

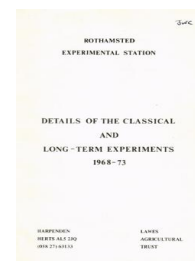
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Details of the Classical and Long-term Experiments 1968-73

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W/RN/12 Organic Manuring - Leys, Wheat, Barley, Potatoes, Sugar Beet, Beans, Rye

Rothamsted Research

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ORGANIC MANURING WOBURN STACKYARD B (W/RN/12)

The experiment was designed to test the effects of several different forms of organic matter applied to the light poorly-structured soils at Woburn. An initial period (1965 to 1971 or 1972) in which organic matter was added by leys, green manures or organic materials applied to arable crops, is being followed by an arable rotation in which effects are tested without further additions. (For further details see Ref 1)

Treatments

(a) *Organic*

- (Lc) Grass-clover ley, N to seedbed only
- (Ln) All grass ley, N for each cut
- (St) Barley straw, chopped except in 1970, at 7.5 t dry matter annually
- (Pt) Sedge peat at 7.5 t dry matter annually
- (Gm) Green manures as practicable depending on arable crop grown
- (Fs) No organic matter
- (Dg) Farmyard manure at about 50 t fresh weight per annum (25 t in 1967 and 1970)
- (Fd) No organic matter but P, K and Mg equivalent to that in FYM applied

- NOTES:** 1. Treatments other than Dg and Fd received the same total amounts of PKMg either as fertilisers alone (Fs) or as fertiliser additions to the organic manures. The amounts were equal to the PK and Mg in the barley straw plus an amount of superphosphate to bring the total phosphate to 63 kg P₂O₅ per ha.
2. Annual balancing dressings of PKMg were applied retrospectively to allow for differential removals by crops.
3. Full details of the PKMg applied in accordance with 1. and 2. are given in Appendix I of reference I.
4. An outline of the treatments and of the cropping programme are set out in Table 4.

(b) *Nitrogen*

- (i) Tests in the initial period. N was applied at four equally spaced levels to the first four crops, the dressings being rotated to avoid differential effects:—

Year	Crops	N rates (kg/ha)			
1966	Barley	0	25	50	75
1967	Potatoes	25	75	125	175
1968	Winter wheat				
1969	Sugar beet				

- (ii) 1972 & 1973 Potatoes (Blocks I and III 1972: II and IV 1973)
0, 50, 100, 150, 200, 250, 300, 350 kg N

- (iii) 1973 Wheat (Blocks I and III)
0, 25, 50, 75, 100, 125, 150, 175 kg N

- (c) *Green manuring* – Details of cropping
- 1964 Hybrid Italian ryegrass sown in spring but rotavated in July owing to weed infestation
 - 1965 Hybrid Italian ryegrass sown in spring and ploughed in September
 - 1966 Trefoil was undersown in wheat in November and again in the barley, which replaced the wheat in April. This was ploughed up at the end of November
 - 1968 Late flowering red clover undersown in winter wheat in March and ploughed in at the end of November
 - 1971 Late flowering red clover undersown in winter rye in April and ploughed in at the end of October
 - 1972 Blocks II and IV: Late flowering red clover undersown in winter rye at end of April and ploughed in at the end of November

Basal applications

1964	Lc and Ln	25 kg N	63 kg P ₂ O ₅	63 kg K ₂ O in seedbed
	Gm	63 kg N	63 kg P ₂ O ₅	63 kg K ₂ O in seedbed
1965	Lc and Ln	63 kg N	63 kg P ₂ O ₅	63 kg K ₂ O in seedbed
	Ln	63 kg N after first cut		

N applications to Ln during the season

1966	190 kg N in 3 dressings: in spring and after first two cuts
1967-69	125 kg N in 2 dressings: in spring and after first cut
1970-71	250 kg N in 2 dressings: in spring and after first cut
1972	Blocks II and IV 250 kg N in 2 dressings: in spring and after first cut.
1970	Beans 63 kg P ₂ O ₅ 125 kg K ₂ O as (0-14-28)
1971	Rye 31 kg N in spring
1972	Rye (Blocks II and IV) 40 kg N in spring
	63 kg P ₂ O ₅ 125 kg K ₂ O as (0-14-28)
	40 kg MgO as Epsom Salts
	Potatoes (Blocks I and III) 460 kg P ₂ O ₅ and 480 kg K ₂ O, half in autumn and half in spring. 100 kg MgO as Epsom Salts in spring.
1973	Potatoes as in 1972
	Fertiliser used except where stated:
	P: superphosphate, K: muriate of potash

Liming

1969	Ground chalk at 5.0 t/ha to whole area
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Weedkillers

Barley:	1966	Paraquat
Winter wheat:	1968 & 1973	Ioxynil and mecoprop
Potatoes:	1973	Linuron with paraquat
Beans:	1970	Simazine

Other chemicals applied

Potatoes:	1967, 1972 & 1973	Mancozeb and undiluted B.O.V.
Sugar beet:	1969	Demeton-S-methyl
Beans:	1970	Demeton-S-methyl

Varieties

Winter wheat:	1968 & 1973	Cappelle
Potatoes:	1967	Majestic
	1972 & 1973	Pentland Crown
Barley:	1966	Maris Badger
Sugar beet:	1969	Klein E
Rye:	1971 & 1972	King II
Beans:	1970	Maris Bead

Seeds mixtures

	Lc	Ln
S48 Timothy	25%	31%
S215 Meadow Fescue	42%	46%
Smooth stalked meadow grass	17%	23%
Kersey Red Clover	13%	
S184 Wild White Clover	4%	
Total seeding:	27 kg/ha	29 kg/ha

Areas harvested

Potatoes:	0.00087 – 0.00413
Winter wheat:	0.00173 – 0.00421
Rye & barley:	0.00421
Beans:	0.00393
Sugar beet:	0.00138

Soil series. Cottenham

References

1. Mattingly, G.E.G. (1974)
The Woburn Organic Manure Experiment. I, Design, crop yields and nutrient balances 1964-72.
Rothamsted Experimental Station. Report for 1973, Part 2, 98-133.
2. Mattingly, G.E.G., Chater, M and Poulton, D.R. (1974)
The Woburn Organic Manure Experiment. II, Soil analyses 1964-72, with special reference to changes in carbon and nitrogen.
Rothamsted Experimental Station. Report for 1973, Part 2, 134-151.

Table 4
Organic Manuring, Woburn Stackyard B
Cropping and Treatments

Treatment	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
	S	A	S	A	S	A	S	A	S	A
Lc	Sown Pl	Resown	Leys left growing up to: 1971 & 1972							
Ln									II, IV	PI
St		+	+	+	+	+	+			
Pt		+	+	+	+	+	+			
Gm	IR	PI	Tref	PI	LFR	PI	—	LFR	PI	LFR
			U/S		U/S			U/S	U/S	PI
									II, IV	
Fs		+	+	+	+	+	+			
Dg		50t	50t	25t	50t	50t	25t			
Fd		+	+	+	+	+	+			
Crops	Fallow	Fallow	Barley	Potatoes	Wheat	S.Beet	Beans	W.Rye	W.Rye	Potatoes
									II, IV	II, IV
									Potatoes	Wheat
									I, III	I, III

Symbols: +Treatment applied. PI: Ploughed up. IR: Italian ryegrass. LFR: Late Flowering Red Clover.
Tref: Trefoil. U/S: Undersown. S: Spring A: Autumn. t: Tonnes. I, II, III, IV, Blocks.