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# Yields of the Field Experiments 1983

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## 83/R/RN/5 Arable Reference Plots - W. Barley, Ley, Potatoes, W. Wheat, W. Oats, Permanent Grass

### Rothamsted Research

Rothamsted Research (1984) *83/R/RN/5 Arable Reference Plots - W. Barley, Ley, Potatoes, W. Wheat, W. Oats, Permanent Grass* ; Yields Of The Field Experiments 1983, pp 71 - 75 - DOI: <https://doi.org/10.23637/ERADOC-1-44>

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ARABLE REFERENCE PLOTS

Object: To study the long term effects of FYM and N, P and K fertilizers on the yield and mineral content of crops - Great Field IV.

Sponsor: F.V. Widdowson.

The 28th year of a rotation, s. barley, ley, potatoes, w. wheat, kale until 1980, w. barley, ley, potatoes, w. wheat, w. oats since 1981. The 23rd year of a rotation on the additional plots (as the initial above rotation for 20 years; w. barley, ley, potatoes, w. wheat, w. oats since 1980). The 27th year of permanent grass.

For previous years see 58/Bc/1(t), 59/Bc/1(t), 60/B/3(t), 61-64/B/2, 65/B/2(t), 66/B/2(t), 67/B/2, 68/B/3(t) and 69-82/R/RN/5.

Design: 1 block of 12 plots for each crop on original plots. 1 block of 7 plots for each crop on additional plots.

Whole plot dimensions: 2.13 x 2.44.

Treatments: Fertilizers and farmyard manure:

MANURE

Original plots

O  
N1  
P  
N1P  
K  
N1K  
PK  
N1PK  
N2PK  
D  
N1PKD  
N2PKD

N<sub>1,2</sub> (kg N): 20, 40 (ley): 100, 200 (w. wheat, w. barley and w. oats): 125, 250 (potatoes, and permanent grass) as 'Nitro-Chalk'

P: 63 kg P<sub>2</sub>O<sub>5</sub> as superphosphate

K: 250 kg K<sub>2</sub>O as muriate of potash

D: 38 tonnes FYM (permanent grass): 100 tonnes (to potatoes only - 50 tonnes to potatoes and kale until 1980): none to other crops

NOTES: (1) All w. wheat on these plots receives a standard dressing of 82 kg MgO as Epsom salts.

(2) Cereals receive 40 kg N in March, remainder in April

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Additional plots

MANURE                      Fertilizers from 1980 to 1983 and in previous years:

1980-83	Until 1979
0	0
N2PK	N2 PK
N2PKMG	N2 PK MG CA
N2PKS	N2 PK CA S
N2PKMGS	N2 PK MG S
N1PKMGS	N2 PK CA MG S
N3PKMGS	N2 PK CA MG S TE

- N: In 1983: N1: 20 kg (ley), 120 kg (w. wheat, w. barley and w. oats), 160 kg (potatoes). N2: 30 kg (ley), 160 kg (w. wheat, w. barley and w. oats), 240 kg (potatoes). N3: 40 kg (ley), 200 kg (w. wheat, w. barley and w. oats), 320 kg (potatoes). Until 1979 N2 = larger rate on original plots in these years. As urea in all years. Cereals receive 40 kg N in March, remainder in April.
- P: 126 kg P205 as potassium dihydrogen phosphate
- K: 251 kg K20 total. As potassium dihydrogen phosphate (83 kg K20) on all PK plots. In addition plots without S receive 168 kg K20 as potassium chloride, plots with S receive 92 kg K20 as potassium sulphate plus 76 kg K20 as potassium chloride. Since 1978 all PK plots receive, in addition to the standard total, 126 kg K20 for potatoes, applied in autumn as potassium chloride.
- MG: 126 kg MgO as magnesium chloride
- CA: 126 kg CaO as calcium carbonate until 1979. In 1980 plots not previously given CA received calcium carbonate at 7.5 t, except 0 which was given 5 t.
- S: 30 kg S supplied by the potassium sulphate
- TE: Trace element mixture which included Mn, Cu, Zn, B, Mo, Ca and Fe.

