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ROTHAMSTED
RESEARCH

Collection of Plans for the Rothamsted Long-term Liming Experiment

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Default Title

Rothamsted Research

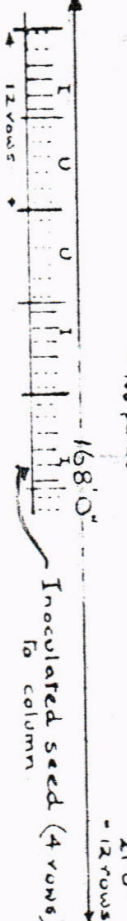
Rothamsted Research (1962-1996) *Default Title* ; Collection Of Plans For The Rothamsted Long-Term Liming Experiment, pp 1 - 29

Rothamsted Long Term Liming

Spring Beans
Sawyers I 1962
1st year.

CWC

LIME	a1	b1	a2	b2	a3	b3	a4	b4	a5	b5	a6	b6	a7	b7	a8	b8
P	-	-	-	-	63	21	-	-	63	21	42	21	63	21	63	63
PH	5.0	5.2	5.1	4.9	5.1	4.9	4.8	4.8	5.3	5.3	4.8	5.3	5.3	5.1	5.4	5.4
	42	-	2	21	42	42	63	63	42	42	63	63	42	42	42	42
	-K	-	-	-	P/K	K	K	P/K	P/K	P/K	K	P/K	P/K	P	P	P
	5.1	5.0	5.1	5.0	5.1	5.0	5.0	5.0	5.1	5.1	4.9	5.1	5.1	5.1	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	42	42	42	42	42	42	42	42
	K	P/K	-	P	P	K	P/K	P	63	63	63	63	63	63	63	63
	5.2	5.2	5.3	5.1	5.1	5.1	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
	PK	U:I	K	P/K	K	U:I	P	U:I	U:I	U:I	U:I	U:I	U:I	U:I	U:I	U:I
	1:0	5:2	5:1	5:0	5:0	5:0	5:0	5:0	5:0	5:0	5:0	5:0	5:0	5:0	5:0	5:0



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 Experiment
 Spring Beans
 Sawyers I 2nd year 1963

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 40 gal.

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

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

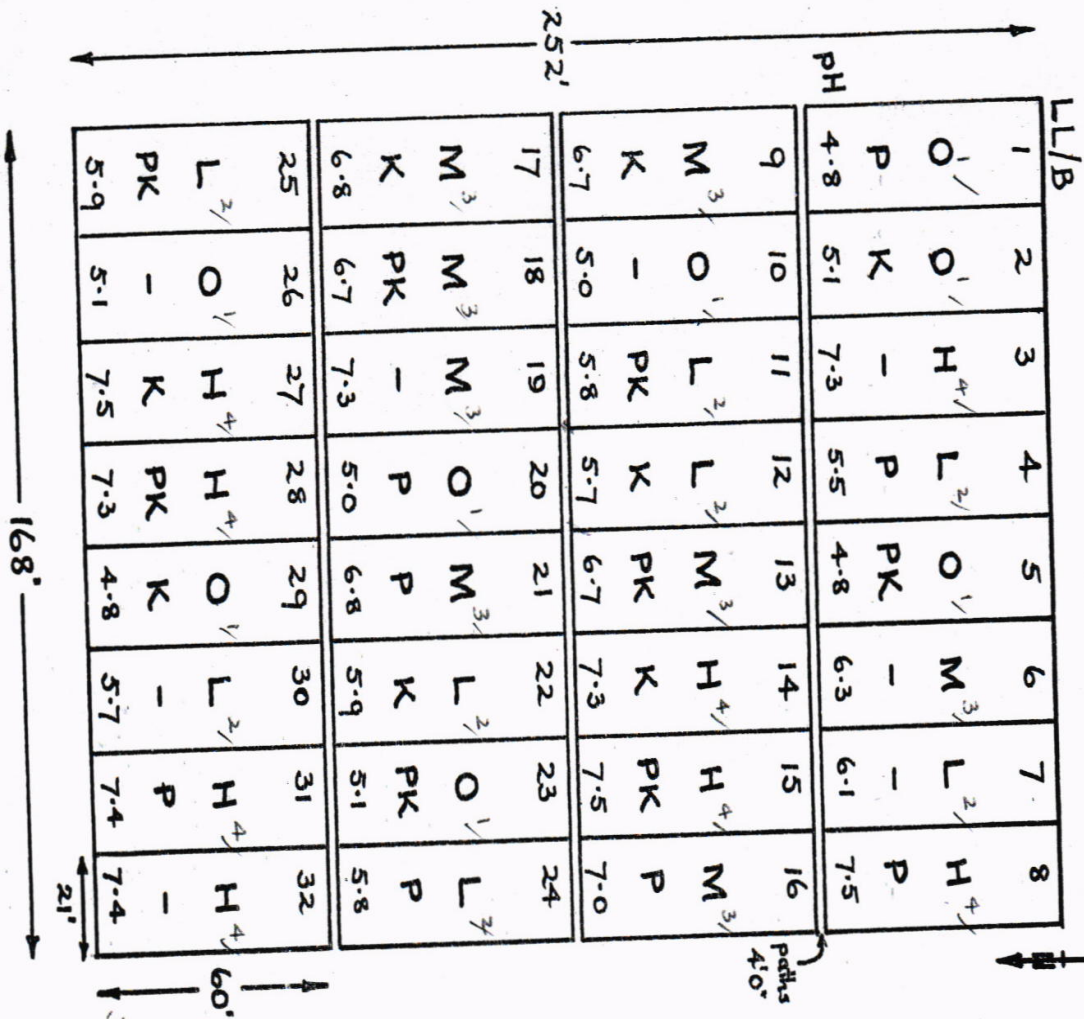
Symbols: V. Very low PH. L. Low
 M. Medium H. High PH.

