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F.R.I. PROJECT RECORD

NO. 1533

NATIONAL FERTILISER CO-OPERATIVE SCHEDULE OF TRIALS

BUDGET AND PROGRAM

SEPTEMBER 1986 - SEPTEMBER 1987

FORWARD BUDGET

SEPTEMBER 1987 - SEPTEMBER 1988

COMPILED

BY

E.D. ROBERTSON

REPORT NO. 8

MAY 1987

Note: Confidential to Participants of the National Forest
Fertilising Co-operative Program

: This material is unpublished and must not be cited as a
literature reference

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NORTH ISLAND REGION

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SOUTH ISLAND REGION

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Approved budget for the period Sept 1986 to Sept 1987

CENTRAL REGION

FRI Trials

RO1889	6232	
RO2002/1	6780	
RO2002/2	6528	
RO2063	3860	23400

NORTH ISLAND REGION

FRI Trials

AK286	5884	
AK734	-	
AK761	-	
AK850/3	7764	
AK888	2968	
AK911	3188	
AK930	7956	
AK977	7260	
AK1053	5946	
WN261	4225	
WN278	3332	
WN356	6060	54583

SOUTH ISLAND REGION

FRI Trials

NN440	2900	
NN518	10830	
NN527	2172	
CY581	3148	
CY594	1188	
WD180	5380	
WD223	7080	
WD232	8144	
WD274	4678	
WD379	4050	
WD388	1056	
WD398	3944	
WD399	5696	
WD403/1	7552	
WD403/2	3340	
WD407	4676	
WD416	1274	
WD420/1	468	
WD420/5	44	
WD420/6	44	
WD420/7	320	
WD420/8	1356	
WD420/9	568	
WD423/1,2,3	6088	
WD423/4	3720	
WD425	2224	91940

Conservancy Trials

28/15/2	660	
*28/15/4	-	
*28/15/4	-	
NN412	-	
NN434	-	
NN468	176	
NN546	1056	
NN571	2112	
NN575	792	4796

Proposed New Work

CHI	Whole tree thinning trial	8600
Tasman	Whole tree thinning trial	8600
NZFP	Whole tree thinning trial	8600
FORCORP	Boron fertiliser trial	7000
FORCORP	PARR acidulation trial	9500

217019

ESTIMATED FORWARD BUDGET SEPTEMBER 1987 - SEPTEMBER 1988

CENTRAL REGION

FRI Trials

RO1889	2828	foliage & measurment
RO2002/1	3996	foliage & measurment
RO2002/2	4088	foliage & measurment
RO2063	616	foliage sampling only
	<u>11528</u>	

NORTH ISLAND REGION

FRI Trials

AK286	8080	foliage sampling only
AK734	23392	foliage & measurment
AK761	6600	foliage & measurment
AK850/3	7764	foliage & measurment
AK888	1740	foliage sampling only
AK911	-	
AK930	-	
AK977	-	
AK1053	5946	foliage & measurment
WN261	-	
WN278	4924	foliage & measurment
WN356	6060	foliage & measurment
	<u>64506</u>	

SOUTH ISLAND REGION

FRI Trials

NN440 ✓	2900	foliage & measurment
NN518	11012	foliage & measurment
NN527	-	
CY581	3148	foliage & measurment
CY594	-	
WD180	300	report only
WD223	300	report only
WD232	300	report only
WD274	2996	foliage & measurment
WD379	300	report only
WD388	1056	measurment only
WD398	3944	foliage & measurment
WD399	-	
WD403/1	7552	foliage & measurment
WD403/2	3340	foliage & measurment
WD407	4676	foliage & measurment
WD416	1274	foliage & measurment
WD420/1	-	
WD420/5	-	
WD420/6	-	
WD420/7	320	foliage sampling only
WD420/8	1356	foliage & measurment
WD420/9	568	foliage & measurment
WD423/1,2,3	3508	foliage & measurment
WD423/4	3720	foliage & measurment
WD425	2224	foliage & measurment
	<u>54794</u>	

Conservancy Trials

28/15/2	660	analysis only
*28/15/4	-	
*28/15/4	-	
NN412	-	
NN434	-	
NN468	176	analysis only
NN546	1056	analysis only
NN571	2112	analysis only
NN575	792	analysis only
	<u>4796</u>	

Maintenance of new trials establishment in 1987

15000

Total 150624

CENTRAL REGION

RO1889 Effect of N*P interaction on the growth of young Radiata pine

Objective:- To determine the economic and biological growth optima from the application of N and P fertiliser to radiata pine on soils suspected to respond to those elements.

Status:- Established 1983 in 4-yr-old pines on a shallow low tephra. Expected duration is 4 years. Five main rates up to 400 kg N/ha and 200 kg P/ha were applied. Mg treatments were also included.

Total cost to date including establishment is \$ 17500

Results:- * All the five sites of this trial series have shown a response to fertiliser. There was a positive linear response to nitrogen in basal area.

Benefits of continuing the trial to the forest manager:-

- * The pattern of response is evolving and changing slightly with time but the trial series appear at this stage to indicate further potential reductions in the application rate of P fertilisers.
- * Nitrogen responses are somewhat larger than we would have expected. Fertiliser regimes including small amounts of N may give better, more cost effective results than those made up of P alone.
- * The effect of the other elements, particularly magnesium, has yet to emerge.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Foliage Collection:-	
Mandays	616
Travel allowance	-
Vehicle running	40
Analysis	2904
Report	300
Winter Measurements:-	
Mandays	1232
Travel allowance	-
Vehicle running	40
Data processing	800
Report	300
<u>TOTAL</u>	<u>6232</u>

RO2002/2 Magnesium rates and sources.

