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## Yields of the Field Experiments 1977

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### 77/R/CS/195 Aqueous Ammonia and Nitrification Inhibitors - Old Grass

#### Rothamsted Research

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77/R/CS/195

AQUEOUS AMMONIA AND NITRIFICATION INHIBITORS

Object: To study the residual effects of adding a range of nitrification inhibitors to aqueous ammonia on the yield and nitrogen uptake of grass cut for silage - Bones Close.

Sponsors: J. Ashworth, G.G. Briggs, A. Penny.

The second year, old grass.

For previous year see 76/R/G/1.

Design: 2 randomised blocks of 24 plots split into 2.

Whole plot dimensions: 2.43 x 9.14.

Treatments: All combinations of:-

Whole plots

1. NI INHIB(76)      Nitrification inhibitors added to aqueous ammonia applied at 375 kg N, as a single application in 1976, injection tines spaced 30 cm apart:  

|          |                        |
|----------|------------------------|
| CS2      | Carbon disulphide      |
| NITRAPYR | Nitrapyrin ('N-Serve') |
2. NI RATE(76)      Rates of nitrification inhibitors in 1976:  

|   |                                                   |
|---|---------------------------------------------------|
| 1 | 1 (5 kg carbon disulphide; 0.5 kg nitrapyrin)     |
| 2 | 2 (12.5 kg carbon disulphide; 1.25 kg nitrapyrin) |
| 3 | 3 (25 kg carbon disulphide; 2.5 kg nitrapyrin)    |
3. NI TIME(76)      Times of applying aqueous ammonia and nitrification inhibitors:  

|        |             |
|--------|-------------|
| AUTUMN | Autumn 1975 |
| SPRING | Spring 1976 |

Sub plots

4. N PERCUT(77)      Nitrogen fertiliser, 'Nitro-Chalk' per cut (kg N) in 1977:  

|    |
|----|
| 0  |
| 83 |

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Plus all combinations of:-

Whole plots

1. AA(76)                      Aqueous ammonia applied as above, in 1976 only:  
  
    AQ/A                      Alone, in autumn  
    AQ/S                      Alone, in spring  
    AQ+CN1/A                With a mixture of carbon disulphide (12.5 kg) and nitrapyrin  
                                 (0.5 kg) in autumn 1975  
    AQ+CN2/A                With a mixture of carbon disulphide (12.5 kg) and nitrapyrin  
                                 (1.25 kg) in autumn 1975  
    AQ+AT1/S                With ammonium trithiocarbonate (4 kg) in spring 1976  
    AQ+AT2/S                With ammonium trithiocarbonate (10 kg) in spring 1976  
    AQ+AT3/S                With ammonium trithiocarbonate (20 kg) in spring 1976  
    AQ+ST/A                With sodium trithiocarbonate (25 kg) in autumn 1975

Sub plots

2. N PERCUT(77)            Nitrogen fertiliser, 'Nitro-Chalk' per cut (kg N) in 1977:  
  
    0  
    83

Plus all combinations of:-

Whole plots

1. N PERCUT                Nitrogen fertiliser, 'Nitro-Chalk', per cut (kg N):  
  
    83  
    125  
    167

Sub plots

2. YEAR                      Years of application:  
  
    1976                      1976 only  
    1976 77                  1976 and 1977

Plus one extra plot:-

EXTRA                      Untreated 1976 and 1977  
NONE

NOTE: Yields were only taken from the first cut in 1977.

Basal applications: Manures: (0:14:28) at 500 kg.

Cultivations, etc.:- PK applied: 9 Dec, 1976. 'Nitro-Chalk' applied: 10 Mar, 1977. Cut: 25 May.

NOTE: Crop samples were taken for N determinations.

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1ST AND ONLY CUT (25/5/77) DRY MATTER TONNES/HECTARE

