ROTHAMSTED RESEARCH

Yields of the Field Experiments 1981

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81/W/CS/245 Minimum Cultivation and Deep Pk - W. Wheat, W. Barley

Rothamsted Research

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81/W/CS/245

MINIMUM CULTIVATION AND DEEP PK

Object: To study the effects of thorough subsoil disturbance and the incorporation of P & K into the subsoil on w. wheat and w. barley either sown conventionally or direct drilled - Woburn Warren Field I & II.

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The second year, w. wheat and w. barley.

For previous year see 80/W/CS/245.

Column plot dimensions: 4.27 x 57.6.

Design: 3 series each of 20 x 4 criss cross

Treatments: All combinations of:-

Series:

1. SER CROP		Series, crops and previous cropping:
	SER1 WB2	Series I, w. barley, second cereal after a break crop
	SER2 WW4	Series II, w. wheat, fourth cereal after a break crop
	SER3 WB4	Series III, w. barley, fourth cereal after a break crop

Column plots: All combinations (duplicated) of:

2. PK SUB		Extra PK and subsoil treatments (applied autumn 1979 only):
	---	None, mouldboard ploughed
	--S	None, subsoiled
	PKS	PK to subsoil
3. DRL DATE		Drills & sowing dates:
	DD 29SEP	Direct drilled w. barley on 29 Sept, 1980, w. wheat 30 Sept
	DD 9OCT	Direct drilled on 9 Oct
	CD 9OCT	Mouldboard ploughed autumn 1980, conventionally drilled on 9 Oct

Row plots:

4. N PATH		Nitrogen fertiliser in spring, and pathogen control:
	75 ENHD	75 kg N, enhanced pathogen control
	150 ENHD	150 kg N, enhanced pathogen control
	225 ENHD	225 kg N, enhanced pathogen control
	150 STND	150 kg N, standard pathogen control

plus two extra column plot treatments, in all combinations with row plots above:-

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EXTRA

TPK DL — PK applied to topsoil and mouldboard ploughed in 1979, direct drilled on 9 Oct, 1980

TPK CL — PK as above, mouldboard ploughed autumn 1980, conventionally drilled on 9 Oct, 1980

NOTES: (1) Rates of P and K were 500 kg P_2O_5, as superphosphate, 250 kg K_2O as muriate of potash.
(2) 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 & K this was distributed ahead of the rotary cultivator.
(3) The topsoil PK dressing was equally divided before and after ploughing.
(4) Standard pathogen control was conventional seed dressings and methiocarb pellets at sowing. Enhanced pathogen control had in addition prochloraz at 0.4 l in 300 l on 18 Apr and in 280 l on 5 June, 1981.

Basal applications: All series: Manures: (10:23:23) at 300 kg, combine drilled. Weedkillers: Paraquat at 0.56 kg ion in 300 l, chlortoluron at 4.5 l (early sowing) and 5.6 l (late sowing) in 300 l.
Series I & III: Growth regulator: Mepiquat chloride and ethephon (as 'Terpal' at 2.5 l) in 300 l.
Series II: Growth regulator: Chlormequat at 1.4 l in 280 l.

Seed: W. barley: Igri with methiocarb pellets, sown at 170 kg.
W. wheat: Flanders with methiocarb pellets, sown at 200 kg.

Cultivations, etc.:-
All plots:
Series I, w. barley: Wheat straw spread and burnt: 19 Sept, 1980. N treatments applied: 9 Apr, 1981. Growth regulator applied: 18 Apr. Combine harvested: 3 Aug.
Series II, w. wheat: Wheat straw spread and burnt: 19 Sept, 1980. N treatments applied: 9 Apr, 1981. Growth regulator applied: 10 Apr. Combine harvested: 18 Aug.
Series III, w. barley: Paraquat applied: 24 Sept, 1980. N treatments applied: 9 Apr, 1981. Growth regulator applied: 18 Apr. Combine harvested: 30 July.

CD 9 OCT: Series I and II: Ploughed: 25 Sept, 1980. Rolled: 26 Sept. Disced, three strokes: 27-28 Sept. Rotary cultivated: 30 Sept, 5 Oct. Series III: Ploughed: 1 Sept, 1980. Spike rotary cultivated with crumbler attached: 2 Sept. Rotary cultivated with crumbler attached: 25 Sept. All series: Chlortoluron applied: 10 Oct.