Objective:-To determine the most suitable rate of magnesium application (as dolomite) to slightly Mg deficient radiata pine growing on a flow tephra.

To study the effect of pruning when the trees are under Mg stress.

To compare the performance of other potential Mg fertilisers.

Status:- Established in 1984 in five year old radiata pine. Five rates of Mg fertiliser (as dolomite) up to 400 kg/ha. Five other sources of Mg were used at 55 kg Mg/ha. Every plot has a pruned and unpruned subplot.

Total cost to date including establishment = \$12500

Results:- * Responses to Mg fertiliser are known to develop slowly. The 1986 foliage results showed no obvious effect of rate or type of fertiliser. They have not yet been statistically analysed yet.

* Basal area and height growth have been reduced by pruning.

Benefit of continuing the trial for the forest manager.

* There has been insufficient time for responses to develop.

* Increasing areas of pines on flow and water sorted tephras are found to be low in Mg. The most economic method of correction should be found.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Foliage Collection:-	
Mandays	1232
Travel allowance	-
Vehicle running	36
Analysis	1760
Report	300
Winter Measurements:-	
Mandays	1848
Travel allowance	-
Vehicle running	72
Data processing	1000
Report	300
<u>TOTAL</u>	<u>6528</u>

RO2063 Nutrient deficiency demonstration in radiata pine.

Objective:-1. To produce an educative demonstration of a range of nutrient deficiencies.

2. To observe any relationship of nutrient status to frost damage that may eventuate.

Status:- Established in 1985 in a shallow flow tephra soil on the volcanic plateau at time of planting. Fertilisers of varying mixes were applied two months after planting. After approx three or four years half the plots will be felled and replanted. Fertilisation is scheduled for each year over the next eight years.

Total amount spent on trial to date \$4800.

Results:- No recorded results to date.

Benefits of continuing the trial for the forest manager.

- * To ascertain what nutrient deficiencies may arise at the particular site.
- * On a national scale, to become familiar with deficiency symptoms and thye fundamantal interaction of nutrients.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Foliage Collection:-	
Mandays	616
Travel allowance	-
Vehicle running	40
Analysis	2904
Report	300
<u>TOTAL</u>	<u>3860</u>

NORTH ISLAND REGION

AK286 Long term phosphorus rates trial.

Objectives:-To determine the long term response to P fertilizer at varying rate and frequencies on a range of clay soils.

Status:- There are 4 sites at

Riverhead	planted 1973
Maramarua	1971
Glenbervie	1970
Whangapoua	1967

Fertilised at stand ages between 5 and 8.

Results:- Very large volume gains to P demonstrated. The results have been used to construct Auckland Growth model and to calculate the growth model modifier effect.

Benefits of continuing the trial to the forest manager:-

These trials constitute a very scarce resource of long term P responses at management rates. Some sites will be clearfelled in the next few years. Studies at clearfelling will document fertiliser efficiency.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Winter Measurments:-(Glenbervie)	-
Mandays	2772
Travel allowance	600
Vehicle running	200
Data processing	250
Report	300
Winter Measurments:-(Maramarua)	
Mandays	1232
Travel allowance	-
Vehicle running	100
Data processing	200
Report	300
<u>TOTAL</u>	<u>5884</u>

AK734 Rock phosphate/superphosphate comparison.

Objective:-To compare the efficiency of rock phosphate of several provenances to superphosphate as a source of fertiliser.

Status:- At three sites,

Riverhead	planted 1974
	established 1978
Waipoua	planted 1971
	established 1978
Tairua	planted 1974
	established 1978

All thinned 1985
 Last measured 1985
 Next measurement 1988

Results:- Rock P was not as effective as superphosphate in the early years at rectifying P deficiency in the trees but a biomass done in 1985 showed that the trees had by then taken up more P from the rock phosphate than from the superphosphate.

Benefits of continuing the trial to the forest manager:-

- * These trials are the next generation after AK286 and are representative of the newer site types.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Nil activity this year	

AK888 Pampus * N Fertiliser Trial Waiuku.

Objective:-To determine the relative effects of N fertiliser and pampus growth on mature trees at waiuku.

Status:- Planted 1971
 Established 1983
 Pampus controlled with herbicide
 Nitrogen applied at 200kgN/ha
 Last measured 1985

Results:- No direct effect of pampus on tree growth, N response in trees less in plots with pampus.

Benefits of continuing the trial for the forest manager:-

* Increased understanding of effects of pampus on tree growth.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Winter Measurments:-	
Mandays	1848
Travel allowance	300
Vehicle running	120
Data processing	400
Report	300
<u>TOTAL</u>	<u>2968</u>

AK911 Pruning * Thinning * fertiliser trial Woodhill.

Objective:-To determine the relative effects of thinning, pruning and fertiliser on 5 year old radiata pine at Woodhill forest.

Status:- Established 1981
 Last measured 1985
 Due to be thinned late 1987
 To be measured 1987

Results:- Good responses to N fertiliser after 4 years (approximately 50m³/ha at rotation). Pruning reduced growth relative to unpruned trees.