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

|              |      |      |      |      |
|--------------|------|------|------|------|
| NI RATE(76)  | 1    | 2    | 3    | MEAN |
| NI INHIB(76) |      |      |      |      |
| CS2          | 4.84 | 4.77 | 4.34 | 4.65 |
| NITRAPYR     | 4.57 | 5.00 | 4.91 | 4.83 |
| MEAN         | 4.71 | 4.88 | 4.62 | 4.74 |

|              |        |        |      |
|--------------|--------|--------|------|
| NI TIME(76)  | AUTUMN | SPRING | MEAN |
| NI INHIB(76) |        |        |      |
| CS2          | 4.72   | 4.57   | 4.65 |
| NITRAPYR     | 4.62   | 5.04   | 4.83 |
| MEAN         | 4.67   | 4.81   | 4.74 |

|             |        |        |      |
|-------------|--------|--------|------|
| NI TIME(76) | AUTUMN | SPRING | MEAN |
| NI RATE(76) |        |        |      |
| 1           | 4.62   | 4.80   | 4.71 |
| 2           | 4.73   | 5.03   | 4.88 |
| 3           | 4.66   | 4.59   | 4.62 |
| MEAN        | 4.67   | 4.81   | 4.74 |

|              |      |      |      |
|--------------|------|------|------|
| N PERCUT(77) | 0    | 83   | MEAN |
| NI INHIB(76) |      |      |      |
| CS2          | 3.67 | 5.62 | 4.65 |
| NITRAPYR     | 4.04 | 5.62 | 4.83 |
| MEAN         | 3.85 | 5.62 | 4.74 |

|              |      |      |      |
|--------------|------|------|------|
| N PERCUT(77) | 0    | 83   | MEAN |
| NI RATE(76)  |      |      |      |
| 1            | 3.83 | 5.59 | 4.71 |
| 2            | 3.94 | 5.83 | 4.88 |
| 3            | 3.80 | 5.45 | 4.62 |
| MEAN         | 3.85 | 5.62 | 4.74 |

|              |      |      |      |
|--------------|------|------|------|
| N PERCUT(77) | 0    | 83   | MEAN |
| NI TIME(76)  |      |      |      |
| AUTUMN       | 3.69 | 5.65 | 4.67 |
| SPRING       | 4.02 | 5.60 | 4.81 |
| MEAN         | 3.85 | 5.62 | 4.74 |

|              |        |        |        |        |        |        |
|--------------|--------|--------|--------|--------|--------|--------|
| NI RATE(76)  | 1      |        | 2      |        | 3      |        |
| NI TIME(76)  | AUTUMN | SPRING | AUTUMN | SPRING | AUTUMN | SPRING |
| NI INHIB(76) |        |        |        |        |        |        |
| CS2          | 4.77   | 4.91   | 4.79   | 4.74   | 4.61   | 4.07   |
| NITRAPYR     | 4.47   | 4.68   | 4.67   | 5.33   | 4.71   | 5.11   |

|              |      |      |      |      |      |      |
|--------------|------|------|------|------|------|------|
| NI RATE(76)  | 1    |      | 2    |      | 3    |      |
| N PERCUT(77) | 0    | 83   | 0    | 83   | 0    | 83   |
| NI INHIB(76) |      |      |      |      |      |      |
| CS2          | 3.99 | 5.69 | 3.64 | 5.89 | 3.38 | 5.30 |
| NITRAPYR     | 3.66 | 5.49 | 4.24 | 5.76 | 4.22 | 5.61 |

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

|              |        |      |        |      |
|--------------|--------|------|--------|------|
| NI TIME(76)  | AUTUMN |      | SPRING |      |
| N PERCUT(77) | 0      | 83   | 0      | 83   |
| NI INHIB(76) |        |      |        |      |
| CS2          | 3.61   | 5.84 | 3.74   | 5.41 |
| NITRAPYR     | 3.78   | 5.45 | 4.29   | 5.78 |
| NI TIME(76)  | AUTUMN |      | SPRING |      |
| N PERCUT(77) | 0      | 83   | 0      | 83   |
| NI RATE(76)  |        |      |        |      |
| 1            | 3.68   | 5.55 | 3.97   | 5.62 |
| 2            | 3.81   | 5.66 | 4.07   | 6.00 |
| 3            | 3.59   | 5.73 | 4.01   | 5.17 |
| NI TIME(76)  | AUTUMN |      | SPRING |      |
| N PERCUT(77) | 0      | 83   | 0      | 83   |
| NI INHIB(76) |        |      |        |      |
| CS2          | 1      | 3.88 | 5.66   | 4.11 |
|              | 2      | 3.62 | 5.96   | 3.66 |
|              | 3      | 3.32 | 5.90   | 3.45 |
| NITRAPYR     | 1      | 3.49 | 5.45   | 3.83 |
|              | 2      | 3.99 | 5.35   | 4.48 |
|              | 3      | 3.86 | 5.56   | 4.57 |
| N PERCUT(77) | 0      | 83   | MEAN   |      |
| AA(76)       |        |      |        |      |
| AQ/A         | 3.66   | 5.54 | 4.60   |      |
| AQ/S         | 3.11   | 4.83 | 3.97   |      |
| AQ+CN1/A     | 3.61   | 5.98 | 4.79   |      |
| AQ+CN2/A     | 3.87   | 5.91 | 4.89   |      |
| AQ+AT1/S     | 3.13   | 5.43 | 4.28   |      |
| AQ+AT2/S     | 3.26   | 5.27 | 4.27   |      |
| AQ+AT3/S     | 4.18   | 5.73 | 4.95   |      |
| AQ+ST/A      | 3.44   | 5.16 | 4.30   |      |
| MEAN         | 3.53   | 5.48 | 4.51   |      |
| N PERCUT     | 83     | 125  | 167    | MEAN |
| YEAR         |        |      |        |      |
| 1976         | 3.43   | 3.44 | 4.06   | 3.64 |
| 1976 77      | 5.46   | 5.45 | 5.94   | 5.61 |
| MEAN         | 4.44   | 4.45 | 5.00   | 4.63 |
| EXTRA NONE   | 2.81   |      |        |      |
| GRAND MEAN   | 4.57   |      |        |      |

