ROTHAMSTED RESEARCH

Yields of the Field Experiments 1979

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79/R/RN/5 Arable Reference Plots - Barley, Ley, Potatoes, Wheat

Rothamsted Research

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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 - Great Field IV.

Sponsor: F.V. Widdowson.

The 24th year of the rotation, barley, ley, potatoes, winter wheat, kale.
The 20th year of the same rotation on the additional plots.
The 23rd 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 69-78/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: Fertilisers and farmyard manure:

MANURE

Original plots

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

N1, 2 (kg N): 19, 38 (ley): 56, 112 (barley): 75, 150 (wheat): 125, 250 (potatoes - 75, 150 until 1975): 125, 250 (kale and permanent grass) as 'Nitro-Chalk'

P: 63 kg P_2O_5 as superphosphate

K: 250 kg K_2O as muriate of potash

D: 38 tonnes FYM (permanent grass): 50 tonnes (kale and potatoes): none to other crops.

NOTE: Since 1977 all wheat on these plots receives a standard dressing of 82 kg MgO as Epsom salts. Before 1976 potatoes tested 0 v 82 kg MgO on sub plots, dressing balanced-up after harvest before wheat.

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Additional plots

MANURE

0	None
F	N PK
FMGCA	N PK Mg Ca
FMGS	N PK Mg S
FCAS	N PK Ca S
FMGCAS	N PK Mg Ca S
FMGCASTE	N PK Mg Ca S TE

F: N PK
N: N2 applied as urea.
P: 126 kg P205 as potassium dihydrogen phosphate
K: 251 kg K20 total. As potassium dihydrogen phosphate (83 kg K20) on all NPK 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 F plots received in addition 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
S: 30 kg S supplied by potassium sulphate
TE: Trace element mixture including Mn, Cu, Zn, B, Mo, Ca, Fe. Test varies with crop.

Standard applications:
Barley: Weedkillers: Ioxynil at 0.42 kg and mecoprop at 1.3 kg in 280 l. Fungicide: Tridemorph at 0.53 kg with benodanil at 1.1 kg in 280 l. Insecticide: Pirimicarb at 0.14 kg in 280 l.
Potatoes: Fungicide: Mancozeb at 1.3 kg in 280 l applied three times to additional plots and four times to original plots. Insecticides: Pirimicarb at 0.14 kg in 280 l applied twice with the first and second fungicide applications. Menazon at 0.28 kg in 280 l alone to additional plots, with mancozeb to original plots.
Wheat: Ioxynil at 0.32 kg and mecoprop at 0.95 kg in 280 l. Fungicides: Tridemorph at 0.53 kg with benodanil at 1.1 kg in 280 l. Insecticide: Pirimicarb at 0.14 kg in 280 l.
Kale: Pirimicarb at 0.07 kg in 280 l.

Seed: Barley: Minak, sown at 200 kg.
Grass-clover ley: Italian ryegrass RvP, and red clover Hungaropoly.
Potatoes: Pentland Crown.
Winter wheat: Maris Hobbit, sown at 210 kg.
Kale: Thousand Head.

Cultivations, etc.:-
Barley: Dug by hand: 20 Nov, 1978. P, K, Mg, Ca and S applied: 26 Feb, 1979. N applied, rotary cultivated, raked by hand, seed sown: 19 Apr. Weedkillers applied: 25 May. Trace elements applied: 5 June. Fungicides applied: 25 June. Insecticide applied: 16 July. Harvested by hand: 28 Aug.
Grass-clover ley: Rotary cultivated, raked by hand, seed sown: 1 Sept, 1978. P, K, Mg and S applied: 20 Nov. N applied: 23 Mar, 1979. Cut: 31 May, 19 July, 21 Sept.
Potatoes: Dug by hand: 6 Dec, 1978. P, K, Mg, Ca and S applied: 26 Feb, 1979. N applied (first half on additional plots), rotary cultivated, raked by hand, potatoes planted: 8 May. Second half N applied to additional plots: 5 June.

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Trace elements applied: 11 June. Fungicide with pirimicarb applied: 27 June and 16 July. Fungicide with menazon applied to original plots, additional plots not given manures lifted: 2 Aug. Menazon applied to remaining additional plots, original plots given neither K nor FYM, lifted: 3 Aug. Mancozeb applied to remaining plots: 20 Aug. Remaining plots lifted: 24 Sept.

Wheat: P, K and Mg applied: 21 Sept, 1978. Dug by hand: 22 Sept. Raked by hand, seed sown: 29 Sept. Weedkillers applied: 20 Nov. N applied (first half on additional plots): 23 Mar, 1979. Second half N applied to additional plots: 19 Apr. Fungicides applied: 8 May. Insecticide applied: 16 July. Harvested by hand: 14 Aug.

