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# Yields of the Field Experiments 1991

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## 91/R/WW/3 N and Crop Physiology - W. Wheat

### Rothamsted Research

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91/R/WW/3

**WINTER WHEAT**

**N AND CROP PHYSIOLOGY**

**Object:** To study the relationship between N supply to crops of different size and their nitrate contents, N uptakes, growth rates and yield - Stackyard.

**Sponsors:** R.J. Darby, G.F.J. Milford.

**Design:** 3 randomised blocks of 15 plots.

**Whole plot dimensions:** 3.0 x 20.0.

**Treatments:** All combinations of:-

1. **SOW DATE**            Dates of sowing:
- |        |                    |
|--------|--------------------|
| 12 SEP | 12 September, 1990 |
| 11 OCT | 11 October         |
2. **N R T S**            Nitrogen fertilizer (kg N) as 'Nitro-Chalk', rates, times and plot shading:
- |     |   |
|-----|---|
| -   | None  |
| N1  | 30 kg N on 21 Mar, 1991 + 92 kg N on 11 Apr |
| N2  | 60 " " " " " " + 184 " " " " " "            |
|     | (duplicated)                                |
| N2T | " " " " 11 Apr " " " " " " 29 Apr           |

plus 5 extra treatments all sown on 31 Oct

- N R T S L**            Nitrogen fertilizer (kg N) as 'Nitro-Chalk', rates and times:
- |     |   |
|-----|---|
| -   | None  |
| N1  | 30 kg N on 21 Mar, 1991 + 92 kg N on 11 Apr |
| N2  | 60 " " " " " " + 184 " " " " " "            |
| N3  | " " " " " " " " " " " " " " +               |
|     | 56 kg N on 23 May                           |
| N2T | " " " " 11 Apr " " " " " " 29 Apr           |

- NOTES:** (1) Shading, to reduce light to 44% of normal, was erected on 9 Apr, 1991 on **SOW DATE** 12 SEP and 11 OCT only, on one of the duplicates of **N R T S** N2. On **N R T S L** shading was not erected, because of loss of plants due to bird damage.  
(2) **N R T S** N2T treatment was applied three weeks after a threshold stem nitrate value of 200 ppm.  
(3) Each sowing date was rotary harrowed before drilling.

**Basal applications:** Manure: Magnesian limestone at 5.0 t. Weedkillers: Isoproturon at 1.3 kg and pendimethalin at 1.3 kg in 300 l. Fungicides: Fenpropimorph at 0.75 kg in 250 l and on a second occasion at 0.75 kg with chlorothalonil at 0.50 kg in 300 l. Insecticides: Deltamethrin at 6.2 g in 300 l. Pirimicarb at 0.14 kg in 300 l.

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Seed: Mercia, sown at 170 kg.

Cultivations, etc.:— Magnesian limestone applied: 31 July, 1990.  
 Ploughed: 3 Sept. Rolled: 4 Sept. Rotary harrowed: 12 Sept.  
 Deltamethrin applied: 7 Nov. Weedkillers applied: 21 Nov.  
 Fenpropimorph alone applied: 10 May, 1991. Fenpropimorph with  
 chlorothalonil applied: 2 July. Pirimicarb applied: 17 July.  
 Combine harvested: 27 Aug. Previous crops: Fallow 1989, w. oats  
 1990.

NOTE: Soils were sampled, to 90 cm depth, for ammonium and nitrate contents on four occasions from mid-October to the end of February and then at fortnightly intervals corresponding with crop sampling. Crop samples were taken from November to June at fortnightly intervals to measure stem nitrate concentrations and at similar intervals from April to the end of June to measure crop growth and total N content.

GRAIN TONNES/HECTARE

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

| N R T S  | -    | N1   | N2   | N2T  | Mean |
|----------|------|------|------|------|------|
| SOW DATE |      |      |      |      |      |
| 12 SEPT  | 2.00 | 6.31 | 8.75 | 8.25 | 6.81 |
| 11 OCT   | 1.98 | 6.81 | 8.91 | 8.21 | 6.96 |
| Mean     | 1.99 | 6.56 | 8.83 | 8.23 | 6.89 |

  

| N R T SL | -    | N1   | N2   | N3   | N2T  | Mean |
|----------|------|------|------|------|------|------|
|          | 2.07 | 6.47 | 8.52 | 9.04 | 8.08 | 6.84 |

GRAND MEAN 6.87

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

| SOW DATE | N R T S | N R T SL | N R T S       |
|----------|---------|----------|---------------|
|          | 0.121   |          | SOW DATE      |
| 0.076    | 0.101   | 0.170    | 0.170 min.rep |
|          |         |          | 0.148 max-min |
|          |         |          | 0.121 max.rep |

N R T S  
 max.rep N2 only  
 min.rep any of the remainder  
 max-min N2 v any of the remainder

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

| Stratum        | d.f. | s.e.  | cv% |
|----------------|------|-------|-----|
| BLOCK.WP       | 30   | 0.209 | 3.0 |
| GRAIN MEAN DM% | 84.8 |       |     |

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STRAW TONNES/HECTARE

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

| N R T S  | -    | N1   | N2   | N2T  | Mean |      |
|----------|------|------|------|------|------|------|
| SOW DATE |      |      |      |      |      |      |
| 12 SEPT  | 1.73 | 5.05 | 7.51 | 5.78 | 5.52 |      |
| 11 OCT   | 1.48 | 5.87 | 7.29 | 5.99 | 5.58 |      |
| Mean     | 1.60 | 5.46 | 7.40 | 5.88 | 5.55 |      |
| N R T SL | -    | N1   | N2   | N3   | N2T  | Mean |
|          | 1.18 | 5.11 | 6.13 | 6.31 | 5.38 | 4.82 |

GRAND MEAN 5.31

STRAW MEAN DM% 77.6

PLOT AREA HARVESTED 0.00276