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

| TABLE | NI INHIB(76) | NI RATE(76) | NI TIME(76) | N PERCUT(77)    |
|-------|--------------|-------------|-------------|-----------------|
| SED   | 0.182        | 0.223       | 0.182       | 0.107<br>0.131* |

| TABLE | AA(76) | N PERCUT | YEAR  | NI INHIB(76)<br>NI RATE(76) |
|-------|--------|----------|-------|-----------------------------|
| SED   | 0.445  | 0.445    | 0.214 | 0.315                       |

| TABLE                                              | NI INHIB(76)<br>NI TIME(76) | NI RATE(76)<br>NI TIME(76) | NI INHIB(76)<br>N PERCUT(77) | NI RATE(76)<br>N PERCUT(77) |
|----------------------------------------------------|-----------------------------|----------------------------|------------------------------|-----------------------------|
| SED                                                | 0.257                       | 0.315                      | 0.211                        | 0.258                       |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: |                             |                            |                              |                             |
| NI INHIB(76)                                       |                             |                            | 0.151                        |                             |
| NI RATE(76)                                        |                             |                            |                              | 0.186                       |

| TABLE                                              | NI TIME(76)<br>N PERCUT(77) | AA(76)<br>NPERCUT(77) | N PERCUT<br>YEAR | NI INHIB(76)<br>NI RATE(76)<br>NI TIME(76) |
|----------------------------------------------------|-----------------------------|-----------------------|------------------|--------------------------------------------|
| SED                                                | 0.211                       | 0.517                 | 0.517            | 0.445                                      |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: |                             |                       |                  |                                            |
| NI TIME(76)                                        | 0.151                       |                       |                  |                                            |
| AA(76)                                             |                             | 0.371                 |                  |                                            |
| N PERCUT                                           |                             |                       | 0.371            |                                            |

| TABLE                                              | NI INHIB(76)<br>NI RATE(76)<br>N PERCUT(77) | NI INHIB(76)<br>NI TIME(76)<br>N PERCUT(77) | NI RATE(76)<br>NI TIME(76)<br>N PERCUT(77) | NI INHIB(76)<br>NI RATE(76)<br>NI TIME(76)<br>N PERCUT(77) |
|----------------------------------------------------|---------------------------------------------|---------------------------------------------|--------------------------------------------|------------------------------------------------------------|
| SED                                                | 0.365                                       | 0.298                                       | 0.365                                      | 0.517                                                      |
| EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: |                                             |                                             |                                            |                                                            |
| NI INHIB(76).NI RATE(76)                           | 0.262                                       |                                             |                                            |                                                            |
| NI INHIB(66).NI TIME(76)                           |                                             | 0.214                                       |                                            |                                                            |
| NI RATE(76).NI TIME(76)                            |                                             |                                             | 0.262                                      |                                                            |
| NI INHIB(76).NI RATE(76).NI TIME(76)               |                                             |                                             |                                            | 0.371                                                      |

\* USE ONLY WITH TABLES INVOLVING AA(76)

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

| STRATUM     | DF | SE    | CV% |
|-------------|----|-------|-----|
| BLOCK.WP    | 23 | 0.445 | 9.7 |
| BLOCK.WP.SP | 23 | 0.371 | 8.1 |

1ST CUT MEAN DM% 21.6

SUB PLOT AREA HARVESTED 0.00048