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Yields of the Field Experiments 1975

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75/ W/RN/12 - Organic Manuring - Sugar Beet, Barley

Rothamsted Research

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75/W/RN/12

ORGANIC MANURING

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

Sponsor: C.E.G. Mattingly.

The eleventh year, sugar beet, barley.

For previous years see 66/C/31(t), 67/C/24(t), 68/C/18(t), 69/W/RN/12(t), 70/W/RN/12(t), 71/W/RN/12(t), 72/W/RN/12(t) and 73-74/W/RN/12.

Design for each crop: 2 blocks of 8 plots split into 8.

Whole plot dimensions: 8.53 x 30.5.

Treatments: From 1966 to 1971 the experiment had a preliminary period designed to build up organic matter, derived from different sources. A rotation of potatoes, wheat, sugar beet and barley was started on two blocks in 1972 and the remaining two blocks in 1973. Organic manures were last applied in 1971, the leys were ploughed in autumn 1971 and 1972 before starting the rotation. The experiment now tests all combinations of:-

Whole plots: 1. Organic manures and fertilisers in the preliminary period:

	MANURE
Farmyard manure	FYM
Straw	STRAW
Peat	PEAT
Green manures	GREENMNR
Fertilisers equivalent to FYM	FERT-FYM
Fertilisers equivalent to straw	FERT-STR
Grass/clover ley, no N	CLOVRLEY
Grass ley with N for each cut	GRASSLEY

Sub plots: 2. Fertiliser nitrogen (kg N) in 1975:

		N	
Sugar beet	Barley	S. BEET BARLEY	
None	None	0	0
40	25	40	25
80	50	80	50
120	75	120	75
160	100	160	100
200	125	200	125
240	150	240	150
280	175	280	175

Standard applications:

Sugar beet: Manures: Ground chalk at 5 tonnes. P₂O₅ at 114 kg as super-phosphate, K₂O at 180 kg as muriate of potash in autumn. (0:20:20) at 570 kg, MgO at 100 kg as Epsom salts in the seedbed. Boron at 8.2 kg B₂O₃ (as 'Solubor') in 390 l. Weedkiller: Aminotriazole at 4.5 kg in 280 l. Insecticide: Demeton-s-methyl at 0.25 kg in 280 l on the first occasion and in 390 l on the second occasion.

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Barley: Manures: (0:20:20) at 280 kg, combine drilled. Weedkiller: Ioxynil at 0.52 kg and mecoprop at 1.6 kg in 280 l.

Seed: Sugar beet: Klein E, sown at 5.6 kg.

Barley: Julia, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:-

Sugar beet: Weedkiller applied: 18 Sept, 1974. Subsoiled, tines 140 cm apart and 60 cm deep: 19 Sept. Ground chalk applied: 9 Oct. PK applied: 15 Nov. Ploughed: 9 Dec. PK and Mg applied, spring-tine cultivated with crumbler: 28 Apr, 1975. Seed sown: 29 Apr. N applied: 29-30 Apr. Tractor hoed three times: 29 May, 27 June, 30 June. Insecticide applied: 9 June. Singled: 16-18 June. Insecticide with boron applied: 1 July. Side hoed: 10-17 July. Lifted: 11-14 Nov.

Barley: Ploughed in sugar beet tops: 14 Jan, 1975. Spring-tine cultivated with crumbler: 3 Mar. Seed sown: 4 Mar. N applied: 18 Mar. Weedkiller applied: 20 May. Combine harvested: 11 Aug.

SUGAR BEET

ROOTS (WASHED) TONNES/HECTARE

*** TABLES OF MEANS ***

N	0	40	80	120	160	200	240	280	MEAN
MANURE									
FYM	8.1	11.6	14.3	14.8	15.2	15.5	13.5	15.4	13.6
STRAW	6.4	10.2	11.2	11.9	12.5	13.2	14.0	13.7	11.6
PEAT	5.2	7.2	10.5	11.0	12.2	13.9	13.9	13.8	11.0
GREENMNR	5.8	9.0	8.2	9.0	12.0	12.3	12.5	12.8	10.2
FERT FYM	4.2	4.1	8.0	8.6	9.6	11.0	11.5	12.3	8.6
FERT STR	3.8	7.8	8.8	11.6	10.6	11.4	11.3	13.2	9.8
CLOVRLEY	7.2	11.4	12.8	14.2	12.7	15.7	16.6	15.0	13.2
GRASSLEY	10.0	12.5	13.8	16.8	18.5	13.2	16.3	14.7	14.5
MEAN	6.3	9.2	11.0	12.2	12.9	13.3	13.7	13.9	11.6

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

TABLE	MANURE	N	MANURE
			N
SED	1.37	0.52	1.95

EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:
MANURE 1.48

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

STRATUM	DF	SE	CV%
BLOCK.WP	7	1.37	11.8
BLOCK.WP.SP	56	1.43	12.3

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SUGAR BEET

TOPS TONNES/HECTARE

*** TABLES OF MEANS ***

	N	0	40	80	120	160	200	240	280	MEAN
MANURE										
FYM	7.4	8.7	11.7	12.0	13.3	14.6	13.8	13.5	11.9	
STRAW	5.6	8.7	10.9	12.1	12.8	14.5	13.7	13.9	11.6	
PEAT	4.3	7.3	9.3	11.2	13.7	14.2	13.6	12.3	10.8	
GREENMNR	5.3	8.9	8.7	11.4	14.4	12.6	13.5	13.7	11.1	
FERT FYM	4.3	5.9	7.1	8.4	11.1	11.2	13.4	13.4	9.4	
FERT STR	4.1	6.3	9.0	11.5	11.9	11.6	13.1	12.3	10.0	
CLOVRLEY	7.5	9.9	11.2	13.3	11.9	14.6	15.1	15.6	12.4	
GRASSLEY	7.0	8.9	10.3	13.0	15.4	12.1	14.9	13.5	11.9	
MEAN	5.7	8.1	9.8	11.6	13.1	13.2	13.9	13.5	11.1	

