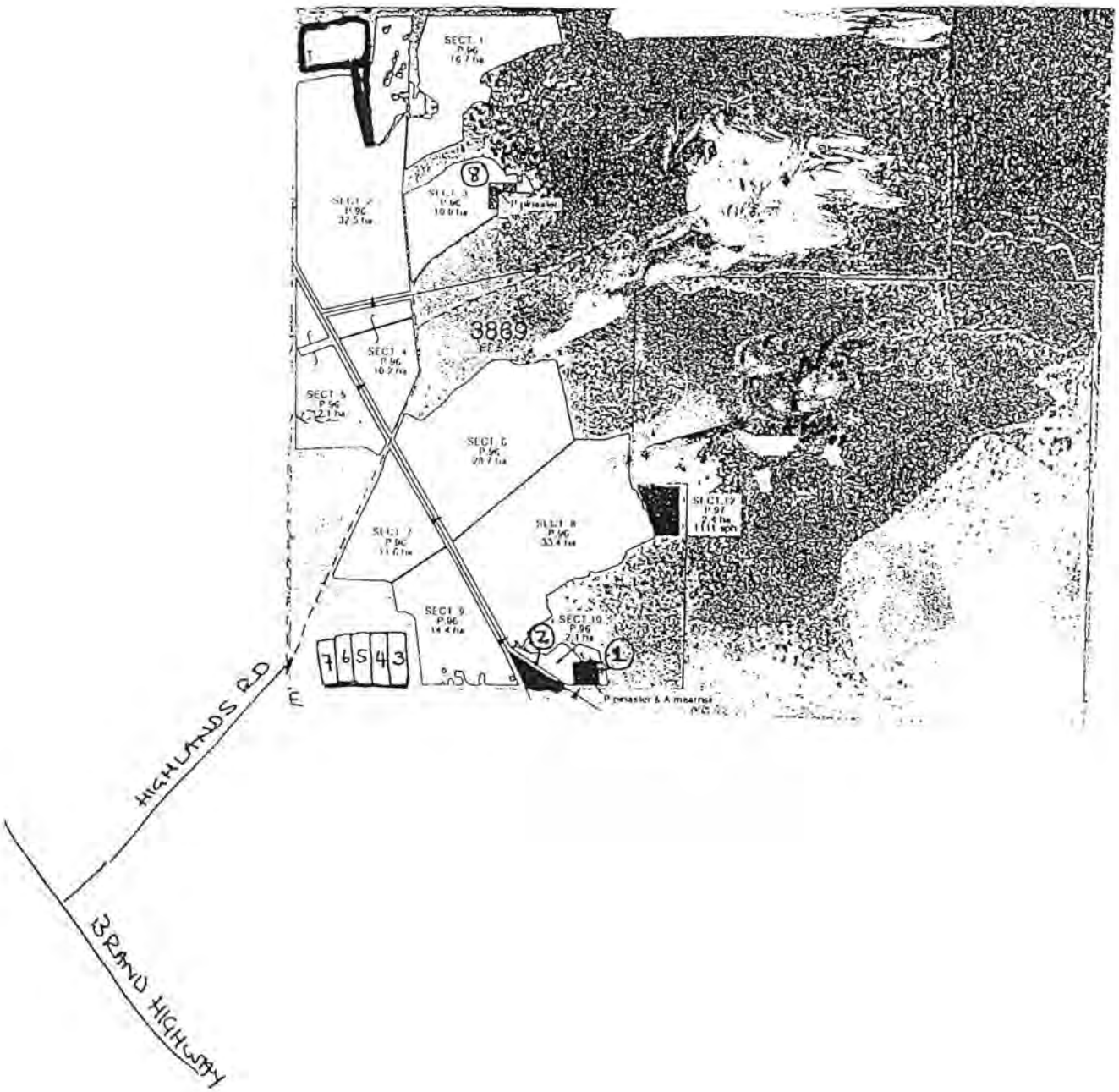
Genetic Deployment Unit
Research trials
at Panara Farm, Gingin
(Mr Winton)

Location of trials at Panara



1. P96 *Pinus pinaster* and *Acacia mearnsii* mixed planting

One trial of a series of 9 trials

Objectives:

- To test the growth performance of containerised *P.pinaster* on a wide range of sites North of Perth
- To test the growth performance of *A.mearnsii* on a wide range of sites North of Perth
- To test the combing ability of *P.pinaster* and *A.mearnsii* on their growth performance.
- To test the provenance performance of *A.mearnsii*

Material included:

