ROTHAMSTED RESEARCH

Yields of the Field Experiments 1974

Full Table of Content

74/W/RN/3 Ley/ARABLE - Leys, Barley, Potatoes, Wheat

74/W/RN/3 Ley/ARABLE - Leys, Barley, Potatoes, Wheat, Rothamsted Research (1975) Yields Of The Field Experiments 1974, pp 73 - 82 **- DOI: https://doi.org/10.23637/ERADOC-1-119**

74/W/RN/3

LEY/ARABLE

Object: To compare the effects on soil fertility of rotations with or without three-year leys. The effects of the cropping systems on soil-borne pathogens are also studied - Woburn Stackyard D.

Sponsors: D.A. Boyd, J.M. Hirst, A.E. Johnston, F.G.W. Jones.

The 37th year, leys, barley, potatoes, wheat.

For previous years see 'Details' 1967, 68/B/2(t), 69/W/RN/3(t), 70/W/RN/3(t), 71/W/RN/3(t), 72/W/RN/3(t) and 73/W/RN/3.

Design: 5 series of 8 plots, split for treatments other than rotations.

Whole plot dimensions: 8.53 x 40.7. Areas harvested: Barley, 2nd treatment crop: 0.00260, Potatoes, 1st treatment crop (LEY and SAINFOIN) - 0.00280, 1st treatment crop (ARABLE and ARABLE H) - 0.00130. Wheat - 0.00260.

Treatments: All phases of four five-course rotations are present:

		ROTATION
Grass/clover ley:	L, L, L, P, W	Ley
All legume ley:	SA, SA, SA, P, W until 1971 then CL, CL, CL, P, W	Sainfoin Clover
Arable with roots:	P, R, C, P, W until 1971 then P, B, B, P, W	Arable
Arable with hay:	P, R, H, P, W until 1971 then P, B, H, P, W	Arable H

P = potatoes, R = rye, C = carrots, W = wheat, B = barley, H = hay, L = grass/clover ley, SA = sainfoin ley, CL = red clover ley

Additional treatments to first test crop, potatoes:-

1/2 plots:	1. Farmyard manure residues, last applied 1964:-	FYMRES64
	None	None
	38 tonnes on each occasion	FYM
1/4 plots:	2. Fumigant applied in 1974:-	FUM74
	None	None
	Dichloropropene, 220 kg, plus aldicarb, 6.7 kg	Dichl/al

https://doi.org/10.23637/ERADOC-1-119

Additional treatments to second test crop, winter wheat:-

1/2 plots	1. Farmyard manure residues, last applied 1963:-	FYMRES63
	None	None
	38 tonnes on each occasion	FYM
1/4 plots (A,AH only)	2. Fumigant residues, applied 1970:-	FUMRES70
	None	None
	Chloropicrin, 448 kg	Chlorop
1/4 plots (L,S) 1/8 plots (A,AH)	3. Fumigant residues, applied 1973:-	FUMRES73
	None	None
	Chloropicrin, 448 kg, plus aldicarb, 6.7 kg	Chlcr/al
1/8 plots	4. Nitrogen fertiliser (kg N) in 1974:-	N74
	None	0
	63	63
	126	126
	189	189

Additional treatments to first treatment crop, potatoes:-

1/2 plots	1. Farmyard manure residues, last applied 1967:-	FYMRES67
	None	None
	38 tonnes on each occasion	FYM
1/8 plots (A,AH only)	2. Fumigant residues, applied 1972:-	FUMRES72
	None	None
	Chloropicrin, 448 kg, plus aldicarb, 11 kg	Chlor/al
1/4 plots	3. Fumigant applied in 1974:-	FUM74
	None	None
	Dichloropropene, 220 kg, plus aldicarb, 6.7 kg	Dichl/al

https://doi.org/10.23637/ERADOC-1-119

74/W/RN/3

Additional treatments to second treatment crop, barley:-

1/2 plots	1. Farmyard manure residues, last applied 1966:-	FYMRES66
	none	None
	38 tonnes on each occasion	FYM
1/8 plots	2. Fumigant residues, applied 1971:-	FUMRES71
	None	None
	Chloropicrin, 448 kg, plus aldicarb, 11.2 kg	Chlor/al
1/4 plots	3. Fumigant residues, applied 1973:-	FUMRES73
	None	None
	Chloropicrin, 448 kg, plus aldicarb, 6.7 kg	Chlor/al