Benefits of continuing the trial for the forest manager:-

* We have little information on long term effects of N fertiliser. Some good trials (this is one) should be retained.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Winter Measurements:-	
Mandays	1848
Travel allowance	300
Vehicle running	140
Data processing	600
Report	300
<u>TOTAL</u>	<u>3188</u>

AK930 Rock Phosphate, Superphosphate Comparison Puhipuhi.

Objective:-To compare the effect of rock P and superphosphate with a mixture comparable to PAPR.

Status:- Puhipuhi forest
Planted 1977
Established 1982
last measured 1985

Results:- A small response to P fertiliser so far.

Benefits of continuing the trial for the forest manager:-

* Monitor continued slow release of P fertiliser.

Budget Sept86-Sept87	
Job Description	To Spend
Foliage Collection:-	
Mandays	1232
Travel allowance	200
Vehicle running	220
Analysis	1056
Report	300
Winter Measurments:-	
Mandays	2772
Travel allowance	600
Vehicle running	220
Data processing	1056
Report	300
<u>TOTAL</u>	<u>7956</u>

AK977 Thinning*Pruning*Fertiliser Trial Aupouri.

Objective:-To compare the effect of three stocking regimes, pruning and N fertiliser on tree growth at Aupouri.

Status:- Planted 1978
Established 1983
Completion 1987

Results:- The unthinned portion proved to be unexpectedly productive, growing at the rate of 30m³/ha/yr but thinned pruned portion suffered a major shock and growth reduced to 10m³/ha/yr.

Benefits of continuing the trial for the forest manager:-

- * Of major importance to the continued management of sand forests.

Budget Sept86-Sept87

Job Description	To Spend
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Winter measurements:

Mandays	4620
Travel allowance	1200
Vehicle running	240
Data processing	900
Report	300

TOTAL	7260
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AK1053 Whole tree thinning trial.

Objective:-To determine the effects on the growth of the residual crop of waste, production and whole tree thinning.

Status:- Woodhill forest
Planted 1976
Established 1986

Results:- A biomass conducted at establishment showed that whole tree thinning removed four times more nitrogen from the site than conventional thinning, we expect this to have an effect on growth.

Benefits of continuing the trial to the forest manager:-

* Mechanised thinning, which may involve whole tree removal for delimbing, is very likely to occur in NZ forestry.

Budget Sept86-Sept87	
<u>Job Description</u>	<u>To Spend</u>
Foliage Collection:-	
Mandays	924
Travel allowance	200
Vehicle running	140
Analysis	1144
Report	300
Winter Measurments:-	
Mandays	1848
Travel allowance	300
Vehicle running	140
Data processing	650
Report	300
<u>TOTAL</u>	<u>5946</u>

Objective:-To examine the effect of cultivation and fertiliser on the early growth of radiata pine at high altitude.

Status:- Established in 1979 at Karioi State Forest, on an andesitic ash.

Results:- To Age 6.

- * Controls at 2.7 metres.
- * Height growth improved to 3.2 metres with cultivation.
- * Height growth improved to 3.2 metres with fertiliser.
- * In combination, cultivation and fertiliser improved height growth to 3.8 metres.
- * Fertiliser gains occurred where foliar nutrients were not growth limiting.

Benefits of continuing the trial for the forest manager.

- * To test the longevity of the early growth gains to cultivation and fertiliser.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Foliage sampling:-	
Mandays	
Travel allowance	924
Vehicle running	-
Analysis	120
Report	396
	300
Winter Measurments:-	
Mandays	
Travel allowance	1540
Vehicle running	300
Data processing	120
Report	225
	300
<u>TOTAL</u>	<u>4225</u>

WN278 Nitrogen fertiliser in young stands on calcareous sands.

Objective:-To determine the effect of applying nitrogen at 200 kg/ha to young radiata pine (5 years) at time of first thinning on calcareous sands

To monitor the continued effect through second thinning and fertilisation, this being a relatively new regime for the forest.

Status:- Established in 1980 in 5 year old pines recently thinned. Second thinning and fertilisation 1985 forming a 2 X 2 factorial in early and late fertilising.

Costs to date including establishment \$17000

Results:- * N fertiliser increased growth:

Basal area increment increased by 38% in year 1
24% in year 2
11% in year 3
8% in year 4
1% in year 5

* By year 5 fertilised plots had 2.2 m²/ha more basal area and 13 m³/ha more volume.

* Residual and thinnings volume both increased with the fertiliser effect split about evenly.

Benefits of continuing the trial for the forest manager.

- * The particular soils are subject to drought and nutrient stress.
- * Early thinning to waste may help alleviate both problems but later production thinning will give opportunity for fertilising, the cost benefits should be determined.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Foliage Collection:-	
Analysis	740
Report	300
Winter Measurments:-	
Mandays	1232
Travel allowance	200
Vehicle running	160
Data processing	400
Report	300
<u>TOTAL</u>	<u>3332</u>

WN356 Rock phosphate rates trial at establishment.

Objective:-To determine the minimum rate of application of P (as rock phosphate) for the early growth of radiata pine.

Status:- Established in 1983 on Wellington Regional Council land, on a Akatarawa hill soil.

Results:- To Age 2.

