

FRI/INDUSTRY RESEARCH COOPERATIVES

**MANAGEMENT OF IMPROVED RADIATA
BREEDS COOPERATIVE**

**FOREST RESEARCH INSTITUTE
PRIVATE BAG
ROTORUA**

**COMPARISON OF CONTAINERISED AND BARE-ROOTED
CUTTINGS AND SEEDLINGS TRIAL
– ESTABLISHMENT REPORT**

R.H. SAUNDERS AND P.L. WILCOX

Report No. 16

November 1989

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EXECUTIVE SUMMARY

COMPARISON OF CONTAINERISED AND BARE-ROOTED CUTTINGS AND SEEDLINGS TRIAL - ESTABLISHMENT REPORT

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REPORT NO. 16 NOVEMBER 1988

This report documents the establishment of research/production plantings of three genetically-dissimilar plant types and four differing propagation methods. Bare-rooted and rootrainer-grown cuttings and seedlings from "268" control pollinated GF 23-25 material are compared with bare-rooted seedlings from "268" open pollinated GF 16 and unimproved GF 5 seedlots. The objectives of the trial series are to obtain more information on different propagation methods of *Pinus radiata* and to further extend the growth and log quality database for the growth and form breed grown in a clearwood regime with intermediate production thinning options.

The experimental design is a combination of a row plot trial designed to obtain relatively precise early growth information, and an associated large-plot silvicultural trial designed to provide longer term information on growth and yield data for the various treatments.

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INTRODUCTION

This report describes the establishment of research/production plantings of various multinodal radiata pine seedlots and propagation methods on NZ Timberlands Limited (Hawkes Bay) land.

The trials were established in 1989 under the Management of Improved Radiata Breeds Cooperative WP 1633, Project 3.

The objectives of this trial series are to determine both short and long term differences in propagation techniques and levels of genetic improvement within the growth and form breed.

LOCATIONS

The two sites chosen were at Tikokino and Gwavas Forests in Central Hawkes Bay (Appendix (i)). Both sites are former open-pollinated seed orchards thus relatively flat and of moderate to high fertility.

The trials have been replicated to some extent on a much larger operational scale on the planting sites and other Timberlands Hawkes Bay forests; viz:

Esk	Barerooted	GF 23 & 25	CP 1-yr-old cuttings	(88 ha)
Esk	Roottrainer	GF 23 & 25	" " "	(1 ha)
Esk	"	GF 23 & 25	" ' seedlings	(2 ha)
Gwavas	Bare-rooted	GF 23	" " cuttings	(120 ha)
Gwavas	"	GF 16	OP seedlings	(79 ha)
Mohaka	"	GF 16	OP "	(326 ha)

DESIGN

Each site contains two experiments:

1. Row-plot trial. This design was specifically aimed at providing relatively precise short term growth information on short-term genetic and/or propagation differences between the various treatments. The design consists of 12 replications of six tree-row plots of each treatment arranged in a randomised complete block design.
2. Large-plot genotype-silviculture interaction trial. This trial was designed to obtain long-term growth and log quality information from the various stock types at two final crop stockings. The design used was a split-plot randomised complete block design, with silvicultural treatment assigned to the major block treatments. Each silviculture-stocktype treatment was replicated three times per site. This design is less precise than the row-plot design, but is suitable for providing long-term information for modelling purposes, thus complementing the short-term row plot trial series.

SEEDLOT AND PLANT TYPES

1. Unimproved OP seedlings GF 5 88/101
2. "268" OP seedlings, GF 16 88/6 SO
"850" Kaingaroa and Gwavas plus "268" Kaingaroa
3. "268" CP cuttings 1 yr GF 23 88/2
268 B + C ranks x "Top 16" pollens
(Bare-rooted)
4. "268" CP cuttings 1 yr GF 25 88/1
(Roottrainer-grown)
5. Seedlings 268 "Top 16 x Top 16"
(Roottrainer grown).

MANAGEMENT

The seedlings and cuttings were planted using Timberlands resources between April and July 1989.

The planting method was the recognised multicut, cultivate and "pull-up" systems using "Atlas" planting spades. All trials were manually released with 2 gm/tree (4 kg/ha equivalent) of "Velpar" using the Weed-a-metre" applicator.

A half tree height pruning will be undertaken a mean crop height of 6.5 m.

A second pruning to 5.8 m or 9.0 cm internode will be undertaken on all final crop stems at MCH 8.5 m.

A production thinning down to 250 sph is scheduled at MCH 18.0 metres for the row plot trials, with the large plot trials thinned to either 250 sph or 400 sph at a similar stage.

ASSESSMENT AND ANALYSIS

Initial height measurements were taken at the time of planting (Appendix iii).

There has been some browsing damage from rabbits and hares and this date has been recorded. Some plants have been lost whilst other are recovering (Appendix ii).

A survival count (100%) and height measurement will be undertaken in March 1990. Height measurement will be undertaken annually.

Diameter (DBH) will be recorded annually from Year 3.

Stability, malformation, branch index and internode length will also be monitored.

The stands will be treated as normal Timberlands clearwood stands with a production thinning option.

Measurement will be undertaken with FRI and all data and stand records will be pooled, analysed and written up as Cooperative reports.

ACKNOWLEDGEMENTS

The assistance of all personnel involved in preparing, planting and measuring the trial, particularly Herb Fincham and Neil Woods, is acknowledged.

APPENDIX (F)

N.Z.M.S. 260
GRID REFERENCE
SHEET U22: 982598



Compartment : 59 P.Year : 1989 Area : 6.70

Con Expt Sub Forest Control Current Terminated
FR-0078-00 GWAVAS FRI 48 0

Contact Person : WILCOX P.L.

Purpose : Obtain growth and log quality data from various
P.radiata breeds at differing stocking and
propagation.

