1990

Central wheatbelt grain legume development extension program : fieldpeas and lupins

E E. Rowley
Department of Agriculture and Food, Western Australia

I Pritchard
Department of Agriculture and Food, Western Australia

FINAL REPORT

Central Wheatbelt grain legume development extension programme fieldpeas and lupins

(W/06/093/W)

STATE WHEAT INDUSTRY RESEARCH
COMMITTEE OF WESTERN AUSTRALIA

DEPARTMENT OF AGRICULTURE
WESTERN AUSTRALIA

MR E.E. ROWLEY
MR I. PRITCHARD

FINAL REPORT
WHEAT INDUSTRY RESEARCH COMMITTEE OF WESTERN AUSTRALIA

PROJECT NUMBER: W/06/093/W

ORGANIZATION: Western Australian Department of Agriculture
Avon Districts Agriculture Centre,
Northam, Western Australia, 6401.

PROJECT TITLE: Central wheatbelt grain legume development extension programme fieldpeas and lupins.

PROJECT LOCATION: Avon Districts Agriculture Centre,
Northam, Western Australia.

PROJECT SUPERVISOR: Mr. E.E. Rowley, Regional Manager, Central Region,
Avon Districts Agriculture Centre, Northam.

PROJECT OFFICER: Mr. I. Pritchard, Avon Districts Agriculture Centre, Northam.

DATE OF COMMENCEMENT: July 1 1987

DATE OF COMPLETION: December 31 1990

AIM OF PROJECT:

The project aims to:

1) Collect integrate and extend to advisers, farmers and industry representatives technical information on field pea growing systems to optimize profit and reduce new enterprise failure risks.

2) Collect market and process information (prices and demand) for all types of field pea products, and to advise industry representatives and growers on the best options for the continued development of the field pea industry.

3) Identify areas within the field pea industry which require immediate research and industry action.

4) Conduct a field research programme on field pea agronomy within the central medium and high rainfall areas of the W.A. wheatbelt.

SUMMARY OF PROJECT ACHIEVEMENTS
July 1 1987 - December 31 1990

Extension Activities

From the commencement of the project in 1987 to December 1990 over 3000 contacts with farmers had been made through the following extension activities:
NB "Contacts" - The attendance by farmers to a field day/seminar at which a paper/discussion topic was presented or the one to one communication of advice by phone, farm visit.

* Western Australian Farmers Federation, Australian Wheat Board and Grain Pool of Western Australia seminars.
* Agricultural shows - Perth Royal Show, Dowerin Machinary Field Days.
* Agriculture Research Station Field Days
* Field walks - field day.
* Technical updates.
* Individual farmer contact - letters, phone calls, farm visits.

Field Pea Bulletin

The initiation and production of an information bulletin specifically for the field pea industry - "The Field Pea Bulletin." The bulletin is mailed directly to field pea growers, industry representatives, agricultural consultants and Western Australian Department of Agriculture personnel via a field pea data base and subsequent mailing list. Names and details of field pea growers being obtained from grower meetings, industry sources and Western Australian Department of Agriculture district offices.
Eighteen editions of the field pea bulletin were published from its inception in 1988 to December 1990 and distributed via the field pea database and subsequent mailing list.
In this time the mailing list has grown from 156 farmers (35 first year growers in 1989) to 203 farmers (49 first year growers in 1990), 37 agricultural consultants or consultant firms and 83 Western Australian Department of Agriculture personnel.

Subject areas included:
(i) Paddock Preparation for Harvest.
(ii) Weed Control.
(iii) Early Insect Control.
(iv) Identification and Control of Field Pea Diseases.
(v) Field Pea Market Outlook.
(vii) Field Pea Market Development.
(viii) Field Pea Stubble Management.
(ix) Field Pea Variety Recommendations.
(x) Seeding Rates and Depth for Field Peas.
(xi) Farmer Viewpoints.
(xii) Field Pea Harvesting.
(xiiv) Pea Weevil Control.
(xiv) Field Pea Rotations.

Field Pea Bulletin contd.

Articles from the field pea bulletin were utilized by the agricultural industry as:

(i) Rural media articles - Elders Weekly, Countryman, Western Farmer and Grazier, Kondnin Farm Improvement Group and local rural papers.
(ii) Western Australian Department of Agriculture Ag Memo Articles.
(iii) Statewide radio interview topics with regional ABC stations and local radio topics with commercial radio stations.

Farm notes

Since 1987 all current field pea farmnotes have been updated and a series of farmnotes on field pea agronomy have been produced.

1. Time of sowing field peas, I. Pritchard. Farm note 7/90 (Agdex 166/22).
2. Outlook for field peas, G. Annan. Farmnote 32/90 (Agdex 166/860).
3. Field pea varieties, T. Khan and G. Brown. Farmnote 122/89 (Agdex 166/30).
4. Paddock selection for field peas, R. French and I. Pritchard. Farmnote 37/90 (Agdex 166/20).
5. Fertilizers for field peas, G. Walton. Farmnote 133/89 (Agdex 166/540).
6. Weed control in field peas, D. Gilbey, D. Brown, D. Bowran and I. Pritchard. Farmnote 31/90 (Agdex 166/640).
7. Diseases of peas, M. Barbetti, T. Khan and R. Floyd. Farmnote 21/89 (Agdex 166/633).
8. Insect control in field peas, D. Hardie. Farmnote 127/89. (Agdex 166/622).
9. Harvesting field peas, E. Blanchard and W. Horwood. Farmnote 34/90 (Agdex 166/50).
10. Paddock preparation to avoid pea harvesting problems, R. Doyle. Farmnote 7/87 (Agdex 166/51).
11. Control of peas and lupins in cereals, J. Peirce. Farmnote 28/90 (Agdex 110/642).
12. Introducing sheep to pea stubbles, P. Metcalfe and R. Jacob. Farmnote 12/88 (Agdex 430/60).

Information and Extension Packages

Pea-weevil Extension Package

In conjunction with the entomology branch of the Western Australia Department of Agriculture a totally integrated media and information package on pea weevil life cycle and control methods was produced in 1988.

The package consisted of:

(i) Information on the identification and control of pea weevil.
(ii) 35 mm slides on the identification and control of pea weevil.
(iii) Glass resin pea weevils to aid identification of the insect in the field.
(iv) VHS video 'The Pea-weevil Threat'.
(v) Pea weevil life cycle and chemical control poster.
(vi) Sweep net.

The package was distributed to all Western Australian Department of Agriculture district offices and made available to all farm merchandise stores throughout Western Australia.

Information and Extension Packages contd.

1990 Autumn Extension Package
Information and extension packages were produced during 1989 and distributed to all wheatbelt Western Australian Department of Agriculture district offices for use in their 1990 autumn extension campaigns. The information and extension packages were also made available to all agricultural consultants.

Trial Programmes

Field Pea Agronomy
A series of agronomic trials investigating the interactions between field pea varieties, sowing date, density and disease severity were conducted throughout the West Australian central wheatbelt from 1987- 1989. Collaborative trials on varieties, weed control, insect control and rotational benefits were also conducted state wide. Much of the data generated from these trials forms the basis for current field pea packages, recommendations and farm notes. Details and results of these trials may be found in Appendix 1.
In 1990 13 farmer demonstrations examining the effectiveness of the chemical Pursuit® were conducted in the Northam, Katanning, Lake Grace, Merredin, Moora and Geraldton advisory districts. The demonstrations were also used to examine the various field pea production systems in the advisory districts. Each demonstration site being visited at least twice during the growing season.

Dupont Grant
In 1988 the Grains Council of Australia administered Dupont Grant was secured for three years to practically demonstrate the "Implementation of an integrated Pea Weevil Pest Management System under High Pest Incidence".

1988
In conjunction with the entomology branch of the Western Australian Department of Agriculture a totally integrated media and information package on pea weevil life cycle and control methods was produced in 1988. See Information and Extension Package section.
Attended the 1988 Grain Legume Research Council National Pea Weevil Workshop.

1989
A total of 11 properties (12 field pea crops) were used in the 1989 research project.

(i) Large demonstration blocks using previous findings from GLRC replicated trial work in 1987 and 1988 and from research groups in South Australia and Victoria.

(ii) Replicated plot work comprising chemicals and formulations, use of multiple versus single sprays, time of spray application and application methods for the control of pea weevil and native budworm in field peas.

Dupont Grant contd.

1990
Attended Grain Legumes Research Council National Pea Weevil Work shop, May 9-10 in Melbourne 1990. Four scientific papers were presented at the workshop in conjunction with Dr. P. Michael of the Western Australian Department of Agriculture entomology branch which have subsequently been published in the proceedings of the National Pea Weevil Workshop edited by A.M. Smith.
1990 Research:
(i) Replicated plot work examining the persistence and biological activity of insecticides on pea weevil. 1 - property.
(ii) Replicated plot work examining the verification of spray thresholds for pea weevil control 6 - properties.
(iii) Monitoring of field pea crops for pea weevil and heliothis. 14-15 properties.

A copy of the final report on the Grain Legumes Research Council Project ;
No#: DAW 25G 68/2501. "The Control of Pea Weevil and Native Budworm in Field Peas." is available from the Western Australian Department of Agriculture or the Grain Legumes Research Council(GRDC WA state committee).

Research Co-ordination

1989 Field Pea Survey.
A statewide postal survey of field peas growers was conducted in February and March 1989 via the field pea bulletin.
The aims of the survey were to:
(i) Provide a means by which the future direction of extension and research could be indicated through the level of response and feedback from farmers.

(ii) Measure the current level of awareness and knowledge among farmers on field peas. An indication of the current level within the WA field pea industry is that the majority of growers presently (89%) have less than 4 years experience growing field peas.

Relevant survey results were made available to all field pea research officers.
Details of the survey form and a summary of the survey results may be found in Appendix 2.

1989 Research Co-ordination.
In 1989 15% of the projects time consisted of reviewing field pea research projects within the Western Australian Department of Agriculture providing farmer feedback to the research officers involved in field pea research and coordinating research objectives towards common goals. In February 1989 a review of individual field pea projects held at which significant research results were highlighted and the future research direction of each project discussed. This in turn was followed by a field review of each project during the growing season. In 1989 the projected also contributed to a Western Australian Department of Agriculture technical officer training course on trial management.

