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Yields of the Field Experiments 1977

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77/W/RN/6 Arable Reference Plots - Oats, Sugar Beet, Barley, Ley, Potatoes, Old Grass

Rothamsted Research

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77/W/RN/6

ARABLE REFERENCE PLOTS

Object: To study the long term effects of FYM and N, P and K fertilisers on the yield and mineral content of crops - Woburn Stackyard C.

Sponsor: F.V. Widdowson.

The 18th year, oats, sugar beet, barley, ley, potatoes, permanent grass.

For previous years see 60/B/3(t), 61-65/B/2, 66/B/2(t), 67/B/2(t), 68/B/3(t), 69/W/RN/6, 70/W/RN/6(t) and 71-76/W/RN/6.

Design: 1 block of 12 plots for each crop.

Whole plot dimensions: 2.74 x 2.13.

Treatments: All combinations of:-

Blocks

1. CROP Crops:-
 After old grass (1960-73):
- OATS/G Oats
- In arable rotation since 1960:
- BARLEY Barley
 LEY Ley
 POTATO Potatoes
 SUGRBEET Sugar beet
 OATS/A Oats
 PERMGRAS Permanent grass, sown autumn 1973

Plots

2. MANURE Fertilisers and farmyard manure:-

0
N1
P
N1P
K
NIK
PK
N1PK
N2PK
D
N1PKD
N2PKD

N1,2 (kg N): 31.5, 63 (ley): 63, 126 (barley and oats): 126, 252 (sugar beet and potatoes): 188, 376 (permanent grass) as ammonium nitrate.

P: P205 at 63 kg as triple superphosphate.

K: K20 at 252 kg as potassium bicarbonate.

D: Farmyard manure at 25 tonnes (permanent grass): 50 tonnes (sugar beet and potatoes): none to other crops.

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- NOTES: (1) The old grass block was dug in autumn 1973 and follows the arable rotation, the crop in 1977 being oats. A new block was sown to permanent grass on adjacent land.
- (2) Potatoes and sugar beet test on sub plots: - v MG (82 kg MgO as Epsom salts). Yields are recorded from potatoes only. Untreated sub plots receive 82 kg MgO after potato and sugar beet harvest.

Standard applications:

Winter oats After old grass and in rotation: Weedkillers: Ioxynil at 0.42 kg plus mecoprop at 1.3 kg in 280 l on two occasions.

Sugar beet: Manures: Boron at 0.92 kg B_2O_3 as borax in 1120 l. Insecticides: Menazon at 0.28 kg in 280 l. Pirimicarb at 0.14 kg in 280 l.

Barley: Weedkillers: Ioxynil at 0.42 kg plus mecoprop at 1.3 kg in 280 l.

Potatoes: Weedkillers: Linuron at 1.0 kg plus paraquat at 0.28 kg ion in 280 l. Fungicide: Mancozeb at 1.3 kg in 280 l on three occasions, the first with insecticide. Insecticide: Menazon at 0.28 kg with fungicide.

Seed: Winter oats: Peniarth, sown at 200 kg

Sugar beet: Klein E, sown at 5.6 kg

Barley: Julia, dressed with ethirimol, sown at 220 kg

Potatoes: Pentland Crown

Grass-clover ley: RvP Italian ryegrass and Hungaropoly red clover

Permanent grass: S215 Meadow fescue at 20 kg; S24 perennial ryegrass at 20 kg; crested dogstail at 7 kg; Chewings fescue at 7 kg; smooth stalked meadow grass at 7 kg; alsike clover at 4 kg; wild white clover at 2 kg. Mixture sown at 67 kg.

Cultivations, etc.:-

Winter Oats: Both blocks: Balancing Mg applied to oats after long ley only, plots dug by hand, P and K applied: 7 Sept, 1976. Raked, seed sown: 20 Oct. First half N applied, weedkillers applied: 11 Mar, 1977. Second half N applied: 3 May. Weedkiller application repeated: 10 May. Harvested: 3 Aug.

Sugar beet: FYM applied, plots dug by hand: 11 Nov, 1976. P and K applied: 2 Mar, 1977. First half N applied, raked, Mg applied to half plots, raked in, seed drilled and raked in: 25 Mar. Singled, second half N applied, boron applied: 9 June. Menazon applied: 7 July. Pirimicarb applied: 19 July. Lifted: 10 Nov.

Barley: Balancing Mg applied: 7 Oct, 1976. Plots dug by hand: 18 Nov. First half N applied, P and K applied, raked, seed sown, raked in: 2 Mar, 1977. Second half N applied: 3 May. Weedkillers applied: 10 May. Harvested: 11 Aug.

