"	1000	400	6.2	2.5:1	●●	●●	●●	●●
4	"	1500 2)	600	6.2	2.5:1	●●	●●	●●	
5	Unpruned	500	500	-	1:1	●●	●●	●●	
6	4m	500	200	20	2.5:1	●●	●●	●●	
7	"	200	200	-	1:1				●●

1) Forty two PSP's established October 1992.

Data available: FR54: Heights only, age 2, pruning measurements 1992, height and diameter annually from 1992.

2) Initial planting actually 1555 stems/ha. An extra row of trees was included in the buffer (ie. a three row buffer).

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 46.

APPENDIX 17

Experimental design for randomised complete block **Silviculture/Breed Trials** planted in 1988 at **Eyrewell (FR55)**.
Each dot represents one large plot with a PSP.¹⁾

Silviculture							Planting stock		
Treatment		Pruning	Stocking (stems/ha)		Thinning		Seedlings		Cuttings
Original	Estab2)	Crown remaining	Initial	Final	MCH (m)	Ratio	GF16 (2/3/87/34)	GF22 (6/6/87/21)	GF17 (9/0/83/96)
1	1	4m	250	100	6.2	2.5:1		●●	
2 & 6	2	"	500	200	6.2	2.5:1		●●	●●
3 & 7	3	"	1000	400	6.2	2.5:1		●●	●●
5	4	Unpruned	500	500	6.2	1:1		●●	
4	5	4m	1200	600	6.2	2:1		●●	
10	6	"	550	275	6.2	2:1	●●		
11	7	"	830	300	6.2	2.8:1	●●		
8	8	"	200	200	-	1:1			●●
9	9	"	275	275	-	1:1	●●		

1) Twenty two PSP's established December 1994.

Data available: FR55: Heights only, age 2 , pruning measurements 1994, height and diameter annually from 1995.

2) Original treatment numbers were reallocated, December 1994, to a more logical sequence for establishing and numbering of PSP plots.

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 46.

APPENDIX 18

Experimental design for randomised incomplete block **Silviculture/Breed Trials** planted in 1988 at Dalethorpe (FR56).
Each dot represents one large plot with a PSP.¹⁾

Trt	Silviculture				Planting stock				
	Pruning	Stocking (stems/ha)		Thinning		Seedlings			Cuttings
		Initial	Final	MCH (m)	Ratio	GF14 (3/3/87/1)	GF22 (6/6/87/21)	LI23 (GF9) (9/3/86/170)	GF17 (9/0/83/96)
1	4m	250	100	6.2	2.5:1	••	•▲	••	
2	"	500	200	6.2	2.5:1	••	•▲	••	••
3	"	1000	400	6.2	2.5:1	••	••	•▲	▲▲
4	"	1500 2)	600	6.2	2.5:1	••	••	•▲	
5	Unpruned	500	500	-	1:1	••	••	••	
6	4m	500	200	20	2.5:1	••	••	••	
7	"	200	200	-	1:1				••

1) Thirty nine PSP's established March 1995.

Data available: FR56: Heights only, age 2, pruning measurements 1992, height and diameter annually from 1995.

2) Initial planting actually 1555 stems/ha. The extra row of trees was included in the buffer (ie. a three row buffer).

▲ Plots not established or abandoned due to poor tree quality and mortality.

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 46.

APPENDIX 19

Experimental design for split plot **Silviculture/Breed Trial** planted in 1988 at **Tikokino (FR57)**.
Each dot represents one large plot with a PSP. 1)

Trt	Silviculture				Planting stock			
	Pruning	Stocking (stems/ha)		Thinning		Seedlings		Cuttings
	Crown remaining	Initial	Final	MCH (m)	Ratio	GF19 (2/6/87/35)	LI20(GF7) (3/3/87/3)	GF17 (2/3/84/53)
1	4m	250	100	6.2	2.5:1	●●	●●	●●
2	"	500	200	6.2	2.5:1	●●	●●	●●
3	"	1000	400	6.2	2.5:1	●●	●●	●●
4	"	1500	500	6.2	2.5:1	●●	●●	●●
5	"	500	200	20	2.5:1	●●	●●	●●
6	Unpruned	600	600	-	1:1	●●	●●	●▲
7	"	400	400	-	1:1	●●	●●	●▲

1) Forty PSP's established December 1993.

Data available: FR76: Heights only age 2 years, pruning measurements 1993, height and diameter annually from 1994.

▲ Plots not established due to high mortality.

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 46.

APPENDIX 20

Experimental design for split-plot **Silviculture/Breed Trial** planted in 1989 at **Tikokino (FR77)**.

