1985

Residual value of legumes.

J. Hamblin

R. Delane

G. Adams

A Bishop

EXPERIMENTAL SUMMARY

1985 SEASON

RESIDUAL VALUE OF LEGUMES

85 C 25
85 C 46 (CRIDDLE)
85 C 46 (GILL)
85 C 47

by Dr. John Hamblin,
Mr. Rob Delane
Mr. Glenn Adams
Ms. Alice Bishop

SUMMARY

This report examines the residual value of lupins and several other species grown at ECRS in 1984 on the yield of wheat in 1985 (85 C 25). 85 C 46 examined the residual effect of several lupin species and varieties grown under different nutritional treatments in 1984 at two sites differing in rainfall on wheat yields in 1985. 85 C 47 examines the interaction between levels of applied potassium and deep cultivation (ripping) on the yield of wheat at a low K, dry site.

REPORT ON 85 C 27 (Small Rotation trial)

AIM.

To determine if reduced branching lupins have a lower residual value to following crops than normal, branched lupins, and to compare this with the residual effect of other speceies.

METHODS AND MATERIALS

In 1984 plots of the following crops and varieities were grown:

Crop	Variety
Rapeseed	Wesbrook
Oats	Mortlock
Barley	Stirling
Wheat	Eradu
Lupins	Illyarrie
	Chittick
	Marri
	75A39-113
	Erregulla
Wheat/lupin mixture	Eradu/Illyarrie
Medic pasture	Harbinger

The plots were 60m x 1.4m on 1.75m centres. In 1985 these were devided into 5plots 10m long and deep ripped. The design used was a split plot and there were 6 replications. Because of difficulties in weed control in 1984 planting was delayed to allow most brome grass to germinate. The agronomic treatments used in 1985 are listed below:

Treatment	Date
Deep ripped	7.6.85
Sprayseed at 1 l/ha.	10.6.85
Sprayseed at 2 l/ha + Glean at 20 g/ha	18.6.85
Seeded Gutha at 50 kg/ha + TSP at 130 kg/ha	18.6.85
K applied at 100 kg/ha	22.7.85
N rates applied (0, 12.5, 25, 50, 100 kg/ha)	22.7.85
SSH applied at 1.2 l/ha	29.7.85

The following characters were measured:

Biological yield antheisis (BYANT) N = 0 and 100 only	13.9.85
Biological yields (BY)	
Grain yields (GY)	
Yield components obtained in lab post harvest	
Heads/m2, Grains/head and seed weight	
Hand samples (2 x 0.2m2)	1.11.85
Hege harvest yields	10.11.85

The results are given in table 1-7.

TABLE 1.
BY ANTHESIS (t/ha) N 0 and N 100 treatments only.

1984			1985			
TREATMENTS	N 0	N 12.5	N 25	N 50	N 100	Mean
ILLYARRIE	3.33				3.86	3.59
CHITTICK	2.52				2.91	2.71
MARRI	2.63				3.07	2.85
75A39-113	3.01				3.22	3.11
ERRAGULLA	2.86				3.03	2.94
ILLY+ERADU	2.37				2.63	2.50
ERADU	2.47				2.73	2.60
STIRLING	2.81				2.54	2.68
MORTLOCK	1.66				2.26	1.96
WESBROOK	3.14				3.21	3.17
HARBINGER	2.70				3.03	2.86
MEAN	2.68				2.96	2.82

TABLE 2.
BY HARVEST (t/ha)

1984			1985			
TREATMENTS	N 0	N 12.5	N 25	N 50	N 100	MEAN
ILLYARRIE	3.35	3.04	4.09	3.60	3.24	3.46
CHITTICK	3.38	2.92	2.96	3.19	3.51	3.19
MARRI	3.78	3.48	2.68	3.53	3.01	3.30
75A39-113	3.15	3.55	3.60	3.40	3.47	3.43
ERRAGULLA	2.92	3.21	2.87	3.33	2.76	3.02
ILLY+ERADU	3.04	3.49	3.64	3.48	3.09	3.35
ERADU	3.46	3.70	3.51	3.38	3.56	3.52
STIRLING	3.72	3.43	4.24	3.16	4.16	3.74
MORTLOCK	2.64	3.44	3.32	3.44	3.53	3.27
WESBROOK	3.54	3.74	3.84	3.39	3.22	3.43
HARBINGER	3.72	4.15	3.07	3.90	3.31	3.63
MEAN	3.34	3.47	3.44	3.44	3.35	3.41

TABLE 3
GY (t/ha)

1984			1985			
TREATMENTS	N 0	N 12.5	N 25	N 50	N 100	MEAN
ILLYARRIE	1.38	1.29	1.58	1.44	1.20	1.38
CHITTICK	1.38	1.10	1.11	1.19	1.31	1.22
MARRI	1.41	1.31	1.01	1.32	1.17	1.24
75A39-113	1.25	1.37	1.42	1.27	1.39	1.32
ERRAGULLA	1.18	1.26	1.08	1.31	1.04	1.17
ILLY+ERADU	1.26	1.53	1.48	1.41	1.35	1.40
ERADU	1.46	1.61	1.52	1.38	1 87	1.57
STIRLING	1.61	1.48	1.89	1.35	1.49	1.56
MORTLOCK	1.12	1.49	1.41	1.43	1.36	1.37
WESBROOK	1.46	1.57	1.57	1.39	1.35	1.47
HARBINGER	1.52	1.69	1.09	1.52	1.29	1.42
MEAN	1.37	1.43	1.38	1.36	1.34	1.38

TABLE 4
HARVEST INDEX (%).

