ROTHAMSTED RESEARCH

Yields of the Field Experiments 1987

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87/R/WW/3 Factors Affecting Tillering and Yield - W. Wheat

Rothamsted Research

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87/R/WW/3

WINTER WHEAT

FACTORS AFFECTING TILLERING AND YIELD

Object: To study the effects of soil residual nitrogen and applied fertilizer nitrogen on tillering, growth and yield of winter wheat sown early or later - Fosters corner.

Sponsors: R.D. Prew, R.J. Darby, W. Day, D.W. Lawlor, G.F.J. Milford, A. Penny, G.N. Thorne, A.D. Todd.

Design: A single replicate of 2 x 2 x 2 x 2 x 2 + 32 extra plots.

Whole plot dimensions: 3.0 x 16.0.

Treatments: All combinations of the following:-

1. PREVCROP	Previous cropping:	
	RAPE	S. oilseed rape
	OATS	S. oats
2. SOWDATE	Dates of sowing:	
	18 SEPT	Sown on 18 September, 1986
	16 OCT	Sown on 16 October
3. WINTER N	Nitrogen (kg N) in winter (as urea):	
	0	None
	40	40 kg applied on 20 November, 1986
4. SPRING N	Application of 200 kg N in spring (as 'Nitro-Chalk'):	
	SINGLE	Single application at date of 3rd divided application
	DIVIDED	Applied as 4 equal dressings
5. N TIME	Timing of spring nitrogen:	
	N NORM	Normal timing on 12 Feb, 1987, 11 Mar, 6 Apr and 5 May
	N LATE	Late timing on 11 Mar, 6 Apr, 5 May and 27 May

plus all combinations of the following (all sown early, given spring N divided and at normal time):-

1. PRECROPN	Previous cropping:	
	RAPE	S. oilseed rape
	OATS	S. oats
2. WINTR NN	Nitrogen (kg N) in winter (as urea):	
	0	None
	40	40 kg applied on 19 November, 1986

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3. SPRNG NN Nitrogen (kg N) in spring (as 'Nitro-Chalk'):

0	None
150	150
250	250

plus 3 replicates of all combinations of the following (all following oats, sown on 18 Sept and not given Winter N, Spring N given as divided applications at normal time):-

1. SPRNG NP Nitrogen (kg N) in spring (as 'Nitro-Chalk'):

0	None
80	80
200	200

2. SUMMR NP Nitrogen (kg N) in summer, as a foliar spray of urea:

0	None
40	40 kg applied half on 27 May half on 28 May, 1987

Basal applications: Manures: (0:18:36) at 280 kg. Weedkillers: Chlortoluron at 5.6 kg in 200 l. Diclofop-methyl at 1.1 kg in 500 l. Fungicides: Prochloraz at 0.40 kg and carbendazim at 0.15 kg applied with the growth regulator in 200 l. Propiconazole at 0.12 kg in 200 l, and on a second occasion with carbendazim at 0.25 kg and maneb at 1.5 kg in 200 l. Growth regulator: Chlormequat chloride at 1.6 kg. Molluscicide: Methiocarb at 0.22 kg.

Seed: Avalon, sown at 190 kg.

Cultivations, etc.:- PK applied: 15 Sept, 1986. Ploughed: 16 Sept. Rotary harrowed, methiocarb applied: 17 Sept. SOWDATE 18 SEPT plots rotary harrowed, seed sown: 18 Sept. SOWDATE 16 OCT plots rotary harrowed, seed sown: 16 Oct. Chlortoluron applied: 17 Oct. Diclofop-methyl applied: 5 Jan, 1987. Prochloraz with carbendazim and the growth regulator applied: 14 Apr. Propiconazole applied: 28 May. Propiconazole with carbendazim and maneb applied: 23 June. Combine harvested: 31 Aug. Previous crops: W. oats 1985, s. oats and s. rape 1986.

