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ROTHAMSTED
RESEARCH

Collection of Plans for the Rothamsted Long-term Liming Experiment

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Default Title

Rothamsted Research

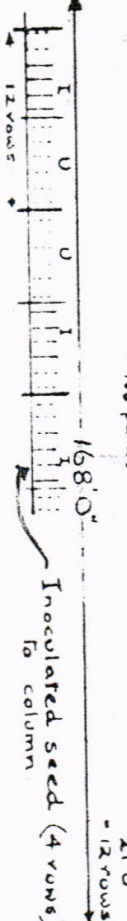
Rothamsted Research (1962-1996) *Default Title* ; Collection Of Plans For The Rothamsted Long-Term Liming Experiment, pp 1 - 29

Rothamsted Long Term Liming

Spring Beans
Sawyers I 1962
1st year.

CWC

LIME	a1	b	a2	b	a3	b	a4	b	a5	b	a6	b	a7	b	a8	b
P	-	-	K	-	63	-	P	21	-	P/K	-	42	21	-	63	-
PH	5.0	5.2	5.1	4.9	5.1	4.8	4.8	5.3	5.3	5.5	5.1	5.4	5.1	5.1	5.4	5.4
	42	-	-	21	2	21	42	63	63	42	63	63	63	42	42	42
	-K	-	-	-	P/K	-	K	K	P/K	K	P/K	P/K	P/K	P	P	P
	5.1	5.0	5.0	5.0	5.1	5.0	5.0	4.9	5.1	5.1	4.9	5.1	5.1	5.4	5.4	5.4
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
	42	42	42	-	42	21	-	21	25	26	27	28	29	30	31	32
	K	P/K	-	P	P	K	P/K	P	P/K	U:I	K	P/K	K	U:I	P	U:I
	5.2	5.2	5.3	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.3	5.3	5.3	5.3	5.3	5.3
	PK	U:I	K	U:I	U:I	U:I	U:I	U:I	U:I	U:I	U:I	U:I	U:I	U:I	U:I	U:I
	1:0	5:2	5:2	5:2	5:2	5:2	5:2	5:2	5:2	5:2	5:2	5:2	5:2	5:2	5:2	5:2



TREATMENTS per acre

0 1 2 3
- 2, 4, 6 None, 2, 4, 6 tons CaCO₃ as ground chalk.

- P None, 0.5 cwt P₂O₅ as superphosphate.

- K None, 1.0 cwt K₂O as muriate of potash.

U, I Uninoculated, Inoculated seed

Basal manuring: None

Variety: Spring Tick Sown: Mar 16

Design: 2 blocks of 16 plots each. (Analysis to include co-variance with PH)

Plot area: $\frac{1}{2}(21'0'' \times 60'0'') = 0.0289 \text{ acre}$
0.01446

Harvested: 4 rows at 21" x 60'0"
= 0.0096 acre

ii Simazine weedkiller to be applied.

2 blocks L. 2 v 2 split 2.

Rothamsted Long Term Liming

Spring Beans

Sawyers I 2nd year

1963. 18

LL/Be.	1	2	3	4	5	6	7	8
V	V	H	L	V	M	L	L	H
P	K	4	2	P	3	2	2	4
5.0	5.1	7.2	6.1	4.8	6.8	6.3	7.4	
9	10	11	12	13	14	15	16	
M	V	L	L	M	H	H	M	
3	1	2	2	3	4	4	3	
K	-	PK	K	PK	K	PK	P	
6.8	5.0	6.2	6.0	7.0	7.1	7.3	7.0	
17	18	19	20	21	22	23	24	
M	M	M	V	M	L	V	L	
3	3	3	1	3	2	1	2	
K	PK	-	P	P	K	PK	P	
7.0	7.2	7.1	5.0	7.0	6.0	5.1	6.4	
25	26	27	28	29	30	31	32	
L	V	H	H	V	L	H	H	
2	1	4	4	1	2	4	4	
PK	-	K	PK	K	-	P	-	
6.3	5.2	7.3	7.1	5.0	6.0	7.1	7.2	

TREATMENTS per acre
 1 V, L, M, H
 2 None, 2, 4, 8 tons CaCO₃
 3 as ground chalk.
 4 Lime applied at -, 2, 4, 6 tons per acre in 1962. an extra 2 tons p.a. to 'H' in 1963)
 PH of soils after 1962 harvest

P 0.5 cut P₂O₅ as superphosphate
 K 1.0 cut K₂O as muriate of potash.

Basal manuring: None. On Apr. 18.
 Crop sprayed with simagine, 1lb ai in 40gal.

Variety: Gartons 308 at 200lb per acre
 Sown: April 8.

Design: 2 blocks of 16 plots each.
 (Analysis to include co-variance with PH.)

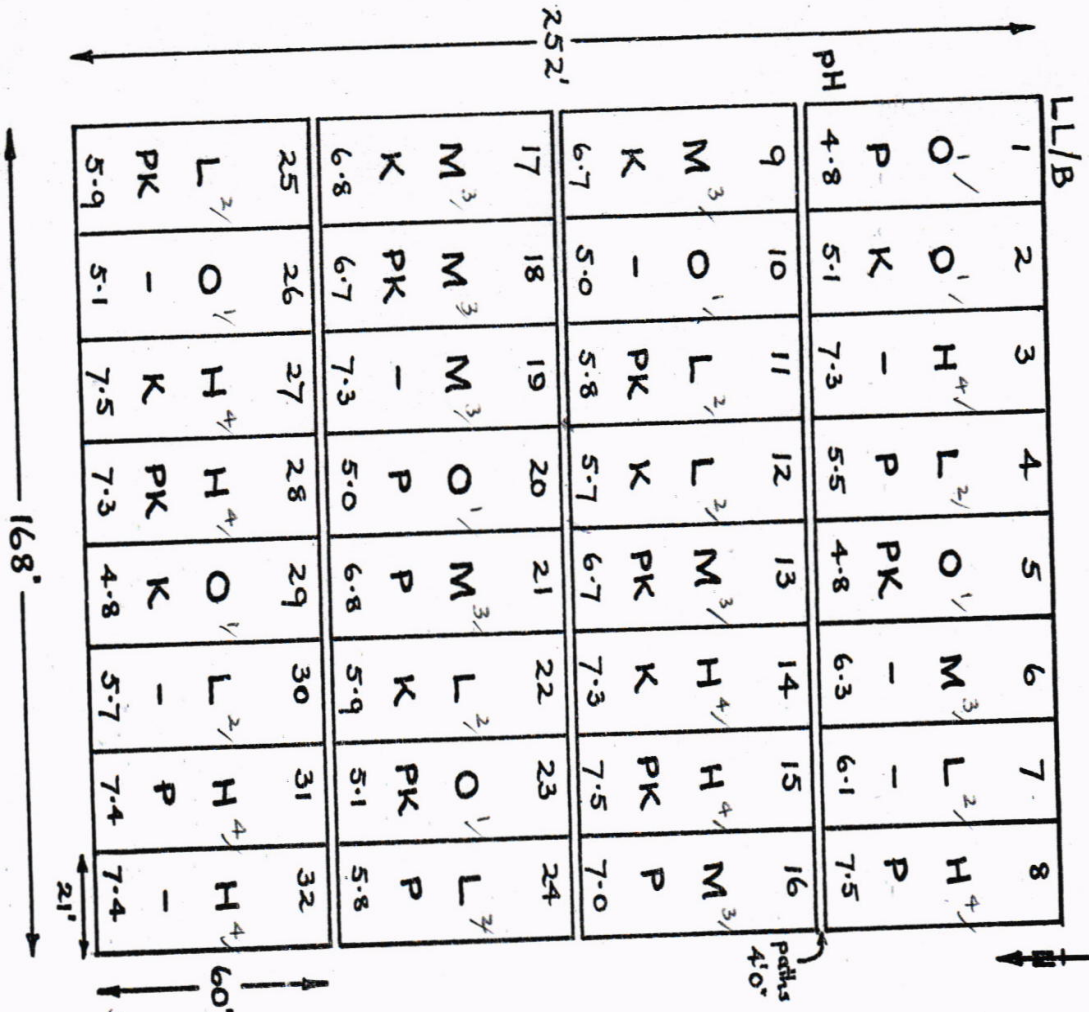
Symbols: V. Very low PH. L. Low
 M. Medium H. High PH.

Plot area: 21'0" x 60'0" = 0.0289 acre
 Harvested: 5 rows @ 21" x 60'0" = 0.0121 acre.

Dimensions: 168'0" (width), 21'0" (row length), 252'0" (block length), 60'0" (plot length).
 Cross paths 4'0"

Rothamsted Long Term Liming Barley

SAWYERS 4th year 1965
Sponsor: J. Bolton.



TREATMENTS per acre

O, L, M, H None, 2, 4, 8 tons CaCO₃ applied
as ground chalk (1962-63)
PH pH of samples taken 14.12.64

In Seedbed - Broadcast.

P 0.5 cut P₂O₅, superphosphate
K 1.0 cut K₂O as muriate of potash

Basal manuring per acre

0.5 cut N as 'Nitro-Chalk' 21 combine drilled.

Variety: Maris Badger Sown: March 17

Design: 2 blocks of 16 plots

Plot area: 21'0" x 60'0" = 0.0289 acre

Sown

Ratharnsted Long Term Liming Barley

SAWYERS 5th year 1966
Sponsor: J. Bolton.

LL/B	1	2	3	4	5	6	7	8
	4.8	5.1	7.3	5.5	4.8	6.3	6.1	7.5
	P	K	-	P	PK	-	-	P
	O	O	H	L	O	M	L	H
	9	10	11	12	13	14	15	16
	6.7	5.0	5.8	5.7	6.7	7.3	7.5	7.0
	M	O	L	L	M	H	H	M
	K	-	PK	K	PK	K	PK	P
	17	18	19	20	21	22	23	24
	6.8	6.7	7.3	5.0	6.8	5.9	5.1	5.8
	M	M	M	O	M	L	O	L
	K	PK	-	P	P	K	PK	P
	25	26	27	28	29	30	31	32
	5.9	5.1	7.5	7.3	4.8	5.7	7.4	7.4
	L	O	H	H	O	L	H	H
	PK	-	K	PK	K	-	P	-

Dimensions: 252' (top), 168' (left), 21' (bottom), 60' (right). Paths 4'0" are indicated between the 168' and 252' lines.

TREATMENTS per acre

O, L, M, H None, 2, 4, 8 tons CaCO₃ applied as ground chalk (1962-63)
PH PH of samples taken 14.12.64

In Seedbed - Broadcast.

P 0.5 cwt P₂O₅, superphosphate
K 1.0 cwt K₂O as muriate of potash

Basal manuring per acre

0.5 cwt N as 'Nitro-chalk' 21 combine drilled.