Additional treatments to third treatment crop, barley:-

1/2 plots	1. Farmyard manure residues, last applied 1965:-	FYMRES65
	None	None
	38 tonnes on each occasion	FYM
1/4 plots	2. Fumigant residues, applied 1972:-	FUMRES72
	None	None
	Chloropicrin, 448 kg, plus aldicarb, 5.6 kg	Chlor/al

Corrective K dressings (in kg K_2O) as muriate of potash applied to first test crop, potatoes:-

	No FYM half plots	FYM half plots
Continuous rotations		
Ley	201	276
Clover	88	38
Arable with hay	38	100
Arable	151	0
Alternating rotations (last two rotations in order)		
Ley/arable with hay	213	50
Sainfoin/arable	251	251
Arable/clover	176	188
Arable with hay/ley	238	389

NOTE: For a fuller record of previous treatments see 'Details' 1967 etc.

https://doi.org/10.23637/ERADOC-1-119

Standard applications:-

Winter wheat: Manures: Magnesian limestone at 5 tonnes. (0:20:20) at 290 kg, combine drilled. Weedkiller: Mecoprop at 0.84 kg in 280 l. Ioxynil at 0.52 kg plus mecoprop at 1.6 kg in 280 l.

Barley: Manures: 2nd and 3rd treatment crops: (15:15:15) at 390 kg combine drilled. Weedkillers: 2nd treatment crop: Benazolin with 2,4-DB and MCPA ('Legumex Extra' at 7.0 l in 280 l). 3rd treatment: Ioxynil at 0.52 kg plus mecoprop at 1.6 kg in 280 l.

Potatoes: Treatment and test crops: Manures: (13:13:20) at 1940 kg. Weedkillers: Linuron at 1.2 kg plus paraquat at 0.28 kg ion in 280 l. Fungicide and insecticide: Mancozeb at 1.3 kg plus demeton-s-methyl at 0.25 kg in 450 l. Fungicide: Mancozeb at 1.3 kg in 450 l.

Hay: Manures: N at 130 kg, as 'Nitro-Chalk', plus (0:14:28) at 540 kg in spring. (25:0:16) at 270 kg after the first cut.

Ley, 1st year: Manures: N at 50 kg, as 'Nitro-Chalk', P_2O_5 at 190 kg as superphosphate, K_2O at 130 kg as muriate of potash in the seedbed. (25:0:16) at 360 kg in late summer. Weedkillers: Benazolin with 2,4-DB and MCPA ('Legumex Extra' at 7.0 l in 280 l).

Ley, 2nd and 3rd years: Manures: (25:0:16) at 360 kg for each cut.

Clover, 1st year: Manures: N at 60 kg as 'Nitro-Chalk', P_2O_5 at 190 kg as superphosphate, K_2O at 130 kg as muriate of potash. Weedkillers: Benazolin with 2,4-DB and MCPA ('Legumex Extra' at 7.0 l in 280 l).

Clover, 2nd and 3rd years: N at 60 kg as 'Nitro-Chalk', K_2O at 190 kg as muriate of potash. Weedkillers 3rd year only: Benazolin with 2,4-DB and MCPA ('Legumex Extra' at 7.0 l in 280 l).

Varieties: Winter wheat: Cappelle, dressed with dieldrin, sown at 190 kg.
Barley: Julia, dressed with ethirimol, sown at 160 kg.
Potatoes: First test and treatment crops: Maris Piper.
Red clover: 1st year: S123, sown at 45 kg.
Red clover: 3rd year resown: English Broad Red, sown at 45 kg.
Ley: 1st year: Perennial ryegrass S23, Cocksfoot S143, late flowering red clover, Alsike clover, sown at 30 kg.

Cultivations, etc.:- Treatment crops:

Ley, 1st year: Subsoiled: Tines 140 cm apart and 50 cm deep: 19 Oct, 1973. Ploughed: 12 Nov. Disced: 14 Nov. Power harrowed: 3 Apr, 1974. Power harrowed, rolled, N, P and K applied, seeds sown: 5 Apr. Rolled: 8 Apr. Weedkiller applied: 26 May. Cut twice: 8 Aug, 16 Sept. NK applied: 19 Aug.

Ley, 2nd and 3rd years: NK applied: 6 Mar, 1974, 24 June. Cut twice: 14 June, 16 Sept.

Clover, 1st year: Subsoiled: Tines 140 cm apart and 50 cm deep: 19 Oct, 1973. Ploughed: 12 Nov. Disced: 14 Nov. Power harrowed: 3 Apr, 1974. Power harrowed, rolled, N and K applied, seeds sown: 5 Apr. Rolled: 8 Apr. P applied: 16 Apr. Weedkiller applied: 26 May. Cut twice: 8 Aug, 16 Sept.

https://doi.org/10.23637/ERADOC-1-119

Clover, 2nd year: N and K applied: 6 Mar, 1974. Cut twice: 25 July, 16 Sept.