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



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

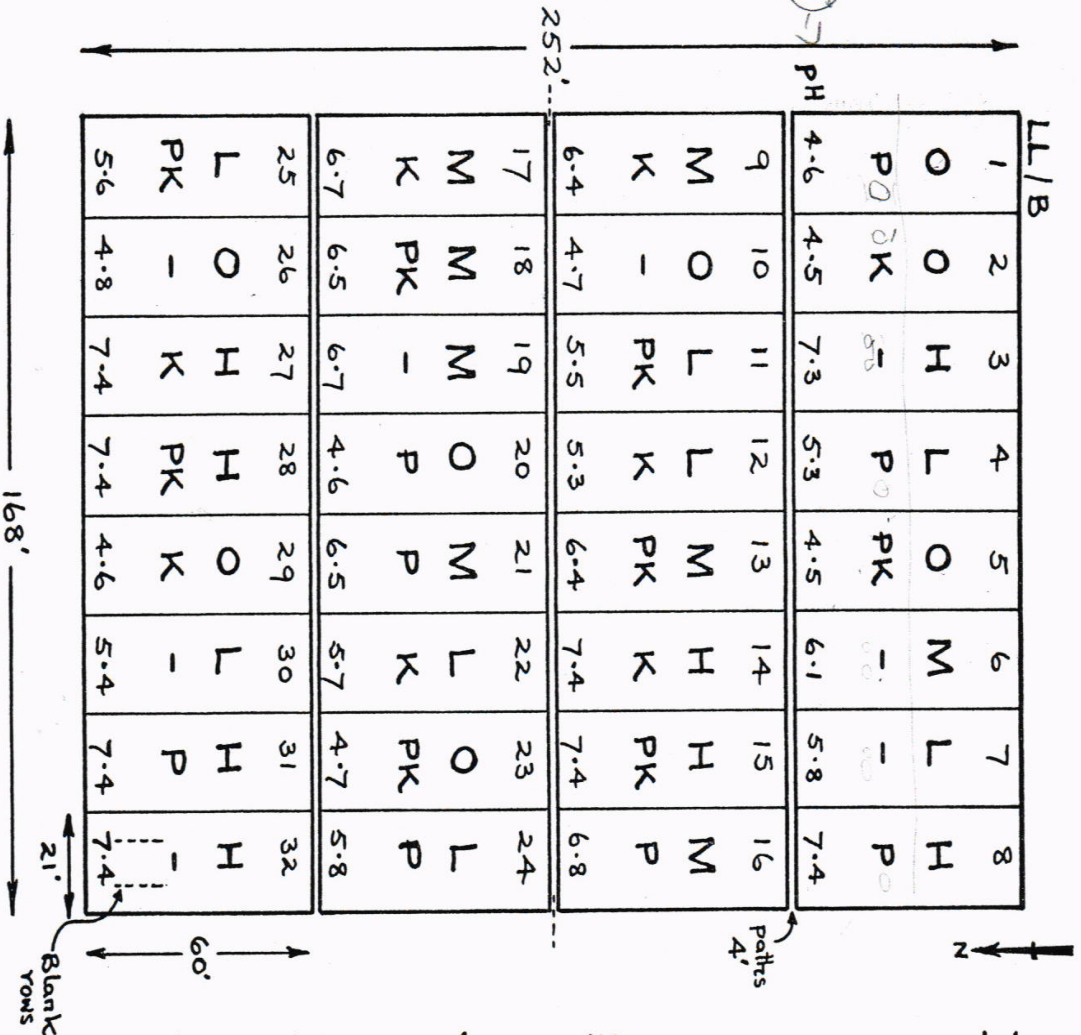
C/3

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



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 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: 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

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	-	O	P ^o	OK	O	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	OK	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'

Paths 4'

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

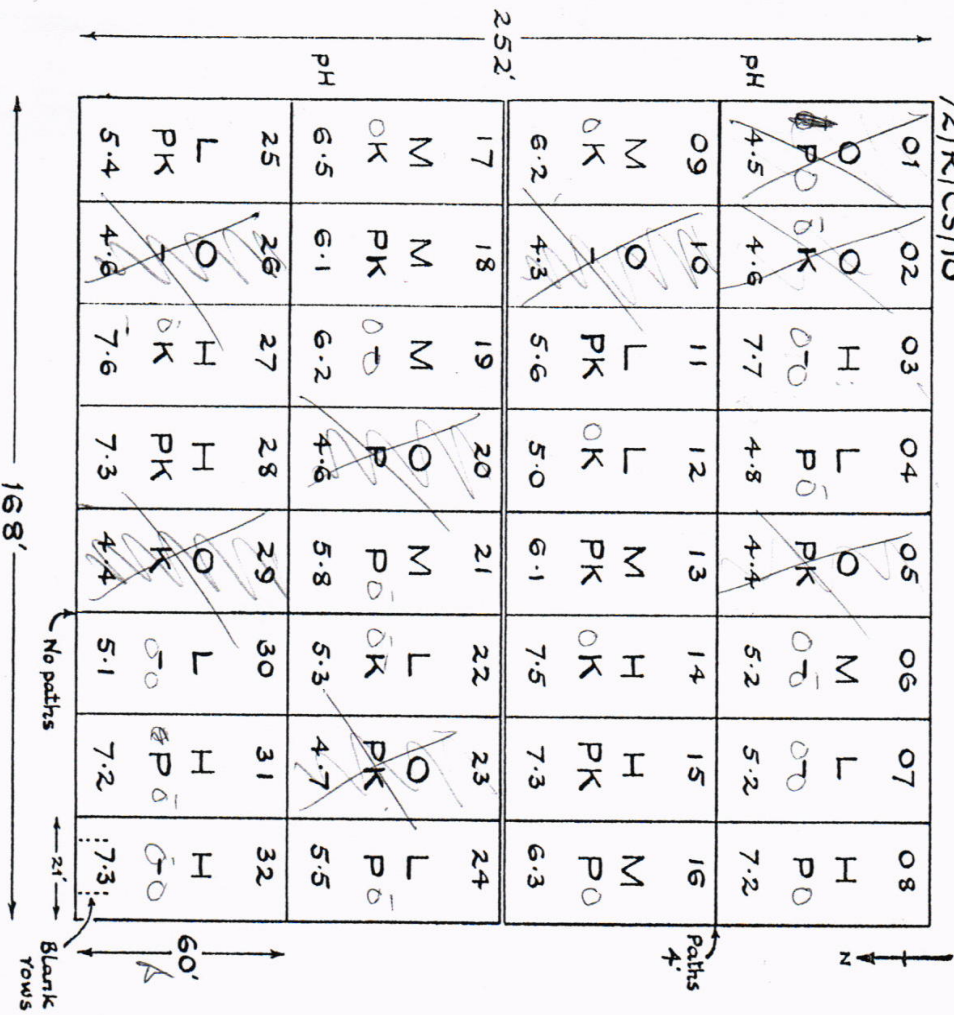
Plot area: 21' x 60' = 0.0289 acre (0.012 ha)

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 'Milstem'.

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

73/R/CS/10

Lime
P₂O₅
K₂O

PH	01	02	03	04	05	06	07	08
	4.5	4.4	7.5	5.1	4.5	5.5	5.4	7.4
	01	02	03	04	05	06	07	08
	09	10	11	12	13	14	15	16
PH	6.0	4.4	5.2	5.0	6.0	7.0	7.0	6.4
	M	-	L	-	M	H	H	M
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
PH	17	18	19	20	21	22	23	24
	6.3	6.0	6.3	4.4	5.8	5.3	4.6	5.4
	M	M	M	-	M	L	-	L
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
PH	25	26	27	28	29	30	31	32
	5.2	4.4	7.1	7.0	4.4	4.9	7.0	7.3
	L	0	H	H	0	L	H	H
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

252'

168'

No paths

21'

Blank rows

60'

Paths

Barley

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

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)

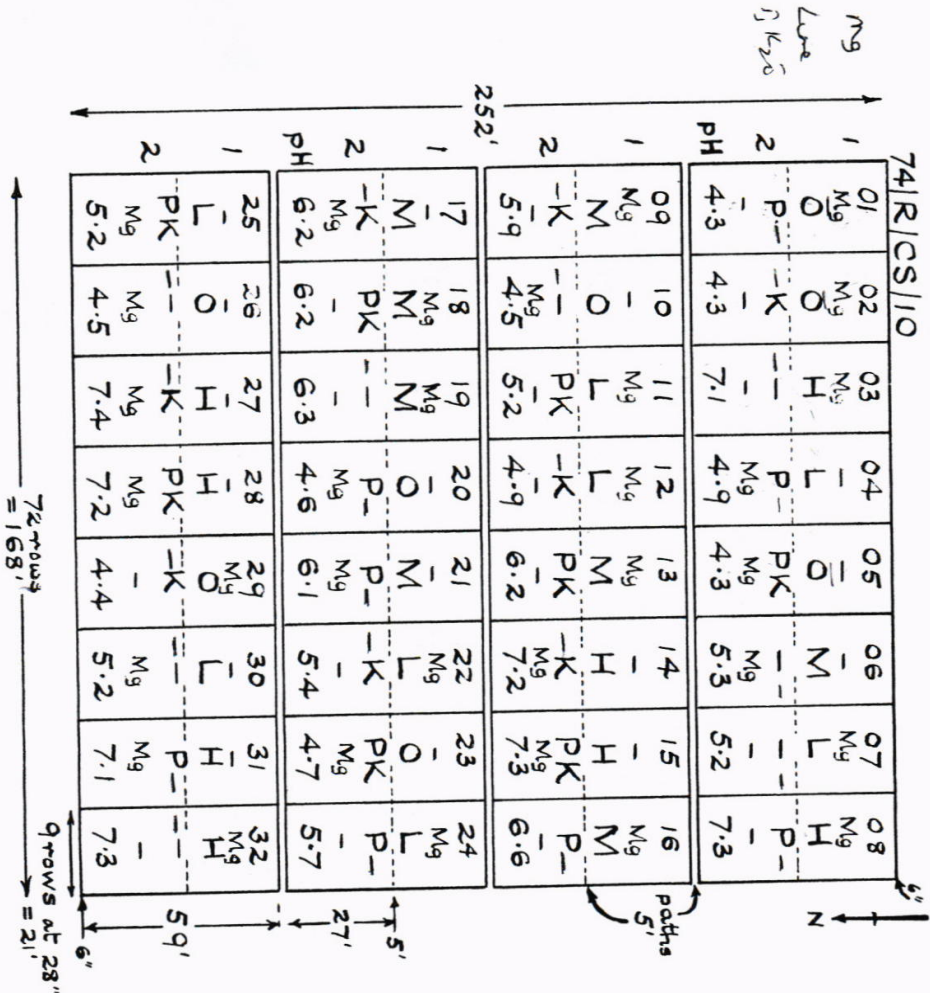
Harvested: 9'4" x 60' = 0.0129 acre (0.0052 ha)