Variety: Maris Badger Sown: March 14 at 156 lb per acre

Design: 2 blocks of 16 plots

Plot area: 21'0" x 60'0" = 0.0289 acre

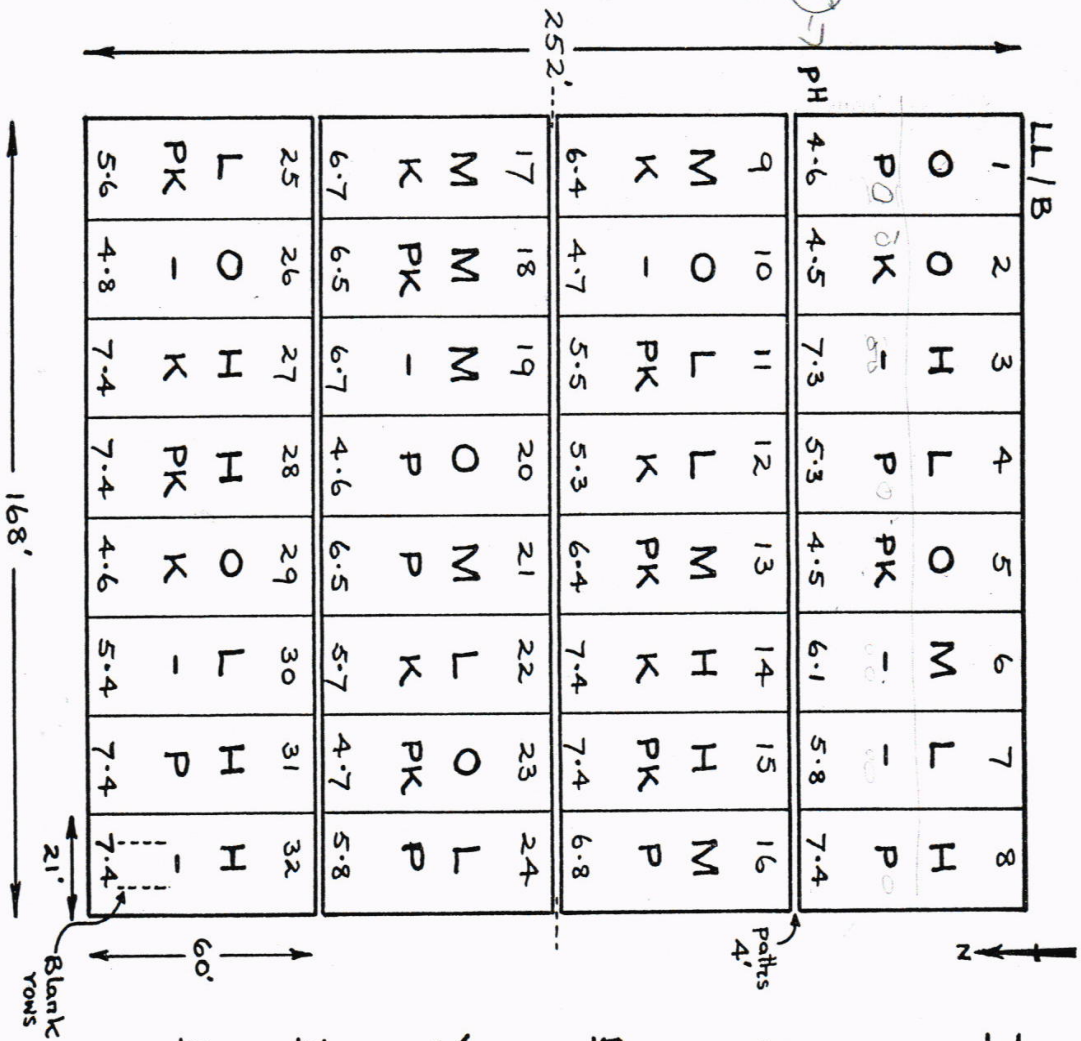
C/3

Rothamsted LONG TERM LIMING

BARLEY

SAWIERS 6th year 1967
Sponsor: J. BOLTON

23



TREATMENTS per acre

O, L, M, H None, 2, 4, 8 tons CaCO₃ applied as ground chalk (1962-63)

pH pH of samples taken 16 Nov 1966

In Seedbed - Broadcast

P 0.5 cwt P₂O₅ as superphosphate
K 1.0 cwt K₂O as muriate of potash

Basal manuring - per acre

0.75 cwt N as 'Nitro-Chalk' 21 combine drilled

Variety: Maris Badger seedrate:

Sown:

Design: 2 blocks of 16 plots

Plot area: 21' x 60' = 0.0289

Harvested:

9' 14" x 60' = 0.0129 acre

1970
(781)

Rothamsted LONG TERM LIMING

Barley 9th year SAWYERS I 1970 24
Sponsors: J. Bolton, D.B. Slope

ZO/R/CS/110

	01	02	03	04	05	06	07	08
	O P 0	O OK	H 0 0	L P 0	O PK	M 0 0	L 0 0	H P 0
	4.8	4.8	7.8	5.3	4.7	6.0	5.8	7.7
	09	10	11	12	13	14	15	16
	M 0 OK	O 0	L PK	L OK	M PK	H OK	H PK	M P 0
	6.5	4.8	5.6	5.4	6.5	7.7	7.8	6.9
	17	18	19	20	21	22	23	24
	M 0 OK	M PK	M 0 0	O P 0	M P 0	L OK	O PK	L P 0
	6.9	6.8	6.6	5.0	6.5	5.7	5.1	5.9
	25	26	27	28	29	30	31	32
	L PK	O 0	H OK	H PK	O OK	L 0 0	H P 0	H 0 0
	5.6	5.0	7.7	7.6	4.8	5.3	7.6	7.8

PH 252'

PH 60'

168'

No paths

Blank rows

paths 4'

21'

7.8'

Basal manuring, per acre
0.75 cut N as 'Nitro-Chalk' 21 combine drilled.

Variety: Julia
sown at 140 lb per acre on 28 March.

Design: 2 blocks of 16 plots

Plot area: 21' x 60' = 0.0289 acre
Harvested: 9'4" x 60' = 0.0129 acre

TREATMENTS, per acre
O, L, M, H None, 2, 4, 8 tons CaCO₃
as ground chalk (1962-63)
PH pH of samples taken Dec. 1968
In seedbed - applied broadcast
P 0.5 cut P₂O₅ as superphosphate
K 1.0 cut K₂O as muriate of potash

Note: In 1969 the land was fallowed and subsoiled (5 Aug)

Rotamsted LONG TERM LIMING

Barley 10th year

SAWYERS I 1971

Sponsors: J Bolton, D.B. Slope

71/R/CS/10

01	02	03	04	05	06	07	08
O	O	H	L	O	M	L	H
PK	PK	o	P ^o	PK	o	o	P ^o
4.5	4.6	7.7	4.8	4.4	5.2	5.2	7.2
PH	PH						
09	10	11	12	13	14	15	16
M	O	L	L	M	H	H	M
OK	o	PK	OK	PK	OK	PK	P ^o
6.2	4.3	5.6	5.0	6.1	7.5	7.3	6.3
PH							
17	18	19	20	21	22	23	24
M	M	M	O	M	L	O	L
OK	PK	-	PK	P ^o	OK	PK	P ^o
6.5	6.1	6.2	4.6	5.8	5.3	4.7	5.5
PH							
25	26	27	28	29	30	31	32
L	O	H	H	O	L	H	H
PK	-	OK	PK	PK	o	P ^o	o
5.4	4.6	7.6	7.3	4.4	5.1	7.2	7.3

252'

168'

No paths

21'

Blank rows

60'

4'

Paths

N

TREATMENTS per acre (hectare)

O,L,M,H None, 2, 4, 8 tons (none, 5, 10, 20 tonnes)
CaCO₃ as ground chalk (1962-63)

PH pH of soil samples taken 28 Sep 1970

In Seedbed - applied broadcast

P 0.5 cwt (63kg) P₂O₅ as superphosphate
K 1.0 cwt (125kg) K₂O as muriate of potash

Basal manuring, per acre (hectare)

0.75 cwt (94kg) N as 'Nitro-chalk' 21 combine drilled.

Variety: Tullia

Sown at 140lb per acre (157 kg/ha) on 10th March

Design: 2 blocks of 16 plots

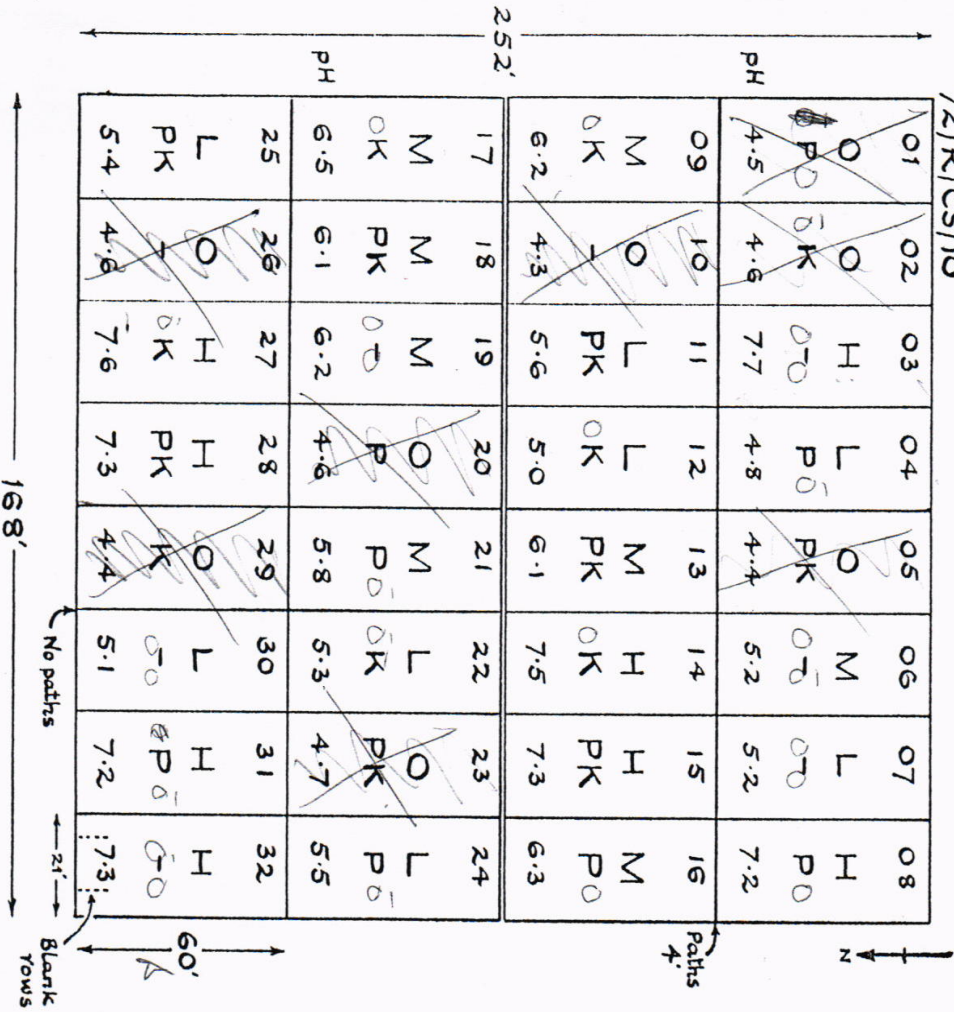
Plot area: 21' x 60' = 0.0289 acre (0.012 ha)

Harvested: 9'4" x 60' = 0.0129 acre (0.0052 ha)

Previous crops: Fallow 1969, Barley 1970

Rothamsted LONG TERM LIMING Barley
11th Year

SAWYERS I 1972 24
Sponsors: J. Bolton, D. B. Slope



TREATMENTS per acre (hectare)

O.L.M.H None, 2, 4, 8 tons (none, 5, 10, 20 tonnes)
CaCO₃ as ground chalk (1962-63)

PH PH of soil samples taken 28 Sep 1970

In Seedbed - applied broadcast

P 0.5 cwt (63 kg) P₂O₅ as superphosphate
K 1.0 cwt (125 kg) K₂O as muriate of potash

Basal manuring, per acre (hectare)

0.75 cwt (94 kg) N as 'Nitro-Chalk' 2:1 combine drilled.

Variety: Tulia seed dressed with 'Millstem'.

