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Agronomy of Dwarf oats.

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Agronomy of Dwarf oats

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87AL6, 87BR5, 87KA4, 87MT4, 87NA7 - Time of sowing x oat cultivars
 87AL4, 87BR8, 87KA2, 87MT2, 87NA5 - N rates x oat cultivars
 87AL5, 87BR4, 87KA3, 87MT3, 87NA6 - Seed rates x oat cultivars
 87AL7, 87BR6, 87KA5, 87MT5, 87NA8 - Oat cultivar factorial

Aim: To identify the agronomy and management practices necessary to exploit the potential of new high yielding oats.

Methods: Experiments were sown at Mt Barker Research Station, Pardelup Prison Farm, Kojonup, Williams and Mayanup. Soil chemical analyses at sowing were not available as at February 1988 but seasonal rainfall and cropping history are shown in Table 1.

Table 1. Seasonal rainfall and previous crop at oat agronomy sites in 1987

Site	Growing season rainfall (mm)	Previous crop
Pardelup	425	Rapeseed
Mt Barker Research Station	432	Rapeseed
Kojonup	147	Pasture
Williams		Oats
Mayanup	203	Oats

The basal N rate was 50 kg/ha and seed was sown at 50 kg/ha where these were not experimental treatments. P was applied as per local practice. The cultivars used were West, Mortlock and Echidna in the time of sowing experiments, West and Echidna in the agronomy factorial and Mortlock and Echidna in the N rate and seed rate experiments. Yield components were measured at all sites and plant numbers, tiller numbers and dry matter at anthesis at some sites. Only grain yields are reported here.

Results

Sowing time (Tables 2-6)

Yields declined with late sowing at most sites except for the April sowing at Mt Barker which was generally lower yielding. (This was complicated by shedding and bird damage at this site.) Barley yellow dwarf virus symptoms were much worse in the late sowings at all sites in 1987, undoubtedly accentuating the yield reduction from June and later sowings. Echidna outyielded the other cultivars at all sites especially at the May sowings.

Nitrogen rate (Table 7-11)

There was no response to N at Mt Barker or Kojonup by either cultivar. At the other sites yields were increased by additions of N but generally more for Echidna than for Mortlock (i.e. larger yield increases per unit of N applied).

Seed rate (Tables 12-16)

Yield increases due to increasing seed rate were evident at all sites. However responses were seldom evident above 60 kg/ha and similar for both Mortlock and Echidna except at Kojonup where Echidna responded and Mortlock did not.

Factorial (Tables 17-21)

Yields were increased by as much as 3 t/ha by the highest yielding combinations of factors compared to the 'standard' combination of West, sown in June with 40 kg/ha of seed and zero nitrogen. Cultivar and sowing time increased yields most consistently but nitrogen fertilizer lead to large increases at responsive sites such as Williams. Doubling the seed rate also increased yields in combination with other factors at some sites.

Table 2. Grain yields (t/ha) of three oat cultivars sown on three dates at Pardelup in 1987

Sowing date	Cultivar		
	West	Mortlock	Echidna
May	2.97	3.47	4.14
June	3.05	3.33	3.83
July	2.25	2.50	2.89
Mean	2.76	3.10	3.62

Table 3. Grain yields (t/ha) of three oat cultivars sown on three dates at Mt Barker Research Station in 1987

Sowing date	Cultivar		
	West	Mortlock	Echidna
April 23	2.68	2.66	2.85
May 27	3.15	2.83	3.03
June 23	2.75	2.34	3.18
Mean	2.86	2.61	3.02

Table 4. Grain yields (t/ha) of three oat cultivars sown on three dates at Williams in 1987

Sowing date	Cultivar		
	West	Mortlock	Echidna
May 6	3.46	3.58	4.17
June 11	3.23	3.18	3.31
July 14	1.49	1.45	1.49
Mean	2.73	2.74	2.99

