ROTHAMSTED RESEARCH

Yields of the Field Experiments 1977

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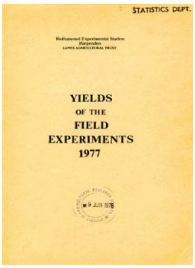

Annuals - Wheat

Rothamsted Research

Rothamsted Research (1978) *Annuals - Wheat ;* Yields Of The Field Experiments 1977, pp 312 - 336 **- DOI: https://doi.org/10.23637/ERADOC-1-29**

77/R/WW/1 and 77/W/WW/1

WINTER WHEAT

VARIETIES AND N

Object: To study the yields and flour quality of a selection of the newer varieties of winter wheat and the effects of nitrogen and aphicide on them on land in rotation (pathogen free) and after cereal (pathogen infected) - Rothamsted Webbs (pathogen free RH) and Great Knott I (pathogen infected RD), Woburn White Horse (pathogen free WH).

Sponsors: R. Moffitt, D.B. Slope.

Design: 4 randomised blocks of 9 plots split into 4 (except Webbs RH: 3 blocks only).

Whole plot dimensions: 4.27 x 27.1.

Treatments: All combinations of:-

Whole plots

1. VARIETY — Varieties:

AR	Armada
AT	Atou
CA	Cappelle
FL	Flanders
MF	Maris Fundin
MH	Maris Huntsman
MK	Maris Kinsman
SA	Sappo (spring wheat replacing a winter variety which failed)
SP	Sportsman

Sub plots

2. N — Nitrogen fertiliser (kg N):

(RH)	(RD)&(WH)	Webbs (RH)	Great Knott I (RD) & White Horse (WH)
0	63	0	63 in spring
63	126	63 in spring	126 in spring
126	189	126 in spring	189 in spring
63+63	126+63	63 in spring + 63 at flowering	126 in spring + 63 at flowering

3. INSCTCDE — Insecticide (Great Knott I (RD) & White Horse (WH) only. Basal pirimicarb applied to Webbs (RH):

NONE	None
PIRIMICA	Pirimicarb at 0.14 kg in 250 l on 14 July (Great Knott I (RD)) and at 0.14 kg in 270 l on 15 July (White Horse (WH))

Basal applications: Manures:
Webbs (RH) and Great Knott I (RD): (0:20:20) at 310 kg, combine drilled.
Great Knott I (RD) only: Chalk at 7.5 t.
White Horse (WH): (0:20:20) at 250 kg.

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Weedkillers:
Webbs (RH): Dicamba with mecoprop and MCPA ('Banlene Plus' at 4.9 l in 220 l).
Great Knott I (RD): Terbutryne and related triazines ('Prebane' at 4.5 kg in 220 l), ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 220 l.
White Horse (WH): Ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 220 l.

Insecticide:
Webbs (RH) only: Pirimicarb at 0.14 kg in 270 l.

Seed: Webbs (RH) and Great Knott I (RD): Varieties sown at 200 kg.
White Horse (WH): Varieties sown at 210 kg.

NOTE: The variety Hobbit established poorly on all three sites because old seed was used and was replaced in the spring by Sappo spring wheat sown at 200 kg.

Cultivations, etc.:-
Webbs (RH): Deep-tine cultivated three times: 19-23 Nov, 1976. Heavy spring-tine cultivated: 24 Nov. Rotary harrowed, seed sown, spring-tine cultivated: 25 Nov. Power harrowed SA treatments: 4 Apr, 1977. SA treatments sown: 5 Apr. Spring N applied: 18 Apr. Weedkillers applied: 11 May. Late N applied: 27 June. Insecticide applied: 14 July. Combine harvested: 9 Sept. Previous crops: Barley 1975, potatoes 1976.
Great Knott I (RD): Deep-tine cultivated: 24 Aug, 1976. Chalk applied: 1 Sept. Deep-tine cultivated: 20 Nov. Seed sown, spring-tine cultivated: 22 Nov. 'Prebane' applied: 26 Nov. Power harrowed SA treatments: 4 Apr, 1977. SA treatments sown: 5 Apr. Spring N applied: 18 Apr. Ioxynil plus mecoprop applied: 2 May. Late N applied: 27 June. Combine harvested: 10 Sept. Previous crops: Beans 1975, wheat 1976.
White Horse (WH): Heavy spring-tine cultivated twice: 8-9 Nov, 1976. Spring-tine cultivated, seed sown: 10 Nov. Spring-tine cultivated with crumbler attached SA treatments, SA treatments sown: 31 Mar, 1977. Spring N applied: 15 Apr. Weedkiller applied: 10 May. Late N applied: 29 June. Combine harvested: 8 Sept. Previous crops: Beans 1975, potatoes 1976.

