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# Yields of the Field Experiments 1971

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## Potatoes

### Rothamsted Research

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POTATOES

SEED STOCKS, DISEASES AND FUNGICIDES

Object: To study the effects of systemic fungicides and re-infection with *Oospora* and *Rhizoctonia*, on potato stocks either freed from these diseases by the use of stem cuttings, or not. Varieties and the effects of chitting are also studied - Whittlocks.

Design: 4 randomised blocks of 12 plots (plus one extra block for sampling). Plots split into 4.

Whole plot dimensions: 5.69 x 9.52. Sub-plot area harvested: 0.00135.

Treatments: All combinations of:-

Whole plots: 1. Seed stocks, diseases and fungicides:  
F, FB, FC, FCB, H, HC, HCB, HCBP, HCOE, HCOL,  
HCRL, HCORL

where F = Once grown seed from Rothamsted\*  
H = Healthy seed (from stem cuttings)  
B = Seed treated with fungicide (Benomyl 5% dust at 4.47 kg per tonne of seed)  
P = Seed treated with fungicide ('Plantvax' 5% dust at 4.47 kg per tonne of seed)  
C = Chitted seed  
O = Seed inoculated with *Oospora*  
R = Seed inoculated with *Rhizoctonia*  
E = Early inoculation (inoculated on 20 Jan, 1971 using vermiculite as a carrier)  
L = Late inoculation (applied to furrow at planting, using vermiculite as a carrier)

Quarter plots: 2. Varieties: King Edward (KE), Majestic (M), Pentland Crown (PC), Record (R)

\* For Record 'A' stock was used.

Basal applications: 1506 kg (13:13:20). Weedkiller: Linuron at 0.84 kg in 427 l. Fungicide: Mancozeb at 1.35 kg in 438 l on 2 occasions. Insecticide: Demeton-s-methyl at 245 g with the first application of mancozeb.

Cultivations, etc.: Ploughed: 1 Oct, 1970. NPK applied: 6 Apr, 1971. Rotary cultivated: 19 Apr. Potatoes hand planted: 20 Apr. Weedkiller applied: 11 May. Fungicide and insecticide applied: 24 June.

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Fungicide applied: 16 Aug. Sprayed with undiluted BOV at 168 l:  
16 Sept. Lifted: 30 Sept. Previous crops: Spring wheat 1969,  
fallow 1970.

NOTE: Stem and plant numbers were recorded before lifting. During  
the season samples were taken from the sampling block for disease  
assessment on progeny tubers. At harvest a sub-sample was taken  
for disease assessment in the eyes.

Standard errors per plot. Total tubers, tonnes/hectare:

Whole plot: 1.53 or 2.9% (33 d.f.)  
Sub plot: 2.55 or 4.8% (108 d.f.)

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SUMMARY OF RESULTS

	KE	M	PC	R	Mean
TOTAL TUBERS: TONNES/HECTARE					
	(1) and (2)				(±0.76)
F	48.0	50.5	47.2	33.2	44.7
FB	45.7	50.0	45.0	35.8	44.1
FC	56.2	56.4	52.4	37.9	50.7
FCB	55.0	62.4	54.9	42.1	53.6
H	54.0	54.1	42.7	44.2	48.7
HC	60.5	60.0	56.7	44.6	55.5
HCB	60.5	64.5	56.4	45.4	56.7
HCBP	62.3	62.1	57.3	46.1	57.0
HCOE	58.9	59.9	55.5	45.0	54.8
HCOL	59.4	58.9	57.2	42.8	54.6
HCRL	59.8	59.1	57.9	44.4	55.3
HCORL	61.0	63.1	54.3	43.5	55.5
Mean (±0.37)	56.8	58.4	53.1	42.1	52.6

- (1) (±1.34) For use in vertical and diagonal comparisons only  
 (2) (±1.27) For use in horizontal and interaction comparisons only