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

Rothamsted LONG TERM LIMING

SAWYERS 13th Year 1974

Sponsor : J. Bolton



Potatoes

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 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)

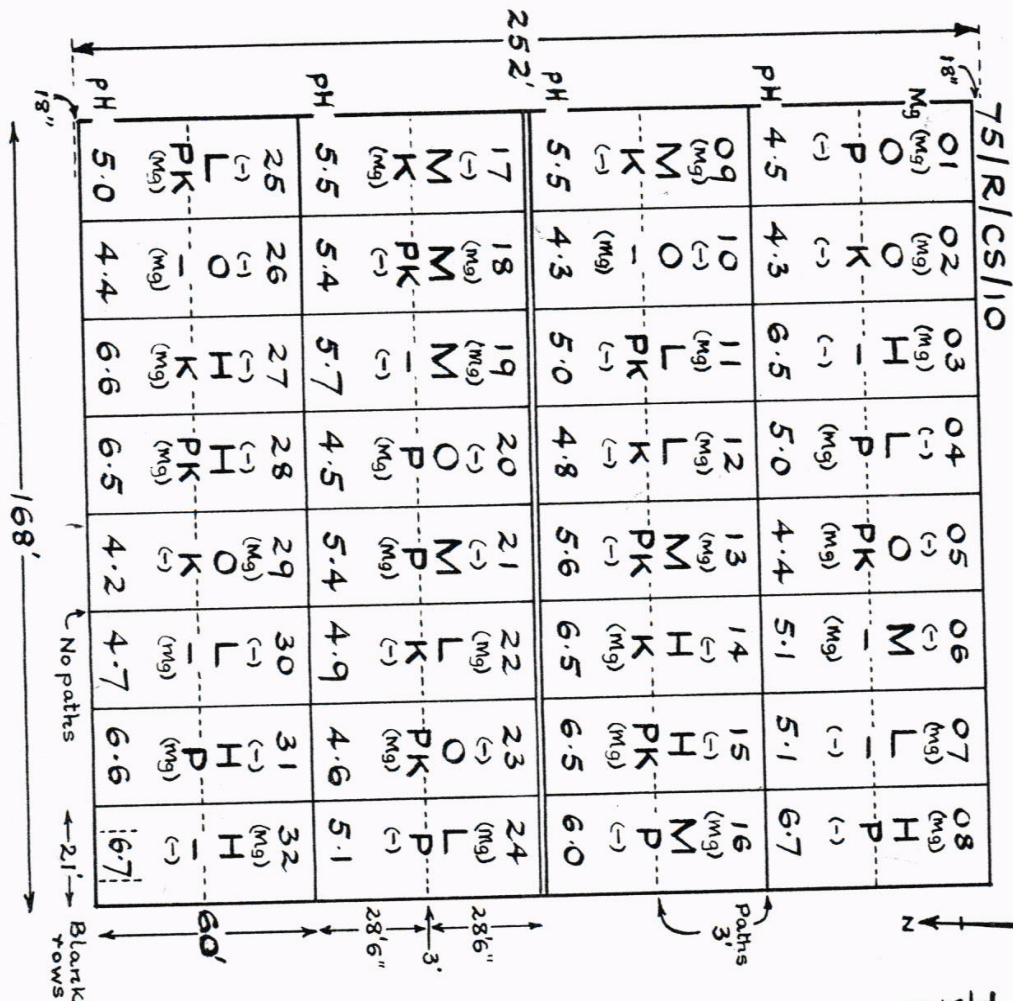
Previous Cropping:
1962-64 spr. beans, 1965-67 barley,
1968 potatoes, 1969 fallow, 1970-73 barley

SA

Rothamsted LONG TERM LIMING

Spring Oats

SAVYERS 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 } broadcast

K 1.0cwt (125 kg) K₂O as muriate of potash } 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

Plot	Liming	PH	Liming	PH	Liming	PH	Liming	PH	Liming	PH	Liming	PH
01	Mg	4.5	Mg	4.3	Mg	5.0	Mg	4.8	Mg	5.6	Mg	6.0
02	Mg	4.3	Mg	4.3	Mg	5.0	Mg	4.3	Mg	5.6	Mg	6.0
03	Mg	5.5	Mg	5.5	Mg	5.0	Mg	5.0	Mg	5.6	Mg	6.0
04	Mg	5.0	Mg	5.0	Mg	5.0	Mg	5.0	Mg	5.6	Mg	6.0
05	Mg	4.4	Mg	4.4	Mg	5.0	Mg	5.0	Mg	5.6	Mg	6.0
06	Mg	5.1	Mg	5.1	Mg	5.0	Mg	5.0	Mg	5.6	Mg	6.0
07	Mg	5.1	Mg	5.1	Mg	5.0	Mg	5.0	Mg	5.6	Mg	6.0
08	Mg	6.7	Mg	6.7	Mg	5.1	Mg	5.1	Mg	5.6	Mg	6.0

Sown by Nordstern drill in 8" rows

168'

No paths

21' rows at 8"

Spr. 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 26 Mar

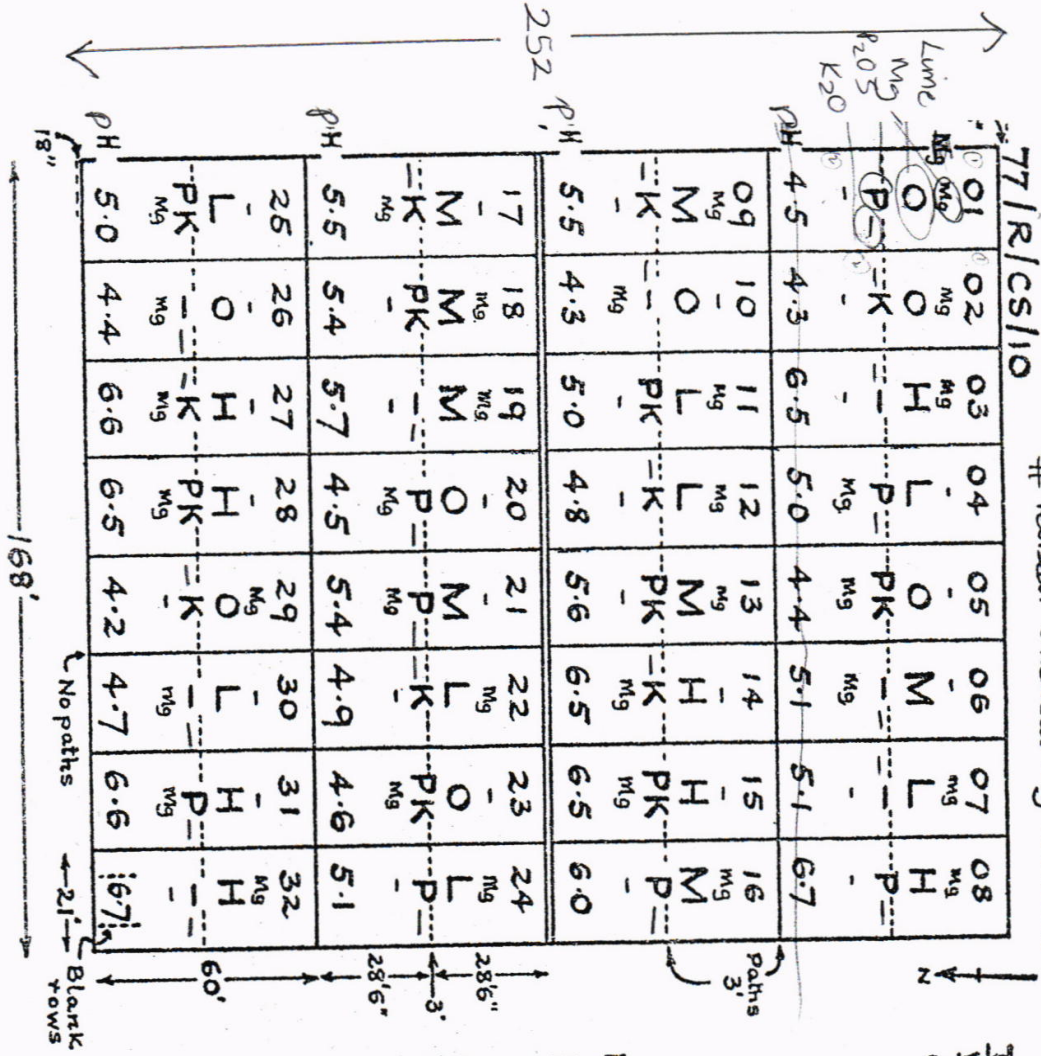
Design: 2 blocks of 16 plots split into 2

