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# Yields of the Field Experiments 1976

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

### Rothamsted Research

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76/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 17th 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 71-75/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):
- POTATO/G    Potatoes
- In arable rotation since 1960:
- BARLEY      Barley  
LEY          Ley  
POTATO/A    Potatoes  
SUGRBEET   Sugar beet  
OATS        Oats  
PERMGRAS   Permanent grass, sown autumn 1973

Plots

2. MANURE    Fertilisers and farmyard manure:-
- O            None  
N1           N1  
P            P  
N1P          N1 P  
K            K  
N1K          N1 K  
PK           PK  
N1PK        N1 PK  
N2PK        N2 PK  
D            D  
N1PKD       N1 PK D  
N2PKD       N2 PK D

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 1976 being potatoes. A new block was sown to permanent grass on adjacent land.
- (2) Potatoes in the old arable rotation and sugar beet test on sub plots: - v MG (82 kg Mg 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: Weedkillers: Ioxynil at 0.63 kg and mecoprop at 1.9 kg in 280 l. Fungicide: Tridemorph at 0.53 kg in 280 l on two occasions the first with weedkiller.

Sugar beet: Manures: Boron at 0.92 kg B203 as borax in 1120 l. Insecticide: Menazon at 0.28 kg in 280 l on two occasions.

Barley: Weedkillers: Ioxynil at 0.42 kg and mecoprop at 1.3 kg in 280 l. Fungicide: Tridemorph at 0.53 kg in 280 l.

Potatoes: After old grass and in rotation: Insecticide: Menazon at 0.28 kg in 280 l on two occasions, the second with fungicide. Fungicide: Mancozeb at 1.3 kg in 280 l.

Permanent grass: Manures: MgO at 82 kg as Epsom salts.

Seed: Winter oats: Peniarth, sown at 200 kg  
Sugar beet: Klein E, sown at 5.6 kg  
Barley: Julia, dressed with ethirimol, sown at 160 kg  
Potatoes: Maris Piper  
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: Balancing Mg applied: 29 Sept, 1975. Plots dug by hand, P and K applied: 2 Oct. Seed sown: 6 Oct. First half N applied: 1 Mar, 1976. Weedkiller with fungicide applied: 5 Apr. Second half N applied: 22 Apr. Fungicide applied: 20 May. Harvested: 9 July.

Sugar beet: FYM applied, plots dug by hand: 21 Sept, 1975. P and K applied: 1 Mar, 1976. First half N applied, Mg applied to half plots, raked in, seed drilled: 22 Mar. Boron applied: 3 May. Second half N applied: 20 May. Singled: 25 May. Insecticide applied: 14 June, 29 June. Lifted: 7 Oct.

Barley: Balancing Mg applied: 8 Nov, 1975. Plots dug by hand: 21 Nov. P and K applied, first half N applied, rotary cultivated, raked level, seed sown, raked in: 1 Mar, 1976. Second half N applied: 22 Apr. Weedkiller applied: 3 May. Fungicide applied: 20 May. Harvested: 13 July.

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Grass-clover ley: Seed undersown in barley stubble: 12 Aug, 1975. P and K applied: 20 Nov. N applied: 9 Mar, 1976. Cut twice: 20 May, 1 July.

Potatoes: Both blocks: FYM applied, plots dug by hand: 20 Nov, 1975. P and K applied: 1 Mar, 1976. First half N applied, rotary cultivated, potatoes planted, Mg applied to half plots, ridged up by hand: 13 Apr. Second half N applied: 20 May. Insecticide applied: 14 June. Insecticide with fungicide applied: 29 June. Lifted plots with neither K nor FYM: 12 Aug. Remaining plots lifted: 6 Sept.

Permanent grass: P, K and basal Mg applied: 20 Nov, 1975. FYM applied: 1 Mar, 1976. First third N applied: 9 Mar. Second third N applied: 20 May. Third third N applied: 1 July. Cut three times: 20 May, 1 July, 5 Nov.

- 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.

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

	OATS		ROOTS WASHED	SUGARBEET	TOTAL SUGAR	TOPS
	GRAIN	STRAW		SUGAR %		
MANURE						
O	3.24	3.19	8.4	13.2	1.11	7.5
N1	2.92	3.63	10.6	13.2	1.39	12.8
P	3.28	3.34	6.8	13.2	0.90	8.5
N1P	3.35	4.00	9.2	13.7	1.26	11.1
K	2.37	3.07	18.6	15.7	2.92	10.1
N1K	2.92	3.16	18.1	13.7	2.49	14.2
PK	2.22	2.60	14.2	15.1	2.14	9.9
N1PK	4.50	6.05	18.1	13.6	2.46	16.2
N2PK	3.34	6.46	22.9	13.7	3.13	19.1
D	3.94	4.90	28.7	15.8	4.55	16.7
N1PKD	3.47	6.05	28.4	14.4	4.09	20.8
N2PKD	3.87	7.55	32.8	14.3	4.70	25.6
MEAN DM%	87.3	77.1				

	BARLEY		-	POTATO/A	MEAN
	GRAIN	STRAW		TOTAL TUBERS MG	
MANURE					
O	1.59	1.69	6.1	4.7	5.4
N1	1.56	2.31	5.5	5.4	5.4
P	1.58	1.64	4.4	6.1	5.2
N1P	1.15	2.10	4.7	5.2	5.0
K	1.79	2.06	10.8	11.1	10.9
N1K	2.81	3.47	9.4	9.0	9.2
PK	1.97	1.70	11.1	12.1	11.6
N1PK	2.83	3.50	10.7	11.8	11.2
N2PK	3.56	4.29	10.7	11.9	11.3
D	2.69	2.91	13.7	13.0	13.4
N1PKD	3.43	4.39	11.5	11.1	11.3
N2PKD	3.67	4.97	13.6	12.4	13.0
MEAN DM%	86.8	82.8			

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TONNES/HECTARE

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

	POTATO/G	PERMGRAS : DRY MATTER			LEY : DRY MATTER			
	TOTAL TUBERS	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS	1ST CUT	2ND CUT	TOTAL OF 2 CUTS
MANURE								
O	6.4	0.90	0.25	0.36	1.51	0.90	0.26	1.16
N1	5.9	2.26	0.37	0.39	3.02	1.74	0.42	2.17
P	6.5	0.44	0.12	0.27	0.84	0.84	0.24	1.08
N1P	5.6	2.19	0.34	0.50	3.02	1.91	0.48	2.39
K	10.5	1.45	0.43	0.47	2.34	0.85	0.42	1.27
N1K	10.8	2.63	0.32	0.36	3.31	2.22	0.29	2.51
PK	7.9	1.44	0.29	0.39	2.11	1.44	0.58	2.02
N1PK	10.5	2.42	0.33	0.56	3.32	2.78	0.43	3.21
N2PK	11.5	3.96	0.59	0.45	5.00	3.39	0.48	3.87
D	12.6	1.40	0.37	0.44	2.21	2.00	0.49	2.49
N1PKD	14.2	3.30	0.51	0.51	4.31	3.38	0.57	3.95
N2PKD	13.7	3.78	0.82	0.45	5.05	4.42	0.73	5.14
MEAN DM%		24.8	61.3	18.3	34.8	27.8	47.1	37.4