1990 Research Co-ordination.

i) Reviewing Western Australian Department of Agriculture field pea research projects.
ii) Coordinating Western Australian Department of Agriculture field pea research projects.
iii) Highlighting field pea research priorities via farmer and industry feedback.
iv) Evaluation of field pea growing systems both on farm and by the MIDAS whole farm model for the northern and eastern wheatbelt regions.

From February 28-29 a Field Pea Workshop involving farmers, industry representatives, agricultural advisers and research officers was held at the Avon Districts Agriculture Centre, Northam.

The objectives of the workshop were:

i) To exchange information/or experience with field peas in WA.
ii) To identify field pea production constraints and therefore determine field pea research priorities.
iii) To develop field pea research guidelines and direction for 1990.

The workshop was in turn followed by a field tour from 28-29 August to continue the review of current field pea production systems.

Research Proposal

Continuing/New Project

Field pea research in Western Australia is being conducted in a number of separate projects which require integration for maximum benefit to the field pea industry. The direction of these projects follows priorities set at field pea workshops to address important deficits in our knowledge of field peas and field pea growing systems. The overall research objective is to provide data as a basis for sustainable field pea production systems for the various climatic regions in the Western Australia an wheatbelt.

The relative success, value or dollar return of the field pea research is not realized however until:

(i) results from the separate projects are integrated into sustainable practical field pea growing systems which can then be further integrated into the whole farming system.

(ii) and these field pea growing systems are communicated to the farmer and then accepted, adopted and finally utilized by the farming community.

Aims:

i) to integrate and extend to farmers, farm advisers and industry representatives sustainable production packages for field peas appropriate to each climatic situation and soil type in the West Australian Wheatbelt.
ii) to identify areas which require immediate research and industry action through liaison with farmers, farm advisers, research officers and industry representatives within the field pea industry.
iii) to provide communication links between farmers, farm advisers and research officers, and industry representatives within the field pea industry.

Appendix 1

WESTERN AUSTRALIAN
DEPARTMENT OF AGRICULTURE

SUMMARY OF EXPERIMENTAL RESULTS 1987
FIELD PEA AGRONOMY

I.A. PRITCHARD
G.COOPER
D. DODGE

AVON DISTRICTS AGRICULTURE CENTRE

Introduction

The central region encompassing the Northam, Merredin and Lake Grace advisory districts accounts for over half of the total area sown to field peas within W.A. The aims of the 1987 trial program were to provide agronomic and management information specifically for the central region and to subsequently extend relevant managerial systems information to the rest of the state.

Three paired trials were conducted at two sites, Wyalkatchem and Beverley to examine varieties, time of sowing and sowing rates in the central region. The seed used in these trials had the following properties.

Table 1. 1987 Trial Seed Properties

Variety	Seed Size (g)	Germination %
Alma	0.177	57
Derrimut	0.176	87
Dundale	0.192	82
Pennant	0.179	93
Wirrega	0.169	`75

Experimental Program

Trial: 87A31 - Field Peas - Sowing Rates

Aim: to accurately define the response of field peas to plant density in the Central Wheatbelt.

Location: Avondale Research Station Paddock 1C.

Site Characteristics: Total Season Rainfall 260mm (break of season to crop maturity) Red brown sandy loam to clay loam over red brown to dark brown clay at 18cm.

Sowing Date: 05/06/87 - sown with a row cone seeder.

Herbicide: 20/05/87- 1.5L/ha Spray seed + 1.5L/ha Diuron
26/06/87 - 250ml/ha Fusilade + 250ml/100L 60% Wetting Agent.

Insecticide: 22/10/87 - 200ml/ha Cymbush.

Fertiliser: 80kgs/ha Plain Superphosphate top dressed and tickled in.

Results

All varieties showed little yield response to increasing plant density above 30 plants/ sq.m. The yield increase with increasing plant density was not statistically significant. (Table 2). The variety wirrega yielded significantly better than the varieties, Dundale, Derrimut and Pennant. (Table 3).

Table 2. Measured Plant density (plants/ sq.m)

Calculated	Variety				
Plant Density sq.m	Dundale	Pennant	Derrimut	Wirrega	Mean
30	36.0	24.5	38.0	44.0	35.63
40	51.0	41.0	43.0	50.0	46.25
50	57.5	54.5	60.0	62.0	58.50
60	61.0	57.0	58.5	84.5	65.25
100	106.0	87.5	89.0	108.0	97.63
Mean	62.3	52.9	57.7	69.7	60.65

LSD 95% = 18.3
P < Variety 0.01 LSD 95% = 7.97
P < Plant Density 0.01 LSD 95% = 8.91

Table 3 Grain Yield (t/ha)

Calculated	Variety				
Plant Density sq.m	Dundale	Pennant	Derrimut	Wirrega	Mean
30	2.40	2.24	2.57	3.14	2.57
40	2.60	2.48	2.74	3.08	2.72
50	2.40	2.76	2.76	3.51	2.86
60	2.75	2.51	2.78	3.21	2.81
100	2.76	2.76	2.95	2.85	2.83
Mean	2.58	2.55	2.76	3.16	2.76

LSD 95% = 0.41
P < Variety 0.01 LSD 95% = 0.27
P <Plant Density 0.01 LSD 95% = 0.30

Trial: 87A32 - Field Peas - Time of Sowing

Aim: To study the affect of sowing time on the growth and yield of field peas in the Central Wheatbelt.

Location: Avondale Research Station Paddock 1C.

Site Characteristics: As for 87A31

Sowing Date: Sown with a 8 sow cone seeder

Time 1	-	Early	-	21.05.87
Time2	-	Mid	-	05.05.87
Time 3	-	Late	-	17.06.87
Time 4	-	Very Late	-	25.06.87

Sowing Rates: As for 87A31

Herbicide: As for 87A31

Insecticide: As for 87A31

Fertiliser: As for 87A31

Results

Time of sowing had very little effect on pea yields with only the very late time of sowing yielding significantly less than the early, mid and late times of sowing. All pea varieties yielded significantly better than Danja Lupins (Table 4).

Table 4. Grain Yield (t/ha)

T.O.S.	Dundale	Pennant	Derrimut	Wirrega	*Danja*
Early	3.03	3.19	3.11	2.96	1.71
Mid	3.0	3.06	3.19	3.17	1.68
Late	2.93	2.87	3.10	3.36	1.57
Very Late	2.63	2.76	2.76	2.85	1.53
Mean	2.90	2.97	3.04	3.08	1.62

LSD 95% = 0.42
P < Varieties 0.01 LSD 95% = 0.24

Trial: 87A33 - Field Peas - Factorial Agronomy

Aim: To accurately define the response of field peas to plant density by time of sowing in the Central Wheatbelt.

Location: Avondale Research Station Paddock 1C.

Site Characteristics: As for 87A31

Sowing Date: Sown with a 8 sow cone seeder

Time 1	-	Early	-	21.05.87
Time 2	-	Mid	-	05.06.87
Time 3	-	Late	-	17.06.87

Sowing Rates:

Plant Density/sq.m	Pennant kg/ha	Alma kg/ha
20	39	62
35	67	109
45	87	140

Herbicide: As for 87A31

Insecticide: As for 87A31

Fertiliser: As for 87A31

Results

Two distinct responses to time of sowing were shown in this trial. The first response - that displayed by Pennant showed a progressive yield decline with delayed sowing time. The second response - that displayed by alma showed time of sowing had little effect on field pea yield similar to the response displayed by field pea varieties in 87A32. The interaction between variety and plant density was significant. The significant interaction appears to be due to poor experimental technique with a relative large difference between the average plant

density of the two varieties Pennant and Alma.

Table 5 Measured Plant Density (plants/ sq.m)

T.O.S.	Variety	Calculated Plant Density sq.m			T.O.S.	Variety
		20	35	45	Mean	Mean
Early	Pennant	19.5	33.0	44.0	39.42	Pennant
	Alma	30.0	51.0	59.0		33.59
Mid	Pennant	25.5	42.0	40.0	43.33	
	Alma	32.0	56.5	64.0		
Late	Pennant	23.5	30.0	43.0	41.33	Alma
	Alma	35.0	52.5	64.0		49.33
Density Mean		27.58	44.17	52.33		

LSD 95% = 0.58
P <T.O.S. N.S LSD 95% = 0.46
P <VARIETY 0.01 LSD 95% = 0.13
P <DENSITY 0.01 LSD 95% = 5.96
P <(V x D) N.S. LSD 95% = 8.42

Table 6 Grain Yield (t/ha)

T.O.S.	Variety	Calculated Plant Density sq.m			T.O.S.	Variety
		20	35	45	Mean	Mean
Early	Pennant	2.60	3.08	3.26	3.10	Pennant
	Alma	3.12	3.28	3.27		2.49
Mid	Pennant	1.94	2.42	2.75	2.68	
	Alma	2.87	3.09	3.01		
Late	Pennant	1.80	2.23	2.31	2.37	Alma
	Alma	2.46	2.77	2.66		2.953
Density Mean		2.46	2.81	2.88		

LSD 95% = 0.58
P <T.O.S. N.S LSD 95% = 0.46
P < VARIETY 0.01 LSD 95% = 0.13
P <DENSITY 0.01 LSD 95% = 5.96
P <(V x D) N.S. LSD 95% = 8.42

Discussion

In the medium to high rainfall areas (>350mm) of the central region it would appear that sowing time for field peas is not critical with sowing times up to mid June yielding well. A plant density above 35 plants/ sq.m gave no statistically significant grain yield response. The optimal plant density for grain yield appears to fall within the currently recommended range of 40 - 50 plants /sq.m. A plant density below 30 gave significantly lower grain yields for all varieties.

Trial: 87NO92 - Field Pea - Sowing Rates

Aim: To accurately define the response of field peas to plant density in the Central Wheatbelt.

Location: Wyalkatchem R. Stratford

Site Characteristics: Total Season Rainfall 174mm (break of season to crop maturity).
Red sandy loam over clay (salmon gum-gimlet).

Sowing Date: 23.05.87 Sown with a 8 row cone seeder.

Herbicide: 23.05.87 1.5L/ha sprayseed + 1.5l/ha.
Diuron IBS = 1.5L/ha Trifluralin IBS.

Insecticide: 06.07.87 400ml/ha Fusilade
22.06.87 150ml/ha Decis + 70ml/ha Lemat
06.07.87 100ml/ha Lemat
03.09.87 1.0L/ha Thiodan
01.10.87 200 ml/ha Ripcord

Fertiliser: 120kg/ha plain Superphosphate drilled with seed.

