




1989

## Tactical nitrogen decisions for wheat (and nitrogen sources rates and times on wheat)

J. W. Bowden

R. J. Lunt

Follow this and additional works at: <https://library.dpir.wa.gov.au/rqmsplant>

 Part of the [Agronomy and Crop Sciences Commons](#), [Fresh Water Studies Commons](#), [Inorganic Chemistry Commons](#), [Organic Chemistry Commons](#), and the [Soil Science Commons](#)

---

### Recommended Citation

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

This report is brought to you for free and open access by the Agriculture at Digital Library. It has been accepted for inclusion in Experimental Summaries - Plant Research by an authorized administrator of Digital Library. For more information, please contact [library@dpird.wa.gov.au](mailto:library@dpird.wa.gov.au).

1989 TACTICAL NITROGEN DECISIONS FOR WHEAT  
(AND NITROGEN SOURCES RATES AND TIMES ON WHEAT)

Trial: 89MO49 (89MO48)

Location: Mark Campbell - Tenderloin, Brand Highway, Regan's Ford

Soil type: Deep yellow sand. Nuytsia and Coastal Blackbutt  
(E. todtiana)

CSBP soil test parameter: Nitrogen as NO<sub>3</sub> 17 ppm  
as NH<sub>4</sub> 10 ppm  
Bicarb. P 5 ppm K 34 ppm  
Organic Carbon 0.96%  
Reactive iron 337 ppm  
pH in water 5.8

History: 1987 Aroona wheat with 70 kg DAP and 3 kg CuSO<sub>4</sub> at seeding followed by 60 urea at 3WAS and another 40 urea at 6WAS. Yield was about 1.7 to 1.8 t/ha;  
1988 Gungurru lupins with 120 kg super and manganese/ha yielded 1.9 t/ha. 350-400 ml Roundup/ha and one cultivation prior to seeding.

Seasonal: Sown with Aroona wheat on 2/6/89. Nitrogen treatments hand topdressed prior to seeding. 5/7/89 sprayed with 1 L hoegrass and 1 L Bromynil. Samplings as per attached results tables. Severe drought stress evident in mid September. Septoria rather than copper deficiency, correlated with scoring for brown heads, lodging and nodding at harvest.

Rainfall: As occasionally read at the site - to be checked with farmers' records. Gauge installed on 2/6/89: day/mm

June		July		August		September		November	
6	9.8	5	9.2	3	34.3	8	8.3	30	24.8 + evaporation
14	13.5	20	44.1	10	2.6	11	0.5		
15	1.9	25	22.8	24	21.4	26	21.4		
30	21.2			31	11.7				

Table 10. Trial: 89MO49 Tenderloin Regan's Ford

No.	Treatment name	At seeding 2/6/89 Fertilizer kg/ha	N	P	After seeding kg fert/ha (date)	Total kg N/ha	Adj* cost \$
1	CSBP Strategic	190 Agras 2	23	19	60u (30/6)	51	85
2	CSBP Tactics	210 Super, 40 urea	18	19	60u (25/7)	46	69
3	NPD Strategic	250 Super, 30 urea	14	23	60u (30/6)	42	69
4	NPD Tactics	115 DAP	20	23	40u (30/6)	38	58
5	Traditional	250 Super	-	23	45u (30/6) 45u (25/7)	42	62
6	Farmer	67 DAP	12	13	60u (30/6) 40u (20/7)	58	68
7	Nil/Nil	Nil	-	-	-	-	-
8	Adviser	80 DAP	14	16	60u (30/6)	42	53
7+	Nil/ + N	50 Urea	23	-	70u (30/6) 70u (25/7)	88	83

Treatments 1, 2 and 3 received 100 kg Kcl/ha to middle 20 M of plot on 10/8.

