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## Getting the best out of our wheats.

B Shackley

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WESTERN AUSTRALIAN DEPARTMENT OF AGRICULTURE

DIVISION OF PLANT INDUSTRY

CROP SCIENCE BRANCH

SUMMARY OF 1989 EXPERIMENTAL RESULTS

"GETTING THE BEST OUT OF OUR WHEATS"

B. SHACKLEY  
RESEARCH OFFICER  
KATANNING.



## GETTING THE BEST OUT OF OUR WHEATS

FILE NO: 6086

Time of Sowing - 89KA9, 89LG3, 89N4  
Factorial - 89LG4, 89N5, 89KA10

### Aim

To characterize the grain yield and quality responses of new entries in the crop variety testing (C.V.T.) system to management and environmental factors in the Western Australian Wheatbelt.

### Methods

Two experiments were each located in Katanning, Tarin Rock and the Newdegate Research Station following a lupin crop. Seasonal rainfall and the surface pH are listed in Table 1. The soil types were sandy loam over clay of various depths and gravel content.

Table 1. Growing seasonal rainfall and surfaces pH for three sites in 1989.

Site	Rainfall (April-Oct)	Surface pH (CaCl <sub>2</sub> )
KATANNING	378	4.5
TARIN ROCK	259	4.5
NEWDEGATE RESEARCH STATION	294	4.7

The standard agronomic practice was 50kg/ha seed, this was incorporated with the following :

- Katanning - 50 kg/ha N (147 kg/ha Agran) ; 150 kg/ha Super,Cu,Zn,Mo ; 2 l/ha Sprayseed and 1.5 l/ha Hoegrass.
- Tarin Rock - 25 kg/ha N (144 kg/ha Agras No 1) ; 116 kg/ha superphosphate 1.5 l/ha Sprayseed and 15 gm/ha Glean.
- Newdegate Research Station - 40 kg/ha N (116 kg/ha Agran) ; 99 or 146 kg/ha superphosphate 750 ml/ha Roundup and 1.4 l/ha Brominil M.

Measurements included rainfall, temperature and radiation. Crop development, dry matter, N uptake were estimated at 'ear at 1cm', flowering and maturity. Grain yield, grain quality and yield components were measured at maturity.

## Comments

The season 'broke' on April 23rd followed by a two week dry spell and then a very wet end of May. For the rest of the season rainfall was below average with a particularly dry September. Fortunately this was associated with a cool September and October. A number of frosts were recorded with the most severe occurring on September 25th, when minimums of 0.7<sup>0</sup>c at Katanning and 1.5<sup>0</sup>c at Tarin Rock were recorded. The only visible damage occurred at Katanning on Kulin. Septoria diseases were present at all sites, Tarin Rock had the least disease and Katanning had the most.

The data are present for each experiment in Tables that follow.

Note: Grain protein at this stage has been measured by NIR but not calibrated to the Kjeldahl method, hence only relative values.

## Time of Sowing

Generally there is a yield decline for sowings after early or mid-May at most sites and varieties (the exceptions being Gutha, Kulin and occasionally Tincurrin). Yields at Tarin Rock were low, associated with low plant density and tiller numbers then what would be expected for a high potential crop. The lack of any differences between the first two sowing times at Katanning are possibly related to poor weed control in the mid-May sowing.

Delayed sowing decreased kernal and hectolitre weight, and increased grain protein and the amount of small grains.

## Factorial

The addition of N did not increase yield at the Newdegate Research Station except for Aroona. At Tarin Rock N additions did increase yields although not significantly. There is a possibility that the N, which was applied at seeding was leached at Newdegate and at the mid-May sowing at Tarin Rock.

Dry matter and ear numbers were increased by N at Tarin Rock only. Aroona was the only cultivar to respond similarly at Newdegate. Kernal weights, kernal numbers and harvest indices had a variable response to the addition of N. However mid-June sowing at Tarin Rock suggests a decrease of harvest indices and kernal weights occurred with N but kernal numbers increased.

N addition had very little effect on hectolitre weight and did not necessarily lead to more small grains. Similarly N application lead to increased grain protein content at Tarin Rock but had a variable response at Newdegate.