DD 29 SEP: DD 9 OCT: Series I and II: Paraquat applied: 25 Sept, 1980. Spring-tine cultivated: 26 Sept. All series: Chlortoluron applied to early sowing: 3 Oct. Paraquat applied: 8 Oct. Chlortoluron applied to late sowing: 10 Oct.

NOTE: Plant establishment counts were made. Observations on diseases were made during the season.

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SERIES I WINTER BARLEY

GRAIN TONNES/HECTARE

***** TABLES OF MEANS *****

PK SUB N PATH	---	--S	PKS	MEAN
75 ENHD	7.02	6.72	7.01	6.92
150 ENHD	7.69	7.91	7.93	7.84
225 ENHD	8.31	8.50	8.21	8.34
150 STND	7.31	7.01	7.21	7.18
MEAN	7.59	7.53	7.59	7.57

DRL DATE N PATH	DD 29SEP	DD 9OCT	CD 9OCT	MEAN
75 ENHD	6.48	6.76	7.51	6.92
150 ENHD	7.76	7.77	8.01	7.84
225 ENHD	8.12	8.30	8.59	8.34
150 STND	6.90	7.16	7.47	7.18
MEAN	7.32	7.50	7.89	7.57

DRL DATE PK SUB	DD 29SEP	DD 9OCT	CD 9OCT	MEAN
---	7.37	7.42	7.97	7.59
--S	7.28	7.40	7.93	7.53
PKS	7.30	7.67	7.79	7.59
MEAN	7.32	7.50	7.89	7.57

N PATH EXTRA	75 ENHD	150 ENHD	225 ENHD	150 STND	MEAN
TPK DL	6.67	7.79	7.79	7.09	7.34
TPK CL	7.73	7.72	8.62	7.66	7.93
MEAN	7.20	7.76	8.21	7.38	7.64

N PATH	DRL DATE PK SUB	DD 29SEP	DD 9OCT	CD 9OCT
75 ENHD	---	6.52	6.80	7.75
	--S	6.35	6.41	7.40
	PKS	6.57	7.09	7.37
150 ENHD	---	7.48	7.51	8.10
	--S	7.87	7.81	8.05
	PKS	7.92	7.98	7.87
225 ENHD	---	8.40	8.26	8.28
	--S	8.37	8.33	8.78
	PKS	7.60	8.31	8.72
150 STND	---	7.06	7.12	7.76
	--S	6.53	7.04	7.47
	PKS	7.13	7.31	7.19

GRAND MEAN 7.58

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SERIES I WINTER BARLEY

GRAIN TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	EXTRA	PK SUB	DRL DATE	N PATH* PK SUB
SED	0.734	0.299	0.299	0.356

TABLE	N PATH* DRL DATE	PK SUB DRL DATE	N PATH* EXTRA	N PATH* PK SUB DRL DATE
SED	0.356	0.519	0.873	0.617

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP1	9	0.519	6.8
WP1.WP2	27	0.386	5.1

GRAIN MEAN DM% 81.9

SUB PLOT AREA HARVESTED 0.00341

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SERIES II WINTER WHEAT

GRAIN TONNES/HECTARE

***** TABLES OF MEANS *****

PK SUB / N PATH	---	--S	PKS	MEAN
75 ENHD	4.67	5.02	5.38	5.02
150 ENHD	6.00	6.33	6.80	6.38
225 ENHD	6.15	6.37	6.53	6.35
150 STND	5.80	6.26	6.82	6.29
MEAN	5.66	5.99	6.39	6.01

DRL DATE / N PATH	DD 29SEP	DD 9OCT	CD 9OCT	MEAN
75 ENHD	5.20	4.84	5.03	5.02
150 ENHD	6.51	6.34	6.28	6.38
225 ENHD	6.39	6.66	6.00	6.35
150 STND	6.32	6.35	6.21	6.29
MEAN	6.11	6.05	5.88	6.01

DRL DATE / PK SUB	DD 29SEP	DD 9OCT	CD 9OCT	MEAN
---	6.21	5.32	5.44	5.66
--S	5.80	6.08	6.09	5.99
PKS	6.30	6.75	6.11	6.39
MEAN	6.11	6.05	5.88	6.01