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)

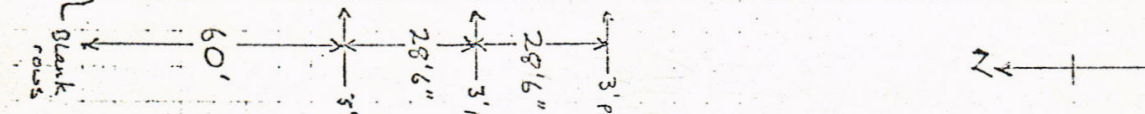
Previous Cropping

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
	O	O	H	P	PK	L	L	H
	P	K	-	Mg	Mg	Mg	-	P
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	-	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	L	PK	L
	Mg	-	-	Mg	Mg	-	Mg	-
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	-



Barley
SAVYER, I 19th Year 1978
Sponsor - J. Bellin

TREATMENTS

Whole Plots

O, L, M, H

PH

P

K

per acre (hectare)

None, 2, 4, 8 tons (0, 5, 10, 20 tonnes)
CaCO₃ as ground chalk (1962-63)

PH of soil sample taken Jan 1975

0.5 cast (65 kg) P₂O₅
as superphosphate

1.0 cast (125 kg) K₂O
as muriate of potash

Half Plots

None, 100 lb (112 kg) Mg as kieserite
1974-77 (except 1975) Mg as Epsom salt

Basal manuring per acre (hectare)

Nitro-chalk only at 336 lb (377 kg)

Variety

Porthos at 140 lb/acre (157 kg/ha)
sown 19 April

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. ONY'S

SPRINKERS I 20th YEAR 1981

Sponsors: S. McGrath, 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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (P)P1 (-)K
5.5	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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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 H (P)P2 (K)K	Mg M (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

Sampling over 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

215E 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 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' ←

60' ←

3' part

10 parts

10 parts

21'

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

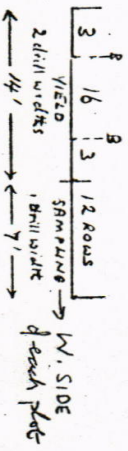
N Nitro chate at 80 kg N ha⁻¹
 K Murate of potash at 120 " " K "
 Mg Epsom Salts at 40 " " Mg "

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)

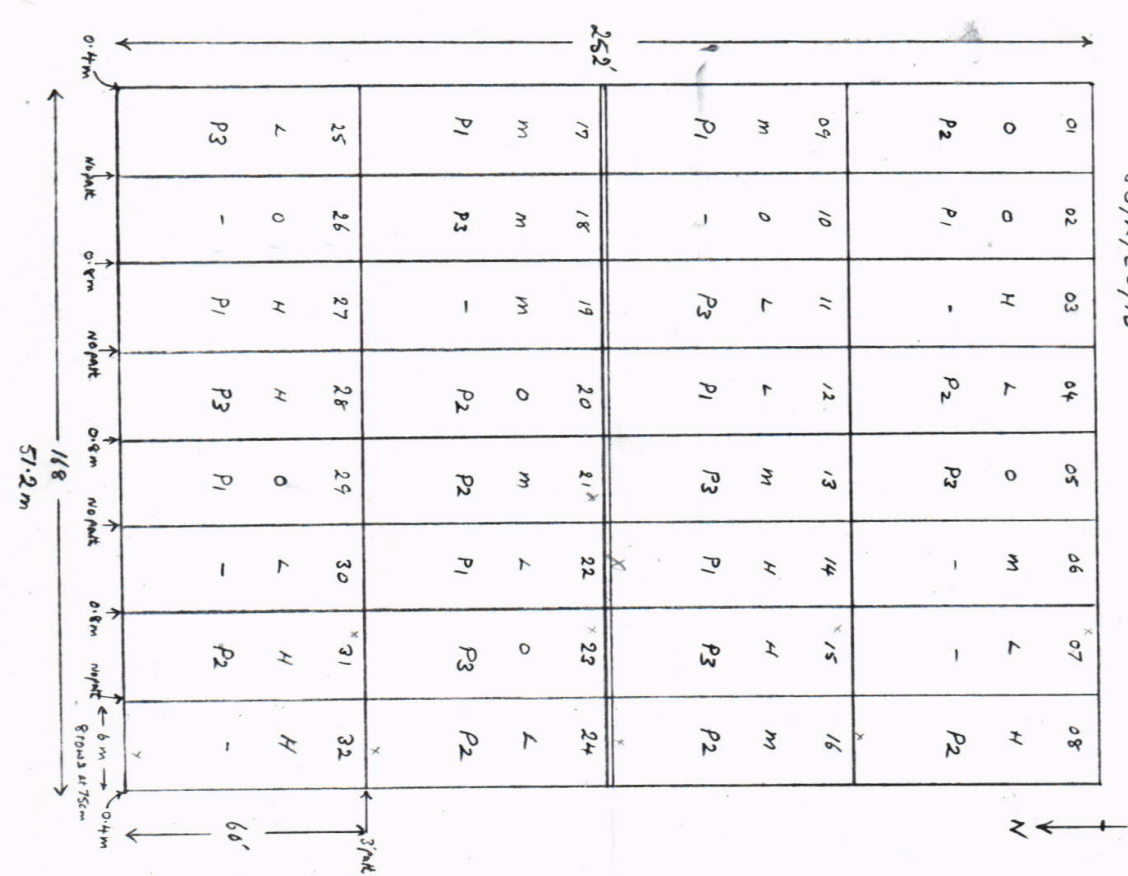
PLOT ARRANGEMENT



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

ROTHAMSTED LONG TERM LIMING
83/K/CS/10

POTATOES SAWYERS I 22nd YEAR 1983
Sponsors: S. McGrath, D.P. Stribley



TREATMENTS OF P+K

until winter 1978	1981	1982	Rate of P in 1982	1983	Rate of P in 1983
-	-K	K	None	-K	None
P1	K	PK	50 kg P ha ⁻¹	-K	50 kg P ha ⁻¹
P2	P	PK	None	P2K	50 kg P ha ⁻¹
P3	PK	PK	50 kg P ha ⁻¹	P2K	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

