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Yields of the Field Experiments 1985

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85/W/RN/4 Market Garden - Red Beet, Carrots, Clover

Rothamsted Research

Rothamsted Research (1986) *85/W/RN/4 Market Garden - Red Beet, Carrots, Clover ; Yields Of The Field Experiments 1985*, pp 62 - 69 - DOI: <https://doi.org/10.23637/ERADOC-1-19>

85/W/RN/4

MARKET GARDEN

Object: The experiment compared the effects of fertilizers and organic manures applied annually in the period 1942 to 1967. Residual effects of the organic manures were studied in arable crops from 1968 to 1973. From 1974 until 1982 the site was maintained in grass without yields. A new sequence of arable cropping started in 1983 to study further the residual effects of the organic manures, particularly the availability of metals from sewage sludge - Woburn Lansome I.

Sponsor: S.P. McGrath.

The 44th year, red beet, carrots, clover.

For previous years see 'Details' 1967 & 1973, 74-80/W/RN/4 and 83-84/W/RN/4.

Design: 2 series each of 4 blocks of 10 plots split, systematically, into 2.

Whole plot dimensions: 8.15 x 5.18.

Treatments:

To Series A, red beet and carrots on sub plots, all combinations of:-

- | | |
|-------------|---|
| 1. OM RESID | Residues of organic manures: |
| FYM | Farmyard manure until 1967 |
| SEWAGE | Sewage sludge until 1961 |
| SEW COM | Sewage sludge, composted with straw, until 1961 |
| VEG COM | Vegetable compost until 1962, then farmyard manure until 1967 |
| 2. OM RATE | Rates of organic manures (t per crop): |
| 25 | |
| 50 | |
| EXTRA | plus one extra treatment (duplicated): |
| NONE | No organic manures |

To Series B, white clover, all combinations of:-

Whole plots

- | | |
|-------------|---|
| 1. OM RESID | Residues of organic manures: |
| FYM | Farmyard manure to whole plots until 1964, to half plots until 1967. Untreated half plots received a balancing dressing in 1974 |
| SEWAGE | Sewage sludge until 1961 |
| SEW COM | Sewage sludge, composted with straw, until 1961 |
| VEG COM | Vegetable compost until 1962, then farmyard manure until 1965 |

85/W/RN/4

2. OM RATE Rates of organic manures (t per crop):

25
50

EXTRA plus one extra treatment (duplicated):

PEAT Peat at 31 t per crop to half plots 1965 to 1967.
Untreated half plots received a balancing dressing
in 1974.

Sub plots

3. NPERCUT Nitrogen (kg N) per cut, as 'Nitro-Chalk' (27.5% N):

0
100

NOTE: On series A red beet in 1985 followed carrots in 1984 and vice versa.

Basal applications:

Series A:

Red Beet: Manures: (0:24:24) at 620 kg. N at 210 kg as 'Nitro-Chalk' (27.5% N). Weedkiller: Phenmedipham (as 'Betanal E' at 8.4 l) in 220 l.

Carrots: Manures: (0:24:24) at 620 kg. N at 70 kg as 'Nitro-Chalk' (27.5% N). Insecticide: Carbofuran (as 'Yaltox' granules at 94 kg). Weedkiller: Linuron at 0.52 kg in 280 l.

Series B:

Clover: Manures: (0:18:36) at 380 kg.

Seed: Red beet: Asmer Detroit, sown by precision drill.

Carrots: Chantenay Red-cored Supreme, sown by precision drill.

Cultivations, etc.:-

Series A:

Red beet: Ploughed: 4 Feb, 1985. PK and N applied, power harrowed: 19 Apr. Spike rotary cultivated with crumbler attached, seed sown: 22 Apr. Weedkiller applied: 14 June. Singled, hand hoed: 24-28 June. Hand harvested: 12 Aug.

Carrots: Ploughed: 4 Feb, 1985. PK and N applied, power harrowed: 19 Apr. Insecticide applied, spike rotary cultivated, seed sown: 22 Apr. Weedkiller applied: 5 June. Hand harvested: 14 Aug.

Series B:

Clover: PK applied: 13 Mar, 1985. N applied: 13 Mar, 22 July.
Cut: 3 July, 13 Nov.

NOTE: Crop samples were taken at maturity and soil samples after harvest for chemical analyses.