- * Controls at 0.9 metres; Foliar P at 0.17%
- * DAP treated trees at 0.9 metres; Foliar P at 0.17%
- * Rock treated trees at 1.0 metres; Foliar P at 0.18%

Benefits of continuing the trial for the forest manager.

* If we continue the trial to age 6, we will be able to see the relevance of different fertiliser strategies:

- (a) Current management practise with fertiliser at time-of-planting , and repeat appliacion at age 3,
- (b) Possible growth losses with (a),
- (c) Rock P at establishment, with no further P applications.

* Contrasts with the companion trials will provide detailed site-specific recommendations for the fertiliser use, i.e. the prospect of refining the rates and timing of application.

* The trial was established on a clay deficient in available P according to the Bray P test. The growth results show this is not the case. The trial is one of several which gave results at variance to the Bray P test, and which prompted a re-evaluation of the soil test. The result is a modified test which satisfactorially resolves the problem.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Foliage Collection:-	
Mandays	924
Travel allowance	200
Vehicle running	200
Analysis	2112
Report	300
Winter Measurments:-	
Mandays	1232
Travel allowance	200
Vehicle running	200
Data processing	480
Report	300
<u>TOTAL</u>	<u>6060</u>

SOUTH ISLAND REGION

FRI TRIALSNN518 N*P interaction on the growth of radiata pine

Objective:- To determine the economic and growth optima from the application of N P fertiliser to radiata pine on soils suspected to respond to those elements.

Status:- Established 1983 in 5-yr-old pines on a granite soil. Expected duration is 4 years. Five main rates up to 400 kg N/ha, 200 kg P/ha were applied. A base dressing of Boron was to all but one treatment. Total cost to date including establishment is \$ 40000

Results (1985):- All the five sites of this trial series have shown a fertiliser. There was a positive response to nitrogen and phosphorus and a significant quadratic effect was shown.

Benefits of continuing the trial for the forest manager

- * The pattern of response is evolving and changing slightly with time but the trial series appear at this stage to indicate further potential reductions in the application rate of P fertilisers.
- * Nitrogen responses are somewhat larger than we would have expected. Fertiliser regimes including small amounts of N may give better, more cost effective results than those made up of P alone.
- * The effect of the other elements, particularly boron, has yet to emerge.

Budget Sept86-Sept87

Job description	To spend
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Foliage collection:-

Mandays	924
Travel allowance	300
Air fares	860
Rental vehicle	150
Analysis	2112
Report	300

Measurement:-

Mandays	2464
Travel allowance	650
Air fares	1320
Rental vehicle	250
Data processing	1200
Report	300

<u>TOTAL</u>	<u>10830</u>
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NN440 B fertiliser at time of planting

Objective:- To assess the effect of soluble B fertiliser on the growth of radiata pine from establishment.

Status:- Established 1976
Wairau S.F. Cpt 27
Completion 1986

Results:-

- * Slight growth response to weed control only.
- * -B treatment 7ppm B, +B treatment 18ppm B.
- * Weed control had no effect on foliar B.
- * Malformation independent of treatment.

Benefits of continuing the trial to the forest manager:-

- * Trial has reached its expected completion date

Comments:-

- * No further work is considered with soluble borates.

Budget Sept86-Sept87

Job Description	To Spend
Winter measurements:-	
Mandays	804
Vehicle running	16
Data processing	400
Report	300
Foliage sampling:-	
Mandays	536
Vehicle running	16
Analysis	528
Report	300
<u>TOTAL</u>	<u>2900</u>

NN527,(WD444, CY594) Lotus trial

Objective:- To assess field production of Lotus Maku with a range of seed coating weights of phosphate and with a broadcast P application.

Status:- Established 1985
 Motueka S.F.
 Nemona S.F.
 Ashley S.F.

Results:-

- * No data available as yet.
- * Dry matter assessment to be done late 1986.

Benefits of continuing the trial to the forest manager

- * Will demonstrate the effectiveness of specific fertiliser regimes to enable lotus to establish and compete with existing weed species.
- * To get better lotus establishment on difficult sites.

Budget

Job Description	To Spend		
	NN527	WD444	CY594
Dry matter assessment:-			
Mandays	1072	804	536
Travel allowance	320	160	-
Vehicle running	140	80	12
Analysis	400	400	400
Report	240	240	240
TOTAL	2172	1684	1188

CY581 Boron Fertiliser

Objective:- To study the effect of B fertiliser on the early growth of radiata pine.

Status: Planted 1982
 Established 1984
 Ashley S.F. Cpt 27
 Completion 1994

Results:-

Change in foliar B concentrations between age 3 & 4

* control	from 9 to 11
* sod. borate	" 12 to 22
* ulexite	" 13 to 22
* colemanite	" 9 to 15

Benefits of continuing the trial to the forest manager:-

* To assess the long term B supplying power of insoluble B fertilisers

Comment:-

* 1986 management programme for B in Canterbury and Nelson can be based on results from CY581.

Budget Sept86-Sept87

Job Description	To Spend
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Foliage sampling:-

Mandays	616
Vehicle running	12
Analysis	792
Report	300

Winter measurments:-

Mandays	616
Vehicle running	12
Data processing	500
Report	300

<u>TOTAL</u>	<u>3148</u>
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WD180 223 232 Series

Objective:- To assess the effect of various fertiliser regimes on the long term growth of *P.radiata* on gley podzol soils.