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

TABLE	MANURE	N	MANURE
			N
SED	1.68	0.46	2.07
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			1.29

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

STRATUM	DF	SE	CV%
BLOCK.WP	7	1.68	15.1
BLOCK.WP.SP	56	1.29	11.6

SUB PLOT AREA HARVESTED 0.00130

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SUGAR BEET

SUGAR PERCENTAGE

*** TABLES OF MEANS ***

N	0	40	80	120	160	200	240	280	MEAN
MANURE									
FYM	15.3	15.1	15.4	15.1	14.7	14.9	14.6	14.3	14.9
STRAW	15.4	15.3	15.1	15.2	14.8	15.0	15.0	14.8	15.1
PEAT	15.3	15.2	15.4	15.3	15.2	15.1	14.9	14.7	15.1
GREENMNR	15.4	15.4	15.0	15.0	14.9	14.7	14.5	14.5	14.9
FERT FYM	15.3	15.3	15.0	15.1	14.9	14.4	14.4	14.1	14.8
FERT STR	15.3	15.4	15.3	15.4	15.0	15.0	15.0	15.0	15.2
CLOWRLEY	15.2	15.2	15.2	15.2	14.7	14.7	14.5	14.5	14.9
GRASSLEY	15.3	15.3	15.3	14.8	15.1	14.5	14.7	14.2	14.9
MEAN	15.3	15.3	15.2	15.1	14.9	14.8	14.7	14.5	15.0

TOTAL SUGAR TONNES/HECTARE

*** TABLES OF MEANS ***

N	0	40	80	120	160	200	240	280	MEAN
MANURE									
FYM	1.25	1.75	2.19	2.24	2.24	2.30	1.97	2.21	2.02
STRAW	0.98	1.56	1.69	1.80	1.84	1.98	2.10	2.03	1.75
PEAT	0.79	1.09	1.62	1.68	1.85	2.10	2.07	2.02	1.65
GREENMNR	0.89	1.39	1.24	1.36	1.79	1.81	1.81	1.86	1.52
FERT FYM	0.63	0.62	1.20	1.30	1.43	1.60	1.65	1.75	1.27
FERT STR	0.58	1.20	1.35	1.79	1.60	1.72	1.69	1.98	1.49
CLOWRLEY	1.09	1.73	1.95	2.16	1.87	2.31	2.42	2.17	1.96
GRASSLEY	1.54	1.92	2.10	2.48	2.78	1.91	2.40	2.10	2.15
MEAN	0.97	1.41	1.67	1.86	1.93	1.97	2.01	2.02	1.73

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

TABLE	MANURE	N	MANURE
			N
SED	0.206	0.081	0.298

EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:
MANURE 0.230

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

STRATUM	DF	SE	CV%
BLOCK.WP	7	0.206	11.9
BLOCK.WP.SP	56	0.230	13.3

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BARLEY

GRAIN TONNES/HECTARE

*** TABLES OF MEANS***

	N	0	25	50	75	100	125	150	175	MEAN
MANURE										
FYM		1.80	2.98	4.20	4.42	4.45	4.97	4.61	4.44	3.98
STRAW		1.61	2.82	3.99	4.62	4.39	4.35	4.24	4.49	3.81
PEAT		0.78	2.48	3.20	4.26	4.27	4.54	4.77	4.37	3.58
GREENMNR		2.10	2.95	3.97	4.11	4.90	4.56	4.65	4.36	3.95
FERT FYM		0.63	1.74	3.46	3.72	4.34	4.16	4.48	4.90	3.43
FERT STR		0.91	2.27	3.28	4.37	4.33	4.16	3.97	3.75	3.38
CLOVRLEY		2.02	3.45	4.42	4.41	4.29	4.82	4.61	4.79	4.10
GRASSLEY		2.43	3.20	4.27	4.66	4.78	4.95	4.66	4.08	4.13
MEAN		1.54	2.74	3.85	4.32	4.47	4.56	4.50	4.40	3.80

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

TABLE	MANURE	N	MANURE N
SED	0.409	0.157	0.582

EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:
MANURE 0.443

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

STRATUM	DF	SE	CV%
BLOCK.WP	7	0.409	10.8
BLOCK.WP.SP	56	0.443	11.7

GRAIN MEAN DM% 88.3

STRAW TONNES/HECTARE

*** TABLES OF MEANS***

	N	0	25	50	75	100	125	150	175	MEAN
MANURE										
FYM		1.15	1.84	2.17	2.38	2.40	2.94	2.26	2.68	2.23
STRAW		0.74	1.59	2.44	2.82	3.02	3.14	3.00	3.17	2.49
PEAT		0.51	1.39	1.83	2.08	2.55	2.67	2.72	2.63	2.05
GREENMNR		1.06	1.56	1.88	2.57	3.15	3.05	2.96	2.82	2.38
FERT FYM		0.45	1.05	1.72	2.27	2.31	2.51	2.62	2.75	1.96
FERT STR		0.51	1.34	1.83	2.82	2.41	2.52	2.74	2.36	2.07
CLOVRLEY		1.02	2.07	2.49	2.54	3.05	3.27	3.24	3.20	2.61
GRASSLEY		1.32	1.74	2.45	3.00	3.27	3.47	3.26	2.98	2.69
MEAN		0.85	1.57	2.10	2.56	2.77	2.94	2.85	2.83	2.31

STRAW MEAN DM% 91.7

SUB PLOT AREA HARVESTED 0.00173