

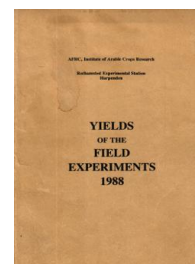
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88/R/RN/17 Rates of P and K to the Subsoil - S. Beans, W. Wheat, Potatoes, S. Barley

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88/R/RN/17

RATES OF P AND K TO THE SUBSOIL

Object: To study the effects of a range of rates and frequencies of application of P and K to the subsoil, singly and together, on the yields and nutrient uptakes of a rotation of crops - Meadow.

Sponsors: J. McEwen, A.E. Johnston.

The eighth year, potatoes, s. barley, s. beans, w. wheat.

For previous years see 81-87/R/RN/17.

Design: 4 series (for crops) each of 40 plots.

Whole plot dimensions: 3.0 x 14.0.

Treatments to each series:

TREATMNT Extra P and K and primary cultivation tool in autumn 1980 only, except on A plots, treatments repeated annually, and F plots treatments repeated four yearly:

	P2O5 (kg)	K2O (kg)	Tool	
- - -	0	0	Plough	(duplicated)
P6 K6 T	1000	500 to topsoil	"	(")
- - S	0	0	Wye double-digger	(triplicated)
- - SA	0	0	" " "	(duplicated)
- - SF	0	0	" " "	
P2 - SA	63	0 to subsoil	" " "	
P3 - SF	125	0 " "	" " "	
P4 - S	250	0 " "	" " "	
P5 - S	500	0 " "	" " "	
P5 - SF	500	0 " "	" " "	
P6 - S	1000	0 " "	" " "	
- K2 SA	0	31 " "	" " "	
- K3 SF	0	63 " "	" " "	
- K4 S	0	125 " "	" " "	
- K5 S	0	250 " "	" " "	
- K5 SF	0	250 " "	" " "	
- K6 S	0	350 " "	" " "	
P1 K1 SA	31	16 " "	" " "	
P1 K3 SA	31	63 " "	" " "	
P2 K2 SA	63	31 " "	" " "	
P3 K1 SA	125	16 " "	" " "	
P3 K3 SA	125	63 " "	" " "	
P3 K4 SF	125	125 " "	" " "	
P4 K3 SF	250	63 " "	" " "	
P4 K4 S	250	125 " "	" " "	
P4 K5 S	250	250 " "	" " "	
P4 K5 SF	250	250 " "	" " "	
P4 K6 S	250	350 " "	" " "	
P5 K4 S	500	125 " "	" " "	
P5 K4 SF	500	125 " "	" " "	
P5 K5 S	500	250 " "	" " "	
P5 K6 S	500	350 " "	" " "	
P6 K4 S	1000	125 " "	" " "	
P6 K5 S	1000	250 " "	" " "	
P6 K6 S	1000	350 " "	" " "	

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- NOTES:** (1) Subsoiling was done with the Wye double-digger which turns a furrow with a conventional plough share, to a depth of 23 cm, and at the same time rotary cultivates the bottom of the adjacent furrow to a further depth of 15 cm. When applying P and K this was distributed ahead of the rotary cultivator.
- (2) The topsoil PK dressing was equally divided before and after ploughing.
- (3) All plots were conventionally ploughed each autumn unless the Wye double-digging treatment was due.
- (4) The rate of 350 kg K₂O applied was in error for 500 kg K₂O.

Standard applications:

- Potatoes: Manures: (10:10:15+4.5 Mg) at 1960 kg. Weedkiller: Linuron at 1.6 kg in 260 l. Fungicides: Mancozeb at 1.4 kg in 200 l on five occasions, applied with the insecticide on the first two occasions. Manganese zinc ethylene bisdithiocarbamate at 1.4 kg in 200 l. Fentin hydroxide at 0.27 kg in 200 l. Insecticide: Pirimicarb at 0.14 kg. Desiccant: Diquat at 0.80 kg ion in 200 l.
- S. barley: Manures: (20:10:10) at 630 kg. Weedkillers: Mecoprop at 2.4 kg with clopyralid at 0.05 kg and bromoxynil at 0.24 kg in 200 l. Fungicides: Fenpropimorph at 0.75 kg in 200 l. Propiconazole at 0.12 kg and tridemorph at 0.25 kg in 200 l.
- S. beans: Weedkiller: Simazine at 1.2 kg in 200 l. Insecticide: Phorate at 4.5 kg.
- W. wheat: Manures: (0:18:36) at 350 kg. 'Nitram' at 120 kg and later at 480 kg. Weedkillers: Chlortoluron at 3.5 kg in 200 l. Fluroxypyr at 0.20 kg with clopyralid at 0.07 kg and bromoxynil at 0.34 kg in 200 l. Fungicides: Propiconazole at 0.12 kg and tridemorph at 0.25 kg in 200 l.