% WARE: 4.44 CM (1.75 INCH) RIDDLE

F	72.2	82.6	84.6	80.1	79.9
FB	62.0	80.4	81.0	75.9	74.8
FC	75.6	79.8	85.0	81.6	80.5
FCB	73.0	80.3	82.8	79.6	79.0
H	67.1	80.7	79.3	74.4	75.4
HC	73.6	79.2	81.1	77.6	77.9
HCB	71.9	82.1	81.3	79.2	78.6
HCBP	71.2	83.0	83.7	79.3	79.3
HCOE	73.2	82.7	82.7	81.9	80.1
HCOL	75.1	83.3	84.5	82.0	81.3
HCRL	74.7	82.1	83.4	80.9	80.3
HCORL	76.1	81.9	82.2	80.0	80.1
Mean	72.2	81.5	82.6	79.4	78.9

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POTATOES

SEED STOCKS, DISEASES AND FUNGICIDES

Object: To study the effects of systemic fungicides and re-infection with *Oospora* and *Rhizoctonia* on potato stocks either freed from these diseases by the use of stem cuttings, or not. Varieties and the effects of chitting are also studied - Woburn Great Hill II.

Design: 4 blocks of 3 plots split into 12 (plus one extra block for sampling).

Whole plot dimensions: 5.69 x 37.7. Sub plot area harvested: 0.00135.

Treatments: All combinations of:-

Whole plots: 1. Varieties: Majestic (M), Pentland Crown (PC), Record (R).

Twelfth plots: 2. Seed stocks, chitting, diseases, times of inoculation and fungicides:

F, FB, FC, FCB, H, HC, HCB, HCBP, HCOE, HCOL, HCRL, HCOLR,

where F = Once grown seed Rothamsted grown\*.

H = Healthy seed (from stem cuttings).

B = Seed treated with fungicide (Benomyl 5% dust at 4.46 kg per tonne of seed).

P = Seed treated with fungicide ('Plantvax' 10% dust at 4.46 kg per tonne of seed).

C = Chitted seed.

O = Seed inoculated with *Oospora*.

R = Seed inoculated with *Rhizoctonia*.

E = Early inoculation.

L = Late inoculation.

\* For Record an 'A' stock was used.

Basal applications: 1883 kg (13:13:20). Weedkiller: Linuron at 1.12 kg in 371 l. Fungicide with insecticide: Mancozeb at 1.34 kg plus demeton-s-methyl at 245 g in 416 l. Fungicide: Mancozeb at 1.34 kg in 371 l.

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Cultivations, etc.: Ploughed: 10 - 11 Nov, 1970. NPK applied, rotary cultivated: 6 Apr, 1971. Potatoes planted: 7 Apr. Weedkiller applied: 5 May. Rotary ridged: 1 June. Fungicide with insecticide applied: 29 June. Fungicide applied: 13 Aug. Sprayed with undiluted BOV at 225 l: 20 Sept. Lifted: 29 Sept. Previous crops: Barley 1969, fallow 1970.

NOTE: Samples were taken throughout the season from the sample blocks for tuber weights and numbers of different sizes. After harvest estimates were made of tuber infection with *Oospora*, *Rhizoctonia*, *Helminthosporium* and *Phoma*.

Standard errors per plot. Total tubers, tonnes/hectare:  
Whole plot: 2.56 or 5.6% (6 d.f.)  
Sub plot: 4.27 or 9.3% (99 d.f.)

