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

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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 $3 \times 2 \times 2 \times 2 \times 2 + 24$ 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

86/R/WW/3

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 follow 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.

86/R/WW/3

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

86/R/WW/3

GRAIN TONNES/HECTARE

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

SDATE NT	SE	NORMN	SE	LATEN	SL	NORMN	MEAN
SUMMER N							
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	SE	NORMN	SE	LATEN	SL	NORMN	MEAN
PREVCROP							
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	SE	NORMN	SE	LATEN	SL	NORMN	MEAN
WINTER N							
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	SE	NORMN	SE	LATEN	SL	NORMN	MEAN
SPRING N							
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			

86/R/WW/3

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				

86/R/WW/3

GRAIN TONNES/HECTARE

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

SPRNG NN	0	150	250	MEAN		
WINTR NN						
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	0	NORMAL	LATE	MEAN		
SOWDATEF						
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		

86/R/WW/3

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