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J. W. Bowden

R. J. Lunt

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Recommended Citation

Bowden, J W, and Lunt, R J. (1989), *Tactical nitrogen decisions for wheat (and N rates trials)*. Department of Primary Industries and Regional Development, Western Australia, Perth. Report.

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1989 TACTICAL NITROGEN DECISIONS FOR WHEAT (AND N RATES TRIALS)

Trial: 89N077 (89N076)

Location: Ray Fulwood - Mt Noddy, Meenaar North Road, Grass Valley

Soil type: Gravelly sandy loam of variable depth Whitegum and blackboy

CSBP soil test parameter: Nitrogen as NO₃ 9 ppm
as NH₄ 9 ppm
Bicarb. P 45 ppm K₁ 60 ppm
Organic Carbon 1.02%
Reactive iron 263 ppm
pH water 5.60

History: 1984 lupins;
1985/6 pasture legumes and about 100 kg super/ha;
1987 wheat yield of 2.8 t/ha using 45 kg DAP/ha and 60 of urea
2-4 WAS
1988 Gungurru lupins (27 kg/ha seed) yielding 1.9 t/ha using
80 kg double super/ha.

Seasonal: Nitrogen topdressed 22/5, seeded 23/5 after heavy
overnight rain. Sampling and subsequent nitrogen
dressings as indicated in results sheets. Post emergent
spray for broad leaf weeds on 22/6. No spray for wild
oats which became a real problem. Wild oat growth is
included in the tops yields and nitrogen uptake
calculations. A dry finish to the season, weeds and
insipient copper deficiency caused lower yields than
predicted. Disease was not a problem.

Rainfall: (a) Recorded spasmodically at the site when someone
bothered to read the gauge which was installed on
22/5/89: day/mm

May		June		July		August		September		October	
22	Nil	15	58.5	6	3.9	1.	8.8	12	2.4	2	10.5
23	25.0	22	Nil	17	9.2	2	2.0	25	9.5	6	1.5
		28	6.2	20	8.8	15	Nil	29	4.7	16	1.0
				21	3.5	20	15.3			19	9.6
				27	6.2	30	8.0			30	3.2

These readings will be correlated with the farmers more complete records.

1989 Tactical Nitrogen Trials

Summary of treatments applied

Table 1. Trial: 89N077 Ray Fulwood, Meckering

No.	Treatment name	At seeding 22/23/5 Fertilizer kg/ha	N	P	After seeding kg fert/ha (date)	Total kg N/ha	Adj* cost \$
1	CSBP Strategic	50 DAP, 40 urea	27	10	70u (22/6)	59	66
2	CSBP Tactical	115 Agras I	10	9	40u (22/6) 60u (21/7)	66	85
3	NPD Strategic	Nil	-	-	120u (22/6)	66	49
4	NPD Tactical	40 urea	18	-	40u (6/7)	40	38
5	Traditional	35 urea	16	-	-	16	17
6	Farmer	50 DAP	9	10	90u (22/6)	50	54
7	Nil/Nil	Nil	-	-	-	-	Nil
8	Adviser	45 Super 40 urea	18	4	-	18	24
7+	Nil P + N	Nil	-	-	120u (22/6) 60u (18/7)	99	75

* December 1988 prices + \$15/tonne on farm - 50% of Cost of P as Super (\$1.6/kg) plus 20% interest on dollars invested in fertilizer plus \$4/ha application cost of urea;
e.g. DAP ex Bayswater = $(400 + 15) \times 1.2 - 200 \times 1.6 \times 0.5 = \$338/\text{tonne}$.

NPD Rationalisation

- (3) Rate of nitrogen calculated on the basis of a 3 t/ha potential yield and not applied at seeding because it was considered that the lupin pre history would provide enough nitrogen for tillering - i.e. the site was considered to be poorly drained - we were wrong.
- (4) Only 40 kg urea/ha at seeding to be able to play the season. Initial establishment was sufficiently unimpressive to reduce the estimate of yield potential and so total N requirement was reduced and only 40 kg urea was applied later at about six weeks after seeding. I was tempted to apply Agras at six weeks on a relativity argument but did not do so because I have no guidelines for what is adequate in terms of potential head numbers at this stage.