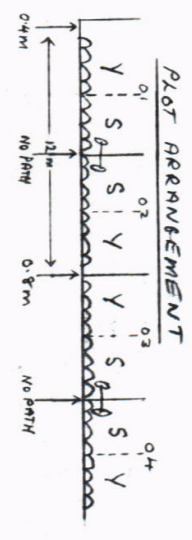
TIME TREATMENTS

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

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

VARIETY Pentland Crown
DESIGN 2 blocks of 16 plots

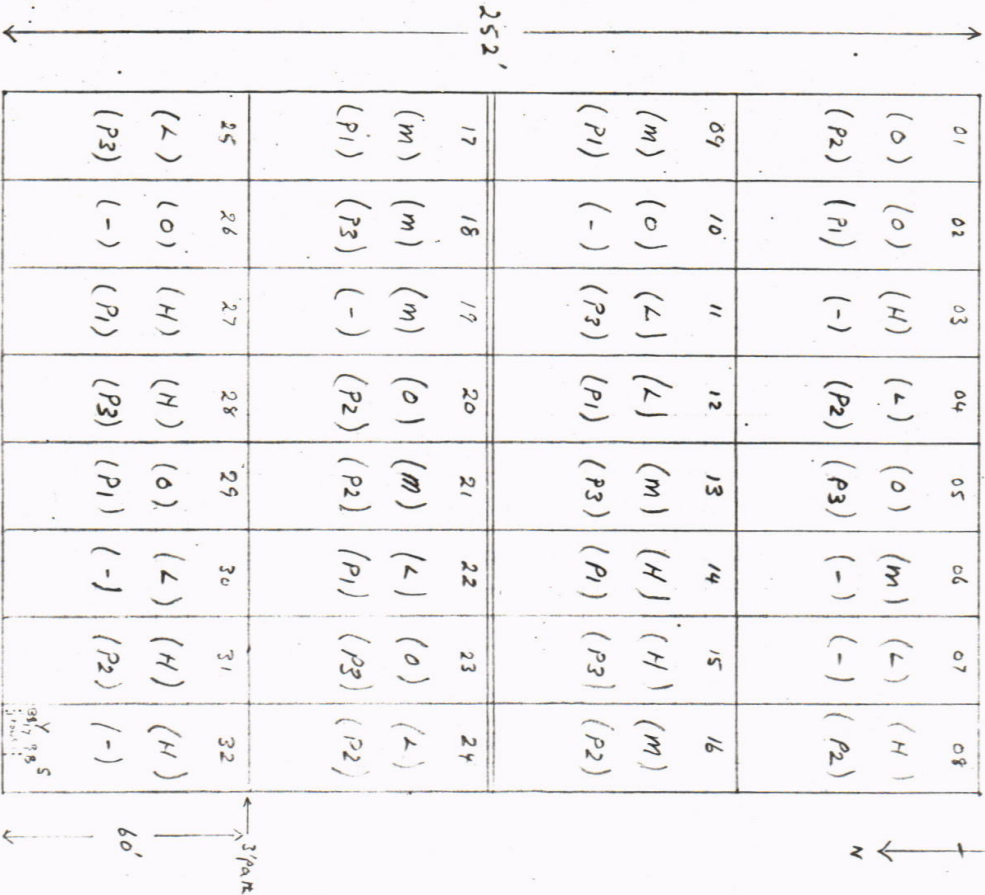
PLOT AREA 21' x 60' = 0.029 ac (0.0117 ha)
harvest 2 rows x 60' = 0.0068 ac (0.0027 ha)



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
(P1)	K	25 kg/ha	P2K 50 kg P/ha
(P2)	P	P1K 25 "	- K
(P3)	PK	P3K 75 "	P2K 50 kg P/ha

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
(O)	None	None	0
(L)	7	2	14
(M)	15	5	23
(H)	30	10	50

BASAL MANURING

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

VARIETY

Kilacorn, sown at 157 kg/ha as 18 March

DESIGN

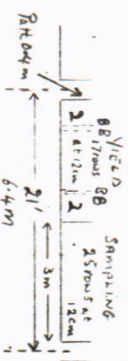
2 blocks of 16 plots.

PLOT AREA

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

Harvest - 17mm P12a x 60' = 0.0037 ha

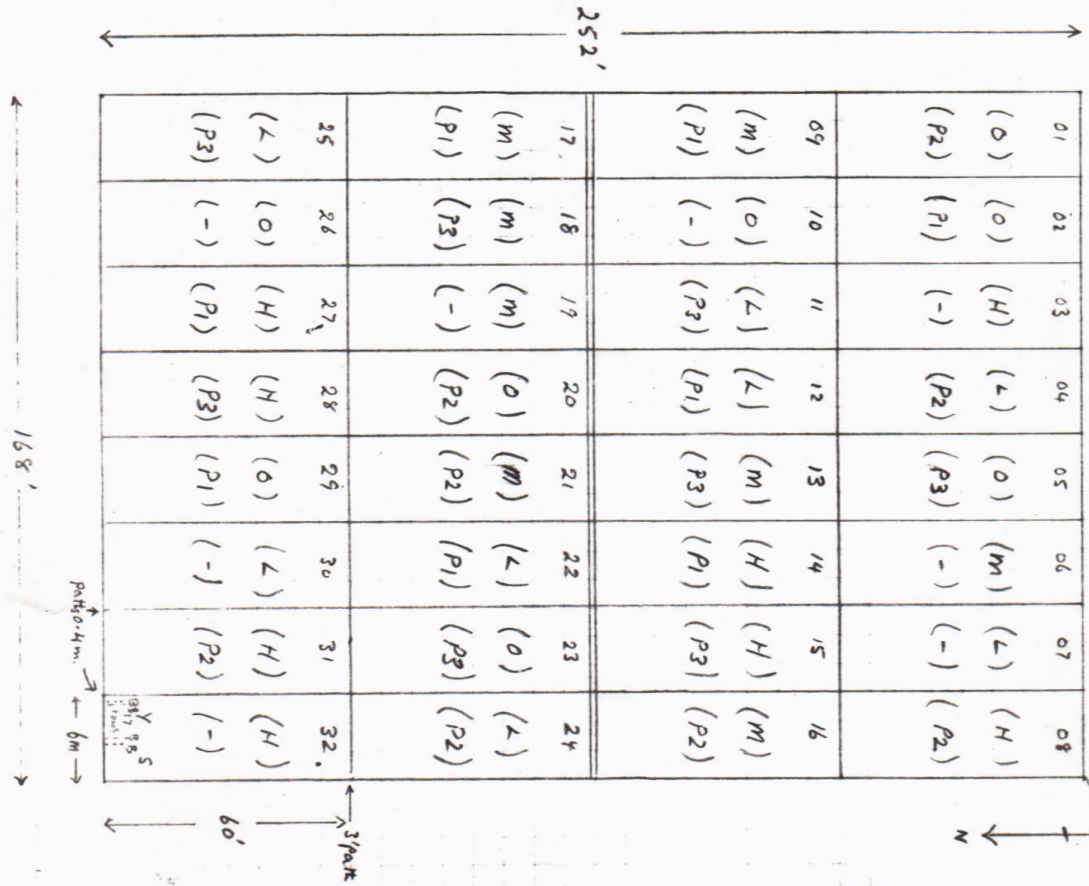
PLOT ARRANGEMENT



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

untillimber 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)	PK 25 kg/La	P2K 50 kg P/La	- K None
(P2)	P PK 25 " "	- K None	P2K 50 kg P/La
(P3)	PK P2K 75 " "	P2K 50 kg P/La	P2K 50 " "

P+K until 1978 cumulative, rates depended on crop

In 1981
K 120 kg K/La

LIME TREATMENTS UNTIL 1983

(O)	None	None	None	Return/ha d c/La
(L)	7	2	5	= 14
(M)	15	5	3	= 23
(H)	30	10	10	= 50

BASAL MANURING

N in spring

VARIETY

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

DESIGN

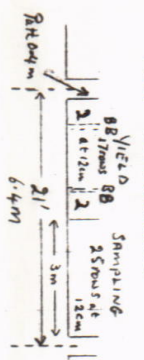
2 blocks of 16 plots

PLOT AREA

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

Hurf-Trossel 12m x 60' = 0.0037 ha

PLOT ARRANGEMENT



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

Rollamster Long Term Experiment

87/R/cs/10

S. Lupton 26th Year Samplers I 1987

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

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, used to be unvarietal

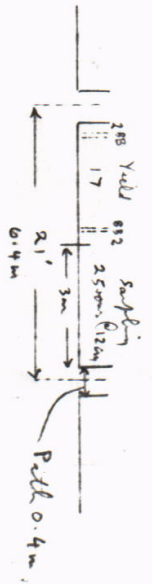
PLOT AREA

6m x 6.0' = 0.0119 ha
Sum @ 31 mow by ha⁻¹
Ringsbum
Har: 17mm @ 12mm x 28.6" = 0.0018 ha