#### NPD Rationalisation

- (3) Strategic rates based on a potential yield of 2.5 t/ha. Some nitrogen applied at seeding because lupin nitrogen probably making very little contribution early due to pre-seeding mineralization and leaching.
- (4) DAP used as a means of placing nitrogen with seed. Also the use of the compound means less handling of fertilizer at seeding than using super and urea.

Table 11. 89MO49 Mark Campbell - Regans Ford

Treat.	Plants/m <sup>2</sup> 30/6	Ratings for vigour		Per plant tillers		rating 31/8	t/ha 26/9	kg N/ha		kg P/ha	
		30/6	20/7	25/7	mgm 25/7			25/7	26/9	25/7	26/9
1	108	9	11	4.0	533	17	3.5	31	38	4.1	6.9
2	117	14	9	3.2	435	20	3.7	20	44	3.0	7.8
3	109	12	14	3.4	502	16	3.6	26	37	3.6	6.9
4	111	9	12	3.3	479	17	3.5	26	34	4.0	6.7
5	108	12	11	3.4	472	17	3.9	22	44	3.1	7.6
6	102	9	14	3.9	543	23	3.7	29	41	3.9	7.4
7	116	11	7	2.7	397	4	2.9	17	26	1.9	4.5
8	100	10	11	3.7	517	17	3.6	27	39	3.8	6.9
7+	111	-	-	2.7	428	-	3.6	24	42	1.9	5.3

Table 12. 89M049 - Yield components (from hand harvests) - Tenderloin

Number	Treatment Description	BY t/ha	GY t/ha	Heads per m <sup>2</sup>	TGW gm	HI %	Grains /head	Grains per m <sup>2</sup>
1	CSBP soil test	4.60	2.21	236	42	48	23	5330
2	CSBP tactics	4.63	2.22	246	42	48	22	5280
3	NPD strategic	4.65	2.19	230	42	47	22	5310
4	NPD tactics	4.16	1.95	219	41	47	22	4740
5	Traditional	4.34	2.06	217	43	48	22	4810
6	Farmer	4.35	2.07	219	42	48	23	4990
7	Control	3.34	1.50	170	42	45	21	3590
8	Adviser	4.38	2.04	204	42	47	24	4830
7+	Control + N	3.92	1.82	207	41	46	21	4440

Table 13. 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	51	19	85	2.09	228	8
2	CSBP tactics	46	19	69	2.13	251	42
3	NPD strategic	42	23	69	2.07	242	29
4	NPD tactics	38	23	58	1.95	235	22
5	Traditional	42	23	62	1.93	227	8
6	Farmer	58	13	68	1.99	231	13
7	Control	Nil	Nil	Nil	1.48	222	-
8	Adviser	42	16	53	1.98	244	42
7+	Control + N	88	Nil	83	1.60	157	-78
	LSD (P < 0.05)				0.25	37	

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

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

Mean dollar return is the return to fertilizer dollars as a per cent of the adjusted cost (net return<sub>i</sub> - net return<sub>7</sub>)/(adj cost<sub>i</sub>).

Table 13. Trial 89M048 - Hand harvest 30/11/89 - Location: Tenderloin

Treatment No.	kg N/ha AS	kg N/ha 4WAS	kg N/ha 8WAS	Source	kg N/ha total	Adj. cost \$/ha	Yield* t/ha	Net return \$/ha	Mean \$ return %
1	0	0	0		0	28.5	2.50	347	428
2	25	0	0	Urea	25	53	3.43	461	445
3	50	0	0	Urea	50	73	3.41	438	292
4	100	0	0	Urea	100	114	2.97	331	93
5	200	0	0	Urea	200	195	3.90	390	85
6	0	25	0	Urea	25	53	2.57	332	202
7	0	50	0	Urea	50	73	3.84	503	381
8	0	100	0	Urea	100	114	3.44	402	155
9	0	200	0	Urea	200	195	3.11	271	24
10	0	0	25	Urea	25	53	2.85	374	281
11	0	0	50	Urea	50	73	3.07	387	208
12	0	0	100	Urea	100	114	3.26	375	132
13	0	0	200	Urea	200	195	3.55	338	58
14	50	25	0	Urea	75	97	2.88	335	113
15	50	50	0	Urea	100	118	3.13	351	107
16	50	100	0	Urea	150	158	3.38	349	78
17	50	200	0	Urea	250	240	3.12	228	1
18	50	0	25	Urea	75	97	3.34	404	185
19	50	0	50	Urea	100	118	3.18	359	114
20	50	0	100	Urea	150	158	3.57	377	96
21	50	0	200	Urea	250	240	3.19	238	5
22	50	0	0	NO <sub>3</sub>	50	162	3.93	427	125
23	0	50	0	NO <sub>3</sub>	50	162	3.70	397	106
24	0	0	50	NO <sub>3</sub>	50	162	3.79	406	173
25	50	0	0	NH <sub>4</sub>	50	95	3.38	412	197