NOTE: Samples were taken in April and July, on Great Knott I (RD) only, for estimates of eyespot (Cercosporella herpotrichoides) and 'take-all' (Gaeumannomyces graminis).

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77/R/WW/1 WEBBS (RH) PATHOGEN FREE

GRAIN TONNES/HECTARE

VARIETY N	AR	AT	CA	FL	MF	MH	MK	SA	SP	MEAN
0	2 98	3.23	3.46	2.73	2.60	3.05	3.10	2.48	3.22	2.98
63	4.89	5.32	4.70	5.29	4.93	4.58	4.85	3.60	5.61	4.86
126	6.33	6.49	5.87	6.32	6.26	5.87	6.40	3.69	7.14	6.04
63+63	5.49	5.60	4.79	5.22	5.31	4.76	5.02	4.77	5.98	5.22
MEAN	4.92	5.16	4.70	4.89	4.77	4.57	4.84	3.64	5.49	4.78

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

TABLE	VARIETY	N	VARIETY N
SED	0.172	0.102	0.316
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
VARIETY			0.307

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

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.211	4.4
BLOCK.WP.SP	54	0.376	7.9

GRAIN MEAN DM% 79.5

SUB PLOT AREA HARVESTED 0.00173

https://doi.org/10.23637/ERADOC-1-29

77/R/WW/1 GREAT KNOTT I (RD) PATHOGEN INFECTED

GRAIN TONNES/HECTARE

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

VARIETY N	AR	AT	CA	FL	MF	MH	MK	SA	SP	MEAN
63	4.39	4.36	3.72	4.56	4.26	5.27	4.85	3.80	4.06	4.36
126	5.27	6.10	5.24	5.45	5.39	4.90	6.71	3.67	5.65	5.38
189	5.33	6.19	5.26	6.12	5.93	6.04	7.61	3.33	5.53	5.70
126+63	6.65	6.33	5.40	5.76	5.75	5.52	5.30	3.42	6.47	5.62
MEAN	5.41	5.75	4.91	5.47	5.33	5.43	6.12	3.55	5.43	5.27

VARIETY INSCTCDE	AR	AT	CA	FL	MF	MH	MK	SA	SP	MEAN
NONE	5.30	5.73	4.79	5.37	5.27	5.53	6.10	3.28	5.49	5.21
PIRIMICA	5.52	5.76	5.02	5.58	5.40	5.33	6.13	3.83	5.36	5.32
MEAN	5.41	5.75	4.91	5.47	5.33	5.43	6.12	3.55	5.43	5.27

N	VARIETY INSCTCDE	AR	AT	CA	FL	MF	MH	MK	SA	SP
63	NONE	5.09	5.05	4.12	5.22	4.39	5.55	4.70	3.51	3.41
	PIRIMICA	3.68	3.66	3.32	3.90	4.12	5.00	5.00	4.09	4.72
126	NONE	5.40	6.07	4.51	4.53	5.21	4.82	7.14	3.38	6.26
	PIRIMICA	5.14	6.13	5.98	6.38	5.56	4.97	6.29	3.95	5.03
189	NONE	4.79	5.84	4.59	6.28	6.07	6.29	7.00	3.20	7.19
	PIRIMICA	5.86	6.54	5.93	5.96	5.80	5.79	8.23	3.45	3.87
126+63	NONE	5.90	5.97	5.94	5.46	5.40	5.47	5.58	3.03	5.11
	PIRIMICA	7.39	6.70	4.86	6.06	6.11	5.57	5.02	3.82	7.82