Table 5. Grain yields (t/ha) of three oat cultivars sown on three dates at Kojonup in 1987

Sowing date	Cultivar		
	West	Mortlock	Echidna
June 9	3.82	3.70	3.82
July 6	1.76	1.76	1.79
July 21	0.52	0.84	0.70
Mean	2.03	2.10	2.10

Table 6. Grain yields (t/ha) of three oat cultivars sown on three dates at Mayanup in 1987

Sowing date	Cultivar		
	West	Mortlock	Echidna
May 21	1.86	2.30	2.72
June 23	1.30	1.76	1.63
July 24	0.96	1.43	1.20
Mean	1.38	1.83	1.85

Table 7. Grain yields (t/ha) of two oat cultivars at five N rates, Pardelup 1987

N rate (kg/ha)	Cultivar	
	Mortlock	Echidna
0	3.58	4.34
30	3.59	5.11
60	4.12	4.53
90	3.89	4.72
120	4.06	4.61

Table 8. Grain yields (t/ha) of two oat cultivars at five N rates, Mt Barker, 1987

N rate (kg/ha)	Cultivar	
	Mortlock	Echidna
0	2.22	2.80
30	2.29	2.89
60	2.28	2.89
90	2.25	2.70
120	2.21	2.70

Table 9. Grain yields (t/ha) of two oat varieites at five N rates, Williams 1987

N rate (kg/ha)	Cultivar	
	Mortlock	Echidna
0	2.46	2.62
30	3.31	3.36
60	3.32	4.41
90	3.57	4.29
120	4.09	4.91

Table 10. Grain yields (t/ha) of two oat cultivars at five N rates, Kojonup 1987

N rate (kg/ha)	Cultivar	
	Mortlock	Echidna
0	3.19	3.23
30	3.19	3.25
60	3.17	3.19
90	3.39	3.13
120	3.37	3.10

Table 11. Grain yields (t/ha) of two oat cultivars at five N rates, Mayanup 1987

N rate (kg/ha)	Cultivar	
	Mortlock	Echidna
0	3.05	3.45
30	3.05	3.61
60	3.18	3.63
90	3.16	3.55
120	3.16	3.45

Table 12. Grain yields (t/ha) of two oat cultivars at five seed rates, Pardelup 1987

Seed rate (kg/ha)	Cultivar	
	Mortlock	Echidna
40	3.39	3.89
60	3.72	4.56
80	3.75	4.09
100	3.97	4.69
120	3.84	4.44

Table 13. Grain yields (t/ha) of two oat cultivars at five seed rates, Mt Barker 1987

Seed rate (kg/ha)	Cultivar	
	Mortlock	Echidna
40	2.15	2.43
60	2.49	2.90
80	2.65	2.60
100	2.64	3.34
120	2.80	3.26

Table 14. Grain yields (t/ha) of two oat cultivars at five seed rates, Williams 1987

Seed rate (kg/ha)	Cultivar	
	Mortlock	Echidna
40	3.19	3.78
60	3.40	3.92
80	3.19	3.89
100	2.99	3.70
120	2.96	3.55

Table 15. Grain yields (t/ha) of two oat cultivars at five seed rates, Kojonup 1987

Seed rate (kg/ha)	Cultivar	
	Mortlock	Echidna
40	4.08	4.31
60	4.04	4.91
80	3.85	4.60
100	3.87	4.84
120	4.13	5.03

Table 16. Grain yields (t/ha) of two oat cultivars at five seed rates, Mayanup 1987

Seed rate (kg/ha)	Cultivar	
	Mortlock	Echidna
40	2.95	3.36
60	3.26	3.83
80	3.45	3.80
100	3.43	4.18
120	3.22	4.16

Table 17. Grain yields (t/ha) of two oat cultivars x 2 N rates x 2 seed rates at two sowing dates, Pardellup 1987

