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79/R/G/1 Liquid Fertiliser and Nitrification Inhibitors - Grass

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79/R/G/1

GRASS

LIQUID FERTILISER AND NITRIFICATION INHIBITORS

Object: To study the effects of adding nitrification inhibitors to liquid fertilisers on the yield and nitrogen uptake of grass cut for silage - Great Harpenden I.

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

Design: 3 blocks of 3 whole plots split into 4 sub plots plus 1 extra whole plot split into 4 and 4 extra sub plots.

Whole plot dimensions: 2.44 x 9.14.

Treatments: All combinations of:-

Whole plots

1. N TIME	Times of injecting aqueous urea and nitrification inhibitors:
AU	Autumn, 22 Nov, 1978
ES	Early spring, 4 Apr, 1979
LS	Late spring, 25 Apr, 1979

Sub plots

2. N IHIB	Nitrification inhibitors, added to aqueous urea supplying 375 kg N:
U3 O	None
U3 NI	Nitrapyrin at 1.5 kg
U3 DX	Diethyl xanthate at 1.5 kg
U3 PX	Potassium ethyl xanthate at 10 kg

Plus eight extra treatments

Extra sub plots

3. EXTRA(1)	'Nitro-Chalk' (kg N) dressing divided equally between three dates of application: 4 Apr, 8 June, 27 July
O	None
NC2 ES	250
NC3 ES	375
NC4 ES	500

Extra whole plots

EXTRA(2)	Nitrification inhibitors, added to a mixture of aqueous urea and ammonium nitrate supplying 375 kg N, injected on 4 Apr:
UA3ES O	None
UA3ES NI	Nitrapyrin at 1.5 kg
UA3ES DX	Diethyl xanthate at 1.5 kg
UA3ES PX	Potassium ethyl xanthate at 10 kg

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

Seed: S.24 perennial ryegrass sown May, 1977

Cultivations, etc.:— Topped: 14 Nov, 1978. PK applied: 16 Nov. Out: 4 June, 1979, 24 July, 22 Oct.

- NOTES: (1) Soil cores were taken to 1 m depth (in March from autumn injected plots only) and 20 cm depth (during the season from all plots) and tested for urea, ammonium and nitrate.
 (2) 15N was used on two plots to assess the immobilisation of fertiliser N.
 (3) Grass from the first two cuts was tested for nitrate, and from all cuts for organic N.

1ST CUT (4/6/79) DRY MATTER TONNES/HECTARE

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

	N TIME	AU	ES	LS	MEAN
N INHIB					
U3 0		7.29	5.54	3.00	5.28
U3 NI		6.81	5.26	2.87	4.98
U3 DX		6.95	5.34	3.10	5.13
U3 PX		6.72	5.04	3.28	5.01
MEAN		6.94	5.29	3.06	5.10
EXTRA(1)	0	NC2 ES	NC3 ES	NC4 ES	MEAN
	1.00	4.18	4.77	5.41	3.84
EXTRA(2)	UA3ES 0	UA3ES NI	UA3ES DX	UA3ES PX	MEAN
	5.29	5.27	5.17	5.55	5.32

GRAND MEAN 4.89

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

TABLE	N TIME	N INHIB	EXTRA(1)	EXTRA(2)
SED	0.222	0.158	0.445	0.273

TABLE	N TIME
	N INHIB
SED	0.324
EXCEPT WHEN COMPARING MEANS WITH THE SAME LEVEL(S) OF:	
N TIME	0.273

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	24	0.334	6.8
1ST CUT MEAN DM%	16.2		

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2ND CUT (24/7/79) DRY MATTER TONNES/HECTARE

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

N TIME N INHIB	AU	ES	LS	MEAN
U3 0	1.31	3.47	4.67	3.15
U3 NI	2.18	3.39	4.57	3.38
U3 DX	1.55	3.62	4.44	3.20
U3 PX	1.41	3.30	4.28	3.00
MEAN	1.61	3.44	4.49	3.18

EXTRA(1)	0	NC2 ES	NC3 ES	NC4 ES	MEAN
	0.21	2.91	3.78	4.07	2.74

EXTRA(2)	UA3ES 0	UA3ES NI	UA3ES DX	UA3ES PX	MEAN
	2.61	3.35	3.16	2.98	3.02

GRAND MEAN 3.06

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

TABLE	N TIME	N INHIB	EXTRA(1)	EXTRA(2)
SED	0.188	0.099	0.375	0.172

TABLE	N TIME N INHIB
SED	0.239
EXCEPT WHEN COMPARING MEANS WITH THE SAME LEVEL(S) OF:	
N TIME	0.172

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	24	0.210	6.9
2ND CUT MEAN DM%	27.7		

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3RD CUT (22/10/79) DRY MATTER TONNES/HECTARE

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

	N TIME	AU	ES	LS	MEAN
N INHIB					
U3 0		0.28	0.51	0.89	0.56
U3 NI		0.42	0.55	0.96	0.64
U3 DX		0.37	0.60	0.73	0.57
U3 PX		0.32	0.51	0.80	0.55
MEAN		0.35	0.54	0.84	0.58
EXTRA(1)	0	NC2 ES	NC3 ES	NC4 ES	MEAN
	0.06	2.12	2.63	2.65	1.87
EXTRA(2)	UA3ES 0	UA3ES NI	UA3ES DX	UA3ES PX	MEAN
	0.35	0.41	0.42	0.42	0.40

GRAND MEAN 0.80

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

TABLE	N TIME	N INHIB	EXTRA(1)	EXTRA(2)
SED	0.070	0.053	0.140	0.092

TABLE	N TIME
	N INHIB
SED	0.106
EXCEPT WHEN COMPARING MEANS WITH THE SAME LEVEL(S) OF:	
N TIME	0.092

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	24	0.113	14.2

3RD CUT MEAN DM% 35.9

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TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

N TIME N INHIB	AU	ES	LS	MEAN
U3 0	8.88	9.51	8.55	8.98
U3 NI	9.42	9.20	8.39	9.00
U3 DX	8.86	9.56	8.27	8.90
U3 PX	8.45	8.85	8.36	8.56
MEAN	8.90	9.28	8.39	8.86

EXTRA(1)	0	NC2 ES	NC3 ES	NC4 ES	MEAN
	1.27	9.22	11.18	12.13	8.45

EXTRA(2)	UA3ES 0	UA3ES NI	UA3ES DX	UA3ES PX	MEAN
	8.25	9.03	8.75	8.95	8.74

GRAND MEAN 8.75

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

TABLE	N TIME	N INHIB	EXTRA(1)	EXTRA(2)
SED	0.325	0.193	0.650	0.334

TABLE	N TIME N INHIB
SED	0.435
EXCEPT WHEN COMPARING MEANS WITH THE SAME LEVEL(S) OF:	
N TIME	0.334

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	24	0.409	4.7

GRAND MEAN 8.75

TOTAL OF 3 CUTS MEAN DM% 26.6

PLOT AREA HARVESTED 0.00104