TIME OF SOWING EXPERIMENTS

Seed Rate: 50 kg/ha

N Rate: 50 kg/ha N (Katanning), 40 kg/ha N (NRS) and 25 kg/ha N (Tarin Rock).

Phosphate: As recommended.

TIME OF SOWING EXPERIMENTS, 1989. GRAIN YIELD (t/ha)

SITE T.O.S.	NEWDEGATE			TARIN ROCK		KATANNING		
	5-May	19-May	2-Jun	17-May	15-Jun	23-May	7-Jun	21-Jun
AROONA	2.63	2.56	2.13	1.42	1.21	1.97	1.99	1.69
GUTHA	2.06	2.07	2.16	1.47	1.18	1.92	2.36	1.57
HALBERD	2.6	2.65	2.23	1.38	1.19	2.32	2.17	1.58
KULIN	1.94	1.77	2.28	1.2	1.27	1.95	2.58	1.94
SPEAR	2.68	2.6	2.28	1.57	1.26	2.36	2.39	1.5
TINCURRIN	3.04	3.15	2.24	1.45	1.42	2.26	2.49	1.65
79W:781	2.33	2.08	2.21	1.46	1.31	2.48	2.35	1.78
REEVES	3	2.71	2.43	1.54	1.4	2.26	2.59	1.87
79W:793	3.09	2.41	2.28	1.52	1.34	2.16	2.54	1.78
79W:804	2.66	2.58	2.21	1.54	1.25	2.2	2.22	1.5
CORRIGIN	3.01	2.9	2.37	1.36	1.29	2.86	2.76	2.01
77Z:884	2.51	2.57	1.92	1.39	1.18	1.88	1.99	1.65
SED	0.21			0.15		0.31		

TIME OF SOWING EXPERIMENTS, 1989. KERNAL WEIGHT (mg)

SITE T.O.S.	NEWDEGATE			TARIN ROCK		KATANNING		
	5-May	19-May	2-Jun	17-May	15-Jun	23-May	7-Jun	21-Jun
AROONA	45	48	42	40	38	40	34	36
GUTHA	45	41	40	39	35	34	32	34
HALBERD	45	41	39	37	34	33	33	29
KULIN	43	44	42	39	36	39	35	35
SPEAR	47	46	45	42	40	36	36	33
TINCURRIN	38	41	37	34	31	33	26	26
79W:781	45	46	42	40	37	38	35	34
REEVES	50	48	44	40	35	38	38	34
79W:793	46	34	42	41	39	36	34	36
79W:804	47	47	45	41	41	41	39	35
CORRIGIN	40	37	37	34	33	32	28	29
77Z:884	43	41	40	36	34	35	36	33

## TIME OF SOWING EXPERIMENTS, 1989.

## HECTOLITRE WEIGHTS (kg/hl)

SITE T.O.S.	NEWDEGATE			TARIN ROCK		KATANNING		
	5-May	19-May	2-Jun	17-May	15-Jun	23-May	7-Jun	21-Jun
AROONA	84	84	84	84	82	83	79	81
GUTHA	83	82	83	82	80	78	75	79
HALBERD	86	85	85	84	83	81	81	81
KULIN	81	82	84	82	82	80	77	78
SPEAR	86	86	86	85	84	82	81	80
TINCURRIN	82	84	83	81	79	81	75	77
79W:781	85	85	86	84	84	84	80	80
REEVES	86	85	85	85	84	83	82	80
79W:793	84	85	84	85	82	82	76	81
79W:804	86	86	85	85	84	84	81	81
CORRIGIN	83	82	83	82	81	80	76	80
77Z:884	85	85	84	84	82	82	80	81