Pinus pinaster grown in the Ropak tray.
10 provenance's of *A.mearnsii*

Trial establishment:

8 sites were established through the planting season of 1996
They are:

- Norm Green –Merrivale
- Bill Vogan- off Lancelin highway
- Christine Morrison – near Gingin Brook Rd
- Wintons –Panara
- Noel Monks – near Dandaragan
- John Harper – Velyere – near Dandaragan
- Muresk College
- Hennings – near Dandaragan

Trial design:

Pinaster	Pinaster: Acacia 1:1
Acacia provenance's 10 8 4 6	Pinaster : Acacia 1:4

Road fence

The trial was planted in the format of 1664 stems per hectare

- The Pinaster plot is a pure stand of containerised seedlings
- The A.mearnsii pure stand is sub-divided into 4 provenance's
- The mix of 1 acacia : 4 pinaster is to test the practice of the extraction row being A.mearnsii instead of Pinaster for productivity
- The mix of 1 acacia: 1 pinaster is to test the additive effects of the nitrogen fixing of acacia on pinaster growth.

2. P98 Low rainfall hybrid trial

Objectives:

- To test the growth performance of two different *E.globulus x E.camadulensis* hybrid families with the controls of out-crossed *E.globulus* and *E.camaldulensis.*
- To test the growth performance of the three different *E.grandis x E.camaldulensis* hybrid families with the control of out-crossed *E.camaldulensis.*
- To test the growth performance of *E.camaldulensis* tissue cultured material compared to seedling material.
- To determine in-breeding depression of *E.camaldulensis* by comparing the performance of the control pollinated out-crossed *E.camaldulensis* with selfed and open pollinated sources.

Material included:

- *E.globulus x E.camaldulensis* hybrid (seedlings)
- *E.camaldulensis x E.grandis* hybrid (rooted cuttings)
- Control pollinated out-crossed *E.camaldulensis* (seedlings and tissue culture)
- Control pollinated selfed *E.camaldulensis* (seedlings)
- Open pollinated *E.camaldulensis* (seedlings and tissue culture)
- Control pollinated out-crossed *E.globulus* (seedlings)

Trial establishment:
2nd July 1998 and in-filled on 24th August 1998.

Trial design:
24 individuals divided into 8 replicates of a 3 tree row plot represent each treatment.
The beginning of each plot is surrounded by a two-tree row.
The trial surrounds consist of tissue culture and seedling *E.camaldulensis.*

		Rep 4
		Rep 3
Rep 8	Rep 6	Rep 2
Rep 7	Rep 5	Rep 1

Fence line

3. P98 Minicutting trial 1

Objectives:

- To observe the overall performance of minicuttings in plantation establishment.
- To test the effect of different nursery media on survival and growth of the minicuttings.
- To test the effect of different concentrations of the auxin rooting hormone, indolebutyric acid (IBA) on survival and growth.
- To observe the effect of environment on survival and growth performance.

Material included:

The trial included 40 treatments combining both the different media and various concentrations of the auxin-rooting hormone, indolebutyric acid (IBA). The cuttings from each of the four environments were allocated to a replicate.

Media/hormone conc.	Control	0.1 mg/l IBA	0.8 mg/l IBA	1.6 mg/l IBA	2.4 mg/l IBA
100 Vermiculite	1	2	3	4	5
50 PB:50 sand	6	7	8	9	10
70 perlite:30 peat	11	12	13	14	15
50 vermiculite:50 PB	16	17	18	19	20
50 sawdust:50 sand	21	22	23	24	25
70 PB:30 sand	26	27	28	29	30
70 PB: 30 peat	31	32	33	34	35
100 PB	36	37	38	39	40

Summary of nursery results:

(Table below)
Best media identified as pinebark: peat 70:30
Best rooting hormone treatment: 0.1 mg/l IBA
Further discussions on nursery results will be presented tomorrow.