Status:- Established 1976
 Refertilised 1979
 Refertilised and thinned 1982
 Completion 1987

Results:-

Refertilisation with DAP at 500 kg/ha yielded additional volume of:

* 31 m3/ha	WD180	(Flagstaff soil)
* 40 m3/ha	WD223	(Okarito soil)
* 34 m3/ha	WD232	(Maimai soil)

Benefit of continuing the trial for the Forest Manager

- * monitor foliar nutrient concentrations
- * assess long term productivity

Comments:-

Four years after refertilisation

- * foliar P concentrations satisfactory
- * foliar N concentrations are low
- * growth with 1000 kg DAP/ha "equivalent" to the 250 kg/ha rate

Budget WD180 Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
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Foliage sampling:-

Mandays	616
Travel allowance	200
Vehicle running	80
Analysis	1056
Report	300

Winter measurments:-

Mandays	*1848
Travel allowance	* 300
Vehicle running	80
Data processing	600
Report	300

- * 66% of this cost is presently covered by an 'in kind' contribution from Westland district.

<u>TOTAL</u>	<u>5380</u>
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Budget WD223 Sept86-Sept87

Job Description	To spend
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Foliage sampling:-

Mandays	1232
Travel allowance	200
Vehicle running	80
Analysis	1056
Report	300

Winter measurments:-

Mandays	*3696
Travel allowance	*900
Vehicle running	80
Data processing	600
Report	300

* 66% of this cost is presently covered by an 'in kind' contribution from Westland district.

TOTAL	7080
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Budget WD232 Sept86-Sept87

Job Description	To Spend
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Foliage sampling:-

Mandays	1232
Travel allowance	200
Vehicle running	80
Analysis	1056
Report	300

Winter measurments:-

Mandays	*3696
Travel allowance	*600
Vehicle running	80
Data processing	600
Report	300

* 66% of this cost is presently covered by an 'in kind' contribution from Westland district.

TOTAL	8144
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Objective:- To examine the management of lotus maku and radiata pine,
 1. with various P sources (rock & super)
 2. for weed suppression
 3. to compare soil N fertility

Status:- Lotus established 1983 (after root raking)
 Radiata planted 1984 (after V-blading)
 Nemona S.F.

Results:-

- * 3-5 tonnes d.m./ha with lotus (vig. prod.).
- * 8 fold decrease in weed growth with lotus. (from 4 tonnes/ha to 0.5 tonnes/ha).
- * suppression of radiata pine.

Benefits of continuing the trial to the forest manager:-

- *
- *

Comments:-

- * Minor element nutrition of lotus maku yet to be defined.
- * Subsequent trials have successfully (at establishment) intergrated radiata pine with lotus & rock P.

Budget Sept86-Sept87

Job Description	To Spend
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Foliage sampling:-

Mandays	616
Travel allowance	-
Vehicle running	100
Analysis	88
Report	180

Winter measurments:-

Mandays	1232
Travel allowance	200
Vehicle running	100
Data processing	180
Report	300

Refertilising:-

Mandays	1232
Travel allowance	200
Vehicle running	100
Materials	150

TOTAL	4678
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WD379 Radiata/legumes/tailings

Objective:- To study radiata pine growth and nutrition in association with legumes on dredge tailings

Status:- Established 1981
Hohonu S.F.
Completion 1987

Results:-	TREATMENT	HT(m)	DIA(cm)
	Control	2.0	1.9
	+fert	2.6	3.8
	-fert +clover -P	3.0	4.6
	+fert +clover -P	3.3	5.4
	-fert +clover +P	3.3	5.7
	+fert +clover +P	3.7	6.6

* After 5 years 1m gain in height and a 2.8cm gain in diameter for radiata underplanted with white clover.

Benefits of continuing the trial for the forest manager

* To be discussed.

Comments:-

- * Thinned & pruned to 600sph
- * Gorse infestation

Budget Sept86-Sept87

Job description	To Spend
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Foliage sampling:-

Mandays	616
Travel allowance	-
Vehicle running	80
Analysis	792
Report	300

Winter measurments:-

Mandays	1232
Travel allowance	200
Vehicle running	80
Data processing	450
Report	300

TOTAL	4050
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WD388Eucalyptus Sp. on Teramakau TailingsEst. 1981

Demonstration of White Clover on growth of Eucs

Budget Sept86-Sept87

<u>Job description</u>	<u>To Spend</u>
Winter Measurment:-	
Man days	616
Travel allowance	-
Vehicle running	160
Data processing	180
Report	100
<u>TOTAL</u>	<u>1056</u>

WD398 Rockphosphate

Objective:- To test rock phosphate (100 kg P/ha broadcast) as the alternative to hand top-dressing.

Two possibilities are:

- (i) rock phosphate broadcast over V-blade mounds
- (ii) rock phosphate broadcast before V-blading (incorporated into mound).

Status:- Established in 1983 on an Okarito gley podzol in Westland Conservancy.

Results to Age 3:-

- * Controls at 1.3 metres; foliar P at 0.08%
- * DAP treated trees at 2.2 metres; foliar P at 0.11%
- * Rock treated trees at
 - (a) 2.0 metres (rock P incorporated into mound); foliar P at 0.13%.
 - (b) 1.8 metres (rock P broadcast); foliar P at 0.12%.