Results

All varieties showed little yield response to increasing plant density above 35 plants/ sq.m, the yield increase with increasing plant density was not statistically significant (Table 8). Wirrega and Pennant yielding significantly better than Dundale and Derrimut.

Table 7 Measured Plant density (plants/ sq.m)

Calculated	Variety				
Plant Density sq.m	Dundale	Pennant	Derrimut	Wirrega	Mean
30	29.0	24.0	23.0	30.5	26.63
40	35.5	26.5	33.0	39.5	33.63
50	37.0	37.0	37.5	53.0	41.13
60	56.5	50.0	37.5	51.5	48.88
100	94.5	79.5	79.0	93.5	86.63
Mean	50.5	43.4	42.0	53.6	47.38

LSD 95% = 14.4
P < Variety 0.01 LSD 95% = 6.58
P <Plant Density 0.01 LSD 95% = 7.35

Table 8. Measured Plant density (plants/ sq.m)

Calculated	Variety				
Plant Density sq.m	Dundale	Pennant	Derrimut	Wirrega	Mean
30	1.10	0.97	0.91	1.24	1.05
40	1.07	1.20	1.03	1.21	1.13
50	1.15	1.25	1.08	1.16	1.16
60	1.09	1.23	1.18	1.22	1.18
100	0.96	1.24	1.19	1.26	1.16
Mean	1.07	1.18	1.08	1.22	1.14

LSD 95% = 1.18
P < Variety 0.01 LSD 95% = 0.09
P < Plant Density 0.01 LSD 95% = 0.11

Trial: 87NO93- Field Peas - Time of Sowing

Aim: To study the effect of sowing time on the growth and yield of field peas in the Central Wheatbelt.

Site Characteristics: As for 87NO92

Sowing Date: Sown with a 8 sow cone seeder

Time 1	-	Early	-	23.05.87
Time 2	-	Mid	-	09.06.87
Time3	-	Late	-	22.06.87
Time4	-	Very Late	-	06.07.87

Herbicide: 23.05.87 1.5L/ha Sprayseed + 1.5/L/ha Diuron IBS +1.5/L/ha Trifluralin IBS across entire site.
22.06.87 1.5L/ha + sprayseed 750ml/ha on Time 3 and 4 Treatments.

Herbicide: As for 87NO92

Fertiliser: As for 87NO92

Results

The three varieties Dundale, Pennant and Derrimut displayed a similar response to time of sowing - a gradual progressive decline with delayed sowing. Wirrega showed very little yield response to delayed sowing with only the very late time of sowing yielding significantly less than the early or mid lines.

Table 9. Grain Yield (t/ha)

T.O.S.	Dundale	Pennant	Derrimut	Wirrega	*Dania*
Early	1.33	1.17	1.15	1.30	1.12
Mid	0.88	1.02	0.88	1.20	0.49
Late	0.89	0.71	0.77	0.99	0.70
Very Late	0.57	0.26	0.41	0.85	0.42
Mean	0.92	0.79	0.80	1.09	0.68

LSD 95% = 0.22
P < Varieties 0.01 LSD 95% = 0.13

Trial: 87NO94 - Field Peas - Factorial Agronomy

Aim: To accurately define the response of field peas to plant density by time of sowing in the Central Wheatbelt.

Site Characteristics: As for 87NO92

Sowing Date: Sown with a 8 sow cone seeder

Time 1	-	Early	-	23.05.87
Time 2	-	Mid	-	09.06.87
Time 3	-	Late	-	22.06.87

Sowing Rates:	Plant Density/sqm	Pennant kg/ha	Alma kg/ha
	20	39	62
	35	67	109
	45	87	140

Herbicide: 23.05.87 1.5L/ha Sprayseed + 1.5/L/ha Diuron IBS + 1.5/L/ha Trifluralin IBS across entire site.
22.06.87 1.5L/ha + sprayseed 750ml/ha on Time 3.

Herbicide: As for 87NO92

Fertiliser: As for 87NO92

Results

Pennant showed a progressive yield decline with delayed sowing time and a progressive yield increase with increasing plant density. alma showed no or very little yield response to sowing time and plant density. (Tables 10 & 11). the interaction between time of sowing by variety and variety by density was statistically significant.

Table 10. Measured Plant Density (plants/ sq.m)

T.O.S.	Variety	Calculated Plant Density sq.m			T.O.S. Mean	Variety Mean
		20	35	45		
Early	Pennant	22.5	25.0	39.0	36.1	Pennant
	Alma	30.5	42.0	57.5		36.1
Mid	Pennant	33.0	51.5	36.5	35.7	
	Alma	28.0	21.0	44.0		
Late	Pennant	38.0	44.5	34.5	37.5	Alma
	Alma	35.0	52.5	64.0		36.8
Density Mean		28.6	35.75	44.9		

LSD	95% = 0.58			
P < T.O.S.	N.S	LSD	95%	= 5.1
P < VARIETY	N.S	LSD	95%	= 2.9
P < DENSITY	0.01	LSD	95%	= 2.7
P < (T x V)	0.01	LSD	95%	= 6.9
P < (V x D)	0.01	LSD	95%	+ 6.7

Table 11 Grain Yield (t/ha)

T.O.S.	Variety	Calculated Plant Density sq.m			T.O.S. Mean	Variety Mean
		20	35	45		
Early	Pennant	0.94	1.16	1.21	1.14	Pennant
	Alma	1.19	1.15	1.16		0.91
Mid	Pennant	0.81	1.01	1.10	0.94	
	Alma	0.99	0.88	0.83		
Late	Pennant	0.58	0.69	0.69	0.79	Alma
	Alma	0.87	0.97	0.95		1.00
Density Mean		0.90	0.98	0.99		

LSD 95% = 0.15
P<T.O.S. 0.01 LSD 95% = 0.08
P <VARIETY 0.01 LSD 95% = 0.04
P < DENSITY 0.01 LSD 95% = 0.05
P<(T x V) 0.01 LSD 95% = 0.10
P<(V x D) 0.01 LSD 95% = 0.08

Discussion

In the medium to low rainfall areas of the central region early sowing of field peas (by the end of May) is sufficiently rewarded by yield to be economically justified. In general pea yields declined less with delayed sowing than lupin yields.

The two recently released S.A. varieties Wirrega and Alma yielded significantly better over the entire trial series than the other field pea varieties. Therefore it would appear even though these two varieties hare classified as late maturing (maturity similar to Dundale) they have physiological characteristics which allow them to yield well in a short growing season environment. The identification of these plant physiological characteristics requires further study.

WESTERN AUSTRALIAN
DEPARTMENT OF AGRICULTURE

SUMMARY OF EXPERIMENTAL RESULTS 1988
FIELD PEA AGRONOMY

I.A. PRITCHARD

AVON DISTRICTS AGRICULTURE CENTRE

FIELD PEA AGRONOMY

Aim:
To define the response of field pea varieties to the interactions between plant density and time of sowing.

Methods;
A set of three trials were sown at four sites Northam (Dowerin), Moora (Calingiri and Coomberdale), East Beverley and Avondale. Two field pea factorial trials were sown at Three Springs (Coorow and Perenjori). Trial details including some soil properties, growing season rainfall and standard agronomic practices carried out at each trial site are given in Appendix 1. Weed control at East Beverley (Radish and Lupins) and Avondale (Ryegrass and Wild Oats) was unsatisfactory. Field pea varieties used in the trial program were Alma, Collegian, Dundale, Pennant and Wirrega. Seed properties of these varieties is given in Table 1 below.

Table 1. Field pea trial seed properties.

Variety	Seed Size (g)	Germination (%)
Alma	0.242	92
Collegian	0.208	90
Dundale	0.199	70
Pennant	0.141	78
Wirrega	0.156	84

Factorial experimental designs were used with three replicates and a plot size of 25m * 1.44m. Measurements were made of rainfall, plant density and grain yield. Data on plant density and grain yield is presented here.

Trials;
88NO84, 88A27, 88EB14, 88MO47, - time of sowing x field pea varieties.
88NO85, 88A28, 88EB15, 88MO48 - sowing rates x field pea varieties.
88NO86, 88A29, 88EB16, 88MO49, 88TS59, 88TS66, - field pea factorial.

Results;
The disease complex blackspot was visible at all sites. From casual observations, blackspot disease severity appeared higher on the early and mid sowing's than the late and very late sowings. This observation was also supported by farmer experiences in the 1988 season. The relationship between blackspot disease severity ,field pea variety, time of sowing and plant density requires further investigation. At East Beverley and Avondale weed control, particularly in the early and mid sowing times was poor with the weeds competing heavily with the field peas.

Time of Sowing;
Data presented in Tables 2-8.

At Northam time of sowing had no significant effect on plant establishment or were there any differences between varieties. At Avondale time of sowing had no significant effect on plant establishment however the average plant density of Alma was significantly lower than the other experimental varieties. At East Beverley plant establishment was lower for the early sowing than the mid, late and very late sowing's and the average plant density of Alma and Dundale was lower and higher respectively than the average plant densities of Collegian, Pennant and Wirrega. The loss of plants in the early sowing's could be attributed due to weed competition.

Time of Sowing contd;
Grain yields were higher from the early and mid sowing's at Northam, Avondale, East Beverley but lower at Moora. With sowing's in the first week of June generally giving the highest grain yield. From casual observations and personal communication with farmers in the Moora region this was typical of field pea crops in the region and appeared to be correlated with the incidence and severity of the disease blackspot. In 1989 all trial plots will be rated for the disease blackspot. At Avondale, East Beverley and Moora Wirrega out yielded the other experimental varieties however at Northam, Pennant and Collegian were the highest yielding varieties.

Sowing Rate;
Data presented in Tables 9-16.

In all sowing rate trials Alma established the worst and Dundale the best of the experimental varieties. Alma establishment worsened as the sowing rate increased. This is particularly interesting as Alma being the largest seeded variety of all the varieties with the highest germination percentage should display a greater seedling vigour than the other varieties.(See Table 1.)

The four sowing rate trials displayed four differing responses to increasing plant density. At Northam there was little or no yield response to increasing plant density, at Avondale there was a significant positive yield response to increasing plant density .AT Moora the yield response was positive but not significant to increasing plant density and at East Beverley the response of grain yield to increasing plant density was saturated at 30 plants/m^2. In all the trials there was no interaction between plant density and field pea variety.

