1987

Harvested and grazed lupin stubbles on following wheat South Carrabin.

J W. Bowden

South Carrabin Lease Block
(86M8 and 87M7)

1987 rainfall

	Date/mm		Date/mm		Date/mm
January	22/ 1.0	June	4/ 1.0	September	12/3.7
			7/ 5.0		23/9.2
February	Nil		8/10.4		24/3.2
			10/ 2.6		26/1.4
March	15/ 0.2		16/N x P		27/1.6
	24/ 0.6		19/ 9.4		
	26/ 0.8		29/ 3.6	October	6/1.5
	31/ 0.5				12/6.8
		July	6/ 7.8		13/4.9
April	8/ 7.6		9/ 2.3		14/0.6
	10/ 0.8		23/ 3.2		15/0.3
	11/ 0.5		29/24.4		
	26/23.0		30/11.2	November	1/8.8
	29/ 0.8		31/ 3.0		11/0.6
	30/ 8.6				15/4.2
		August	1/ 0.3		16/1.5
May	6-10/25.6		13/13.2		28/0.6
	11/ 3.0		14/ 0.3		30/6.4
	12/ 0.9		20/ 9.8		
			26/12.4		

Irrigation 1987

	Date	1/9	16/9	1/10	12/10	22/10
87M7	mm	12	13	21	17	17

86M8 Grazing and harvesting lupins and the nitrogen requirements of a following wheat crop
(with Bill Booth, Mel Mason and Ian Rowland)

Location: Merredin Research Station - South Carrabin Block

Soil:

Depth	Clay %	pH (H_2O)	OC W%	Total N %	C/N ratio
0-10 cm	14.3	5.5	0.66	0.028	23.7
0-15 cm	14.8	5.2	0.60	0.027	22.1
15-30 cm	19.8	4.8	0.44	0.023	19.2
30-45 cm	22.3	4.5	0.24	0.016	15.4

Yellow loamy sand

History: Cleared 1984
Wheat 1985 200 kg Super Cu Mo Zn
Trial commenced 1986
Harvested lupins 1/12/86 354 kg/ha
Harvested oats 5/12/86 633 kg/ha
Grazed plots - light grazing January 1987
Animals from paddock grazed plots 10, 11 and 12 very hard in February 1987
Coarse organic matter was scraped up after harvest but prior to grazing on 8/12/86. This was also carried out after grazing on 3/2/87 and again prior to seeding on 6/5/87. Soil mineral nitrogen was measured on bulked 0-10 cm cores at the time of each scraping and in profiles to 50 cm at seeding.

Seasonal: 1987
Cultivated on 7/5/87
Sown with 45 kg/ha Eradu on 25/5. 200 kg Super/ha drilled with the seed. The seed was not treated with sodium molybdate.

Plots cut for dry matter and N uptake on 20/7 and 1/10 and the plots were harvested for grain yield on or about 1/12/87.

Comments: This trial is difficult to analyze statistically because of the treatment changes induced by sheep breaking in to some of the plots. Further, lupin grain yields were not very high and so differences between harvested and unharvested treatments are not large. Also the grazing intensity was not very severe (except on the unintentionally grazed plots) and so the effect of grazing is also relatively small.

(1) The main effect of grazing was to remove seed (and seed nitrogen). However grazing also seemed to promote early germination of lupin seeds so that a green manuring effect was possible (albeit small). On the ungrazed plots, germination of lupins occurred after seeding cultivation.

(2) Nitrogen in lupin tops on 15/10/86 did not reflect final nitrogen yields as determined by scrapings (i.e. lupins fix and translocate nitrogen from the roots to the tops right up to maturity).

(3) The unharvested but grazed treatments (LG and LGG) showed higher mineral nitrogen in the soil than the analogous harvested or ungrazed treatments. Obviously animals help turn residue nitrogen into inorganic nitrogen. The summer and autumn periods were very dry and so there was not a big turnover of organic nitrogen from the ungrazed treatments (L and LH) and there was not a lot of nitrogen to turn over on the harvest and grazed treatment (LHG).

(4) The unharvested ungrazed lupin plot seemed to give better dry matter production, grain yield and nitrogen uptake figures than the other lupin treatments, in the absence of fertilizer nitrogen at all but the first assessment. Even there, uptake was highest on this treatment. This reflects the total nitrogen measured on the plots but not the mineral nitrogen measured at seeding.

(5) The 1986 lupin treatments gave early yield and nitrogen uptake figures in wheat which were equivalent to between 20 and 30 kg/ha of fertilizer nitrogen on the 1986 oats plots. Later in the season, the lupin treatments were equivalent to between 30 and 40 kg/ha fertilizer nitrogen.

(6) This trial (minus oats treatment) is being repeated in 1988 at South Carrabin on a 1987 bulk lupin crop.