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SUMMARY OF RESULTS

	M	PC	R	Mean
TOTAL TUBERS: TONNES/HECTARE				
	(1) and (2)			(±1.23)
F	49.0	45.4	26.7	40.4
FB	45.7	45.0	32.3	41.0
FC	55.2	43.9	32.2	43.8
FCB	55.9	56.2	34.0	48.7
H	48.6	40.3	34.6	41.2
HC	61.6	52.0	39.8	51.2
HCB	59.7	54.7	40.6	51.6
HCBP	60.4	54.7	38.6	51.3
HCOE	57.5	47.6	38.1	47.7
HCOL	60.1	48.1	37.9	48.7
HCRL	54.8	41.2	35.4	43.8
HCORL	52.9	40.9	34.5	42.8
Mean (±1.28)	55.1	47.5	35.4	46.0

- (1) (±2.41) For use in horizontal and diagonal comparisons only  
 (2) (±2.14) For use in vertical and interaction comparisons only

¾ WARE: 4.44 CM (1.75 INCH) RIDDLE

F	73.1	75.4	66.4	71.6
FB	64.9	72.7	72.2	70.0
FC	75.5	78.8	72.3	75.5
FCB	71.1	80.5	65.4	72.3
H	65.4	67.9	47.3	60.2
HC	74.2	83.5	64.1	73.9
HCB	75.5	81.0	66.6	74.3
HCBP	73.2	79.7	63.8	72.3
HCOE	74.6	78.5	66.1	73.1
HCOL	76.1	78.4	68.5	74.3
HCRL	77.7	74.1	70.7	74.2
HCORL	78.3	72.5	64.6	71.8
Mean	73.3	76.9	65.7	72.0

71/R/P/2

POTATOES

CHEMICALS AND SEED-BORNE FUNGI

Object: To study the effects of different rates of three systemic fungicides, applied to seed tubers, on yield and tuber health of potatoes - Whittlocks.

Design: 4 randomised blocks of 2 plots, split into 8.  
(Plus one extra block for sampling).

Whole plot dimensions: 5.69 x 24.8. Sub plot area harvested: 0.00135.

Treatments:

All combinations of:-

- Whole plots: 1. Varieties: Pentland Crown (PC), King Edward (KE).  
Sub plots: 2. Seed treatment with chemicals: Benomyl powder (B), thiabendazole powder (T), EL 273 powder (L).  
3. Rates of application: Diluted with kaolin dust to give 1% (1), 5% (5), (1% (1) and 4% (4) for EL 273).

Together with additional treatments to sub plots: None (0), kaolin dust (K). All dust treatments were applied at 4.5 kg per tonne of seed potatoes.

Basal applications: 1506 kg (13:13:20). Weedkiller: Linuron at 0.84 kg in 427 l. Fungicide: Mancozeb at 1.35 kg in 438 l on 2 occasions. Insecticide: Demeton-s-methyl at 245 g applied with the first mancozeb spray.

Cultivations, etc.: Ploughed: 1 Oct, 1970. Basal NPK applied: 6 Apr, 1971. Rotary cultivated, potatoes machine planted: 19 Apr. Weedkiller applied: 11 May. Grubbed: 4 June. Rotary cultivated: 7 June. Fungicide and insecticide applied: 24 June. Fungicide applied: 16 Aug. Sprayed with undiluted BOV at 168 l: 16 Sept. Lifted: 1 Oct. Previous crops: Spring wheat 1969, fallow 1970.

NOTE: Emergence counts were made. Diseases in the eyes of tubers were assessed after riddling.

Standard errors per plot.

Total tubers, tonnes/hectare: Whole plot: 1.17 or 2.7% (3 d.f.)  
Sub plot: 2.62 or 6.1% (42 d.f.)



71/R/P/2

SUMMARY OF RESULTS

	O	K	B1	B5	T1	T5	L1	L4	Mean
TOTAL TUBERS: TONNES/HECTARE									
(1) and (2)									
									(±0.59)
KE	47.6	47.9	45.4	47.6	47.3	49.4	23.5	5.1	39.2
PC	51.6	50.2	49.7	50.4	50.4	53.8	35.3	29.3	46.3
Mean (±0.93)	49.6	49.1	47.6	49.0	48.8	51.6	29.4	17.2	42.8

(1) (±1.36) For use in vertical and diagonal comparisons only

(2) (±1.31) For use in horizontal and interaction comparisons only

% WARE: 4.44 CM (1.75 INCH) RIDDLE

KE	71.5	74.4	69.0	68.6	71.7	72.6	81.7	89.0	74.8
PC	83.5	83.5	84.5	82.7	83.5	85.5	91.6	93.7	86.1
Mean	77.5	79.0	76.7	75.7	77.6	79.0	86.7	91.3	80.4

71/R/P/10

POTATOES

SPACING, SEED SIZE AND FERTILISER

Object: To study the effects of different spacings within and between rows, seed size and fertiliser rates on yield and size grades of potatoes - Whittlocks.