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

TABLE	VARIETY	N	INSCTCDE	VARIETY N
SED	0.335	0.203	0.144	0.625
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
VARIETY				0.609

TABLE	VARIETY INSCTCDE	VARIETY N INSCTCDE
SED	0.452	0.973
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:		
VARIETY	0.431	0.963

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

STRATUM	DF	SE	CV%
BLOCK.WP	8	0.473	9.0
BLOCK.WP.SP	45	0.861	16.4

GRAIN MEAN DM% 81.2

SUB PLOT AREA HARVESTED 0.00172

https://doi.org/10.23637/ERADOC-1-29

77/W/WW/1 WHITE HORSE (WH) PATHOGEN FREE

GRAIN TONNES/HECTARE

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

VARIETY N	AR	AT	CA	FL	MF	MH	MK	SA	SP	MEAN
63	4.22	4.13	3.80	3.10	3.26	3.51	4.25	4.10	5.00	3.93
126	4.59	4.45	3.67	4.03	3.93	4.16	4.99	3.42	4.94	4.24
189	4.42	3.70	3.57	3.67	3.05	3.76	4.28	2.72	4.29	3.72
126+63	4.43	4.36	3.89	3.45	3.56	4.25	4.20	3.39	5.10	4.07
MEAN	4.42	4.16	3.73	3.56	3.45	3.92	4.43	3.41	4.83	3.99

VARIETY INSCTCDE	AR	AT	CA	FL	MF	MH	MK	SA	SP	MEAN
NONE	4.34	4.04	3.61	3.41	3.40	3.89	4.20	3.35	4.74	3.89
PIRIMICA	4.49	4.28	3.86	3.71	3.50	3.95	4.66	3.47	4.92	4.10
MEAN	4.42	4.16	3.73	3.56	3.45	3.92	4.43	3.41	4.83	3.99

N	VARIETY INSCTCDE	AR	AT	CA	FL	MF	MH	MK	SA	SP
63	NONE	4.28	4.07	4.02	2.99	3.80	3.51	3.90	4.04	5.13
	PIRIMICA	4.16	4.19	3.58	3.21	2.71	3.52	4.59	4.16	4.87
126	NONE	4.40	4.29	3.30	3.91	3.82	3.73	4.70	3.38	4.67
	PIRIMICA	4.79	4.62	4.05	4.14	4.03	4.59	5.29	3.47	5.20
189	NONE	4.50	3.78	3.32	3.74	2.79	3.53	4.16	2.83	3.67
	PIRIMICA	4.34	3.62	3.82	3.61	3.32	3.98	4.41	2.61	4.91
126+63	NONE	4.17	4.03	3.79	3.00	3.18	4.77	4.05	3.13	5.48
	PIRIMICA	4.68	4.69	3.99	3.90	3.93	3.73	4.34	3.66	4.72

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

TABLE	VARIETY	N	INSCTCDE	VARIETY N
SED	0.166	0.098	0.069	0.304
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:				
VARIETY				0.293

TABLE	VARIETY INSCTCDE	VARIETY N INSCTCDE
SED	0.222	0.471
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:		
VARIETY	0.208	0.464

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

STRATUM	DF	SE	CV%
BLOCK.WP	8	0.235	5.9
BLOCK.WP.SP	45	0.415	10.4

GRAIN MEAN DM% 83.5

SUB PLOT AREA HARVESTED 0.00173

https://doi.org/10.23637/ERADOC-1-29

77/R/WW/2 and 77/W/WW/2

WINTER WHEAT

AQUEOUS N AND NITRIFICATION INHIBITORS

Object: To study the effects of adding a range of nitrification inhibitors to aqueous urea and aqueous ammonia on the yield and nitrogen uptake of winter wheat - Rothamsted (R), Fosters West and Woburn (W) Horsepool.

Sponsors: F.V. Widdowson, J. Ashworth, A. Penny.