1984			1985			
TREATMENTS	N 0	N 12.5	N 25	N 50	N 100	MEAN
ILLYARRIE	41	41	38	40	36	39
CHITTICK	40	37	37	37	37	38
MARRI	37	37	37	37	38	37
75A39-113	39	38	39	37	37	38
ERRAGULLA	40	39	37	39	37	38
ILLY+ERADU	41	43	40	40	45	42
ERADU	41	42	43	40	64 ?	46(41)
STIRLING	43	42	44	41	36	41
MORTLOCK	42	42	41	41	38	41
WESBROOK	41	42	41	41	41	41
HARBINGER	40	40	35	33	38	37
MEAN	40	40	39	39	41	40

TABLE 5
HEADS/M2

1984			1985			
TREATMENTS	N 0	N 12.5	N 25	N 50	N 100	MEAN
ILLYARRIE	195	176	225	205	186	197
CHITTICK	205	179	173	187	204	190
MARRI	232	210	177	206	175	184
75A39-113	197	193	195	178	194	191
ERRAGULLA	175	202	185	192	156	182
ILLY+ERADU	173	203	212	188	178	191
ERADU	192	193	181	177	175	184
STIRLING	194	187	210	178	192	192
MORTLOCK	152	197	186	187	177	180
WESBROOK	191	183	216	186	175	190
HARBINGER	204	222	165	195	180	193
MEAN	192	195	193	189	181	190

TABLE 6
SEEDS/HEAD

1984			1985			
TREATMENTS	N 0	N 12.5	N 25	N 50	N 100	MEAN
ILLYARRIE	24.9	24.5	24.7	24.9	23.9	24.6
CHITTICK	23.5	21.5	20.2	23.6	22.3	22.1
MARRI	22.3	22.8	21.8	23.5	30.2	24.1
75A39-113	22.9	22.1	26.8	25.6	24.9	24.5
ERRAGULLA	23.3	23.0	22.3	24.2	25.4	23.6
ILLY+ERADU	23.7	24.4	24.8	25.7	24.6	24.6
ERADU	24.7	26.2	27.5	25.0	26.6	26.0
STIRLING	26.1	24.5	27.9	24.8	26.8	26.0
MORTLOCK	24.0	24.2	25.0	25.4	25.2	24.8
WESBROOK	25.7	26.8	25.3	27.0	26.3	26.2
HARBINGER	25.9	25.3	26.1	28.4	25.7	26.3
MEAN	24.3	24.1	24.8	25.3	25.6	24.8

TABLE 7
1000 SEED WEIGHT (g)

1984	1985					
TREATMENTS	N 0	N 12.5	N 25	N 50	N 100	MEAN
ILLYARRIE	29.2	29.1	28.5	31.0	26.7	28.7
CHITTICK	28.7	29.4	32.8	27.1	29.0	29.4
MARRI	27.4	27.0	25.9	27.1	24.1	26.3
75A39-113	27.4	34.0 ?	27.6	28.1	26.6	28.7
ERRAGULLA	28.9	27.4	26.6	28.2	25.8	27.4
ILLY+ERADU	30.6	30.6	28.3	28.2	33.3	30.2
ERADU	30.3	31.4	30.2	31.0	45.5 ?	33.7
STIRLING	32.0	32.3	32.5	30.8	29.4	31.4
MORTLOCK	30.7	30.8	30.0	29.7	31.8	30.6
WESBROOK	29.5	31.4	28.8	27.4	29.0	29.3
HARBINGER	28.9	29.7	24.8	27.7	27.5	27.7
MEAN	29.3	30.3	28.7	28.8	29.9	29.4

Table 8 summarises the main effects of the 1984 treatments into 5 groups, wheat following lupins (W/L), wheat following medic pasture (W/P), wheat following a lupin/cereal mixture (W/M), wheat following rape, a non-leguminous break crop (W/R), and wheat folllowing cereal (W/C).