Species : P.RAD

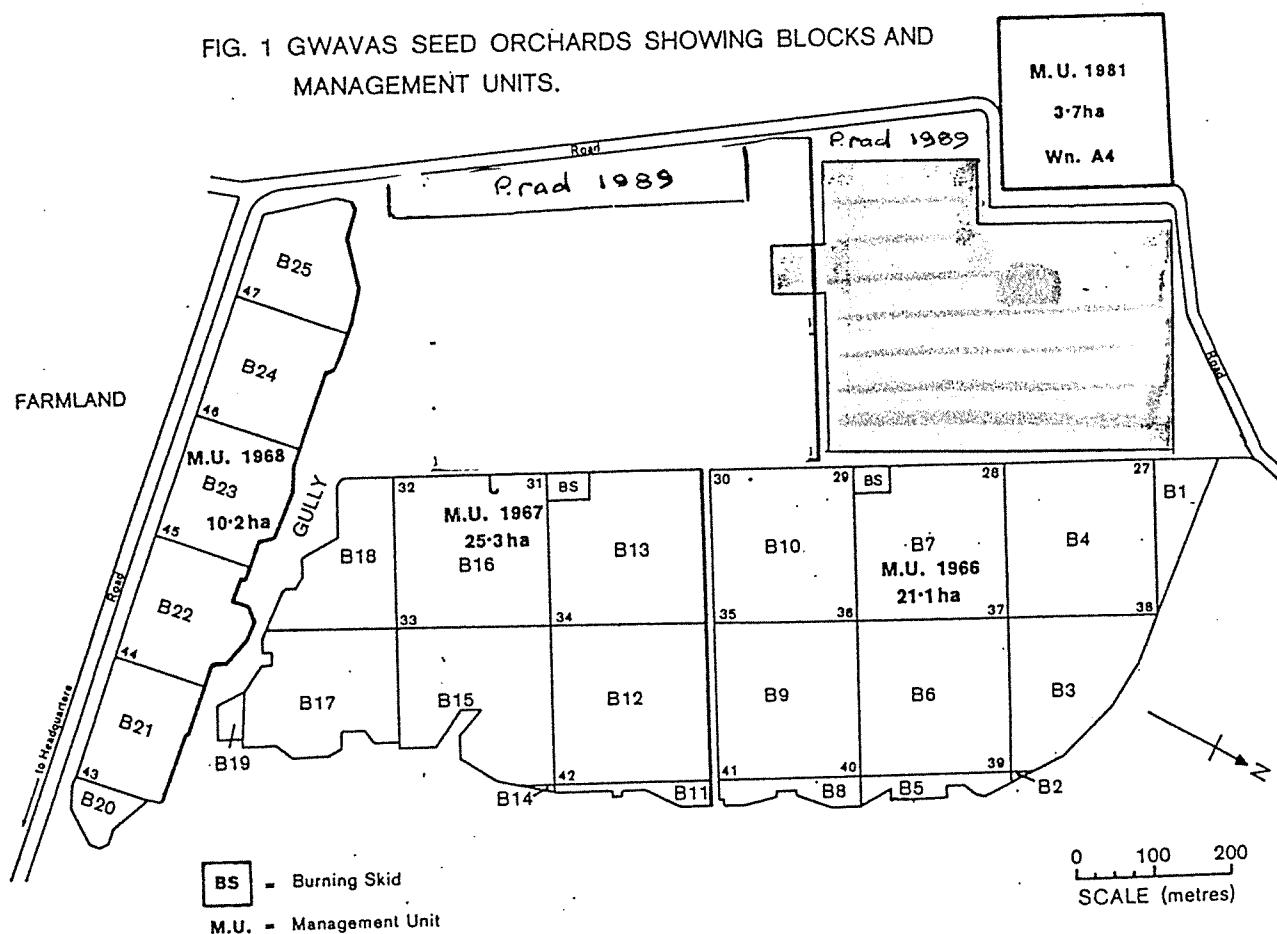
Future Management : Forest manager to release and
prune as per normal management.
Trial to be thinned under FRI
supervision.

Gwavas

59

Dec. 1988

FIG. 1 GWAVAS SEED ORCHARDS SHOWING BLOCKS AND
MANAGEMENT UNITS.



Compartment : 300

P.Year : 1989 Area : 6.70

Con Expt Sub Forest
FR-0077-00 TIKOKINO

Control	Current	Terminated
FRI	48	0



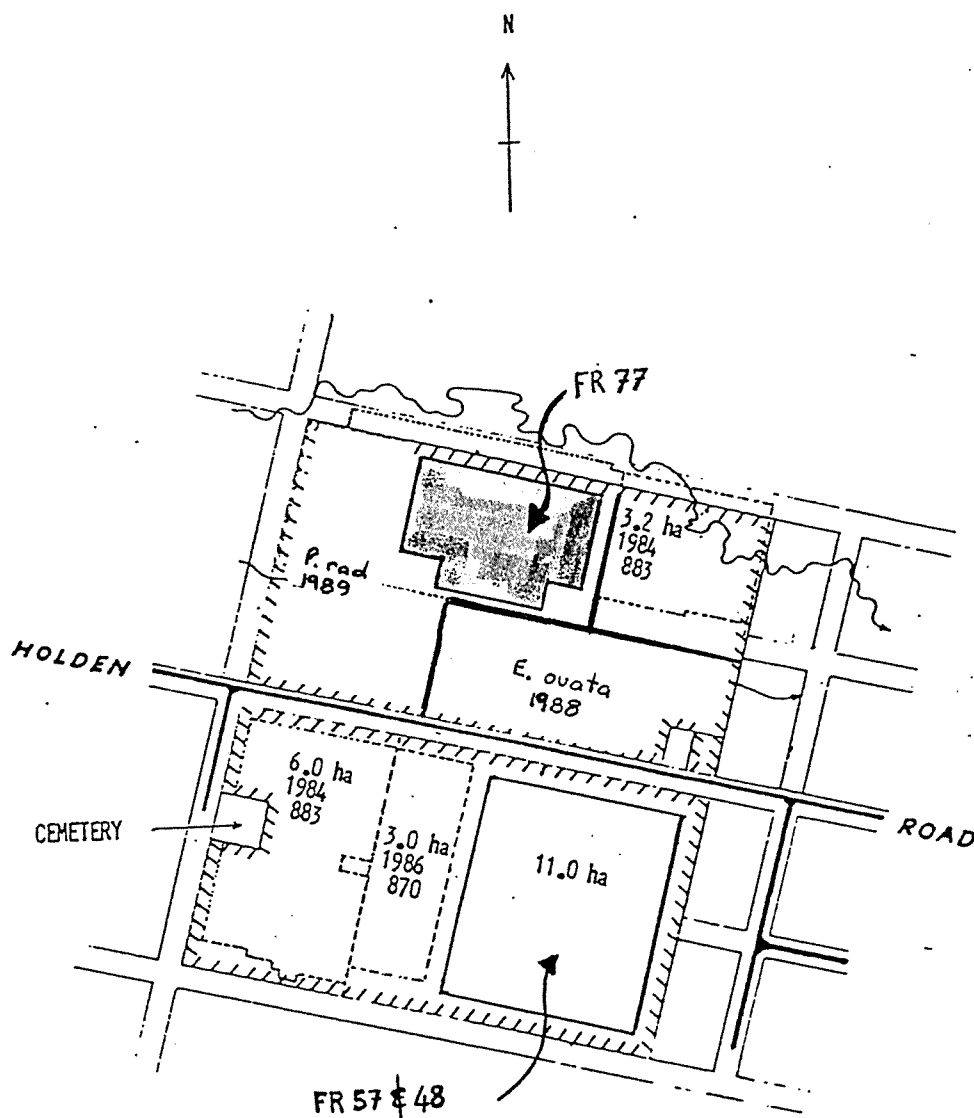
Contact Person : WILCOX P.L.

Purpose : Obtain growth and log quality data from various
P.radiata breeds at differing final stockings.

Species : P.RAD

Future Management : Forest manager to release and
prune as per normal management.
Trial to be thinned under FRI
supervision.

