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Yields of the Field Experiments 1976

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76/R/CS/161 Injected N - Old Grass

Rothamsted Research

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76/R/CS/161

INJECTED N

Object: To study the effects of injecting aqueous urea, with or without a nitrification inhibitor, at three rates and two spacings on the yield and nitrogen uptake of old grass cut for silage - Highfield IX.

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

The second year, old grass.

Design: 2 randomised blocks of 18 plots.

Whole plot dimensions: 4.27 x 15.2.

Treatments: All combinations of:-

1. LIQUID N(76) Liquid nitrogen fertiliser in 1976:
- | | |
|----------|--|
| UREA | Aqueous solution of urea, no nitrification inhibitor |
| UREA+ATC | Aqueous solution of urea plus ammonium trithiocarbonate as a nitrification inhibitor |

2. SPACING Spacing between tines injecting liquid fertiliser, cumulative 1975 and 1976:

30 CM	30 cm
60 CM	60 cm

3. N RATE Rate of liquid fertiliser, applied as a single annual dressing, cumulative 1975 and 1976 (kg N):

250	250
375	375
500	500

SOLID N(76) plus six treatments given 'Nitro-Chalk', rates cumulative 1975 and 1976, dressing divided between cuts (kg N, total/annum):

0	0
100	100
200	200
300	300
400	400
500	500

- NOTES: (1) The whole area was grazed in 1975, yields were not taken.
(2) Ammonium trithiocarbonate was applied at 16 kg to SPACING, 30 CM and at 8 kg to SPACING, 60 CM.

Cultivations, etc.: - Aqueous urea and inhibitors injected: 26 Feb, 1976. 'Nitro-Chalk' applied: 3 Mar, 6 May, 3 June, 7 July, 13 Aug, 2 Sept. Cut: 5 May, 2 June, 10 Aug, 2 Nov.

NOTE: It was intended to make six cuts during the season but drought prevented this.

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1ST CUT (5/5/76) DRY MATTER TONNES/HECTARE

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

SOLID N(76)	0	100	200	300	400	500	MEAN
	1.01	1.25	1.87	2.41	2.69	3.04	2.04
SPACING	30 CM	60 CM	MEAN				
LIQUID N(76)							
UREA	3.10	2.90	3.00				
UREA+ATC	2.76	2.67	2.72				
MEAN	2.93	2.79	2.86				
N RATE	250	375	500	MEAN			
LIQUID N(76)							
UREA	2.69	3.00	3.30	3.00			
UREA+ATC	2.51	2.82	2.82	2.72			
MEAN	2.60	2.91	3.06	2.86			
N RATE	250	375	500	MEAN			
SPACING							
30 CM	2.80	2.97	3.01	2.93			
60 CM	2.40	2.86	3.10	2.79			
MEAN	2.60	2.91	3.06	2.86			
LIQUID N(76)							
UREA							
UREA+ATC							
SPACING							
30 CM	250	2.94	2.66				
	375	3.07	2.87				
	500	3.28	2.74				
60 CM	250	2.44	2.36				
	375	2.94	2.78				
	500	3.31	2.89				

GRAND MEAN 2.59

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

TABLE	SOLID N(76)	LIQUID N(76)	SPACING	N RATE
SED	0.215	0.088	0.088	0.107
TABLE	LIQUID N(76)	LIQUID N(76)	SPACING	LIQUID N(76)
	SPACING	N RATE	N RATE	SPACING
				N RATE
SED	0.124	0.152	0.152	0.215

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

STRATUM	DF	SE	CV%
BLOCK.WP	17	0.215	8.3

1ST CUT MEAN DM% 19.5

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2ND CUT (2/6/76) DRY MATTER TONNES/HECTARE

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

SOLID N(76)	0	100	200	300	400	500	MEAN
	0.77	1.11	1.59	2.13	2.12	1.99	1.62

SPACING	30 CM	60 CM	MEAN
LIQUID N(76)			
UREA	1.82	1.58	1.70
UREA+ATC	1.58	1.63	1.60
MEAN	1.70	1.60	1.65

N RATE	250	375	500	MEAN
LIQUID N(76)				
UREA	1.74	1.79	1.56	1.70
UREA+ATC	1.69	1.80	1.32	1.60
MEAN	1.71	1.80	1.44	1.65

N RATE	250	375	500	MEAN
SPACING				
30 CM	1.74	1.79	1.57	1.70
60 CM	1.69	1.80	1.31	1.60
MEAN	1.71	1.80	1.44	1.65

	LIQUID N(76)	UREA	UREA+ATC
SPACING	N RATE		
30 CM	250	1.76	1.71
	375	1.90	1.68
	500	1.79	1.35
60 CM	250	1.72	1.67
	375	1.68	1.92
	500	1.34	1.29

GRAND MEAN 1.64

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

TABLE	SOLID N(76)	LIQUID N(76)	SPACING	N RATE
SED	0.262	0.107	0.107	0.131

TABLE	LIQUID N(76)	LIQUID N(76)	SPACING	LIQUID N(76)
	SPACING	N RATE	N RATE	SPACING
				N RATE
SED	0.151	0.185	0.185	0.262

