ROTHAMSTED RESEARCH

Yields of the Field Experiments 1987

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87/R/RN/5 Arable Reference Plots - W. Barley, Ley, Potatoes, W. Wheat, W. Oats, S. Oats, Old Grass

Rothamsted Research

Rothamsted Research (1988) *87/R/RN/5 Arable Reference Plots - W. Barley, Ley, Potatoes, W. Wheat, W. Oats, S. Oats, Old Grass ;* Yields Of The Field Experiments 1987, pp 57 - 61 **- DOI: https://doi.org/10.23637/ERADOC-1-37**

87/R/RN/5

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: A. Penny.

The 32nd year of a rotation, s. barley, ley, potatoes, w. wheat, kale until 1980; w. barley, ley, potatoes, w. wheat, w. oats since 1981. The 28th 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 31st 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 69-86/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

0
N1
P
N1P
K
N1K
PK
N1PK
N2PK
D
N1PKD
N2PKD

N1, 2 (kg N): 20, 40 (ley): 100, 200 (w. wheat, w. barley and w. oats): 125, 250 (potatoes, and permanent grass) as 'Nitro-Chalk' (26% N)
P: 63 kg P_2O_5 as superphosphate
K: 250 kg K_2O 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 20 kg of N1 and 40 kg of N2 in February or March, remainder in April.
(3) In 1987 w. oats on the original plots given MANURE 0, N1, P and NP failed during the winter and were sown to s. oats.

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Additional plots

MANURE	Fertilizers from 1980 to 1987 and in previous years:
1980-87	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 1987: 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 P2O5 as potassium dihydrogen phosphate.
K: 251 kg K2O total. As potassium dihydrogen phosphate (83 kg K2O) on all PK plots. In addition plots without S receive 168 kg K2O as potassium chloride, plots with S receive 92 kg K2O as potassium sulphate plus 76 kg K2O as potassium chloride. Since 1978 all PK plots receive, in addition to the standard total, 126 kg K2O 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 5.0 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: Mecoprop at 0.72 kg, bromoxynil at 0.16 kg and ioxynil at 0.16 kg in 220 l on two occasions, with isoproturon (except to oats) at 2.1 kg on the first occasion. Fungicides: Prochloraz at 0.37 kg and carbendazim at 0.14 kg with tridemorph at 0.52 kg in 220 l. Propiconazole at 0.13 kg with captafol at 1.0 kg in 220 l. Carbendazim at 0.15 kg, maneb at 1.6 kg and tridemorph at 0.37 kg with chlorothalonil at 1.1 kg and the insecticide in 220 l. Insecticide: Pirimicarb at 0.14 kg.
W. wheat: Manures: MgO at 82 kg as Epsom salts. Growth regulator: Chlormequat at 1.9 kg in 220 l.
W. barley: Growth regulator: Mepiquat chloride at 0.85 kg and 2-chloroethylphosphonic acid at 0.43 kg in 220 l.
W. oats: Growth regulator: Chlormequat at 1.9 kg in 220 l (none to s. oats).
Potatoes: Weedkillers: Linuron at 0.93 kg with paraquat at 0.28 kg ion in 220 l. Fungicides: Mancozeb at 1.3 kg in 220 l on three occasions, applied with the insecticide on the second. Applied on a fourth occasion to later-harvested plots only. Insecticide: Pirimicarb at 0.14 kg.

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Seed: W. wheat: Galahad, sown at 210 kg.
W. barley: Panda, sown at 190 kg.
W. oats: Bulwark, sown at 210 kg.
S. oats: Dula, sown at 180 kg.
Potatoes: Cara.
Grass-clover ley: RVP Italian ryegrass and Hungaropoly red clover.

Cultivations, etc.:-
Original and additional plots:
All cereals: Mecoprop, bromoxynil, ioxynil and (except to oats) isoproturon applied: 20 Nov, 1986. First N treatments applied: 24 Mar, 1987. Mecoprop, bromoxynil, ioxynil applied: 10 Apr. Second N treatments applied, prochloraz, carbendazim with tridemorph applied: 24 Apr. Growth regulators applied: 1 May (to barley) and 6 May to wheat and oats (except re-sown plots). Propiconazole and captafol applied: 13 May (to barley), 20 May (to wheat additional plots) and 28 May (to wheat original plots and oats). Carbendazim, maneb, tridemorph, chlorothalonil and pirimicarb applied: 23 June.
W. wheat: Rotary cultivated, P, K, Mg and S applied (S to additional plots only), seed sown and raked in: 25 Sept, 1986. Hand harvested: 17 Aug, 1987.
W. barley: Rotary cultivated, P and K and (to additional plots only) Mg and S applied: 1 Sept, 1986. Seed sown and raked in: 17 Sept. Hand harvested: 31 July, 1987.
W. & s. oats: Rotary cultivated, P and K and (to additional plots only) Mg and S applied: 16 Sept, 1986. Seed sown and raked in: 2 Oct. S. oats sown: 26 Mar, 1987. Hand harvested: 11 Aug. Spring oats harvested: 1 Sept.
Potatoes: Extra K applied (to additional plots except nil only): 2 Oct, 1986. FYM applied to original plots and all original plots dug by hand: 1 Dec. All additional plots dug by hand, P, K and (to additional plots only), Mg and S applied: 2 Dec. N applied, rotary cultivated, potatoes planted: 22 Apr, 1987. Weedkillers applied: 13 May. Mancozeb applied: 24 June, 7 July and 28 July. Insecticide applied: 7 July. Plots given neither FYM nor K on original plots and plot given no fertilizer on additional plots harvested by hand, mancozeb applied to remaining plots: 14 Aug. Remaining plots harvested by hand: 29 Sept (original plots) and 30 Sept (additional plots).
Grass-clover ley: Rotary cultivated: 11 Aug, 1986. Seed sown and raked in: 12 Aug. P, K and (to additional plots only), Mg and S applied: 2 Dec. N applied: 24 Mar, 1987. Cut: 19 May, 20 July and 28 Sept.
Permanent grass: P and K applied: 2 Dec, 1986. FYM applied: 12 Mar, 1987. First N applied: 24 Mar. Cut, second N applied: 19 May. Cut, third N applied: 20 July. Cut: 28 Sept.