Tikokino Seed Orchard

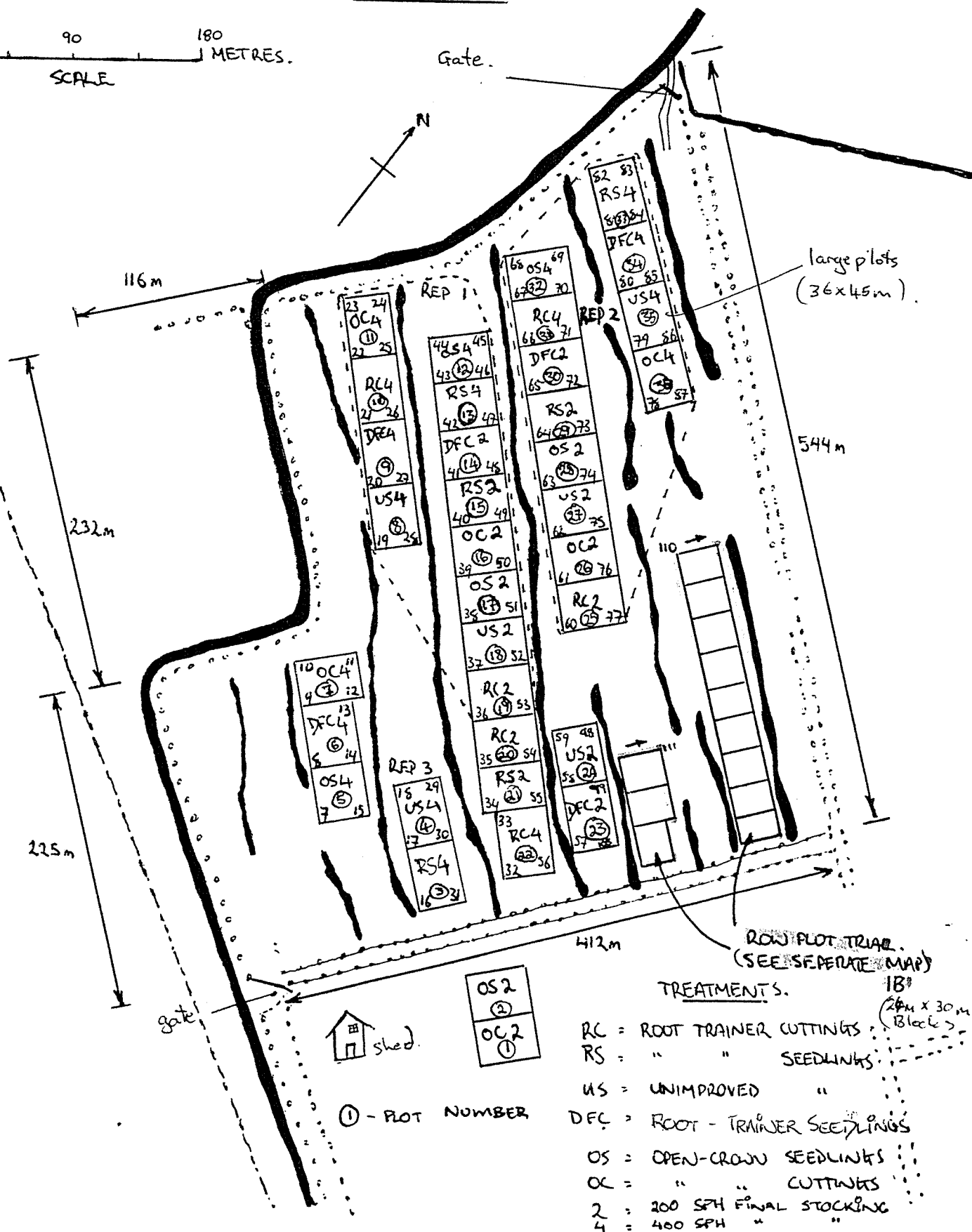
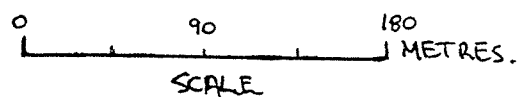


GWAVAS S.O. HAWKE'S BAY

- CPT 59

Established 1989

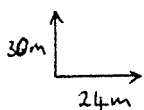
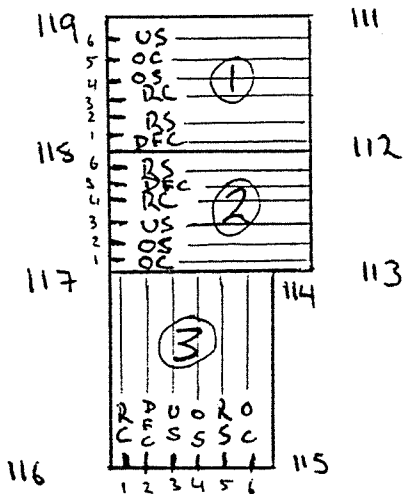
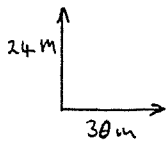
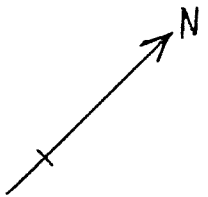
G. F. 23-25



Management of Improved Breeds

GWARAS ROW-PLOT TRIAL

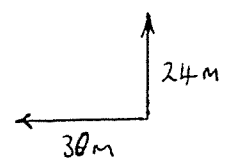
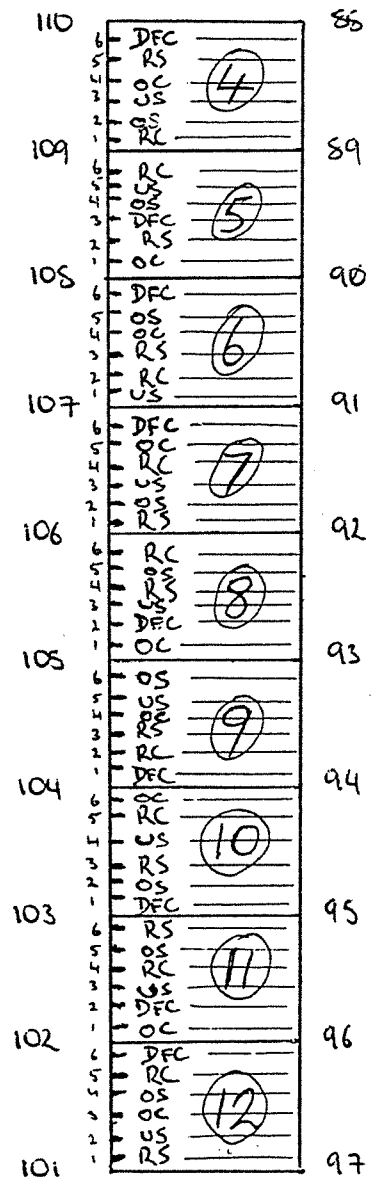
Established 1989



key

RC - Roottrainer Cuttings
 DFC - ROOT TRAINER SEEDLINGS
 US - unimproved Seedlings

