

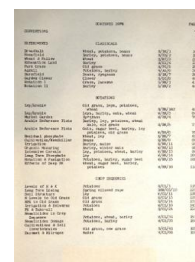
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## Yields of the Field Experiments 1976

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### 76/R/WW/2 and 76/W/WW/2 Aqueous N and Nitrification Inhibitors - W. Wheat

#### Rothamsted Research

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76/R/WW/2 and 76/W/WW/2

WINTER WHEAT

AQUEOUS N AND NITRIFICATION INHIBITORS

Object: To study the effects of adding a range of nitrification inhibitors to aqueous urea and aqueous ammonia on the yield and nitrogen uptake of winter wheat - Rothamsted (R), Gt. Knott III and Woburn (W) Horsepool.

Sponsors: F.V. Widdowson, J. Ashworth, A. Penny, G.G. Briggs.

Design: 2 randomised blocks of 24 plots.

Whole plot dimensions: 2.44 x 12.2.

Treatments: All combinations of:-

1. N FORM Form of aqueous nitrogen:

|         |                       |
|---------|-----------------------|
| AMMONIA | Aqueous ammonia 26% N |
| UREA    | Aqueous urea 18% N    |

2. N RATE Rate of nitrogen (kg N):

| (R) | (W) | (R) | (W) |
|-----|-----|-----|-----|
| 70  | 60  | 70  | 60  |
| 100 | 90  | 100 | 90  |

3. NIT INHB Nitrification inhibitors added to aqueous fertiliser:

|          |                                    |
|----------|------------------------------------|
| NONE     | None                               |
| CS2      | Carbon disulphide at 11 kg         |
| NITRAPYR | Nitrapyrin ('N-Serve') at 1.25 kg  |
| AMM TRI  | Ammonium trithiocarbonate at 16 kg |

plus eight extra treatments given solid fertiliser, 'Nitro-Chalk', (kg N):-

NITRO CH

|     |                       |
|-----|-----------------------|
| 0   | 0                     |
| 50  | 50 (Woburn only)      |
| 60  | 60                    |
| 70  | 70                    |
| 80  | 80                    |
| 90  | 90                    |
| 100 | 100                   |
| 110 | 110                   |
| 120 | 120 (Rothamsted only) |

NOTE: Aqueous nitrogen was applied by injectors spaced 30 cm apart 10.2 cm deep.

76/R/WW/2 and 76/W/WW/2

Basal applications:-

Gt Knott III (R): Manures: (0:20:20) at 310 kg, combine drilled.  
Weedkillers: Paraquat at 0.42 kg ion in 220 l. Ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 220 l. Growth regulator: Chlormequat at 1.7 kg in 220 l.

Horsepool (W): Manures: (0:20:20) at 250 kg, combine drilled.  
Weedkillers: Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 280 l.  
Growth regulator: Chlormequat at 1.7 kg in 280 l.

Seed: Gt Knott III (R): Maris Huntsman, sown at 200 kg.

Horsepool (W): Maris Huntsman, sown at 190 kg.

Cultivations, etc.:-

Gt Knott (R): Heavy spring-tine cultivated: 25 Sept, 1975. Paraquat applied: 6 Oct. Ploughed, rotary cultivated: 13 Oct. Seed sown: 14 Oct. Aqueous urea injected: 8 Mar, 1976. Aqueous ammonia injected: 9 Mar. Solid N treatments applied: 14 Apr. Ioxynil plus mecoprop applied: 22 Apr. Chlormequat applied: 7 May. Combine harvested: 22 July. Previous crops: Barley 1974, winter oats 1975.

Horsepool (W): Heavy spring-tine cultivated twice: 30, 31 Aug, 1975. Spring-tine cultivated: 3 Oct. Seed sown: 4 Oct. Aqueous urea and ammonia injected: 10 Mar, 1976. Solid N treatments applied: 13 Apr. Weedkiller applied: 21 Apr. Chlormequat applied: 4 May. Combine harvested: 23 July. Previous crops: Winter wheat 1974, beans 1975.

- NOTES: (1) Soil samples were taken during the growing season to estimate rates of nitrification.
- (2) Horsepool (W) after harvest the grain from one plot:- NITRO CH 70 was spilt, an estimated value was used in the analysis.

76/R/WW/2 GREAT KNOTT III (R)