From sowing rate trials in 1987 and 1988 it would appear that a field pea density below 25 plants/m^2 is definitely limiting grain yield. From 25 - 35 plants/m^2 the grain yield response to field pea density is extremely variable depending upon site and seasonal conditions. Above 35 plants/m^2 the response to field pea density is generally positive with the optimal field pea density for grain yield falling in the range of 40 - 45 plants/m^2.

Factorial Agronomy;
Data presented in Tables 17- 26.

At all five factorial agronomy trial sites time of sowing had no effect on plant establishment nor were there any significant differences between the experimental varieties.

Grain yields were higher from the early sowing's at Northam, Avondale, East Beverley and Three Springs but lower at Moora. The yield decline with late sowing's at Northam and Three Springs for Dundale and Wirrega was less than that for Pennant. At Moora the yield increase with the late sowing was less for Pennant than for Dundale and Wirrega.

At Northam the decline in yield for the late sowing's at the higher plant densities was less than for the late sowing's at the low plant densities . At Moora the yield increase for the late sowing's was greater at the higher plant densities than at the low plant densities. At the other sites there was no interaction between time of sowing and density.

Wirrega out yielded Pennant and Dundale at Avondale, East Beverley, Moora and Three Springs however at Northam Pennant was the highest yielding variety.

(Note 88TS 59 Factorial Agronomy Trial at Perenjori - Not harvested).

Effect of variety and time of sowing (T.O.S.) on plant establishment (plants/m^2).Target plant density 45 plants/m^2.

NORTHAM (Dowerin)

Table 2. Measured Plant Density (plants/m^2)

Time of sowing	Variety					Mean
	Alma	Collegian	Dundale	Pennant	Wirrega	
18/5/88	37.3	42.3	40.3	41.3	42.0	40.7
6/6/88	59.7	42.0	45.7	43.7	49.7	48.1
15/6/88	42.7	47.3	43.7	41.7	43.0	34.7
30/6/88	42.0	55.0	45.3	44.3	47.7	46.9
Variety Mean	45.4	46.7	43.7	42.7	45.6	7.97

P<T.O.S N.S.
P< Variety N.S.
P< T.O.S. x Variety N.S., LSD 95% = 16.1 plants

AVONDALE

Table 3. Measured Plant Density (plants/m^2)

Time of sowing	Variety					Mean
	Alma	Collegian	Dundale	Pennant	Wirrega	
23/5/88	32.7	40.7	46.7	43.7	40.0	40.7
1/6/88	37.7	35.0	40.7	43.7	46.7	40.7
13/6/88	34.3	49.3	72.0	54.7	45.7	51.2
23/6/88	42.0	46.3	44.7	48.0	44.7	45.1
Variety Mean	36.7	42.8	51.0	47.5	44.2	7.84

P<T.O.S. N.S.
P< Variety 0.05, LSD 95% = 7.9 plants
P< T.O.S. x Variety N.S., LSD 95% = 15.8 plants

EAST BEVERLEY

Table 4. Measured Plant Density (plants/m^2)

Time of sowing	Variety					Mean
	Alma	Collegian	Dundale	Pennant	Wirrega	
17/5/88	37.3	34.3	47.7	41.0	47.3	41.5
3/6/88	45.7	47.0	59.0	49.3	46.0	49.4
15/6/88	37.7	45.0	51.7	47.0	48.7	46.0
30/6/88	41.0	55.0	66.7	50.0	62.7	55.1
Variety Mean	40.4	45.3	56.2	46.8	51.2	7.17

P<T.O.S. 0.05, LSD 95% = 5.4 plants
P< Variety 0.01, LSD 95% = 7.4 plants
P<T.O.S. x Variety N.S., LSD 95% = 14.5 plants

Effect of variety and time of sowing (T.O.S.) on grain yield (kg/ha).

NORTHAM (Dowerin)

Table 5. Grain Yield (kg/ha)

Time of sowing	Variety					Mean
	Alma	Collegian	Dundale	Pennant	Wirrega	
18/5/88	1437	1743	1530	1840	1393	1589
6/6/88	1287	1603	1220	1803	1400	1463
15/6/88	1120	1140	1160	1383	1270	1215
30/6/88	447	747	780	543	820	667
Variety Mean	1072	1308	1173	1392	1221	1233

P< T.O.S. 0.001,LSD 95% = 146 kg
P< Variety 0.01, LSD 95% = 144 kg
P< T.O.S. x Variety 0.05, LSD 95% = 301 kg

AVONDALE

Table 6. Grain Yield (kg/ha)

Time of sowing	Variety					Mean
	Alma	Collegian	Dundale	Pennant	Wirrega	
23/5/88	1330	1340	1527	1577	1983	1551
1/6/88	1557	1563	1670	2113	2093	1799
13/6/88	1447	1623	1583	1867	2027	1709
23/6/88	957	1133	927	1483	1597	1219
Variety Mean	1322	1415	1427	1760	1925	1570

P< T.O.S. 0.05, LSD 95% = 272 kg
P< Variety 0.001,LSD 95% = 196 kg
P< T.O.S. x Variety N.S., LSD 95% = 449 kg

EAST BEVERLEY

Table 7. Grain Yield (kg/ha)

Time of sowing	Variety					Mean
	Alma	Collegian	Dundale	Pennant	Wirrega	
17/5/88	1113	873	1190	1313	1287	1155
3/6/88	1413	1373	1210	1440	1607	1409
15/6/88	717	783	993	633	117	849
30/6/88	400	457	597	360	840	531
Variety Mean	911	872	997	937	1213	986

P< T.O.S. 0.01, LSD 95% = 244 kg
P< Variety 0.001,LSD 95% = 154 kg
P<T.O.S. x Variety N.S., LSD 95% = 372 kg

MOORA

Table 8. Grain Yield (kg/ha)

Time of sowing	Variety					Mean
	Alma	Collegian	Dundale	Pennant	Wirrega	
25/5/88	837	1063	847	1013	1210	994
15/6/88	1023	760	1220	690	1270	993
27/6/88	1123	1057	1423	1340	1590	1307
12/7/88	1190	1230	1347	1100	1397	1253
Mean	1043	1028	1209	1036	1367	1137

P<T.O.S. N.S.
P< Variety 0.001,LSD 95% = 136 kg
P<T.O.S. x Variety 0.05, LSD 95% = 335 kg

Effect of variety and plant density on grain yield kg/ha.
NORTHAM (Dowerin)

Table 9. Measured Plant Density (plants/m^2)

Variety	Calculated Plant Density plants/m^2						Variety
	20	25	30	35	40	50	Mean
Alma	16.7	14.7	21.3	38.0	27.3	40.0	26.3
Dundale	23.7	25.7	32.0	36.7	39.3	50.3	34.6
Pennant	15.0	18.7	29.3	23.7	35.3	35.7	26.3
Wirrega	20.7	20.0	30.0	27.3	34.0	40.0	28.7
Mean	19.0	19.8	28.2	31.4	34.0	41.5	

P< Variety 0.001,LSD 95% = 4.4 plants
P< Density 0.001,LSD 95% = 5.3 plants
P< Variety x Density N.S., LSD 95% = 10.7 plants

Table 10. Grain yield (kg/ha).

Variety	Calculated Plant Density plants/m^2						Variety
	20	25	30	35	40	50	Mean
Alma	1143	1213	1497	1663	1683	1627	1471
Dundale	1373	1463	1333	1403	1487	1373	1406
Pennant	1350	1747	1607	1683	1893	1453	1622
Wirrega	1257	1420	1420	1400	1417	1470	1397
Mean	1281	1461	1464	1537	1620	1481	

P< Variety 0.01, LSD 95% = 127 kg
P< Density 0.01, LSD 95% = 151 kg
P< Variety x Density N.S., LSD 95% = 303 kg

AVONDALE

Table 11. Measured Plant Density (plants/m^2).

Variety	Calculated Plant Density plants/m^2						Variety
	20	25	30	35	40	50	Mean
Alma	19.3	18.7	28.0	29.0	30.3	31.7	26.2
Dundale	28.7	30.3	39.7	39.7	41.3	45.7	37.6
Pennant	20.3	24.7	28.3	33.7	36.7	49.0	32.1
Wirrega	20.7	36.0	32.0	36.0	37.7	45.3	34.6
Mean	22.3	27.4	32.0	34.6	36.5	42.9	

P< Variety 0.001,LSD 95% = 3.6 plants
P< Density 0.001,LSD 95% = 4.4 plants
P< Variety x Density N.S., LSD 95% = 8.8 plants

Table 12. Grain Yield (kg/ha).

Variety	Calculated Plant Density plants/m^2						Variety
	20	25	30	35	40	50	Mean
Alma	753	1173	1320	1263	1193	1517	1203
Dundale	820	1113	1280	1350	1280	1770	1269
Pennant	1203	1213	1567	1653	1630	1897	1527
Wirrega	1103	1233	1710	1720	1457	1700	1487
Mean	970	1183	1469	1497	1390	1721	

P< Variety 0.001,LSD 95% = 151 kg
P< Density 0.001,LSD 95% = 185 kg
P< Variety x Density N.S., LSD 95% = 375 kg

EAST BEVERLEY

Table 13. Measured Plant Density (plants/m^2).

Variety	Calculated Plant Density plants/m^2						Variety
	20	25	30	35	40	50	Mean
Alma	19.7	18.0	29.0	33.7	31.7	39.0	28.5
Dundale	24.0	31.0	37.0	42.0	47.3	56.3	39.6
Pennant	26.0	19.3	28.0	27.7	36.3	41.0	29.7
Wirrega	20.3	26.0	26.0	30.7	33.7	41.0	29.6
Mean	22.5	23.6	30	33.5	37.3	44.3	

P< Variety 0.001,LSD 95% = 2.9 plants
P< Density 0.001,LSD 95% = 3.6 plants
P< Variety x Density N.S., LSD 95% = 7.2 plants

Table 14. Grain Yield (kg/ha).

Variety	Calculated Plant Density plants/m^2						Variety
	20	25	30	35	40	50	Mean
Alma	1323	1230	1330	1397	1237	1403	1320
Dundale	937	1223	1407	1527	1353	1483	1322
Pennant	1157	1107	1473	1603	1613	1617	1428
Wirrega	1370	1300	1427	1647	1520	1613	1479
Mean	1197	1215	1409	1543	1431	1529	

P< Variety 0.05, LSD 95% = 116 kg
P< Density 0.001,LSD 95% = 142 kg
P< Variety x Density N.S., LSD 95% = 287 kg

MOORA(Calingiri)

Table 15. Measured Plant Density (plants/m^2).