TABLE 8.
Summary of Tables 1-7

1984	1985 Response						
Treatment	BY ANT	BY	GY	HI	Heads /m2	Seeds /head	Seed wt g
W/L	3.04	3.27	1.27	38	189	23.8	27.8
W/P	2.86	3.63	1.42	37	193	26.3	27.7
W/M	2.50	3.35	1.40	42	191	24.6	30.2
W/R	3.17	3.43	1.47	41	190	26.2	29.3
W/C	2.41	3.51	1.50	41	185	25.6	30.9

REPORT ON 85 C 46

This trial compares the residual value of different lupin species and varieties when grown at 3 different levels of nutrition at 2 sites differing in rainfall (Criddle and Gill, low and high rainfall respectively) .

METHODS AND MATERIALS

In 1984 the following and varieities were grown: Illyarrie, Marri, 75A39-113, Soft seeded Erregulla, Kiev Mutant. Three levels of fertlizer were applied, trace elements (TE) only, TE + P and TE + P + K. The plots were 60m x 1.4m on 1.75m centres. In 1985 these were devided into 5 sub-plots 10m long (split plot design). There were 4 replications. All plots were deep cultivated (ripped). The agronomic treatments used in 1985 are listed below:

Treatments	Criddle	Gill
Wheat Variety	Gutha	Gutha
Deep ripped	Yes preplant	Yes preplant
Srayseed 21/ha	8.6.85	10.6.85
Glean	20g on 8.6.85	25g on 9.6.85
Planted 50 kg/ha	8.6.85	10.6.85
P appliedat planting	TSP 103 kg/ha	Super300kg/ha
K applied 100 kg/ha	11.7.85	10.7.85
N applied 0,12.5,25,50,100	11.7.85	10.7.85
MCPA 1.5 l/ha Diuron .35l/ha	29.7.85	-
Combine 20 l/ha	-	11.7.85
BYANT (1 x .2 m2 quadrat)	6.9.85	30.8.85
Hand harvest (2 x .2 m2)	21.10.85	11.7.85

The data is given in table 1 - 7.

TABLE 1
BIOLOGICAL YIELD AT ANTHESIS (t/ha, N 0 and N 100 only)

	SITE	CRIDDLE			GILL		
1984 Treatment		1985 N RATES KG/GA.					
		0	100	MEAN	0	100	MEAN
Illyarrie	TE	2.09	3.09	2.59	2.25	3.92	3.08
	TE+P	1.87	3.00	2.43	2.76	4.19	3.47
	TE+P+K	1.86	3.74	2.80	2.78	4.30	3.54
Marri	TE	1.94	2.96	2.45	2.18	4.10	3.14
	TE+P	2.83	3.10	2.96	3.07	4.76	3.91
	TE+P+K	2.28	3.26	2.77	3.38	5.38	4.38
75A39-113	TE	2.11	3.00	2.55	2.39	3.94	3.16
	TE+P	1.99	3.85	2.94	3.10	4.30	3.70
	TE+P+K	1.99	3.35	2.67	3.15	4.84	3.99
Erragulla	TE	2.80	3.73	3.26	2.85	5.17	4.01
	TE+P	2.31	3.71	3.01	2.76	4.18	3.47
	TE+P+K	2.75	4.34	3.54	2.24	4.30	3.27
Kiev Mutant	TE	1.91	3.05	2.48	1.90	3.89	2.89
	TE+P	2.11	3.94	3.02	2.62	4.60	3.61
	TE+P+K	2.30	4.16	3.23	2.51	4.29	3.40
MEAN		2.21	3.48	2.84	2.66	4.09	3.37

TABLE 2
BIOLOGICAL YIELD AT MATURITY (t/ha)

Site CRIDDLE

1984 Treatment		1985 N RATES KG/GA. 0	12.5	25	50	100	MEAN
Illyarrie	TE	3.49	3.89	4.22	4.95	4.35	4.18
	TE+P	4.05	4.63	4.54	4.56	4.02	4.36
	TE+P+K	3.81	3.47	4.47	5.16	4.17	4.21
Marri	TE	3.37	3.86	4.28	4.29	4.28	4.09
	TE+P	3.32	3.69	3.89	4.22	4.35	3.90
	TE+P+K	3.32	3.46	4.26	4.99	4.72	4.15
75A39-113	TE	3.55	4.40	4.25	4.31	4.80	4.26
	TE+P	3.82	4.49	4.28	4.78	4.41	4.36
	TE+P+K	4.69	2.93	4.77	4.41	4.92	4.34
Erragulla	TE	3.67	4.19	3.73	4.75	5.30	4.33
	TE+P	3.81	4.13	4.26	3.93	4.02	4.03
	TE+P+K	3.83	3.76	4.33	4.23	3.94	4.02
Kiev Mutant	TE	3.93	4.22	4.86	5.06	4.12	4.44
	TE+P	3.99	4.05	4.70	5.21	5.73	4.74
	TE+P+K	4.06	3.92	4.88	5.19	5.25	4.66
MEAN		3.81	3.94	4.38	4.67	4.56	4.27