NOTE: Soil samples were taken to measure nitrate and ammonia contents in September, 1986, November and February, 1987. Photosynthesis, dry weight, leaf area, shoot numbers, N content of the above-ground crop and stem nitrate contents were measured on several occasions. Foliar diseases were assessed.

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GRAIN TONNES/HECTARE

***** Tables of means *****

SOWDATE	18 SEPT	16 OCT	Mean
PREVCROP			
RAPE	8.58	8.46	8.52
OATS	8.50	8.23	8.36
Mean	8.54	8.34	8.44

WINTER N	0	40	Mean
PREVCROP			
RAPE	8.57	8.47	8.52
OATS	8.15	8.58	8.36
Mean	8.36	8.52	8.44

WINTER N	0	40	Mean
SOWDATE			
18 SEPT	8.51	8.57	8.54
16 OCT	8.21	8.47	8.34
Mean	8.36	8.52	8.44

SPRING N	SINGLE	DIVIDED	Mean
PREVCROP			
RAPE	8.48	8.56	8.52
OATS	8.15	8.57	8.36
Mean	8.32	8.57	8.44

SPRING N	SINGLE	DIVIDED	Mean
SOWDATE			
18 SEPT	8.39	8.69	8.54
16 OCT	8.24	8.45	8.34
Mean	8.32	8.57	8.44

SPRING N	SINGLE	DIVIDED	Mean
WINTER N			
0	8.16	8.57	8.36
40	8.48	8.57	8.52
Mean	8.32	8.57	8.44

N TIME	N NORM	N LATE	Mean
PREVCROP			
RAPE	8.50	8.54	8.52
OATS	8.48	8.25	8.36
Mean	8.49	8.39	8.44

N TIME	N NORM	N LATE	Mean
SOWDATE			
18 SEPT	8.64	8.44	8.54
16 OCT	8.34	8.34	8.34
Mean	8.49	8.39	8.44

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GRAIN TONNES/HECTARE

***** Tables of means *****

N TIME WINTER N	N NORM	N LATE	Mean
0	8.44	8.29	8.36
40	8.55	8.50	8.52
Mean	8.49	8.39	8.44

N TIME SPRING N	N NORM	N LATE	Mean
SINGLE	8.49	8.14	8.32
DIVIDED	8.49	8.64	8.57
Mean	8.49	8.39	8.44

PREVCROP	WINTER N SOWDATE	0	40
RAPE	18 SEPT	8.72	8.45
	16 OCT	8.43	8.49
OATS	18 SEPT	8.30	8.70
	16 OCT	8.00	8.46

PREVCROP	SPRING N SOWDATE	SINGLE	DIVIDED
RAPE	18 SEPT	8.55	8.61
	16 OCT	8.41	8.51
OATS	18 SEPT	8.24	8.76
	16 OCT	8.07	8.38

PREVCROP	SPRING N WINTER N	SINGLE	DIVIDED
RAPE	0	8.44	8.70
	40	8.52	8.42
OATS	0	7.87	8.43
	40	8.44	8.71

SOWDATE	SPRING N WINTER N	SINGLE	DIVIDED
18 SEPT	0	8.30	8.72
	40	8.49	8.66
16 OCT	0	8.01	8.41
	40	8.47	8.48

PREVCROP	N TIME SOWDATE	N NORM	N LATE
RAPE	18 SEPT	8.55	8.62
	16 OCT	8.46	8.46
OATS	18 SEPT	8.73	8.27
	16 OCT	8.23	8.23

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GRAIN TONNES/HECTARE

***** Tables of means *****

	N TIME	N NORM	N LATE
PREVCROP	WINTER N		
RAPE	0	8.59	8.55
	40	8.42	8.52
OATS	0	8.28	8.02
	40	8.68	8.48

	N TIME	N NORM	N LATE
SOWDATE	WINTER N		
18 SEPT	0	8.65	8.37
	40	8.63	8.51
16 OCT	0	8.23	8.20
	40	8.46	8.49

	N TIME	N NORM	N LATE
PREVCROP	SPRING N		
RAPE	SINGLE	8.58	8.38
	DIVIDED	8.43	8.69
OATS	SINGLE	8.41	7.90
	DIVIDED	8.55	8.60