Sown at 140lb per acre (157 kg/ha): 20 March

Design: 2 blocks of 16 plots

Plot area: 21' x 60' = 0.0289 acre (0.012 ha)

Harvested: 9'4" x 60' = 0.0129 acre (0.0052 ha)

Previous crops: Fallow 1969, Barley 1970, 1971

Rothamsted LONG TERM LIMING

Barley

SAWYERS 12th Year 1973
Sponsors: J. Bolton, D. B. Slope

73/R/CS/10

01	02	03	04	05	06	07	08
4.5	4.4	7.5	5.1	4.5	5.5	5.4	7.4
09	10	11	12	13	14	15	16
6.0	4.4	5.2	5.0	6.0	7.0	7.0	6.4
17	18	19	20	21	22	23	24
6.3	6.0	6.3	4.4	5.8	5.3	4.6	5.4
25	26	27	28	29	30	31	32
5.2	4.4	7.1	7.0	4.4	4.9	7.0	7.3

TREATMENTS per acre (hectare)

O, L, M, H None, 2, 4, 8 tons (-1, 5, 10, 20 tonnes)
CaCO₃ as ground chalk (1962-63)

PH PH of soil samples taken Nov. 1972

In Seedbed - applied broadcast

P 0.5 cwt (63 kg) P₂O₅ as superphosphate
K 1.0 cwt (125 kg) K₂O as muriate of potash

Basal manuring, per acre (hectare)

0.75 cwt (94 kg) N as 'Nitro-Chalk' 25
combine drilled

Variety: Julia - seed dressed with ethirimol

Sown at 140 lb (157 kg/ha) on 12 Mar. 1973

Design: 2 blocks of 16 plots

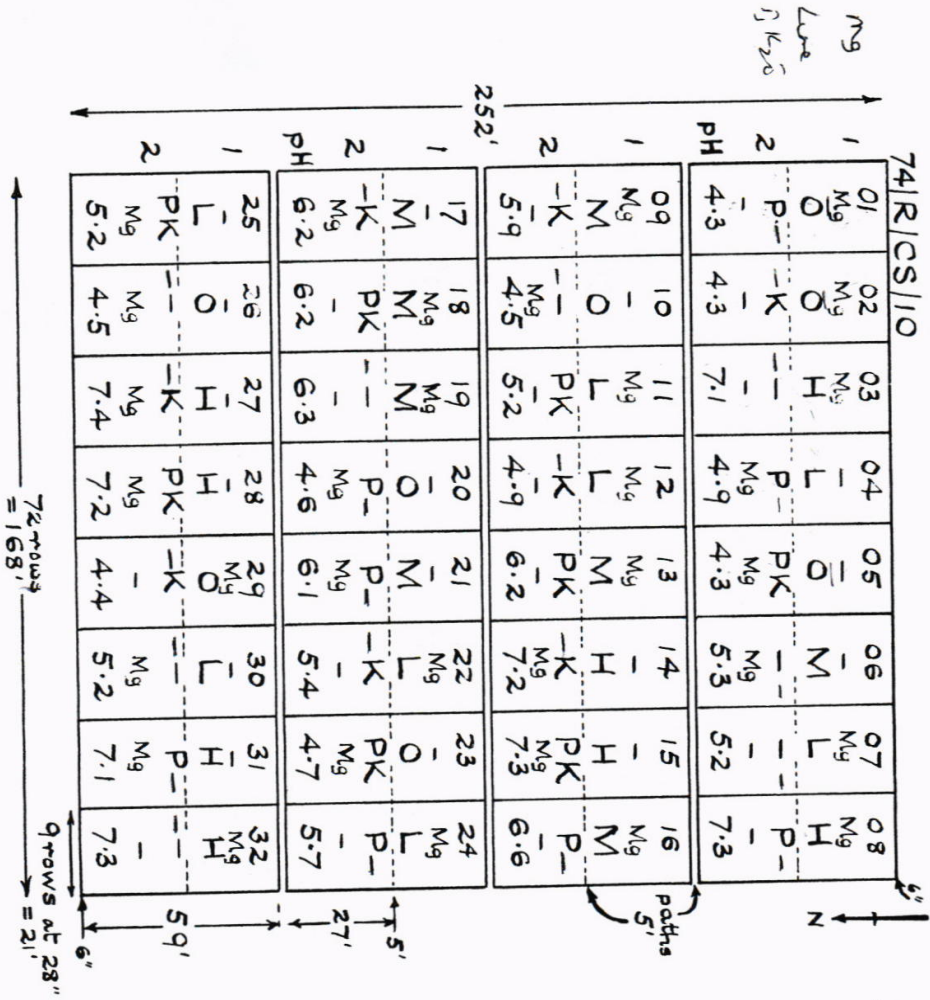
Plotted area: 21' x 60' = 0.0289 acre (0.012 ha)

Harvested: 9'4" x 60' = 0.0129 acre (0.0052 ha)

Previous crops: Fallow 1969, Barley 1970, 1971, 1972

Rothamsted LONG TERM LIMING Potatoes

SAWYERS 13th Year 1974
Sponsor: J. Bolton



TREATMENTS per acre (hectare)

Whole Plots

O, L, M, H None, 2, 4, 8 tons (-, 5, 10, 20 tonnes)
CaCO₃ as ground chalk (1962-63)
PH pH of soil samples taken Oct 1973

P 1.0 cwt (126 kg) P₂O₅ as superphosphate } Applied broadcast in seedbed
K 1.5 cwt (188 kg) K₂O as muriate of potash }

Half Plots

- , Mg None, 100 lb (112 kg) Mg as sulphate of magnesia (10% Mg)

Basal manuring per acre (hectare)
670 lb (750 kg) Nitro-chalk 25 broadcast before planting

Variety: Pentland Crown

Design: 2 blocks of 16 plots split into 2

Plot area: 21' x 59' = 0.0284 acre (0.0115 ha)
harvested: 4 rows x 27' = 9'4" x 27' = 0.0058 acre (0.0023 ha)

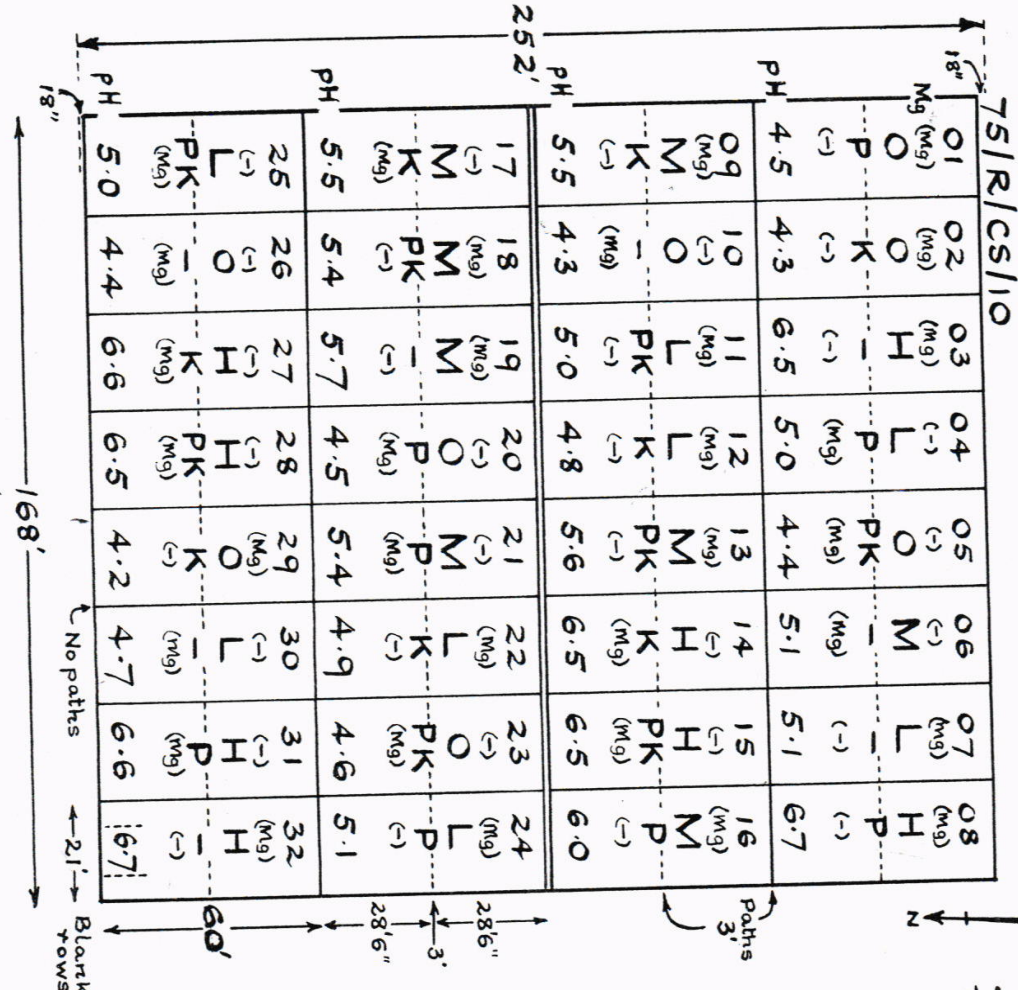
Previous Cropping:

1962-64 spr. beans, 1965-67 barley,
1968 potatoes, 1969 fallow, 1970-73 barley

SA

Rothamsted LONG TERM LIMING

Spring Oats SAWYERS I 14th Year 1975
 Sponsor: J. Bolton



TREATMENTS per acre (hectare)

Whole Plots
 O, L, M, H None, 2, 4, 8 tons (-5, 10, 20 tonnes)
 CaCO₃ as ground chalk (1962-63)

PH pH of soil sample taken Jan 1975
 P 0.5cwt (63 kg) P₂O₅ as superphosphate
 K 1.0cwt (125 kg) K₂O as muriate of potash } broadcast in seedbed

Half Plots, Mg residues.
 - , Mg None, 100lb (112kg) Mg to potatoes 1974

Basal manuring, per acre (hectare)
 280 lb (314kg) Nitro-chalk 25

Variety: Marrod at 180lb/a (202 kg/ha)

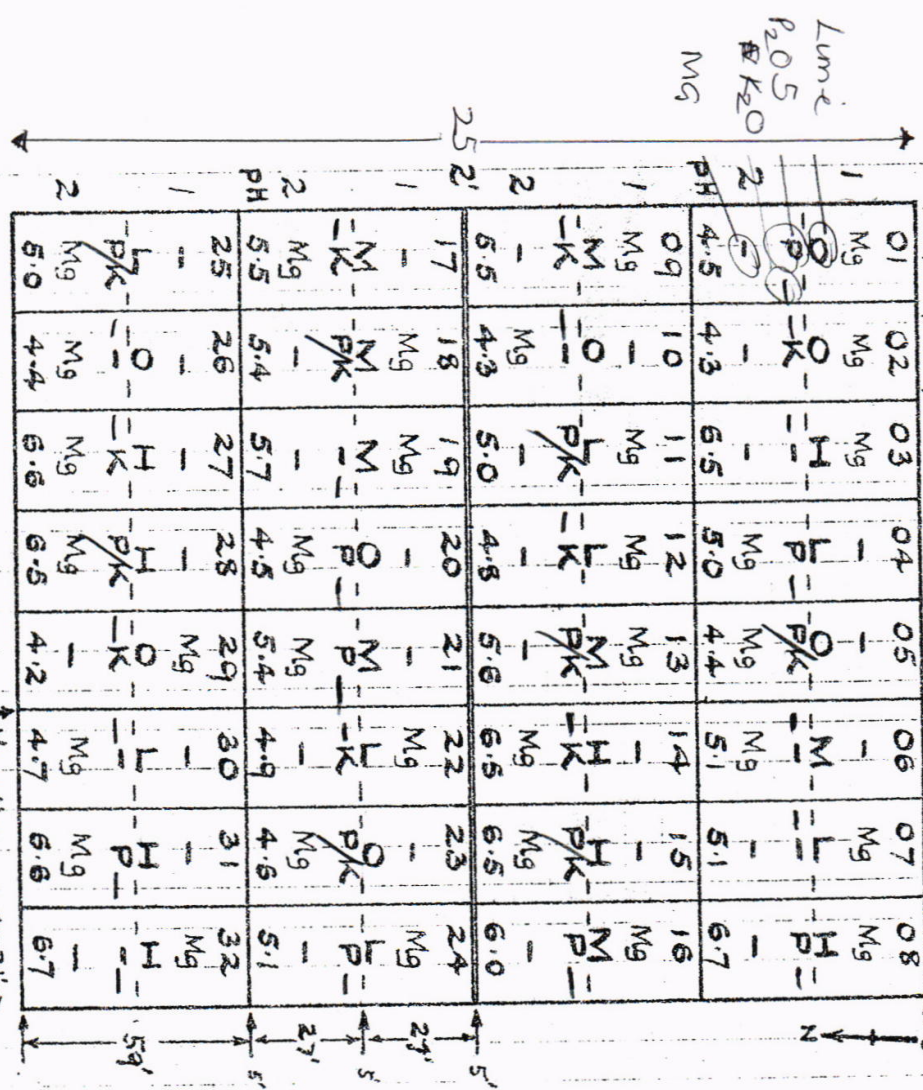
Design: 2 blocks of 16 plots split into 2