Trial establishment:

3rd July 1998

Summary of mini-cutting results experiment 1

Assessment date	8/12/97					4/5/98				Laboratory analysis 20/5/98											
Environment	Survival (%)	rank	Height (mm)	rank	Maturation	Survival (%)	rank	Height (mm)	rank												
Bench	99.2	1	67.78	4	2.38	98.2 a	1	103.89 c	4												
Shadehouse	98.3	2	74.41	3	1.94	96.9 a	2	137.84 a	1												
Greenhouse 6 weeks	92.7	4	85.01	2	2.27	90.8 b	3	134.03 ab	2												
Greenhouse 4 weeks	93.8	3	86.66	1	2.22	90.9 b	4	127.08 b	3												
IBA conc effect	Survival (%)	rank	Height (mm)	rank	Maturation	Survival (%)	rank	Height (mm)	rank	fresh mass (g)		dry mass (g)		Rt:Sh fresh mass		Rt:Sh dry mass		Root #		Root distr	
0.1 mg/l IBA	98.1	1	81.46	2	2.24	97.5 a	1	131.2 a	1	12	b	3.3	b	0.77	b	0.67	c	3.28	a	0.75	ab
0.8 mg/l IBA	98.1	1	73.41	4	2.12	95.5 a	3	123.4 a	4	12.9	ab	3.5	b	0.81	a	0.71	b	3.15	a	0.75	ab
1.6 mg/l IBA	94.3	3	79.49	3	2.19	91.7 b	4	131 a	2	13	ab	3.8	ab	0.82	a	0.73	ab	2.87	a	0.52	b
2.4 mg/l IBA	91.6	4	85.43	1	2.28	90.3 b	5	129.9 a	3	15.1	a	4.3	a	0.84	a	0.76	a	3.37	a	0.94	a
Control - 0	97.9	2	72.55	5	2.18	96.1 a	2	113 b	5	12.6	b	3.4	b	0.84	a	0.74	ab	2.91	a	0.52	b
Media influence	Survival (%)	rank	Height (mm)	rank	Maturation	Survival (%)	rank	Height (mm)	rank	fresh mass (g)		dry mass (g)		Rt:Sh wt		Rt:Sh dry mass		Root #		Root distr	
Vermiculite	97.8	2	74.83	6	2.08	97.8 a	1	127.78 a	6	12.31	bcd	3.2	cd	0.85	a	0.74	ab	2.95	ab	0.1	b
PB:peat 70:30	97.7	3	76.12	5	2.14	97.7 a	2	134.98 a	2	13.84	abc	3.6	c	0.85	ab	0.73	ab	3.65	a	0.78	a
PB:Vermiculite 50:50	97.8	2	85.33	1	2.35	95.5 ab	3	128.85 a	4	14	abc	3.7	bc	0.84	ab	0.72	abc	2.9	ab	0.68	a
PB:sand 70:30	95.6	5	83.59	2	2.2	94.7 bc	4	135.12 a	1	15.19	ab	4.7	a	0.75	c	0.69	bc	3.2	ab	0.83	a
Sawdust:sand 50:50	95.9	4	69.74	8	2.25	94.5 bc	5	93.54 b	8	10.58	d	3.4	cd	0.83	ab	0.77	a	3	ab	0.62	a
PB:sand 50:50	94.1	6	82.78	3	2.26	92.7 cd	6	128.51 a	5	12.25	cd	3.7	bc	0.8	b	0.73	abc	3.2	ab	0.73	a
Perlite:peat 70:30	98.8	1	82.23	4	2.24	91.4 de	7	126.96 a	7	10.73	d	2.7	d	0.82	ab	0.68	c	2.65	b	0.83	a
Pinebark	93.1	7	73.12	7	2.1	89 e	8	129.94 a	3	16.01	a	4.6	ab	0.81	b	0.73	ab	3.7	a	0.99	a

Trial design:
16 individuals divided into 4 replicates of a 2 x 2 plot represent each treatment.
The beginning of each plot is surrounded by a two-tree row.
The trial surrounds consist of open-rooted seedlings.

Rep 1		Rep 2		Rep 3		Rep 4	
1	21	23	11	30	26	32	17
2	22	27	32	39	8	34	23
3	23	6	22	17	35	39	1
4	24	18	5	37	40	13	14
5	25	33	19	24	4	27	7
6	26	12	7	11	15	37	21
7	27	1	24	7	20	8	11
8	28	14	3	29	1	31	3
9	29	39	37	21	27	15	18
10	30	31	13	34	16	2	29
11	31	40	28	3	10	20	5
12	32	25	35	28	12	24	9
13	33	2	15	6	31	40	22
14	34	17	30	25	19	6	12
15	35	4	9	33	2	19	26
16	36	36	21	13	23	10	33
17	37	38	26	36	9	36	38
18	38	29	16	5	14	25	16
19	39	10	34	32	38	28	30
20	40	20	8	22	18	4	35

4. P98 Minicutting trial 2

Objectives:

- To observe the overall performance of minicuttings in plantation establishment
- To test the effect of cutting length on survival and growth of the minicuttings
- To test rooting environment on survival and growth of minicuttings.

