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80/W/RN/12 Organic Manuring

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80/W/RN/12

ORGANIC MANURING

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

Sponsor: G.E.G. Mattingly.

The 16th year, s. barley, sugar beet, ley.

For previous years see 'Details' 1973 and 74-79/W/RN/12.

Design for s. barley and sugar beet: 2 blocks of 6 plots split into 8
1st & 2nd year ley: 2 blocks of 2 plots.

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. An arable rotation 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. MANURE Organic manures and fertilisers in the preliminary period:

FYM	Farmyard manure
STRAW	Straw
FERT-FYM	Fertilisers equivalent to FYM
FERT-STR	Fertilisers equivalent to straw
CLOVRLEY	Clover/grass ley, no N
GRASSLEY	Grass ley with N for each cut

Sub plots

2. N Fertiliser nitrogen (kg N):

S. BARLEY	SUGAR BEET
0	0
30	40
60	80
90	120
120	160
150	200
180	240
210	280

Two additional MANURE treatments given green manures (GREENMNR) and peat (PEAT) in the preliminary period have been sown to clover/grass ley - 2 blocks in 1979 and 2 blocks in 1980.

80/W/RN/12

Standard applications:

- S. barley: Manures: P_2O_5 at 110 kg as superphosphate, K_2O at 60 kg as muriate of potash. Weedkillers: Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 280 l. Fungicides: Tridemorph at 0.53 kg in 280 l, ethirimol (as 'Milgo E' at 1.3 l) in 280 l.
- Sugar beet: Manures: Chalk at 5.0 t, (0:20:20) at 1210 kg in autumn, (0:20:20) at 610 kg in spring, Mg at 60 kg as kieserite, Boron at 8.0 kg B_2O_3 (as 'Solubor') in 300 l.
- 1st year Clover/grass ley: Chalk at 5.0 t, (0:20:20) at 1210 kg and later at 610 kg, Mg at 60 kg as kieserite, N at 60 kg as 'Nitro-Chalk'. Weedkiller: Paraquat at 0.84 kg ion in 450 l.
- 2nd year Clover/grass ley: P_2O_5 at 110 kg as superphosphate, K_2O at 60 kg as muriate of potash.
- Seed: S. barley: Georgie, dressed with ethirimol, sown at 160 kg.
Sugar beet: Bush Mono G, sown at 5.6 kg.
Clover/grass ley: Climax timothy at 7 kg, S.215 meadow fescue at 14 kg, Huia white clover at 2 kg, mixture sown at 23 kg.

Cultivations, etc.:-

- S. barley: Ploughed in sugar beet tops: 22 Nov, 1979. P and K applied: 14 Jan, 1980. Heavy spring-tine cultivated: 29 Feb. Spring-tine cultivated with crumbler attached: 3 Mar. Seed sown: 4 Mar. N applied: 21 Mar. Weedkiller applied: 8 May. Tridemorph applied: 13 May. 'Milgo E' applied: 5 June. Combine harvested: 28 Aug.
- Sugar beet: Chalk applied: 13 Nov, 1979. Ploughed: 22 Nov. Autumn PK applied: 4 Mar, 1980. Ploughed: 11 Mar. Spring PK and Mg applied: 31 Mar. Heavy spring-tine cultivated: 8 Apr. Rotary cultivated: 9 Apr. N applied, seed sown: 11 Apr. Tractor hoed: 22 May, 4 June, 20 June. Singled: 29 May. Side-hoed by hand: 16 June. Boron applied: 19 June. Lifted: 4-7 Nov.
- 1st year Clover/grass ley: Chalk applied: 13 Nov, 1979. Ploughed: 22 Nov. PK applied: 4 Mar, 1980. Ploughed: 11 Mar. PK and Mg applied: 31 Mar. Heavy spring-tine cultivated: 8 Apr. Rotary cultivated: 9 Apr. N applied: 11 Apr. Seeds sown: 17 Apr. Topped: 9 June. Paraquat applied because of poor germination: 26 June. Rotary cultivated: 30 June. Spring-tine cultivated: 2 July. Spring-tine cultivated with crumbler attached, seeds re-sown: 11 July.
- 2nd year Clover/grass ley: P and K applied: 20 Mar, 1980. Cut: 4 June, 8 Sept. Topped: 18 Sept.

80/W/RN/12 SPRING BARLEY

GRAIN TONNES/HECTARE

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

	N	0	30	60	90	120	150	180	210	MEAN
MANURE										
FYM	3.24	4.32	5.27	5.25	5.12	5.77	6.09	6.27	5.16	
STRAW	2.74	4.08	4.43	4.72	6.00	5.83	5.67	5.11	4.82	
FERT-FYM	2.46	3.55	4.52	4.46	4.96	4.99	5.45	5.67	4.51	
FERT-STR	2.29	3.78	4.27	4.86	5.72	5.39	5.56	4.75	4.58	
CLOVRLEY	3.47	4.57	5.07	5.07	5.08	5.32	5.20	5.33	4.89	
GRASSLEY	3.28	4.27	5.07	4.82	6.32	6.21	5.78	5.98	5.22	
MEAN	2.91	4.10	4.77	4.86	5.53	5.58	5.62	5.52	4.86	

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

TABLE	MANURE	N	MANURE N
SED	0.596	0.239	0.809
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			0.584

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.596	12.3
BLOCK.WP.SP	42	0.584	12.0