Plot area: 21' x 60' = 0.029 acre (0.0117ha)
 Sub-plot harvested: 9'4" x 28'6" = 0.0061 acre (0.00246 ha)

Previous Cropping -
 1962-64 Spr. beans, 1965-67 barley, 1968 potatoes
 1969 fallow, 1970-73 barley 1974 potatoes

Rothamsted LONG TERM LIMING

76/R/CS/110



Sown by Nordstern drill in 8" rows

Sp. Oilseed Rape
15th Year

SAWYERS I 1976²³
Sponsor: J. Bolton

TREATMENTS per acre (hectare)

Whole Plots
O, L, M, H None, 2, 4, 8 tons (-, 5, 10, 20 tonnes)
CaCO₃ as ground chalk (1962-68)
PH of soil sample taken Jan 1975

P 0.5 cwt (63kg) P₂O₅ as super Broadcast in
K 1.0 cwt (125kg) K₂O as muriate } seedbed

Half Plots

-, Mg None, 100lb (112kg) Mg, as Epsom salts

Note: P K Mg treatments cumulative (Mg in 1974 + 76 only)

Basal manuring per acre (hectare)

600 lb (675kg) Nitro-Chalk 25

Variety: Maris Hadlow sown 5 lb/acre (6kg/ha) sown on 26 Mar

Design: 2 blocks of 16 plots split into 2

Plot area: 21' x 60' = 0.029 acre (0.0117ha)

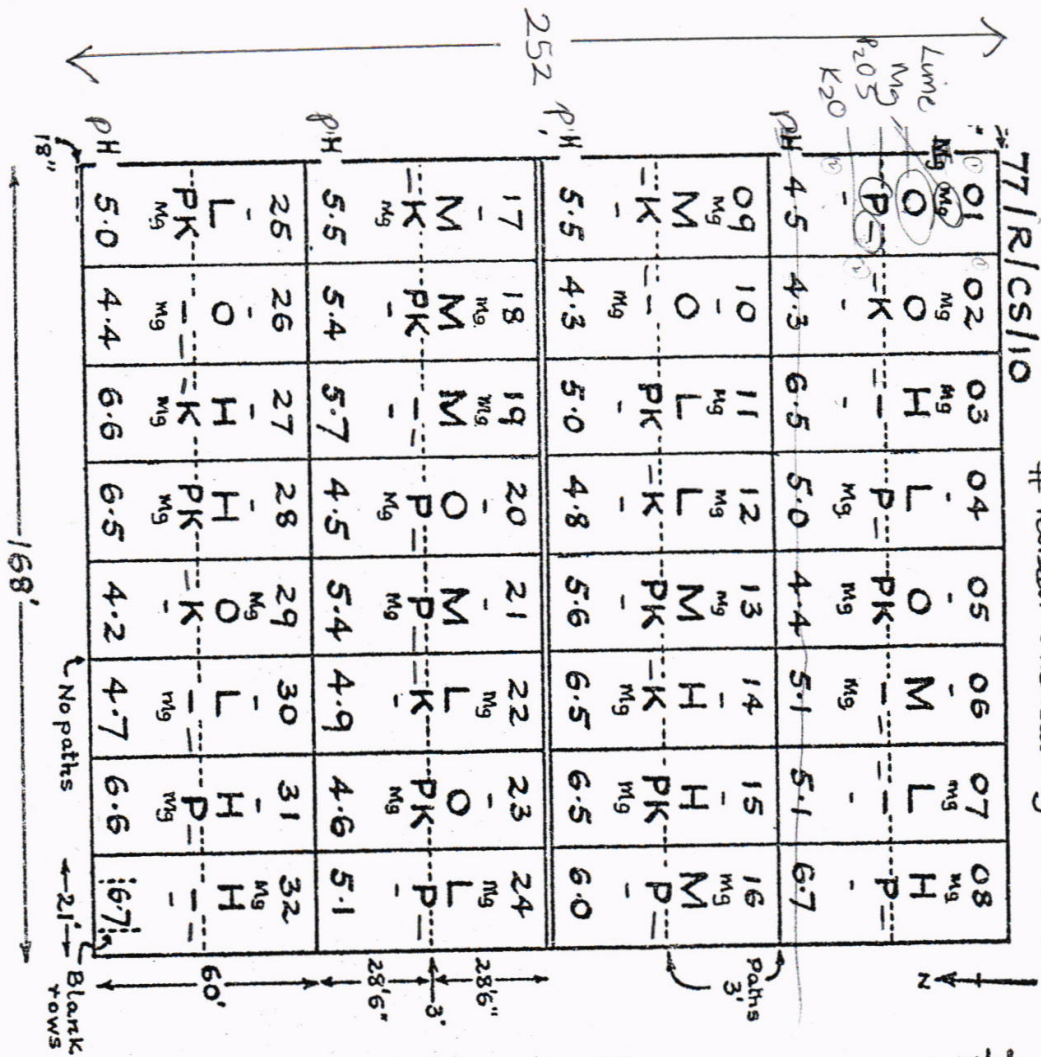
Sub-plot harvested 15 rows at 8"

10' x 27' = 0.0062 acre (0.0025 ha)

Previous cropping: 1962-64 beans,

1965-67 barley, 1968 potatoes, 1969 fallow
1970-73 barley, 1974 potatoes, 1975 oats

Rothamsted LONG TERM LIMING Spring Oats SAWYERS I 16th Year 1977 21
 # revised. Includes Mg treatments Sponsor: J. Bolton



TREATMENTS per acre (hectare)

Whole Plots

O.L.M.H None, 2, 4, 8 tons (-5, 10, 20 tonnes) CaCO₃ as ground chalk (1962-63)

PH PH of soil sample taken Jan 1975

P 0.5cut (63 kg) P₂O₅ as superphosphate } Broadcast

K 1.0cut (125 kg) K₂O as muriate of potash } in seedbed

Half Plots

- Mg None, 100 lb (112 kg) Mg, as Epsom salts

Note: P, K, Mg treatments cumulative (Mg in 1974 & 76)

Basal manuring, per acre (hectare)

SFP 'Nitro-Chalk' only @ 280 lb (314 kg)

Variety: Marod at 180 lb/acre (202 kg/ha) Sown 4/4/77

Design: 2 blocks of 16 plots split into 2

Plot area: 21' x 60' = 0.029 acre (0.0117 ha)

Sub-plot harvested:

9'4" x 28'6" = 0.0061 acre (0.00246 ha)

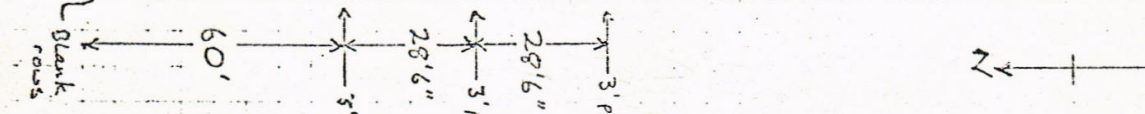
Previous Cropping

- 1962-64 Spr. beans, 1965-67 barley, 1968 potato
- 1969 fallow, 1970-73 barley 1974 potatoes,
- 1975 oats, 1976 oilseed rape

Rothamsted LONG-TERM LIMING

78/R/C/S/110

PH	01	02	03	04	05	06	07	08
	Mg	Mg	Mg	L	O	M	Mg	Mg
	P	K	H	P	PK	L	L	H
PH	4.5	4.3	6.5	5.0	4.4	5.1	5.1	6.7
	09	10	11	12	13	14	15	16
	Mg	O	Mg	Mg	Mg	H	H	Mg
	M	O	L	L	M	K	PK	M
	K		PK	K	PK	K	PK	P
PH	5.5	4.3	5.0	4.8	5.6	6.5	6.5	6.0
	17	18	19	20	21	22	23	24
	M	Mg	Mg	O	M	Mg	O	Mg
	K	PK		P	P	K	PK	L
PH	5.5	5.4	5.7	4.5	5.4	4.9	4.6	5.1
	25	26	27	28	29	30	31	32
	L	O	H	H	Mg	L	H	Mg
	PK		K	PK	O		P	H
PH	5.0	4.4	6.6	6.5	4.2	4.7	6.6	6.7



Barley
SAVYER, I 19th Year 1978
Sponsor: J. Bellon

TREATMENTS

Whole Plots
O, L, M, H
None, 2, 4, 8 tons (0, 5, 10, 20 tonnes)
CaCO₃ on ground chalk (1962-63)
PH of soil sample taken Jan 1975
0.5 t (65 kg) P₂O₅
as superphosphate
1.0 t (125 kg) K₂O
as muriate of potash
1962-78

Half Plots
None, 100 lb (112 kg) Mg as fluorside
1974-77 (except 1975) Mg as Epsom salt.

Basal manuring: per acre (hectare)
Nitro-chalk only at 336 lb (377 kg)

Variety: Parthos
sown 19 April
at 140 lb/acre (157 kg/ha)

Design: 2 blocks of 16 plots split into 2
Plot area: 21' x 60' = 0.029 acre (0.0117 ha)
Sub plot harvested
9'4" x 28'6" = 0.0061 acre (0.00246 ha)

Previous cropping
1962-64 5 beans, 1965-67 barley, 1968 potatoes,
1969 fallow, 1970-73 barley, 1974 potatoes,
1975 oats, 1976 oilseed rape, 1977 oats

81/R/CS/10

ROTHAMSTED LONG TERM LIMING

S. ONYS

SPRINGS I 20th YEAR 1981

Sponsors: S. Me Grath, D.P. Stribley

PH	01	02	03	04	05	06	07	08
4.6	Mg (P)P1 (-)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
4.7	Mg (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
7.5	Mg H (-)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
5.1	Mg L (-)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
5.2	Mg L (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
5.5	Mg (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
5.9	Mg L (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
6.2	Mg L (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
6.7	Mg L (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
6.8	Mg L (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
6.9	Mg L (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
6.3	Mg L (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
6.4	Mg L (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
6.5	Mg L (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
6.6	Mg L (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
6.7	Mg L (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
6.8	Mg L (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K
6.9	Mg L (-)P1 (K)K	Mg (-)P1 (K)K	Mg H (-)K	Mg L (-)P1 (K)K	Mg O (P)P2 (K)K	Mg M (-)K	Mg L (-)K	Mg H (P)P1 (-)K

P + K TREATMENTS

	UNTIL 1978	FROM 1981	LIME TREATMENTS (Total 1982-1978 t ha ⁻¹)
(-) - (-)K	P	P	0
(P)P(-)K	K	K	7
(-)P1(K)K	-	P1	15
(P)P1(K)K	P	P1	30
(P)P2(K)K	P	P2	

P+K until 1978 cumulative rates depended on error
From 1981
P1, P2 25, 75 kg P ha⁻¹
K 120 kg K ha⁻¹

BASAL MINERALISING

N 'Nitrochalk' at 80 kg N ha⁻¹
Mg Epsom salts at 120 kg Mg ha⁻¹

VARIETY Peniarth sown at 168 t/ha (189 t/ha) on 13 April

DESIGN 2 blocks of 16 plots

PLOT AREA 21' x 66' = 0.029 acre (0.0117 ha)
Harvested 914" x 66" = 0.013 acre (0.0052 ha)

PLOT ARRANGEMENT

3 blocks of 16 plots each
2 tillage rows
12 rows
Sampling 7' wide on W side

Sampling area W side of each plot.