Design: 4 blocks of 8 plots, randomisation restricted. Plots split into 4.

Whole plot dimensions: N plots: 2.84 x 44.7. Sub plot area harvested: 0.00116.

W plots: 3.66 x 44.7. Sub plot area harvested: 0.00149.

Treatments:

Whole plots: All combinations of:-

1. Distance between rows: 71.1 cm (28 inches) (N), 91.4 cm (36 inches) (W).

2. Seed size: Small (S), large (L). All seed chitted.

3. Fertiliser rate: 1510 kg (F1), 2510 kg (F2) (13:13:20).

Sub plots:

4. Spacing of seed within the row: Seed 30.5 cm (12 inches) (3), 40.6 cm (16 inches) (4), 50.8 cm (20 inches) (5), 61.0 cm (24 inches) (6) apart within the row.

The seed was dusted with 4% 'Benlate' at approximately 3.57 kg per tonne, after being sorted into 2 seed sizes, 3.18 cm to 4.76 cm, and 4.76 cm to 5.72 cm, for the S and L treatments.

Basal applications: Manures: None. Weedkiller: Linuron at 0.84 kg in 427 l. Fungicide: Mancozeb at 1.35 kg in 438 l on 3 occasions. Insecticide: Demeton-s-methyl at 245 g applied with first mancozeb application.

Cultivations, etc.: Ploughed: 1 Oct, 1970. NPK applied to F1 plots: 6 Apr, 1971. NPK applied to F2 plots, all plots rotary cultivated: 20 Apr. Potatoes hand planted: 21 Apr. Weedkiller applied: 11 May. Fungicide plus insecticide applied: 24 June. Fungicide applied: 14 Aug, 16 Aug\*. Sprayed with undiluted BOV at 168 l: 16 Sept. Lifted: 27 Sept. Variety: King Edward. Previous crops: Spring wheat 1969, fallow 1970.

\* Because the spray on 14 Aug was followed by heavy rain.

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NOTE: After harvest a sample from the produce of each plot was graded into 6 sizes.

Standard errors per plot. Total tubers, tonnes/hectare.

Whole plot: 3.58 or 7.1% (21 d.f.)

Sub plot: 2.81 or 5.6% (72 d.f.)

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SUMMARY OF RESULTS

TOTAL TUBERS: TONNES/HECTARE

	S	L	F1	F2	3	4	5	6	Mean
	( $\pm 1.26$ )		( $\pm 1.26$ )		(1) and (2)				( $\pm 0.89$ )
N	51.0	54.4	51.2	54.2	54.6	52.2	51.6	52.4	52.7
W	46.5	49.4	46.3	49.6	49.5	48.6	46.9	46.8	48.0
			( $\pm 1.26$ )		(1) and (2)				( $\pm 0.89$ )
		S	47.6	49.9	50.9	48.7	47.5	47.8	48.8
		L	49.9	53.9	53.2	52.1	51.0	51.4	51.9
					(1) and (2)				( $\pm 0.89$ )
			F1		50.6	48.9	47.5	48.0	48.8
			F2		53.5	51.9	51.1	51.2	51.9
Mean					52.1	50.4	49.3	49.6	50.3
( $\pm 0.50$ )									

(1) ( $\pm 1.08$ ) For use in vertical and diagonal comparisons only  
 (2) ( $\pm 0.70$ ) For use in horizontal and interaction comparisons only

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% WARE: 4.44 CM (1.75 INCH) RIDDLE