Clover, 3rd year: N and K applied: 6 Mar, 1974. Ploughed, because of weeds: 4 Apr. Rolled, power harrowed, rolled, seed sown: 5 Apr. Weedkiller applied: 26 May. Cut once: 16 Sept.

Potatoes, 1st treatment crop: Subsoiled: Tines 140 cm apart and 50 cm deep: 19 Oct, 1973. Ploughed: 12 Nov. Disced: 14 Nov. Dichloropropene applied, spring-tine harrowed: 22 Nov. Power harrowed: 3 Apr, 1974. NPK applied: 8 Apr. Aldicarb applied, rotary cultivated: 9 Apr. Potatoes planted: 10 Apr. Weedkiller applied: 15 May. Rotary ridged: 11 June. Fungicide with insecticide applied: 18 July. Fungicide applied: 7 Aug. Haulm mechanically destroyed: 16 Sept. Sprayed with undiluted BOV at 170 l: 18 Sept. Lifted: 14 Oct.

Barley, 2nd treatment crop: Deep-tine cultivated: 18 Dec, 1973. Spring-tine cultivated: 27 Mar, 1974. Spring-tine cultivated with crumbler: 28 Mar. Seed sown: 29 Mar. Rolled: 2 Apr. Seeds hay undersown (Arable H plots), harrowed and rolled: 30 Apr. Weedkiller applied: 26 May. Combine harvested: 22 Aug.

Barley, 3rd treatment crop: Ploughed: 13 Nov, 1973. Spring-tine cultivated twice, with crumbler the second time: 28 Mar, 1974. Seed sown: 29 Mar. Rolled: 2 Apr. Weedkiller applied: 20 May. Combine harvested: 22 Aug.

Seeds Hay: Seeds undersown in barley: 15 Mar, 1973. N, P and K applied: 6 Mar, 1974. Cut twice: 14 June, 16 Sept. NK applied: 24 June.

Test crops:

Potatoes, 1st test crop: First half corrective K applied, ploughed: 12 Nov, 1973. Disced: 14 Nov. Rotary cultivated, dichloropropene applied, spring-tine harrowed: 23 Nov. Second half corrective K applied: 18 Feb, 1974. Power harrowed: 3 Apr. NPK applied: 8 Apr. Aldicarb applied, all plots rotary cultivated: 9 Apr. Potatoes planted: 10 Apr. Weedkiller applied: 16 May. Rotary ridged: 12 June. Fungicide and insecticide applied: 18 July. Fungicide applied: 7 Aug. Haulm mechanically destroyed: 16 Sept. Sprayed with undiluted BOV at 170 l: 18 Sept. Lifted: 14 Oct.

Wheat, 2nd test crop: Magnesian limestone applied, rotary cultivated twice: 11 Oct, 1973. Spring-tine cultivated: 13 Oct. Seed sown: 15 Oct. Mecoprop applied: 5 Apr, 1974. N applied: 11 Apr. Ioxynil and mecoprop applied: 14 May. Combine harvested: 29 Aug.

NOTE: Soil samples were taken from the potatoes throughout the growing season for counts of nematodes.

https://doi.org/10.23637/ERADOC-1-119

74/W/RN/3

TABLES OF MEANS

POTATOES 1ST TEST CROP

ROTATION

	Ley	Clover	Arable	Arable H	Mean
	TOTAL TUBERS: TONNES/HECTARE				
FYMRES64					
None	63.9	61.9	47.3	52.1	56.3
FYM	68.0	71.6	57.8	61.1	64.6
FUM74					
None	62.3	61.5	47.7	48.4	55.0
Dichl/al	69.6	71.9	57.4	64.9	65.9
Mean	65.9	66.7	52.5	56.6	60.5
	PERCENTAGE WARE: 3.81 CM (1.5 INCH) RIDDLE				
FYMRES64					
None	97.8	97.1	96.1	96.3	96.8
FYM	97.5	98.0	97.6	96.4	97.4
FUM74					
None	97.2	97.1	96.0	95.5	96.5
Dichl/al	98.1	98.0	97.7	97.2	97.8
Mean	97.6	97.6	96.8	96.4	97.1