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ORIGINAL PLOTS

TONNES/HECTARE

***** Tables of means *****

	W. WHEAT:		W. BARLEY:		LEY : DRY MATTER			
	GRAIN	STRAW	GRAIN	STRAW	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE								
0	2.41	2.60	2.62	1.94	1.20	1.75	1.16	4.11
N1	3.21	3.81	3.73	3.40	2.30	1.85	1.25	5.40
P	4.37	4.24	3.02	2.52	1.95	1.50	0.90	4.34
N1P	1.01	1.83	3.60	3.78	3.75	1.54	0.68	5.98
K	4.07	4.23	2.43	2.27	2.19	2.88	1.98	7.05
N1K	5.77	6.67	4.91	4.24	2.58	2.47	1.39	6.44
PK	4.72	4.75	3.49	3.08	3.65	4.78	3.65	12.09
N1PK	8.03	7.83	7.85	5.73	4.57	4.81	3.56	12.93
N2PK	8.57	9.26	8.46	6.33	5.58	4.43	3.59	13.60
D	6.12	6.75	3.64	3.69	3.56	4.25	3.37	11.19
N1PKD	9.50	10.35	8.24	5.76	5.16	5.16	3.95	14.27
N2PKD	9.65	11.87	9.23	7.95	5.02	5.27	3.91	14.20
MEAN DM%	80.6	53.7	81.2	61.9	23.4	19.2	22.4	21.7

	W. OATS:		POTATOES:	PERMANENT GRASS : DRY MATTER			
	GRAIN	STRAW	TOTAL TUBERS	1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE							
0	3.00*	2.37*	12.5	0.57	0.90	0.84	2.31
N1	4.38*	3.16*	14.2	1.40	2.07	2.11	5.59
P	2.78*	2.54*	8.1	0.57	1.17	0.92	2.67
N1P	2.73*	2.82*	7.3	1.99	2.56	2.22	6.77
K	2.76	2.88	34.4	0.74	1.01	1.03	2.78
N1K	4.94	5.16	36.7	1.56	2.60	2.05	6.22
PK	3.94	4.25	50.2	0.82	1.26	1.27	3.36
N1PK	7.64	8.12	62.7	2.40	3.02	2.90	8.32
N2PK	8.02	11.45	58.2	3.67	4.52	3.55	11.73
D	4.56	5.26	71.9	3.92	2.42	2.73	9.08
N1PKD	8.41	11.43	83.0	4.51	3.96	3.66	12.13
N2PKD	7.71	13.46	74.6	4.70	4.99	4.41	14.09
MEAN DM%	79.1	40.9	21.0	28.3	24.3	29.4	27.3

* S. OATS

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ADDITIONAL PLOTS

***** Tables of means *****

	W. WHEAT: GRAIN	W. WHEAT: STRAW	W. BARLEY: GRAIN	W. BARLEY: STRAW	W. OATS: GRAIN	W. OATS: STRAW	POTATOES: TOTAL TUBERS
MANURES							
0	2.85	2.70	2.70	2.07	2.73	2.74	9.1
N2PK	9.00	8.90	9.03	7.39	7.67	11.21	69.8
N2PKMG	8.02	8.70	8.56	6.42	8.23	13.20	69.2
N2PKS	7.52	7.85	9.04	6.97	8.01	10.31	66.5
N2PKMGS	8.47	8.72	8.67	7.28	7.92	12.38	78.8
N1PKMGS	8.28	8.64	8.34	6.56	8.17	11.21	74.4
N3PKMGS	8.69	9.35	8.99	7.21	7.40	10.69	69.4
MEAN DM%	79.3	44.5	80.6	62.4	78.4	44.8	21.5

	LEY : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURES				
0	1.79	1.57	1.31	4.66
N2PK	4.99	5.36	3.52	13.87
N2PKMG	5.04	4.79	3.90	13.73
N2PKS	5.05	4.98	4.13	14.16
N2PKMGS	4.24	5.07	3.92	13.24
N1PKMGS	4.32	4.53	3.81	12.66
N3PKMGS	4.67	4.40	3.51	12.58
MEAN DM%	22.1	17.2	22.1	20.5

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