Variety	Calculated Plant Density plants/m^2						Variety
	20	25	30	35	40	50	Mean
Alma	17.3	20.0	24.0	26.7	24.0	34.7	24.4
Dundale	24.0	32.0	30.7	33.3	36.0	44.7	33.4
Pennant	21.3	24.0	30.7	32.0	33.3	41.3	30.4
Wirrega	26.7	22.7	33.3	30.7	30.7	41.3	30.9
Mean	22.3	24.7	29.7	30.7	31.0	40.5	

P< Variety 0.001,LSD 95% = 3.6 plants
P< Density 0.001,LSD 95% = 4.4 plants
P< Variety x Density N.S., LSD 95% = 8.9 plants

Table 16. Grain Yield (kg/ha).

Variety	Calculated Plant Density plants/m^2						Variety
	20	25	30	35	40	50	Mean
Alma	1463	1667	1533	1607	1487	1817	1596
Dundale	1583	1807	1983	1907	1780	1983	1841
Pennant	1610	1813	1833	2037	2010	2113	1903
Wirrega	1633	1723	1897	1800	1783	1967	1801
Mean	1572	1752	1812	1838	1765	1970	

P< Variety 0.001,LSD 95% = 132 kg
P< Density 0.001,LSD 95% = 159 kg
P< Variety x Density N.S., LSD 95% = 321 kg

Effects of variety, sowing date and plant density on grain yield.

NORTHAM (Dowerin)

Table 17. Measured Plant Density (plants/m^2).

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		20	30	45		
	Dundale	18.3	33.3	31.3		Dundale
18/5/88	Pennant	27.0	33.0	43.7	31.6	31.7
	Wirrega	18.0	31.0	49.0		
						Pennant
	Dundale	41.3	31.0	35.0		32.8
15/6/88	Pennant	28.0	28.7	36.3	33.9	
	Wirrega	37.3	27.7	40.0		Wirrega
						33.8
Density Mean		28.3	30.8	39.2		

P< T.O.S. N.S.
P< Variety N.S.
P< Density 0.05, LSD 95% = 7.38 plants
P< T.O.S. x Variety N.S.
P< T.O.S. x Density 0.05, LSD 95% = 9.4 plants
P< Variety x Density N.S.
P< T.O.S. x Variety x Density N.S., LSD 95% = 17.5 plants

Table 18. Grain Yield (kg/ha).

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		20	35	45		
	Dundale	1403	1540	1510		Dundale
18/5/88	Pennant	1623	2020	1953	1602	1360
	Wirrega	1383	1390	1597		
						Pennant
	Dundale	1073	1283	1350		1573
15/6/88	Pennant	893	1423	1523	1269	
	Wirrega	1090	1207	1577		Wirrega
						1374
Density Mean		1244	1477	1585		

P< T.O.S. 0.01, LSD 95% = 68 kg
P< Variety 0.001,LSD 95% = 80 kg
P< Density 0.001,LSD 95% = 80 kg
P< T.O.S. x Variety 0.001,LSD 95% = 116 kg
P<T.O.S. x Density 0.05, LSD 95% = 116 kg
P< Variety x Density 0.01, LSD 95% = 139 kg
P< T.O.S. x Variety x Density N.S., LSD 95% = 201 kg

AVONDALE

Table 19. Measured Plant Density (plants/m^2)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		20	35	45		
	Dundale	20.0	38.0	51.3		Dundale
23/5/88	Pennant	23.0	37.3	47.0	35.7	39.3
	Wirrega	30.7	35.7	38.7		
						Pennant
	Dundale	32.3	41.3	52.7		39.8
13/6/88	Pennant	36.7	52.3	42.7	44.6	
	Wirrega	48.3	39.7	55.7		Wirrega
						41.4
Density Mean		31.8	40.7	48.0		

P<T.O.S. N.S.
P< Variety N.S.
P< Density 0.001,LSD 95% = 6.2 plants
P< T.O.S. x Variety N.S.
P< T.O.S. x Density N.S.
P< Variety x Density N.S.
P< T.O.S. x Variety x Density N.S., LSD 95% = 16.0 plants

Table 20. Grain Yield (kg/ha).

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		20	35	45		
	Dundale	810	970	920		Dundale
23/5/88	Pennant	733	1073	1263	1043	880
	Wirrega	997	1270	1350		
						Pennant
	Dundale	647	830	1103		1041
13/6/88	Pennant	870	1083	1223	971	
	Wirrega	743	950	1290		Wirrega
						1100
Density Mean		800	1029	1192		

P< T.O.S. N.S.
P< Variety 0.01, LSD 95% = 122 Kg
P< Density 0.001, LSD 95% = 122 Kg
P<T.O.S. x Variety N.S.
P<T.O.S. x Density N.S.
P< Variety x Density N.S.
P< T.O.S. x Variety x Density N.S., LSD 95% = 353 Kg

EAST BEVERLEY

Table 21. Measured Plant Density (plants/m^2)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		20	35	45		
	Dundale	17.7	33.0	43.0		Dundale
17/5/88	Pennant	20.0	32.7	30.7	29.1	32.1
	Wirrega	23.0	25.3	36.7		
						Pennant
	Dundale	20.0	31.3	42.3		28.7
15/6/88	Pennant	20.0	29.3	39.3	29.5	
	Wirrega	16.3	28.3	38.7		Wirrega
						28.1
Density Mean		19.5	30.1	38.4		

P<T.O.S. N.S.
P< Variety N.S.
P< Density 0.001, LSD 95% = 3.9 plants
P<T.O.S. x Variety N.S.
P< T.O.S. x Density N.S.
P< Variety x Density N.S.
P< T.O.S. x Variety x Density N.S., LSD 95% = 9.3 plants

Table 22. Grain Yield (kg/ha)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		20	35	45		
	Dundale	1020	1213	1370		Dundale
17/5/88	Pennant	1083	1210	1487	1265	843
	Wirrega	1170	1387	1443		
						Pennant
	Dundale	310	670	477		835
15/6/88	Pennant	233	467	530	480	
	Wirrega	307	707	670		Wirrega
						939
Density Mean		687	942	988		

P< T.O.S. 0.01,LSD 95% = 38 Kg
P< Variety N.S.
P< Density 0.001,LSD 95% = 100 Kg
P<T.O.S. x Variety N.S.
P<T.O.S. x Density N.S.
P< Variety x Density N.S.
P< T.O.S. x Variety x Density N.S., LSD 95% = 238 Kg

Moora (Coomberdale)

Table 23. Measured Plant Density (plants/m^2)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		20	35	45		
	Dundale	14.7	28.0	30.7		Dundale
25/5/88	Pennant	20.0	24.0	28.0	24.4	27.8
	Wirrega	21.3	28.0	25.3		
						Pennant
	Dundale	22.7	30.7	40.0		25.8
27/6/88	Pennant	20.0	28.0	34.7	29.2	
	Wirrega	14.7	32.0	40.0		Wirrega
						26.9
Density Mean		18.9	28.4	33.1		

P< T.O.S. N.S.
P< Variety N.S.
P< Density 0.001,LSD 95% = 3.3 plants
P<T.O.S. x Variety N.S.
P< T.O.S. x Density 0.05, LSD 95% = 5.2 plants
P< Variety x Density N.S.
P< T.O.S. x Variety x Density N.S., LSD 95% = 8.5 plants

Table 24. Grain Yield (kg/ha).

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		20	35	45		
	Dundale	813	850	977		Dundale
25/5/88	Pennant	1070	1070	1237	989	1067
	Wirrega	987	940	960		
						Pennant
	Dundale	1013	1383	1367		1186
27/6/88	Pennant	887	1400	1453	1305	
	Wirrega	1113	1517	1610		Wirrega
						1188
Density Mean		981	1193	1267		

P< T.O.S. N.S.
P< Variety 0.05, LSD 95% = 106 Kg
P< Density 0.001,LSD 95% = 106 Kg
P< T.O.S. x Variety 0.05, LSD 95% = 343 Kg
P<T.O.S. x Density 0.01, LSD 95% = 343 Kg
P< Variety x Density N.S.
P< T.O.S. Variety x Density N.S., LSD 95% = 410 Kg

THREE SPRINGS (Coorow)

Table 25. Measured Plant Density (plants/m^2)

T.O.S.	Variety	Calculated Plant Density 20	35	45	T.O.S. Mean	Variety Mean
25/5/88	Dundale					Dundale
	Pennant					
	Wirrega					Pennant
28/6/88	Dundale					
	Pennant					
	Wirrega					Wirrega
Density Mean						

Table 26. Grain Yield (kg/ha)

T.O.S.	Variety	Calculated Plant Density 20	35	45	T.O.S. Mean	Variety Mean
25/5/88	Dundale	957	1000	957	1248	Dundale 693
	Pennant	1393	1613	1613		
	Wirrega	1270	1253	1173		Pennant 952
28/6/88	Dundale	407	360	477	526	
	Pennant	263	390	437		
	Wirrega	680	787	930		Wirrega 1016
Density Mean		828	901	931		

P< T.O.S. 0.01, LSD 95% = 64 Kg
P< Variety 0.001,LSD 95% = 72 Kg
P< Density 0.05, LSD 95% = 72 Kg
P< T.O.S. x Variety 0.001,LSD 95% = 106 Kg
P< T.O.S. x Density N.S.
P< Variety x Density N.S.
P< T.O.S. x Variety x Density N.S., LSD 95% = 183 Kg

APPENDIX 1

TRIAL SITE DETAILS

NORTHAM

Location: Dowerin D. Friend

Rainfall: Growing Season Rainfall 217mm

Soil Type: A surface horizon of red brown sandy loam (pH $CaCl_2$ 5.5 - 6.0) overlying a sandy clay loam subsoil (pH $CaCl_2$ 6.5 - 8.0) at a depth of 10-50$^+$ cm.

Sowing Date:

88NO84
Time 1 - early - 18/5/88
Time 2 - mid - 6/6/88
Time 3 - late - 15/6/88
Time 4 - very late - 30/6/88

88NO85 18/5/88

88NO86
Time 1 - early - 18/5/88
Time 2 - late - 15/6/88

Herbicide:
400ml/ha Roundup CT (Farmer applied)
18/5/88 - 1.5l/ha Diuron
20/6/88 - 750ml/ha Diuron, applied to Time 3 & 4
20/6/88 - 400ml/ha Fusilade and 250ml/100L Agral 60 wetting agent.