Kale: FYM applied to original plots, all plots dug: 24 Oct, 1978. P, K, Ca, Mg and S applied: 26 Feb, 1979. N applied (first half on additional plots), rotary cultivated, raked by hand, seed sown: 8 May. Second half N applied to additional plots: 5 June. Trace elements applied to additional plots: 11 June. Insecticide applied: 16 July. Harvested by hand: 11 Oct.

Permanent grass: P and K applied: 20 Nov, 1978. FYM applied: 26 Feb, 1979. N applied: 23 Mar, 31 May, 19 July. Cut: 31 May, 19 July, 20 Sept.

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GREAT FIELD IV (R):ORIGINAL PLOTS

TONNES/HECTARE

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

	WINTER WHEAT: GRAIN	WINTER WHEAT: STRAW	KALE: FRESH WEIGHT	BARLEY: GRAIN	BARLEY: STRAW	LEY : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE									
0	4.68	4.59	10.5	2.83	2.23	1.64	2.01	1.87	5.52
N1	5.56	5.75	11.3	4.17	3.75	2.22	1.86	1.58	5.67
P	4.70	4.66	15.3	3.37	2.73	1.67	1.95	1.58	5.20
N1P	2.19	4.05	20.9	4.89	4.68	2.45	1.38	1.05	4.89
K	4.37	4.42	7.0	3.14	2.70	2.10	3.14	2.15	7.38
N1K	7.31	6.68	13.9	5.29	4.94	2.73	3.13	2.02	7.89
PK	4.72	5.04	14.8	3.61	3.18	4.00	4.92	4.22	13.15
N1PK	8.44	8.44	30.5	5.72	5.45	4.41	4.68	4.46	13.55
N2PK	9.59	8.95	53.6	6.18	6.74	4.94	4.41	3.76	13.11
D	6.03	5.92	25.7	4.62	3.74	3.74	4.62	4.19	12.54
N1PKD	9.85	9.93	44.0	6.66	6.57	4.91	5.40	5.07	15.38
N2PKD	9.68	10.39	63.6	6.53	7.47	5.13	5.19	4.64	14.96
MEAN DM%	79.4	68.2		83.7	71.8	16.5	25.0	21.6	21.0

	POTATOES: TOTAL TUBERS	PERMANENT GRASS : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE					
0	7.8	0.60	0.82	0.68	2.10
N1	13.1	1.77	1.14	1.75	4.66
P	20.0	0.70	0.59	0.63	1.92
N1P	12.5	1.96	1.30	1.86	5.12
K	23.1	0.90	1.01	0.93	2.83
N1K	41.3	2.57	2.08	2.01	6.66
PK	32.7	1.11	1.57	1.26	3.94
N1PK	53.8	2.36	1.91	1.85	6.12
N2PK	60.4	4.39	2.55	2.88	9.82
D	43.4	3.36	1.85	1.45	6.65
N1PKD	61.7	5.06	2.43	2.25	9.74
N2PKD	67.5	2.70	3.97	3.61	10.28
MEAN DM%		21.4	31.7	28.0	27.0

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GREAT FIELD IV (R): ADDITIONAL PLOTS

TONNES/HECTARE

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

	WINTER WHEAT: GRAIN	WINTER WHEAT: STRAW	KALE: FRESH WEIGHT	BARLEY: GRAIN	BARLEY: STRAW	POTATOES TOTAL TUBERS
MANURE						
0	4.38	4.61	13.5	1.83	1.70	11.3
F	9.71	9.95	56.7	6.36	7.13	58.6
FMGCA	9.68	10.33	48.0	6.25	6.57	58.0
FMGS	8.55	8.94	53.2	6.97	7.02	59.8
FCAS	9.93	9.71	54.5	5.81	5.40	58.2
FMGCAS	9.31	9.76	53.6	6.49	6.94	58.6
FMGCASTE	8.59	9.73	48.4	6.03	6.36	59.2
MEAN DM%	80.7	73.2		84.4	79.5	

	LEY : DRY MATTER 1ST CUT	2ND CUT	3RD CUT	TOTAL OF 3 CUTS
MANURE				
0	2.43	2.55	1.91	6.88
F	3.67	3.34	2.77	9.78
FMGCA	5.05	4.49	4.26	13.80
FMGS	4.56	3.64	3.64	11.83
FCAS	5.06	4.56	4.51	14.13
FMGCAS	5.63	5.10	4.54	15.26
FMGCASTE	4.77	4.82	4.27	13.87
MEAN DM%	17.3	23.8	20.7	20.6

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