OS - open grown seedlings
 RS - Root trainer Seedlings
 OC - Open grown Cuttings

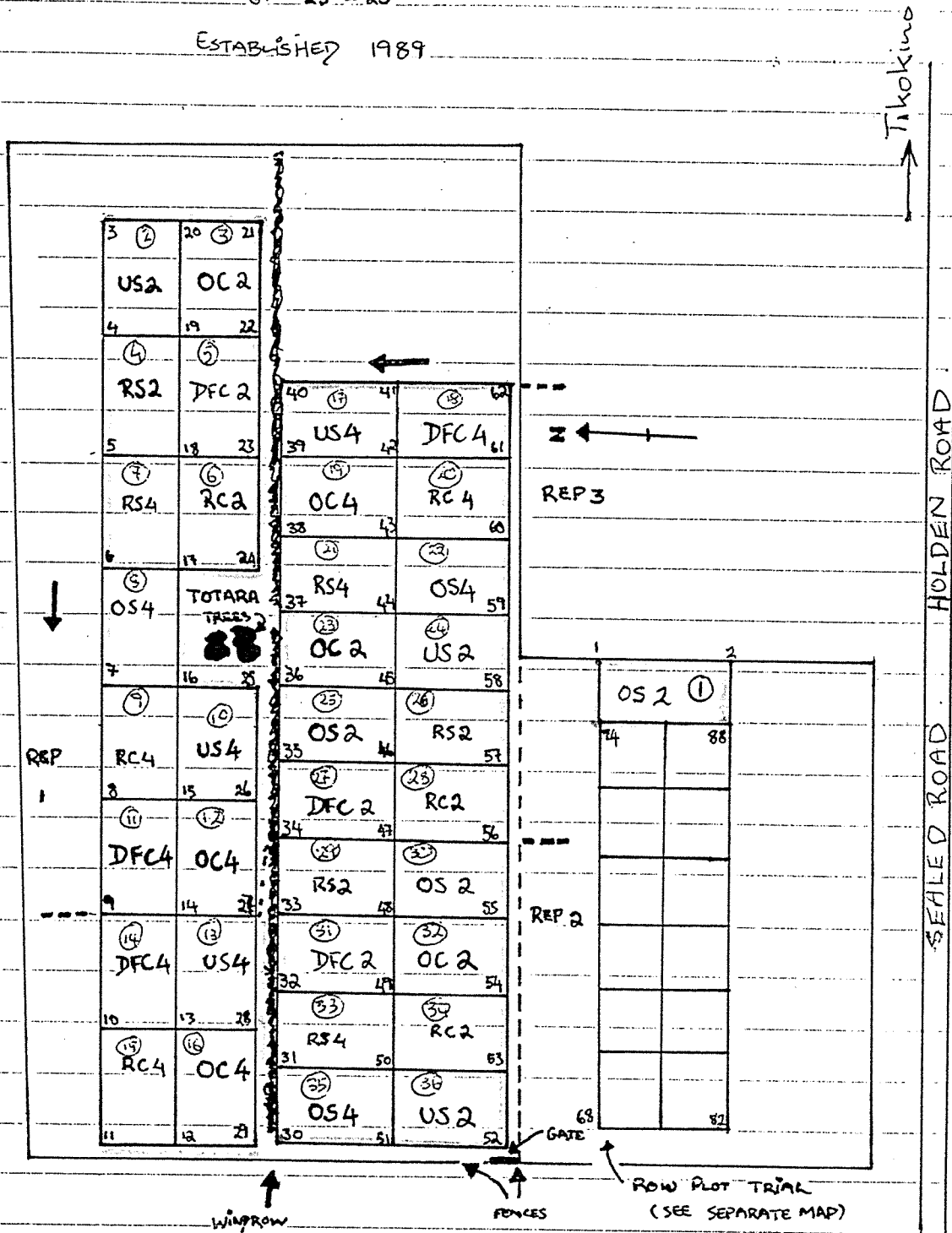


88-119 = Peg Numbers

TIKOKINO IMPROVED BREEDS MANAGEMENT TRIAL - LARGE PLOT TRIAL LAYOUT

GF 23 - 25

ESTABLISHED 1989



TREATMENTS - RC - ROOT TRAINER CUTTINGS

RS - " " SEEDLINGS

US - UNIMPROVED "

OC - OPEN-GROWN CUTTINGS

OS - " SEEDLINGS

DFC - ROOT TRAINER SEEDLINGS

2 - 200 SPH FINAL STOCKING

4 - 400 SPH " "

① - PLOT NUMBERS

1-88 - Peg Numbers

Plots

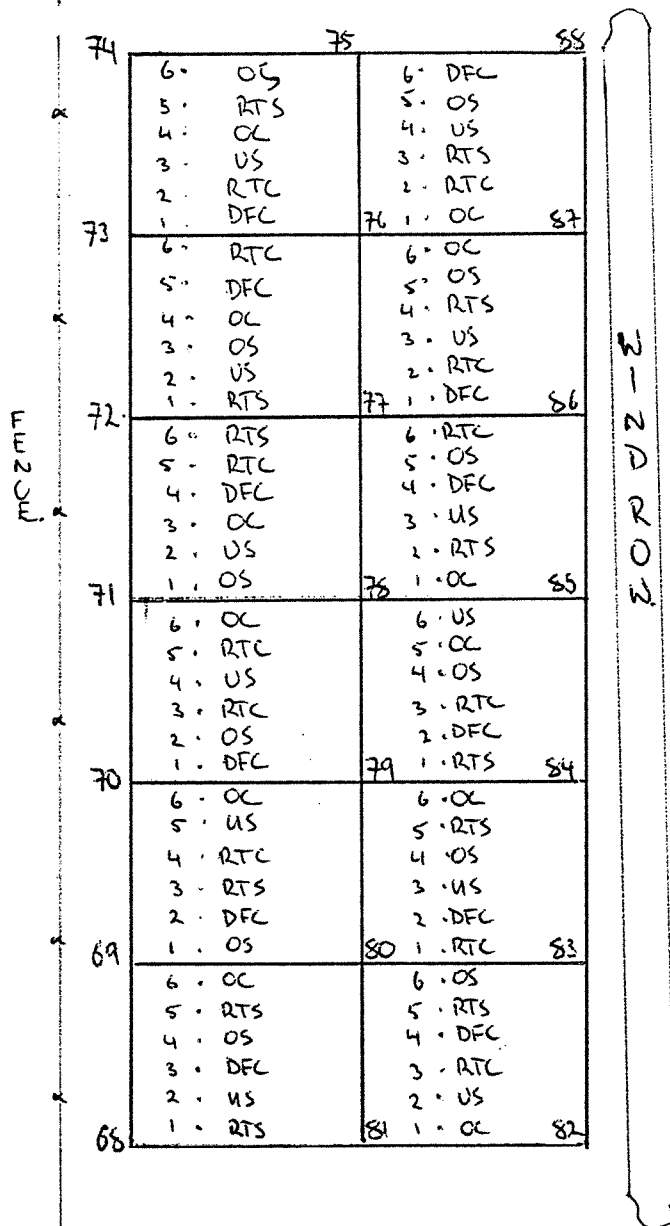
Rep 1 2-12, 25

Rep 2 13-16, 29-36

Rep 3 17-24, 26-28, 1

TIKOKINO ROW PLOT TRIAL LAYOUT:

ESTABLISHED 1989.



1-6 = PLANTING ROW NOS

68-82 = PEG IDENTIFICATION NOS

RTS = ROOT TRAINER SEEDLINGS

RTC = " " CUTTINGS

OC = OPEN GROWN CUTTINGS

OS = " " SEEDLINGS

DFC = ROOT TRAINER SEEDLINGS

US = UNIMPROVED SEEDLINGS.

Plot 4	91%
Plot 5	59%
Plot 6	41%

BOLDFACE = Trees Damaged by Storms/Explosion
X = Trees gone

Plot No 1						Plot No 2					
peg no			peg no			peg no			peg no		
116			117			118			112		
-1						10	24	18	16	10	14
-2											
-3											
-4											
-5	16	2	13	16	3	20					
-6											
peg no			peg no			peg no			peg no		
115			114			117			113		

Plot No 3							Plot No 4					
peg no		peg no		peg no		peg no		peg no		peg no		
119		111		102		98						
-1												
-2												
-3												
-4												
-5	31	18	12	11	19	27						
-6							32	17	22	32	23	28
peg no		peg no		peg no		peg no		peg no		peg no		
118		112		101		97						

Plot No 5							Plot No 6						
peg no				peg no			peg no				peg no		
103				95			104				94		
-1	28	17	25	17	33	19							
-2													
-3							12	26	18	27	17	5	
-4													
-5													
-6													
peg no				peg no			peg no				peg no		
102				96			103				95		

Plot No 7							Plot No 8						
beg no							beg no						
105							92						
r1													
r2													
r3							24	31	33	16	11	31	
r4	7	16	24	30	29	17							
r5													
r6													
beg no							beg no						
104							94						
							103						
							90						

Plot No. 9		Plot No. 10	
seg no	seg no	seg no	seg no
107	91	102	90

r2
r3
r4
r5

23 14 11 7 11 33

no 14 36 30 17 15 27

peg no	peg no	peg no	peg no
106	92	107	91

Plot No 11

Plot No 12

peg no	peg no	peg no	peg no
109	89	110	88

r1
r2
r3
r4
r5
r6

17 15 27 10 10 15

10 16 25 29 23 21

peg no	peg no	peg no	peg no
108	90	109	89

P.Radiata Improved Breeds Winter Plant Trials Gwavas S.O
Tree Heights (centimetres) Measured 19.07.89

Root trainer seedlings
4m between rows
5m between trees
plot size 45m X 36m
Planted 3-7=July 1989

