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66/W/WOM/C/31 Organic Manuring

Rothamsted Research

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66/c/31,1

ORGANIC MANURING EXPERIMENT

(WDM)

The cumulative effects of organic matter on light land - Woburn Stackyard B 1966.

The intention is to allow 6 years for the accumulation of organic matter derived from different sources including applied organic manures, green manures and long leys. Later there will be a period of test-cropping with nutrient tests on micro plots.

Design: 4 randomised blocks of eight plots. Plots (except those in leys) being split into four for nitrogen.

Area of each sub-plot: 0.0156. Area harvested: Barley - 0.0104, leys - 0.0129.

Treatments: Whole plots:

- (A) 6 year leys (cut): Grass-clover (N to seedbed only) (Lc).
All grass (N for each cut) (Ln).
- (B) A sequence of arable crops with the following annual treatments:
Dung at 3 tons o.m. (approx 20 tons dung) (Dg).
Chaffed straw at 3 tons organic matter (o.m.) (St).
Peat at 3 tons o.m. (Pt).
Green manures as practicable (Gm).
No organic, fertilisers equivalent to dung (Fd).
No organic, fertilisers equivalent to straw (Fs).

Quarter plots (not to Lc, Ln):

Nitrogen at 4 levels. The levels each year are equally spaced, but vary from crop to crop. On each sub-plot the levels are applied in rotation in the first four years.

Notes on manuring:

1. Green manures (treatment Gm) receive appropriate fertilisers.
2. Organics are applied in autumn.
3. Treatments Fs, Gm, Pt, Lc, Ln receive the same net amounts of K and Mg as in the straw (allowance being made retrospectively for differential removals). These treatments will receive P at 0.5 cwt P₂O₅ each year (allowance being made for the P in the peat) and treatment St receives P at 0.5 cwt P₂O₅ (allowance being made for the P in the straw). Treatment Fd receives PK Na Mg equivalent to the total amounts in the dung.

All P as superphosphate, all K as muriate of potash, all Mg as sulphate of magnesia, and all N as 'Nitro-Chalk'.

66/C/31.2

1964. The experiment began with the sowing of the leys and green manures (Hybrid Italian ryegrass sown at 30 lb) in spring 1964.

Basal manuring:

Lc and Ln: 0.2 cwt N, 0.5 cwt P₂O₅, 0.5 cwt K₂O in seedbed.
Ln only: 0.5 cwt N in spring and after each cut except the last.
Gm: 0.5 cwt N, 0.5 cwt P₂O₅, 0.5 cwt K₂O in seedbed.

The remaining plots were left fallow without manures. Because of perennial weeds (grasses and Equisetum) all plots were rotary cultivated in July.

Cultivations, etc.:

Subsoiled: Sept 23, 1963. Ploughed twice: Oct 3, 1963, and Jan 3, 1964. Fertilisers applied: May 1. Seeds sown: May 7. Previous crops: Winter wheat 1962, spring wheat 1963.

1965. Treatment Lc and Ln were resown (basal manuring as for 1964, but with 0.5 cwt N in seedbed for both).

Treatment Gm was resown with species and manuring as in 1964.

Cultivations, etc.:

All plots: Rotary cultivated: July 2, 1964 and again July 18. Deep-tine cultivated: Aug 17. Rotary cultivated: Oct 13. Ploughed: Nov 16. Rotary cultivated: Apr 21, 1965.

Lc and Ln plots: Seeds sown, seedbed fertilisers applied: Apr 23. Sprayed with dinoseb at 1.25 lb in 40 gals: June 30. Cut twice: Aug 12, and Oct 20. 'Nitro-Chalk' applied: Aug 20.

Gm plots: Seed sown, fertiliser applied: Apr 23.

Seeds mixtures 1964 and 1965:

Lc Timothy S48	6 lb
Meadow Fescue S215	10 lb
Smooth-stalked meadow grass	4 lb
Kersey white clover	3 lb
Wild white clover	1 lb

24 lb

Sown at 24 lb

66/c/31.3

Ln	Timothy S48	8 lb
	Meadow Fescue S215	12 lb
	Smooth-stalked meadow grass	6 lb

26 lb

Sown at 26 lb

1966. In autumn 1965 winter wheat (Cappelle at 180 lb) was sown on all treatments except Lc and Ln, but it was severely damaged by wheat bulb fly (*Leptohylemia coarctata*) and was replaced by spring barley (Maris Badger at 155 lb). Treatment Gm was undersown with trefoil (inoculated, but with no additional manures) in both wheat and barley.

Fertilisers applied autumn 1965 (cwt)

Treatments	P205	K20	MgO
Dg	-	-	-
St	0.4	-	-
Pt	0.5	1.0	0.15
Gm	-	-	0.15
Fd	1.0	3.0	0.40
Fs	0.5	1.0	0.15
Lc	-	-	0.15
Ln	-	-	0.15

Nitrogen to spring barley:

NO, N1, N2 N3-0.0, 0.2, 0.4, 0.6 cwt N as 'Nitro-Chalk'.

Cultivations, etc.:

Lc and Ln plots: Mg applied: Nov 4, 1965. 'Nitro-Chalk' applied to Ln plots: Mar 17, 1966, June 15, Aug 22. Lc plots cut: June 8, July 13, Aug 12, Oct 25. Ln plots cut: June 8, Aug 12, Oct 25.

Remainder: Peat, straw, dung, P, K, Mg, applied: Sept 2 - 7, 1965. Ploughed: Sept 7. Wheat drilled, trefoil undersown on Gm plots: Nov 2. 'Nitro-Chalk' applied: Apr 28, 1966. Sprayed with paraquat at 0.75 lb ion in 34 gals: Apr 28. Barley drilled, trefoil undersown on Gm plots: Apr 30. Combine harvested: Sept 9.

Standard errors per plot. Barley, grain 1966.

Whole plot: 1.41 or 7.2% (15 d.f.)

Sub plot: 1.82 or 9.3% (54 d.f.)

66/c/31.4

SUMMARY OF RESULTS

1965

GRASS: DRY MATTER

	Lc	In
1ST CUT		
	17.1	12.3
2ND CUT		
	14.6	14.3
TOTAL OF 2 CUTS		
	31.7	26.6
Mean D.M. %:		
1st cut:	18.4	23.0
2nd cut:	18.6	24.8
Total of 2 cuts:	18.5	23.9

66/C/31.5

1966

GRASS: DRY MATTER

	Lc	Ln
1ST CUT		
	27.0	43.8
2ND CUT		
	9.4	*
3RD CUT		
	5.2	20.2
4TH CUT		
	12.2	12.9
TOTAL OF ALL CUTS		
	53.7	76.9
* No cut taken.		
Mean D.M. %:		
1st cut:	26.7	31.8
2nd cut (Lc only):	18.0	-
3rd cut:	17.4	26.5
4th cut:	19.1	24.4

66/c/31.6

BARLEY

GRAIN

	NO	N1	N2	N3	Mean
		(1) and (2)			(±0.71)
Dg	11.5	18.5	26.3	35.5	22.9
St	4.1	13.9	22.4	27.9	17.1
Pt	7.1	15.4	24.7	31.3	19.6
Gm	8.8	13.2	17.7	27.8	16.9
Fd	7.3	17.5	26.7	31.3	20.7
Fs	7.0	16.7	23.7	32.9	20.1
Mean (±0.37)	7.6	15.9	23.6	31.1	19.5

Mean D.M. %: 81.8

- (1) (±1.06) For use in vertical and diagonal comparisons
 (2) (±0.91) For use in horizontal and interaction comparisons