Table 2. Trial 89N077: Yield components (from hand harvests) - Grass Valley

Number	Treatment Description	BY t/ha	GY t/ha	Heads per m ²	TGW gm	HI %	Grains /head	Grains per m ²
1	CSBP soil test	5.90	2.08	220	42	35	23	4930
2	CSBP tactics	6.24	2.46	235	42	38	24	5600
3	NPD strategic	5.24	2.05	178	44	39	26	4680
4	NPD tactics	5.31	2.13	183	45	40	26	4800
5	Traditional	4.79	2.11	177	45	44	26	4710
6	Farmer	6.16	2.26	226	43	37	23	5280
7	Control	5.20	2.24	197	43	43	26	5210
8	Adviser	5.76	2.60	207	45	45	29	5870
7+	Control + N	5.20	1.88	186	42	36	24	4480

Table 3. Economic analysis (from machine harvest)

Number	Treatment Description	Total kg/ha		Adj. cost \$/ha	Yield t/ha	Net return \$/ha	Mean \$ return %
		N	P				
1	CSBP soil test	59	10	66	2.10	249	-48
2	CSBP tactics	66	9	85	2.15	237	-52
3	NPD strategic	66	Nil	49	2.12	269	-24
4	NPD tactics	40	Nil	38	2.13	282	3
5	Traditional	16	Nil	17	2.20	313	188
6	Farmer	50	10	54	2.07	257	-44
7	Control	Nil	Nil	Nil	1.87	281	-
8	Adviser	18	4	24	2.17	302	88
7+	Control + N	99	Nil	75	1.86	215	-88
	LSD (P < 0.05)				0.28	41	

Adj cost is cost of fertilizer adjusted for the future value of phosphate.

Net return is gross return (with wheat at \$150/tonnes) minus adjusted costs.

Mean dollar return is the return to fertilizer dollars as a per cent of the adjusted cost $(\text{net return}_i - \text{net return}_7) / (\text{adj cost}_i)$.

1989 Tactical Nitrogen trials

Table 4. 88N077 Ray Fulwood, Grass Valley - Summary of observations

	Plants/ m ²	Rating	Tillers/ plant	MGM/ plant	Rating	t/ha dry wt.	kg N/ha	kg P/ha	kg N/ha	kg P/ha
Treatment	22/6	22/6	18/7	18/7	27/7	12/9	18/7	18/7	12/9	12/9
1	120	29	1.8	283	45	4.4	18	1.8	57	6.7
2	126	28	2.2	285	37	4.3	17	1.9	65	7.5
3	122	15	1.5	232	36	4.1	15	1.3	54	5.9
4	96	18	1.2	207	28	3.6	10	1.0	49	5.8
5	118	22	1.1	183	18	3.2	10	1.0	38	4.9
6	127	22	1.7	303	40	4.3	21	2.1	59	6.8
7	133	19	1.0	175	20	3.0	10	1.1	35	4.3
8	114	20	1.1	190	20	3.6	10	1.1	51	6.0
7 ⁺	-	-	-	-	33	4.2	-	-	60	5.7