86M8 Recoveries of dry matter (kg/ha) in various fractions - summer 1986/87

Treatment (plots)	Fraction	15/10	8/12	3/2	6/5
Oats (1, 9, 13)	Coarse		1,718	1,402	639
	Fine		331	210	214
Grazed	Faeces		-	9	7
	Green		-	-	5
	Total	2,470	2,039	1,621	865
Lupin (5, 8, 15)	Coarse		926	750	726
Harvested and	Fine		408	364	252
grazed	Faeces	-	-	36	15
	Seed		93	13	10
	Green		-	-	6
	Total	1,620	1,427	1,163	1,009
Lupin (4, 6, 14)	Coarse		1,145	705	692
	Fine		768	339	199
Grazed	Faeces		-	34	61
	Seed		505	36	31
	Green		-	-	31
	Total	1,770	2,418	1,114	1,014
Lupin (3, 7)	Coarse		778	1,049	902
	Fine		568	594	414
Harvested	Seed		148	156	134
	Green		-	-	1
	Total	1,780	1,494	1,799	1,451
Lupin (2)	Coarse		1,289	1,070	907
	Fine		786	713	378
	Seed		611	598	522
	Green		-	-	5
	Total	2,680	2,686	2,381	1,812

Fractions

Coarse: Material greater than 2 mm includes coarse stems, branches, pods and petioles.

Fine: Material which passed a 2 mm sieve, some was floated from the soil fraction: includes leaflets and fine organic material.

Individual analyses (corrected on ash content back to 4% ash) are available for coarse stems (> 4 mm), medium stems and pods (> 2 mm), fine leaflets etc. (< 2 mm) and fine floated material (< 2 mm).

86M8 Recoveries of nitrogen (kg N/ha) in various fractions - 1986/87

Treatment (plots)	Fraction	15/10	8/12	3/2	6/5
Oats (1, 9, 13)	Coarse		13.1	9.6	4.1
	Fine		2.2	2.9	2.6
Grazed	Faeces		-	0.2	0.1
	Green		-	-	0.2
	Soil*		4.5	9.0	8.0
	Total	27.1	19.8	21.7	15.0
Lupin (5, 8, 15)	Coarse		8.7	8.3	5.5
Harvested and	Fine		14.6	12.7	7.6
grazed	Faeces		-	0.8	0.3
	Seed		4.7	0.7	0.5
	Green		-	-	0.5
	Soil*		18.0	20.0	22.7
	Total	47.3	46.0	42.5	37.1
Lupin (4, 6, 14)	Coarse		13.0	6.4	5.5
	Fine		30.4	9.6	4.6
Grazed	Faeces		-	0.7	1.5
	Seed		25.2	1.8	1.5
	Green		-	-	2.7
	Soil*		18.0	27.0	32.3
	Total	58.3	86.6	45.5	48.1
Lupin (3, 7)	Coarse		8.2	9.7	9.2
	Fine		18.5	21.5	14.8
Harvested	Seed		7.4	8.0	6.7
	Green		-	-	0.1
	Soil*		15.2	19.0	21.0
	Total	52.6	49.3	58.2	51.8
Lupin (2)	Coarse		14.0	8.9	1.3
	Fine		33.4	27.3	13.8
	Seed		30.6	29.0	26.1
	Green		-	-	0.4
	Soil*		22.7	22.5	21.0
	Total	78.5	100.7	87.7	62.6

* NH_4 + NO_3 nitrogen in 0-10 cm samples of bulk density 1.5.

86M8 Mineral nitrogen profiles 6/5/1987

Treatment	Oats	LHG	NH_4 + NO_3 Nitrogen (ppm) LG	LH	L	LGG
reps	3	3	3	2	1	2
depth (cm)						
0-10	4.7	15.0	22.0	13.5	13.0	14.7
10-20	3.7	10.3	9.3	7.5	7.0	6.7
20-30	2.7	3.3	3.3	3.0	3.0	4.3
30-40	2.3	2.0	2.7	2.5	2.0	3.0
40-50	2.7	2.0	2.7	2.5	2.0	3.0
Bulk 0-10	5.3	15.7	22.0	14.0	14.0	18.7
kg N/ha 0-50 cm	24	49	60	44	40	48

86M8 Grazed and harvested lupins and the nitrogen requirement of a subsequent cereal crop

1987 crop results

(a) Dry matter production 21/7/1987 (kg/ha)

1986 Treat.	Reps	1987 kg N/ha (as Agran 34:0) Nil	10	20	30	40	80	160
Oats H, G	3	58	79	84	124	134	129	138
Lupin H, G	3	117	120	125	161	149	164	155
Lupin G	3	109	129	147	142	134	170	175
Lupin H	2	122	106	133	117	153	149	167
Lupin	1	112	112	130	144	154	149	203
Lupin GG	2	86	119	99	127	152	162	150