Benefits of continuing the trial for the forest manager:-

- * Long term effectiveness of incorporating rock phosphate in the V-blade mound, compared with surface broadcasting.
- * examine the economics with soluble fertiliser (DAP) at establishment, with the refertilising at age 3, on tree growth, and provide a comparison with rock phosphate as an alternative strategy (no refertilisation).

Budget Sept86-Sept87

<u>Job Description</u>	<u>To spend</u>
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Foliage collection:-

Mandays	462
Travel allowance	150
Vehicle running	80
Analysis	1056
Report	300

Measurement:-

Mandays	616
Travel allowance	300
Vehicle running	80
Data processing	600
Report	300

<u>TOTAL</u>	<u>3944</u>
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WD399 N*P interaction on the growth of radiata pine

Objective:- To determine the economic and biological growth optima from the application of N and P fertiliser to radiata pine on soils suspected to respond to those elements.

Status:- Established 1983 in 5-yr-old pines on a pakihi on glacial terraces. Five main rates up to 400 kg N/ha and 200 kg P/ha were applied. Potassium and copper treatments were also included.
Completion 1987

Total cost to date including establishment is \$ 34000

Results (1985):- All the five sites of this trial series have shown a response to fertiliser.
There were positive responses to nitrogen and phosphorus shown in this trial.

Benefits of continuing the trial for the forest manager:-

- * The pattern of response is evolving and changing slightly with time but the trial series appear at this stage to indicate further potential reductions in the application rate of P fertilisers.
- * Nitrogen responses are somewhat larger than we would have expected. Fertiliser regimes including small amounts of N may give better, more cost effective results than those made up of P alone.
- * The effect of the other elements, particularly Potassium, has yet to emerge.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To spend</u>
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Foliage collection:-

Mandays	462
Travel allowance	100
Air fares	200
Rental vehicle	100
Analysis	1056
Report	300

Measurement:-

Mandays	1078
Travel allowance	350
Air fares	400
Rental vehicle	100
Data processing	1250
Report	300

<u>Total</u>	<u>5696</u>
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WD403/1 Rock phosphate rates trial at establishment

Objective:- To determine the minimum rate of application of P (as phosphate rock) for the early growth of radiata pine.

Status:- Established 1984 on an Okarito gley podzol, in Westland Conservancy.
Completion date is 1990 (with a review for extension).

Results at Age 2:-

- * Controls at 0.7 metres.
- * DAP at 1.6 metres.
- * Rock at 1.4 metres.
- * Soil test for Bray P confirm P requirement

Benefits of continuing the trial for the forest manager

- * If we continue the trial to age 6, we will be able to see the relevance of different fertiliser strategies:
 - (a) Current management practise with fertiliser at time-of-planting, and repeat appliacion at age 3,
 - (b) Possible growth losses with (a),
 - (c) Rock P at establishment, with no further P applications.
- * Contrasts with the companion trials will provide detailed site-specific recommendations for the fertiliser use, i.e. the prospect of refining the rates and timing of application.

Budget Sept86-Sept87

<u>Job description</u>	<u>To Spend</u>
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Foliage sampling:-

Mandays	616
Travel allowance	-
Vehicle running	80
Analysis	2112
Report	300

Winter measurments:-

Mandays	2464
Travel allowance	400
Vehicle running	80
Data processing	1200
Report	300

<u>TOTAL</u>	<u>7552</u>
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WD403/2 Rock phosphate types trial at establishment

Objective:- To determine the effect of the N and P component in the starter mix on the early growth of radiata pine established with rock phosphate (North Carolina or Xmas/Ngaru, both at 125 kg P/ha).

Status:- Established in 1984 on an Okarito gley podzol in Westland Conservancy.

Results:-

- * At 125 kg P/ha, growth of radiata similar with either type of rock. (At 1.5 metres height)
- * Growth boost with starter (10 cm to N or P alone; 20cm to both)

Benefits of continuing the trial for the forest manager:-

Cross referenced to WD403/1, this trial will:-

- * detail the effectiveness of N and/or P in the "starter" mix.
- * enable the cost effectiveness of the "starter" mix approach to be assessed.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Foliage sampling:-	-
Mandays	308
Travel allowance	-
Vehicle running	80
Analysis	1056
Report	300
Winter measurments:-	
Mandays	616
Travel allowance	-
Vehicle running	80
Data processing	600
Report	300
<u>TOTAL</u>	<u>3340</u>

WD407 Potassium rates trial

Objective:- To determine the effect of various rates of K applied at age 2 on the growth of radiata on a gley podzol.

Status:- Established 1982
Mokihurui S.F.
Completion 1992

Results:-

- * controls at 0.28% K
- * 50 kg K/ha 0.40%
- * 100 kg K/ha 0.41%

Benefit of continuing the trial for the Forest Manager

- * To relate foliar K concentrations (and rates of K application) to observed deficiency symptoms.

Comment:-

- * companion trial WD467 Nemonia S.F. established 1984 in 1982 plantings

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Foliage sampling:-	
Mandays	924
Travel allowance	200
Vehicle running	120
Analysis	660
Report	300
Winter measurments:-	
Mandays	1377
Travel allowance	300
Vehicle running	120
Data processing	375
Report	300
<u>TOTAL</u>	<u>4676</u>

WD416 Rock phosphate at establishment

Objective:- To assess the effectiveness of broadcast rock phosphate on a management scale.

Status:- Established in 1984 on an Okarito gley podzol in Westland Conservancy.

