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85/R/CS/303 Factors Affecting Tillering and Yield - W. Wheat

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85/R/CS/303

FACTORS AFFECTING TILLERING AND YIELD

Object: To study the effects of applying nitrogen at a range of growth stages on tiller production and survival and on the yield of winter wheat - Long Hoos I/II.

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

Associate sponsors: P.B. Barraclough, A.H. Weir, F.V. Widdowson.

The second year, winter wheat.

Design: 2 x 2 x 2 x 2 x 2 + 26 extra plots.

Whole plot dimensions: 3.0 x 18.0.

Treatments: All combinations of the following (all given insecticides and molluscicide):

1. PREVCROP Previous cropping:
 RAPE W. oilseed rape, failed and re-sown to s. oilseed rape in 1984
 OATS W. oats in 1984
2. WINTER N Nitrogen (kg N), as urea, in winter:
 0 None
 60 60 kg N on 7 Nov, 1984
3. E SPNG N Application of nitrogen, 60 kg N after rape, 80 kg N after oats, as 'Nitro-Chalk' (26% N) in early spring:
 EARLY D Half on 25 Feb, 1985 half on 18 Mar
 EARLY S All on 18 Mar
4. L SPNG N Application of nitrogen, 120 kg N after rape, 160 kg N after oats, as 'Nitro-Chalk' (26% N) in late spring:
 LATE D Half on 15 Apr, half on 9 May
 LATE S All on 15 Apr
5. SUMMER N Nitrogen (kg N), as 'Nitro-Chalk' (26% N), in summer:
 0 None
 60 60 kg N on 30 May

plus all combinations of the following (all given late spring N divided and summer N but not given insecticides):

1. PRECROPX Previous cropping:
 RAPE W. oilseed rape failed and re-sown to s. oilseed rape in 1984
 OATS W. oats in 1984

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2. WINTR NX Nitrogen (kg N), as urea, in winter:
0 None
60 60 kg N on 7 Nov, 1984
3. ESPNG NX Application of nitrogen, 60 kg N after rape, 80 kg N after oats, as 'Nitro-Chalk' (26% N) in early spring:
EARLY D Half on 25 Feb, 1985 half on 18 Mar
EARLY S All on 18 Mar

plus all combinations of the following (all given insecticides and molluscicide but not summer N):

1. PRECROPN Previous cropping:
RAPE W. oilseed rape, failed and re-sown to s. oilseed rape in 1984
OATS W. oats in 1984
2. WINTR NN Nitrogen (kg N), as urea, in winter:
0 None
60 60 kg N on 7 Nov, 1984
3. SPRNG NN Nitrogen in spring (kg N), one third on 18 Mar, 1985, two thirds on 15 Apr:
N1 120 kg after rape, 180 kg after oats
N3 240 kg after rape, 300 kg after oats

plus five extra treatments, all given insecticides, all duplicated:

EXTRA

- | | |
|----------|---|
| RAPE NO | After oilseed rape as above, given molluscicide, no nitrogen |
| OATS NO | After oats as above, given molluscicide, no nitrogen |
| RAPE MO | After oilseed rape as above, given no molluscicide, given winter N, early spring N divided, late spring N divided and summer N |
| OATSSO F | After oats as above, given no summer nitrogen, given fenpropimorph at 0.75 kg in 220 l on 10 Dec, 1984 given early spring N divided, late spring N divided and molluscicide |
| OATSSN F | As for OATSSO F also given summer nitrogen |

Eight additional plots following fallow were used for root sampling, yields not taken.

- NOTES: (1) Insecticide treatments were: Cypermethrin at 0.02 kg in 200 l on 30 Oct, 1984 plus chlorpyrifos at 0.72 kg in 220 l on 30 Jan, 1985 plus omethoate at 0.65 kg in 220 l on 4 Apr.
(2) The molluscicide treatment was: Methiocarb at 0.22 kg applied as pellets on 13 Sept, 1984.

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Standard applications (1984 crops):

Rape: Manures: 'Nitro-Chalk' (26% N) at 250 kg followed by 770 kg.
Weedkillers: TCA at 11 kg in 220 l. Propachlor at 4.3 kg in 250 l.

Oats: Manures: 'Nitro-Chalk' (26% N) at 130 kg followed by 380 kg.
Weedkillers: Paraquat at 0.60 kg ion in 200 l. Methabenzthiazuron at 2.4 kg in 220 l. Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 250 l.

Seed (1984 crops):

Rape: Jet Neuf, dressed thiram and iprodione, sown at 9.0 kg (crop failed). Re-sown in spring with Brutor, dressed thiram and fenpropimorph, sown at 8.0 kg.

Oats: Pennal, sown at 190 kg.

Cultivations, etc. (1984 crops):-

Both crops and fallow: Heavy spring-tine cultivated twice: 24 Aug, 1983. Discd: 26 Aug.

Rape: First N applied, TCA applied: 30 Aug, 1983. Rotary harrowed, seed sown: 31 Aug. Rotary cultivated (crop failed) : 7 Dec. Second N applied: 5 Apr, 1984. Heavy spring-tine cultivated, rotary harrowed: 12 Apr. Rotary harrowed, seed sown: 13 Apr. Propachlor applied: 18 Apr. Combine harvested: 3 Sept.

