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Exhaustion Land Experiment plans and fertilizer treatments, Phases I & II, 1856-1939

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Description: Plans and details of the fertilizer treatments and total nutrients applied to the Rothamsted Exhaustion Land Experiment, Phase I (1856-1901) and Phase II (1902-1939), not to scale.

- **Page 1:** Cover page
- **Page 2:** Experiment overview, 1856-present day
- **Pages 3-4:** Experiment plan Phases I and II
- **Page 5:** Total nutrients applied, Phase I

Site: R/EX/4. Hoos Field, Rothamsted Experimental Farm, Rothamsted Research, West Common, Harpenden, Hertfordshire, AL5 2JQ, UK. Latitude 51.812883, Longitude -0.375931

Derived from:

- Rothamsted Experimental Station (1970) *Details of the Classical and Long-Term Experiments up to 1967*, Rothamsted Experimental Station, Lawes Agricultural Trust, Harpenden UK **DOI:** [10.23637/ERADOC-1-192](https://doi.org/10.23637/ERADOC-1-192)
- Rothamsted (1991) *Guide to the Classical Field Experiments*, Rothamsted Experimental Station, Lawes Agricultural Trust, Harpenden UK **DOI:** [10.23637/ERADOC-1-189](https://doi.org/10.23637/ERADOC-1-189)
- Johnston, A. E. and Poulton, P. R. (1977) "Yields on the Exhaustion Land and changes in NPK content of the soils due to cropping and manuring, 1852-1975", Rothamsted Experimental Station Annual Report for 1976, Part 2, (53-85) **DOI:** [10.23637/ERADOC-1-34447](https://doi.org/10.23637/ERADOC-1-34447)

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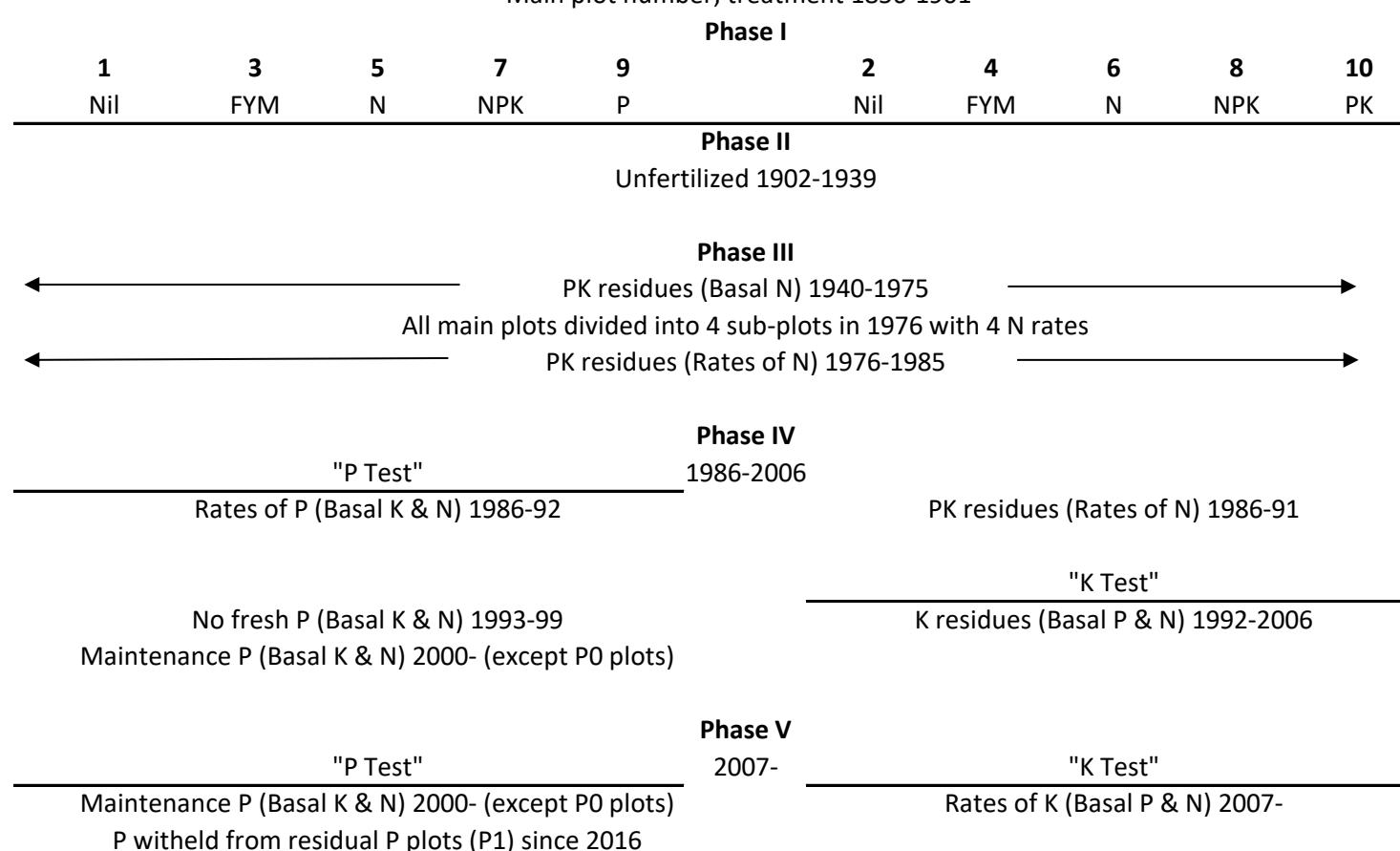
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Exhaustion Land Experiment overview