Standard applications:

Original and additional plots:

- All cereals: Weedkillers: Ioxynil at 0.32 kg with mecoprop at 0.95 kg in 220 l. Mecoprop, bromoxynil and ioxynil (as 'Brittox' at 2.1 l) in 220 l with the tridemorph. Fungicides: Tridemorph at 0.52 kg. Benomyl at 0.28 kg in 220 l. Carbendazim at 0.15 kg, maneb at 1.6 kg and tridemorph at 0.37 kg in 220 l, applied on three occasions, with the growth regulator on the first, and with the pirimicarb and captafol on the third. Captafol at 1.1 kg. Insecticides: Pirimicarb at 0.14 kg. Permethrin at 0.05 kg in 220 l.
- W. wheat: Growth regulator: Chlormequat at 1.9 kg in 220 l.
- W. barley: Additional insecticide: Omethoate at 0.64 l in 220 l. Growth regulator: Mepiquat chloride and ethephon (as 'Terpal' at 2.8 l) in 220 l.
- W. oats: Growth regulator: Chlormequat at 1.9 kg in 220 l.
- Potatoes: Weedkillers: Linuron at 0.93 kg with paraquat at 0.28 kg in 220 l. Fungicide: Mancozeb at 1.3 kg in 220 l with the insecticide. Insecticide: Pirimicarb at 0.14 kg.
- Seed: W. wheat: Norman, sown at 210 kg  
W. barley: Igrí, sown at 200 kg  
W. oats: Peniarth, sown at 210 kg  
Potatoes: Desiree  
Grass-clover ley: RVP Italian ryegrass and Hungaropoly red clover.

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Cultivations, etc.:-

- W. wheat: Dug by hand: 10 Sept, 1982. P, K and Mg applied to original plots; P, K, Mg and S applied to additional plots: 14 Sept. All plots raked level, seed sown and raked in: 15 Sept. Ioxynil and mecoprop applied: 18 Oct. Permethrin applied: 25 Oct. First N applied: 14 Mar, 1983. 'Brittox' with tridemorph applied: 30 Mar. Benomyl applied: 7 Apr. Second N applied: 22 Apr. Growth regulator, carbendazim with maneb and tridemorph applied: 27 Apr. Carbendazim with maneb and tridemorph applied: 20 May. Pirimicarb, captafol, carbendazim with maneb and tridemorph applied: 16 June. Harvested by hand: 1 Aug.
- W. barley: Rotary cultivated: 13 Sept, 1982. P and K applied to original plots; P, K, Mg and S to additional plots, raked level, seed sown, raked in: 15 Sept. Ioxynil and mecoprop applied: 18 Oct. Omethoate, permethrin applied: 25 Oct. First N applied: 14 Mar, 1983. 'Brittox' with tridemorph applied: 30 Mar. Benomyl applied: 7 Apr. Second N applied: 8 Apr. Growth regulator, carbendazim, maneb and tridemorph applied: 27 Apr. Carbendazim, maneb and tridemorph applied: 20 May. Pirimicarb, carbendazim, maneb, tridemorph and captafol applied: 16 June. Harvested by hand: 18 July.
- W. oats: Rotary cultivated: 14 Sept, 1982. P and K applied to original plots; P, K, Mg and S applied to additional plots, raked level, seed sown, raked in: 22 Sept. Ioxynil and mecoprop applied: 18 Oct. Permethrin applied: 25 Oct. First N applied: 14 Mar, 1983. 'Brittox' with tridemorph applied: 30 Mar. Benomyl applied: 7 Apr. Second N applied: 8 Apr. Growth regulator, carbendazim, maneb and tridemorph applied: 27 Apr. Carbendazim, maneb and tridemorph applied: 20 May. Pirimicarb, carbendazim, maneb, tridemorph and captafol applied: 16 June. Harvested by hand: 26 July.
- Potatoes: FYM applied to original plots, dug by hand; extra K applied to additional plots, dug by hand: 19 Oct, 1982. P and K applied to original plots; P, K, Mg and S applied to additional plots: 1 Nov. Total N applied, rotary cultivated, potatoes planted and ridged by hand: 23 May, 1983. Linuron and paraquat applied: 7 June. Mancozeb and pirimicarb applied: 6 July. Plots given neither FYM nor K harvested by hand: 26 Aug. Remaining plots harvested by hand: 19 Sept.
- Grass-clover ley: Rotary cultivated, raked level, seed sown and raked in: 26 July, 1982. P and K applied to original plots; P, K, Mg and S applied to additional plots: 1 Nov. N applied: 14 Mar, 1983. Cut: 25 May, 20 July, 11 Oct.
- Permanent grass: P and K applied: 1 Nov, 1982. FYM and first N applied: 14 Mar, 1983. Second N applied: 24 May. Final N applied: 20 July. Cut: 24 May, 20 July, 11 Oct.

