ROTHAMSTED RESEARCH

Yields of the Field Experiments 1986

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

Rothamsted Research

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86/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 - Sawyers I E.

Sponsors: R.D. Prew, R.J. Darby, A. Penny, G.N. Thorne, A.D. Todd, D.W. Wood.

Associate sponsor: F.V. Widdowson.

Design: A single replicate of 3 x 2 x 2 x 2 x 2 + 24 extra plots.

Whole plot dimensions: 3.0 x 18.5.

Treatments: All combinations of the following:-

1. SDATE NT		Date of sowing and timing of nitrogen:
	SE NORMN	Sown on 20 September, 1985 and N timed SINGLE 25 April, 1986, DIVIDED 6 March, 1 April, 21 April, 19 May, SUMMER N, 9 June
	SE LATEN	Sown on 20 September, 1985 and N timed SINGLE 19 May, 1986, DIVIDED, 1 April, 21 April, 19 May, 9 June, SUMMER N 25 June
	SL NORMN	Sown on 18 October, 1985 and N timed as for SE NORMN
2. PREVCROP		Previous cropping:
	RAPE	W. oilseed rape, resown to s. oilseed rape in 1985
	OATS	W. oats, resown to s. oats in 1985
3. WINTER N		Nitrogen (kg N) in winter (as urea):
	0	None
	50	50 kg applied on 27 November, 1985
4. SPRING N		Application of 200 kg N in spring (as 'Nitro-Chalk' 26% N):
	SINGLE	Single application
	DIVIDED	Applied as 4 equal dressings
5. SUMMER N		Amount of summer nitrogen:
	0	None
	50	50 kg

plus all combinations of the following (all sown early, given spring N divided and at normal time and not given summer N):-

1. PRECROPN		Previous cropping:
	RAPE	W. oilseed rape, resown to s. oilseed rape 1985
	OATS	W. oats, resown to s. oats 1985

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2. WINTR NN		Nitrogen (kg N) in winter (as urea):
	0	None
	50	50 on 27 Nov, 1985
3. SPRNG NN		Nitrogen (kg N) in spring (as 'Nitro-Chalk' 26% N):
	0	None
	150	150
	250	250

plus all combinations of the following (all following fallow in 1985 and not given Winter N or Summer N, Spring N given as a single application):-

1. SOWDATEF		Date of sowing:
	20 SEPT	20 September, 1985 (duplicated)
	18 OCT	18 October (duplicated)
2. S NTIMEF		Nitrogen (kg N) in spring (as 'Nitro-Chalk' 26% N) and timing:
	0	None
	NORMAL	200 on 25 April, 1986
	LATE	200 on 19 May, 1986

NOTE: PREVCROP RAPE and OATS were Jet Neuf and Peniarth sown in autumn 1984 with a basal application of (0:18:36) at 690 kg and N at 50 kg, as 'Nitro-Chalk' (26% N). They were ploughed up and re-sown in spring 1985 to Calypso rape and Trafalgar oats, given 210 and 105 kg N as 'Nitro-Chalk' (27.5% N) respectively.

Basal applications: Manures: (0:18:36) at 280 kg. Weedkillers: Paraquat at 0.40 kg ion in 200 l. Chlortoluron at 3.5 kg in 200 l. Fungicides: Prochloraz at 0.40 kg with carbendazim at 0.15 kg applied with the growth regulator in 200 l. Propiconazole at 0.12 kg in 200 l on two occasions, on the second with carbendazim and maneb (as 'Septal' at 2.5 kg). Insecticides: Cypermethrin at 0.025 kg in 200 l. Omethoate at 0.64 kg in 200 l. Molluscicide: Methiocarb at 0.22 kg. Growth regulator: Chlormequat chloride at 1.3 kg.

Seed: Avalon, sown at 190 kg.