Design: 2 randomised blocks of 32 plots (Fosters West (R)). 2 randomised blocks of 37 plots (Horsepool (W)).

Whole plot dimensions: Fosters West (R) 4.27 x 10.7
Horsepool (W) 4.27 x 13.7

Treatments: All combinations of:-

1. N FORM(1) Form of aqueous nitrogen:

AMMONIA	Aqueous ammonia 26% N
UREA	Aqueous urea 18% N

2. N RATE Rate of nitrogen (kg N):

70
100

3. N TIME Time of applying aqueous nitrogen:

AUTUMN
SPRING

4. NIT INHB Nitrification inhibitors added to aqueous nitrogen:

NONE	None
NITRAPYR	Nitrapyrin ('N-Serve')
SOD TRI	Sodium trithiocarbonate

plus extra treatments given additional forms of nitrogen fertiliser in spring (kg N):-

N FORM(2)

0	0
NC 60	60 As 'Nitro-Chalk'
NC 70	70 As 'Nitro-Chalk'
NC 80	80 As 'Nitro-Chalk'
NC 90	90 As 'Nitro-Chalk'
NC 100	100 As 'Nitro-Chalk'
NC 110	110 As 'Nitro-Chalk'
NC 120	120 As 'Nitro-Chalk' (Fosters West (R) only)

and at Horsepool (W) only, in aqueous form:-

AS 100	100 As ammonium sulphate
AS 100NI	100 As ammonium sulphate + nitrapyrin and carbon disulphide
AN 100	100 As ammonium nitrate
AN 100NI	100 As ammonium nitrate + nitrapyrin and carbon disulphide
CN 100	100 As calcium nitrate
CN 100NI	100 As calcium nitrate + nitrapyrin and carbon disulphide

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77/R/WW/2 and 77/W/WW/2

NOTES: (1) Nitrification inhibitor rates:
Fosters West(R): Aqueous N applied with nitrapyrin at 1.4 kg or with sodium trithiocarbonate at 39 kg in autumn and with nitrapyrin at 1.0 kg or with sodium trithiocarbonate at 23 kg in spring.
Horsepool (W): Aqueous N applied with nitrapyrin at 1.5 kg or with sodium trithiocarbonate at 38 kg in autumn and with nitrapyrin at 1.0 kg or with sodium trithiocarbonate at 23 kg to N FORM(1) and nitrapyrin at 1.0 kg plus carbon disulphide at 5.0 kg as an emulsion to appropriate treatments of N FORM(2) in spring.
(2) Aqueous nitrogen was applied by injectors with tines spaced 30 cm apart, 10 cm deep.

Basal applications:
Fosters West (R): Manures: (0:20:20) at 310 kg, combine drilled. Weedkiller: Paraquat at 0.56 kg ion in 220 l, ioxynil at 0.53 kg plus mecoprop at 1.6 kg in 220 l. Insecticide: Pirimicarb at 0.14 kg in 280 l. Growth regulator: Chlormequat at 1.7 kg applied with weedkiller in spring.
Horsepool (W): Manures: (0:20:20) at 310 kg, combine drilled. Insecticide: Pirimicarb at 0.14 kg in 270 l.

Seed: Fosters West (R): Maris Huntsman, sown at 190 kg.
Horsepool (W): Maris Huntsman, sown at 180 kg.

Cultivations, etc.:-
Fosters West (R): Deep-tine cultivated twice: 25 Aug, 1976, 3 Sept. Aqueous N with inhibitors injected: 21, 25 Oct. Paraquat applied: 27 Oct. Heavy spring-tine cultivated: 20 Nov. Seed sown, spring-tine cultivated: 22 Nov. Aqueous N with inhibitors injected: 12-13 Apr, 1977. 'Nitro-Chalk' treatments applied: 2 May. Ioxynil plus mecoprop applied: 23 May. Insecticide applied: 15 July. Combine harvested: 8 Sept. Previous crops: Winter wheat and barley: 1975, winter oats 1976.
Horsepool (W): Deep-tine cultivated twice: 20 Aug, 1976, 23 Aug. Aqueous N with inhibitors injected: 12 Oct. Heavy-tine cultivated: 3 Nov. Seed sown: 4 Nov. Aqueous N with inhibitors injected: 14-15 Apr, 1977. 'Nitro-Chalk' treatments applied: 3 May. Insecticide applied: 11 July. Combine harvested: 9 Sept. Previous crops: Beans 1975, winter wheat 1976.