DESIGN

2 total of 16 plots
plot size 2

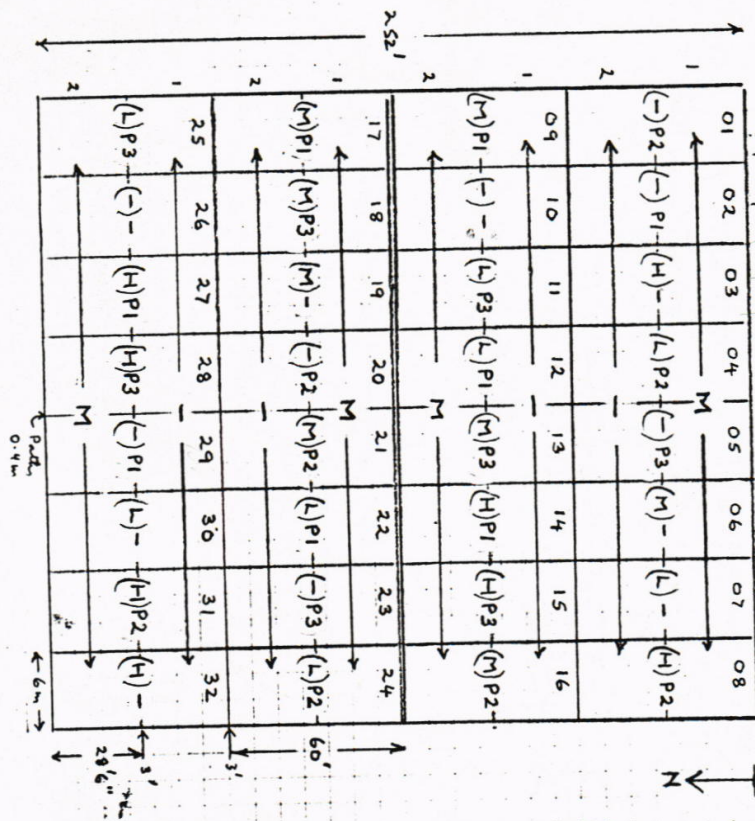
DRILLING



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	←	←	(L P3)	(- P1)	(L P1)	(L -)	(H P2)	(H -)
2	←	←	(L P3)	(- P1)	(L 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 wheelings

Rothamsted Long Term Liming
98/R/c5/10



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

Limed 27th Year
Sponsor: S.P. McGrath
Savoyers I
1988

TREATMENTS

- Revised effects of previous rates of chalk (total applied 1962-87 t/ha):
- (-) None
 - (L) 15
 - (M) 24.5
 - (H) 52.5

P applied Autumn 1987 Kg P₂O₅/ha, cumulative to previous dressings

- None
- P1 25
- P2 25
- P3 75

Manganese sprayed in 1987

- None
M* sprayed at rates of nutrients to be added

BASAL MANURING per ha.