## TIME OF SOWING EXPERIMENTS, 1989.

## SMALL GRAINS (%), 2 mm SEIVE

SITE T.O.S.	NEWDEGATE			TARIN ROCK		KATANNING		
	5-May	19-May	2-Jun	17-May	15-Jun	23-May	7-Jun	21-Jun
AROONA	0.1	0.2	0.1	0.3	0.4	0.6	1.9	2.6
GUTHA	0.3	0.7	0.4	1.1	1.1	2.3	4	4.6
HALBERD	0.1	0.2	0.2	1.3	2.2	3.6	2.7	6.5
KULIN	0.3	0.4	0.1	0.2	0.5	0.4	1.1	2.2
SPEAR	0.1	0.1	0.1	0.2	0.4	1.9	1.4	6
TINCURRIN	0.8	0.6	0.8	1.2	4.4	3.7	11.1	14.4
79W:781	0.6	0.2	0.2	0.4	1.5	1.4	2.9	5
REEVES	0.1	0.1	0.1	0.6	0.5	1	4.7	3.7
79W:793	0.3	0.1	0.1	0.2	0.3	0.7	1.8	2.6
79W:804	0.3	0.2	0.1	0.6	0.8	0.7	2	4.1
CORRIGIN	0.2	0.9	0.5	0.6	1.7	4	7.7	6.8
77Z:884	0.2	0.2	0.1	0.6	1	1.4	2.6	3.6



TIME OF SOWING EXPERIMENTS, 1989. GRAIN PROTEIN (% NIR)

SITE T.O.S.	NEWDEGATE			TARIN ROCK		KATANNING		
	5-May	19-May	2-Jun	17-May	15-Jun	23-May	7-Jun	21-Jun
AROONA	9.1	10.5	10.4	8.3	9.6	9.9	11.4	11.7
GUTHA	9.6	10.7	11.1	8.3	9.9	11.4	12.4	12
HALBERD	9.5	10	10.9	7.7	9.5	9.8	10.5	11.4
KULIN	10.4	11.7	11	9.2	9.6	10.9	11.3	11.4
SPEAR	9	10.2	10.3	7.98	9.9	9.9	11.2	11.6
TINCURRIN	7.6	8.5	9.2	7.4	8.5	8.5	10.5	10.2
79W:781	10.1	11.1	10.6	8.4	9.7	9.9	10.7	11.4
REEVES	9.7	10.6	10.7	8.4	9.8	10.3	11.1	11.3
79W:793	9.4	11.2	10.4	8.3	9.6	10.4	11.8	11.4
79W:804	9.5	10.5	10.5	8.2	9.5	10.2	11.6	11.5
CORRIGIN	8.3	9.4	9.5	7.7	9.3	9.2	10.6	9.9
77Z:884	9.6	10	11	8.5	10.1	11	12.7	11.9

\* NOTE : ONLY RELATIVE VALUES NOT ABSOLUTE

TIME OF SOWING EXPERIMENTS, 1989. DATE OF 50% ANTHESIS

SITE T.O.S.	NEWDEGATE			TARIN ROCK		KATANNING		
	5-May	19-May	2-Jun	17-May	15-Jun	23-May	7-Jun	21-Jun
AROONA	15-Sep	22-Sep	29-Sep	25-Sep	10-Oct	2-Oct	9-Oct	19-Oct
GUTHA	6-Sep	19-Sep	27-Sep	17-Sep	6-Oct	24-Sep	4-Oct	12-Oct
HALBERD	18-Sep	27-Sep	4-Oct	29-Sep	12-Oct	5-Oct	12-Oct	22-Oct
KULIN	4-Sep	16-Sep	25-Sep	18-Sep	7-Oct	25-Sep	6-Oct	24-Oct
SPEAR	18-Sep	27-Sep	8-Oct	30-Sep	13-Oct	6-Oct	13-Oct	22-Oct
TINCURRIN	11-Sep	25-Sep	12-Oct	25-Sep	11-Oct	3-Oct	11-Oct	19-Oct
79W:781	15-Sep	25-Sep	5-Oct	26-Sep	10-Oct	3-Oct	1-Oct	19-Oct
REEVES	11-Sep	22-Sep	28-Sep	24-Sep	10-Oct	2-Oct	10-Oct	17-Oct
79W:793	14-Sep	21-Sep	29-Sep	23-Sep	9-Oct	1-Oct	6-Oct	16-Oct
79W:804	15-Sep	22-Sep	29-Sep	24-Sep	10-Oct	1-Oct	8-Oct	17-Oct
CORRIGIN	14-Sep	24-Sep	9-Oct	24-Sep	11-Oct	2-Oct	10-Oct	19-Oct
77Z:884	18-Sep	25-Sep	6-Oct	27-Sep	12-Oct	6-Oct	14-Oct	21-Oct