Oats: N applied: 30 Aug, 1983. Paraquat applied: 2 Oct. Spring-tine cultivated, rotary harrowed, seed sown: 4 Oct. Methabenzthiazuron applied: 6 Oct. N applied: 5 Apr, 1984. 'Herrisol' applied: 18 Apr. Combine harvested: 3 Aug.

Fallow: Rotary hoed: 22 June, 1984.

Previous crops: Potatoes 1982, w. barley 1983.

Basal applications (to 1985 wheat): Manures: (0:18:36) at 280 kg.

Weedkillers: Isoproturon at 2.4 kg with mecoprop at 1.1 kg, bromoxynil at 0.14 kg and ioxynil at 0.14 kg in 250 l. Fungicides: Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 200 l. Propiconazole at 0.25 kg in 200 l. Propiconazole at 0.12 kg with carbendazim and maneb (as 'Septal' at 2.5 kg) in 200 l. Insecticide: Pirimicarb at 0.14 kg in 200 l.

Seed (1985 wheat): Avalon, sown at 220 kg.

Cultivations, etc. (to 1985 wheat):- Cultivated by rotary digger (1984

rape stubble only): 8 Sept, 1984. PK applied: 10 Sept. Ploughed, spring-tine cultivated: 11 Sept. Discd three times: 12 Sept. Rotary harrowed, seed sown: 19 Sept. Weedkillers applied: 7 Dec. Prochloraz and carbendazim applied: 10 Apr, 1985. Propiconazole applied: 31 May. Propiconazole with 'Septal' applied: 2 July. Insecticide applied: 15 July. Combine harvested: 29 Aug.

NOTE: Soil samples were taken for measurements of water and mineral N contents in October, November and February. Light interception, 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-based diseases and shoot borers were assessed.

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GRAIN TONNES/HECTARE

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

WINTER N	0	60	MEAN
PREVCROP			
RAPE	10.34	9.82	10.08
OATS	10.66	10.42	10.54
MEAN	10.50	10.12	10.31
E SPNG N	EARLY D	EARLY S	MEAN
PREVCROP			
RAPE	10.06	10.10	10.08
OATS	10.55	10.53	10.54
MEAN	10.31	10.31	10.31
E SPNG N	EARLY D	EARLY S	MEAN
WINTER N			
0	10.39	10.60	10.50
60	10.22	10.03	10.12
MEAN	10.31	10.31	10.31
L SPNG N	LATE D	LATE S	MEAN
PREVCROP			
RAPE	10.20	9.96	10.08
OATS	10.73	10.34	10.54
MEAN	10.47	10.15	10.31
L SPNG N	LATE D	LATE S	MEAN
WINTER N			
0	10.66	10.33	10.50
60	10.27	9.97	10.12
MEAN	10.47	10.15	10.31
L SPNG N	LATE D	LATE S	MEAN
E SPNG N			
EARLY D	10.52	10.09	10.31
EARLY S	10.42	10.21	10.31
MEAN	10.47	10.15	10.31
SUMMER N	0	60	MEAN
PREVCROP			
RAPE	9.94	10.22	10.08
OATS	10.34	10.74	10.54
MEAN	10.14	10.48	10.31

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GRAIN TONNES/HECTARE

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

SUMMER N	0	60	MEAN
WINTER N			
0	10.34	10.66	10.50
60	9.95	10.30	10.12
MEAN	10.14	10.48	10.31
SUMMER N	0	60	MEAN
E SPNG N			
EARLY D	10.09	10.52	10.31
EARLY S	10.19	10.44	10.31
MEAN	10.14	10.48	10.31
SUMMER N	0	60	MEAN
L SPNG N			
LATE D	10.25	10.68	10.47
LATE S	10.03	10.28	10.15
MEAN	10.14	10.48	10.31
WINTR NX	0	60	MEAN
PRECROPX			
RAPE	10.49	10.58	10.53
OATS	10.72	10.82	10.77
MEAN	10.60	10.70	10.65
ESPNG NX	EARLY D	EARLY S	MEAN
PRECROPX			
RAPE	10.63	10.44	10.53
OATS	11.08	10.46	10.77
MEAN	10.85	10.45	10.65
ESPNG NX	EARLY D	EARLY S	MEAN
WINTR NX			
0	10.99	10.21	10.60
60	10.71	10.68	10.70
MEAN	10.85	10.45	10.65
WINTR NN	0	60	MEAN
PRECROPN			
RAPE	10.05	9.86	9.96
OATS	10.32	10.09	10.20
MEAN	10.18	9.98	10.08

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GRAIN TONNES/HECTARE

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

SPRNG NN	N1	N3	MEAN
PRECROPN			
RAPE	9.99	9.92	9.96
OATS	10.31	10.10	10.20
MEAN	10.15	10.01	10.08

SPRNG NN	N1	N3	MEAN
WINTR NN			
0	10.03	10.33	10.18
60	10.27	9.69	9.98
MEAN	10.15	10.01	10.08

EXTRA	RAPE NO	OATS NO	RAPE MO	OATSSO F	OATSSN F
	8.39	5.04	9.34	10.77	10.77

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

(MAIN FACTORIAL PLOTS ONLY)
 MARGIN OF TWO FACTOR TABLES 0.114
 TWO FACTOR TABLES 0.161

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

STRATUM	DF	SE	CV%
WP	16	0.322	3.1

GRAIN MEAN DM% 85.4

PLOT AREA HARVESTED 0.00246