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87/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 seventh year, potatoes, s. barley, s. beans, w. wheat.

For previous years see 81-86/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:

	P205(kg)	K20(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 K20 applied was in error for 500 kg K20.

Standard applications:

- Potatoes: Manures: (10:10:15+4.5 Mg) at 1960 kg. Weedkiller: Linuron at 1.6 kg in 500 l. Fungicides: Mancozeb at 1.4 kg in 200 l on four occasions, applied with the pirimicarb on the second occasion. Fentin hydroxide at 0.28 kg in 200 l on two occasions. Insecticide: Pirimicarb at 0.14 kg. Desiccant: Diquat at 0.80 kg in 300 l.
- S. barley: Manures: (20:10:10) at 630 kg. Weedkillers: Clopyralid at 0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l. Fungicide: Tridemorph at 0.52 kg in 200 l.
- S. beans: Weedkillers: Trietazine at 1.2 kg and simazine at 0.17 kg in 500 l. Insecticide: Phorate at 4.5 kg.
- W. wheat: Manures: (0:18:36) at 350 kg. 'Nitram' at 590 kg. Weedkillers: Clopyralid at 0.07 kg and bromoxynil at 0.34 kg with mecoprop at 2.5 kg 200 l. Fungicide: Tridemorph at 0.52 kg in 200 l.

Seed: Potatoes: Pentland Crown.

- S. barley: Klaxon, dressed triadimenol and fuberidazole, sown at 160 kg.
- S. beans: Minden, sown at 260 kg.
- W. wheat: Avalon, sown at 200 kg.

Cultivations, etc.:-

All crops: Treatments applied by double-digger: 29 Oct, 1986 and 30 Oct. Ploughed: 31 Oct.

- Potatoes: Heavy spring-tine cultivated: 20 Feb, 1987. NPK+Mg applied: 14 Apr. Heavy spring-tine cultivated: 15 Apr. Rotary harrowed, potatoes planted: 16 Apr. Rotary ridged: 27 Apr. Linuron applied: 8 May. Mancozeb applied: 24 June, 8 July, 28 July, 10 Aug. Insecticide applied: 8 July. Fentin hydroxide applied: 28 Aug, 9 Sept. Desiccant applied: 21 Sept. Haulm mechanically destroyed: 3 Oct. Lifted: 19 Oct.
- S. barley: Heavy spring-tine cultivated: 20 Feb, 1987. NPK applied, spring-tine cultivated: 16 Mar. Rotary harrowed, seed sown: 17 Mar. Weedkillers applied: 6 May. Fungicide applied: 24 June. Combine harvested: 20 Aug.
- S. beans: Heavy spring-tine cultivated: 20 Feb, 1987. Phorate applied, spring-tine cultivated: 16 Mar. Rotary harrowed, seed sown: 18 Mar. Weedkillers applied: 30 Mar. Combine harvested: 18 Sept.
- W. wheat: PK applied, rotary harrowed, seed sown: 7 Nov, 1986. N applied: 17 Apr, 1987. Weedkillers applied: 8 May. Fungicide applied: 24 June. Combine harvested: 31 Aug.

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SERIES III POTATOES

TOTAL TUBERS TONNES/HECTARE

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

TREATMNT	
- - -	64.6
P6 K6 T	60.0
- - S	61.7
- - SA	62.2
- - SF	63.6
P2 - SA	62.4
P3 - SF	71.5
P4 - S	50.7
P5 - S	65.4
P5 - SF	66.9
P6 - S	68.1
- K2 SA	62.6
- K3 SF	65.0
- K4 S	68.1
- K5 S	70.1
- K5 SF	66.6
- K6 S	70.8
P1 K1 SA	61.8
P1 K3 SA	67.6
P2 K2 SA	69.5
P3 K1 SA	67.9
P3 K3 SA	65.7
P3 K4 SF	71.8
P4 K3 SF	63.0
P4 K4 S	62.3
P4 K5 S	65.0
P4 K5 SF	68.8
P4 K6 S	68.1
P5 K4 S	68.7
P5 K4 SF	67.8
P5 K5 S	70.5
P5 K6 S	64.6
P6 K4 S	67.0
P6 K5 S	67.7
P6 K6 S	69.2
Mean	65.4

