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Yields of the Field Experiments 2007

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W/RN/12 Organic Manuring

Rothamsted Research

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07/W/RN/12

ORGANIC MANURING

Object: To study, from crop yields and soil analyses, the effects of a range of types of organic matter – Woburn, Stackyard B.

Sponsors: P. R. Poulton and A. J. Macdonald

The 43rd year, forage maize

For previous years see 'Details' 1973 and Yield Books for 74-06/W/RN/12.

Design: 4 blocks of 8 plots

Whole plot dimensions: 8.0 x 29.5 (8.0 x 26.5 on Block III).

Treatments: From 1966 to 1971 the experiment had a preliminary period designed to build up organic matter from different sources. An arable rotation was started on two blocks on 1972 and the remaining two blocks in 1973. After a period of testing the residues, a further period of accumulation was started; on two blocks (which included ley sown in 1979) in 1981 and on the other two (which included ley sown in 1980) in 1982. A second test phase began when leys on the first pair of blocks were ploughed for the 1st test crop in 1987 and on the second pair for the 1st test crop in 1988. From 1988 two blocks, and 1989 the other two, to 1994, plots were split into 6 sub-plots to test five levels of nitrogen and nil. From 1995 to 1997 residual effects of that nitrogen were measured. In 1998 to 2000 yields were taken from whole plots only. In 2001 plots were split into half-plots to test two rates of N.
For 2003 the experiment was modified to test further inputs of organic matter. An arable rotation (w. rye, s. barley, w. beans, w. wheat, forage maize) was started on seven plots within each block; the eighth was sown to a grass/clover ley.

Whole plots

1. **Treatment** (Not necessarily applied each year):

1966-1971/2	1979/82-1986/7	Since 2003
Fd	Fd	F
Ln	Lc6	F
St	St	St
Gm	Lc8	CC
Pt	Lc8	Co
Fs	Fs	Dg10
Dg	Dg	Dg25
Lc	Lc6	Lc

F: no organic amendment. St: chopped straw at 7.5t/ha. CC: cover crop prior to spring sown crops. Co: compost at 40t/ha. Dg10: FYM at 10t/ha. Dg25: FYM at 25t/ha. Dg: FYM at 50t/ha. Fd: fertilizers equivalent to FYM. Fs: fertilizers equivalent to straw (+P). Lc/Lc6/Lc8: grass/clover leys. Ln: grass ley + N. Gm: green manure. Pt: peat.

Since 2003, all treatments, except Dg25, have also received PKS fertilizers:
20 kg P/ha, 83 kg K/ha, 36 kg S/ha

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In addition in 2003 F and CC treatments received 120 kg N/ha, St received 90 kg N/ha. Dg10 received 60 kg N/ha. No N was applied to Dg25, Co or Lc treatments.

Nitrogen
In 2007 all plots, except Lc (permanent grass/clover), split into 6 to test rates of N. For crops receiving nitrogen rates rotate as follows:
N0 > N1 > N2 > N3 > N4 > N5 > N0 etc.
For 2007 maize crop nitrogen rates (kg N/ha) were:
0, 50, 100, 150, 200, 250 as nitro-chalk (27% N), split 50 kg N to the seedbed (except NO) and the remainder post-emergence.

Experimental Diary:

			Rate	Unit
25-Sep-06	p	Azural	4.00	l/200 l/ha
29-Sep-06	a	Direct Drill		
	s	Rivona Mustard, CC plots	350.00	seeds/m^2
27-Mar-07	p	Clinic Ace maize plots	4.00	l/200 l/ha
12-Apr-07	f	DG 10 plots, F.Y.M.	10.00	t/ha
	f	DG 25 plots, F.Y.M.	25.00	t/ha
	f	CO plots, Compost	40.00	t/ha
13-Apr-07	f	ST plots, Wheat straw	7.50	t/ha
	a	Topped ST plots, to chop straw	2.00	
16-Apr-07	a	Plough / NW		
30-Apr-07	f	Sulphate of Potash all plots except Dg25	200.00	kg/ha
	f	Triple Superphosphate all plots except Dg25	97.50	kg/ha
01-May-07	a	Nodet Drilled		
	s	Hudson tr Mesurol	10.20	seeds/m^2
23-May-07	f	Nitraprill - N plots, maize	145.00	kg/ha
01-Jun-07	p	Callisto - maize	1.50	l/200 l/ha
11-Jun-07	a	1st cut grass/clover		
12-Jun-07	a	Turned hay - grass plots		
19-Jun-07	a	Rowed up hay – grass/clover plots		
	a	Baled grass plots		
22-Jun-07	a	Topped grass/clover plots, to tidy		
26-Jun-07	f	Nitraprill - Post emergent N, Maize, N2 plots, completed 26-Jun-07	145.00	kg/ha
	f	Nitraprill - Post emergent N, Maize, N3 plots, completed 26-Jun-07	290.00	kg/ha
	f	Nitraprill - Post emergent N, Maize, N4 plots, completed 26-Jun-07	345.00	kg/ha
	f	Nitraprill - Post emergent N, Maize, N5 plots, completed 26-Jun-07	580.00	kg/ha
25-Jul-07	p	Alpha Bromotril P - maize plots	2.50	l/200 l/ha
19-Sep-07	a	Cut harvest strips, weighed and sampled		
25-Sep-07	a	Mowed maize plots		
	a	Baled maize plots		
27-Sep-07	a	Rowed up and baled remaining maize tops		
12-Nov-07	a	2nd cut grass/clover, harvest strips, weighed and sampled		
	a	Mowed and baled		

NOTE: Samples of maize and grass were taken for chemical analysis.

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07/W/RN/12

FORAGE MAIZE

WHOLE CROP (100% DM) TONNES/HECTARE

***** Table of means *****

Nitrogen	0	50	100	150	200	250	Mean
Treatment							
F(Fd)	2.74	5.47	7.53	6.61	7.01	7.12	6.08
F(Ln,Lc6)	3.81	6.57	7.53	7.81	8.41	8.37	7.08
St(St)	4.20	6.53	7.53	8.86	9.11	8.95	7.53
CC(Gm,Lc8)	3.80	7.27	8.64	7.88	9.30	8.09	7.50
Co(Pt,Lc8)	5.36	8.45	7.70	9.15	10.29	10.76	8.62
Dg10(Fs)	4.32	6.86	8.06	8.61	8.42	8.35	7.44
Dg25(Dg)	5.60	9.34	10.64	11.28	11.00	11.24	9.85
Mean	4.26	7.21	8.23	8.60	9.08	8.98	7.73

*** Standard errors of differences of means ***

Table	**Treatment**	**Nitrogen**	**Treatment Nitrogen**
rep.	24	28	4
s.e.d.	0.765	0.379	1.193
d.f.	18	105	78.92

Except when comparing means with the same level(s) of
Treatment 1.004
d.f. 105

MEAN DM% 25.2

GRASS/CLOVER

DRY MATTER TONNES/HECTARE

***** Table of means *****

Year	1st Cut	2nd Cut	Total
2003	-	-	-
2004	1.82	-	1.82
2005	1.86	0.13	1.99
2006	4.07	-	4.07
2007	3.12	1.36	4.48

Note: See previous Yield Books (2004-06) for cutting dates

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