FACTORIAL EXPERIMENTS

Seed Rate: 50 kg/ha

N Rates: Katanning - 0 and 50 kg/ha N

Tarin Rock - 0 and 25 kg/ha N

Newdegate Research Station - 0 and 40 kg/ha N

N Fertilizer was ammonium nitrate applied at seeding.

FACTORIAL EXPERIMENTS, 1989.

GRAIN YIELD (kg/ha)

SITE T.O.S.	NEWDEGATE		TARIN ROCK	
	5-May	30-May	17-May	15-Jun
AROONA - N	2.38	2.29	1.36	1.02
+ N	2.57	2.44	1.48	1.08
HALBERD - N	2.21	2.29	1.33	1.06
+ N	2.33	2.14	1.36	1.13
KULIN - N	1.97	2.07	1.14	0.96
+ N	1.85	2.28	1.25	1.27
SPEAR - N	2.78	2.49	1.47	1.01
+ N	2.58	2.43	1.5	1.19
REEVES - N	2.68	2.58	1.49	1.14
+ N	2.58	2.57	1.52	1.29
79W:804 - N	2.59	2.36	1.47	1.07
+ N	2.54	2.18	1.64	1.24
SED	0.13		0.1	

FACTORIAL EXPERIMENTS, 1989.

EARS / m<sup>2</sup>

SITE T.O.S.	NEWDEGATE		TARIN ROCK	
	5-May	30-May	17-May	15-Jun
AROONA - N	245	234	176	157
+ N	255	242	182	191
HALBERD - N	223	309	173	155
+ N	223	282	187	209
KULIN - N	176	169	148	136
+ N	184	193	144	152
SPEAR - N	234	304	192	162
+ N	268	267	176	181
REEVES - N	207	219	143	145
+ N	206	200	150	161
79W:804 - N	227	232	175	159
+ N	206	232	180	191
SED	30	32	16	19

FACTORIAL EXPERIMENTS, 1989. KERNAL WEIGHT (mg)

SITE T.O.S.	NEWDEGATE		TARIN ROCK	
	5-May	30-May	17-May	15-Jun
AROONA - N	46	43	38	42
+ N	44	42	39	40
HALBERD - N	44	38	37	38
+ N	44	38	37	36
KULIN - N	46	41	38	39
+ N	42	41	40	36
SPEAR - N	45	42	43	40
+ N	46	44	39	42
REEVES - N	49	44	40	36
+ N	47	45	39	38
79W:804 - N	48	46	42	41
+ N	47	45	41	43
SED	2.1	1.6	2	1.7

FACTORIAL EXPERIMENTS, 1989. KERNAL NUMBER / m2

SITE T.O.S.	NEWDEGATE		TARIN ROCK	
	5-May	30-May	17-May	15-Jun
AROONA - N	6291	5329	4405	2689
+ N	6890	5400	4043	3152
HALBERD - N	6057	6552	4274	3454
+ N	5753	6692	4293	3944
KULIN - N	5419	5324	3512	2533
+ N	5643	5961	4108	3796
SPEAR - N	6862	6670	4217	2894
+ N	7339	5741	4242	2898
REEVES - N	6366	6332	5374	3652
+ N	6874	6386	4382	3997
79W:804 - N	7128	5040	4428	3161
+ N	6231	5001	4454	3318

FACTORIAL EXPERIMENTS, 1989. HARVEST INDEX (%)

SITE T.O.S.	NEWDEGATE		TARIN ROCK	
	5-May	30-May	17-May	15-Jun
AROONA - N	44	41	42	38
+ N	46	40	42	38
HALBERD - N	43	41	41	39
+ N	42	39	41	38
KULIN - N	41	41	44	39
+ N	40	40	45	41
SPEAR - N	45	40	42	39
+ N	46	42	43	36
REEVES - N	45	42	45	42
+ N	46	44	44	40
79W:804 - N	46	40	45	44
+ N	48	41	41	41
SED	1.4	1.4	1.4	2.2