Plot No										Plot No									
peg no										peg no									
20										21									
r1	35	28	15	20	22	28	31	9	22	27	24	27	28	25	15	22	26	2	
r2	26	23	31	18	15	27	19	33	29	28	27	23	33	19	25	23	22	1	
r3	25	28	13	20	22	27	23	28	17	29	19	26	23	21	24	36	24	3	
r4	28	X	29	27	23	22	18	28	19	27	22	12	32	30	22	26	23	2	
r5	23	32	14	25	28	25	12	21	24	26	24	30	30	34	24	25	22	2	
r6	12	14	13	29	33	25	24	19	25	21	18	27	27	32	30	25	37	2	
r7	31	23	20	21	24	10	22	16	24	27	20	26	17	30	27	21	26	3	
r8	19	16	20	25	25	29	22	36	15	26	21	26	20	23	22	29	22	2	
r9	21	31	17	7	17	21	26	17	24	34	20	25	23	27	25	36	26	1	
peg no										peg no									
27										26									
Plot No										Plot No									
peg no										peg no									
66										71									
r1	11	28	14	19	23	28	26	33	21	20	29	31	13	30	36	20	29	2	
r2	28	35	35	15	18	25	19	23	15	32	20	26	24	23	25	26	32	1	
r3	21	22	31	29	12	22	21	17	27	17	30	24	29	28	24	30	21	1	
r4	19	30	24	24	27	22	18	26	16	23	31	20	22	32	23	21	21	1	
r5	16	25	25	36	19	15	21	27	17	15	18	17	13	14	17	19	31	2	
r6	14	23	35	17	25	18	11	18	19	18	38	25	22	20	22	22	26	3	
r7	33	32	29	X	26	23	28	17	29	26	15	25	25	29	26	31	36	2	
r8	20	18	24	28	27	25	29	19	22	24	30	21	29	18	20	19	20	1	
r9	31	14	26	17	23	36	20	24	15	32	29	25	9	22	28	37	25	2	
peg no										peg no									
65										72									
Plot No										Plot No									
peg no										peg no									
99										100									
r1	32	28	33	15	21	31	17	20	38	10	19	26	33	30	25	26	20	2	
r2	25	32	22	23	20	20	28	15	17	29	10	26	33	31	18	20	26	1	
r3	32	19	35	15	12	28	27	22	39	25	10	34	12	16	12	14	23	2	
r4	25	20	17	14	35	25	20	27	39	20	13	6	26	18	33	30	27	2	
r5	29	18	25	29	16	26	20	28	38	29	24	19	30	18	22	24	16	1	
r6	18	25	23	20	23	26	20	25	24	19	23	29	28	24	26	24	22	2	
r7	24	23	22	29	29	21	19	25	26	29	28	18	18	24	27	25	19	2	
r8	17	25	17	22	27	27	23	24	20	31	16	20	38	24	22	27	21	2	
r9	20	17	26	26	33	14	27	18	22	20	14	21	20	23	20	25	28	2	
peg no										peg no									
58										57									
Plot No										Plot No									
peg no										peg no									
9										9									

P. Radiata Improved Breeds Winter Plant Trials Gwatal S.O
HEIGHT MEASUREMENTS 23.07.89

Root trainer seedlings (Row Plots)

4m between rows

5m between trees

plot size 24m X 30m

Planted 3-7 July 1989

Plot No 3							Plot No 2						
peg no							peg no						
116							117						
r1													
r2	13	26	26	22	30	33	23	28	29	30	25	23	
r3													
r4													
r5													
r6													
peg no							peg no						
115							114						

Plot No 1							Plot No 12						
peg no							peg no						
119							102						
r1							30	28	31	22	36	-	
r2													
r3													
r4													
r5													
r6	28	24	21	29	27	30							
peg no							peg no						
118							101						

Plot No 11						Plot No 10					
peg no						peg no					
103						104					
r1											
r2											
r3											
r4											
r5	28	27	24	30	31	20					
r6											
peg no						peg no					
102						103					

Plot No 9							Plot No 8						
peg no							peg no						
105							106						
r1													
r2													
r3													
r4													
r5							17	17	31	31	28	26	
r6	19	17	23	30	21	23							
peg no							peg no						
104							105						

Plot No 7							Plot No 6						
peg no							peg no						
107							108						
r1	30	13	28	30	27	35	20	24	31	24	26	27	

r2
r3
r4
r5
r6

peg no	peg no	peg no	peg no
106	92	107	91

Plot No	5	Plot No	4
peg no	peg no	peg no	peg no
109	89	110	88
r1		21	24
r2		9	23
r3	25 26 16 31 23 23		31 38
r4			
r5			
r6			

peg no	peg no	peg no	peg no
108	90	109	89

P. Radiata Improved Breeds Summer Plant Trials Tikokino S.O
Tree Heights (centimetres) Measured - 17.05.89

Root trainer seedlings

0 = Trees Not Planted.

4m between rows

5m between trees

plot size 45m X 36m

Planted 11-May 1989

Plot No 1

peg no

19

r1	34	25	34	19	15	29	23	28	30
r2	23	29	14	30	28	25	28	18	25
r3	30	25	25	18	27	28	33	29	17
r4	34	23	22	22	27	29	33	25	29
r5	30	29	27	26	17	25	25	26	16
r6	30	25	29	22	27	18	29	27	24
r7	21	27	30	29	19	22	20	19	31
r8	18	33	22	27	26	32	21	19	23
r9	19	26	21	11	24	26	19	20	20

peg no

4

peg no

18

Plot No 2

peg no

18

22	29	27	25	12	23	30	22	31
20	20	18	14	13	17	14	27	31
12	26	28	19	21	20	29	30	36
17	13	26	32	29	34	28	31	27
19	29	25	25	21	18	27	28	22
32	20	16	17	16	25	25	33	16
16	29	16	17	26	27	28	27	27
23	23	17	22	29	24	30	32	28
33	28	19	32	28	22	26	11	28

peg no

5

peg no

17

22	29	27	25	12	23	30	22	31
20	20	18	14	13	17	14	27	31
12	26	28	19	21	20	29	30	36
17	13	26	32	29	34	28	31	27
19	29	25	25	21	18	27	28	22
32	20	16	17	16	25	25	33	16
16	29	16	17	26	27	28	27	27
23	23	17	22	29	24	30	32	28
33	28	19	32	28	22	26	11	28

peg no

6

Plot No 3

peg no

38

r1	0	34	30	27	24	31	29	38	14
r2	0	14	34	27	31	16	18	31	27
r3	0	33	22	29	27	32	26	13	24
r4	0	12	23	29	18	34	19	14	23
r5	0	28	26	20	24	26	33	36	16
r6	0	0	0	22	11	17	19	10	25
r7	0	34	35	33	29	19	29	29	25
r8	0	0	0	24	23	20	17	19	21
r9	0	25	18	27	27	21	14	15	21

peg no

37

peg no

43

Plot No 4

peg no

45

20	20	22	29	31	21	30	25	18
19	24	23	17	22	22	21	11	18
16	20	23	29	17	24	28	23	31
19	29	19	21	26	25	29	25	26
24	24	24	26	16	31	18	23	27
30	33	32	23	27	17	30	15	24
29	24	17	24	22	14	25	30	36
27	27	36	26	23	24	20	28	19
15	19	13	26	23	25	23	23	26

peg no

46

peg no

58

20	20	22	29	31	21	30	25	18
19	24	23	17	22	22	21	11	18
16	20	23	29	17	24	28	23	31
19	29	19	21	26	25	29	25	26
24	24	24	26	16	31	18	23	27
30	33	32	23	27	17	30	15	24
29	24	17	24	22	14	25	30	36
27	27	36	26	23	24	20	28	19
15	19	13	26	23	25	23	23	26

peg no

57

Plot No 5

peg no

34

r1	26	20	18	22	15	10	22	21	31
r2	17	20	19	26	19	19	29	14	27
r3	28	31	28	26	19	27	21	27	26
r4	21	26	30	17	26	20	23	18	20
r5	22	28	25	36	23	27	29	32	28
r6	31	29	26	27	23	23	26	26	24
r7	29	21	34	18	18	26	29	17	14
r8	33	20	32	30	24	34	33	31	31
r9	26	24	27	23	26	33	29	28	23