- K at 80 kg
- Mg at 40 kg
- N at 86 kg

VARIETY

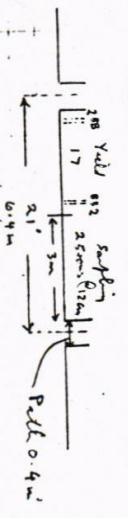
Antares sown on 13 April at 87 kg/ha

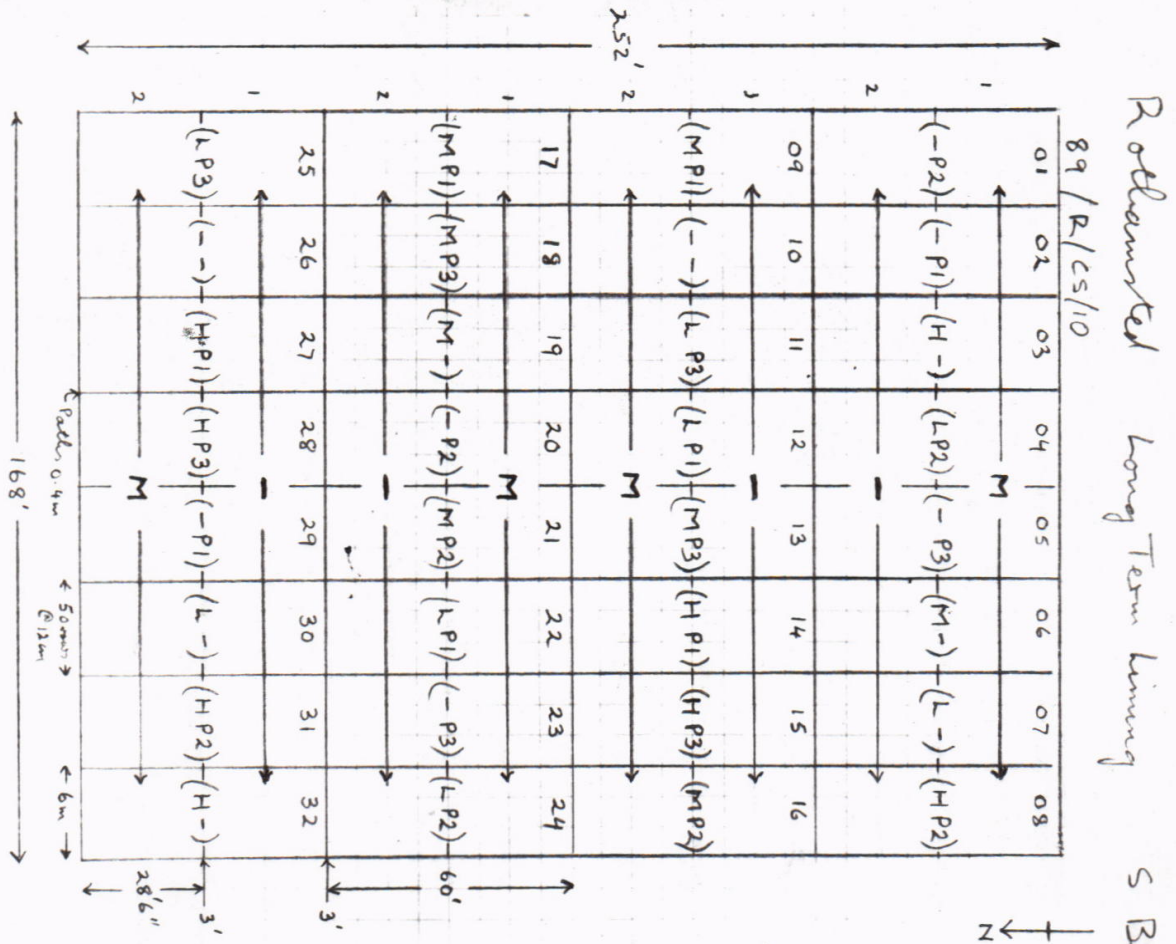
PLOT AREA

6m x 60' = 0.0110 ha
Har: 12m x 28.6m = 0.0018 ha

DESIGN

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

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

Management strategy - 1989, cumulative to previous applications

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

BASAL MAUURING

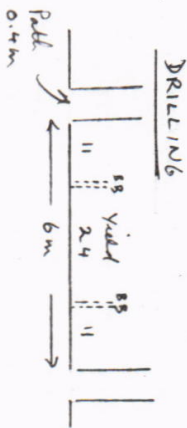
None

VARIETY	DESIGN
Agripear	2 trials of 16 plots each

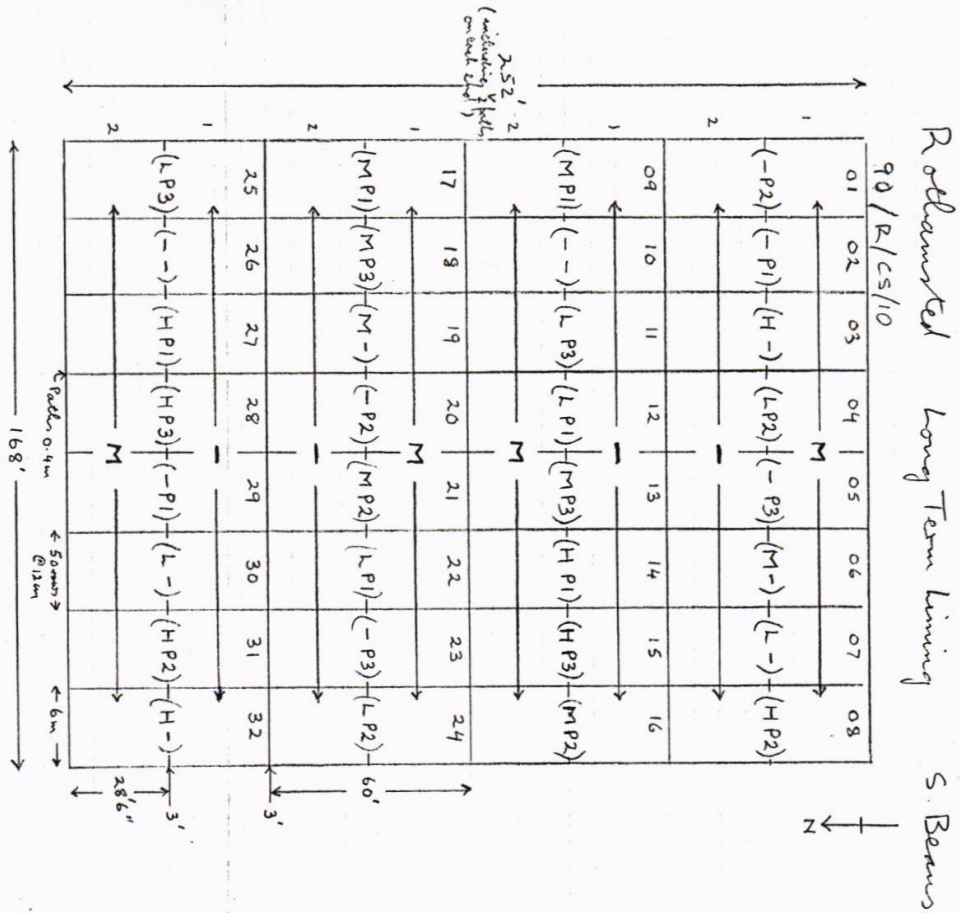
PLOT AREA

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/collectings.



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

19

TREATMENTS

Random effects of date applied 1962-87 (total 5/ha):

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

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

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

Management of crops in 1990: cumulative to previous applications, 10t/ha

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

None

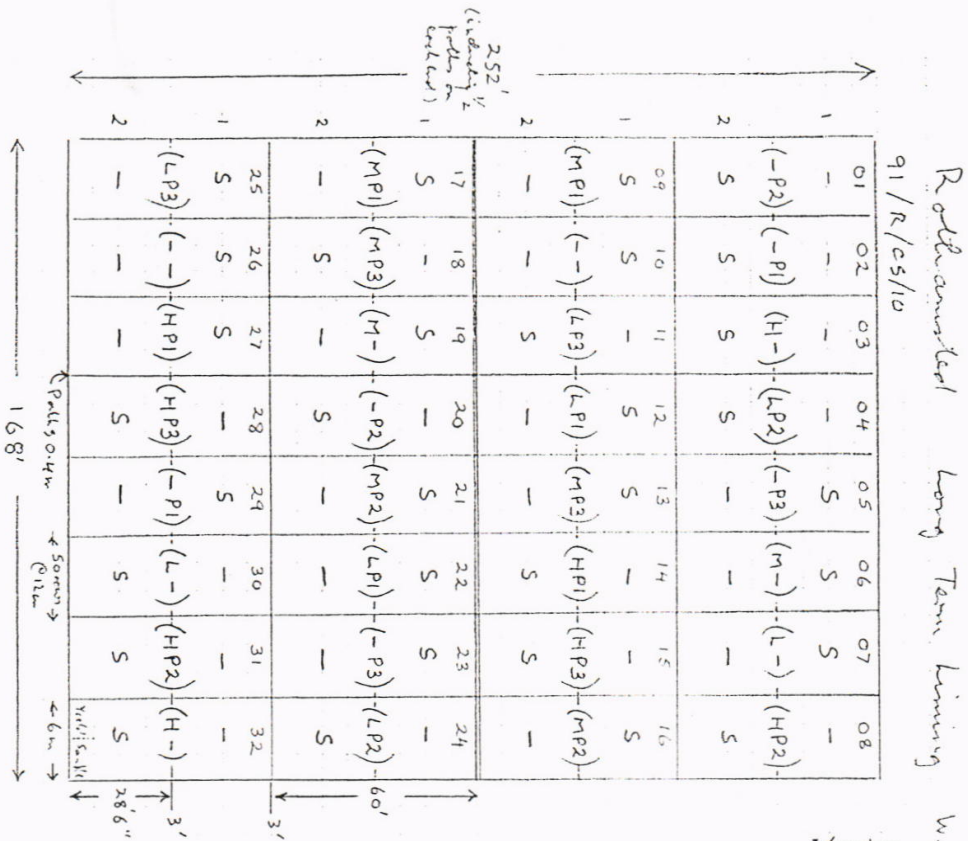
VARIETY DESIGNED PLOT AREA

Admiral 2 stands of 16 plots each 6m x 6m = 0.0110 ha
 at 200g/ha on 6 March
 New 24 rows 12m x 286" = 0.0035 ha

II * Yield applied 4 SPM

III - All operations by Farm

* M applied by spray: rows
 strips of grass - plots, of strips
 to travel over 1" and plots on
 each occasion to spray/1
 collection.



Wildfield Road 30th Year Summer I 1991 16

Sponsor: S.P. McGeil, P.B. Bamberg, G.F. McGeil

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

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

Random 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 per ha

(25:0:16) at 200 lb/ha wetter
+ 400 lb Mg spring wetter
N spring wetter SFP wetter

VARIETY
Lidmaro, sown at 6 kg/ha on 31 August, 1990

PLOT AREA
6m x 6m = 0.0110 ha

- || All operations by Farm
- || Repro all agrochemicals & SPM
- || To be netted

Rothamsted Long Term Experiment
92/R/05/10

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

Sponsors: S.P. Mc Gable, P.B. Brammley, G.F.I. Midford

TREATMENTS

Residual effects of dress applied 1962-87 (total £/ha):

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

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

- (-) 0
- (P1) 15
- (P2) 30
- (P3) 45

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
+ 400 kg of spring not containing sulphate