Results at Age 2:-

- * 1 ha DAP treated block comparable with adjacent 1 ha block of rock phosphate treated trees.

Benefits of continuing the trial for the forest manager:-

- * In subsequent years the long term effectiveness of phosphate rock can be assessed against the current strategy of soluble fertiliser at establishment and again at ages 3 and 6.

Budget Sept86-Sept87

Job Description	To Spend
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Foliage collection:-

Mandays	308
Travel allowance	-
Vehicle running	80
Analysis	88
Report	300

Winter measurement:-

Mandays	308
Travel allowance	-
Vehicle running	80
Data processing	50
Report	60

TOTAL	1274
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WD420 Series N-fixing tree species

Objective:- To demonstrate the performance of a range of N-fixing tree species on various sites

WD420/1 N Fixing Tree Species on Teramakau Tailings Est. 1982-83

Demonstration trial to see if above species succeed on these raw sites without the help of fertilisers

WD420/5 No name Nemona SF Est 1983

Demonstration trial of Alnus Sp. plus and minus Rock P
Extensive deer damage in Rock Phos. treated area.
Inspection and winter measurement -

WD420/6 Est 1984

Demonstration of interplanting with P. rad [1 in 6]
of N fixing tree species

WD420/7 3 Mile Hohonu SF Est. 1984

Demonstration trial on "newer" type tailings. Top
soil consisting of 99% coarse sand.
A range of Alnus Sp., Robinia [American source], Euc Sp.
Acacia Sp. and Macrocarpa.
White clover has been Est. with 2 rates of P.

WD420/8 Alnus Glutinosa 8 Mile Nemona SF. Est/ 1984

Demonstration of influence of combinations of
N and P fertilisers and various trace elements on performance
of Alnus.

WD420/9 N Fixing Tree Species Cpt 30 Nemona S.F. Est. 1985

A range of N Fixing tree species on V Bladed soil, with and
without P and K - Heights only recorded

Budget WD420 series Sept86-Sept87

Job description

To Spend

	420/1	420/5	420/6	420/7	420/8	420/9
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Foliage sampling:-

Mandays	-	-	-	154	308	-
Travel allowance	-	-	-	-	-	-
Vehicle running	-	-	-	-	160	-
Analysis	-	-	-	176	220	-
Report	-	-	-	-	100	-

Winter measurment:-

Mandays	308	44	44	-	308	308
Travel allowance	-	-	-	-	-	-
Vehicle running	160	-	-	-	160	160
Data processing	-	-	-	-	-	-
Report	-	-	-	-	100	100
TOTAL	468	44	44	320	1356	568

WD423 series (fertiliser pellets/micronutrients)

Objective:- To study the effectiveness of various forms of fertiliser pellets on the growth and nutrition of radiata pine at time of establishment

Status:- WD423/1,2,3 Nemona S.F. 1983
WD423/4 Charleston S.F. 1984

Results:-

- * DAP treated trees responded to DAP
- * no effect of micronutrients on growth

Benefits of continuing the trial for the forest manager:-

- * final measurement to age 4 to complete workplan

Comment:-

- * all treatments are now highly deficient in P
- * some possibility of refertilising to test micronutrient additions

Budget WD423/1,2,3 Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Foliage sampling:-	-
Mandays	924
Travel allowance	200
Vehicle running	100
Analysis	1056
Report	300
Winter measurment:-	
Mandays	1848
Travel allowance	300
Vehicle running	100
Data processing	960
Final report	300
<u>TOTAL</u>	<u>6088</u>

Budget WD423/4 Sept86-Sept87

<u>Job description</u>	<u>To Spend</u>
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Foliage sampling:-

Mandays	462
Travel allowance	100
Vehicle running	100
Analysis	352
Report	300

Winter measurments:-

Mandays	1386
Travel allowance	300
Vehicle running	100
Data processing	320
Report	300

<u>TOTAL</u>	<u>3720</u>
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WD425 Timing of sowing lotus

Objective:- To examine the effect of rock P and lotus seeding prior to V-blading on the growth of radiata pine.

Status:- Established 1984
Nemona S.F.
Completion 1988-90

Results:-

- * Excellent establishment of lotus (about 3.5 tonnes d.m./ha)
- * No suppression of radiata pine (growth of lotus restricted to platforms)

Benefits of continuing trial to the forest manager

- * Intergrate the management of lotus (N nutrition) and growth of radiata pine.

Budget

Job Description	To spend
-----------------	----------

Foliage sampling:-

Mandays	308
Travel allowance	-
Vehicle running	80
Analysis	440
Report	300

Winter measurments:-

Mandays	616
Travel allowance	-
Vehicle running	80
Data processing	100
Report	300

<u>TOTAL</u>	<u>2224</u>
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FORESTRY CORPORATION TRIALS NELSON REGION

Fertiliser Trials At Establishment28/15/2 Rockphosphate/Soluble fertiliser comparisonObjective:- To compare rockphosphate with soluble fertilisers
at establishmentStatus:- Established 1985
 Motueka Forest
 Completion 1989

Results to age 1:-

- * At this site N as well as P was limiting.
- * Trees treated with rock P show a growth response behind that of superphosphate.
- * The lesser growth response to rock P should be temporary.