No No-tiller or pesticides without Sponsors consent
All operations by Farm.

42/R/CS/10

ROTHAMSTED LONG TERM LIMING

S. OHTS

SAWYERS I

21st YEAR

1982

Sponsors: S.M. Grant, D.P. Stribley

01	0	02	03	04	05	06	07	08
P ₁	P ₁	-	-	P ₂	P ₃	-	-	P ₂
09	10	11	12	13	14	15	16	
m	o	L	L	m	H	H	m	
P ₁	-	P ₃	P ₁	P ₃	P ₁	P ₃	P ₂	
17	18	19	20	21	22	23	24	
m	m	m	o	m	L	o	L	
P ₁	P ₃	-	P ₂	P ₂	P ₁	P ₃	P ₂	
25	26	27	28	29	30	31	32	
L	o	H	H	o	L	H	H	
P ₃	-	P ₁	P ₃	P ₁	-	P ₂	-	

252' ←

168' ← 10 parts

60' ← 2 part

21' ← 10 parts

TREATMENTS OF P+K	1981	1982	Rate of P in 1982
until winter 1978	- K	K	None
P ₁	P ₁ K	P ₁ K	50 kg P ha ⁻¹
P ₂	P ₁ K	-K	None
P ₃	P ₃ K	P ₃ K	50 kg P ha ⁻¹

P+K until 1978 cumulative rates depended on crop

In 1981
 P₁, P₃ 25, 75 kg P ha⁻¹
 K 120 kg K ha⁻¹

LIME TREATMENTS
 (Total 1962-1978 t ha⁻¹) winter 1981/82 t ha⁻¹

o	None	None
L	7	2
m	15	5
H	30	10

BASAL MANURE

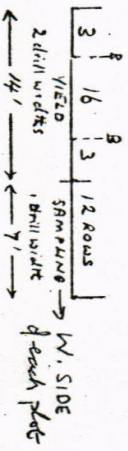
N Nitro chate at 80 kg N ha⁻¹
 K Murate of potash at 120 " " K "
 Mg Epsom Salts at 40 " " Mg "

VARIETY Peniarth

DESIGN 2 blocks of 16 plots

PLOT AREA 21' x 60' = 0.029 ac (0.0117 ha)
 Harvested 9'4" x 60' = 0.013 ac (0.0052 ha)

PLOT ARRANGEMENT



// No weedkillers or pesticides without
 Sponsors consent
 // All operations by farm

ROTAMSTED LONG TERM LIMING

83/K/CS/10

Block	01	02	03	04	05	06	07	08
Treatment	O	O	H	L	O	M	L	H
Treatment	P2	P1	-	P2	P3	-	-	P2
Block	09	10	11	12	13	14	15	16
Treatment	M	O	L	L	M	H	H	M
Treatment	P1	-	P3	P1	P3	P1	P3	P2
Block	17	18	19	20	21	22	23	24
Treatment	M	M	M	O	M	L	O	L
Treatment	P1	P3	-	P2	P2	P1	P3	P2
Block	25	26	27	28	29	30	31	32
Treatment	L	O	H	H	O	L	H	H
Treatment	P3	-	P1	P3	P1	-	P2	-

POTATOES SAWYERS I 22nd YEAR

Sponsors: S. McGrath, D.P. Stribley

1983

TREATMENTS OF P+K

	1981	1982	1983	1983
1981	- K	K	- K	None
1982	P1 K	P1 K	- K	None
1983	P2 P	- K	P2 K	50 kg P ₂ K ₂ a ⁻¹
1984	P3 PK	P1 K	P2 K	50 kg P ₃ K ₂ a ⁻¹

P+K until 1978 cumulative, rates depended on crop

In 1981

P1, P3 25, 75 kg P₂ K₂ a⁻¹
 K 120 kg K a⁻¹

LIME TREATMENTS

	1981/82	1982/83	1983/84
Total 1962-1978 t ha ⁻¹	None	None	None
0	None	None	None
L	7	2	5
M	15	5	3
H	30	10	10

BASAL MANURING

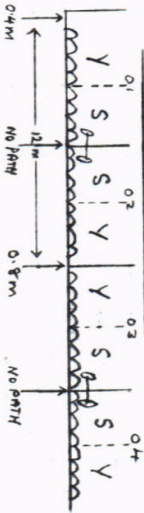
N 250 kg N
 K 250 kg K₂O
 Mg 40 kg Mg (as kieserite)

VARIETY Pentlands Crown

DESIGN 2 blocks of 16 plots

PLOT AREA 21' x 60' = 0.029 ac (0.0117 ha)
 harvest 2 rows x 60' = 0.0068 ac (0.0027 ha)

PLOT ARRANGEMENT

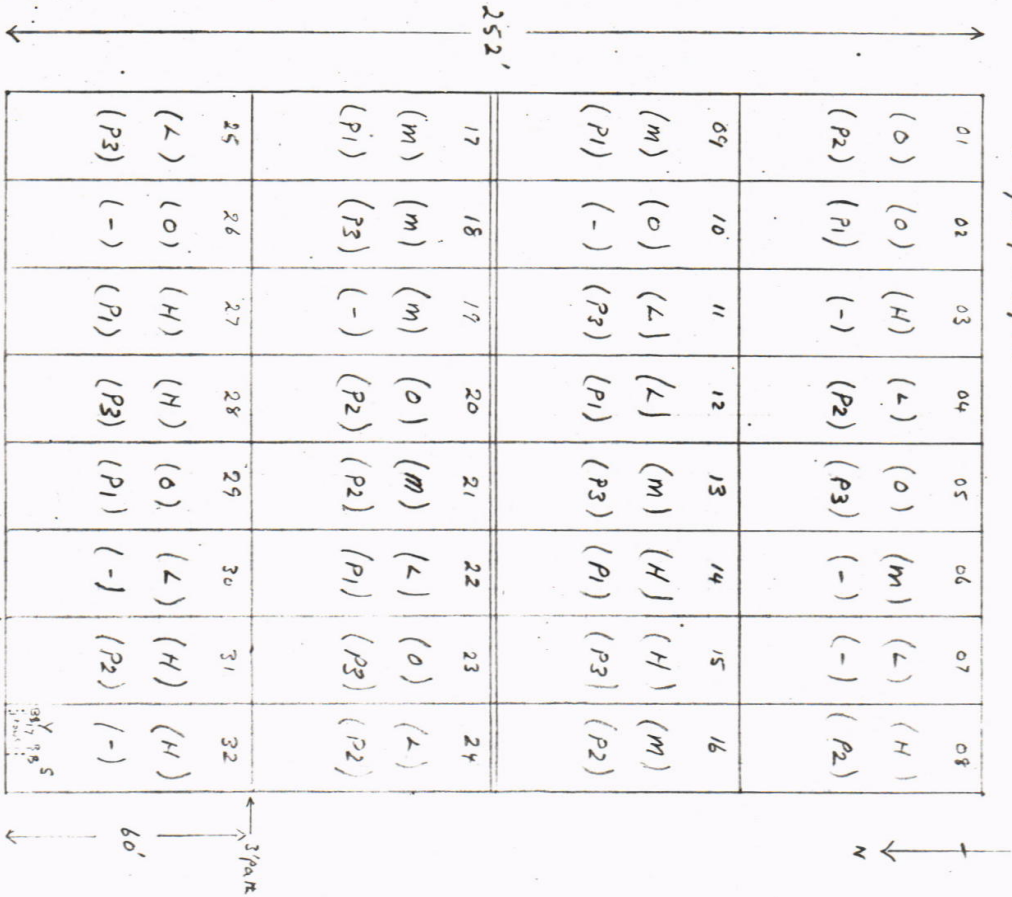


No weedkillers or pesticides without Sponsors consent

All operations by Farm

ROTHAMSTED LONG TERM LIMING
85/R/CS/10

S BARLEY 24th YEAR SAWYERS I 1985
Sponsor: S.P. McGRATH



TREATMENTS OF PK UNTIL 1983

Winter 1978	1981 Rates of P _{in} 1981	1982 Rates of P _{in} 1982	1983 Rates of P _{in} 1983
(-)	- K None	- K None	- K None
(P1)	K PK 25 kg/ha	P2K 50 kg P/ha	- K None
(P2)	P PK 25 "	- K None	P2K 50 kg P/ha
(P3)	PK P3K 75 "	P2K 50 kg P/ha	P2K 50 "

P+K until 1978 cumulative; rates depended on crop

In 1981
K 120 kg K/ha

LIME TREATMENTS UNTIL 1983

Total 1962-1978 t/ha	Winter 1981/82 t/ha	Winter 1982/83 t/ha	Accumulated t/ha
(0) None	None	None	0
(L) 7	2	5	14
(M) 15	5	3	23
(H) 30	10	10	50

BASAL MANURING

(25:0:16) at 448 kg/ha

VARIETY

Kilacorn, sown at 157 kg/ha as 18 March

DESIGN

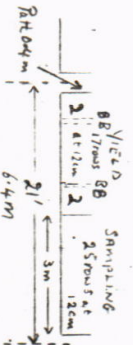
2 blocks of 16 plots.

PLOT AREA

6m x 60' = 0.0027 ac (0.011 ha)

Harvest - 17mm P12a x 60' = 0.0037 ha

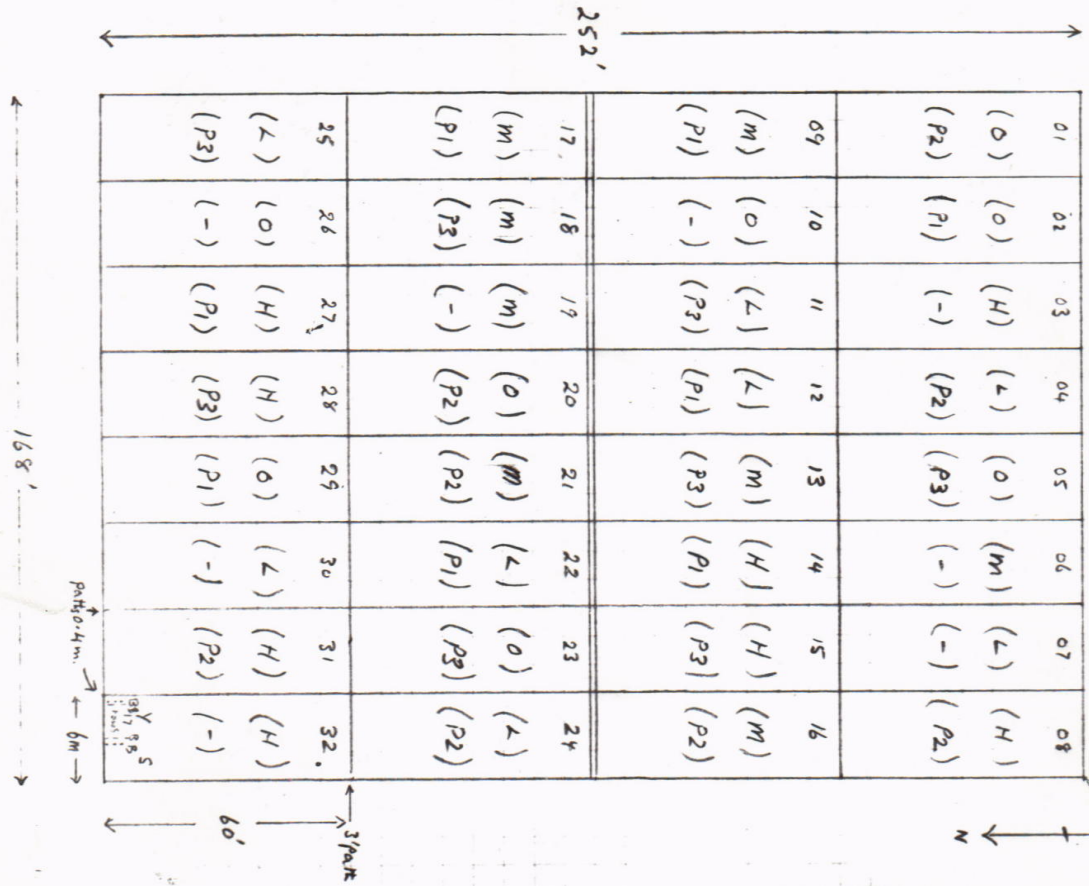
PLOT ARRANGEMENT



No fertilizer or pesticides without Sponsor's consent

All operations by Farm

ROTHAMSTED. LONG TERM LIMING
86/R/C5/110



TRITICALE 25th YEAR SAUVAGES I 1986
Sponsor: S. R. McGrath

TREATMENTS OF PK UNTIL 1983

until winter 1978	1981	Rates of P in 1981	1982	Rates of P in 1982	1983	Rates of P in 1983
(-)	- K	None	- K	None	- K	None
(P1)	K	25 kg/La	P2 K	50 kg P/La	- K	None
(P2)	P	" "	P1 K	None	P2 K	50 kg P/La
(P3)	PK	75 "	P2 K	50 kg P/La	P2 K	50 " "