Cultivations, etc.:- PK applied: 5 Sept, 1985. Paraquat applied: 18 Sept. Heavy spring-tine cultivated twice: 19 Sept. Rotary grubbed, subsoiled with 25 cm wide wings on tines 38 cm deep and 66 cm apart, molluscicide applied, early-sown plots rotary harrowed and seed sown: 20 Sept. Later-sown plots rotary harrowed and seed sown: 18 Oct. Cypermethrin applied: 13 Nov. Chlortoluron applied: 6 Dec. Omethoate applied: 13 Mar, 1986. Prochloraz and carbendazim applied with the growth regulator: 1 May. First propiconazole applied: 16 June. Second propiconazole with 'Septal' applied: 1 July. Combine harvested: 21 Aug. Previous crops: W. wheat 1984, fallow, s. oats, s. rape 1985.

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NOTE: Soil samples were taken for measurements of water and mineral N contents, in October, November and February. Photosynthesis, dry weight, leaf area, shoot numbers, N content of the above-ground crop and stem nitrate contents were measured on several occasions. Foliar and stem base diseases were assessed.

GRAIN TONNES/HECTARE

***** TABLES OF MEANS *****

PREVCROP	RAPE	OATS	MEAN
SUMMER N			
0	9.23	9.24	9.24
50	9.30	9.30	9.30
MEAN	9.27	9.27	9.27

WINTER N	0	50	MEAN
SUMMER N			
0	9.26	9.22	9.24
50	9.25	9.35	9.30
MEAN	9.25	9.29	9.27

WINTER N	0	50	MEAN
PREVCROP			
RAPE	9.32	9.21	9.27
OATS	9.19	9.36	9.27
MEAN	9.25	9.29	9.27

SPRING N	SINGLE	DIVIDED	MEAN
SUMMER N			
0	9.25	9.22	9.24
50	9.25	9.35	9.30
MEAN	9.25	9.29	9.27

SPRING N	SINGLE	DIVIDED	MEAN
PREVCROP			
RAPE	9.27	9.27	9.27
OATS	9.23	9.31	9.27
MEAN	9.25	9.29	9.27

SPRING N	SINGLE	DIVIDED	MEAN
WINTER N			
0	9.12	9.38	9.25
50	9.38	9.19	9.29
MEAN	9.25	9.29	9.27

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GRAIN TONNES/HECTARE

***** TABLES OF MEANS *****

SDATE NT SUMMER N	SE NORMN	SE LATEN	SL NORMN	MEAN
0	9.38	9.32	9.01	9.24
50	9.53	9.44	8.93	9.30
MEAN	9.45	9.38	8.97	9.27

SDATE NT PREVCROP	SE NORMN	SE LATEN	SL NORMN	MEAN
RAPE	9.49	9.31	8.99	9.27
OATS	9.41	9.46	8.94	9.27
MEAN	9.45	9.38	8.97	9.27

SDATE NT WINTER N	SE NORMN	SE LATEN	SL NORMN	MEAN
0	9.53	9.28	8.94	9.25
50	9.37	9.48	9.00	9.29
MEAN	9.45	9.38	8.97	9.27

SDATE NT SPRING N	SE NORMN	SE LATEN	SL NORMN	MEAN
SINGLE	9.46	9.26	9.03	9.25
DIVIDED	9.45	9.50	8.91	9.29
MEAN	9.45	9.38	8.97	9.27

WINTER N	0		50	
SPRING N	SINGLE	DIVIDED	SINGLE	DIVIDED
PREVCROP				
RAPE	9.20	9.43	9.33	9.10
OATS	9.04	9.33	9.43	9.28

WINTER N	0		50	
SUMMER N	0	50	0	50
PREVCROP				
RAPE	9.32	9.31	9.14	9.29
OATS	9.19	9.18	9.29	9.42

SPRING N	SINGLE		DIVIDED	
SUMMER N	0	50	0	50
PREVCROP				
RAPE	9.35	9.18	9.11	9.42
OATS	9.14	9.33	9.34	9.27

SPRING N	SINGLE		DIVIDED	
SUMMER N	0	50	0	50
WINTER N				
0	9.16	9.08	9.35	9.42
50	9.33	9.43	9.10	9.28

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GRAIN TONNES/HECTARE

***** TABLES OF MEANS *****

WINTER N	0			50		
SDATE NT	SE NORMN	SE LATEN	SL NORMN	SE NORMN	SE LATEN	SL NORMN
PREVCROP						
RAPE	9.72	9.22	9.01	9.26	9.40	8.98
OATS	9.34	9.35	8.87	9.48	9.57	9.01