Site GILL

1984 Treatment		1985 N RATES KG/GA. 0	12.5	25	50	100	MEAN
Illyarrie	TE	4.99	5.29	6.08	6.08	6.13	5.71
	TE+P	6.13	6.50	6.52	6.97	7.01	6.63
	TE+P+K	6.19	6.90	6.15	6.54	8.15	6.79
Marri	TE	4.99	5.93	5.68	6.17	6.87	5.93
	TE+P	5.83	4.56	6.89	6.87	7.82	6.39
	TE+P+K	5.94	7.04	8.39	8.34	7.67	7.48
75A39-113	TE	4.57	5.32	5.16	6.22	5.71	5.40
	TE+P	6.80	5.93	6.76	6.99	8.67	7.03
	TE+P+K	6.25	5.95	6.09	6.89	7.58	6.55
Erragulla	TE	4.96	6.53	7.06	5.51	6.40	6.09
	TE+P	5.27	5.16	6.83	6.85	6.76	6.17
	TE+P+K	5.54	5.69	6.14	7.75	7.38	6.50
Kiev Mutant	TE	3.66	4.53	5.52	5.62	6.48	5.16
	TE+P	4.77	5.42	6.56	6.54	6.52	5.96
	TE+P+K	4.31	6.05	5.45	5.99	6.80	5.72
MEAN		5.35	5.92	6.35	6.62	7.06	6.26

TABLE 3
GRAIN YIELD (t/ha)
Site CRIDDLE

1984 Treatment		1985 N RATES KG/GA. 0	12.5	25	50	100	MEAN
Illyarrie	TE	1.58	1.83	1.90	2.21	1.83	1.87
	TE+P	1.93	2.12	2.02	1.94	1.65	1.93
	TE+P+K	1.70	1.46	1.87	2.10	1.61	1.75
Marri	TE	1.67	1.59	1.81	1.75	1.72	1.71
	TE+P	1.48	1.54	1.71	1.74	1.73	1.64
	TE+P+K	1.43	1.45	1.69	1.82	1.83	1.65
75A39-113	TE	1.58	2.00	1.88	1.83	2.01	1.86
	TE+P	1.72	2.06	1.95	2.12	1.95	1.96
	TE+P+K	2.05	1.41	2.00	1.91	1.85	1.84
Erragulla	TE	1.67	1.89	1.60	2.05	2.21	1.88
	TE+P	1.61	1.85	1.79	1.43	1.59	1.66
	TE+P+K	1.68	1.55	1.77	1.60	1.59	1.64
Kiev Mutant	TE	2.10	1.93	2.35	2.18	1.66	2.04
	TE+P	1.82	1.73	1.97	2.29	2.45	2.05
	TE+P+K	1.74	1.71	2.15	2.24	2.08	1.99
MEAN		1.72	1.74	1.90	1.95	1.85	1.83

Site GILL

1984 Treatment		1985 N RATES KG/GA. 0	12.5	25	50	100	MEAN
Illyarrie	TE	2.15	2.34	2.47	2.81	2.67	2.49
	TE+P	2.75	3.04	2.94	3.19	2.99	2.98
	TE+P+K	2.91	3.17	2.81	2.86	3.44	3.04
Marri	TE	2.18	2.80	2.59	2.81	3.01	2.68
	TE+P	2.69	2.04	3.10	3.07	3.51	2.88
	TE+P+K	2.89	3.22	3.78	3.74	3.46	3.42
75A39-113	TE	2.00	2.39	2.23	2.70	2.51	2.37
	TE+P	3.16	2.76	3.01	3.03	3.81	3.15
	TE+P+K	2.90	2.78	2.84	3.01	3.37	2.98
Erragulla	TE	2.32	2.91	3.27	2.38	2.76	2.73
	TE+P	2.36	2.41	3.13	3.01	2.78	2.74
	TE+P+K	2.66	2.59	2.75	3.29	3.17	2.89
Kiev Mutant	TE	1.56	1.91	2.44	2.50	2.84	2.25
	TE+P	2.17	2.63	3.02	2.76	2.79	2.67
	TE+P+K	1.86	2.79	2.56	2.55	3.15	2.58
MEAN		2.43	2.65	2.86	2.91	3.08	2.79

TABLE 4
HARVEST INDEX (%)
Site CRIDDLE

1984 Treatment		1985 N RATES KG/GA. 0	12.5	25	50	100	MEAN
Illyarrie	TE	45	46	44	44	41	44
	TE+P	47	45	44	41	40	44
	TE+P+K	44	42	41	40	38	41
Marri	TE	44	41	42	40	40	41
	TE+P	45	41	43	40	40	42
	TE+P+K	43	41	39	35	38	39
75A39-113	TE	44	44	43	42	41	43
	TE+P	44	45	44	44	43	44
	TE+P+K	43	49	42	38	37	42
Erragulla	TE	45	45	42	43	41	43
	TE+P	42	44	42	36	40	41
	TE+P+K	43	41	41	37	40	40
Kiev Mutant	TE	54	45	47	42	40	46
	TE+P	45	42	41	43	42	43
	TE+P+K	43	43	43	43	39	42
MEAN		45	44	43	40	40	42