(b) Nitrogen uptake 21/7/1987 kg/ha

1986 Treat.	Reps	1987 kg N/ha (as Agran 34:0) Nil	10	20	30	40	80	160
Oats H, G	3	2.0	2.8	3.3	4.9	5.7	6.0	6.4
Lupin H, G	3	4.3	4.8	5.1	6.7	6.4	7.1	7.2
Lupin G	3	4.3	5.2	6.2	5.8	5.9	7.5	8.2
Lupin H	2	4.4	4.2	5.5	5.2	6.8	6.8	7.6
Lupin	1	4.8	4.7	5.6	6.1	7.0	6.8	10.0
Lupin GG	2	3.4	5.0	4.3	5.8	6.6	7.4	6.9

(c) Dry matter production 1/10/1987 (t/ha)

1986 Treat.	Reps	1987 kg N/ha (as Agran 34:0) Nil	10	20	30	40	80	160
Oats H, G	3	0.9	1.2	1.6	1.8	2.0	2.3	2.5
Lupin H, G	3	1.7	1.7	1.9	1.8	2.1	2.3	2.2
Lupin G	3	1.8	1.6	1.9	2.1	2.0	2.2	2.1
Lupin H	2	1.5	1.6	1.5	1.7	1.8	1.9	2.4
Lupin	1	2.2	1.7	2.1	1.8	2.5	3.0	3.1
Lupin GG	2	1.8	1.9	1.7	1.9	2.0	2.1	2.3

H = Harvested
G = Grazed
GG = Extreme grazing (by mistake)

(d) Nitrogen uptake (1/10/1987) kg/ha

1986 Treat.	Reps	1987 kg N/ha (as Agran 34:0) Nil	10	20	30	40	80	160
Oats H, G	3	9	12	18	19	21	31	37
Lupin H, G	3	18	17	20	19	23	25	27
Lupin G	3	19	17	20	25	21	26	25
Lupin H	2	17	19	16	19	20	25	31
Lupin	1	20	18	26	18	27	35	38
Lupin GGG	2	18	20	20	20	22	27	27

(e) Grain yield (27/11/1987) t/ha

1986 Treat.	Reps	1987 kg N/ha (as Agran 34:0) Nil	10	20	30	40	80	160
Oats H, G	3	0.46	0.68	0.80	0.90	0.98	1.22	1.20
Lupin H, G	3	0.92	0.98	1.06	1.03	1.09	1.18	1.24
Lupin G	3	0.93	1.10	1.08	1.16	1.11	1.21	1.32
Lupin H	2	0.90	0.90	0.93	0.99	0.98	1.07	1.22
Lupin	1	1.11	0.92	1.05	1.23	1.20	1.35	1.26
Lupin GGG	2	0.98	1.01	1.09	1.16	1.10	1.28	1.28

(f) Grain nitrogen uptake (27/11) kg/ha

1986 Treat.	Reps	1987 kg N/ha (as Agran 34:0) Nil	10	20	30	40	80	160
Oats H, G	3	10	13	16	18	20	26	28
Lupin H, G	3	20	21	24	23	25	28	31
Lupin G	3	20	24	24	26	26	29	33
Lupin H	2	20	20	21	22	23	26	30
Lupin	1	23	21	24	27	27	32	32
Lupin GGG	2	20	22	24	25	25	29	31

Nitrogen Phosphorus and Irrigation of Wheat
(with Mel Mason)

This trial was designed to give a nitrogen/phosphorus response surface on wheat under a couple of seasonal conditions. The information can be used directly to test some of the functions used in NPDECIDE. Because we also measured N and P concentrations in the tops, critical levels for these nutrients can also be determined as a function of time and demand.

Trial no.: 87M7
Location: South Carrabin lease block. Paddock above the dam (Booth)
Soil: Yellow sandy loam; Bic.P, 7 ppm; Bic.K, 33 ppm. pH 5.3(H_2O)
Vegetation: Wodgil and Tamma scrub

History: Cleared 1984/85
1985 Gamenya wheat with 200 kg/ha super Cu, Zn and Mo and 60 kg/ha Agran 34
1986 Eradu wheat and 200 kg plain super and 60 kg/ha Agran 34

Seasonal: Sown late (16/6/87) with 12 run cone seeder. Cu and Zn sprayed out prior to seeding. Super rates drilled as TSP. Eradu wheat at about 50 kg/ha gave an average of 105 plants per m^2 on 6/8. High N and P rates reduced plant densities from about 120 plants/m^2 to about 90 plants/m^2. Tillering at 6/8 compensated for these low densities. There was some evidence of early septoria attack. Early growth was very slow.
Overhead irrigation was applied on 1/9 (12 mm), 16/9 (13), 1/10 (21), 12/10 (17), 22/10 (17).