Table 5. Trial 89N076 - Hand harvest 23/11/89 - Location: Meckering

Treatment No.	kg AS	kg N/ha 4WAS	kg N/ha 8WAS	Source	kg N/ha total	Adj. cost \$/ha	Yield* t/ha +cu	Net return \$/ha +cu	Mean \$ return %
1	0	0	0		0	11	2.38 (2.36)	346 (343)	91 (164)
2	13	0	0	Urea	13	26	2.47 (2.58)	344 (361)	31 (138)
3	26	0	0	Urea	26	36	2.61 (2.76)	354 (378)	50 (147)
4	52	0	0	Urea	52	57	2.78 (2.92)	360 (381)	42 (98)
5	104	0	0	Urea	104	100	2.55 (2.80)	282 (320)	- -
6	0	13	0	Urea	13	26	2.37 (2.87)	329 (404)	- (304)
7	0	26	0	Urea	26	36	2.13 (2.49)	283 (337)	- (33)
8	0	52	0	Urea	52	57	2.13 (2.65)	262 (340)	- (26)
9	0	104	0	Urea	104	100	1.95 (2.91)	192 (336)	- (11)
10	0	0	13	Urea	13	26	2.45 (2.69)	341 (377)	19 (200)
11	0	0	26	Urea	26	36	2.51 (2.53)	340 (343)	11 (50)
12	0	0	52	Urea	52	57	2.07 (2.77)	253 (358)	- (58)
13	0	0	104	Urea	104	100	1.81 (2.29)	171 (243)	- -
14	26	13	0	Urea	39	47	2.67 (2.98)	353 (400)	36 (160)
15	26	26	0	Urea	52	61	2.46 (2.96)	308 (383)	- (95)
16	26	52	0	Urea	78	82	1.65 (2.70)	165 (323)	- -
17	26	104	0	Urea	130	125	1.77 (2.64)	140 (271)	- -
18	26	0	13	Urea	39	47	2.55 (2.84)	335 (379)	- (115)
19	26	0	26	Urea	52	61	2.54 (2.73)	320 (348)	- (38)
20	26	0	52	Urea	78	82	2.31 (3.02)	264 (371)	- (56)
21	26	0	104	Urea	130	125	2.05 (2.67)	182 (275)	- -
22	26	0	0	NO ₃	26	82	2.77 (3.00)	333 (368)	- (52)
23	0	26	0	NO ₃	26	82	1.76 (2.56)	182 (302)	- -
24	0	0	26	NO ₃	26	82	2.22 (2.82)	251 (341)	- (20)
25	26	0	0	NH ₄	26	48	2.54 (2.78)	333 (369)	- (94)

Basal 9 kg P/ha as Super

Tactics trial

7	Nil P	Nil N	0	0	2.24 (2.17)	336 (325)	- -
7+	Nil P	N	99	75	1.88 (2.24)	207 (261)	- -
5	Top net return		16	17	2.11 (2.11)	299 (299)	- -
4	2nd net return		40	38	2.13 (2.13)	281 (281)	- -

* 2 copper deficient replicates included in average.

() copper sufficient replicates only.

Table 6. Trial no. 89N076 - yield components for copper sufficient plots reps I and II, copper deficient plots reps III and IV - location Meckering