Site GILL

1984 Treatment		1985 N RATES KG/GA. 0	12.5	25	50	100	MEAN
Illyarrie	TE	47	47	47	47	44	46
	TE+P	45	47	45	46	43	45
	TE+P+K	47	46	46	44	43	45
Marri	TE	44	47	45	45	44	45
	TE+P	46	45	45	45	45	45
	TE+P+K	49	46	45	45	46	46
75A39-113	TE	44	45	43	43	44	44
	TE+P	47	47	45	43	44	45
	TE+P+K	47	47	47	44	44	46
Erragulla	TE	47	45	46	43	42	45
	TE+P	45	46	46	44	41	44
	TE+P+K	49	45	45	42	43	45
Kiev Mutant	TE	43	42	44	45	44	44
	TE+P	45	48	46	42	43	45
	TE+P+K	43	46	47	43	47	45
MEAN		46	46	45	46	44	45

TABLE 5
HEADS/ M2
Site CRIDDLE
1984 Treatment

		1985 N RATES KG/GA.					
		0	12.5	25	50	100	MEAN
Illyarrie	TE	179	175	204	236	222	203
	TE+P	200	221	208	222	207	212
	TE+P+K	184	174	200	224	212	199
Marri	TE	185	181	209	218	232	205
	TE+P	174	189	186	212	229	198
	TE+P+K	149	168	226	237	218	200
75A39-113	TE	160	199	199	202	235	199
	TE+P	185	211	211	209	208	205
	TE+P+K	226	164	226	251	242	222
Erragulla	TE	174	194	181	232	252	207
	TE+P	193	202	186	210	190	196
	TE+P+K	192	192	203	207	196	198
Kiev Mutant	TE	207	186	209	221	170	198
	TE+P	199	186	214	243	249	218
	TE+P+K	199	195	214	232	255	219
MEAN		187	189	205	224	221	205

Site GILLS
1984 Treatment

		1985 N RATES KG/GA.					
		0	12.5	25	50	100	MEAN
Illyarrie	TE	202	199	202	249	223	215
	TE+P	212	258	236	263	267	247
	TE+P+K	257	228	258	328	202	255
Marri	TE	206	221	204	218	263	222
	TE+P	242	183	233	250	278	237
	TE+P+K	252	261	317	306	296	286
75A39-113	TE	210	218	212	241	232	223
	TE+P	264	225	245	266	335	267
	TE+P+K	257	268	226	260	299	262
Erragulla	TE	227	253	278	224	247	246
	TE+P	203	201	261	280	272	243
	TE+P+K	217	206	294	284	306	261
Kiev Mutant	TE	166	187	208	197	234	198
	TE+P	191	210	222	262	312	239
	TE+P+K	191	226	225	222	323	237
MEAN		220	225	241	257	273	243

TABLE 6
SEEDS/HEAD
Site CRIDDLE

1984 Treatment		1985 N RATES KG/GA. 0	12.5	25	50	100	MEAN
Illyarrie	TE	26.1	31.2	28.5	28.7	28.4	28.6
	TE+P	28.9	27.0	28.3	28.5	26.1	27.7
	TE+P+K	27.0	25.6	28.3	29.6	28.4	27.8
Marri	TE	29.3	28.2	29.2	26.9	25.0	27.7
	TE+P	26.4	27.2	29.2	25.9	26.5	27.0
	TE+P+K	30.0	28.8	25.0	26.3	28.9	27.8
75A39-113	TE	33.1	29.4	30.1	29.5	27.1	29.8
	TE+P	28.7	28.8	27.4	30.9	30.1	29.1
	TE+P+K	38.5 ?	26.2	27.7	29.7	28.2	30.0
Erragulla	TE	31.0	29.5	26.8	28.3	28.4	28.8
	TE+P	26.6	27.2	35.7?	26.8	26.3	28.5
	TE+P+K	27.4	28.1	27.5	24.9	27.5	26.5
Kiev Mutant	TE	32.7	33.7	34.2	30.9	30.0	32.3
	TE+P	27.2	31.2	29.5	29.1	32.0	29.8
	TE+P+K	25.3	30.1	28.8	28.4	25.3	27.6
MEAN		29.2	28.6	29.1	28.3	27.9	28.6

