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Yields of the Field Experiments 2009

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W/RN/12 Organic Manuring

Rothamsted Research

Rothamsted Research (2010) *W/RN/12 Organic Manuring ;* Yields Of The Field Experiments 2009, pp 47 - 49 **- DOI: https://doi.org/10.23637/ERADOC-1-219**

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09/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: A. J. Macdonald

The 45th year spring barley

For previous years see 'Details' 1973 and Yield Books for 74-08/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 2009 s. barley crop nitrogen rates (kg N/ha) were:
0, 35, 70, 105, 140, 175 as nitro-chalk (27% N).

Experimental Diary

			Rate	Unit
30-Sep-08	a	Direct drill - CC plots 004, 010, 019 and 032		
	s	Zlata (Mustard) - CC plots	10.00	kg/ha
28-Oct-08	f	Chopped wheat straw - plots 003, 015, 017 and 031, all chopped using McConnell topper	7.50	t/ha
17-Mar-09	f	Potassium Sulphate - all plots except 005, 011, 023 and 026	200.00	kg/ha
	f	Triple Superphosphate - all plots except 005, 011, 023 and 026	97.5	kg/ha
19-Mar-09	f	FYM, Dg 10 plots	10.00	t/ha
		FYM, Dg 25 plots	25.00	t/ha
	f	Compost, Co plots	40.00	t/ha
02-Apr-09	a	Combination drilled		
	s	Tipple Tr Raxil Pro	350.00	seeds/m2
	a	Rolled		
14-May-09	p	Ally	30.00	g/ha
	p	Cherokee	1.25	l/ha
	p	Cycocel	2.25	l/ha
	p	Headland Manganese 500	1.00	L in 200 l/ha
	p	Fandango	1.00	l/ha
	p	Flexity	0.20	l/ha
	p	Ally Max SX	30.00	g/ha
	p	Headland Manganese 500	1.00	L in 200 l/ha
28-May-09	a	Nitro-chalk N1 plots	130.00	kg/ha
	a	Nitro-chalk N2 plots	259.00	kg/ha
	a	Nitro-chalk N3 plots	389.00	kg/ha
	a	Nitro-chalk N4 plots	519.00	kg/ha
	a	Nitro-chalk N5 plots	648.00	kg/ha
03-Jun-09	p	Opus	0.50	L in 200 l/ha
	p	Amistar	0.40	L in 200 l/ha
24-Jun-09	a	Cut harvest strips ley plots, weighed and sampled		
28-Jun-09	a	Baled		
17-Jul-09	a	Topped Ley plots		
23-Aug-09	a	Combine harvest, plots for yield		
	a	Combine harvest, spring barley plots for yield		
24-Aug-09	a	Combine harvest discards		
26-Aug-09	a	Baled		
02-Sep-09	a	Remove bales		

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GRAIN TONNES/HECTARE

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

Nitrogen	0	50	100	150	200	250	Mean
Treatment							
F(Fd)	2.50	3.27	4.05	4.26	4.16	4.24	3.75
F(Ln,Lc6)	2.92	3.93	4.22	4.81	4.52	4.53	4.15
St(St)	2.56	3.45	4.17	4.63	4.14	4.47	3.90
CC(Gm,Lc8)	2.69	3.79	4.42	4.50	4.32	4.93	4.11
Co(Pt,Lc8)	3.50	4.66	4.70	4.91	5.12	5.00	4.65
Dg10(Fs)	2.74	4.04	4.28	4.26	4.26	4.49	4.01
Dg25(Dg)	3.80	5.06	5.19	5.44	5.10	5.23	4.97
Mean	2.96	4.03	4.43	4.69	4.52	4.70	4.22

Standard errors of differences of means

Table	Treatment	Nitrogen	Treatment Nitrogen
s.e.d.	0.229	0.092	0.319
Except when comparing means with the same level(s) of Treatment			0.243

Grain mean dm% 89.3

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
2009	4.77	-	4.77

Note: See previous Yield Books (2004-08) for cutting dates

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