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Yields of the Field Experiments 2008

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W/RN/12 Organic Manuring

Rothamsted Research

Rothamsted Research (2009) *W/RN/12 Organic Manuring ;* Yields Of The Field Experiments 2008, pp 46 - 48 **- DOI: https://doi.org/10.23637/ERADOC-1-218**

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08/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 44th year winter rye

For previous years see 'Details' 1973 and Yield Books for 74-07/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 2008 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 2008 rye crop nitrogen rates (kg N/ha) were:
0, 30, 60, 90, 120, 150 as nitro-chalk (27% N).

Experimental Diary

			Rate	Unit
2-Oct-07	p	Azural stubbles	4.00	l/200 l/ha
12-Oct-07	f	FYM, Dg 10 plots	10.00	t/ha
	f	FYM, Dg 25 plots	25.00	t/ha
	f	Compost, Co plots	40.00	t/ha
	f	Straw, St plots	7.50	t/ha
13-Oct-07	a	Topped to chop wheat straw		
	a	Plough / SE, completed 14-Oct-07 (Rye plots)		
18-Oct-07	a	Power harrowed rye plots		
23-Oct-07	a	Accord Drilled		
	s	Matador recleaned rye plots	350.00	seeds/m^2
	a	Rolled		
13-Dec-07	p	Stomp 400 SC Rye plots	3.30	l/200 l/ha
14-Mar-08	f	Sulphate of potash all except Dg 25 plots	200.00	kg/ha
15-Mar-08	f	Triple Superphosphate all except Dg 25 plots	97.50	kg/ha
2-May-08	p	Quantum SX rye plots	30.00	g/200 l/ha
8-May-08	f	Nitraprill N1 plots, completed 9-May-08	87.00	kg/ha
	f	Nitraprill N2 plots, completed 9-May-08	174.00	kg/ha
	f	Nitraprill N3 plots, completed 9-May-08	261.00	kg/ha
	f	Nitraprill N4 plots, completed 9-May-08	348.00	kg/ha
	f	Nitrprill N5 plots, completed 9-May-08	435.00	kg/ha
25-Jun-08	a	Cut harvest strips, weighed and sampled ley plots		
	a	Mowed all grass discards		
26-Jun-08	a	Rowed up hay Ley plots		
	a	Baled Ley plots		
14-Sep-08	a	Combine harvest discards		
	a	Swath straw		
18-Sep-08	a	Combine harvest, plots for yield		
	a	Swath straw		
19-Sep-08	a	Combine harvest discards		
	a	Swath straw		
21-Sep-08	a	Baled		
19-Nov-08	a	Cut harvest strips, weighed and sampled, ley plots, 2nd cut		

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GRAIN TONNES/HECTARE

***** Tables of means *****

Nitrogen	0	30	60	90	120	150	Mean
Treatment							
F(Fd)	1.98	3.20	4.15	4.69	4.79	4.48	3.88
F(Ln,Lc6)	2.71	3.30	4.34	5.21	5.77	4.96	4.38
St(St)	1.44	2.88	3.92	4.84	5.05	4.27	3.73
CC(Gm,Lc8)	2.12	3.10	4.23	5.11	5.58	4.28	4.07
Co(Pt,Lc8)	2.93	3.98	4.91	5.56	5.80	5.23	4.73
Dg10(Fs)	2.59	3.54	4.80	5.68	5.67	4.74	4.50
Dg25(Dg)	3.16	4.19	5.28	5.98	6.15	5.75	5.08
Mean	2.42	3.45	4.52	5.30	5.54	4.81	4.34

Standard errors of differences of means

Table	**Treatment**	**Nitrogen**	**Treatment Nitrogen**
s.e.d.	0.307	0.127	0.434
Except when comparing means with the same level(s) of Treatment			0.336

Grain mean DM% 79.6

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
2008	5.72	1.65	7.37

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

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