peg no

33

peg no

47

Plot No 6

peg no

32

27	18	28	16	24	26	29	15	21
24	28	20	09	24	22	33	21	29
24	19	24	19	28	21	25	22	18
23	26	21	16	21	27	27	16	18
0	30	19	31	24	21	33	25	10
20	9	13	26	21	18	14	16	10
30	20	34	23	26	23	31	32	26
34	20	19	26	31	19	21	18	14
34	28	23	22	30	27	21	21	24

peg no

31

peg no

49

27	18	28	16	24	26	29	15	21
24	28	20	09	24	22	33	21	29
24	19	24	19	28	21	25	22	18
23	26	21	16	21	27	27	16	18
0	30	19	31	24	21	33	25	10
20	9	13	26	21	18	14	16	10
30	20	34	23	26	23	31	32	26
34	20	19	26	31	19	21	18	14
34	28	23	22	30	27	21	21	24

peg no

50

P.Radiata Improved Breeds Summer Plant Trials Tikokino
Tree Heights (centimetres) Measured -17.05.89

Root trainer seedlings (Row Plots)
4m between rows 5m between trees
plot size 24m X 30m
Planted 20-21st april 1989

Plot No 2

pag no
79

18 26 19 24 25 33

peg no	peg no
69	80

Plot No 4

peg no
77

27 30 24 11 27 22

peg no
78

Plot No 6

peg no
75

33 30 29 24 18 25

peg no peg no
73 76

Plot No 8

peg no
87

22 18 21 22 27 19

peg no peg no
77 86

Plot No 10

pag no
85

11

r2
r3
r4

r5 17 21 28 20 30 2

r6

21 21 33 9 29 26

peg no
78

peg no
85

peg no
79

peg no
84

Plot No 11

Plot No 12

peg no
79

peg no
84

peg no
80

peg no
83

r1

r2 23 20 26 30 21 26

30 29 32 25 25 31

r3

r4

r5

r6

peg no
80

peg no
83

peg no
81

peg no
82

P.Radiata Improved Breeds Winter Plant Trials Tikokino S.O.
Height Measurements 19.07.89

Root trainer seedlings

4m between rows

5m between trees

plot size 45m X 36m

Planted 3-7 July 1989

Plot No										Plot No									
peg no										peg no									
14										15									
r1	25	23	30	25	17	22	24	22	30	35	23	27	20	21	28	37	39	35	35
r2	17	15	18	18	30	20	36	20	26	18	17	23	18	30	17	28	33	10	10
r3	30	27	34	25	21	19	24	25	14	32	32	22	33	26	26	24	33	26	26
r4	35	36	16	23	16	20	38	20	18	26	25	22	33	16	29	21	33	25	25
r5	38	18	28	27	16	18	21	20	18	14	24	20	32	30	23	32	33	20	20
r6	16	20	27	25	14	22	20	35	31	23	27	17	30	24	14	20	27	10	10
r7	35	26	27	38	19	23	34	26	21	23	26	22	28	26	27	31	28	15	15
r8	34	19	17	14	20	23	28	36	18	35	25	20	13	27	32	35	11	12	12
r9	21	19	27	11	30	21	34	15	33	16	23	13	19	31	17	17	24	35	35
peg no										peg no									
9										8									
10										9									

Plot No										Plot No									
peg no										peg no									
18										41									
r1	17	18	23	34	19	19	33	x	16	17	20	29	15	26	27	25	32	21	19
r2	18	27	12	22	22	29	24	15	23	22	18	26	15	27	16	24	26	28	20
r3	29	19	7	18	20	16	31	20	24	19	23	33	33	29	26	24	13	19	18
r4	29	30	17	10	13	33	31	20	24	25	18	28	25	28	28	28	27	39	20
r5	31	x	x	35	34	25	22	25	32	19	24	31	21	33	26	21	16	23	20
r6	15	x	x	30	34	29	19	14	13	28	32	31	24	11	13	20	22	30	20
r7	13	x	16	16	10	24	34	16	31	23	22	19	26	28	31	23	30	18	20
r8	28	10	x	x	25	24	29	28	24	27	31	35	14	34	25	32	27	22	20
r9	16	18	9	x	11	20	22	17	20	31	27	36	30	31	26	34	21	19	20
peg no										peg no									
23										42									

Plot No										Plot No									
peg no										peg no									
35										49									
r1	32	26	34	22	17	22	21	37	27	27	25	x	25	25	37	x	30	26	35
r2	17	25	25	38	22	17	23	37	24	23	15	21	23	31	31	35	21	28	35
r3	18	35	24	37	28	22	31	26	25	27	21	19	24	25	27	19	30	18	35
r4	12	18	33	24	23	24	27	20	22	28	29	22	25	33	14	23	26	22	35
r5	23	25	29	27	33	22	25	16	9	12	19	12	33	22	32	28	23	18	35
r6	27	x	11	14	24	24	29	15	19	26	35	30	32	30	19	23	34	28	35
r7	28	34	27	27	16	33	12	17	21	17	30	28	36	20	29	9	33	21	35
r8	x	18	31	31	24	18	18	25	18	31	28	25	30	18	29	19	26	22	35
r9	30	26	25	35	28	28	26	22	18	32	27	25	22	32	26	21	18	18	35
peg no										peg no									
34										48									

3\$

P. Radiata Improved Breeds ^{winter} ~~Summer~~ Plant Trials Tikokino
 HEIGHT MEASUREMENTS 25.07.89

Root trainer seedlings (Row Plots)
 4m between rows 5m between trees
 plot size 24m X 30m
 Planted 3-7 July 1989

Plot No 6		Plot No 5
peg no	peg no	peg no
69	80	70
		79
r1		
r2		
r3		
r4	22 25 21 18 27 27	
r5		23 20 26 19 13 23
r6		
peg no	peg no	peg no
68	81	69
		80

Plot No 4		Plot No 3
peg no	peg no	peg no
71	78	72
		77
r1		
r2		
r3		
r4		24 23 24 14 34 30
r5		
r6	25 33 23 25 38 29	
peg no	peg no	peg no
70	79	71
		78

Plot No 2		Plot No 1
peg no	peg no	peg no
73	76	74
		75
r1		
r2	28 18 29 27 26 20	
r3		
r4		
r5		
r6		20 22 21 17 14 31
peg no	peg no	peg no
72	77	73
		76

Plot No 7		Plot No 8
peg no	peg no	peg no
75	88	76
		87
r1	17 28 23 29 26 36	
r2		
r3		
r4		
r5		
r6		30 21 20 27 30 30
peg no	peg no	peg no
76	87	77
		86

Plot No 9		Plot No 10
peg no	peg no	peg no
77	86	78
		85

r1
r2
r3 36 21 21 29 26 27
r4

r5 17 26 22 24 24 18
r6

peg no	peg no	peg no	peg no
78	85	79	84

Plot No 11

peg no
79

peg no
84

Plot No 12

peg no
80

peg no
83

r1
r2
r3 23 19 20 10 15 12
r4

r5 26 4 33 19 25 27
r6

peg no	peg no	peg no	peg no
80	83	81	82

APPENDIX (iv)

P.Radiata	Improved Breeds	Summer Plant Trials	Gwavas S.O
	Clone Family Numbers		

Root trainer seedlings
4m between rows
5m between trees
plot size 45m X 36m
Planted 20-21st april 1989