Treatment kg N/ha				Source	BY (t/ha)		GY (t/ha)		HI		Heads		TGW		GPH	
No.	AS	4WAS	8WAS		+cu	-cu	+	-	+	-	+	-	+	-	+	-
1	0	0	0		4.9	5.4	2.4	2.4	48	44	194	198	49	47	25	26
2	13	0	0	Urea	5.5	5.3	2.6	2.4	47	45	211	193	46	46	26	26
3	26	0	0	Urea	5.7	5.4	2.8	2.5	48	46	210	206	47	45	28	28
4	52	0	0	Urea	6.4	6.0	2.9	2.6	45	44	210	228	46	43	30	26
5	104	0	0	Urea	6.0	5.7	2.8	2.3	46	40	240	234	45	42	26	23
6	0	13	0	Urea	6.2	5.1	2.9	1.9	46	36	230	210	46	42	27	21
7	0	26	0	Urea	5.5	5.2	2.5	1.8	46	34	208	211	46	42	26	20
8	0	52	0	Urea	5.6	5.8	2.6	1.6	47	28	234	239	45	41	25	16
9	0	104	0	Urea	7.1	5.2	2.9	1.0	42	18	256	244	42	34	27	12
10	0	0	13	Urea	5.8	5.2	2.7	2.2	46	42	214	216	47	44	26	23
11	0	0	26	Urea	5.4	5.9	2.5	2.5	47	42	215	235	47	46	25	24
12	0	0	52	Urea	6.2	4.8	2.8	1.4	45	28	229	224	46	39	27	16
13	0	0	104	Urea	5.2	5.2	2.3	1.3	44	26	216	234	39	36	28	16
14	64	13	0	Urea	6.7	5.9	3.0	2.3	44	40	236	212	46	43	28	26
15	64	26	0	Urea	6.7	6.1	3.0	2.0	44	32	258	257	47	40	26	19
16	64	52	0	Urea	6.2	3.9	2.7	0.6	44	16	218	187	43	34	29	9
17	64	104	0	Urea	6.1	4.6	2.6	0.9	43	20	232	205	42	34	27	13
18	64	0	13	Urea	6.2	5.6	2.8	2.3	45	40	218	220	47	42	28	24
19	64	0	26	Urea	6.3	5.9	2.7	2.3	44	40	226	232	44	42	28	24
20	64	0	52	Urea	7.1	5.4	3.0	1.6	43	29	236	228	45	38	28	18
21	64	0	104	Urea	6.0	5.2	2.7	1.4	44	26	235	224	40	36	28	16
22	64	0	0	NO ₃	6.4	5.8	3.0	2.5	46	44	235	222	48	46	26	25
23	0	64	0	NO ₃	6.0	4.9	2.6	1.0	42	20	214	220	46	40	26	12
24	0	0	64	NO ₃	6.2	5.6	2.8	1.6	45	30	228	208	44	42	28	18
25	64	0	0	NH ₄	6.1	5.5	2.8	2.3	46	40	224	227	47	43	26	24

Basalt 9 kg P/ha as super

Tactics trial

7	Nil P	Nil N	5.2	2.2	43	197	43
7+	Nil P	N	5.2	1.9	36	186	42
5	Top net return		4.8	2.1	44	177	45
4	2nd net return		5.3	2.1	40	183	45

Table 7. Trial no. 89N076 - Hand harvest 23/11/89, yield components -
Meckering

No.	Treatment kg N/ha			Source	BY t/ha	GY t/ha	Heads /m ²	TGW gm	HI %	Grains /head	Grains /m ²
	23/5 AS	22/6 4WAS	18/7 8WAS								
1	0	0	0		5.14	2.38	196	48	47	25	4960
2	13	0	0	Urea	5.41	2.47	201	46	46	27	5360
3	26	0	0	Urea	5.57	2.61	208	46	47	28	5710
4	52	0	0	Urea	6.22	2.78	219	46	45	28	6220
5	104	0	0	Urea	5.86	2.55	237	44	43	25	5820
6	0	13	0	Urea	5.67	2.37	220	44	41	24	5380
7	0	26	0	Urea	5.31	2.13	209	44	40	23	4830
8	0	52	0	Urea	5.72	2.13	236	43	37	21	4880
9	0	104	0	Urea	6.14	1.95	249	38	30	19	4780
10	0	0	13	Urea	5.52	2.45	215	46	44	25	5340
11	0	0	26	Urea	5.65	2.51	225	46	44	24	5450
12	0	0	52	Urea	5.52	2.07	226	42	36	21	4770
13	0	0	104	Urea	5.23	1.81	225	38	35	22	4760
14	0	13	0	Urea	6.30	2.67	224	45	42	27	5970
15	0	26	0	Urea	6.43	2.46	253	43	38	22	5640
16	0	52	0	Urea	5.07	1.65	203	39	29	19	4000
17	0	104	0	Urea	5.36	1.77	219	38	31	20	4460
18	0	0	13	Urea	5.94	2.55	219	45	43	26	5680
19	0	0	26	Urea	6.07	2.54	229	43	42	26	5880
20	0	0	52	Urea	6.26	2.31	232	41	36	24	5510
21	0	0	104	Urea	5.62	2.05	230	38	35	22	5200
22	26	0	0	NO ₃	6.08	2.77	228	47	46	26	5930
23	0	26	0	NO ₃	5.50	1.76	217	43	31	19	4010
24	0	0	26	NO ₃	5.91	2.22	217	43	37	23	5100
25	26	0	0	NH ₄	5.85	2.54	225	45	43	25	5660
Basal kg P/ha as Super											
Tactics trial											
7	Nil P	Nil N			5.20	2.24	197	43	43	26	5210
7+	Nil P	N			5.20	1.88	186	42	36	24	4480
5	Top net return				4.79	2.11	177	45	44	26	4710
4	2nd net return				5.31	2.13	183	45	40	26	4800