Material included:

The trial included 6 treatments combing both the length of the cutting at setting and the rooting environment.

	Greenhouse	Shadehouse
3 - 4 cm long	1	2
4 - 5 cm long	3	4
5 - 6 cm long	5	6

Summary of nursery results:

(Table below)
Best shoot length for survival: 3-4 cm
Best shoot length for growth: 5-6 cm
Best environment for survival and growth: shadehouse
Further discussions on nursery results will be presented tomorrow

Trial establishment:

3rd July 1998

Trial design:

64 individuals divided into 4 replicates of a 4 x 4 block represent each treatment
The beginning of the trial is surrounded by a two-tree row.
The trial surrounds consist of open-rooted seedlings.

Rep 1	Rep 2	Rep 3	Rep 4
1	3	6	4
2	5	3	1
3	4	5	6
4	1	2	5
5	6	4	2
6	2	1	3

Summary of mini-cutting results experiment 2

Assessment Date:	12/08/97					4/05/98				Laboratory assessment 20/5/98											
Environment	Survival (%)	rank	Height (mm)	rank	Maturation	Survival (%)	rank	Height (mm)	rank	Fresh mass (g)		Dry mass (g)		Rt:Sh dry mass		# roots		root distr	
Shadehouse	99.03	1	33.87	1	1.698	91.02 b	1	55.88 a	1	8.6	a	2.4	a	0.69	a	2.8	a	0.34	a
Greenhouse	89.03	2	27.05	2	1.327	73.26 a	2	45.13 b	2	10.2	a	3	a	0.67	a	2.3	a	0.17	a
Length cut (cm)	Survival (%)	rank	Height (mm)	rank	Maturation	Survival (%)	rank	Height (mm)	rank	Fresh mass (g)		Dry mass (g)		Rt:Sh dry mass		# roots		root distr	
3 - 4	97.29	1	24.3	3	1.5444	87.78 b	1	45.13 b	3	9.05	a	2.55	a	0.72	a	2.5	a	0.26	a
4 - 5	94.58	2	29.5	2	1.573	83.53 b	2	46.61 b	2	10.3	a	2.95	a	0.67	ab	2.75	a	0.52	a
5 - 6	90.21	3	37.59	1	1.421	75.12 a	3	59.79 a	1	8.8	a	2.6	a	0.65	b	2.37	a	0	a
Width of cutting	Survival (%)	rank	Height (mm)	rank	Maturation	Survival (%)	rank	Height (mm)	rank										
>3mm	91.25	2	34.43	1	1.491	82.77 a	1	50.22 a	2										
<3mm	96.81	1	26.5	2	1.534	81.51 a	2	50.79 a	1										
Transport system	Survival (%)	rank	Height (mm)	rank		Survival (%)	rank	Height (mm)	rank										
Plastic bag	95.42	1	28.71	3		84.44 a	1	48.34 a	3										
Bucket benylate	93.33	2	30.65	2		81.18 a	2	50.42 a	2										
Bucket water	93.33	2	32.04	1		80.79 a	3	52.76 a	1										

5. P98 Minicutting trial 3

Objectives:

- To observe the overall performance of minicuttings in plantation establishment
- To compare the survival and growth of *P.pinaster* cuttings set at different times
- To compare different sources of mother plant material.

Material included:

#	Date set	source of cuttings	Type of cutting	media	Hormone	# trays	Tray type
1	26-27/6/97	potted mother plants	tip cutting	SD7/S3	0	4	Colmax64
2	20-27/5/97	plot 7 serial # 96117SA	side shoot	SD5/S5	0	399	Colmax64
3	11/07/97	potted mother plants	tip cutting	SD7/S3	0	82	Colmax64
4	11/07/97	plot 10 serial # A94256	tip cutting	SD7/S3	0	123	Colmax64
5	30/09/97	potted mother plants	tip cutting	SD7/S3	0	1116	Colmax64
6	10/11/97	plot 10 serial # A94256	tip cutting	SD7/S3	0	99	Bcc81
7	6 - 2/11/97	potted mother plants	tip cutting	SD7/S3	0	113	Bcc81

Laboratory results:

#	Month set	MP source	Shoot length (mm)	# roots	% even distribution of roots	Stem fresh mass (g)	Root fresh mass (g)	Stem dry mass (g)	Root dry mass (g)	Shoot: root ratio
2	May	Field	192	3.57	85.7	7.89	6.57	2.73	1.99	1.72
1	June	Pot	116	4.0	85.7	8.08	14.12	2.74	5.24	0.53
3	July	Pot	102	2.85	71.42	5.20	9.07	1.67	2.88	0.70
4	July	Field	92	2.57	57.14	6.4	9.41	2.40	4.26	0.61
5	Sept	Pot	111	4.14	57.14	4.10	3.27	1.28	0.86	1.68
6	Nov	Field	40	2.71	100	1.50	1.13	0.43	0.22	1.96
7	Nov	Pot	56	4.85	85.7	2.21	1.88	0.64	0.36	1.87
Avg			*101*	*3.5*	*77.5*	*5.12*	*7.05*	*1.70*	*2.26*	*1.29*

Trial establishment:

3rd July 1998

Trial design:

63 cuttings divided into 4 replicates of a 3 x 3 block represent each treatment. The beginning of the trial is surrounded by a two-tree row. The trial surrounds consist of open-rooted seedlings.

Rep 1	Rep 2	Rep 3	Rep 4
1	6	3	4
2	5	7	1
3	7	5	6
4	1	6	5
5	4	2	7
6	3	4	2
7	2	1	3

6. P98 Tray trial

One of three trials

Objectives:

- To compare the survival and growth of *P.pinaster* cuttings in 2 different trays compared to the open-rooted system
- To compare the survival and growth of *P.pinaster* seedlings in 7 different trays compared to open-rooted system.
- To compare the performance of seedlings compared to rooted cuttings in containers
- To compare the performance of seedlings compared to cuttings from the open-rooted system.
- To compare growth performance across three sites: a good site, average and low productivity

Material included:

Trial treat #	Plant material type	Tray name	Tray Length (cm)	Tray Width (cm)	Tray Depth (cm)	Cell size (cm)	Cell vol (cm3)	Cells/ m2	# cells per tray	Media vol per tray	Side slits	Root trainer ridges	Cell base
1	seedlings	BCC 81F	38.5	38.5	8.5	4.0*4.0	100	545	81	8100	yes	yes	cross
2	seedlings	LANNEN 121F	38.5	38.5	7.3	3.4*3.4	50	820	121	6050	yes	yes	circle
3	seedlings	LANNEN 81F	38.5	38.5	7.3	4.1*4.1	85	549	81	6885	yes	yes	circle
4	seedlings	LANNEN 64F	38.5	38.5	7.3	4.6*4.6	115	434	64	7360	yes	yes	circle
5	seedlings	AIRBLOCK 410	60	35.5	10.5	3.4*3.4	80	526	112	8960	yes	yes	circle
6	seedlings	COLMAX 64	34.4	29.2	5.2	3.4*3.4	45	637	64	2880	no	yes	circle & cross
7	seedlings	LANNEN 63F	40	30	9	4.3*4.1	90	539	63	5670	yes	yes	cross
8	seedlings	OPEN ROOTED											
9	cuttings	BCC 81F	38.5	38.5	8.5	4.0*4.0	100	545	81	8100	yes	yes	cross
10	cuttings	COLMAX 64	34.4	29.2	5.2	3.4*3.4	45	637	64	2880	no	yes	circle & cross
11	cuttings	OPEN ROOTED											

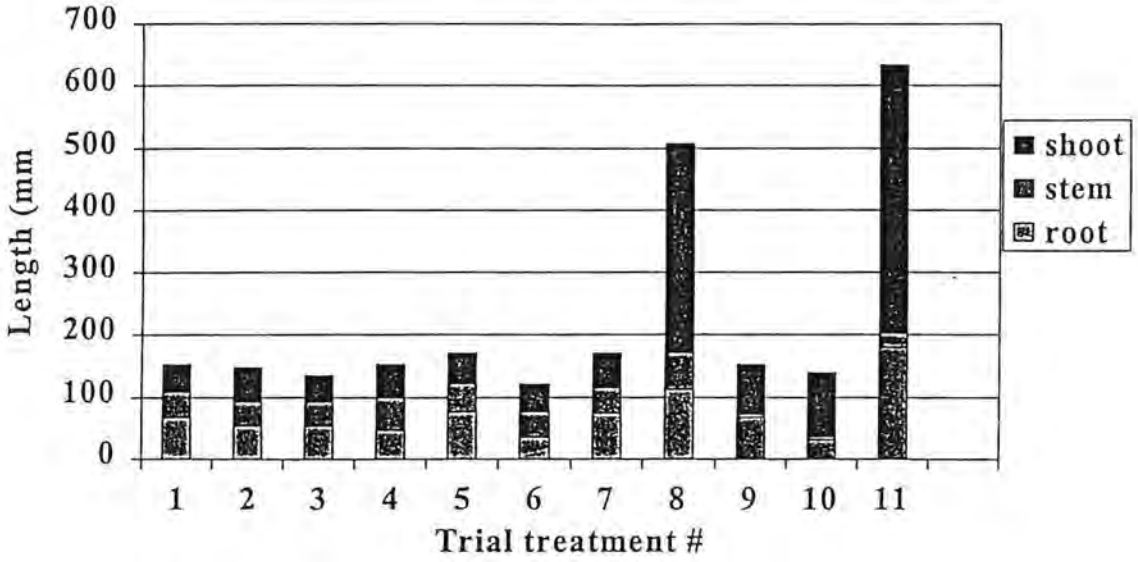
Laboratory results:
Set of graphs attached

