1985

Agronomy of oat varieties.

W. K. Anderson

EXPERIMENTAL RESULT SUMMARY - 1985

WESTERN AUSTRALIAN DEPARTMENT OF AGRICULTURE

PLANT RESEARCH DIVISION

CROP AGRONOMY SECTION

W.K. ANDERSON
RESEARCH OFFICER

Agronomy of Oat Varieties (with R. McLean, Plant Production Division)

85MT47 Nitrogen rates x oat varieties
85MT48 Seed rates x oat varieties
85MT49 Time-of-sowing x oat varieties

Aim: To determine if the newer oat varieties differ in their agronomic responses from the older types.

Methods: The experiments were sown on a typical lateritic podsolic soil on Mt Barker Research Station (pH 5.7, bicarbonate P 64 ppm, bicarbonate K 300 ppm, 0-20 cm). N was applied before seeding as Agran at 50 kg/ha where N rate was not a treatment. P was applied as for district practice. The basal seed rate (where not a treatment) was 50 kg/ha. Experimental seed rates were adjusted to achieve equal seed numbers according to seed size (West 38.0, Mortlock 45.8 and Echidna 34.8 mg/seed). West was chosen to represent older, tall varieties, Mortlock to represent newer, high yielding types of intermediate height and Echidna to represent dwarf types. The experimental layout contained three replicates of the factorial treatments in a randomized complete block design.

Limited data were collected (selected treatments only) on soil water, crop dry matter, phenology, N content and yield components. Only grain and dry matter yields are presented here.

Results: The rainfall for 1985 is compared to the 17 year average for MBRS in Table 1. The experiments were sown in June and the yield potential based on June to October rainfall would have approached 4 t/ha (336 mm rain, 140 mm estimated soil evaporation, 20 kg/ha/mm water use efficiency). Rainfall during the 1985 season was considerably below the 17 year average in all months of the growing season except August.

There was a positive response of grain yield of Mortlock and Echidna up to about 30 kg/ha of N (Table 2). The response of West was positive up to about 60 N but was possibly not significantly different from zero N. Lodging occurred in West at all N rates and in Mortlock at the higher N rates but not in Echidna. The grain yield of Echidna did not decline as much as the others at the higher N rates. Grain filling occurred during late October and November when the relatively low rainfall was possibly insufficient to realize the potential indicated by the dry matter at heading (Table 2) and calculated from the total growing season rainfall. The same factor possibly also helped limit the grain yield response to N.

The grain yield response of all varieties to seed rate was positive up to about 80 kg/ha (Table 3). However it is doubtful if the yield of Mortlock at 80 kg/ha will prove significantly different from that at 20 kg/ha. Examination of the yield component data may help explain these differences.

The experiments will be continued to obtain more information from a range of sites and seasons. Yields were raised from about 30% of the estimated potential for West at 50 kg/ha of seed and 60 kg/ha of N to about 50% of the potential for Echidna at various combinations of seed and N rates. Echidna yielded more grain at the earliest sowing date than Mortlock but considerably less at the latest sowing (Table 4). Examination of the relevant interactions may further close the yield gap in future.

Table 1. Monthly rainfall (mm) for Mt Barker Research Station. 1985 compared to the 17-year average.

Month	1985	17-year average
January	28.5	29.2
February	5.8	21.4
March	11.1	18.0
April	77.3	47.9
May	37.5	73.9
June	46.8	79.5
July	72.0	97.5
August	109.0	80.8
September	52.8	67.7
October	55.0	60.1
November	36.3	49.4
December	17.8	19.9
Total	550.7	645.3
Growing Season	336.4 (Jn-Oct.)	507.4 (Ap-Oct.)

Table 2. Dry matter at heading (DMH) and grain yield (GY) - N rates experiment.

N Rate	West		Mortlock		Echidna	
	DMH	GY	DMH	GY	DMH	GY
(kg/ha)	(t/ha)	(t/ha)	(t/ha)	(t/ha)	(t/ha)	(t/ha)
0	10.06	1.12	11.45	1.41	10.28	1.50
30		1.23		1.85		2.05
60	9.47	1.36	13.44	1.83	10.29	1.88
90		1.17		1.67		1.99
120	11.39	1.00	10.84	1.47	11.50	1.85

Table 3. Dry matter at heading (DMH) and grain yield (GY) seed rates experiment.