P+K until 1978 cumulative, rates depended on crop

In 1981
K 120 kg K/La

LIME TREATMENTS UNTIL 1983

Total 1962-1978	c/La	winter 1981/82	c/La	winter 1982/83	c/La	Reaccumulated
(O)	None	None	None	None	None	= 0
(L)	7	2	5	3	14	= 14
(M)	15	5	10	10	23	= 23
(H)	30	10	10	10	50	= 50

BASAL MANURING

N in spring

VARIETY

Keado, sown at 169 kg/La (190 kg/La) on 23 October

DESIGN

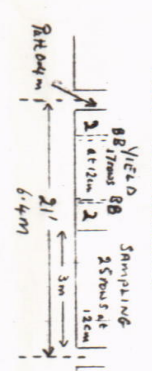
2 blocks of 16 plots

PLOT AREA

6m x 60' = 0.0027 ha (0.001 ha)

Hurf-Trows@12cm x 60' = 0.0037 ha

PLOT ARRANGEMENT



!! No weedkillers or pesticides without Sponsor's consent
!! All operations by farm

Rohlaunsteel Long Term Experiment

87/R/cs/10

S. Lupton 26th Year Samplers I 1987

Sponsors: S.P. McGrath, T.R. Egan, D.P. Yeoman

TREATMENTS

Residual effects of previous rates of chalk
(total applied 1962-83 £/ha):

- (-) None
- (L) 14
- (M) 23
- (H) 50

Residual effects of previous rates of P

- (-) None
- (P1)
- (P2)
- (P3)

Manganese sprayed in 1987

- None
- M* Sprayed at rates of instructions to be added

BASAL MANURE

None

VARIETY

Vladimir, red & the unvarietal

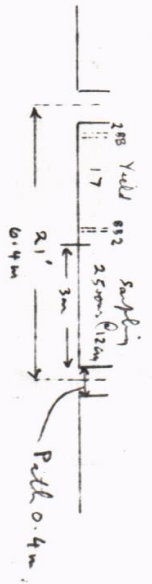
PLOT AREA

6m x 6.0' = 0.0119 ha
Sum @ 31 mow by ha⁻¹

DESIGN

2 total of 16 plots

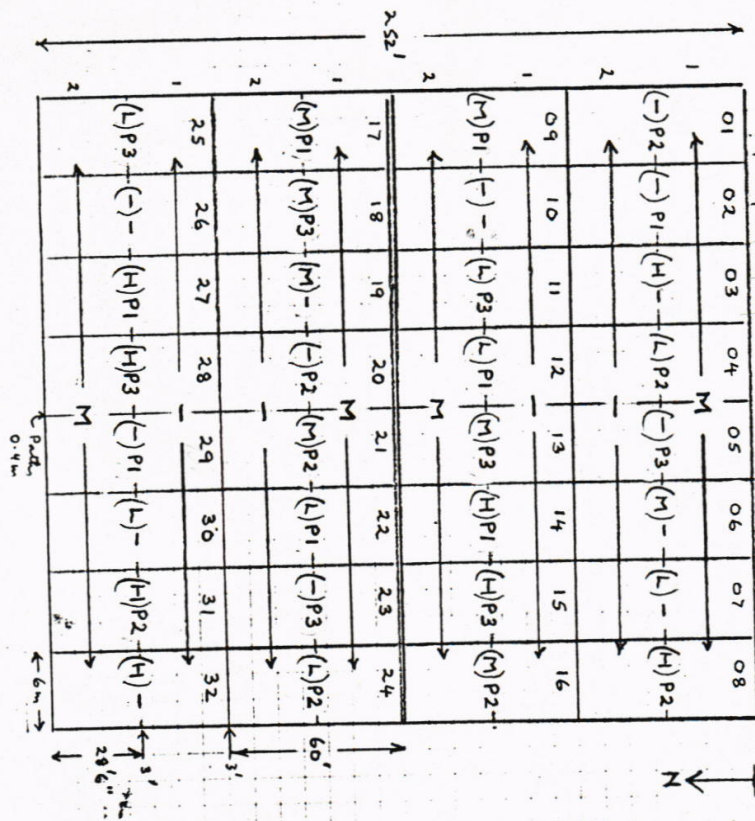
Hard: 17mm @ 12mm x 28.6" = 0.0018 ha



1	01	02	03	04	05	06	07	08
1	←	←	(H -)	(L P2)	(- P3)	(M -)	(L -)	(H P2)
2	←	←	(L P3)	(L P1)	(M P3)	(H P1)	(H P3)	(M P2)
1	09	10	11	12	13	14	15	16
1	←	←	(L P3)	(L P1)	(M P3)	(H P1)	(H P3)	(M P2)
2	←	←	(L P3)	(L P1)	(M P3)	(H P1)	(H P3)	(M P2)
1	17	18	19	20	21	22	23	24
1	←	←	(M P1)	(M P3)	(M -)	(L P1)	(- P3)	(L P2)
2	←	←	(M P1)	(M P3)	(M -)	(L P1)	(- P3)	(L P2)
1	25	26	27	28	29	30	31	32
1	←	←	(H P1)	(H P3)	(- P1)	(L -)	(H P2)	(H -)
2	←	←	(H P1)	(H P3)	(- P1)	(L -)	(H P2)	(H -)

M* applied by sprayer across strip of sub. plots, spray to be spread over 1 m² plots on each occasion to equivalent, including

Rothamsted Long Term Liming
98/R/C5/10



M* applied by spray: across strip of soil. P1, spray to ground over 1' and P2 on each corner to regularly wheelings

Limed 27th Year Savers I 1988

Sponsor: S.P. McGrath

TREATMENTS

- (-) None
 - (L) 15
 - (M) 24.5
 - (H) 52.5
- Applied Autumn 1987 Kg P₂O₅, cumulative to previous dressings

Revised effects of previous rates of soil (total applied 1962-87 t/ha):

- P1 25
 - P2 25
 - P3 75
- Manure applied in 1987

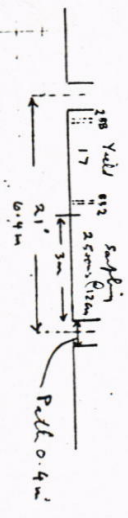
None
M* sprayed at rate of nutrients to be added

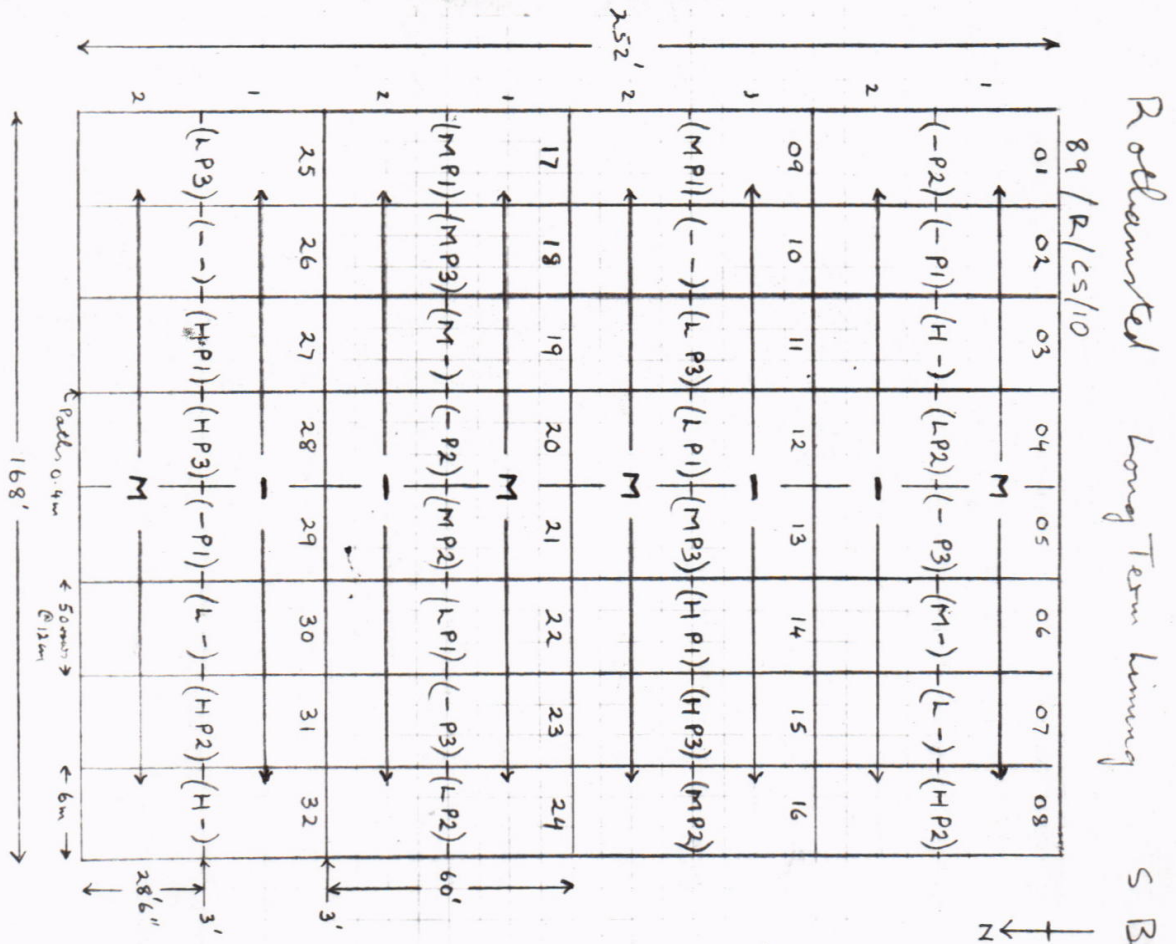
BASAL MANURING per ha.