Trial establishment:
Beverly site (Shaws): 15/7/98
Wickepin site (Eastons): 8 and 9/7/98
Gingin site (Wintons): 3/7/98

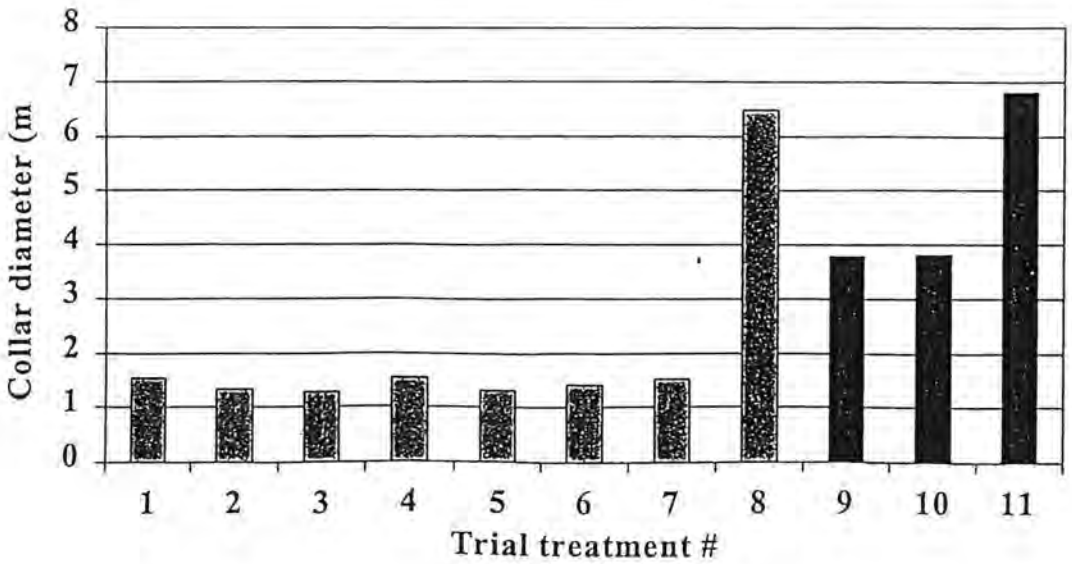
Trial design:
80 plants of each of the 11 treatments were designed into a trial so that each treatment had a 16 plant block (4 x 4) replicated 5 times.

Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
1	3	4	9	5
2	7	8	5	10
3	9	7	11	4
4	6	10	8	2
5	10	1	7	11
6	8	11	4	9
7	2	5	6	1
8	4	6	10	3
9	11	2	3	8
10	5	9	1	7
11	1	3	2	6