	N TIME	N NORM	N LATE
SOWDATE	SPRING N		
18 SEPT	SINGLE	8.67	8.12
	DIVIDED	8.61	8.77
16 OCT	SINGLE	8.32	8.17
	DIVIDED	8.37	8.52

	N TIME	N NORM	N LATE
WINTER N	SPRING N		
0	SINGLE	8.41	7.90
	DIVIDED	8.46	8.67
40	SINGLE	8.58	8.38
	DIVIDED	8.51	8.62

WINTR NN	0	40	Mean
PRECROPN			
RAPE	7.66	7.90	7.78
OATS	7.07	7.46	7.26
Mean	7.36	7.68	7.52

SPRNG NN	0	150	250	Mean
PRECROPN				
RAPE	5.91	8.60	8.83	7.78
OATS	4.49	8.34	8.96	7.26
Mean	5.20	8.47	8.89	7.52

SPRNG NN	0	150	250	Mean
WINTR NN				
0	4.76	8.43	8.89	7.36
40	5.64	8.51	8.89	7.68
Mean	5.20	8.47	8.89	7.52

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GRAIN TONNES/HECTARE

***** Tables of means *****

PRECROPN	SPRNG NN / WINTR NN	0	150	250
RAPE	0	5.56	8.61	8.80
	40	6.26	8.59	8.85
OATS	0	3.96	8.26	8.99
	40	5.01	8.42	8.94

*** Standard errors of differences of means ***

Table	PREVCROP	SOWDATE	WINTER N	SPRING N
s.e.d.	0.102	0.102	0.102	0.102

Table	N TIME	PREVCROP SOWDATE	PREVCROP WINTER N	SOWDATE WINTER N
s.e.d.	0.102	0.145	0.145	0.145

Table	PREVCROP SPRING N	SOWDATE SPRING N	WINTER N SPRING N	PREVCROP N TIME
s.e.d.	0.145	0.145	0.145	0.145

Table	SOWDATE N TIME	WINTER N N TIME	SPRING N N TIME	PREVCROP SOWDATE WINTER N
s.e.d.	0.145	0.145	0.145	0.205

Table	PREVCROP SOWDATE SPRING N	PREVCROP WINTER N SPRING N	SOWDATE WINTER N SPRING N	PREVCROP SOWDATE N TIME
s.e.d.	0.205	0.205	0.205	0.205

Table	PREVCROP WINTER N N TIME	SOWDATE WINTER N N TIME	PREVCROP SPRING N N TIME	SOWDATE SPRING N N TIME
s.e.d.	0.205	0.205	0.205	0.205

Table	WINTER N SPRING N N TIME
s.e.d.	0.205

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
WP	6	0.290	3.4

GRAIN MEAN DM% 82.6

PLOT AREA HARVESTED 0.00207

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GRAIN TONNES/HECTARE

***** Tables of means *****

SUMMR NP / SPRNG NP	0	40	Mean
0	3.51	4.21	3.86
80	6.57	6.94	6.76
200	8.23	8.46	8.34
Mean	6.11	6.54	6.32

*** Standard errors of differences of means ***

Table	SPRNG NP	SUMMR NP	SPRNG NP SUMMR NP
s.e.d.	0.223	0.182	0.315

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
WP	10	0.386	6.1

GRAIN MEAN DM% 80.6

STRAW TONNES/HECTARE

***** Tables of means *****

SUMMR NP / SPRNG NP	0	40	Mean
0	3.65	3.86	3.76
80	6.39	6.53	6.46
200	7.83	8.33	8.08
Mean	5.95	6.24	6.10

STRAW MEAN DM% 60.7

PLOT AREA HARVESTED 0.00047

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