85/W/RN/4 RED BEET

ROOTS FRESH WEIGHT TONNES/HECTARE

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

OM RESID OM RATE	FYM	SEWAGE	SEW COM	VEG COM	MEAN
25	21.0	24.8	23.2	22.6	22.9
50	24.6	24.1	22.3	24.8	23.9
MEAN	22.8	24.5	22.7	23.7	23.4

NONE 20.7

GRAND MEAN 22.9

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

TABLE	OM RESID	OM RATE	OM RESID OM RATE
SED	1.85	1.31	2.62

SED FOR COMPARING EXTRA NONE WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 2.27

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

STRATUM	DF	SE	CV%
BLOCK.WP	28	3.70	16.2

TOPS FRESH WEIGHT TONNES/HECTARE

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

OM RESID OM RATE	FYM	SEWAGE	SEW COM	VEG COM	MEAN
25	15.8	19.1	16.9	15.6	16.9
50	18.3	18.5	18.7	18.7	18.6
MEAN	17.1	18.8	17.8	17.2	17.7

NONE 14.4

GRAND MEAN 17.0

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

TABLE	OM RESID	OM RATE	OM RESID OM RATE
SED	1.59	1.12	2.24

SED FOR COMPARING EXTRA NONE WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 1.94

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

STRATUM	DF	SE	CV%
BLOCK.WP	28	3.17	18.6

PLOT AREA HARVESTED 0.00022

85/W/RN/4 CARROTS

ROOTS FRESH WEIGHT TONNES/HECTARE

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

OM RESID OM RATE	FYM	SEWAGE	SEW COM	VEG COM	MEAN
25	9.3	8.0	6.2	9.7	8.3
50	7.7	8.7	7.9	7.3	7.9
MEAN	8.5	8.3	7.1	8.5	8.1

NONE 8.0

GRAND MEAN 8.1

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

TABLE	OM RESID	OM RATE	OM RESID OM RATE
SED	1.09	0.77	1.54

SED FOR COMPARING EXTRA NONE WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 1.34

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

STRATUM BLOCK.WP	DF	SE	CV%
	28	2.18	27.0

TOPS FRESH WEIGHT TONNES/HECTARE

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

OM RESID OM RATE	FYM	SEWAGE	SEW COM	VEG COM	MEAN
25	4.7	4.1	3.0	4.8	4.2
50	3.8	4.7	3.8	3.7	4.0
MEAN	4.3	4.4	3.4	4.2	4.1

NONE 3.9

GRAND MEAN 4.0

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

TABLE	OM RESID	OM RATE	OM RESID OM RATE
SED	0.54	0.38	0.76

SED FOR COMPARING EXTRA NONE WITH ANY ITEM IN OM RESID.OM RATE TABLE IS 0.66

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

STRATUM BLOCK.WP	DF	SE	CV%
	28	1.08	26.7

PLOT AREA HARVESTED 0.00022

85/W/RN/4 WHITE CLOVER

1ST CUT (3/7/85) DRY MATTER TONNES/HECTARE

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

OM RESID	FYM	SEWAGE	SEW COM	VEG COM	MEAN
OM RATE					
25	4.94	4.89	4.76	5.34	4.98
50	4.76	4.78	4.98	5.24	4.94
MEAN	4.85	4.83	4.87	5.29	4.96
NPERCUT	0	100	MEAN		
OM RATE					
25	4.79	5.18	4.98		
50	4.78	5.09	4.94		
MEAN	4.79	5.13	4.96		
NPERCUT	0	100	MEAN		
OM RESID					
FYM	4.57	5.13	4.85		
SEWAGE	4.78	4.88	4.83		
SEW COM	4.71	5.03	4.87		
VEG COM	5.08	5.50	5.29		
MEAN	4.79	5.13	4.96		
OM RATE	NPERCUT	0	100		
25	OM RESID				
	FYM	4.60	5.29		
	SEWAGE	4.96	4.82		
	SEW COM	4.53	4.99		
	VEG COM	5.07	5.62		
50	FYM	4.54	4.97		
	SEWAGE	4.61	4.95		
	SEW COM	4.88	5.07		
	VEG COM	5.10	5.37		
PEAT	NPERCUT	0	100	MEAN	
		4.87	5.03	4.95	

GRAND MEAN 4.96

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

TABLE	OM RESID	OM RATE	NPERCUT	OM RESID OM RATE
SED	0.180	0.127	0.147	0.255
TABLE	OM RESID NPERCUT	OM RATE NPERCUT	OM RESID OM RATE NPERCUT	PEATNPER
SED	0.276	0.195	0.390	0.295
EXCEPT WHEN COMPARING MEANS WITH THE SAME LEVEL(S) OF:				
OM RESID	0.295			
OM RATE		0.209		
OM RESID.OM RATE			0.417	