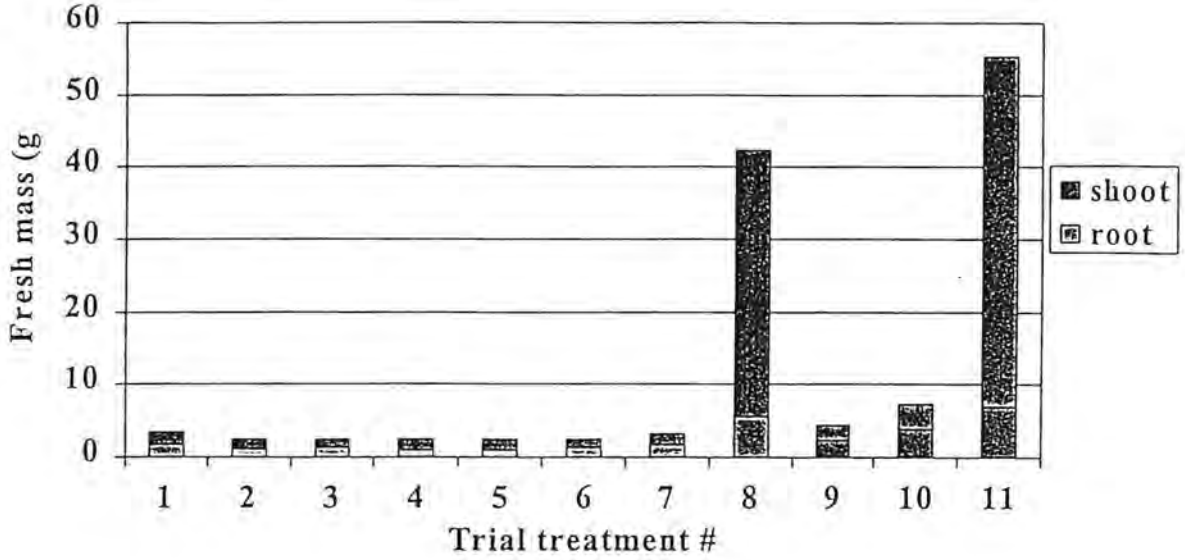
Tray trial:
seedling/cutting length at planting



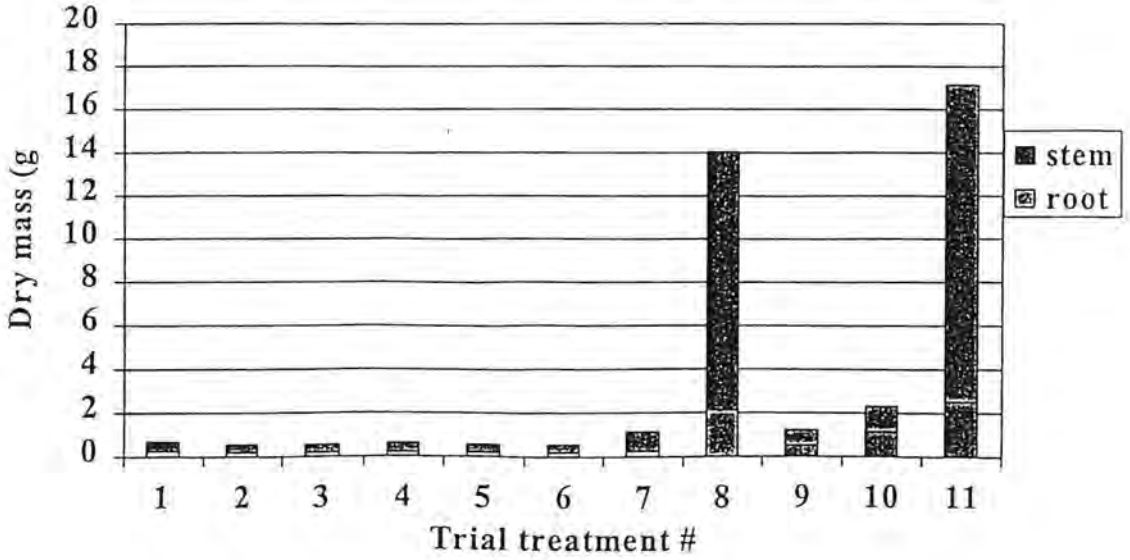
Tray trial:
seedling/cutting collar diameter at planting



Tray trial:
seedling/cutting fresh mass at planting



Tray trial:
seedling/cutting dry mass at planting



7. P98 *E.occidentalis* family breeding trial

One of two trials

Objectives:

- To strengthen our relationship with the CSIRO, Australian Tree Seed Centre
- To investigate another species that can adapt to low rainfall and salt-contaminated lands
- To establish a breeding base for this species

Material included:

107 families of E.occidentalis were sown with 6 other seedlots of other species established as comparisons. The seed was sown in two lots; those collected by our own Seed Centre and then the other seed from CSIRO, which was received a little late. A tray (64) of each seedlot was sown.

The material was assessed late May and it was decided that two trials could be planted. The trial that included more of the families was established at Wickepin and the remainder of the material planted at Gingin.

Trial establishment:

Gingin 3rd July 1998

Wickepin 8th and 9th July 1998 – poor weed control

Trial design:

Gingin

This trial includes 32 families represented by 18 trees divided into 6 replicates of a 3 tree line plot.

Wickepin

This trial includes 100 families represented by 21 trees divided into 7 replicates of a 3 tree line plot.