	S	L	F1	F2	3	4	5	6	Mean
N	69.0	69.0	67.5	70.5	62.2	67.0	71.1	75.5	69.0
W	75.5	74.4	74.8	75.1	70.5	73.4	75.2	80.7	75.0
		S	71.8	72.7	66.5	70.7	73.5	78.3	72.3
		L	70.5	72.9	66.3	69.7	72.9	78.0	71.7
				F1	64.0	70.0	72.1	78.4	71.1
				F2	68.8	70.4	74.3	77.9	72.8
Mean					66.4	70.2	73.2	78.1	72.0

71/R/P/11

POTATOES

BLIGHT AND APHID REFERENCE PLOTS

Object: To study the separate and combined effects of sprays to control blight and aphids on potatoes - Whittlocks.

Design: 4 randomised blocks of 5 plots, split into 3.

Whole plot dimensions: 8.53 x 9.53. Sub plot area harvested: 0.00271

Treatments:

Whole plots: Sprayed with blight fungicide, as treatment (F), plot used for sampling (no yields recorded) and all combinations of:-

1. Fungicide: None (O), sprayed on 2 occasions with mancozeb at 1.35 kg in 449 l (F).
2. Aphicide: None (O), sprayed with demeton-s-methyl at 245 g in 449 l (A).

Sub plots:

3. Varieties: King Edward (KE), Majestic (M), Pentland Crown (PC).

Basal applications: 1510 kg (13:13:20). Weedkiller: Linuron at 0.84 kg in 438 l.

Cultivations, etc.: Ploughed: 1 Oct, 1970. Basal NPK applied: 6 Apr, 1971. Plots rotary cultivated, potatoes machine planted: 19 Apr. Weedkiller applied: 11 May. Grubbed: 4 June. Rotary ridged: 7 June. Mancozeb treatment applied: 24 June. Demeton-s-methyl treatment applied: 25 June. Mancozeb treatment applied: 16 Aug. Haulm destroyed mechanically: 21 Sept. Lifted: 1 Oct. Previous crops: Spring wheat 1969, fallow 1970.

NOTE: Aphid counts were made and estimates made of the percentage of tubers blighted and of haulm destroyed by blight (*Phytophthora infestans*).

Standard errors per plot.

Total tubers, tonnes/hectare: Whole plot: 2.02 or 3.7% (9 d.f.)  
Sub plot: 2.60 or 4.8% (24 d.f.)

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SUMMARY OF RESULTS

TOTAL TUBERS: TONNES/HECTARE

	O	A	KE	M	PC	Mean
	( $\pm 1.01$ )		(1) and (2)			( $\pm 0.71$ )
O	55.5	53.4	50.7	57.9	54.8	54.4
F	53.0	55.0	51.2	55.9	54.9	54.0
			(1) and (2)			( $\pm 0.71$ )
		O	50.9	57.4	54.5	54.2
		A	51.0	56.4	55.2	54.2
Mean ( $\pm 0.65$ )			50.9	56.9	54.8	54.2

(1) ( $\pm 1.03$ ) For use in vertical and diagonal comparisons only

(2) ( $\pm 0.92$ ) For use in horizontal and interaction comparisons only

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% WARE: 3.81 CM (1.5 INCH) RIDDLE

	O	A	KE	M	PC	Mean
O	93.5	94.2	91.4	94.4	95.7	93.9
F	94.1	94.9	92.4	95.7	95.5	94.5
		O	91.8	94.5	95.2	93.8
		A	92.0	95.6	96.0	94.6
Mean			91.9	95.0	95.6	94.2



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POTATOES

COMPARISON OF FUNGICIDES

Object: To test the effects of organo-tin fungicides on yield and foliar blight (*Phytophthora infestans*) of potatoes - Fosters Corner.

Design: 6 x 6 Latin square.

Whole plot dimensions: 4.27 x 10.7. Area harvested: 0.00152.

