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

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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 N RATE	N FORM NIT INHB	N RATE NIT INHB	N FORM N RATE 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 N RATE	N FORM NIT INHB	N RATE NIT INHB	N FORM N RATE 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		