Benefit of continuing the trial for the forest manager

- * The information gathered from this trial will assist in an economic analysis of rock P as an alternative to superphosphate.
- * Will assist in further calibration tests for N, K and micronutrient deficiencies.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Foliage analysis	660
<u>TOTAL</u>	<u>660</u>

28/15/4 Pyrobor Trial

Objective:- To monitor the effect of Pyrobor on foliar B.

Status:- Established 1982
 Completion 1988

Results to age 2:-

* A good response two years after application, now declining.

Benefit of continuing the trial for the forest manager

* Monitor B trends through to age 6.

28/15/4 Colemanite Trial

Objective:- To monitor the effects of Colemanite on foliar B levels.

Status:- Established 1982
Completion 1988+?

Results:-

- * A confused response 3 years after application with the lowest rate/ha showing the highest B levels.

Benefit of continuing the trial for the forest manager

- * To be discussed.

NN412 N fertiliser in Douglas fir

Objective:- To measure the growth response to N fertiliser for a middle aged stand of D.fir which has recently been production thinned.

Status:- Planted 1933
Trial established 1978
Completion Sept86-Sept87
Golden Downs

Results:-

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*

Benefits of continuing the trial to the forest manager

- * being clear-felled
- * opportunity for sectional measurements

NN434 N rates

Objective:- To determine the optimum rate of nitrogen fertiliser necessary once other limiting nutrients have been corrected.

Status:- Planted 1967
Trial established 1976
Completion 1991?
Rabbit Island
Sectional measurement at C/F 1991?

Results to 1984:-

	m2/ha	m3/ha	%N	%P	B(ppm)
N0	21.1	176.3	0.92	0.13	14
N1	25.3	223.9	1.03	0.12	13
N2	27.9	239.9	0.91	0.12	13
N3	29.1	250.0	1.05	0.13	10

Benefits of continuing the trial to the forest manager

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NN468 N rates

Objective:- To observe growth after application of N in a Douglas fir stand.

Status:- Planted 1962
 Trial established 1977
 Modified 1982
 Completion 2000?

Results:-		Before modification	After modification
		Results to 1982	Results to 1985
N0	136.3 m3/ha		N0P0 225.6 m3/ha
N1	148.3		N0P1 240.8
N2	139.1		N1P1 230.9
N3	135.5		N2P1 215.4

- * N rates results are not conclusive
- * small gain to P alone
- * strong fertiliser response in the understorey (bracken)

Benefits of continuing the trial to the forest manager

- * to be discussed

Budget Sept86-Sept87

<u>Job Description</u>	<u>To Spend</u>
Foliage analysis	176
<u>TOTAL</u>	<u>176</u>

NN546 Thinning*pruning*fertiliser

Objective:- 1. the size and nature of response to fertiliser as influenced by stocking following first thinning.
 2. to determine how a delay in fertiliser application alters the response and how this is influenced by stocking and pruning.
 3. to determine how fertiliser and pruning interact.

Status:- Planted 1972
 Trial established 1979
 Pruning*fertiliser interaction ceased when all stems were pruned in 1980.
 Completion 2000

Results:-

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Benefits of continuing the trial to the forest manager

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Budget Sept86-Sept87

<u>Job description</u>	<u>To Spend</u>
Foliage analysis	1056
<u>TOTAL</u>	<u>1056</u>

N571 Rockphosphate

Objective:- To assess broadcast rock phosphate as an alternative to hand top dressing at establishment.

Status:- Established by Nelson District staff in 1982, on a podzolised yellow brown earth.

Results To Age 4:-

- * Controls at 1.4 metres.
- * DAP treated trees at 2.9 metres.
- * Rock treated trees at 2.4 metres.

Benefits of continuing the trial for the forest manager

- * Assess the longevity of the rock phosphate treatment
- * Compare the economics of rock phosphate with soluble fertiliser at establishment.

Budget Sept86-Sept87

<u>Job Description</u>	<u>To spend</u>
Foliage analysis	2112
<u>TOTAL</u>	<u>2112</u>

N575 N rates

Objective:- Standard N rates trial

Status:- Planted 1973, P.radiata
 Trial established 1982
 Waimea S.F.
 Completion 2000? (sectional measurement at C/F)

Results:-

		m2/ha	m3/ha	%N	%P	B(ppm)
Control		13.9	77.2	1.53	0.18	16
200N	82	14.9	81.1	1.42	0.17	17
200N	83	14.9	83.4	1.45	0.16	14
100N	82,83	15.2	83.3	1.41	0.13	15
200N	81,82,83	17.7	95.9	1.69	0.16	21

Benefits of continuing the trial for the Forest Manager

* To be discussed.

Budget 1987

<u>Job Description</u>	<u>To Spend</u>
Foliage analysis	792
<u>TOTAL</u>	<u>792</u>

PROPOSED NEW WORK.

1. Boron fertilising at establishment and in established stands
At the last meeting we agreed a budget of \$7000 to establish new trials with Colemanite and Ulexite. A number of trial designs will be tabled for discussion.
2. Discussions are well advanced to establish a PAPR and nitrogen trial on second rotation land at Riverhead Forest. A budget of \$9500 was established.
3. A whole tree thinning trial is being established on CHI land in Hawkes Bay. CHI wish to bring this trial under the umbrella of the Co-op. A budget of \$8600 exists.
4. Discussions have been underway with Tasman and NZFP about establishing more replications of the whole tree thinning trial on their land . Both companies have indicated strong interest.

A budget of \$ 8600 per trial is required.