GRAIN MEAN DM% 83.1

STRAW TONNES/HECTARE

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

	N	0	30	60	90	120	150	180	210	MEAN
MANURE										
FYM	0.95	1.85	2.32	2.19	2.88	3.02	3.32	3.67	2.52	
STRAW	0.89	1.72	2.00	2.96	3.14	3.43	3.22	3.42	2.60	
FERT-FYM	0.77	1.48	1.99	2.84	3.17	2.98	3.20	3.46	2.49	
FERT-STR	0.72	1.53	2.01	1.99	2.94	2.85	3.82	3.98	2.48	
CLOVRLEY	1.38	1.84	2.34	2.43	3.30	3.47	3.53	4.08	2.80	
GRASSLEY	1.08	2.13	2.13	2.63	3.11	3.70	4.28	4.20	2.91	
MEAN	0.97	1.76	2.13	2.51	3.09	3.24	3.56	3.80	2.63	

STRAW MEAN DM% 82.8

SUB PLOT AREA HARVESTED 0.00173

80/W/RN/12 SUGAR BEET

ROOTS WASHED TONNES/HECTARE

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

	N	0	40	80	120	160	200	240	280	MEAN
MANURE										
FYM		19.8	26.8	42.2	39.5	48.4	53.0	47.6	46.8	40.5
STRAW		21.0	30.7	35.1	41.4	44.5	47.3	47.8	43.1	38.9
FERT-FYM		14.4	22.9	32.1	41.5	44.5	46.1	48.4	42.3	36.5
FERT-STR		17.4	28.6	37.7	42.6	48.0	42.5	50.2	47.1	39.3
CLOVRLEY		25.1	34.4	40.2	41.9	44.0	45.2	49.4	47.5	41.0
GRASSLEY		26.3	40.3	42.2	44.7	48.9	51.2	50.7	49.4	44.2
MEAN		20.7	30.6	38.2	41.9	46.4	47.5	49.0	46.0	40.1

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

TABLE	MANURE	N	MANURE N
SED	1.65	1.39	3.59
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			3.41

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	1.65	4.1
BLOCK.WP.SP	42	3.41	8.5

SUGAR PERCENTAGE

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

	N	0	40	80	120	160	200	240	280	MEAN
MANURE										
FYM		17.4	18.0	17.8	17.9	17.7	17.7	16.7	16.6	17.5
STRAW		17.7	18.2	17.9	17.5	17.6	17.1	17.1	16.6	17.5
FERT-FYM		17.3	17.5	17.9	18.1	18.1	17.4	17.4	16.7	17.5
FERT-STR		17.2	18.0	17.7	17.9	17.6	16.8	16.5	16.7	17.3
CLOVRLEY		17.5	17.9	18.1	18.0	17.5	17.2	17.0	16.5	17.5
GRASSLEY		17.3	17.8	17.7	17.4	17.4	16.7	16.4	16.9	17.2
MEAN		17.4	17.9	17.8	17.8	17.6	17.1	16.8	16.7	17.4

80/W/RN/12 SUGAR BEET
 TOTAL SUGAR TONNES/HECTARE
 ***** TABLES OF MEANS *****

	N	0	40	80	120	160	200	240	280	MEAN
MANURE										
FYM		3.45	4.83	7.51	7.09	8.56	9.36	7.93	7.76	7.06
STRAW		3.73	5.59	6.28	7.24	7.84	8.09	8.20	7.14	6.76
FERT-FYM		2.49	4.03	5.72	7.52	8.04	8.03	8.39	7.04	6.41
FERT-STR		3.00	5.16	6.68	7.62	8.44	7.14	8.26	7.88	6.77
CLOVRLEY		4.38	6.17	7.27	7.56	7.70	7.80	8.39	7.83	7.14
GRASSLEY		4.54	7.18	7.47	7.77	8.51	8.55	8.30	8.36	7.59
MEAN		3.60	5.49	6.82	7.47	8.18	8.16	8.24	7.67	6.95

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

TABLE	MANURE	N	MANURE N
SED	0.289	0.268	0.678
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			0.656

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.289	4.1
BLOCK.WP.SP	42	0.656	9.4

TOPS TONNES/HECTARE
 ***** TABLES OF MEANS *****

	N	0	40	80	120	160	200	240	280	MEAN
MANURE										
FYM		14.8	19.2	34.5	34.4	46.6	56.7	63.6	68.4	42.3
STRAW		12.7	19.7	29.5	40.5	43.8	49.3	56.1	61.6	39.1
FERT-FYM		10.8	15.3	22.0	32.1	40.5	43.4	56.7	58.9	35.0
FERT-STR		12.9	18.1	25.5	35.9	49.0	53.2	65.0	66.6	40.8
CLOVRLEY		18.0	25.3	34.7	39.6	49.3	51.8	56.0	66.1	42.6
GRASSLEY		20.8	32.6	34.0	45.2	57.4	67.8	67.7	67.0	49.0
MEAN		15.0	21.7	30.0	37.9	47.7	53.7	60.9	64.8	41.5

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

TABLE	MANURE	N	MANURE N
SED	2.76	1.77	4.90
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			4.33

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

STRATUM	DF	SE	CV%
BLOCK.WP	5	2.76	6.7
BLOCK.WP.SP	42	4.33	10.4

SUB PLOT AREA HARVESTED 0.00130