Site GILL

1984 Treatment		1985 N RATES KG/GA. 0	12.5	25	50	100	MEAN
Illyarrie	TE	26.4	28.9	31.2	30.3	33.3	30.0
	TE+P	33.6	28.9	31.8	31.8	32.3	31.7
	TE+P+K	29.0	30.0	31.4	29.1	30.1	29.9
Marri	TE	27.7	31.0	31.8	33.7	32.9	31.4
	TE+P	28.1	29.0	33.5	31.8	33.6	31.2
	TE+P+K	29.6	32.2	31.7	33.1	32.6	31.8
75A39-113	TE	23.8	27.3	26.8	30.5	29.6	27.6
	TE+P	29.1	31.0	32.3	31.5	31.3	31.0
	TE+P+K	28.0	26.6	31.8	31.3	30.3	29.6
Erragulla	TE	25.8	28.6	30.0	29.2	32.1	29.1
	TE+P	29.0	30.9	30.5	30.8	30.6	30.4
	TE+P+K	30.5	30.7	26.5	32.0	29.1	29.8
Kiev Mutant	TE	24.1	26.1	29.7	34.2	32.7	29.4
	TE+P	29.2	32.6	33.8	29.2	25.4	30.0
	TE+P+K	24.3	29.8	28.8	29.7	27.3	28.0
MEAN		28.1	29.6	30.8	31.2	30.9	30.1

TABLE 7
1000 GRAIN WEIGHT (g)
Site CRIDDLE

1984 Treatment		1985 N RATES KG/GA. 0	12.5	25	50	100	MEAN
Illyarrie	TE	33.8	33.3	31.9	32.3	29.1	32.1
	TE+P	33.6	35.6	33.8	29.9	30.6	32.7
	TE+P+K	34.1	33.4	33.1	31.2	27.5	31.8
Marri	TE	31.6	31.1	30.4	30.5	29.5	30.6
	TE+P	31.6	30.1	31.3	31.5	28.7	30.6
	TE+P+K	31.9	30.4	29.9	28.9	28.6	29.9
75A39-113	TE	30.5	33.4	31.2	30.9	32.0	31.6
	TE+P	31.3	34.0	33.4	33.0	29.7	32.3
	TE+P+K	28.4	33.1	32.1	26.5	27.8	29.6
Erragulla	TE	32.1	33.1	33.0	31.2	30.8	32.1
	TE+P	31.2	33.7	27.4	25.5	32.7	30.1
	TE+P+K	32.1	32.4	32.0	31.3	29.9	31.5
Kiev Mutant	TE	32.0	30.4	33.4	32.0	32.4	32.0
	TE+P	33.1	30.3	31.1	32.3	30.7	31.5
	TE+P+K	34.7	32.6	34.8	33.8	31.3	33.5
MEAN		32.1	32.5	31.9	30.7	30.1	31.5

Site GILL

1984 Treatment		1985 N RATES KG/GA. 0	12.5	25	50	100	MEAN
Illyarrie	TE	39.2	0.0	38.9	37.0	35.8	38.2
	TE+P	38.8	41.2	39.3	38.4	34.7	38.5
	TE+P+K	41.1	40.8	38.9	37.5	35.5	38.8
Marri	TE	38.1	40.9	39.9	38.6	35.3	38.6
	TE+P	39.5	38.5	40.2	38.5	37.5	38.8
	TE+P+K	38.9	39.0	37.9	36.8	37.0	37.9
75A39-113	TE	39.6	39.7	39.6	37.1	36.2	38.4
	TE+P	40.8	39.4	38.2	36.5	35.9	38.2
	TE+P+K	40.3	40.7	39.8	37.0	36.8	38.9
Erragulla	TE	39.4	40.3	39.2	36.3	33.8	37.8
	TE+P	40.0	38.5	39.3	34.9	33.9	37.3
	TE+P+K	39.3	41.2	38.8	36.3	35.3	38.2
Kiev Mutant	TE	38.1	38.9	39.3	37.7	37.2	38.2
	TE+P	39.0	38.6	40.3	36.1	36.5	38.1
	TE+P+K	39.8	41.2	39.3	38.6	36.8	39.1
MEAN		39.5	40.0	39.3	37.2	35.9	38.4

These results are summarised in table 8, 9 and 10 which give the main effects.

TABLE 8.
MAIN EFFECT OF N RATE

CHARACTER AND SITE	N RATE 0	12.5	25	50	100	MEAN
BY ANTHESIS (t/ha)						
CRIDDLE	2.21	-	-	-	3.48	2.84
GILL	2.66	-	-	-	4.09	3.54
BY MATURITY (t/ha)						
CRIDDLE	3.81	3.94	4.38	4.67	4.56	4.27
GILL	5.35	5.92	6.35	6.62	7.06	6.26
GRAIN YIELD (t/ha)						
CRIDDLE	1.72	1.74	1.90	1.95	1.85	1.83
GILL	2.43	2.65	2.86	2.91	3.08	2.79
HARVEST INDEX (%)						
CRIDDLE	45	44	43	40	40	42
GILL	46	46	45	46	44	45
HEADS/M2						
CRIDDLE	187	189	205	224	221	205
GILL	220	225	241	257	273	243
SEEDS/HEAD						
CRIDDLE	29.2	28.6	29.1	28.3	27.9	28.6
GILL	28.1	29.6	30.8	31.2	30.9	30.1
1000 GRAIN WEIGHT (g)						
CRIDDLE	32.1	32.5	31.9	30.7	30.1	31.5
GILL	39.5	40.0	39.3	37.2	35.9	38.4