Insecticide: As required

Fertilizer: 154kgs/ha plain superphosphate drilled with seed.

AVONDALE

Location: Avondale Research Station Paddock IC

Rainfall: Growing Season Rainfall 300mm

Soil Type: Red brown sandy loam to clay loam over red brown to dark brown clay at 18cm.

Sowing Date:

88A27
Time 1 - early - 23/5/88
Time 2 - mid - 1/6/88
Time 3 - late - 13/6/88
Time 4 - very late - 23/6/88

88A28 23/5/88

88A29
Time 1 - early - 23/5/88
Time 2 - late - 13/6/88

AVONDALE contd

Herbicide: 19/5/88 - 1.5l/ha Diuron + 750ml/ha Sprayseed

Insecticide: As required

Fertilizer: 23/5/88 - 100kgs/ha plain superphosphate topdressed.

Notes: 23/5/88 - Paddock was cultivated after being topdressed with superphosphate.

EAST BEVERLEY

Location: East Beverley Research Annexe

Rainfall: Growing Season Rainfall 258.5mm (17/5/88 -> 15/11/88)

Soil Type: A surface horizon of grey brown sand over a pale clayey sand (pH 1:5$H_2$0 5.5-6.5)overlying a sandy clay subsoil (pH 1:5H_2 6.0-7.0) at a depth of 20 to 30cm. The percentage of ironstone gravel in the profile is less than 10%.

Sowing Date: Sown with a 8 row cone seeder

88EB14
Time 1 - early - 17/5/88
Time 2 - mid - 3/6/88
Time 4 - very late - 30/6/88

88EB15 17/5/88

88EB16
Time 1 - early- 17/5/88
Time 2 - late - 3/6/88

Herbicide:
10/5/88 2.0l/ha Sprayseed + 1.5l/ha Diuron
23/6/88 750ml/ha Diuron applied to time 3&4
23/6/88 500ml/ha Assure

Insecticide: As required

Fertilizer: 154 kgs/ha plain Superphosphate drilled with seed.

MOORA

Location: Coomberdale David Topham. 88MO47 and 88MO49

Rainfall:

Soil Type: York gum soil cloddy grey clay

Sowing Date: Sown with a 8 row cone seeder

88MO47
Time 1 - early - 25/5/88
Time 2 - mid - 15/6/88
Time 3 - late - 27/6/88
Time 4 - very late - 12/7/88

88MO49
Time 1 - early - 25/5/88
Time 2 - late - 27/6/88

MOORA contd

Herbicide: 19/5/88 3.0l/ha Sprayseed
20/5/88 1.5l/ha Diuron + 1.5l/ha Trifluralin + 700 mls/ha Lorsban.
Prior to each subseaquent time of sowing (15/6, 27/6, 12/7/88) 2l/ha Sprayseed + 1.5l/ha Diuron + 1.5l/ha Trifiuralin + 700mls/ha Lorsban was applied.
18/7/88 500mls/ha Fusilade + wetter.

Insecticide: See Herbicide above

Fertilizer: 100kg/ha Manganese superphosphate drilled with seed.

Notes: Prior to sowing of 88MO47 Times 3&4 and 86MO49 Time 2 the respective areas were scarified.

MOORA

Location: Calingiri "Lindsay Bros" 88MO48

Rainfall:
Soil Type:

Sowing Date: 26/5/88

Herbicide: 22/5/88 500ml/ha Sprayseed (Farmer applied).
26/5/88 750ml/ha Sprayseed + 1.5l/ha Trifiuralin + 1.5l/ha Duiron + 700ml/ha Lorsban.
10/6/88 600ml/ha Hoegrass + wetter + 700ml/ha Lorsban.
6/7/88 500ml/ha Fusilade + wetter

Insecticide: See Herbicide above.

Fertilizer: 100kg/ha plain Superphosphate top dressed (Farmer applied).
28kg/ha plain Superphosphate drilled with seed.

THREE SPRINGS

Location: Coorow R. Hydes 88TS66

Rainfall:
Soil Type:

Sowing Date: Sown a 8 row cone seeder
Time 1 - early - 25/5/88
Time 2 - late - 28/6/88

Herbicide: 0.75l/ha Sprayseed
2.0l/ha Bladex
250ml/ha Fusilade and wetter

Fertilizer: 150 kg/ha of plain Superphosphate drilled with seed.

WESTERN AUSTRALIAN
DEPARTMENT OF AGRICULTURE

SUMMARY OF EXPERIMENTAL RESULTS 1989
FIELD PEA AGRONOMY

I.A. PRITCHARD

AVON DISTRICTS AGRICULTURE CENTRE

Aim:
To define the responses of Field Pea varieties to plant density, time of sowing and blackspot severity.

Methods:
Trials were sown at 5 sites; Beverley (Avondale Research Station and East Beverley Research Annexe), Lake Grace (Newdegate Research Station), Moora (Coomberdale) and Merredin (Merredin Research Station). Trial details including some soil properties, growing season rainfall and agronomic practices carried out at each trial site are given in Appendix 1.

Field pea varieties used in the trial program were Alma, Dundale, Pennant and Wirrega. Seed properties of these varieties are given in Tables 1 and 2 below.

Split plot experimental designs were used with three replicates and a plot size of 25m x 1.44m. Plots being blocked into times of sowing with varieties and seeding rates being completely randomised within time of sowing blocks.

Plant density, grain yield and disease severity measurements were made on all plots. Data on plant density (plants/ sq.m) and grain yield (kg/ha) only will be presented here. Disease assessments particularly blackspot were made by M. Barbetti plant pathology group. The disease assessments are presented in M. Barbetti's 1989 experimental summary.
No statistical analysis of the Lake Grace trial results were possible.

Trials:
89A20, 89EB21, 89LG50, 89MO40 and 89M50.

Table 1: Field pea seed properties for trials: 89A20, 89EB21, 89LG50, 89MO40.

Variety	Seed Size (g)	Germination%
Alma	0.242	81
Dundale	0.198	88
Pennant	0.203	89
Wirrega	0.154	75

Table 2: Field pea seed properties for trial: 89M50.

Variety	Seed Size (g)	Germination%
Alma	0.222	86
Dundale	0.198	88
Pennant	0.141	93
Wirrega	0.156	85

Results

Plant Density:

At all five trial sites increasing plant density from a target plant density of 25 to 50 plants/ sq.m (actual plant density of 20-25 and 36-50 plants/ sq.m respectively) increased grain yield irrespective of sowing time and variety. With the exception of Dundale at Avondale and Merredin which showed no response to increasing plant density. Increasing the target plant density from 50 to 100 plants/ sq.m (actual plant density of 36-50 and 58-78 plants/ sq.m respectively) had no effect on grain yield. This result confirms the 1987 and 1988 results which showed that field pea densities below 25 plants/ sq.m definitely limit grain yield and from 25 - 35 plants/ sq.m the grain yield response to field pea density is extremely variable depending upon site and seasonal conditions. Above 35 plants/ sq. m the response to field pea density is positive with the economic optimum field pea density falling in the range of 40 - 50 plants/ sq.m.

Blackspot Disease Severity:

At all sites the early time of sowing had more severe black spot disease than the mid and late times of sowing. At four sites increasing actual plant density from 20-25 plants/ sq.m to 58-78 plants/ sq.m increased the severity of the black spot disease. The total difference in black spot severity between varieties and field pea plant density at all sites was not significant in terms of the level of black spot disease and subsequent effect on field pea yield.

Time of Sowing:

Grain yields were highest for the early sowing's at Lake Grace, Moora and Avondale. At Avondale, and East Beverley delaying sowing to the end of June had no significant effect on grain yield. Both at Lake Grace and East Beverley the mid time of sowing's yielded lower than the early and late times of sowing. At Merredin middle of May sowing's gave the highest grain yields with early May and early June sowing's yielding only slightly lower than the middle of May sowing's.

Varieties:

Alma, Dundale and Wirrega were the highest yielding varieties at all five trial sites with Pennant yielding significantly lower at all sites with the exception of East Beverley.

LAKE GRACE - 89LG50

Table 3 Measured Plant Density (plants/ sq.m)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		25	50	100		
	Alma	23.2	40	72		Alma
Early	Dundale	25.2	44.8	72.5	43.5	50.4
30/5/89	Pennant	21.2	41.3	76.5		
	Wirrega	17.8	31.3	56.2		
						Dundale
	Alma	28	49.3	72.3		51.6
Mid	Dundale	24.8	48.8	82.7	49.7	
22/6/89	Pennant	26.5	44.5	86.7		
	Wirrega	21.8	36.5	74.5		Pennant
						51.7
	Alma	29.5	50.2	88.7		
Late	Dundale	32.5	44.2	89.2	54.5	
17/7/89	Pennant	33.2	48.2	87.2		Wirrega
	Wirrega	27.8	41.2	81.7		43.2
Density Mean		26	43.4	78.4		

P< T.O.S.
P< Variety
P< Density
P< T.O.S. x Variety
P< T.O.S. x Density
P< Varietyx Density
P< T.O.S. x Variety x Density

Table 4 Grain Yield (kg/ha)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		25	50	100		
	Alma	1197	1427	1471		Alma
Early	Dundale	1046	1330	1489	1189	1137
30/5/89	Pennant	682	842	1072		
	Wirrega	922	1214	1578		
						Dundale
	Alma	753	993	1028		1241
Mid	Dundale	718	1400	1525	865	
22/6/89	Pennant	381	478	895		
	Wirrega	390	709	1108		Pennant
						751
	Alma	1081	1117	1170		
Late	Dundale	1126	1214	1321	1066	
17/7/89	Pennant	558	753	1099		Wirrega
	Wirrega	798	1152	1400		1030
Density Mean		804	1052	1263		

P< T.O.S.
P< Variety
P< Density
P< T.O.S. x Variety
P< T.O.S. x Density
P< Varietyx Density
P< T.O.S. x Variety x Density

MERREDIN - 89M50

Table 5 Measured Plant Density (plants/ sq.m)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		25	50	100		
	Alma	21.3	41.0	90.3		Alma
Early	Dundale	18.3	36.0	70.7	42.3	47.2
3/5/89	Pennant	20.7	35.3	65.7		
	Wirrega	15.7	30.3	62.0		Dundale
						41.3
	Alma	22.3	38.7	81.0		
Mid	Dundale	21.7	34.3	65.7	41.1	
19/5/89	Pennant	21.3	35.0	71.3		
	Wirrega	20.0	29.7	52.7		Pennant
						42.6
	Alma	25.7	40.3	64.0		
Late	Dundale	22.7	34.7	68.0	41.9	
2/6/89	Pennant	21.3	44.3	68.3		Wirrega
	Wirrega	21.0	32.0	61.0		36.0
Density Mean		21.0	36.0	68.4		

P< T.O.S.	NS	
P< Variety	0.001	LSD 95% = 3.8 plants.
P< Density	0.001	LSD 95% = 3.3 plants.
P< T.O.S. x Variety	NS	
P< T.O.S. x Density	NS	
P< Varietyx Density	NS	
P< T.O.S. x Variety x Density	NS	LSD 95% = 11.2 plants.