Each dot represents one large plot with a PSP.¹⁾

Silviculture					Planting stock 2)						
Trt	Pruning	Stocking (stems/ha)		Thinning		Seedlings		Cuttings			
		Initial	Final	MCH (m)	Ratio	Nursery bed	Root-trainer ³⁾	Nursery bed	Root-trainer ³⁾		
	Crown remaining										
						GF2 (88/101) US	GF16 (88/6) OS	GF25 (88/1) RS	GF23 (88/2) OC	GF25 (88/1) RC	DFC
1	Unpruned	500	500	-	1:1	•	•	•	•	•	•
2	4m	500	200	6.2	2.5:1	••	•▲	••	••	••	••
3	"	500	200	20	2.5:1	•	•	•	•	•	•
4	"	500	400	6.2	1.25:1	••	••	••	••	••	••

1) Thirty five PSP's established November 1994.

Data available: FR77: Heights only, age 2, pruning measurements 1994, height and diameter annually from 1995.

2) Row plots of each stock type were established adjacent to large block trials.

3) Summer planting (April 1989) of these seedlots.

▲ Plot not established, unable to locate plot trees.

Seedlot codes: US = unimproved seedling

OS = open grown seedling

RS = root trainer seedling

OC = open grown cutting

RC = root trainer cutting

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 71.

APPENDIX 21

Experimental design for split plot **Silviculture/Breed Trial** planted in 1989 at Gwavas (FR78).

Each dot represents one large plot with a PSP. 1)

Silviculture				Planting stock 2)							
Trt	Pruning	Stocking (stems/ha)		Thinning		Seedlings			Cuttings		
		Initial	Final	MCH (m)	Ratio	Nursery bed		Root-trainer ³⁾	Nursery bed	Root-trainer ³⁾	
						GF2 (88/101) US	GF16 (88/6) OS				GF25 (88/1) RS
1	Unpruned	500	500	-	1:1	•	• ⁴⁾	▲▲	• ⁴⁾	•	▲▲
2	4m	500	200	6.2	2.5:1	••	••	▲▲	••	••	▲▲
3	"	500	200	20	2.5:1	•	•	▲▲	•	•	▲▲
4	"	500	400	6.2	1.25:1	••	••	▲▲	••	••	▲▲

1) Twenty four PSP's established January 1995.

Data available: FR78: Heights only, age 2, pruning measurements 1995, height and diameter annually from 1995.

2) Row plots of each stock type were established adjacent to large block trials.

3) Summer planting (April 1989) of these seedlots.

4) Two plots accidentally pruned, now equivalent to treatment 4 (mortality resulted in the final crop stocking of 400 stems/ha)

▲ No plots established in these seedlots due to high mortality.

Seedlot codes: US = unimproved seedling

OS = open grown seedling

RS = root trainer seedling

OC = open grown cutting

RC = root trainer cutting

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 71.

APPENDIX 22

Experimental design for completely randomised¹⁾ Silviculture/Breed Trial planted in 1989 at Kawerau (FR84).

Each dot represents one large plot with a PSP. 2)

Silviculture				Planting stock ³⁾					
Trt	Pruning	Stocking (stems/ha)		Thinning		Seedlings		Cuttings	
		Initial	Final	MCH (m)	Ratio	GF2 (88/101)	GF16 (88/6)		GF25 (88/1)
1	4m	600	250	6.2	2.4:1	•••	•••	•••	•••
2	4m	600	250	20 ⁴⁾	2.4:1	•••	•••	•••	•••
3	Unpruned	600	600	-	1:1	•	•	• ⁵⁾	•
4	4m	600	600	-	1:1	••	••	••	••

- 1) This experiment has the potential to be carried out in a split-block design with 2 replications.
- 2) Thirty six PSP's established November 1993. Buffers are 2.75m surrounding each plot, that is, 5.5m between plots.
Data available: FR84: Heights only, age 2, pruning measurements 1993, height and diameter annually from 1994.
- 3) Row plots of each stock type were established adjacent to the large block trial.
- 4) Second thinning treatment (20m MCH) carried out in September 1998.
- 5) Plot was pruned after plot establishment, now equivalent to treatment 4.

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 71.

APPENDIX 23

Experimental design for split plot **Silviculture/Breed Trial** planted in 1989 at **Kaingarua**, Cpt 1187 (**FR85**).
Each dot represents one large plot with a PSP.¹⁾

Silviculture					Planting stock							
Trt	Pruning	Stocking (stems/ha)		Thinning		Seedlings					Cuttings	
		Initial	Final	MCH (m)	Ratio	GF2 (88/101)	GF16 (88/6)	GF18 (88/7)	GF23 (88/2)	GF25 (88/4)	GF22 (6/6/87/21)	GF25 (6/6/87/20)
1	4m	833	250	6.2	3.3:1	••	••	••	••	••	••	••
2	4m	833	250	20	3.3:1	••	••	••	••	••	••	••
3	Unpruned	667	667	-	1:1	••	••	••	••	••	••	••

1) Forty two PSP's established January 1994.