- K at 80 kg
 - Mg at 40 kg
 - N at 86 kg
- VARIETY
Antares sown on 13 April at 87 kg/ha

DESIGN
2 stacks of 16 plots
Plot Area 6m x 60' = 0.0110 ha
Rows: 12m x 28.5m = 0.0018 ha

DRAWING





28th Year
Sponsors: S.P.McGrath, J.McEwen, D.P.Yeaman
Samples I 1989

TREATMENTS

Random effects of shall applied 1962-87 (total t/ha):

- (-) None
- (L) 15
- (M) 24.5
- (H) 52.5

Residual effects of P applied 1962-88, not varied with crop years

- (-) None
- (P1)
- (P2)
- (P3)

Management strategy - 1989, cumulative to previous applications

- None
M* Sprayed at rates 9 times to be settled

BASAL MAINTENANCE

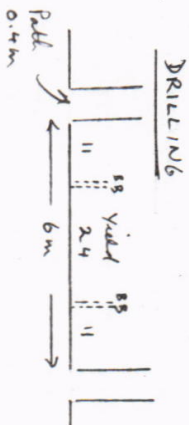
None

VARIETY	DESIGN
Agriar	2 trials of 16 plots each

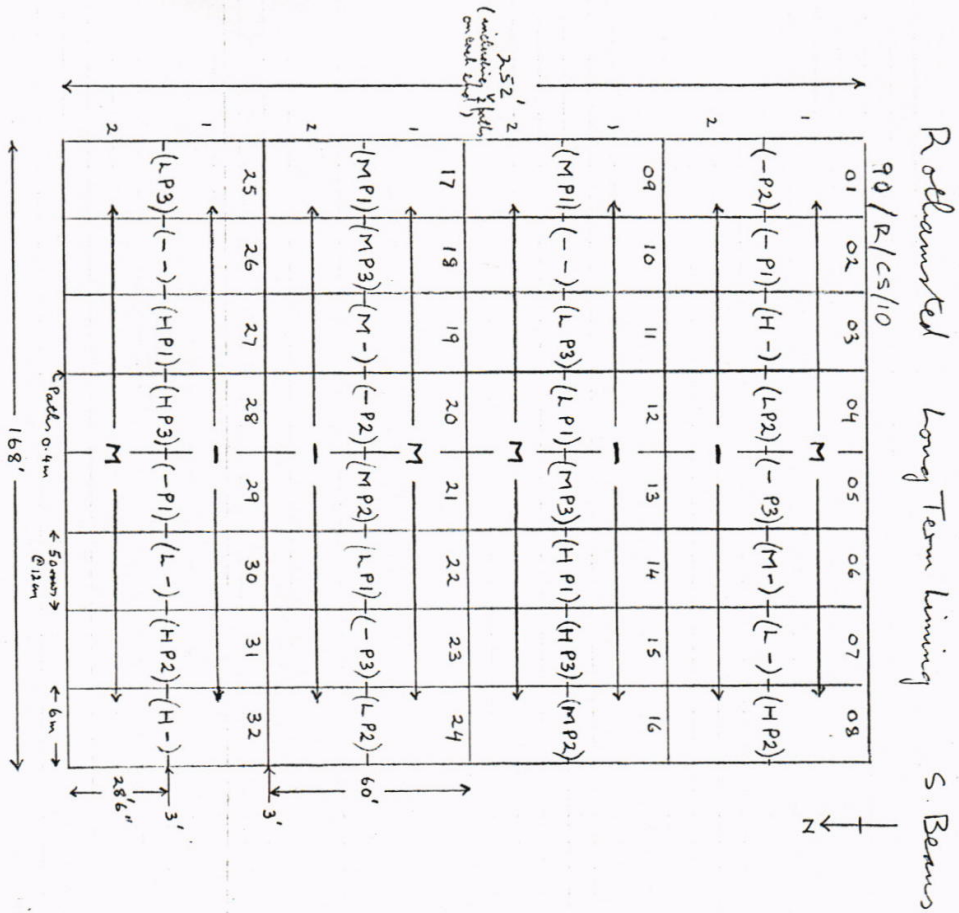
PLOT AREA

6m x 60' = 0.0110 ha

Now 24m x 12m x 28.6" = 0.0025 ha



* M applied by spray, rows, strips of 6m plots, sprayed to travel over - and plots on each occasion to spraying/collecting.



19

29th Year
 Sponsors: S.P. McGrath, F.M. Evans, D.P. Yeoman
 Samples I 1990

TREATMENTS
 Random effects of diallel applied 1962-87 (total 6/ha):

- (-) None
- (L) 15
- (M) 24.5
- (H) 52.5

Random effects of P applied 1962-88, rates varied with crop 9 years

- (-) None
- (P1)
- (P2)
- (P3)

Manure effects of P applied in 1990 cumulative to previous applications, 10 t/ha

None
 M * Yield at 3.0 t and 4.0 t of crop + 1 1/2 t just before flowering
BASAL MANURING

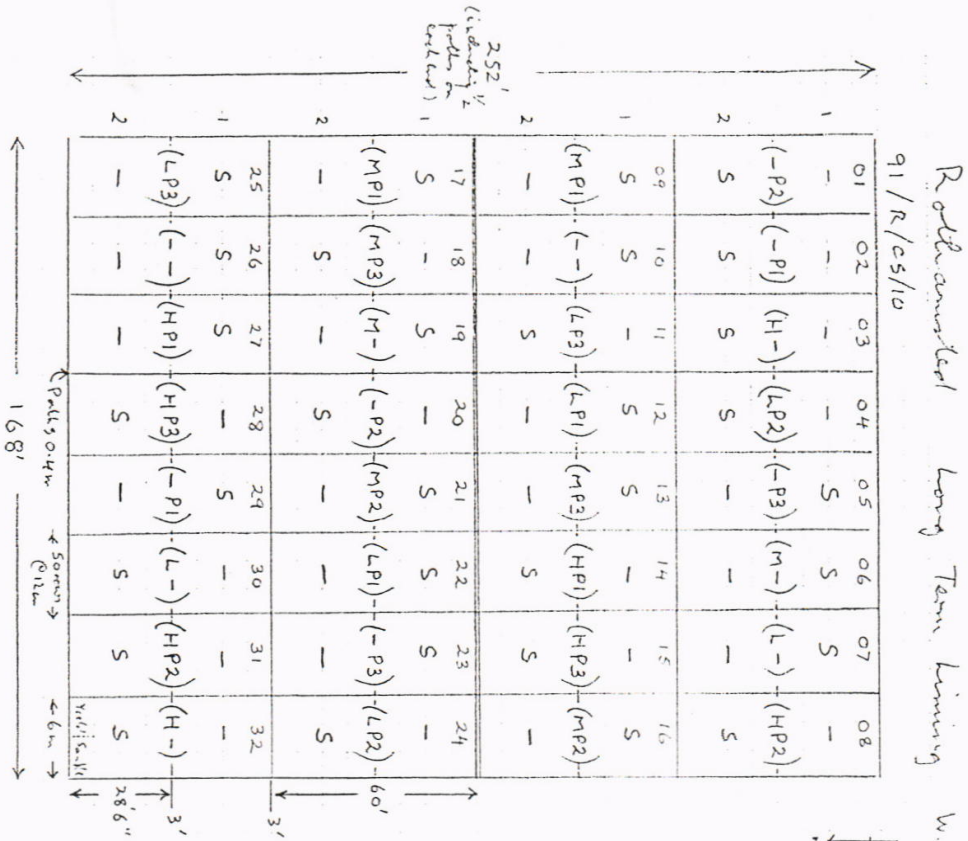
None

VARIETY DESIGN PLOT AREA

Admiral, 2 stands of 16 plots each 2
 at 200g/ha on 6 March
 6 March
 6m x 60' = 0.0110 ha
 Now 24m x 12m x 28'6" = 0.0035 ha

II * Yield applied 4 SPM
 II - All operations by Farm

* M applied by spray, rows
 strips of grub-pits, openings
 to travel over 1" and pits on
 each occasion to granules/
 rollings.



Wildfire Risk

30th Year

Summer I

1991

16

Sponsor: S.P. McGill, P.B. Barendse, G.F. I. Mitchell

TREATMENTS

Residual effects of blocks applied 1962-87 (total t/ha):

- (-) None
- (L) 15
- (M) 24.5
- (H) 52.5

Residual effects of P applied 1962-88, not varied with crops & years:

- (-) None
- (P1) 15
- (P2) 24.5
- (P3) 52.5

Subplots = 1991 on calcareous subplots = spring:

- 1 S None, 30 kg S/ha

BASAL MANURE/ha

(25:0:16) at 200 kg t/ha
+ 40 kg Mg spring rate calcareous subplots
N = spring rate SFP rate

DESIGN

2 blocks of 4x4 plots each

|| All operations by Farm

|| Repro all agrochemicals & SPM

|| To be netted

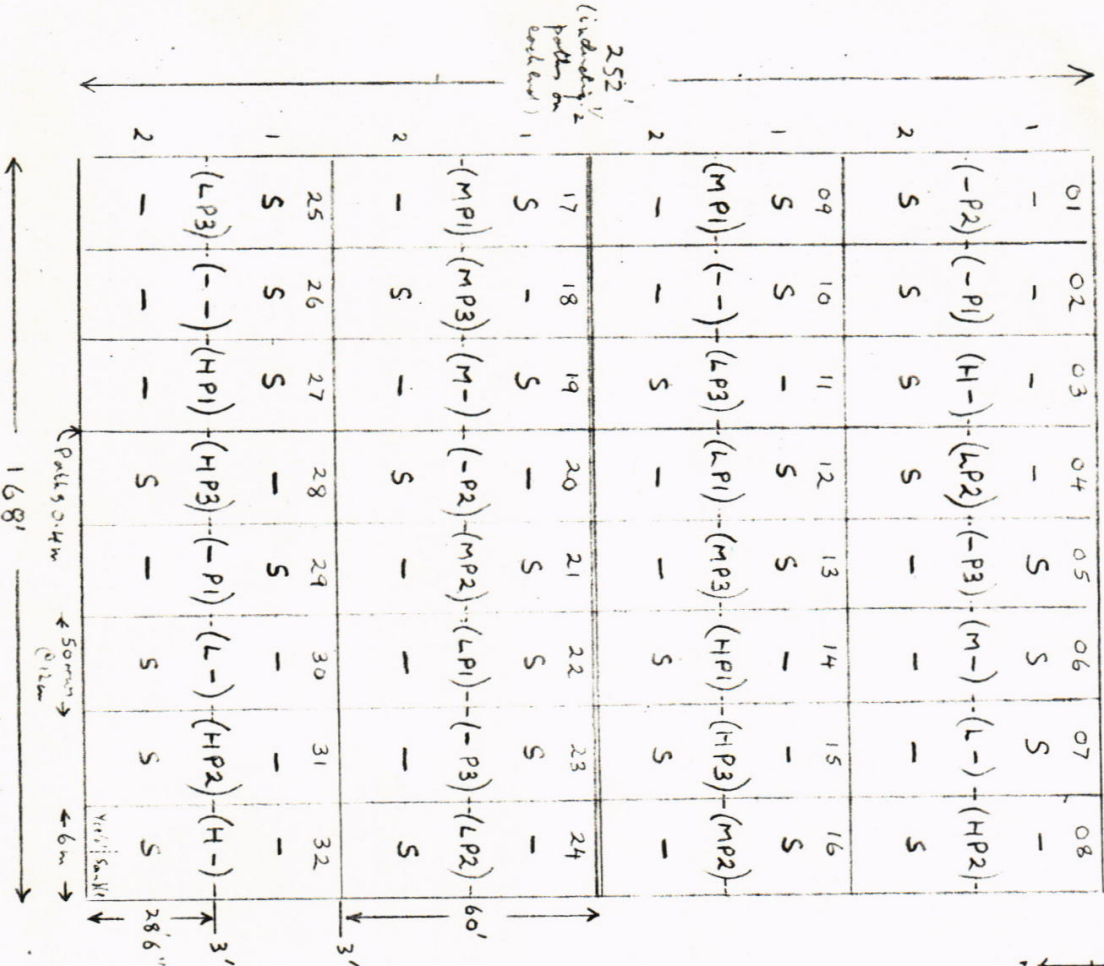
VARIETY

Lidardo, sown at 6 kg/ha
on 31 August, 1990

PLOT AREA

6m x 6m = 0.0110 ha

Rothamsted Long Term Farming
92/R/05/10



W. D. R. 31st Year Samples I 1992

Sponsor: S.P. Mc Grath, P.B. Bramming, G.F.I. Midford

TREATMENTS

Residual effects of levels applied 1962-87 (total t/ha):

- (-) None
- (L) 15
- (M) 24.5
- (H) 52.5

Residual effects of P applied 1962-88, not varied with crop systems:

- (-) 0
- (P1) 0
- (P2) 0
- (P3) 0

Supplier = 1992a calcium sulphate = spring: (Cumulative to 1991)