N PATH / EXTRA	75 ENHD	150 ENHD	225 ENHD	150 STND	MEAN
TPK DL	3.98	5.79	5.04	5.42	5.06
TPK CL	4.63	5.45	5.42	5.03	5.13
MEAN	4.31	5.62	5.23	5.23	5.10

N PATH	DRL DATE / PK SUB	DD 29SEP	DD 9OCT	CD 9OCT
75 ENHD	---	5.72	3.79	4.49
	--S	4.76	5.07	5.22
	PKS	5.13	5.65	5.37
150 ENHD	---	6.21	5.96	5.83
	--S	6.25	6.20	6.53
	PKS	7.07	6.85	6.48
225 ENHD	---	6.83	5.85	5.78
	--S	6.15	6.78	6.16
	PKS	6.20	7.34	6.06
150 STND	---	6.09	5.67	5.65
	--S	6.06	6.24	6.46
	PKS	6.80	7.14	6.52

GRAND MEAN 5.92

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SERIES II WINTER WHEAT

GRAIN TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	EXTRA	PK SUB	DRL DATE	N PATH* PK SUB
SED	1.264	0.516	0.516	0.538

TABLE	N PATH* DRL DATE	PK SUB DRL DATE	N PATH* EXTRA	N PATH* PK SUB DRL DATE
SED	0.538	0.894	1.318	0.932

* WITHIN THE SAME LEVEL OF N PATH ONLY

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP1	9	0.894	15.1
WP1.WP2	27	0.305	5.2

GRAIN MEAN DM% 86.7

SUB PLOT AREA HARVESTED 0.00341

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SERIES III WINTER BARLEY

GRAIN TONNES/HECTARE

***** TABLES OF MEANS *****

PK SUB / N PATH	---	--S	PKS	MEAN
75 ENHD	5.72	5.66	6.03	5.80
150 ENHD	6.60	6.67	6.80	6.69
225 ENHD	6.98	7.24	7.30	7.17
150 STND	6.79	5.96	6.27	6.34
MEAN	6.52	6.38	6.60	6.50

DRL DATE / N PATH	DD 29SEP	DD 9OCT	CD 9OCT	MEAN
75 ENHD	5.56	5.55	6.29	5.80
150 ENHD	6.51	6.79	6.77	6.69
225 ENHD	7.25	7.23	7.04	7.17
150 STND	6.12	6.17	6.73	6.34
MEAN	6.36	6.43	6.71	6.50

DRL DATE / PK SUB	DD 29SEP	DD 9OCT	CD 9OCT	MEAN
---	6.39	6.24	6.94	6.52
--S	6.41	6.30	6.44	6.38
PKS	6.29	6.77	6.74	6.60
MEAN	6.36	6.43	6.71	6.50

N PATH / EXTRA	75 ENHD	150 ENHD	225 ENHD	150 STND	MEAN
TPK DL	7.34	7.37	7.30	5.53	6.89
TPK CL	6.16	6.33	7.08	6.09	6.42
MEAN	6.75	6.85	7.19	5.81	6.65

N PATH	DRL DATE / PK SUB	DD 29SEP	DD 9OCT	CD 9OCT
75 ENHD	---	5.49	5.22	6.44
	--S	5.98	5.46	5.54
	PKS	5.21	5.98	6.90
150 ENHD	---	6.44	6.60	6.75
	--S	6.84	6.53	6.63
	PKS	6.25	7.23	6.92
225 ENHD	---	7.16	7.02	6.76
	--S	7.27	7.11	7.34
	PKS	7.34	7.54	7.01
150 STND	---	6.46	6.10	7.81
	--S	5.55	6.08	6.24
	PKS	6.36	6.32	6.14

GRAND MEAN 6.52

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SERIES III WINTER BARLEY

GRAIN TONNES/HECTARE

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	EXTRA	PK SUB	DRL DATE	N PATH* PK SUB
SED	0.580	0.237	0.237	0.358

TABLE	N PATH* DRL DATE	PK SUB DRL DATE	N PATH* EXTRA	N PATH* PK SUB DRL DATE
SED	0.358	0.410	0.877	0.620

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
WP1	9	0.410	6.3
WP1.WP2	27	0.538	8.3

GRAIN MEAN DM% 86.9

SUB PLOT AREA HARVESTED 0.00341

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