Basal 22.8 kg P/ha as Super

## Tactics trial

7	Nil P Nil N	Nil	Nil	1.50	225	-
7+	Nil P N	88	83	1.82	190	-
5	Top net return	46	69	2.22	264	57
4	2nd net return	42	53	2.04	253	53

Table 14. Trial no. 89M049 - Hand harvest 30/11/89, yield components - Tenderloin

No.	Treatment kg N/ha			Source	BY t/ha	GY t/ha	Heads /m <sup>2</sup>	TGW gm	HI %	Grains /head	Grains /m <sup>2</sup>
	2/6 AS	30/6 4WAS	25/7 8WAS								
1	0	0	0		5.43	2.50	225	46	46	24	5480
2	25	0	0	Urea	7.29	3.43	262	45	47	29	7600
3	50	0	0	Urea	7.21	3.41	285	43	47	27	7870
4	100	0	0	Urea	6.19	2.97	276	39	48	27	7560
5	200	0	0	Urea	7.79	3.90	334	38	50	31	10400
6	0	25	0	Urea	5.49	2.57	243	43	47	24	5920
7	0	50	0	Urea	6.09	3.84	270	44	47	24	6520
8	0	100	0	Urea	7.09	3.44	311	39	49	28	8770
9	0	200	0	Urea	6.42	3.11	318	37	49	26	8530
10	0	0	25	Urea	5.91	2.85	272	43	48	24	6550
11	0	0	50	Urea	6.43	3.07	282	44	48	25	7030
12	0	0	100	Urea	6.55	3.26	301	40	50	27	8160
13	0	0	200	Urea	7.21	3.55	327	39	50	28	9290
14	50	25	0	Urea	6.14	2.88	268	41	47	26	6940
15	50	50	0	Urea	6.53	3.13	279	41	48	28	7770
16	50	100	0	Urea	7.00	3.38	318	37	48	29	9220
17	50	200	0	Urea	6.60	3.12	320	37	47	26	8610
18	50	0	25	Urea	7.00	3.34	295	42	48	27	7960
19	50	0	50	Urea	6.64	3.18	300	38	48	28	8300
20	50	0	100	Urea	7.32	3.57	325	38	49	29	9510
21	50	0	200	Urea	6.56	3.19	317	37	49	27	8570
22	50	0	0	NO <sub>3</sub>	8.30	3.93	319	43	47	29	9180
23	0	50	0	NO <sub>3</sub>	7.76	3.70	304	42	48	29	8860
24	0	0	50	NO <sub>3</sub>	7.80	3.79	308	41	49	31	9450
25	50	0	0	NH <sub>4</sub>	7.17	3.38	273	43	47	29	8000
Basal 22.8 kg P/ha as Super											
Tactics trial (89M048)											
7	Nil P	Nil N			3.34	1.50	170	42	45	21	3590
7+	Nil P	N			3.92	1.82	207	41	46	21	4440
5	Top net return				4.63	2.22	246	42	48	22	5280
4	2nd net return				4.38	2.04	204	42	47	24	4830

Note: there is a marked yield increase at this compared with the adjacent site (89M048). Which shows itself in terms of greater head numbers on this site (M049) implying better early nutrition.