Cultivar	Seed rate (kg/ha)	N rate (kg/ha)	Sowing date	Grains yield
West	40	0	June	4.03
Echidna	40	0	June	4.70
West	80	0	June	4.69
West	40	50	June	3.69
West	40	0	May	4.66
Echidna	80	0	June	5.17
West	80	50	June	4.66
West	40	50	May	4.95
Echidna	40	50	June	4.58
Echidna	40	0	May	4.47
West	80	0	May	4.52
West	80	50	May	5.22
Echidna	40	50	May	5.62
Echidna	80	0	May	5.77
Echidna	80	50	June	5.80
Echidna	80	50	May	6.14

Table 18. Grain yields (t/ha) of two oat cultivars x 2 seed-rates x 2 N rates at two sowing dates, Mount Barker 1987

Cultivar	Seed rate (kg/ha)	N rate (kg/ha)	Sowing date	Grains yield
West	40	0	23 June	1.47
Echidna	40	0	23 June	2.23
West	80	0	23 June	2.08
West	40	50	23 June	1.42
West	40	0	27 May	3.21
Echidna	80	0	23 June	2.25
West	80	50	23 June	2.26
West	40	50	27 May	3.23
Echidna	40	50	23 June	2.20
Echidna	40	0	27 May	4.42
West	80	0	27 May	3.50
West	80	50	27 May	3.63
Echidna	40	50	27 May	4.34
Echidna	80	0	27 May	4.70
Echidna	80	50	23 June	2.64
Echidna	80	50	27 May	4.50

Table 19. Grain yields (t/ha) of two oat cultivars x 2 seed rates x 2 N rates at two sowing dates, Williams 1987

Cultivar	Seed rate (kg/ha)	N rate (kg/ha)	Sowing date	Grains yield
West	40	0	June	2.13
Echidna	40	0	June	2.23
West	80	0	June	2.23
West	40	50	June	3.09
West	40	0	May	2.83
Echidna	80	0	June	2.48
West	80	50	June	3.21
West	40	50	May	2.96
Echidna	40	50	June	3.18
West	80	0	May	2.45
Echidna	40	0	May	2.79
Echidna	80	50	June	3.50
Echidna	80	0	May	2.40
Echidna	40	50	May	4.18
West	80	50	May	3.24
Echidna	80	50	May	4.16

Table 20. Grain yields (t/ha) of two oat cultivars x 2 seed rates x 2 N rates at two sowing dates, Kojonup 1987

Cultivar	Seed rate (kg/ha)	N rate (kg/ha)	Sowing date	Grains yield
West	40	0	9 June	2.59
Echidna	40	0	9 June	2.81
West	80	0	9 June	2.97
West	40	50	9 June	2.35
West	40	0	13 May	3.09
Echidna	80	0	9 June	3.33
West	80	50	9 June	2.97
West	40	50	13 May	3.12
Echidna	40	50	9 June	2.59
Echidna	40	0	13 May	3.07
West	80	0	13 May	3.50
Echidna	80	50	9 June	2.85
Echidna	80	0	13 May	3.92
Echidna	40	50	13 May	3.53
West	80	50	13 May	2.92
Echidna	80	50	13 May	3.63

Table 21. Grain yields (t/ha) of two oat cultivars x 2 seeding rates x 2 N rates at two sowing dates, Mayanup 1987

Cultivar	Seed rate (kg/ha)	N rate (kg/ha)	Sowing date	Grains yield
West	40	0	June	1.36
Echidna	40	0	June	1.98
West	80	0	June	1.61
West	40	0	June	1.37
West	40	0	May	2.37
Echidna	80	0	June	2.55
West	80	50	June	1.68
West	40	50	May	2.41
Echidna	40	50	June	2.14
Echidna	40	0	May	3.18
West	80	0	May	2.54
West	80	50	May	2.72
Echidna	40	50	May	3.23
Echidna	80	0	May	3.38
Echidna	80	50	June	2.87
Echidna	80	50	May	3.57