8. P96 *Pinus pinaster* Propagation trial

Objectives:

- To compare the survival and growth of *Pinus pinaster* open rooted seedlings, open rooted cuttings and containerised seedlings.
- Two different media were compared in the containerised system, pinebark and sand 70:30 and sawdust and sand 60:40.
- Cuttings taken from the apical tip and side shoot were compared.
- Seedling topped and kept whole were compared.

Material included:

The material for the cuttings was taken from open-rooted seedings in the nursery which were 9 months old. The genetic source of the seedlings is unknown. Two types of material were harvested from the seedlings, the seedling tops and the non-dominant side fascicle shoots. These were set into an open rooted bed with a spacing of 20cm x 7.5cm. Approximately 2000 cuttings were set on 12th June, 1995, and eventually undercut and lateral cut.

The open rooted seedlings were raised using normal nursery procedure. They were sown in September, 1995, treated with insecticides and fungicides, and fertilised regularly.

The containerised seedlings were planted in Ropak root training trays in October. Two different types of media were used: the standard nursery mix of composted sawdust and sand 60:40 and a mixture of pine bark and sand 70:30. Both media had the standard fertiliser mix added.

Trial establishment:

Planted July 1996

3 sites:- Mission (fire destroyed trial), Dormans (clay soils - died), and Panama (survived after heavy insect attack)

Measured 18/5/97

Trial design:

There are sixty trees in each of 6 treatments which are planted in lines randomised within five replicates.

Rep1	Rep2	Rep3	Rep4	Rep5
3	2	5	1	4
5	6	3	2	1
1	3	4	5	6
6	5	2	4	3
2	4	1	6	5
4	1	6	3	2

1. Open Rooted Cuttings
2. ORC - non dominant Fascicle Cuttings
3. Open rooted seedlings - not topped
4. ORS - topped
5. Containerised seedlings, standard media
6. Containerised seedlings. Pine bark media

Summary
Pinaster propagation trial P96 - Panama
Trial planted 16/7/96
1st measurment 18/5/97 (10 months)

DEATH								DEATH							
	REP 1	REP 2	REP 3	REP 4	REP 5	AVERAGE			REP 1	REP 2	REP 3	REP 4	REP 5	AVERAGE	
ors	13.46	9.62	11.32	3.7	7.27	9.07		ors	13.46	9.62	11.32	3.7	7.27	9.07	
ors-top	47.06	19.23	15.09	14.81	18.52	22.94		ors-top	47.06	19.23	15.09	14.81	18.52	22.94	
orc-tip	28.57	26.92	26.92	15.09	13.21	22.14		orc-tip	28.57	26.92	26.92	15.09	13.21	22.14	
orc-side	57.14	52.94	9.26	36.59	25	36.19		orc-side	57.14	52.94	9.26	36.59	25	36.19	
c-stdm	71.43	57.14	27.66	33.33	33.33	44.58		c-stdm	71.43	57.14	27.66	33.33	33.33	44.58	
c-pb	61.36	47.73	29.55	29.41	22.92	38.19		c-pb	61.36	47.73	29.55	29.41	22.92	38.19	
AVERAGE	46.5	35.6	19.97	22.16	20.04			AVERAGE	46.50	35.60	19.97	22.16	20.04		
GROWTH	(HT in	cm)						GROWTH	(HT in	cm)					
	REP 1	REP 2	REP 3	REP 4	REP 5	AVERAGE			REP 1	REP 2	REP 3	REP 4	REP 5	AVERAGE	Difference
ors	36.53	43.53	41.89	40.35	39.51	40.36		ors	94.24	105.60	103.00	101.40	97.24	100.30	59.93
ors-top	30.48	38.86	38.20	33.43	32.20	34.63		ors-top	80.15	95.43	92.58	89.17	85.64	88.59	53.96
orc-tip	41.94	40.76	33.11	31.78	38.41	37.20		orc-tip	102.10	96.55	87.84	84.09	94.61	93.04	55.84
orc-side	41.24	35.63	36.06	30.92	36.15	36.00		orc-side	84.43	83.54	85.02		89.40	85.60	49.60
c-stdm	35.92	30.00	29.94	25.64	25.57	29.41		c-stdm	83.17	80.53	81.97	79.39	76.68	80.35	50.93
c-pb	32.65	37.96	30.81	34.89	32.95	33.85		c-pb	74.18	90.26	78.77	87.00	83.89	82.82	48.97
AVERAGE	36.46	37.79	35.00	32.84	34.13			AVERAGE	86.38	91.99	88.20	88.21	87.91		
	2	1	3	5	4				5	1	3	2	4		