GRAIN TONNES/HECTARE

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

|          |          |      |          |          |         |      |      |      |      |
|----------|----------|------|----------|----------|---------|------|------|------|------|
| N RATE   | 70       | 100  | MEAN     |          |         |      |      |      |      |
| N FORM   |          |      |          |          |         |      |      |      |      |
| AMMONIA  | 4.78     | 5.08 | 4.93     |          |         |      |      |      |      |
| UREA     | 4.99     | 5.27 | 5.13     |          |         |      |      |      |      |
| MEAN     | 4.89     | 5.18 | 5.03     |          |         |      |      |      |      |
| NIT INHB | NONE     | CS2  | NITRAPYR | AMM TRI  | MEAN    |      |      |      |      |
| N FORM   |          |      |          |          |         |      |      |      |      |
| AMMONIA  | 4.92     | 4.93 | 4.99     | 4.88     | 4.93    |      |      |      |      |
| UREA     | 5.06     | 5.06 | 5.02     | 5.39     | 5.13    |      |      |      |      |
| MEAN     | 4.99     | 5.00 | 5.00     | 5.14     | 5.03    |      |      |      |      |
| NIT INHB | NONE     | CS2  | NITRAPYR | AMM TRI  | MEAN    |      |      |      |      |
| N RATE   |          |      |          |          |         |      |      |      |      |
| 70       | 4.92     | 4.87 | 4.78     | 4.98     | 4.89    |      |      |      |      |
| 100      | 5.06     | 5.12 | 5.23     | 5.30     | 5.18    |      |      |      |      |
| MEAN     | 4.99     | 5.00 | 5.00     | 5.14     | 5.03    |      |      |      |      |
| N FORM   | NIT INHB | NONE | CS2      | NITRAPYR | AMM TRI |      |      |      |      |
| AMMONIA  | N RATE   |      |          |          |         |      |      |      |      |
|          | 70       | 4.80 | 4.83     | 4.78     | 4.72    |      |      |      |      |
|          | 100      | 5.04 | 5.03     | 5.21     | 5.04    |      |      |      |      |
| UREA     | 70       | 5.05 | 4.91     | 4.78     | 5.23    |      |      |      |      |
|          | 100      | 5.07 | 5.21     | 5.25     | 5.55    |      |      |      |      |
| NITRO CH | 0        | 60   | 70       | 80       | 90      | 100  | 110  | 120  | MEAN |
|          | 3.30     | 4.47 | 4.65     | 5.02     | 4.93    | 5.11 | 5.30 | 5.18 | 4.74 |

GRAND MEAN 4.94

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

| TABLE | NITRO CH         | N FORM             | N RATE             | NIT INHB                     |
|-------|------------------|--------------------|--------------------|------------------------------|
| SD    | 0.197            | 0.070              | 0.070              | 0.099                        |
| TABLE | N FORM<br>N RATE | N FORM<br>NIT INHB | N RATE<br>NIT INHB | N FORM<br>N RATE<br>NIT INHB |
| SD    | 0.099            | 0.139              | 0.139              | 0.197                        |

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

| STRATUM             | DF      | SE    | CV% |
|---------------------|---------|-------|-----|
| BLOCK.WP            | 23      | 0.197 | 4.0 |
| GRAIN MEAN DM%      | 85.4    |       |     |
| PLOT AREA HARVESTED | 0.00186 |       |     |

76/W/WW/2 HORSEPOOL (W)

GRAIN TONNES/HECTARE

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

|          |          |      |          |          |         |      |      |      |      |
|----------|----------|------|----------|----------|---------|------|------|------|------|
| N RATE   | 60       | 90   | MEAN     |          |         |      |      |      |      |
| N FORM   |          |      |          |          |         |      |      |      |      |
| AMMONIA  | 3.90     | 3.86 | 3.88     |          |         |      |      |      |      |
| UREA     | 4.15     | 3.97 | 4.06     |          |         |      |      |      |      |
| MEAN     | 4.02     | 3.91 | 3.97     |          |         |      |      |      |      |
| NIT INHB | NONE     | CS2  | NITRAPYR | AMM TRI  | MEAN    |      |      |      |      |
| N FORM   |          |      |          |          |         |      |      |      |      |
| AMMONIA  | 3.81     | 3.84 | 4.06     | 3.79     | 3.88    |      |      |      |      |
| UREA     | 3.99     | 3.97 | 3.94     | 4.35     | 4.06    |      |      |      |      |
| MEAN     | 3.90     | 3.90 | 4.00     | 4.07     | 3.97    |      |      |      |      |
| NIT INHB | NONE     | CS2  | NITRAPYR | AMM TRI  | MEAN    |      |      |      |      |
| N RATE   |          |      |          |          |         |      |      |      |      |
| 60       | 3.98     | 3.95 | 3.98     | 4.19     | 4.02    |      |      |      |      |
| 90       | 3.82     | 3.86 | 4.02     | 3.95     | 3.91    |      |      |      |      |
| MEAN     | 3.90     | 3.90 | 4.00     | 4.07     | 3.97    |      |      |      |      |
| N FORM   | NIT INHB | NONE | CS2      | NITRAPYR | AMM TRI |      |      |      |      |
| AMMONIA  | N RATE   |      |          |          |         |      |      |      |      |
|          | 60       | 3.64 | 3.84     | 4.06     | 4.05    |      |      |      |      |
|          | 90       | 3.99 | 3.84     | 4.06     | 3.53    |      |      |      |      |
| UREA     | 60       | 4.32 | 4.05     | 3.90     | 4.33    |      |      |      |      |
|          | 90       | 3.66 | 3.88     | 3.99     | 4.37    |      |      |      |      |
| NITRO CH | 0        | 50   | 60       | 70       | 80      | 90   | 100  | 110  | MEAN |
|          | 3.63     | 3.88 | 3.92     | 4.66     | 3.81    | 3.92 | 4.12 | 4.40 | 4.04 |

GRAND MEAN 3.99

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

| TABLE | NITRO CH         | N FORM             | N RATE             | NIT INHB                     |
|-------|------------------|--------------------|--------------------|------------------------------|
| SED   | 0.340            | 0.120              | 0.120              | 0.170                        |
| TABLE | N FORM<br>N RATE | N FORM<br>NIT INHB | N RATE<br>NIT INHB | N FORM<br>N RATE<br>NIT INHB |
| SED   | 0.170            | 0.240              | 0.240              | 0.340                        |

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

| STRATUM             | DF      | SE    | CV% |
|---------------------|---------|-------|-----|
| BLOCK.WP            | 22      | 0.340 | 8.5 |
| GRAIN MEAN DM%      | 84.7    |       |     |
| PLOT AREA HARVESTED | 0.00136 |       |     |