Plot No 1

peg no

16

r1	530	530	530	530	530	530	530	530	530
r2	B	530	494	530	B	530	494	494	494
r3	530	530	530	530	530	494	494	494	530
r4	494	494	494	494	494	494	494	494	530
r5	494	494	494	494	530	494	494	494	494
r6	530	530	494	494	494	B	494	494	494
r7	530	530	530	494	530	494	530	530	530
r8	494	323	530	530	530	530	494	530	530
r9	530	323	494	530	323	494	530	323	494

peg no

31

Plot No 3

peg no

41

r1	345	323	405	405	323	530	323	109	323
r2	405	405	532	323	530	530	530	494	B
r3	109	109	323	109	323	109	494	345	494
r4	345	530	405	323	345	345	494	405	B
r5	109	405	494	345	405	530	323	323	B
r6	530	530	405	494	109	109	405	345	494
r7	494	405	530	530	345	323	405	530	109
r8	323	494	323	345	345	530	405	494	109
r9	530	345	405	109	109	109	323	109	494

peg no

40

Plot No 5

peg no

65

r1	405	530	B	530	323	530	345	494	494
r2	530	405	109	405	530	530	323	345	405
r3	109	323	345	345	109	323	405	109	532
r4	323	494	323	530	109	530	B	405	109
r5	345	494	323	109	109	323	530	405	323
r6	109	323	405	109	345	530	494	109	530
r7	405	405	B	323	345	494	405	494	494
r8	345	109	109	345	345	323	530	323	494
r9	494	530	405	345	B	530	323	405	109

peg no

64

Plot No 2

peg no

35

530	530	530	530	494	109	323	109	109
494	405	494	109	405	345	345	405	405
323	323	494	109	109	109	323	345	345
530	494	323	532	323	345	494	405	109
494	530	B	530	109	405	494	405	405
323	323	323	530	530	109	345	345	494
323	530	323	530	405	345	109	345	405
323	323	323	530	530	405	405	109	323
494	530	530	109	405	109	405	345	345

peg no

34

Plot No 4

peg no

43

109	109	323	494	345	345	109	405	405
109	345	494	530	109	494	530	323	405
109	530	109	494	109	494	109	323	494
345	109	323	405	345	530	405	494	494
494	405	323	494	345	345	109	494	323
323	345	494	494	345	530	530	323	323
323	109	405	405	345	405	405	405	405
532	530	530	530	109	530	530	405	323
405	345	530	109	323	530	530	323	323

peg no

42

Plot No 6

peg no

82

405	405	405	494	530	109	405	109	530
109	323	530	109	494	109	494	494	B
530	323	405	405	405	405	494	405	109
345	B	530	494	323	405	494	530	109
530	323	530	494	345	530	494	494	530
405	B	109	494	323	530	494	405	B
109	405	109	405	345	532	323	345	494
109	323	109	494	530	323	494	530	494
109	323	109	323	494	323	494	494	323

peg no

81

P.Radiata Improved Breeds Summer Plant Trials Gwavas S.C
Clone Family Numbers

Root trainer seedlings (Row Plots)

4m between rows

5m between trees

plot size 24m X 30m

Planted 20-21st april 1989

Plot No 1		Plot No 2	
peg no	peg no	peg no	peg no
116	117	118	112
r1		494 345 B	494 530 109
r2			
r3			
r4			
r5	B 109 323 494 109 323		
r6			
peg no	peg no	peg no	peg no
115	114	117	113

Plot No 3		Plot No 4	
peg no	peg no	peg no	peg no
119	111	102	96
r1			
r2			
r3			
r4			
r5	345 494 109 530 530 323		
r6		345 109 494 494 494 323	
peg no	peg no	peg no	peg no
118	112	101	97

Plot No 5		Plot No 6	
peg no	peg no	peg no	peg no
103	95	104	94
r1	494 530 323 494 494 323		
r2			
r3		323 494 530 323 530 494	
r4			
r5			
r6			
peg no	peg no	peg no	peg no
102	96	103	95

Plot No 7		Plot No 8	
peg no	peg no	peg no	peg no
105	93	106	92
r1			
r2			
r3		494 323 405 109 494 323	
r4	530 109 405 405 109 530		
r5			
r6			
peg no	peg no	peg no	peg no
104	94	105	93

Plot No 9		Plot No 10	
peg no	peg no	peg no	peg no
107	91	108	90
r1			

r2							
r3							
r4				494	109	530	323 494 323
r5							
r6	323	323	345	494	109	530	
peg no					peg no		peg no
106					92	107	91

Plot No 11		Plot No 12	
peg no		peg no	
109	89	110	88
r1			
r2		109 8	345 494 345 530
r3			
r4	109	323	345 345 405 530
r5			
r6			
peg no		peg no	peg no
108	90	109	89

P.Radiata Improved Breeds Winter Plant Trials Gwavas S.O
Clone Family Numbers

Root trainer seedlings
4m between rows
5m between trees
plot size 45m X 36m
Planted 3-7=July 1989

Plot No	peg no	peg no
20	21	21
r1 - 323 494 - - 405 - - 494		
r2 494 109 - 109 109 323 109 - -		
r3 109 494 109 494 - - - 494 109		
r4 - x 323 - - - - 494		
r5 - - 109 - - 494 109 109 323		
r6 - 494 494 - - 323 494 - -		
r7 - 494 323 109 - - 530 - 494		
r8 109 - - - - 323 530 405		
r9 - - 494 495 109 323 - - -		
peg no 27	peg no 26	

Plot No	peg no	peg r
42	47	47
- - 109 109 109 - 109 109 10		
- 323 494 323 - - 494 - 45		
- 405 - - - - - -		
- - 109 - - - - -		
- - - 494 - 109 - -		
494 - - 494 323 - 109 -		
- 494 109 109 - 494 - -		
- 494 - 109 494 109 - 494 -		
- 109 - - - 109 - - 10		
peg no 41	peg r 48	

Plot No	peg no	peg no
66	71	71
r1 494 - - 494 - - 530 -		
r2 109 - - - 405 109 109 530 494		
r3 - 494 - 109 109 405 - 109 -		
r4 - - - - 494 494 109 - -		
r5 - 494 109 - - - 323 109		
r6 494 494 - 109 109 494 405 109 494		
r7 - - - - 323 - - 109 323		
r8 - - - - 109 494 - 323 -		
r9 - 494 323 - 405 - 494 - 109		
peg no 65	peg no 72	

Plot No	peg no	peg r
81	84	84
494 - - - - - - -		
- 109 - 109 - - - - -		
494 494 - - - - - -		
109 - 494 109 - 109 494 109 -		
494 - 494 494 109 109 - -		
494 - - - 109 323 494 32		
- 405 - - 494 323 - - 10		
- - 109 - - - - 494 45		
- 323 - 109 - - - - 45		
peg no 80	peg r 85	

Plot No	peg no	peg no
12	13	13
r1 - - - - - 109		
r2 494 - - 109 109 - - 109 109		
r3 - 494 - 323 - - 109 -		
r4 - - 109 109 323 494 109 - 109		
r5 - - 494 - 405 - - 494 -		
r6 - 109 405 323 323 - - 530 -		
r7 - - 494 - - 494 494 - -		
r8 494 109 494 109 - - 109 -		
r9 109 494 494 - 323 - - -		
peg no 56	peg no 57	

Plot No	peg no	peg r
12	13	13
- - - - - 109 -		
- - - - 109 - 494 -		
- 109 - 494 109 494 - -		
- 494 - - 109 494 - - 45		
- 494 494 - 109 - - -		
- 109 494 - 494 - - -		
- - 109 - 323 - - 40		
- 109 - - 323 323 - -		
- - - 494 494 - 494 45		
peg no 9	peg r 8	

P. Radiata Improved Breeds Winter Plant Trials Gwavas S.O
Clone Family Numbers

Root trainer seedlings (Row Plots)