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GREAT FIELD IV (R):ORIGINAL PLOTS

TONNES/HECTARE

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

	WINTER WHEAT:				BARLEY:		LEY : DRY MATTER			
	GRAIN		STRAW		GRAIN	STRAW	1ST	2ND	3RD	TOTAL OF
							CUT	CUT	CUT	3 CUTS
MANURE										
O	5.00	5.25	3.02	2.19			1.85	1.84	0.90	4.60
N1	7.91	8.33	1.80	2.82			4.36	1.81	0.65	6.83
P	2.90	3.14	2.81	2.32			2.83	3.14	1.59	7.55
N1P	2.29	3.86	1.30	2.76			4.86	1.87	0.62	7.35
K	5.24	5.97	3.13	3.73			2.32	3.20	1.45	6.96
N1K	9.39	10.21	5.91	5.34			4.20	2.54	1.09	7.82
PK	5.89	6.75	4.87	3.62			4.09	5.09	1.68	10.86
N1PK	9.73	10.67	8.31	7.02			5.11	4.61	2.43	12.15
N2PK	10.92	12.59	10.04	9.96			6.17	4.19	2.35	12.72
D	9.26	10.98	4.55	3.64			3.91	4.47	2.18	10.55
N1PKD	11.27	13.74	8.98	8.68			5.84	5.36	2.66	13.86
N2PKD	10.92	14.42	9.93	11.70			7.33	4.00	2.10	13.43
MEAN DM%	80.1	67.6	86.9	63.8			23.4	28.4	23.1	25.0
	OATS:		POTATOES:		PERMANENT GRASS : DRY MATTER					
	GRAIN	STRAW	TOTAL	TUBERS	1ST	2ND	3RD	TOTAL OF		
					CUT	CUT	CUT	3 CUTS		
MANURE										
O	4.39	6.28	9.6		0.64	0.82	0.29	1.75		
N1	7.03	10.40	9.4		1.59	1.29	0.80	3.68		
P	4.80	6.56	7.6		0.64	1.03	0.24	1.90		
N1P	6.33	10.72	8.8		2.24	1.55	1.04	4.83		
K	4.46	6.76	25.0		0.78	1.04	0.39	2.22		
N1K	7.06	11.99	26.3		2.02	2.26	0.88	5.17		
PK	4.69	7.67	27.5		0.72	1.06	0.38	2.17		
N1PK	8.60	13.59	36.5		3.42	2.31	0.78	6.52		
N2PK	6.94	15.50	33.8		4.94	2.84	1.56	9.34		
D	6.06	9.20	36.5		5.15	2.04	0.65	7.84		
N1PKD	8.42	14.66	47.7		5.68	2.97	1.37	10.02		
N2PKD	8.36	20.50	43.8		5.81	4.10	1.68	11.58		
MEAN DM%	82.6	46.1	23.2		25.6	35.3	23.6	28.2		

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GREAT FIELD IV (R): ADDITIONAL PLOTS

TONNES/HECTARE

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

	WINTER WHEAT:		BARLEY:		OATS:		POTATOES:
	GRAIN	STRAW	GRAIN	STRAW	GRAIN	STRAW	TOTAL
							TUBERS
MANURES							
0	5.15	5.81	3.27	2.13	3.01	3.82	9.1
N2PK	10.28	11.95	8.32	8.29	8.50	17.71	40.9
N2PKMG	10.68	11.73	10.49	8.69	7.45	13.97	45.6
N2PKS	10.97	12.00	9.77	8.04	8.19	11.42	40.8
N2PKMGS	10.83	12.84	9.76	8.66	7.71	17.16	32.3
N1PKMGS	9.22	10.66	9.50	8.81	8.06	13.01	43.6
N3PKMGS	10.49	12.40	9.96	8.99	7.07	16.23	42.7
MEAN DM%	80.8	73.0	87.7	67.1	85.2	58.0	23.8

	LEY : DRY MATTER			
	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURES				
0	2.87	2.06	0.66	5.59
N2PK	6.60	4.46	1.95	13.01
N2PKMG	5.21	4.00	1.80	11.01
N2PKS	5.56	4.61	2.03	12.20
N2PKMGS	6.17	4.41	2.00	12.58
N1PKMGS	5.25	4.74	2.04	12.03
N3PKMGS	5.85	4.86	1.91	12.63
MEAN DM%	22.9	28.4	21.7	24.3