-, S None, 30 kg S/ha

BASAL MANURING per ha

(25:0:16) at 200 kg & residual
+ total Mg spring not containing sulphate
N - spring at 50 kg/ha

VARIETY

Victoria, sown at 15/ha
or

DESIGN

2 blocks of 4x4 grids

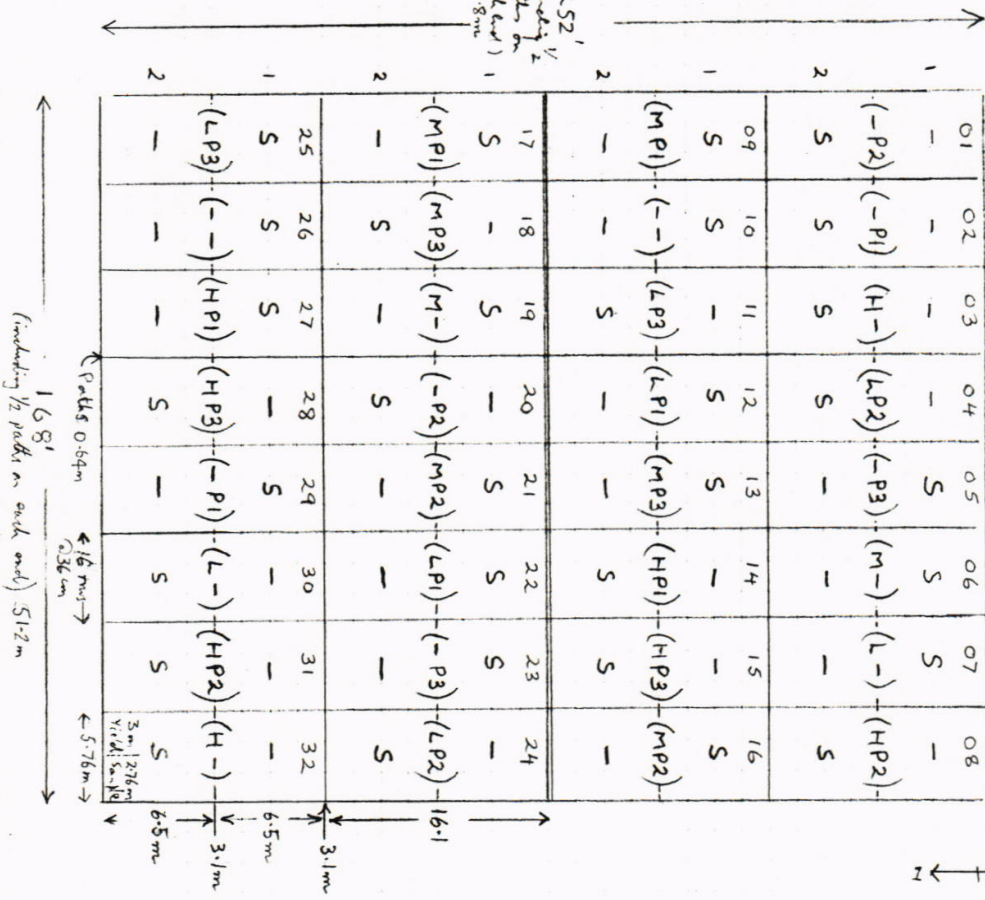
PLOT AREA

6m x 60' = 0.0110

- || All operations by Tron
- || Refer all measurements to SPM
- || To be noted

Roth's experimental Long Term binning

93/R/c5/10



W. Lupinus 32nd Year Sample I 1993¹⁶

Spouses: S.P.M. Gould, P.B. Bamford, G.F. Milford, J.H. Day

TREATMENTS

Residual effects of P applied 1962-87 (total t/ha):

- (-) None
- (L) 15
- (M) 24.5
- (H) 52.5

Residual effects of P applied 1962-88, not varied with crops systems:

- (-)
- (P1)
- (P2)
- (P3)

Subplot = 1993 on calcium sulfate = spring: (cumulative to 1991-92)

- , S None, 30 kg S/ha

BASAL MANURING per ha

VARIETY CH 304, sown at

DESIGN None

2 stands of 4x4 grids with 2 sub plots

5.76m x 16.1m = 0.009 ha

5.76m x 6.5 = 0.0037 ha

All operations by Farm

Replotted experimental stands to SPM

Rothamsted Long Term Experiment
94/R/05/10

252' (including 16' buffer on each end) 76.8m

1	01	-	02	-	03	-	04	-	05	S	06	S	07	S	08	-
1	-	(-P2)	(-P1)	(H-)	(-L P2)	(-P3)	(M-)	(L-)	(H P2)	-	-	-	-	-	-	-
2	S	S	S	S	S	-	-	-	-	S	-	-	-	-	S	
1	09	S	10	S	11	-	12	S	13	S	14	-	15	-	16	S
1	(M P1)	(-)	(L P3)	(L P1)	(M P3)	(H P1)	(H P3)	(M P2)	-	-	-	-	-	-	-	-
2	-	-	S	S	-	-	-	-	-	S	S	-	-	-	-	-
1	17	S	18	-	19	S	20	-	21	S	22	S	23	S	24	-
1	(M P1)	(M P3)	(M-)	(-P2)	(M P2)	(L P1)	(L P3)	(L P2)	-	-	-	-	-	-	-	-
2	-	S	-	-	S	-	-	-	-	-	-	-	-	-	S	
1	25	S	26	S	27	S	28	-	29	S	30	-	31	-	32	-
1	(L P3)	(-)	(H P1)	(H P3)	(L-)	(H P2)	(H-)	-	-	-	-	-	-	-	-	-
2	-	-	-	-	S	-	-	-	-	S	-	-	-	-	-	-

16.8' (including 1/2 pads on each end) 51.2m

16.8m → ← 16.8m →

3.1m → ← 3.1m →

6.5m → ← 6.5m →

3.1m → ← 3.1m →

5m Yield Sample

W. Lupin's 33rd Year Sample I 1994¹⁶

Sponsor: S.P.M. Grath, P.B. Barmclough, G.F. Mitchell, J.H. Jones

TREATMENTS

Residual effects of chalk applied 1962-67 (total 6/ha):

- (-) None
- (L) 15
- (M) 24.5
- (H) 52.5

Residual effects of P applied 1962-88, made residual with extra 9 years:

- (-) None
- (P1) 15
- (P2) 24.5
- (P3) 52.5

Subplot = 1993 on calcium sulphate - spring: (Cumulative to 1991, 92, 93)

- S None, 30 kg S/ha

BASAL MANURING per ha

None

VARIETY
CH304/70 sown at 100 kg/ha on 20.10.92

DESIGN

2 blocks of 4x4 plots with 2

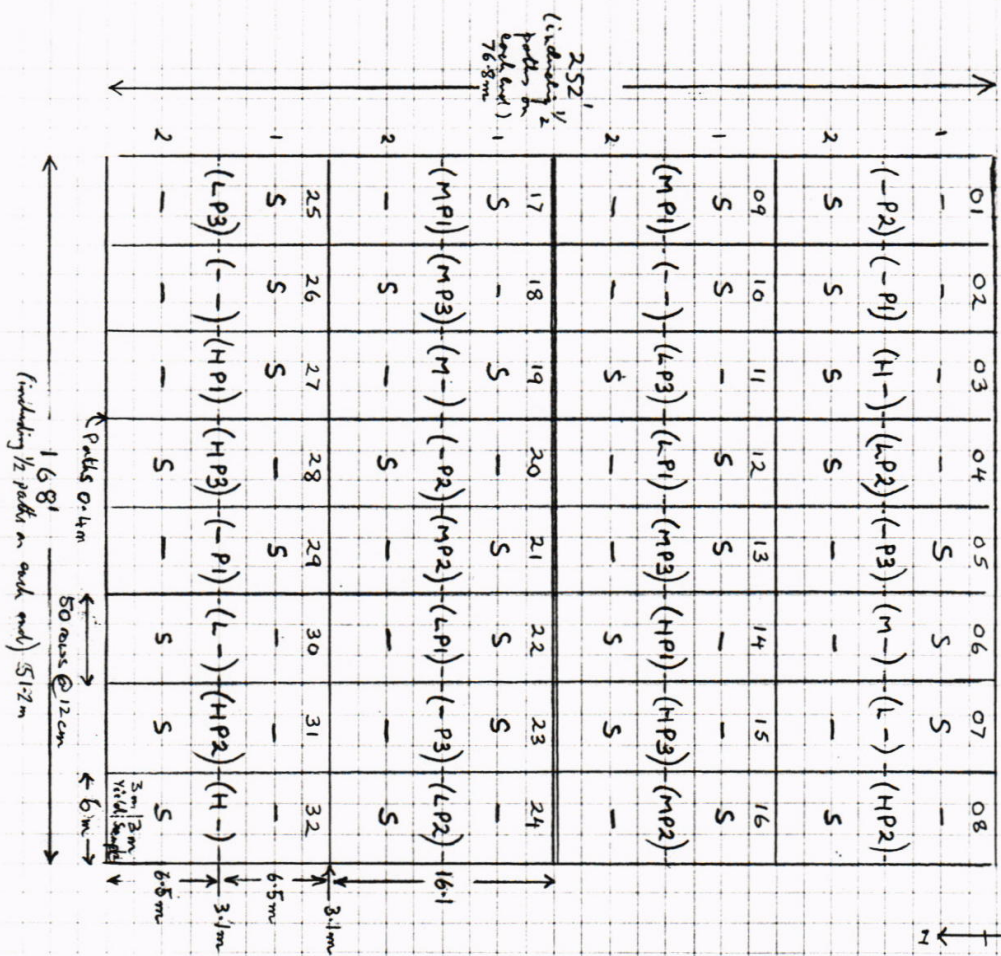
|| All operations by Tractor
|| Residual operations by SPM's Grath

PLOT AREA

5.76 m x 16.1 m = 0.009 ha

Sub plot 5.76 m x 6.5 m = 0.0037 ha

Rothamsted Long Term Liming 95/R/CS/10



W. Wheat 34th Year Summer I 1995¹⁶

Sponsor: S.P. McGrath

TREATMENTS

Residual effects of liming applied 1962-67 (total 6/ha):

- (-) None
- (L) 15
- (M) 24.5
- (H) 52.5

Residual effects of P applied 1962-88, not correlated with liming systems:

- (P1)
- (P2)
- (P3)

Subplots - 1995m calcium sulphate - plowing: (Cumulative to 1991=94)

- S None, 30kg S/ha

BASAL MANURE 60 t/ha

No P or N in spring or SFP

VARIETY Genesis, sown at or

DESIGN

2 blocks of 4x4 plots with 2

|| All operations by Farm

|| Reps not hydrochloric acid to SPMcGrath

PLOT AREA

6m x 6.5m = 0.0097 ha

Sub plot 6m x 6.5m = 0.0039 ha

Rothamsted Experimental Farm
96/R/c5/10 Long Term Experiment

W. Wheat 35th Year 1996¹⁶
Sowing 1 1996

Species: S.P.M.C. Grade

TREATMENTS
Residual effects of date applied 1962-87 (total 4/ha):

- (-) None
- (L) 15
- (M) 24.5
- (H) 52.5

Residual effects of P applied 1962-88, water varied with crops & years:

- (-) None
 - (P1) 15
 - (P2) 24.5
 - (P3) 52.5
- Subplot in 1996 on calcium sulphate in spring: (Cumulative to 1991=95)
- S None, 30 kg S/ha

BASAL MANURING in ha

No P or K
N in spring as SFP

VARIETY

Hereward or Panocline,
sown at 580 seeds/m²
on 28/9/95

PILOT AREA

DESIGN
2 blocks of 4x4 plots with 2 sub plots
6 m x 6.1 m = 0.0097 ha
6 m x 6.5 m = 0.0039 ha
11 Replications of experimental, to S.P.M.C. Grade