85/W/RN/4 WHITE CLOVER

1ST CUT (3/7/85) DRY MATTER TONNES/HECTARE

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

STRATUM	DF	SE	CV%
BLOCK.WP	28	0.360	7.3
BLOCK.WP.SP	31	0.590	11.9

1ST CUT MEAN DM% 14.3

1ST CUT PLOT AREA HARVESTED 0.00047

2ND CUT (13/11/85) DRY MATTER TONNES/HECTARE

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

OM RESID	FYM	SEWAGE	SEW COM	VEG COM	MEAN
OM RATE					
25	2.97	3.07	3.24	3.36	3.16
50	3.31	3.07	2.96	3.05	3.10
MEAN	3.14	3.07	3.10	3.20	3.13
NPERCUT	0	100	MEAN		
OM RATE					
25	3.07	3.25	3.16		
50	3.07	3.13	3.10		
MEAN	3.07	3.19	3.13		
NPERCUT	0	100	MEAN		
OM RESID					
FYM	3.06	3.22	3.14		
SEWAGE	3.00	3.14	3.07		
SEW COM	2.96	3.24	3.10		
VEG COM	3.26	3.15	3.20		
MEAN	3.07	3.19	3.13		
OM RATE	NPERCUT	0	100		
25	OM RESID				
	FYM	3.13	2.82		
	SEWAGE	2.85	3.29		
	SEW COM	2.94	3.54		
	VEG COM	3.36	3.35		
50	FYM	3.00	3.63		
	SEWAGE	3.14	3.00		
	SEW COM	2.98	2.94		
	VEG COM	3.15	2.95		
PEAT	NPERCUT	0	100	MEAN	
		2.90	3.36	3.13	
GRAND MEAN	3.13				

85/W/RN/4 WHITE CLOVER

2ND CUT (13/11/85) DRY MATTER TONNES/HECTARE

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

TABLE	OM RESID	OM RATE	NPERCUT	OM RESID OM RATE
SED	0.139	0.098	0.105	0.197

TABLE	OM RESID NPERCUT	OM RATE NPERCUT	OM RESID OM RATE NPERCUT	PEATNPER
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SED	0.204	0.144	0.288	0.211
EXCEPT WHEN COMPARING MEANS WITH THE SAME LEVEL(S) OF:				
OM RESID	0.211			
OM RATE		0.149		
OM RESID.OM RATE			0.298	

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

STRATUM	DF	SE	CV%
BLOCK.WP	28	0.278	8.9
BLOCK.WP.SP	31	0.422	13.5

2ND CUT MEAN DM% 14.3

2ND CUT PLOT AREA HARVESTED 0.00053

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

OM RESID OM RATE	FYM	SEWAGE	SEW COM	VEG COM	MEAN
25	7.91	7.95	8.00	8.70	8.14
50	8.07	7.85	7.94	8.28	8.04
MEAN	7.99	7.90	7.97	8.49	8.09
NPERCUT OM RATE	0	100	MEAN		
25	7.86	8.43	8.14		
50	7.85	8.22	8.04		
MEAN	7.86	8.32	8.09		
NPERCUT OM RESID	0	100	MEAN		
FYM	7.63	8.35	7.99		
SEWAGE	7.78	8.03	7.90		
SEW COM	7.67	8.27	7.97		
VEG COM	8.34	8.64	8.49		
MEAN	7.86	8.32	8.09		

85/W/RN/4 WHITE CLOVER

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

OM RATE	NPERCUT	OM RESID	0	100
25		FYM	7.73	8.10
		SEWAGE	7.81	8.10
		SEW COM	7.47	8.54
		VEG COM	8.43	8.97
50		FYM	7.54	8.59
		SEWAGE	7.75	7.95
		SEW COM	7.86	8.01
		VEG COM	8.25	8.32
PEAT	NPERCUT	0	100	MEAN
		7.78	8.40	8.09

GRAND MEAN 8.09

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

TABLE	OM RESID	OM RATE	NPERCUT	OM RESID OM RATE
SED	0.250	0.177	0.214	0.354
TABLE	OM RESID NPERCUT	OM RATE NPERCUT	OM RESID OM RATE NPERCUT	PEATNPER
SED	0.393	0.278	0.556	0.428
EXCEPT WHEN COMPARING MEANS WITH THE SAME LEVEL(S) OF:				
OM RESID	0.428			
OM RATE		0.303		
OM RESID.OM RATE			0.605	

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

STRATUM	DF	SE	CV%
BLOCK.WP	28	0.501	6.2
BLOCK.WP.SP	31	0.856	10.6

TOTAL OF 2 CUTS MEAN DM% 14.3