Table 6 Grain Yield (kg/ha)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		25	50	100		
	Alma	1207	1303	1280		Alma
Early	Dundale	1383	1400	1347	1299	1343
3/5/89	Pennant	1163	1057	1277		
	Wirrega	1320	1513	1337		Dundale
						1409
	Alma	1433	1503	1490		
Mid	Dundale	1423	1467	1540	1379	
19/6/89	Pennant	853	1407	1363		
	Wirrega	1163	1453	1477		Pennant
						1127
	Alma	1287	1343	1240		
Late	Dundale	1320	1303	1513	1246	
2/6/89	Pennant	750	1057	1220		Wirrega
	Wirrega	1090	1273	1550		1353
Density Mean		1199	1340	1384		

P< T.O.S.	NS	
P< Variety	0.001	LSD 95% = 79kg
P< Density	0.001	LSD 95% = 69kg
P< T.O.S. x Variety	NS	
P< T.O.S. x Density	0.05	LSD 95% = 198kg
P< Varietyx Density	0.05	LSD 95% = 140kg
P< T.O.S. x Variety x Density	NS	LSD 95% = 289kg

MOORA - 89MO40

Table 7 Measured Plant Density (plants/ sq.m)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		25	50	100		
	Alma	26.3	45.0	72.7		Alma
Early	Dundale	23.3	36.7	61.0	44.1	50.7
26/5/89	Pennant	21.0	44.3	72.3		
	Wirrega	20.3	35.7	71.0		Dundale
						42.0
	Alma	27.7	47.7	79.0		
Mid	Dundale	25.7	38.7	69.3	44.2	
16/6/89	Pennant	23.0	40.7	74.0		
	Wirrega	25.7	36.0	43.0		Pennant
						44.2
	Alma	25.3	45.0	87.7		
Late	Dundale	17.3	40.7	65.7		
30/6/89	Pennant	19.3	30.7	72.3	42.2	Wirrega
	Wirrega	14.7	32.7	54.7		37.1
Density Mean		22.5	39.5	68.6		

P< T.O.S.	NS	
P< Variety	0.001	LSD 95% = 4.8 plants
P< Density	0.001	LSD 95% = 4.2 plants
P< T.O.S. x Variety	NS	
P< T.O.S. x Density	NS	
P< Varietyx Density	NS	
P< T.O.S. x Variety x Density	NS	LSD 95% = 14.5 plants

Table 8 Grain Yield (kg/ha)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		25	50	100		
	Alma	747	1023	907		Alma
Early	Dundale	733	870	1163	957	854
26/5/89	Pennant	657	1073	1193		
	Wirrega	637	1047	1440		Dundale
						863
	Alma	727	863	790		
Mid	Dundale	893	637	797	734	
16/6/89	Pennant	527	587	703		
	Wirrega	563	837	887		Pennant
						691
	Alma	700	970	957		
Late	Dundale	637	893	1147	759	
30/6/89	Pennant	297	520	660		Wirrega
	Wirrega	537	883	910		860
Density Mean		638	851	963		

P< T.O.S.	NS	
P< Variety	0.01	LSD 95% = 119kg
P< Density	0.001	LSD 95% = 103kg
P< T.O.S. x Variety	0.05	LSD 95% = 223kg
P< T.O.S. x Density	NS	
P< Varietyx Density	NS	
P< T.O.S. x Variety x Density	NS	LSD 95% = 367kg

AVONDALE - 89A20

Table 9 Measured Plant Density (plants/ sq.m)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		25	50	100		
	Alma	29.0	45.0	84.7		Alma
Early	Dundale	24.0	42.7	84.0	23.4	43.9
9/6/89	Pennant	22.0	38.7	75.7		
	Wirrega	18.7	31.3	58.7		Dundale
						47.5
	Alma	21.0	36.0	58.7		
Mid	Dundale	26.3	39.7	67.0	39.1	
20/6/89	Pennant	23.3	36.3	60.3		
	Wirrega	21.7	28.0	50.7		Pennant
						42.6
	Alma	23.0	36.0	62.0		
Late	Dundale	27.3	39.3	77.0	42.1	
30/6/89	Pennant	23.0	36.0	68.0		Wirrega
	Wirrega	22.0	34.3	56.7		35.8
Density Mean		23.4	36.9	66.9		

P< T.O.S.	0.05	LSD 95% = 3.7 plants
P< Variety	0.001	LSD 95% = 2.7 plants
P< Density	0.001	LSD 95% = 2.3 plants
P< T.O.S. x Variety	0.01	LSD 95% = 5.5 plants
P< T.O.S. x Density	0.001	LSD 95% = 4.9 plants
P< Varietyx Density	0.01	LSD 95% = 4.7 plants
P< T.O.S. x Variety x Density	NS	LSD 95% = 8.6 plants

Table 10 Grain Yield (kg/ha)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		25	50	100		
	Alma	1410	1733	1550		Alma
Early	Dundale	1277	1463	1140	1432	1441
9/6/89	Pennant	1227	1133	1487		
	Wirrega	1323	1720	1720		Dundale
						1372
	Alma	1323	1487	1640		
Mid	Dundale	1390	1343	1623	1442	
20/6/89	Pennant	1083	1273	1430		
	Wirrega	1300	1627	1780		Pennant
						1152
	Alma	1160	1307	1360		
Late	Dundale	1280	1300	1533	1225	
30/6/89	Pennant	627	913	1207		Wirrega
	Wirrega	1087	1490	1440		1499
Density Mean		1207	1399	1492		

P< T.O.S.	NS	
P< Variety	0.001	LSD 95% = 97kg
P< Density	0.001	LSD 95% = 85kg
P< T.O.S. x Variety	0.05	LSD 95% = 207kg
P< T.O.S. x Density	NS	
P< Varietyx Density	0.05	LSD 95% = 169kg
P< T.O.S. x Variety x Density	NS	LSD 95% = 317kg

EAST BEVERLY - 89EB21

Table 11 Measured Plant Density (plants/ sq.m)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		25	50	100		
	Alma	31.3	61.7	111.7		Alma
Early	Dundale	33.7	47.3	84.0	58.6	51.2
25/5/89	Pennant	28.0	50.0	90.7		
	Wirrega	49.3	48.3	67.3		Dundale
						48.3
	Alma	26.0	44.7	55.3		
Mid	Dundale	34.0	56.7	56.7	42.9	
9/6/89	Pennant	27.7	49.3	50.0		
	Wirrega	25.3	44.0	45.3		Pennant
						47.1
	Alma	48.3	58.3	23.3		
Late	Dundale	47.7	40.7	33.7	43.2	
19/6/89	Pennant	51.3	48.7	28.7		Wirrega
	Wirrega	32.7	55.0	50.3		46.4
Density Mean		36.3	50.4	58.1		

P< T.O.S.	0.01	LSD 95% = 3.2 plants
P< Variety	NS	
P< Density	0.001	LSD 95% = 9.6 plants
P< T.O.S. x Variety	NS	
P< T.O.S. x Density	0.001	LSD 95% = 13.9 plants
P< Varietyx Density	NS	
P< T.O.S. x Variety x Density	NS	LSD 95% = 32.2 plants

Table 12 Grain Yield (kg/ha)

T.O.S.	Variety	Calculated Plant Density			T.O.S. Mean	Variety Mean
		25	50	100		
	Alma	933	1067	1157		Alma
Early	Dundale	957	890	1197	1090	887
25/5/89	Pennant	1297	1293	1403		
	Wirrega	773	1297	820		Dundale
						870
	Alma	237	450	360		
Mid	Dundale	297	467	483	458	
9/6/89	Pennant	433	570	883		
	Wirrega	373	347	883		Pennant
						991
	Alma	1063	1283	1433		
Late	Dundale	1180	1230	1127	1214	
19/6/92	Pennant	1100	1080	1143		Wirrega
	Wirrega	1117	1480	1333		936
Density Mean		813	954	995		

P< T.O.S.	NS	
P< Variety	NS	
P< Density	0.01	LSD 95% = 111kg
P< T.O.S. x Variety	0.05	LSD 95% = 542kg
P< T.O.S. x Density	NS	
P< Varietyx Density	NS	
P< T.O.S. x Variety x Density	NS	LSD 95% = 628kg

APPENDIX 1

TRIAL SITE DETAILS

LAKE GRACE - 89LG50

Location: Newdegate Research Station

Rainfall: May - October

Soil Type: Brown sandy loam 0-5 cm/clay.

Sowing Date:

Early	26/5/89
Mid	22/6/89
Late	17/7/89

Herbicide: 5/7/89 - 1.0 L/ha Hoegrass®

Insecticide:

Fertilizer: 99 kg/ha plain superphosphate drilled with seed.

MERREDIN - 89M50

Location: Merredin Research Station - Paddock 3D-5

Rainfall: May - Oct

Soil Type: Reddish brown sandy clay loam (pH $CaCl_2$ - 6.0) over yellowish red heavy clay (pH 7.8) at 30cm.

Sowing Date:

Early	3/5/89
Mid	19/5/89
Late	2/6/89

Herbicide: 18/5/89- 1.5 L/ha Sprayseed® - Mid and Late T.O.S.
23/6/89 - 500 ml/ha Fusilade® + BS 1000®

Insecticide: 22/6/89- 80 ml/ha Roxion® (Misted)

Fertilizer: 100kgs/ha plain Superphosphate drilled with seed.

Notes: The early time of sowing was heavily infested with doublegees.