Main plot number; treatment 1856-1901*



Cropping: 1856-1875 winter wheat; 1876-1901 potatoes. Spring barley most years 1902-1991, fallow in 1920, 1967 & 1975. Winter wheat since 1992 (except in 2001 when w.wheat failed and the experiment was re-sown to spring wheat)

* See 'Exhaustion Land plan & fertilizer treatments, Phases I & II' for full details of fertilizer treatments 1856-1901

Sources of data:

Johnston, A. E. and Poulton, P. R. (1977) "Yields on the Exhaustion Land and changes in NPK content of the soils due to cropping and manuring, 1852-1975", Rothamsted Experimental Station Annual Report for 1976, Part 2, 53-85

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Johnston, A.E., Poulton, P.R., White, R.P. and Macdonald, A.J. (2016) "Determining the longer term decline in plant-available soil phosphorus from short-term measured values", Soil Use and Management doi:10.1111/sum.12253

[DOI: 10.1111/sum.12253](https://doi.org/10.1111/sum.12253)

Poulton, P. R. , Johnston, A. E. and White, R. P. (2013) "Plant-available soil phosphorus. Part I: the response of winter wheat and spring barley to Olsen P on a silty clay loam", Soil Use and Management, 29, 4-11

[10.1111/j.1475-2743.2012.00450.x](https://doi.org/10.1111/j.1475-2743.2012.00450.x)

Exhaustion Land Experiment Plan

1856-1901

Phase I

↗ N

1902-1939

Phase II

Plot No.

Plot 10	Plot 8	Plot 6	Plot 4	Plot 2	1876-1975
W wheat (1856-1875) PKNaMg	W wheat (1856-1875) NPKNaMg	W wheat (1856-1875) N	W wheat (1856-1875) Nil	W wheat (1856-1875) Nil	
Potatoes (1876-1901) PKNaMg	Potatoes (1876-1901) N*PKNaMg	Potatoes (1876-1901) N*	Potatoes (1876-1901) FYM (N*P)	Potatoes (1876-1901) Nil (FYM)	
Cereals (1902-39) Nil	Cereals (1902-39) Nil	Cereals (1902-39) Nil	Cereals (1902-39) Nil	Cereals (1902-39) Nil	
Plot 9	Plot 7	Plot 5	Plot 3	Plot 1	1876-1975
W wheat (1856-1875) PKNaMg	W wheat (1856-1875) NPKNaMg	W wheat (1856-1875) N	W wheat (1856-1875) Nil	W wheat (1856-1875) Nil	
Potatoes (1876-1901) P	Potatoes (1876-1901) NPKNaMg	Potatoes (1876-1901) N	Potatoes (1876-1901) FYM (P)	Potatoes (1876-1901) Nil	
Cereals (1902-39) Nil	Cereals (1902-39) Nil	Cereals (1902-39) Nil	Cereals (1902-39) Nil	Cereals (1902-39) Nil	

(not to scale)

Annual Treatments per hectare, 1856-1901:

Nil : No fertilizer or manure

FYM : 35 of farmyard manure since 1876

Nil (FYM) : FYM 1876-1881, no fertilizer or manure 1882-1901

FYM (P) : FYM plus P until 1882, FYM only 1883-1901

FYM (N*P) : FYM plus N* and P until 1881, FYM plus P 1882, FYM only 1883-1901

N : 96 kg N as ammonium salts (ammonium sulphate & ammonium chloride)

N* : 96 kg N as sodium nitrate

P : 34 kg P (as superphosphate 1876-96, from basic slag 1897-1901)

K : 137 kg K as potassium sulphate (91 kg K 1859-74)

Na : 16 kg Na as sodium sulphate

Mg : 11 kg Mg as magnesium sulphate

1902-1939: No fertilizer or manure applied, cereals grown most years

Previous cropping:

1852-1855 The 'Lois Weedon' plots, which tested different methods of husbandry.
No fertilizer or manure applied to the whole experimental area, w wheat grown.

Sources of data:

Rothamsted (1970) "Details of the Classical and Long-Term Experiments up to 1967",
Rothamsted Experimental Station, Lawes Agricultural Trust, Harpenden UK

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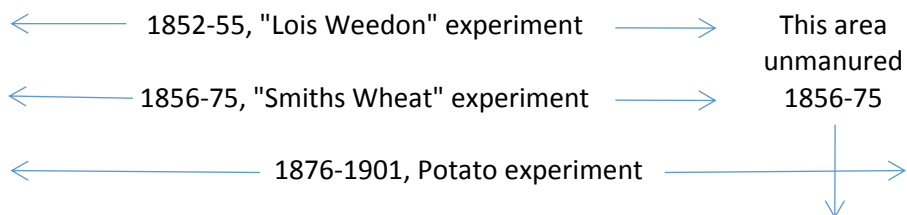
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R/EX/4 Exhaustion Land experiment

Experimental layout and total nutrients applied, Phase I

↗ N



Plot No.	1	2	3	4	5
1856-1875 →	1	2	3	4	
1876-1975 →	10	8	6	4	2
1856-1901 Total nutrients applied in FYM and/or fertilizer kg/ha					
N	0	3870	3870	6364	1344
P	1410	1410	0	1260	235
K	5040	5040	0	3920	900
1876-1975 →	9	7	5	3	1
N	0	3870	3870	5824	0
P	1410	1410	0	1260	0
K	1570	5040	0	3920	0

(not to scale)