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84/W/CS/304 Nitrification Inhibitors - Ley

Rothamsted Research

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84/W/CS/304

NITRIFICATION INHIBITORS

Object: To study the effects of adding nitrification inhibitors to liquid and solid urea on the yield and nitrogen uptake of a ley - Woburn Stackyard II.

Sponsors: G.A. Rodgers, F.V. Widdowson.

The first year, grass ley.

Design: 3 randomised blocks of 18 plots.

Whole plot dimensions: 12.2 x 2.4.

Treatments: All combinations of:-

1. INHIB I Inhibitor to injected aqueous urea (applied at 375 kg N):
 - 0 AQU3 None
 - NIT AQU3 Nitrapyrin at 1.5 kg
 - C+P AQU3 Carbon disulphide at 10 kg plus potassium ethyl xanthate at 5 kg

2. APP TIME Times of applying aqueous urea:

WINTER 18 Jan, 1984
SPRING 12 Mar

plus all combinations of:-

1. INHIB B Inhibitor to broadcast prilled urea (applied at 375 kg N):
 - 0 PU3 None
 - DIC PU3 Dicyandiamide at 56 kg
 - PHEN PU3 Phenylphosphorodiamidate at 8 kg

2. APP DIV Division of prilled urea:

DIVIDED Dressing equally divided between 13 Mar, 14 June, 17 Aug
SINGLE Single dressing on 13 Mar

plus six extra treatments:

EXTRA 'Nitro-Chalk' dressings (kg N):

0 None

Dressings equally divided between 13 Mar, 14 June, 17 Aug:

NC1 D 125
NC2 D 250
NC3 D 375
NC4 D 500

Single dressing on 13 Mar:

NC3 S 375

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Basal applications: Manures: Magnesian limestone at 7.5 t. (0:18:36) at 470 kg. Weedkillers: MCPA with MCPB (as 'Trifolox-tra' at 7.0 l) in 250 l.

Cultivations, etc.:- Weedkillers applied: 22 Sept, 1983. Magnesian limestone applied: 30 Sept. PK applied: 15 Nov. Cut: 8 June, 1984, 9 Aug, 20 Nov.

- NOTES: (1) Estimates of ammonia losses were made in the fortnight after applying treatments. Soil samples were taken at intervals for ammonium and nitrate analyses.
 (2) Plant samples were taken at each cut for estimates of total N and dry matter.

1ST CUT (8/6/84) DRY MATTER TONNES/HECTARE

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

APP TIME	WINTER	SPRING	MEAN
INHIB I			
0 AQU3	5.86	6.61	6.23
NIT AQU3	6.93	6.03	6.48
C+P AQU3	6.54	5.50	6.02
MEAN	6.44	6.05	6.24

APP DIV	DIVIDED	SINGLE	MEAN
INHIB B			
0 PU3	5.53	6.44	5.98
DIC PU3	5.17	5.95	5.56
PHEN PU3	5.43	6.59	6.01
MEAN	5.38	6.32	5.85

EXTRA	0	NC1 D	NC2 D	NC3 D	NC4 D	NC3 S	MEAN
	2.39	4.62	5.28	6.38	6.39	6.48	5.26

GRAND MEAN 5.78

TABLE	EXTRA	APP TIME	APP DIV	INHIB I
SED	0.386	0.223	0.223	0.273

TABLE	INHIB B	APP TIME INHIB I	APP DIV INHIB B
SED	0.273	0.386	0.386

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.473	8.2

1ST CUT MEAN DM% 19.9

84/W/CS/304

2ND CUT (9/8/84) DRY MATTER TONNES/HECTARE

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

APP TIME	WINTER	SPRING	MEAN
INHIB I			
O AQU3	1.85	2.22	2.03
NIT AQU3	2.03	1.97	2.00
C+P AQU3	1.91	2.16	2.04
MEAN	1.93	2.12	2.02

APP DIV	DIVIDED	SINGLE	MEAN
INHIB B			
O PU3	1.72	1.31	1.52
DIC PU3	1.86	1.16	1.51
PHEN PU3	2.21	1.99	2.10
MEAN	1.93	1.49	1.71

EXTRA	0	NC1 D	NC2 D	NC3 D	NC4 D	NC3 S	MEAN
	0.31	1.54	2.52	2.39	2.55	1.99	1.89

GRAND MEAN 1.87

TABLE	EXTRA	APP TIME	APP DIV	INHIB I
SED	0.254	0.147	0.147	0.180

TABLE	INHIB B	APP TIME INHIB I	APP DIV INHIB B
SED	0.180	0.254	0.254

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.311	16.6

2ND CUT MEAN DM% 33.6

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3RD CUT (20/11/84) DRY MATTER TONNES/HECTARE

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

APP TIME	WINTER	SPRING	MEAN
INHIB I			
0 AQU3	0.55	0.52	0.53
NIT AQU3	0.42	0.66	0.54
C+P AQU3	0.49	0.62	0.55

MEAN	0.49	0.60	0.54
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APP DIV	DIVIDED	SINGLE	MEAN
INHIB B			
0 PU3	1.25	0.20	0.73
DIC PU3	0.99	0.17	0.58
PHEN PU3	0.94	0.40	0.67

MEAN	1.06	0.26	0.66
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EXTRA	0	NC1 D	NC2 D	NC3 D	NC4 D	NC3 S	MEAN
	0.09	0.54	0.94	1.45	1.41	0.59	0.84

GRAND MEAN 0.68

TABLE	EXTRA	APP TIME	APP DIV	INHIB I
SED	0.154	0.089	0.089	0.109

TABLE	INHIB B	APP TIME INHIB I	APP DIV INHIB B
SED	0.109	0.154	0.154

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.189	27.8

3RD CUT MEAN DM% 15.0

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TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

APP TIME	WINTER	SPRING	MEAN
INHIB I			
0 AQU3	8.26	9.34	8.80
NIT AQU3	9.39	8.67	9.03
C+P AQU3	8.94	8.29	8.61
MEAN	8.86	8.76	8.81

APP DIV	DIVIDED	SINGLE	MEAN
INHIB B			
0 PU3	8.50	7.96	8.23
DIC PU3	8.03	7.27	7.65
PHEN PU3	8.58	8.97	8.77
MEAN	8.37	8.07	8.22

EXTRA	0	NC1 D	NC2 D	NC3 D	NC4 D	NC3 S	MEAN
	2.79	6.70	8.74	10.22	10.35	9.06	7.98

GRAND MEAN 8.34

TABLE	EXTRA	APP TIME	APP DIV	INHIB I
SED	0.533	0.308	0.308	0.377

TABLE	INHIB B	APP TIME INHIB I	APP DIV INHIB B
SED	0.377	0.533	0.533

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.653	7.8

TOTAL OF 3 CUTS MEAN DM% 22.8

PLOT AREA HARVESTED 0.00084