4m between rows

5m between trees

plot size 24m X 30m

Planted 3-7 July 1989

Plot No 3										Plot No 2									
peg no					peg no					peg no					peg no				
116					117					118					112				
r1					494 345 8					494 530 109									
r2 323 323 530 530 494 -					109 530 -					530 - 530									
r3																			
r4																			
r5 8 109 323 494 109 323																			
r6																			
peg no					peg no					peg no					peg no				
115					114					117					113				
Plot No 1										Plot No 12									
peg no					peg no					peg no					peg no				
119					111					102					96				
r1					530 530 530 530 109 -														
r2																			
r3																			
r4																			
r5 345 494 109 530 530 323																			
r6 - 323 530 323 530 323					345 109 494 494 494 323														
peg no					peg no					peg no					peg no				
118					112					101					97				
Plot No 11										Plot No 10									
peg no					peg no					peg no					peg no				
103					95					104					94				
r1 494 530 323 494 494 323																			
r2																			
r3					323 494 530 323 530 494														
r4																			
r5 405 323 323 530 494 109																			
r6					530 530 323 530 530 494														
peg no					peg no					peg no					peg no				
102					96					103					95				
Plot No 9										Plot No 8									
peg no					peg no					peg no					peg no				
105					93					106					92				
r1																			
r2																			
r3					494 323 405 109 494 323														
r4 530 109 405 405 109 530					494 - 530 530 - 530														
r5																			
r6 494 405 530 530 530 109																			
peg no					peg no					peg no					peg no				
104					94					105					93				
Plot No 7										Plot No 6									
peg no					peg no					peg no					peg no				
107					91					108					90				
r1 530 494 530 323 530 -					109 - 530 530 109 -														

r2									
r3									
r4					494	109	530	323	494 323
r5									
r6	323	323	345	494	109	530			
peg no					peg no			peg no	
106					92			107	91

Plot No	5				Plot No	4			
peg no					peg no				peg no
109				89	110				88
r1					109 530	109	323	323	530
r2					109 8	345	494	345	530
r3	323	530	494	323	530	323			
r4	109	323	345	345	405	530			
r5									
r6									
peg no				peg no	peg no			peg no	
108				90	109			89	

P.Radiata Improved Breeds Winter Plant Trials Tikokino 3.0
Clone Family Numbers 19.07.89

Root trainer seedlings
4m between rows
5m between trees
plot size 45m X 36m
Planted 3-7 July 1989

Plot No	peg no	peg no
14	13	9
r1	323 109 405 530 109 530 323 323 530	
r2	405 109 109 530 323 323 323 109 405	
r3	523 530 405 405 405 530 532 323 109	
r4	405 323 109 530 109 530 323 109 109	
r5	323 109 405 405 109 109 530 - 323	
r6	109 405 405 323 530 530 530 323 323	
r7	405 405 530 323 530 109 405 323 109	
r8	323 109 405 109 109 109 532 405 530	
r9	530 530 405 530 405 405 323 530 323	
peg no	peg no	
9	10	

Plot No	peg no	peg r
15	14	5
232	530 405 323 109 405 405 323 530	
405	109 405 109 405 530 109 405 109	
405	323 109 323 405 405 530 323 323	
109	405 530 405 323 405 405 323 -	
323	405 109 323 405 109 323 405 530	
405	530 405 405 405 405 109 109 530 405	
109	405 405 - 405 323 323 405 323	
323	405 530 109 530 405 405 405 109	
323	405 109 530 323 323 530 405 323	
peg no	peg r	
8	5	

Plot No	peg no	peg no
18	19	23
r1	109 109 405 323 405 405 323 405 323	
r2	323 530 532 109 405 405 109 109 405	
r3	405 405 405 350 109 109 405 530 530	
r4	530 405 405 109 405 323 323 530 405	
r5	405 x x 323 323 405 530 323 323	
r6	109 x x 323 530 109 109 109 530	
r7	323 x 405 405 405 530 323 109 323	
r8	323 109 x 323 109 405 405 405 530	
r9	109 405 530 x 530 323 530 109 530	
peg no	peg no	
23	22	

Plot No	peg no	peg r
4	62	61
530	530 405 - 532 109 109 109 532	
405	109 109 530 323 530 109 530 109	
109	109 405 405 530 323 109 530 323	
530	530 323 405 530 532 405 405 405	
530	405 109 109 405 530 530 109 323	
109	323 405 405 109 109 405 405 530	
405	109 109 323 405 109 530 405 405	
405	323 323 530 323 405 323 405 530	
323	405 323 530 323 405 405 109 530	
peg no	peg r	
42	61	

Plot No	peg no	peg no
36	46	34
r1	323 405 530 109 405 530 405 405 405	
r2	530 405 323 323 530 109 109 530 405	
r3	530 405 405 323 109 530 323 109 530	
r4	109 109 323 530 405 405 323 109 109	
r5	405 530 405 405 323 109 109 530 109	
r6	405 532 109 530 323 109 530 405 109	
r7	405 323 323 405 109 405 109 530 405	
r8	405 405 405 405 530 530 405 405 405	
r9	405 323 109 405 405 109 405 323 323	
peg no	peg no	
34	47	

Plot No	peg no	peg r
49	32	31
109	323 405 530 530 405 405 530 530	
405	109 530 323 405 405 323 530 323	
530	109 323 405 109 405 - 405 -	
323	405 405 405 323 109 530 530 405	
109	530 109 405 532 323 405 530 109	
323	323 530 530 323 109 323 323 405	
109	405 405 323 109 323 - 405 530	
323	405 530 323 405 323 109 530 405	
323	109 530 405 405 530 109 109 405	
peg no	peg r	
48	31	

3\$

P. Radiata Improved Breeds Summer Plant Trials Tikokino
Clone Family Numbers
-19.07.89

Root trainer seedlings (Row Plots)
4m between rows 5m between trees
plot size 24m X 30m
Planted 3-7 July 1989

Plot No 6		Plot No 5	
peg no	peg no	peg no	peg no
69	80	70	79
r1			
r2			
r3			
r4	405 323 109 109 323 323	345 345 494 494 323 323	
r5		405 323 405 109 109 109	
r6	345 345 494 323 494 109		
peg no	peg no	peg no	peg no
68	81	69	80

Plot No 4		Plot No 3	
peg no	peg no	peg no	peg no
71	78	72	77
r1		530 323 109 405 323 405	
r2	530 323 530 109 494 109		
r3		109 405 405 109 405 530	
r4			
r5			
r6	530 323 405 530 323 323		
peg no	peg no	peg no	peg no
70	79	71	78

Plot No 2		Plot No 1	
peg no	peg no	peg no	peg no
73	76	74	75
r1			
r2	323 109 530 109 109 530	323 530 530 405 405 405	
r3			
r4			
r5			
r6	405 323 405 530 494 109	405 405 109 530 405 323	
peg no	peg no	peg no	peg no
72	77	73	76

Plot No 7		Plot No 8	
peg no	peg no	peg no	peg no
75	88	76	87
r1	530 345 530 323 530 530		
r2			
r3		109 109 405 323 530 405	
r4	530 405 405 109 109 109		
r5			
r6		323 405 405 109 405 323	
peg no	peg no	peg no	peg no
76	87	77	86

Plot No 9		Plot No 10	
peg no	peg no	peg no	peg no
77	86	78	85

r1
r2
r3 109 323 109 530 323 530
r4
r5 345 494 530 494 530 345
r6

530 323 530 109 323 530
405 494 345 E 109 323

peg no	peg no	peg no	peg no
78	85	79	84

Plot No 11

Plot No 12

peg no	peg no	peg no	peg no
79	84	80	83

r1
r2 345 494 530 323 109 494
r3
r4
r5 405 405 323 109 323 323
r6

345 323 323 109 494 323
530 109 109 323 405 530

peg no	peg no	peg no	peg no
80	83	81	82