Data available: FR85: Heights only, age 2, pruning measurements 1994, height and diameter annually from 1994.

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 71.

APPENDIX 24

Experimental design for **Silviculture/Breed Trial** planted in 1989 at **Golden Downs (FR86)**.
Each dot represents one large plot with a PSP.1)

Trt	Pruning	Silviculture			Planting stock				
		Stocking (stems/ha)		Thinning		Seedlings			
		Initial	Final	MCH (m)	Ratio	GF2 (88/101)	GF16 (88/6)	GF23 (88/2)	LI27(GF6) (88/868)
1	4m	667	250	6.2	2.5:1	••	••	••	••
2	Unpruned	667	667	-	1:1	•	•	•	•2)
3	4m	667	667	-	1:1	•	•	•	•

- 1) Sixteen PSP's established February 1995.

Data available: FR86: Heights only, age 2, pruning measurements 1995, height and diameter annually from 1995.

- 2) An unscheduled low prune was carried out by local staff, plot is now equivalent to treatment 3.

PSP establishment and silviculture is documented in Stand Growth Modelling Cooperative Report 71.

APPENDIX 25

Experimental design for unbalanced split-split block **Silviculture/Breed Trials** planted in 1990 at **Tungrove (FR121/1)** and **Tarawera (FR121/6)**.

Each dot represents one large plot with a PSP.¹⁾

Trt	Pruning	Silviculture				Planting stock				
		Stocking (stems/ha)		Thinning		Seedlings				
		Initial	Final	MCH (m)	Ratio	GF7 (FR179/2320)	GF14 (88/105)	GF16 (88/201)	GF25 (89/708)	LI25 (GF13) (89/15)
1	Crown remaining	250	100	6.2	2.5:1	•			•	•
2	"	500	200	6.2	2.5:1	•	•	•	•	•
3	"	1000	400	6.2	2.5:1	•			•	•
4	Unpruned	500	200	6.2	2.5:1	•			•	•
5	"	1000	400	6.2	2.5:1	•			•	•
6	"	1000	600	6.2	1.7:1	•			•	•
7	"	1000	1000	-	1:1	•	•	•	•	•

1) Twenty five PSP's established at Tarawera in March 1995 and twenty five PSP's established at Tungrove in September 1995.

Data available: **FR121/6:** Heights only, age 2, pruning measurements 1995, height and diameter annually from 1995.
FR121/1: Heights only, age 2, pruning measurements 1995, height and diameter annually from 1996.

APPENDIX 26

Experimental design for unbalanced split-split block Silviculture/Breed Trial planted in 1990 at Atiamuri (FR121/2).
Each dot represents one large plot with a PSP. 1)

Trt	Silviculture				Planting stock				
	Pruning	Stocking (stems/ha)		Thinning		Seedlings			
		Initial	Final	MCH (m)	Ratio	GF7 (FR179/2320)	GF14 (88/105)	GF16 (88/201)	GF25 (89/708)
	Crown remaining								LI25 (GF13) (89/15)
1	4m	250	100	6.2	2.5:1	•	•	•	•
2	"	500	200	6.2	2.5:1	•	•	•	•
3	"	1000	400	6.2	2.5:1	•			•
4	Unpruned	500	200	6.2	2.5:1	•			•
5	"	1000	400	6.2	2.5:1	•			•
6	"	1000	600	6.2	1.7:1	•			•
7	"	1000	1000	-	1:1	•	•	•	•
8	"	722	300	6.2	2.4:1	•	•	•	•

1) Thirty two PSP's established at Atiamuri in February 1995.

Data available: FR121/2: Heights only, age 2, pruning measurements 1995, height and diameter annually from 1995.

2) Plot pruned illegally in October 1995 by local staff, now equivalent to treatment 2.

APPENDIX 27

Experimental design for unbalanced split-split block Silviculture/Breed Trial planted in 1990 at Gwavas (FR121/3).
Each dot represents one large plot with a PSP. 1)

Silviculture					Planting stock					
Trt	Pruning	Stocking (stems/ha)		Thinning		Seedlings				
		Initial	Final	MCH (m)	Ratio	GF7 (FR179/2320)	GF14 (88/105)	GF16 (88/201)	GF25 (89/708)	LI25 (GF13) (89/15)
1	4m	250	100	6.2	2.5:1	•			•	•
2	"	500	200	6.2	2.5:1	•	•	•	•	•
3	"	1000	400	6.2	2.5:1	•			•	•
4	Unpruned	500	200	6.2	2.5:1	•			•	•
5	"	1000	600	6.2	1.7:1	•			•	•
6	"	1000	1000	-	1:1	•	•	•	•	•

1) Twenty two PSP's established at Gwavas in December 1995.