https://doi.org/10.23637/ERADOC-1-119

74/W/RN/3

WHEAT 2ND TEST CROP

GRAIN: TONNES/HECTARE

	ROTATION			ROTATION		
	Ley	Sainfoin	Mean	Arable	Arable H	Mean
N74						
0	4.92	4.46	4.69	2.98	3.84	3.41
63	6.18	5.91	6.04	4.70	5.75	5.23
126	6.10	6.69	6.40	6.01	6.58	6.29
189	5.74	6.52	6.13	5.45	5.83	5.64
FYMRES63						
None	5.80	6.03	5.92	4.78	5.44	5.11
FYM	5.67	5.76	5.71	4.79	5.56	5.18
FUMRES73						
None	5.66	5.82	5.74	4.76	5.31	5.03
Chlor/al	5.81	5.96	5.89	4.81	5.70	5.25
FUMRES70						
None				4.72	5.38	5.05
Chlorop				4.85	5.63	5.24
Mean	5.73	5.89	5.81	4.79	5.50	5.14

Mean D.M. % 83.2

https://doi.org/10.23637/ERADOC-1-119

74/W/RN/3

WHEAT 2ND TEST CROP

STRAW: TONNES/HECTARE

	ROTATION			ROTATION		
	Ley	Sainfoin	Mean	Arable	Arable H	Mean
N74						
0	2.96	2.75	2.85	2.26	2.79	2.53
63	4.48	4.01	4.24	4.05	4.41	4.23
126	4.96	5.32	5.14	5.01	4.88	4.94
189	5.02	5.87	5.44	4.61	4.66	4.64
FYMRES63						
None	4.38	4.27	4.33	4.05	4.13	4.09
FYM	4.33	4.70	4.51	3.91	4.24	4.08
FUMRES73						
None	4.29	4.14	4.21	3.54	4.03	3.79
Chlor/al	4.42	4.83	4.63	4.42	4.35	4.38
FUMRES70						
None				3.64	3.95	3.80
Chlorop				4.32	4.42	4.37
Mean	4.35	4.49	4.42	3.98	4.19	4.08

Mean D.M. % 82.4

https://doi.org/10.23637/ERADOC-1-119

74/W/RN/3

POTATOES 1ST TREATMENT CROP

	ROTATION Ley	Sainfoin	Mean	ROTATION Arable	Arable H	Mean
	TOTAL TUBERS: TONNES/HECTARE					
FYMRES67						
None	59.0	62.6	60.8	58.7	62.1	60.4
FYM	66.7	58.6	62.7	61.9	58.9	60.4
FUM74						
None	61.3	59.4	60.4	59.2	54.3	56.8
Dichl/al	64.4	61.8	63.1	61.3	66.7	64.0
FUMRES72						
None				58.5	60.6	59.5
Chlor/al				62.1	60.4	61.2
Mean	62.8	60.6	61.7	60.3	60.5	60.4
	PERCENTAGE WARE: 3.81 CM (1.5 INCH) RIDDLE					
FYMRES67						
None	97.6	97.9	97.7	97.3	97.7	97.5
FYM	97.7	96.4	97.0	98.0	97.7	97.8
FUM74						
None	98.1	97.1	97.6	97.7	98.0	97.8
Dichl/al	97.2	97.1	97.2	97.6	97.4	97.5
FUMRES72						
None				98.1	97.3	97.7
Chlor/al				97.1	98.1	97.6
Mean	97.7	97.1	97.4	97.6	97.7	97.7

https://doi.org/10.23637/ERADOC-1-119

74/W/RN/3

BARLEY 2ND TREATMENT CROP

	ROTATION				
	Ley	Sainfoin	Arable	Arable H	Mean
	GRAIN: TONNES/HECTARE				
FYMRES66					
None	5.61	5.41	4.86	4.90	5.20
FYM	5.59	5.30	5.55	5.31	5.44
FUMRES71					
None	5.34	5.43	5.28	5.16	5.30
Chlor/al	5.86	5.27	5.14	5.05	5.33
FUMRES73					
None	5.64	5.28	5.06	4.81	5.20
Chlor/al	5.56	5.43	5.35	5.40	5.44
Mean	5.60	5.35	5.21	5.11	5.32
	STRAW: TONNES/HECTARE				
FYMRES66					
None	3.83	3.55	3.22	2.89	3.37
FYM	4.10	3.82	3.60	3.42	3.74
FUMRES71					
None	3.66	3.83	3.35	3.22	3.51
Chlor/al	4.27	3.55	3.47	3.08	3.59
FUMRES73					
None	3.97	3.63	3.38	2.97	3.49
Chlor/al	3.96	3.74	3.45	3.33	3.62
Mean	3.97	3.69	3.41	3.15	3.55

Mean D.M. % Grain: 85.0
Straw: 85.2

https://doi.org/10.23637/ERADOC-1-119