TABLE 9
MAIN EFFECT OF LUPIN VARIETY IN 1984
(I = Illyarrie, M = Marri, RB = 75A39-113, E = Erragulla, KM = Kiev Mutant)

CHARACTER AND SITE	VARIETY I	M	RB	E	KM	MEAN
BY ANTHESIS (t/ha)						
CRIDDLE	2.61	2.73	2.71	3.27	2.91	2.84
GILL	3.36	3.81	3.62	3.58	3.30	3.54
BY MATURITY (t/ha)						
CRIDDLE	4.25	4.05	4.32	4.13	4.61	4.27
GILL	6.37	6.60	6.33	6.25	5.61	6.26
GY (t/ha)						
CRIDDLE	1.85	1.67	1.89	1.73	2.03	1.83
GILL	2.84	2.99	2.83	2.79	2.50	2.79
HI (%)						
CRIDDLE	43	41	43	41	44	42
GILL	45	45	45	45	45	45
HEADS/M2						
CRIDDLE	205	201	209	200	212	205
GILL	239	248	251	250	225	243
SEEDS/HEAD						
CRIDDLE	28.0	27.5	29.6	27.9	29.9	28.6
GILL	30.5	31.5	29.4	29.8	29.1	30.1
1000 GRAIN WEIGHT (g)						
CRIDDLE	32.2	30.4	31.2	31.2	32.3	31.5
GILL	38.5	38.4	38.5	37.8	38.5	38.4

TABLE 10
MAIN EFFECT OF LUPIN FERTILIZER IN 1984

CHARACTER AND SITE	1984 FERTILIZER TREATMENT			
BY ANTHESIS (t/ha)	TE	TE+P	TE+P+K	MEAN
CRIDDLE	2.67	2.87	3.00	2.84
GILL	3.26	3.63	3.72	3.54
BY MATURE (t/ha)				
CRIDDLE	4.26	4.28	4.28	4.27
GILL	5.61	6.42	6.61	6.26
GY (t/ha)				
CRIDDLE	1.87	1.84	1.77	1.83
GILL	2.50	2.88	2.98	2.79
HARVEST INDEX (%)				
CRIDDLE	43	43	41	42
GILL	45	45	45	45
HEADS/M2				
CRIDDLE	202	206	207	205
GILL	221	247	260	243
SEEDS/HEAD				
CRIDDLE	29.4	28.4	27.9	28.6
GILL	29.5	30.9	29.9	30.1
1000 GRAIN WEIGHT (g)				
CRIDDLE	31.7	31.4	31.3	31.5
GILL	38.2	38.2	38.6	38.4

REPORT ON 85 C 47

AIM

This trial compares the effect of applied K and deep ripping on a wheat crop at a compacted, K deficient site (Criddle).

METHODS AND MATERIALS
Plot size 20 x 1.4 m on 1.85 m centres. The design was a split plot, ripping whole plots and K rates sub-plots. There were 6 replicates.

Treatment	Date
Ripped	13.5.85
Sprayseed 1.0 l/ha Glean 20 g/ha	7.6.85
Planting date (Gutha at 50 kg/ha)	8.6.85
TSP with seed 130 kg/ha	8.6.85
Seedling BY measured	5.7.85
Agran 34:0 150 kg/ha	11.7.85
K applied, rates 0, 10, 20, 40, 80 kg/ha	11.7.85
Diuron 350 ml/ha MCPA 1.5 l/ha	29.7.85
BY anthesis	30.8.85
Yield Components	21.10.85

The results are given in Tables 1 - 8.

TABLE 1.
BY 3 WEEKS g/m2

Reps	+ deep ripping	- deep ripping	mean
1	1.50	1.20	1.35
2	1.55	0.70	1.12
3	1.20	0.65	0.92
4	1.65	1.05	1.35
5	1.20	0.60	0.90
6	2.00	0.75	1.37
Mean	1.52	0.82	1.17

TABLE 2.
BY ANTHESIS t/ha

K rate kg/ha	+ deep ripping	- deep ripping	mean
0	3.33	1.70	2.52
10	3.06	1.51	2.28
20	3.09	1.39	2.24
40	3.44	1.70	2.57
80	3.17	1.25	2.21
Mean	3.22	1.51	2.36

TABLE 3.
BY HARVEST t/ha

K rate kg/ha	+ deep ripping	- deep ripping	mean
0	4.98	4.52	4.75
10	5.26	5.08	5.17
20	5.06	4.27	4.66
40	5.10	4.18	4.64
80	5.26	4.65	4.96
Mean	5.13	4.54	4.84

Table 4.
GRAIN YIELD t/ha

K rate kg/ha	+ deep ripping	- deep ripping	mean
0	1.75	2.02	1.89
10	1.99	2.20	2.10
20	1.89	1.89	1.89
40	1.97	1.83	1.90
80	1.92	2.18	2.05
Mean	1.91	2.02	2.05