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

STRATUM	DF	SE	CV%
BLOCK.WP	17	0.262	16.0
2ND CUT MEAN DM%	24.3		

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3RD CUT (10/8/76) DRY MATTER TONNES/HECTARE

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

SOLID N(76)	0	100	200	300	400	500	MEAN
	0.38	0.39	0.39	0.26	0.32	0.24	0.33

SPACING	30 CM	60 CM	MEAN
LIQUID N(76)			
UREA	0.25	0.24	0.25
UREA+ATC	0.28	0.28	0.28
MEAN	0.27	0.26	0.26

N RATE	250	375	500	MEAN
LIQUID N(76)				
UREA	0.23	0.24	0.27	0.25
UREA+ATC	0.29	0.29	0.28	0.28
MEAN	0.26	0.26	0.27	0.26

N RATE	250	375	500	MEAN
SPACING				
30 CM	0.24	0.26	0.30	0.27
60 CM	0.28	0.27	0.24	0.26
MEAN	0.26	0.26	0.27	0.26

	LIQUID N(76)	UREA	UREA+ATC
SPACING	N RATE		
30 CM	250	0.20	0.28
	375	0.26	0.26
	500	0.30	0.30
60 CM	250	0.27	0.29
	375	0.22	0.31
	500	0.23	0.25

GRAND MEAN 0.29

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

TABLE	SOLID N(76)	LIQUID N(76)	SPACING	N RATE
-----	-----	-----	-----	-----
SED	0.080	0.033	0.033	0.040

TABLE	LIQUID N(76)	LIQUID N(76)	SPACING	LIQUID N(76)
	SPACING	N RATE	N RATE	SPACING
				N RATE
-----	-----	-----	-----	-----
SED	0.046	0.057	0.057	0.080

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

STRATUM	DF	SE	CV%
BLOCK.WP	17	0.080	28.1

3RD CUT MEAN DM% 36.2

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4TH CUT (2/11/76) DRY MATTER TONNES/HECTARE

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

SOLID N(76)	0	100	200	300	400	500	MEAN
	1.47	2.20	2.54	2.47	2.16	1.88	2.12
SPACING	30 CM	60 CM		MEAN			
LIQUID N(76)							
UREA	2.15	2.20		2.18			
UREA+ATC	2.12	2.11		2.11			
MEAN	2.14	2.15		2.14			
N RATE	250	375		500		MEAN	
LIQUID N(76)							
UREA	2.24	2.23		2.06		2.18	
UREA+ATC	2.09	2.24		2.01		2.11	
MEAN	2.16	2.24		2.03		2.14	
N RATE	250	375		500		MEAN	
SPACING							
30 CM	2.17	2.19		2.05		2.14	
60 CM	2.16	2.29		2.02		2.15	
MEAN	2.16	2.24		2.03		2.14	
		LIQUID N(76)	UREA	UREA+ATC			
SPACING		N RATE					
30 CM		250	2.19	2.15			
		375	2.19	2.18			
		500	2.08	2.03			
60 CM		250	2.29	2.02			
		375	2.27	2.31			
		500	2.04	1.99			

GRAND MEAN 2.14

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

TABLE	SOLID N(76)	LIQUID N(76)	SPACING	N RATE
SED	0.173	0.071	0.071	0.087
TABLE	LIQUID N(76)	LIQUID N(76)	SPACING	LIQUID N(76)
	SPACING	N RATE	N RATE	SPACING
				N RATE
SED	0.100	0.122	0.122	0.173

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

STRATUM	DF	SE	CV%
BLOCK.WP	17	0.173	8.1
4TH CUT MEAN DM%	13.7		

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TOTAL OF 4 CUTS DRY MATTER TONNES/HECTARE

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

SOLID N(76)	0	100	200	300	400	500	MEAN
	3.62	4.95	6.39	7.27	7.28	7.15	6.11
SPACING	30 CM	60 CM	MEAN				
LIQUID N(76)							
UREA	7.32	6.92	7.12				
UREA+ATC	6.74	6.69	6.72				
MEAN	7.03	6.80	6.92				
N RATE	250	375	500	MEAN			
LIQUID N(76)							
UREA	6.90	7.26	7.18	7.12			
UREA+ATC	6.57	7.16	6.42	6.72			
MEAN	6.74	7.21	6.80	6.92			
N RATE	250	375	500	MEAN			
SPACING							
30 CM	6.95	7.20	6.93	7.03			
60 CM	6.53	7.21	6.67	6.80			
MEAN	6.74	7.21	6.80	6.92			
LIQUID N(76)							
N RATE							
30 CM	250	375	7.09	6.81			
500	375	7.42	6.99				
60 CM	250	500	7.45	6.42			
250	375	6.72	6.34				
375	500	7.10	7.32				
500	6.92	6.42					

GRAND MEAN 6.65

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

TABLE	SOLID N(76)	LIQUID N(76)	SPACING	N RATE
SED	0.422	0.172	0.172	0.211
TABLE	LIQUID N(76) SPACING	LIQUID N(76) N RATE	SPACING N RATE	LIQUID N(76) SPACING N RATE
SED	0.243	0.298	0.298	0.422

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

STRATUM	DF	SE	CV%
BLOCK.WP	17	0.422	6.3
TOTAL OF 4 CUTS MEAN DM%	23.4		
PLOT AREA HARVESTED	0.00282		