Table 8. 89N076 - 1989 observations as season progressed

	kg N/ha			Per plant		rating	kg/ha	kg/ha	Rating*
	22/5	22/6	18/7	Tillers 18/7	mgm 18/7				
1	0	0	0	1.1	171	14	888	2457	YY
2	13	0	0	1.2	206	24	919	2843	YY
3	26	0	0	1.3	205	19	1021	2864	GY
4	52	0	0	1.2	210	25	1066	3604	YY
5	104	0	0	1.6	256	35	1545	3721	GG
6	0	13	0	1.4	207	26	1074	3221	YY
7	0	26	0	1.5	194	28	1079	3139	GG
8	0	52	0	1.7	214	36	1324	3511	BB
9	9	104	0	1.8	222	42	1700	4382	BB
10	0	0	13	-	-	19	895	2918	GY
11	0	0	26	-	-	19	1013	3232	GY
12	0	0	52	-	-	21	1127	3750	BB
13	0	0	104	-	-	21	1130	3543	BB
14	26	13	0	1.6	228	27	1308	3879	GY
15	26	26	0	1.7	235	36	1255	3793	BG
16	26	52	0	1.8	261	45	1641	3839	BB
17	26	104	0	1.9	257	44	1769	4664	BB
18	26	0	13	-	-	25	1170	3168	YY
19	26	0	26	-	-	23	1206	4014	GY
20	26	0	52	-	-	27	1399	4064	BG
21	26	0	104	-	-	25	1296	3821	BB
22	26	0	0	1.2	193	21	984	3004	YG
23	0	26	0	2.5	264	39	1562	3757	BB
24	0	0	26	-	-	21	1151	3550	BG
25	26	0	0	1.7	253	30	1230	3454	GY

* Two reps showed symptoms of copper deficiency.
Y = normal, G = grey heads, B = black heads.
The other two reps gave YY rating.

Table 9. 89N076 - Crop nitrogen parameters

	Nitrogen percentage (%)					Nitrogen uptake (kg N/ha)				
	tops	tops	tops	straw	grain	tops	tops	tops	straw	grain
	18/7	15/8	12/9	23/11	23/11	18/7	15/8	12/9	23/11	23/11
1	4.78	2.65	1.36			10	24	34		
2	5.01	2.74	1.33			12	25	38		
3	4.84	2.61	1.30			12	27	37		
4	5.18	3.01	1.55			13	32	54		
5	5.08	3.14	1.67			16	49	62		
6	5.43	2.63	1.25			13	28	40		
7	5.77	2.69	1.42			13	29	44		
8	5.93	3.07	1.50			15	41	52		
9	6.16	3.14	1.82			16	54	80		
10	-	2.90	1.48			-	26	42		
11	-	3.22	1.46			-	33	48		
12	-	3.73	1.71			-	42	64		
13	-	4.11	2.07			-	47	73		
14	5.50	2.63	1.38			15	35	52		
15	5.69	2.69	1.58			16	34	59		
16	5.97	3.07	1.54			19	51	59		
17	6.22	3.55	1.80			19	63	83		
18	-	2.93	1.53			-	35	48		
19	-	3.38	1.54			-	41	62		
20	-	3.33	1.63			-	48	65		
21	-	4.11	1.85			-	54	71		
22	5.16	2.79	1.43			12	27	43		
23	6.05	2.70	1.53			19	42	58		
24	-	3.55	1.70			-	41	60		
25	4.96	2.63	1.39			15	33	48		