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

Table	TREATMNT
s.e.d.	7.14 min.rep
	5.83 max-min

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

Stratum	d.f.	s.e.	cv%
WP	5	5.05	7.7

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SERIES III POTATOES

PERCENTAGE WARE 3.81 CM (1.5 INCH) RIDDLE

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

TREATMNT	
- - -	97.6
P6 K6 T	98.5
- - S	98.2
- - SA	98.5
- - SF	97.6
P2 - SA	97.8
P3 - SF	98.8
P4 - S	97.7
P5 - S	98.5
P5 - SF	98.0
P6 - S	98.3
- K2 SA	98.5
- K3 SF	98.1
- K4 S	97.7
- K5 S	97.7
- K5 SF	98.3
- K6 S	98.1
P1 K1 SA	96.7
P1 K3 SA	98.4
P2 K2 SA	98.2
P3 K1 SA	99.1
P3 K3 SA	97.3
P3 K4 SF	98.8
P4 K3 SF	98.2
P4 K4 S	97.9
P4 K5 S	98.3
P4 K5 SF	97.9
P4 K6 S	98.5
P5 K4 S	97.5
P5 K4 SF	98.1
P5 K5 S	99.3
P5 K6 S	96.9
P6 K4 S	98.4
P6 K5 S	98.1
P6 K6 S	99.3
Mean	98.1

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 IV WINTER BARLEY

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	7.02
P6 K6 T	6.92
- - S	6.95
- - SA	7.22
- - SF	6.73
P2 - SA	7.42
P3 - SF	7.12
P4 - S	6.99
P5 - S	6.98
P5 - SF	7.23
P6 - S	6.50
- K2 SA	7.28
- K3 SF	7.10
- K4 S	7.21
- K5 S	7.37
- K5 SF	7.05
- K6 S	6.92
P1 K1 SA	7.10
P1 K3 SA	6.82
P2 K2 SA	6.90
P3 K1 SA	6.82
P3 K3 SA	7.40
P3 K4 SF	7.18
P4 K3 SF	7.10
P4 K4 S	7.01
P4 K5 S	7.30
P4 K5 SF	7.33
P4 K6 S	7.12
P5 K4 S	7.09
P5 K4 SF	6.86
P5 K5 S	7.08
P5 K6 S	7.05
P6 K4 S	6.58
P6 K5 S	6.36
P6 K6 S	7.00
Mean	7.03

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

Table	TREATMNT
s.e.d.	0.206 min.rep
	0.168 max-min

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

Stratum	d.f.	s.e.	cv%
WP	5	0.146	2.1
GRAIN MEAN DM%	86.0	PLOT AREA HARVESTED	0.00286

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SERIES I SPRING BEANS

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	4.50
P6 K6 T	4.31
- - S	4.51
- - SA	4.83
- - SF	4.14
P2 - SA	4.34
P3 - SF	4.43
P4 - S	4.07
P5 - S	4.14
P5 - SF	4.97
P6 - S	4.68
- K2 SA	4.74
- K3 SF	4.77
- K4 S	4.80
- K5 S	4.41
- K5 SF	4.81
- K6 S	4.72
P1 K1 SA	4.63
P1 K3 SA	4.53
P2 K2 SA	4.88
P3 K1 SA	4.70
P3 K3 SA	4.01
P3 K4 SF	4.75
P4 K3 SF	4.32
P4 K4 S	3.82
P4 K5 S	4.50
P4 K5 SF	4.27
P4 K6 S	4.63
P5 K4 S	5.04
P5 K4 SF	4.93
P5 K5 S	4.43
P5 K6 S	4.80
P6 K4 S	4.55
P6 K5 S	4.44
P6 K6 S	4.44
Mean	4.54

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

Table	TREATMNT
s.e.d.	0.430 min.rep
	0.351 max-min

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

Stratum	d.f.	s.e.	cv%
WP	5	0.304	6.7
GRAIN MEAN DM%	81.9	PLOT AREA HARVESTED	0.00386

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SERIES II WINTER WHEAT

GRAIN TONNES/HECTARE

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

TREATMNT	
- - -	6.69
P6 K6 T	7.41
- - S	6.62
- - SA	6.90
- - SF	5.93
P2 - SA	7.10
P3 - SF	7.79
P4 - S	7.15
P5 - S	7.28
P5 - SF	6.99
P6 - S	6.85
- K2 SA	6.81
- K3 SF	5.53
- K4 S	7.35
- K5 S	6.74
- K5 SF	7.08
- K6 S	5.17
P1 K1 SA	7.58
P1 K3 SA	7.24
P2 K2 SA	7.49
P3 K1 SA	7.56
P3 K3 SA	7.27
P3 K4 SF	8.14
P4 K3 SF	7.24
P4 K4 S	7.29
P4 K5 S	6.65
P4 K5 SF	7.01
P4 K6 S	7.88
P5 K4 S	6.33
P5 K4 SF	7.31
P5 K5 S	6.29
P5 K6 S	6.82
P6 K4 S	6.90
P6 K5 S	6.63
P6 K6 S	7.10
Mean	6.96

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

Table	TREATMNT
s.e.d.	0.624 min.rep
	0.510 max-min

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

Stratum	d.f.	s.e.	cv%
WP	5	0.441	6.3
GRAIN MEAN DM%	83.0	PLOT AREA HARVESTED	0.00274