Data available: FR121/3: Heights only, age 2, pruning measurements 1995, height and diameter annually from 1996.

APPENDIX 28

Experimental design for unbalanced split-split block **Silviculture/Breed Trials** planted in 1990 at **Tairua (FR121/4)** and **Huanui (FR121/7)**.
Each dot represents one large plot with a PSP. 1)

Trt	Silviculture				Planting stock				
	Pruning	Stocking (stems/ha)		Thinning		Seedlings			
		Initial	Final	MCH (m)	Ratio	GF7 (FR179/2320)	GF14 (88/105)	GF16 (88/201)	GF25 (89/708)
1	Crown remaining 4m	250	100	6.2	2.5:1	•	•	•	•
2	"	500	200	6.2	2.5:1	•	•	•	•
3	"	1000	400	6.2	2.5:1	•	•	•	•
4	Unpruned	500	200	6.2	2.5:1	•	•	•	•
5	"	1000	400	6.2	2.5:1	•	•	•	•
6	"	1000	600	6.2	1.7:1	•	•	•	•
7	"	1000	1000	-	1:1	•	•	•	•

1) Eighteen PSP's established at Tairua in October 1994 and at Huanui in November 1994.

Data available: FR121/4; FR121/7: Heights only, age 2, pruning measurements 1994, height and diameter annually from 1995.

APPENDIX 29

Experimental design for unbalanced split-split block **Silviculture/Breed Trial** planted in 1990 at Hokonui (FR121/5).

Each ▲ represents one large plot without a PSP.¹⁾

Silviculture					Planting stock					
Trt	Pruning	Stocking (stems/ha)		Thinning		Seedlings				
		Initial	Final	MCH (m)	Ratio	GF7 (FR179/2320)	GF14 (88/105)	GF16 (88/201)	GF25 (89/708)	LI25 (GF13) (89/15)
1	4m	250	100	6.2	2.5:1	▲	▲	▲	▲	▲
2	"	500	200	6.2	2.5:1	▲	▲	▲	▲	▲
3	"	1000	400	6.2	2.5:1	▲			▲	▲
4	Unpruned	500	200	6.2	2.5:1	▲			▲	▲
5	"	1000	400	6.2	2.5:1	▲			▲	▲
6	"	1000	600	6.2	1.7:1	▲			▲	▲
7	"	1000	1000	-	1:1	▲	▲	▲	▲	▲

1) Twenty seven PSP's **abandoned** at Hokonui in November 1997.

Data available: FR121/5: None.

Trial abandoned, November 1997 - major mortality and gorse problems

APPENDIX 30

Experimental design for unbalanced split-split block **Silviculture/Breed Trials** planted in 1991 at **Mangatu (FR121/8)**, **Santoft (FR121/9)**, **Blue Mountains (FR121/10)**, **Shellocks (FR121/11)**, **Ashley (FR121/12)**, and **Golden Downs (FR121/13)**.
Each dot represents one large plot with a PSP. 1)

Trt	Silviculture				Planting stock					
	Pruning	Stocking (stems/ha)		Thinning		Seedlings				
		Initial	Final	MCH (m)	Ratio	GF6 (88/102)	GF14 (88/105)	GF16 (88/201)	GF25 (90/294)	LI25 (GF13) (89/15)
1	Crown remaining	250	100	6.2	2.5:1	•			•	•
2	"	500	200	6.2	2.5:1	•	•	•	•	•
3	"	1000	400	6.2	2.5:1	•			•	•
4	Unpruned	500	200	6.2	2.5:1	•			•	•
5	"	1000	400	6.2	2.5:1	•			•	•
6	"	1000	600	6.2	1.7:1	•			•	•
7	"	1000	1000	-	1:1	•	•	•	•	•

1) Twenty five PSP's established at Mangatu in January 1996, at Ashley in November 1996, at Golden Downs in February 1997 and at Santoft in October 1997.

Twenty five PSP's are to be established at both Blue Mountains and Shellocks Forests in 1999.

Data available: **FR121/8:** Heights only, age 2, pruning measurements 1996, height and diameter annually from 1996.
FR121/12: Heights only, age 2, pruning measurements 1996, height and diameter annually from 1997.
FR121/13: Heights only, age 2, pruning measurements 1997, height and diameter annually from 1997.
FR121/9: Heights only, age 2, pruning measurements 1997, height and diameter annually from 1998.
FR121/10: Heights only, age 2.
FR121/11: Heights only, age 2.