Treatments:

No fungicide	(0)
Fentin acetate at 112 g plus maneb at 34 g	(1AM)
Fentin acetate at 336 g plus maneb at 112 g	(3AM)
Fentin acetate at 112 g plus maneb at 34 g plus 11.2 kg wax	(1AMW)
Dibutyltin diacetate at 785 g	(D)
Fentin sulphide at 392 g	(S)

All the fungicides were applied, on two occasions, in 785 l.

Basal applications: 1506 kg (13:13:20). Weedkiller: Linuron at 0.84 kg in 427 l. Insecticide: Demeton-s-methyl at 245 g in 438 l.

Cultivations, etc.: Ploughed: 28 Sept, 1970. Basal NPK applied: 30 Mar, 1971. Rotary cultivated, potatoes machine planted: 5 Apr. Weedkiller applied: 10 May. Grubbed: 3 June. Rotary ridged: 5 June. Insecticide applied: 25 June. Fungicide sprays applied: 27 July, 17 Aug. Haulm destroyed mechanically: 8 Sept. Sprayed with undiluted BOV at 168 l: 15 Sept. Lifted: 4 Oct. Variety: King Edward. Previous crops: Barley 1969, fallow 1970.

Standard error per plot.

Total tubers, tonnes/hectare: 2.14 or 4.5% (20 d.f.)

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SUMMARY OF RESULTS

1AM	3AM	1AMW	D	S	Mean
TOTAL TUBERS: TONNES/HECTARE					
(±0.88)					
46.4	45.9	50.1	46.8	46.6	48.4
% WARE: 3.81 CM (1.5 INCH) RIDDLE					
93.4	93.0	94.0	92.9	93.8	93.3

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POTATOES

ETHREL AND N

Object: To study the effects of soaking potato seed in 'Ethrel', at a range of nitrogen levels, on yield and bulking rate of early potatoes - Long Hoos III.

Design: 4 blocks of 9 plots, randomisation restricted.

Whole plot dimensions: 2.84 x 7.62. Area harvested: 0.00033.

Treatments: All combinations of:-

1. 'Ethrel'\* (seed soaked before planting): 0, 60, 120 mg per l.
2. Nitrogen: 75, 150, 225 kg.

\* 2-chloroethylphosphonic acid.

Basal applications: 1250 kg (0:14:28). Weedkiller: Linuron at 0.84 kg in 427 l. Fungicide: Mancozeb at 1.4 kg in 438 l. Insecticide: Demeton-s-methyl at 0.25 kg applied with the mancozeb.

Cultivations, etc.: Ploughed: 30 Sept, 1970. N and basal PK applied: 5 Apr, 1971. Rotary cultivated: 13 Apr. Potatoes machine planted: 15 Apr. Weedkiller applied: 10 May. Grubbed: 3 June. Earthed up: 4 June. Insecticide and fungicide applied: 24 June. Haulm destroyed mechanically: 11 Aug. Lifted by hand: 12 Aug. Variety: Arran Pilot. Previous crops: Barley 1969, fallow 1970.

NOTE: Samples were taken throughout the growing season for estimation of leaf areas, tuber numbers and tuber size distribution.

Standard error per plot.

Total tubers, tonnes/hectare: 4.15 or 12.2% (24 d.f.)

71/R/P/15

SUMMARY OF RESULTS

N: KG/HA

	75	150	225	Mean
TOTAL TUBERS: TONNES/HECTARE				
ETHREL MG	(±2.07)			(±1.20)
0	29.3	34.9	36.6	33.6
60	28.4	35.2	36.1	33.2
120	32.0	35.7	38.5	35.4
Mean (±1.20)	29.9	35.3	37.1	34.1

% WARE: 3.81 CM (1.5 INCH) RIDDLE

ETHREL MG				
0	57.5	67.2	70.3	65.0
60	54.8	66.5	72.4	64.6
120	62.0	71.0	75.1	69.4
Mean	58.1	68.2	72.6	66.3