SPRING N	SINGLE			DIVIDED		
SDATE NT	SE NORMN	SE LATEN	SL NORMN	SE NORMN	SE LATEN	SL NORMN
PREVCROP						
RAPE	9.45	9.20	9.15	9.53	9.42	8.84
OATS	9.46	9.32	8.92	9.36	9.59	8.97

SPRING N	SINGLE			DIVIDED		
SDATE NT	SE NORMN	SE LATEN	SL NORMN	SE NORMN	SE LATEN	SL NORMN
WINTER N						
0	9.35	9.02	8.99	9.71	9.54	8.89
50	9.56	9.50	9.07	9.19	9.46	8.92

SUMMER N	0			50		
SDATE NT	SE NORMN	SE LATEN	SL NORMN	SE NORMN	SE LATEN	SL NORMN
PREVCROP						
RAPE	9.43	9.28	8.98	9.56	9.33	9.01
OATS	9.32	9.36	9.04	9.50	9.55	8.84

SUMMER N	0			50		
SDATE NT	SE NORMN	SE LATEN	SL NORMN	SE NORMN	SE LATEN	SL NORMN
WINTER N						
0	9.36	9.36	9.05	9.71	9.20	8.83
50	9.40	9.28	8.97	9.35	9.68	9.02

SUMMER N	0			50		
SDATE NT	SE NORMN	SE LATEN	SL NORMN	SE NORMN	SE LATEN	SL NORMN
SPRING N						
SINGLE	9.45	9.18	9.12	9.47	9.34	8.95
DIVIDED	9.30	9.46	8.91	9.59	9.54	8.91

WINTR NN	0	50	MEAN
PRECROPN			
RAPE	7.24	8.02	7.63
OATS	8.00	8.42	8.21
MEAN	7.62	8.22	7.92

SPRNG NN	0	150	250	MEAN
PRECROPN				
RAPE	4.84	8.79	9.27	7.63
OATS	6.05	9.16	9.42	8.21
MEAN	5.44	8.97	9.34	7.92

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GRAIN TONNES/HECTARE

***** TABLES OF MEANS *****

SPRNG NN / WINTR NN	0	150	250	MEAN
0	4.96	8.87	9.04	7.62
50	5.93	9.08	9.65	8.22
MEAN	5.44	8.97	9.34	7.92

WINTR NN	0			50		
SPRNG NN	0	150	250	0	150	250
PRECROPN						
RAPE	4.03	8.65	9.06	5.66	8.94	9.47
OATS	5.89	9.08	9.02	6.20	9.23	9.82

S NTIMEF / SOWDATEF	0	NORMAL	LATE	MEAN
20 SEPT	8.28	9.38	9.68	9.11
18 OCT	6.85	9.50	8.97	8.44
MEAN	7.56	9.44	9.32	8.78

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GRAIN TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	PREVCROP	WINTER N	SPRING N	SUMMER N
SED	0.100	0.100	0.100	0.100

TABLE	SDATE NT	PREVCROP WINTER N	PREVCROP SPRING N	WINTER N SPRING N
SED	0.122	0.141	0.141	0.141

TABLE	PREVCROP SUMMER N	WINTER N SUMMER N	SPRING N SUMMER N	PREVCROP SDATE NT
SED	0.141	0.141	0.141	0.173

TABLE	WINTER N SDATE NT	SPRING N SDATE NT	SUMMER N SDATE NT	PREVCROP WINTER N SPRING N
SED	0.173	0.173	0.173	0.199

TABLE	PREVCROP WINTER N SUMMER N	PREVCROP SPRING N SUMMER N	WINTER N SPRING N SUMMER N	PREVCROP WINTER N SDATE NT
SED	0.199	0.199	0.199	0.244

TABLE	PREVCROP SPRING N SDATE NT	WINTER N SPRING N SDATE NT	PREVCROP SUMMER N SDATE NT	WINTER N SUMMER N SDATE NT
SED	0.244	0.244	0.244	0.244

TABLE	SPRING N SUMMER N SDATE NT
SED	0.244

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP	11	0.345	3.7

GRAIN MEAN DM% 81.8

PLOT AREA HARVESTED 0.00234

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