Seed Rate	West		Mortlock		Echidna	
	DMH	GY	DMH	GY	DMH	GY
(kg/ha)	(t/ha)	(t/ha)	(t/ha)	(t/ha)	(t/ha)	(t/ha)
20	8.71	0.82	10.06	1.69	9.43	1.26
40		1.02		1.83		1.45
60	11.23	1.45	11.86	1.88	11.71	1.68
80		1.55		1.91		2.01
100	10.55	1.33	12.93	1.48	11.59	1.66

Table 4. Grain yield (kg/ha) - Time of sowing experiment

Sowing date	West	Mortlock	Echidna
19 June	476	981	1552
8 July	390	1190	1095
29 July	448	1086	695

Applied Phenology in Crop Variety Testing

85WH5, 85N4

Aim: To determine the response of a range of named cultivars and breeders lines of wheat to temperature and photoperiod so that flowering times can be predicted for a range of sowing dates and locations in W.A. This should enable more intensive testing of lines in areas where their development response is best suited.

Method: Small, unreplicated plots of 108 stage 2 wheat lines (at about F4) and 12 named cultivars were sown at five dates at Wongan Hills and at Newdegate Research Stations in 1985. Irrigation was used to ensure germination and survival of early sowings. Fifty percent anthesis and physiological maturity dates were recorded for each plot. 100-day scores (Fisher scale) were also recorded.

Results: Flowering dates and days to flowering for all of the named cultivars and three, widely different crossbreds are given in Table 1. If the 'optimum' flowering period is defined as the period between the last expected frost and the last effective rain event it may be estimated that the period is approximately 5 September to 25 September at Wongan Hills and 20 September to 10 October at Newdegate on average. The suitability of the various cultivars and lines can be estimated from the table but similar estimates can be made for other sites and seasons when the development rates are related to mean temperature and photoperiod. These calculations are still in progress.

Table 1. Flowering dates (50% anthesis) and number of days to flowering form some wheat cultivars and crossbred lines - 1985.

Cultivar	Sowing Date									
	Wongan Hills					Newdegate				
	1/4	12/4	24/4	7/5	6/6	11/4	24/4	22/5	2/7	15/7
Gamenya	24/6	22/7	12/8	26/8	20/9	22/7	9/8	23/9	9/10	14/10
	84	101	110	111	106	102	107	124	99	91
Bodallin	9/6	15/7	2/8	23/8	19/9	15/7	14/8	19/9	9/10	15/100
	79	94	100	108	105	95	112	120	99	92
Tincurrin	31/6	22/7	8/8	30/8	24/9	28/7	25/8	27/9	16/10	19/10
	89	101	106	115	110	108	123	128	106	96
Gradin	22/6	15/7	3/8	23/8	18/9	19/7	9/8	15/9	9/10	16/10
	82	94	101	108	104	99	107	116	99	93
Aroona	13/6	11/7	27/8	23/8	18/9	19/7	8/8	14/9	9/10	14/10
	73	90	125	108	104	99	106	115	99	91
Egret	7/7	16/8	30/8	9/9	27/9	13/8	29/8	29/7	15/10	20/10
	107	126	128	125	113	124	127	130	105	97
Halberd	31/6	27/7	12/8	8/9	26/9	25/7	21/8	25/9	14/10	16/10
	89	106	110	124	112	105	119	126	104	93
Sunset	-	17/6	9/7	7/8	25/9	1/7	15/7	29/8	2/10	8/10
	-	56	76	92	111	81	82	99	92	85
Gutha	9/6	27/6	22/7	15/8	11/9	5/7	31/7	7/9	7/10	9/10
	69	76	89	100	97	85	98	108	97	86
Bencubbin	24/7	30/8	10/9	20/9	7/10	21/8	8/9	5/10	23/10	27/10
	114	140	139	136	123	132	137	137	113	104
Miling	31/7	24/8	3/9	9/10	1/10	14/8	29/8	29/9	15/10	24/10
	121	134	132	156	117	125	127	130	105	101
Condor	27/6	19/7	11/8	2/9	27/9	25/7	29/8	28/9	15/10	24/10
	87	98	109	118	113	105	127	129	105	101
X3	24/9	24/9	1/10	10/10	18/10	16/9	3/10	15/10	1/11	4/11
	176	165	160	156	134	158	162	148	122	112
X12	13/6	10/7	4/8	29/8	20/9	13/7	8/8	18/9	12/10	14/10
	73	89	102	114	106	93	106	119	102	91
X29	3/8	22/8	30/8	7/9	29/9	13/7	30/8	26/9	14/10	18/10
	124	132	128	123	115	93	128	127	104	95