- Seed:** Potatoes: Pentland Crown.
S. barley: Klaxon, sown at 160 kg.
S. beans: Minden, sown at 250 kg.
W. wheat: Avalon, sown at 200 kg.

Cultivations, etc.:-

- All crops: Treatments applied by double-digger: 3 Nov, 1987 and 10 Nov. Ploughed: 13 Nov.
- Potatoes: NPK+Mg applied, rotary harrowed, potatoes planted: 6 Apr, 1988. Rotary ridged: 25 Apr. Linuron applied: 5 May. Mancozeb with pirimicarb applied: 15 June, 30 June. Manganese zinc ethylene bisdithiocarbamate applied: 8 July. Mancozeb applied: 18 July, 1 Aug, 15 Aug. Fentin hydroxide applied: 30 Aug. Haulm mechanically destroyed: 14 Sept. Desiccant applied: 19 Sept. Lifted: 1 Nov.
- S. barley: Heavy spring-tine cultivated twice: 7 Mar, 1988. NPK applied, heavy spring-tine cultivated, rotary harrowed, seed sown: 8 Mar. Weedkillers applied: 11 May. Fenpropimorph applied: 17 May. Remaining fungicide applied: 20 June. Combine harvested: 15 Aug.
- S. beans: Heavy spring-tine cultivated: 7 Mar, 1988. Phorate applied, heavy spring-tine cultivated: 8 Mar. Rotary harrowed, seed sown: 10 Mar. Weedkiller applied: 17 Mar. Combine harvested: 19 Sept.

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Cultivations, etc.:-

W. wheat: PK applied: 16 Nov, 1987. Rotary harrowed, seed sown:
17 Nov. Chlortoluron applied: 30 Nov. First N applied: 1 Mar,
1988. Second N applied: 21 Apr. Remaining weedkillers applied:
26 Apr. Fungicides applied: 20 June. Combine harvested: 23 Aug.

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SERIES II POTATOES

TOTAL TUBERS TONNES/HECTARE

***** Tables of means *****

TREATMNT	
- - -	63.1
P6 K6 T	67.4
- - S	65.2
- - SA	60.7
- - SF	61.0
P2 - SA	62.6
P3 - SF	60.4
P4 - S	62.9
P5 - S	64.9
P5 - SF	64.9
P6 - S	58.1
- K2 SA	65.8
- K3 SF	67.9
- K4 S	64.2
- K5 S	67.9
- K5 SF	64.1
- K6 S	66.3
P1 K1 SA	61.7
P1 K3 SA	62.0
P2 K2 SA	59.4
P3 K1 SA	65.7
P3 K3 SA	64.5
P3 K4 SF	58.7
P4 K3 SF	60.9
P4 K4 S	62.0
P4 K5 S	63.1
P4 K5 SF	69.6
P4 K6 S	69.5
P5 K4 S	61.1
P5 K4 SF	63.9
P5 K5 S	62.1
P5 K6 S	64.9
P6 K4 S	59.6
P6 K5 S	62.8
P6 K6 S	67.1
Mean	63.7

*** Standard errors of differences of means ***

TREATMNT	
	3.72 min.rep
	3.04 max-min

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
WP	5	2.63	4.1

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SERIES II POTATOES

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

***** Tables of means *****

TREATMNT	
- - -	98.9
P6 K6 T	98.9
- - S	98.3
- - SA	98.5
- - SF	97.8
P2 - SA	98.4
P3 - SF	99.0
P4 - S	98.6
P5 - S	99.1
P5 - SF	97.3
P6 - S	97.7
- K2 SA	98.5
- K3 SF	97.5
- K4 S	99.0
- K5 S	98.8
- K5 SF	99.1
- K6 S	98.4
P1 K1 SA	98.1
P1 K3 SA	98.8
P2 K2 SA	97.9
P3 K1 SA	98.4
P3 K3 SA	98.1
P3 K4 SF	99.2
P4 K3 SF	98.5
P4 K4 S	98.9
P4 K5 S	97.7
P4 K5 SF	98.5
P4 K6 S	99.0
P5 K4 S	98.4
P5 K4 SF	98.4
P5 K5 S	98.3
P5 K6 S	99.2
P6 K4 S	97.3
P6 K5 S	98.0
P6 K6 S	98.4
Mean	98.4