MOORA - 89MO40

Location: Coomberdale T.McCuish

Rainfall: May - October

Soil Type: Heavy brown sandy loam. (pH H_2O-5.95). Clay at 40cm

MOORA - 89MO40 cont:

Sowing Date:

Early	26/5/89
Mid	16/6/89
Late	30/6/89

Herbicide: Prior to each time of sowing - 2.0 L/ha Sprayseed® + 2.0 L/ha Bladex®
18/7/89- 750 ml/ha Fusilade 212® + wetting agent
28/7/89 - 4.0 L/ha Hoegrass® - Mid & Late T.O.S.
28/7/89 - 1.0 L/ha Lorsban® - Mid & Late T.O.S.

Insecticide: 27/9/89 1.0 L/ha Sumicidin 200®.

Fertilizer: 125- 130 kgs/ha plain Superphosphate drilled with seed

AVONDALE - 89A20

Location: Avondale Research Station Paddock 1C

Rainfall: May - October - 267mm

Soil Type: Red brown sandy loam to clay loam over red brown to dark brown clay at 18cm.

Sowing Date:

Early	9/6/89
Mid	20/6/89
Late	30/6/89

Herbicide: 9/6/89- 1.5 L/ha Bladex®.

Insecticide:

Fertilizer: 95kgs/ha Superphosphate + Mn

EAST BEVERLY - 89EB21

Location: East Beverley Research Annexe

Rainfall: May - October - 238 mm

Soil Type: Ssurface A horizon of grey brown sand over a pale clayey sand (pH H_2O 5.5-6.5) overlying a sandy clay subsoil (pH H_2O 6.6-7.0)at a depth of 20-30cm.

Sowing Date:

Early	25/5/89
Mid	9/6/89
Late	19/7/89

Herbicide: 24/5/89 - 1.5 L/ha Bladex®.

Insecticide:

Fertilizer: 95kgs/ha Superphosphate + Mn.

Appendix 2

1989 FIELD PEA SURVEY

1) Name _____

Address _____

Telephone No# _____

2) Number of years growing Field Peas _____

3) Field Pea Paddock Details

If more than one paddock sown to field peas/year please indicate paddock area and total area.

Include Proposed Plantings for 1989

Year	Variety	Area	Yield	Rotation	Soil Type No# I-V

SOIL TYPE DESCRIPTIONS

I) Poor light: deep sand, Christmas Tree and Banksia sands.

II) Good sandplain and gravel soils: Eradu, Wongan loamy sands yellow sandplain and the granitic gravel soils.

III) Duplex: sands - loamy sands over a clay subsoil, White gums

IV) Medium: loam soils (often red, Chapman Valley, Avon Valley loams.

V) Valley: sandy loams over a clay subsoil, the sandy surfaced Salmon gums, Gimlet and Moort "grey" clays.

VI) Heavy: heavy red and grey clays.

4) What are your major problem weeds in Field Peas?

5) What are your major insect problems in Field Peas?

6) Have you lost sheep from grazing field pea stubbles or standing crops due to grain poisoning or pulpy kidney.
YES/ NO. (please circle applicable situation)
Mob Size Number Lost Type and Age of Sheep

7) Harvest Details

a) Date

b) Machinery

c) Weeds present

d) Time
(before cereals -vs- after cereals)

e) Speed

f) Other

Please indicate as a % of Header Yield the amount of Field Pea seed left on the ground after harvest.
Field Pea seed left:
less than 5% 5% 10% 15% 20% greater than 20%

8) Please indicate the advantages and disadvantages of growing Field Peas (e.g.wind erosion, harvest losses, market information)

a)

b)

c)

d)

1989 FIELD PEA SURVEY RESULTS
(SUMMARY)

A statewide postal survey of field pea growers was conducted in February and March 1989.

274 field pea growers were surveyed.

125 (46%) field pea growers responded.
149 (54%) field pea growers did not respond to survey.

Of the 125 respondants 69(55%) indicated that they would be growing field peas in 1989 ,7(6%) indicated that they would not be growing field peas in 1989 and 49(39%) were undecided. An attempt was then made to contact the 49 who were undecided; of the 49-25 were contacted of which 18 indicated that they would be growing field peas in 1989 and 7 would not.
The 149 "non respondants" were also contacted by telephone and asked for their 1989 cropping programmes. Of the 149 non respondants 85(100%) were contacted of which 36(42%) indicated that they would be growing field peas in 1989 and 49(58%) indicated that they would not be growing field peas in 1989.

Q1 NAME
ADDRESS
TELEPHONE NUMBER

Q2 NUMBER OF YEARS GROWING FIELD PEAS?
ANS 1 YEAR - 13 = 10%
2 YEARS - 53 = 42%
3 YEARS - 35 = 28%
4 YEARS - 10 = 8%
GREATER THAN 4 YEARS -14 = 11%

Q3V88 VARIETY GROWN IN 1988?

Q3A88 AREA GROWN IN 1988 HECTARES?
16,417 HA(pers comm 28,354 HA)
AVERAGE/PROPERTY - 148HA FROM 110 PROPERTIES

Q3Y88 YIELD/HECTARE IN 1988? - AVERAGE YIELD T/HA = 1.0

Q3S88 MAJOR SOIL TYPE IN 1988? (1-6 AS PER MIDAS MODEL)
ANS SOIL TYPE
I) 0-0%
II) 2-1.6%
III) 9-7%
IV) 15 - 12%
V) 41-33%
VI) 44-35%
UNKNOWN 14-11%

Q3V89 VARIETY GROWN IN 1989?

Q3A89 AREA GROWN IN 1989 HECTARES? - 18,095 HA
AVERAGE/PROPERTY - 176HA FROM 69 PROPERTIES

Q3S89 MAJOR SOIL TYPE IN 1989? (1-6AS PER MIDAS MODEL)
ANS SOIL TYPE
I) 0-0%
II) 2-1.6%
III) 3-2.4%
IV) 11-9%
V) 16-13%
VI) 18- 14%
UNDECIDED 75-60%

Q4 WHAT ARE YOUR MAJOR PROBLEM WEEDS IN FIELD PEAS?
ANS - BROADLEAFED WEEDS 2-GRASSWEEDS
63 = 50% 50 = 40%

BL - BROADLEAFS	- 23 = 18%	GR - GRASSES	- 50 = 40%
DG- DOUBLEGEE	- 22 = 18%	RG - RYEGRASS	- 18 = 14%
RA - WILD RADISH	- 7 = 6%	BG- BARLEY GRASS	- 5 = 4%
MU- WILD MUSTARD	- 8 = 6%	WO-WILD OATS	- 13 = 10%
TU- WILD TURNIP	- 1 = 1%	SG- SILVER GRASS	- 0 = 0%
CA -CAPEWEED	- 2 = 2%	BR- BROMEGRASS	- 0 = 0%

UNKNOWN - 12 = 10%

Q7C WEEDS PRESENT - UNLESS STATED OTHERWISE AS PER Q4.
AT HARVEST?
ANS BROADLEAFED WEEDS GRASSWEEDS
54 = 43% 43 = 34%

BL - BROADLEAFS	- 18 = 14%	GR - GRASSES	- 8 = 6%
DG - DOUBLEGEE	- 16 = 13%	RG- RYEGRASS	- 20 = 16%
RA - WILD RADISH	- 9 = 7%	BG -BARLEY GRASS	- 3 = 2%
MU- WILD MUSTARD	- 11 = 9%	WO-WILD OATS	- 12 = 10%

UNKNOWN- 28 = 22%

Q5 WHAT ARE YOUR MAJOR INSECT PROBLEMS IN FIELDS PEAS?
ANS

		Primary	Secondary
R	-RLEM	- 13 = 10%	16
LF	- LUCERNE FLEA	- 4 = 3%	5
PW	-PEA WEEVIL	- 20 = 16%	11
HE	- HELIOTHIS	- 71 = 57%	13
U	- UNKNOWN	- 17 = 14%	

Q6 HAVE YOU LOST SHEEP FROM GRAZING FIELD PEA STUBBLES OR STANDING CROPS DUE TO GRAIN POISONING OR PULPY KIDNEY?

ANS TRUE - YES- 12 = 10%
FALSE -NO - 113 = 90%

Q7 HARVEST DETAILS.

Q7A HARVEST DATE?

ANS

← 15/10	- 9 = 7%
15/10- 1/11	- 27 = 22%
1/11- 15/11	- 31 = 25%
15/11 - 31/11	- 14 = 11%
1/12- 15/12	- 2 = 2%
15/12→	- 7 = 6%
UNKNOWN	- 19 = 15%

Q7B MACHINERY?

ANS

- C = CONTRACT	- 8 = 6%
- OF = OPEN FRONT	- 33 =26%
- CF = CLOSED FRONT	- 1 = 1%
- LOF = LIFTERS OPEN FRONT	- 32=26%
- POF = PLUCKER OPEN FRONT	- 34 = 27%
- U = UNKNOWN	- 18 = 14%

Q7D TIME OF HARVEST?

ANS BEFORE CEREALS-1 - 93 = 74%
AFTER CEREALS - 3 - 7 = 6%

Q7E SPEED OF HARVEST KM/HOUR.

ANS LESS THAN & EQUAL TO 5KM/HOUR -62 = 50%
GREATER THAN 5KM/HOUR - 62 = 50%

Q7F OTHER HARVEST DETAILS

Q7G HARVEST LOSSES

ANS

- 1=LESS THAN 5%	- 12=10%
- 2=EQUALS 5%	- 22 = 18%
- 3 = 5-> 10%	- 5 = 4%
- 4=EQUALS 10%	- 34 = 27%
- 5 = 10-> 15%	- 4 = 3%
- 6 = EQUALS 15%	- 12= 10%
- 7 = 15-> 20%	- 12= 10%
- 8=EQUALS 20%	- 12= 10%
- 9=GREATER THAN 20%	- 3 = 2%

Q8A ADVANTAGES GROWING FIELDPEAS?

ANS

- DIEASE BREAK }	
- INPUT OF NITROGEN}	R - 58 = 46%
- +VE WHEAT YIELD }	
- INCOME }	M - 12= 10%
- SHEEP, STOCKFEED }	SF - 24 =19%

Q8D	DISADVANTAGES GROWING FIELDPEAS ?		
ANS	- WIND EROSION	} WE	-54 = 43%
	- NIL GRAZING	} G	- 1 = 1%
	- INSECTS & DISEASE	} I	- 6 = 5%
	- HARVEST DIFFICULTIES	}HD	-21 = 17%
	- STOCK LOSSES/HARVEST LOSSES	} S	- 5 = 4%
	- BUILD UP OF WEEDS	} W	-10 = 8%
	- UNKNOWN		-16=13%