Table 15. 89M048 - Summary of seasonal growth

	kg N/ha			Counts /m <sup>2</sup>	Per plant		rating 31/8	t/ha 31/8	t/ha 26/9	Rating* 30/11
	2/6	30/6	25/7		Tillers 25/7	mgm 25/7				
1	0	0	0	101	3.4	474	9	2.6	3.8	4
2	25	0	0	111	4.0	566	20	3.0	5.7	5
3	50	0	0	111	4.0	593	22	3.5	6.0	6
4	100	0	0	99	3.9	543	22	3.5	5.9	10
5	200	0	0	95	4.3	556	26	3.7	6.0	12
6	0	25	0	111	3.4	470	15	3.0	5.2	4
7	0	50	0	95	3.8	531	20	3.4	5.1	7
8	0	100	0	116	4.6	600	27	4.4	6.7	11
9	0	200	0	109	3.8	538	26	3.6	5.5	19
10	0	0	25	110	-	-	17	2.9	4.4	4
11	0	0	50	112	-	-	22	3.1	5.4	5
12	0	0	100	98	-	-	26	3.5	5.2	13
13	0	0	200	111	-	-	27	3.8	6.1	14
14	50	25	0	109	4.4	581	20	3.7	5.6	7
15	50	50	0	105	4.2	606	23	4.1	6.1	9
16	50	100	0	119	4.4	622	27	3.7	6.0	16
17	50	200	0	119	4.5	594	23	4.0	6.3	19
18	50	0	25	96	-	-	25	3.5	5.5	9
19	50	0	50	110	-	-	25	3.6	5.4	11
20	50	0	100	126	-	-	26	4.0	7.1	15
21	50	0	200	101	-	-	27	3.3	6.3	19
22	50	0	0	119	4.6	602	22	3.9	6.8	5
23	0	50	0	105	5.1	642	22	3.9	6.6	7
24	0	0	50	104	3.4	474	26	3.5	6.3	5
25	50	0	0	110	4.5	586	22	3.9	5.8	7

\* Rating for nodding heads and darkened heads (suspect septoria or copper deficiency).

Rob Loughman confirmed the presence of septoria.

Sum of rating 1 to 5 per 4 reps. 5 is dark or nodding.



## 89M048. Nitrogen parameters

Date	25/7		31/8		26/9		Grain		NHI
Treat.	N%	kg N/ha	N%	kg N/ha	N%	kg N/ha	N%	kg N/ha	
1	3.9	19	1.36	35	0.91	35			
2	4.5	28	1.45	44	1.08	62			
3	4.9	32	1.58	56	1.05	65			
4	5.8	31	1.95	67	1.24	73			
5	6.0	32	2.25	85	1.44	85			
6	5.0	26	1.33	40	0.99	53			
7	5.1	26	1.50	51	0.93	47			
8	6.0	41	2.11	94	1.29	86			
9	6.3	37	2.61	95	1.59	87			
10	-	-	1.64	48	1.05	46			
11	-	-	1.77	55	1.16	63			
12	-	-	2.15	75	1.36	70			
13	-	-	2.60	96	1.62	98			
14	5.7	36	1.64	60	1.18	65			
15	5.7	36	2.04	84	1.27	79			
16	6.3	46	2.20	83	1.42	85			
17	6.2	44	2.77	111	1.69	106			
18	-	-	1.75	61	1.13	62			
19	-	-	2.12	75	1.32	71			
20	-	-	2.32	92	1.52	104			
21	-	-	2.56	85	1.70	105			
22	5.2	37	1.56	61	1.14	77			
23	5.2	33	1.65	66	1.10	73			
24	-	-	2.06	71	1.19	75			
25	5.1	33	1.47	58	1.08	63			