PLOT AREA HARVESTED 0.00210

* SEDs apply only to - - -, P6 K6 T, - - S and - - SA

TREATMNT
max-min - - S v any of remainder
min.rep any of remainder

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SERIES III BARLEY

GRAIN TONNES/HECTARE

***** Tables of means *****

TREATMNT	
- - -	7.21
P6 K6 T	7.11
- - S	6.89
- - SA	6.83
- - SF	7.00
P2 - SA	6.75
P3 - SF	6.75
P4 - S	7.28
P5 - S	6.74
P5 - SF	6.98
P6 - S	7.37
- K2 SA	7.16
- K3 SF	7.14
- K4 S	6.85
- K5 S	7.44
- K5 SF	6.98
- K6 S	6.93
P1 K1 SA	6.93
P1 K3 SA	7.28
P2 K2 SA	7.00
P3 K1 SA	6.95
P3 K3 SA	7.09
P3 K4 SF	6.88
P4 K3 SF	6.75
P4 K4 S	7.16
P4 K5 S	6.81
P4 K5 SF	7.04
P4 K6 S	7.30
P5 K4 S	7.01
P5 K4 SF	6.83
P5 K5 S	7.06
P5 K6 S	6.73
P6 K4 S	6.58
P6 K5 S	6.55
P6 K6 S	6.86
Mean	6.98

*** Standard errors of differences of means ***

TREATMNT	
0.356	min.rep
0.291	max-min

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
WP	5	0.252	3.6
GRAIN MEAN DM%	85.1	PLOT AREA HARVESTED	0.00286

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SERIES IV BEANS

GRAIN TONNES/HECTARE

***** Tables of means *****

TREATMNT	
- - -	6.78
P6 K6 T	7.31
- - S	6.88
- - SA	6.63
- - SF	6.92
P2 - SA	7.15
P3 - SF	7.60
P4 - S	7.03
P5 - S	6.45
P5 - SF	7.43
P6 - S	6.66
- K2 SA	6.84
- K3 SF	6.82
- K4 S	6.68
- K5 S	6.89
- K5 SF	6.88
- K6 S	6.56
P1 K1 SA	6.98
P1 K3 SA	7.04
P2 K2 SA	6.99
P3 K1 SA	6.69
P3 K3 SA	6.78
P3 K4 SF	7.42
P4 K3 SF	7.08
P4 K4 S	6.81
P4 K5 S	6.67
P4 K5 SF	6.83
P4 K6 S	7.43
P5 K4 S	7.13
P5 K4 SF	6.94
P5 K5 S	6.94
P5 K6 S	7.00
P6 K4 S	6.72
P6 K5 S	7.56
P6 K6 S	7.09
Mean	6.95

*** Standard errors of differences of means ***

TREATMNT	
0.220	min.rep
0.179	max-min

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
WP	5	0.155	2.2
GRAIN MEAN DM%	86.1	PLOT AREA HARVESTED	0.00386

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SERIES I WHEAT

GRAIN TONNES/HECTARE

***** Tables of means *****

TREATMNT	
- - -	7.96
P6 K6 T	7.75
- - S	7.73
- - SA	7.62
- - SF	7.30
P2 - SA	8.13
P3 - SF	6.70
P4 - S	7.61
P5 - S	7.57
P5 - SF	7.30
P6 - S	7.66
- K2 SA	8.47
- K3 SF	8.24
- K4 S	8.46
- K5 S	7.46
- K5 SF	7.94
- K6 S	7.57
P1 K1 SA	7.64
P1 K3 SA	7.85
P2 K2 SA	8.14
P3 K1 SA	8.14
P3 K3 SA	7.98
P3 K4 SF	7.86
P4 K3 SF	7.93
P4 K4 S	7.83
P4 K5 S	7.52
P4 K5 SF	7.59
P4 K6 S	7.62
P5 K4 S	8.33
P5 K4 SF	7.92
P5 K5 S	7.68
P5 K6 S	8.63
P6 K4 S	7.76
P6 K5 S	8.29
P6 K6 S	7.44
Mean	7.81

*** Standard errors of differences of means ***

TREATMNT	
	0.180 min.rep
	0.147 max-min

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
WP	5	0.127	1.6
GRAIN MEAN DM%	83.1	PLOT AREA HARVESTED	0.00286