TABLE 5.
HARVEST INDEX %

K rate kg/ha	+ deep ripping	- deep ripping	mean
0	34	44	39
10	37	42	39
20	36	43	40
40	37	42	40
80	35	46	41
Mean	36	43	40

TABLE 6.
HEADS / M2

K rate kg/ha	+ deep ripping	- deep ripping	mean
0	228.3	209.2	218.7
10	225.4	234.2	229.8
20	221.2	207.5	214.4
40	219.2	190.0	204.6
80	228.3	219.2	223.7
Mean	224.5	212.0	218.2

TABLE 7.
SEEDS/HEAD

K rate kg/ha	+ deep ripping	- deep ripping	mean
0	27.5	30.8	29.1
10	28.9	29.4	29.1
20	27.1	27.4	27.2
40	29.3	28.4	28.8
80	26.4	28.1	27.2
Mean	27.8	28.8	28.3

TABLE 8
1000 GR WEIGHT (g)

K rate kg/ha	+ deep ripping	- deep ripping	mean
0	27.8	31.4	29.6
10	30.6	31.9	31.2
20	31.3	33.0	32.1
40	30.3	33.8	32.0
80	31.6	35.0	33.3
Mean	30.3	33.0	31.7

COMMENTS ON THE ABOVE TRIALS.

All trials involved deep ripping, and it was shown that at the dry site (C8547) that ripping had a large and significant effect on BY at all stages of growth whereas applied K had no significant effect. However there were no significant differences between the grain yields. The effect of deep ripping encourages early growth and water use and at sites short of water this did not lead to increased yields. However there was not the spectacular yield depression that can occur with applied N on heavy soils in dry seasons. It would appear that sandy soils allow better grainfill than heavy soils even when water is limiting. Similar results were obtained by Wilson at ECRS.

In terms of yield components there were no significant differences due to ripping on heads/m2 or on seeds/head, but a large, highly signiciant effect on 1000 grain wt, which was reduced by ripping; again suggesting late water stress. This led to a lower harvest index for the ripped plots. K level had no effect on yield components.

In the other trials (85C25 and 85C46) there were no ripping comparisions, as all plots were deep ripped to allow maximum growth. In the trial 85C46 at the dry site there was a highly significant inverse relationship between the lupin BY in 1984 (as influenced by genotype and fertilizer level) and wheat yields in

1985, ($r = -.82$ $p < .001$). But the relationship between 1984 lupin GY (N removed) and 1985 wheat GY was low and not significant. High wheat yields in 1985 were related to low vegetative growth of lupins in 1984. Little growth in 1984 meant less water used (water use was monitored in 1984) and it is likely that the excess water was available to to 1985 wheat crop (c.f. results of Wilson at ECRS). It is unlikely that the result was due to low residual N being an advantage as no reduction in yield occured with applied N, infact a small, but non-significant increase in GY occured when N was applied. At the high rainfall site (Gill) there was a positive relationship between lupin BY and wheat GY. ($r = .62$ $p < .02$), at this site the amount of N fixed by the lupins would appear to be an important factor in determining wheat GY in 1985.

On the 1985 wheat crops nitrogen increased BY at both sites, but only increased GY significantly at the high rainfall site. At the dry site applied N slightly increased heads/m2, and slightly decreased seeds/head and seed weight. At the wet site applied N had a larger effect on heads/m2 and also increased seeds/head, however there was a marked reduction in grain weight, indicating that even at the wet site water limited grain yield at high levels of BY.

The effect of lupin species and variety in the previous year was inversely related to water use, Marri and Erragulla used most water and Kiev Mutant least, with the early flowering L. angustifolius lines intermediate. Both BY and GY of wheat in 1985 reflected this and wheat growing on Kiev Mutant had most heads/m2, more seeds/head and larger seeds than the other treatments. AT the wet site these trends were reversed.

In Trial 85C25 cleaning effects appear important on early growth as wheat on lupins and wheat on rape had more rapid early growth than wheat on cereal or wheat on lupin/cereal mixture. However by maturity the effect of cereal crops in the preceeding year was not apparent. The rapidly growing plots ran out of water and the slower growing plots were able to continue growing longer. All plots yielded much the same at harvest although wheaton lupins was lower yielding than the other treatments, mainly due to small seed size and few seeds/head, again indicating a high degree of late water stress. Similar results were found by Wilson and neutron meter data in her work confirmed the water use hypothesis put forward here.

These trials allow some hypotheses to be put forward.

1. Deep ripping allows enough early growth for water to be limiting yields late in the season

2. The effects of water shortage at the end of the season due to deep ripping do not cause such catastrophic effects as are found at high rates of applied N on heavy soils.

3. Besides effects on N levels and disease cleaning, rotations with legumes can have marked effects on the water available to following crops in certtain seasons. This greatly adds to the complications of planning rotations that maximise farm production as another factor is added into the decision making process over

which farmers have no control and only limited information on current soil water status at the beginning of the season.