FACTORIAL EXPERIMENTS, 1989. DRY MATTER AT 'EAR AT 1 CM' (g/m<sup>2</sup>)

SITE T.O.S.	NEWDEGATE		TARIN ROCK	
	5-May	30-May	17-May	15-Jun
AROONA - N	23	55	22	35
+ N	35	66	26	48
HALBERD - N	42	50	33	36
+ N	61	62	43	61
KULIN - N	18	*	10	18
+ N	18	*	10	23
SPEAR - N	62	56	31	36
+ N	54	59	32	47
REEVES - N	26	50	35	36
+ N	39	62	31	56
79W:804 - N	44	66	38	30
+ N	53	63	37	51
SED	5	6	3	4

FACTORIAL EXPERIMENTS, 1989. DRY MATTER AT ANTHESIS (g/m<sup>2</sup>)

SITE T.O.S.	NEWDEGATE		TARIN ROCK	
	5-May	30-May	17-May	15-Jun
AROONA - N	268	482	378	201
+ N	395	378	392	255
HALBERD - N	403	569	354	249
+ N	460	517	388	269
KULIN - N	446	473	276	221
+ N	419	425	295	280
SPEAR - N	504	549	370	265
+ N	480	526	446	292
REEVES - N	415	436	335	202
+ N	435	435	351	258
79W:804 - N	413	376	341	244
+ N	372	361	377	320
SED	54	48	25	28

FACTORIAL EXPERIMENTS, 1989. HECTROLITRE WEIGHT (kg/ha)

SITE T.O.S.	NEWDEGATE		TARIN ROCK	
	5-May	30-May	17-May	15-Jun
AROONA - N	84	84	83	84
+ N	84	84	84	84
HALBERD - N	85	84	84	84
+ N	85	84	83	84
KULIN - N	81	81	83	83
+ N	82	82	82	82
SPEAR - N	85	84	84	85
+ N	85	85	85	85
REEVES - N	85	85	84	84
+ N	85	83	84	84
79W:804 - N	86	84	85	86
+ N	86	84	85	86

FACTORIAL EXPERIMENTS, 1989. GRAIN PROTEIN (% NIR)

SITE T.O.S.	NEWDEGATE		TARIN ROCK	
	5-May	30-May	17-May	15-Jun
AROONA - N	9.9	11.3	7.6	8.6
+ N	9.6	11.4	8.5	9.9
HALBERD - N	10.4	11.5	7.1	8.7
+ N	10.2	11.6	8	9.4
KULIN - N	10.9	11.9	8.8	9
+ N	11	12	9.5	10
SPEAR - N	9.8	11.3	7.7	8.9
+ N	9.7	11.3	8.4	10.1
REEVES - N	10	11	7.9	9.1
+ N	10.1	11	8.6	9.6
79W:804 - N	9.5	11.5	7.8	8.4
+ N	9.4	11.3	8.7	9.7

\* NOTE: RELATIVE VALUES NOT ABSOLUTE!

FACTORIAL EXPERIMENTS, 1989. SMALL GRAINS (%), 2mm SIEVE

SITE T.O.S.	NEWDEGATE		TARIN ROCK	
	5-May	30-May	17-May	15-Jun
AROONA - N	0.1	0.08	0.14	0.01
+ N	0.09	0.12	0.22	0.05
HALBERD - N	0.22	0.4	1.4	1.23
+ N	0.15	0.64	1.44	1.25
KULIN - N	0.22	0.54	0.14	0.15
+ N	0.16	0.2	0.1	0.13
SPEAR - N	0.17	0.29	0.12	0.16
+ N	0.08	0.22	0.16	0.13
REEVES - N	0.1	0.17	0.33	0.47
+ N	0.11	0.15	0.5	0.31
79W:804 - N	0.3	0.32	1.03	0.61
+ N	0.24	0.19	0.97	0.01