Potatoes: FYM applied, plots dug by hand: 11 Nov, 1976. P and K applied: 2 Mar, 1977. First half N applied, rotary cultivated, raked, Mg applied to half plots, potatoes planted and earthed up: 26 Apr. Weedkillers applied: 23 May. Second half N applied: 9 June. Insecticide with fungicide applied: 7 July. Fungicide applied: 26 July, 11 Aug. Lifted plots without K: 3 Aug. Remaining plots lifted: 3 Oct.

Grass-clover ley: Barley stubble raked, seeds sown, raked in: 5 Aug, 1976. P and K applied: 18 Nov. N applied: 11 Mar, 1977. Cut three times: 23 May, 19 July, 29 Sept.

Permanent Grass: P and K applied: 18 Nov, 1976. FYM applied: 2 Mar, 1977. N applied in three equal amounts: 11 Mar, 23 May, 19 July. Cut three times: 23 May, 19 July, 29 Sept.

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- NOTES: (1) Samples were taken for determinations of dry matter for each crop and the percentage of N, P and K.
 (2) The percentages of Mg in sugar beet tops, potato tubers and leaves were determined.
 (3) The percentage of K in potato leaves was determined.

TONNES/HECTARE

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

	OATS/A		OATS/G		ROOTS WASHED	SUGRBEET		TOPS
	GRAIN	STRAW	GRAIN	STRAW		SUGAR %	TOTAL SUGAR	
MANURE								
O	0.80	0.94	1.73	2.08	12.6	16.6	2.10	8.2
N1	2.63	2.90	3.71	4.04	19.1	16.3	3.12	21.9
P	0.98	1.17	1.83	2.46	10.6	16.3	1.72	9.2
N1P	3.55	4.08	3.31	3.88	15.7	15.6	2.45	17.4
K	0.92	1.24	1.74	2.28	13.0	17.1	2.22	8.5
N1K	2.89	4.06	3.66	5.06	32.3	17.3	5.60	20.5
PK	0.88	1.34	1.70	2.32	14.2	17.1	2.42	8.4
N1PK	2.46	3.73	3.64	5.29	32.8	16.8	5.51	25.1
N2PK	3.80	6.20	4.76	6.79	38.3	16.5	6.32	40.2
D	1.64	2.28	1.95	2.79	33.3	17.2	5.73	22.2
N1PKD	1.90	2.88	3.55	6.12	46.8	17.6	8.24	35.9
N2PKD	3.82	6.55	4.27	6.59	51.8	16.8	8.68	50.9
MEAN DM%	76.3	49.1	74.4	47.3				

	BARLEY		LEY : DRY MATTER				POTATOES		
	GRAIN	STRAW	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS	TOTAL TUBERS MG	MEAN	
MANURE									
O	1.41	1.20	0.53	0.37	0.31	1.22	7.5	5.8	6.7
N1	2.96	2.92	2.44	0.76	0.34	3.53	8.2	7.9	8.0
P	1.61	1.33	0.49	0.41	0.26	1.17	7.2	6.2	6.7
N1P	1.73	2.60	2.65	0.60	0.32	3.56	7.9	7.5	7.7
K	1.76	1.57	0.74	0.41	0.68	1.84	11.3	9.9	10.6
N1K	3.54	3.79	2.78	0.67	0.59	4.04	27.0	32.1	29.6
PK	1.50	1.30	0.88	0.60	0.95	2.43	16.1	16.7	16.4
N1PK	3.64	3.57	3.31	0.66	0.57	4.54	31.4	32.8	32.1
N2PK	4.88	5.96	4.76	1.10	0.55	6.41	27.3	36.9	32.1
D	2.20	2.04	1.58	0.94	1.06	3.57	26.0	28.7	27.3
N1PKD	4.68	4.44	4.12	0.98	0.90	6.00	36.9	41.3	39.1
N2PKD	4.99	5.82	6.02	1.58	0.76	8.37	53.6	56.7	55.2
MEAN DM%	79.2	70.2	27.1	33.9	23.2	28.1			

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TONNES/HECTARE

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

MANURE	PERMGRAS : DRY MATTER			TOTAL OF 3 CUTS
	1ST CUT	2ND CUT	3RD CUT	
O	1.49	0.38	0.58	2.45
N1	3.75	1.62	2.23	7.60
P	1.03	0.22	0.43	1.69
N1P	3.57	1.50	1.96	7.03
K	2.04	0.84	0.99	3.87
N1K	4.21	1.86	2.10	8.17
PK	1.79	0.50	0.83	3.12
N1PK	4.46	1.80	2.24	8.50
N2PK	4.68	1.89	2.44	9.00
D	3.36	0.96	1.06	5.38
N1PKD	5.54	1.89	2.57	10.01
N2PKD	5.66	2.11	2.96	10.73
MEAN DM%	23.1	33.5	23.8	26.8