N = spring at 50 kg/ha

DESIGN

2 blocks of 4x4 plots

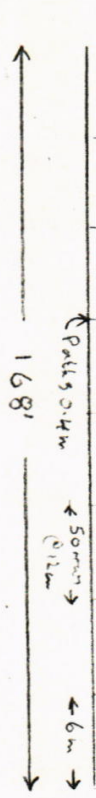
All operations by Tom

Reps not agreed to SPM

To be noted

VARIETY
Liberum, mean at 4/ha
on
6m x 60' = 0.0110

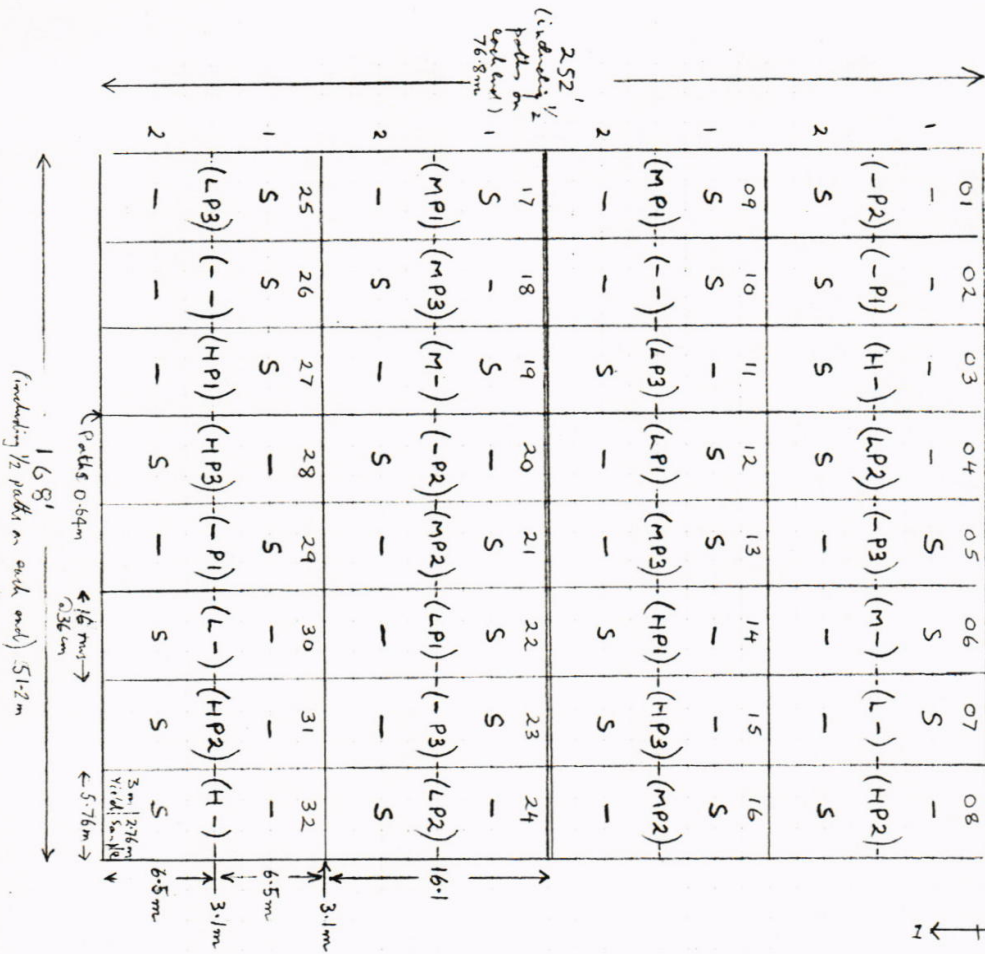
	01	02	03	04	05	06	07	08
1	-	-	-	-	S	S	S	-
2	S	S	S	S	-	-	-	S
1	09	10	11	12	13	14	15	16
1	S	S	-	S	S	-	-	S
2	-	-	S	-	-	S	S	-
1	17	18	19	20	21	22	23	24
1	S	-	S	-	S	S	S	-
2	-	S	-	S	-	-	-	S
1	25	26	27	28	29	30	31	32
1	S	S	S	-	S	-	-	-
2	-	-	-	S	-	S	S	S



25' x 25' (including paths for each row)

Roth's experimental Long Term binning

93/R/c5/10



W. Lupton 32nd Year Sample I 1993¹⁶

Species: S.P.M. Gault, P.B. Bannocklyk, G.F. I. Midford, J.H. Day

TREATMENTS

Residual effects of Palk 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

None

VARIETY

CH 304, sown at

DESIGN

2 blocks of 4x4 grids with 2

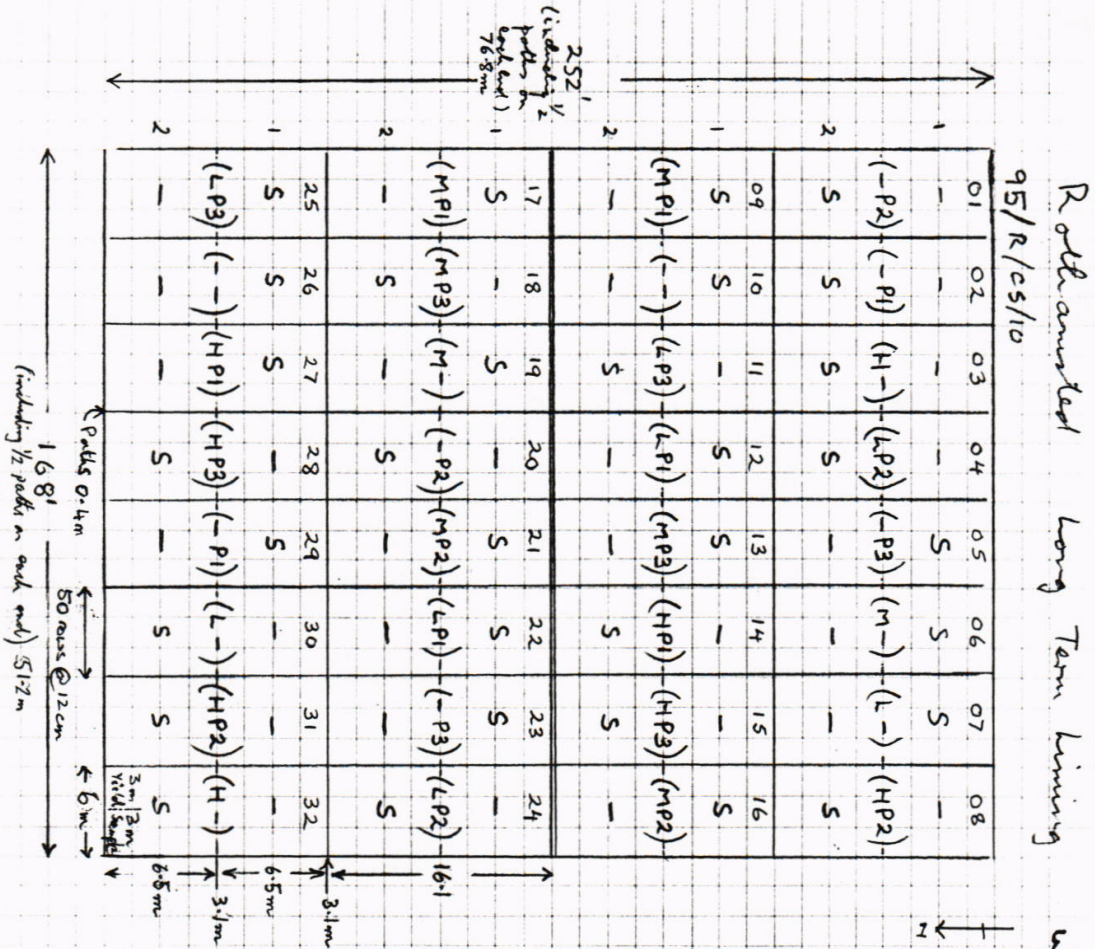
|| All operations by Farm

|| Residuals agreed towards to SPM

PLOT AREA

5.76m x 16.1m = 0.009 ha

Sub plot 5.76m x 6.5 = 0.0037 ha



W. Wheat 34th Year
 Sponser: S.P.McGrath
 Survey I 1995¹⁶

TREATMENTS
 Residual effects of liming applied 1962-87 (total 6/ha):

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

Residual effects of P applied 1962-88, not recorded with other systems:

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

Subplot - 1995m calcium sulphate - young: (Cumulative to 1991-94)
 - S None, 30 kg S/ha

BASAL MANURING per ha
 No P or K
 N in spring on S.F.P.

VARIETY
 Genesis, sown at

PLANT AREA
 6m x 6.1m = 0.0097 ha
 Sub plot
 6m x 6.5 = 0.0039 ha

DESIGN
 2 blocks of 4x4 plots with 2
 All operations by Farm
 11 Reps with hydrochloric acid to S.P.McGrath

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

W. Wheat 35th Year Sowing 1966

Species: S.P.M.C. Grate

TREATMENTS

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

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

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

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

Subplot = 1996a calcium subplot = spring; (Cumulative to 1991 = 95)

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

PLOT AREA

6 m x 6.1 m = 0.0097 ha
Sub plot
6 m x 6.5 = 0.0039 ha

DESIGN
2 blocks of 4x4 plots with 2
|| All operations by Farm
|| Residuals applied, to S.P.M.C. Grate