NOTES: (1) Soil samples were taken at monthly intervals, November to July for measurement of N in the injected bands. N was measured in a cross section of the band at Rothamsted only.
(2) Soil samples were taken at Woburn in selected plots to measure the amount of ammonium nitrate in the rhizosphere.
(3) Plant top samples were taken at fortnightly intervals from April until G.S.10 and then head samples for measurements of nitrate N.
(4) Flag leaf areas were measured several times during the growing season. Weights of the flag leaf and grain heads were also taken.
(5) Assessments were made of 'Take-all' (Gaeumannomyces graminis) on roots in selected plots at Woburn.
(6) At Woburn, waterlogging was noted at one side of the experiment and the effects of this were shown as a trend in yields. Yields presented have been adjusted for this trend.

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77/R/WW/2 FOSTERS WEST(R)

GRAIN TONNES/HECTARE

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

NIT INHB N TIME	NONE	NITRAPYR	SOD TRI	MEAN
AUTUMN	4.85	5.27	5.15	5.09
SPRING	5.39	5.64	5.56	5.53
MEAN	5.12	5.45	5.36	5.31

N FORM(1) N TIME	AMMONIA	UREA	MEAN
AUTUMN	5.08	5.10	5.09
SPRING	5.42	5.63	5.53
MEAN	5.25	5.37	5.31

N FORM(1) NIT INHB	AMMONIA	UREA	MEAN
NONE	5.03	5.20	5.12
NITRAPYR	5.44	5.46	5.45
SOD TRI	5.28	5.44	5.36
MEAN	5.25	5.37	5.31

N RATE N TIME	70	100	MEAN
AUTUMN	4.82	5.35	5.09
SPRING	5.27	5.78	5.53
MEAN	5.05	5.57	5.31

N RATE NIT INHB	70	100	MEAN
NONE	4.83	5.41	5.12
NITRAPYR	5.26	5.65	5.45
SOD TRI	5.06	5.65	5.36
MEAN	5.05	5.57	5.31

N RATE N FORM(1)	70	100	MEAN
AMMONIA	4.96	5.54	5.25
UREA	5.14	5.60	5.37
MEAN	5.05	5.57	5.31

NIT INHB	NONE		NITRAPYR		SOD TRI	
N FORM(1) N TIME	AMMONIA	UREA	AMMONIA	UREA	AMMONIA	UREA
AUTUMN	4.75	4.95	5.39	5.14	5.09	5.21
SPRING	5.32	5.46	5.49	5.78	5.46	5.66

NIT INHB	NONE		NITRAPYR		SOD TRI	
N RATE N TIME	70	100	70	100	70	100
AUTUMN	4.57	5.13	5.11	5.43	4.80	5.51
SPRING	5.08	5.69	5.41	5.86	5.33	5.79

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77/R/WW/2 FOSTERS WEST (R)

GRAIN TONNES/HECTARE

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

N FORM(1)	AMMONIA		UREA	
N RATE	70	100	70	100
N TIME				
AUTUMN	4.73	5.43	4.92	5.28
SPRING	5.20	5.65	5.35	5.91

N FORM(1)	AMMONIA		UREA	
N RATE	70	100	70	100
NIT INHB				
NONE	4.77	5.29	4.88	5.52
NITRAPYR	5.16	5.72	5.36	5.57
SOD TRI	4.95	5.60	5.18	5.70

N FORM(1)	AMMONIA		UREA	
N RATE	70	100	70	100
N TIME NIT INHB				
AUTUMN NONE	4.44	5.06	4.70	5.19
NITRAPYR	5.16	5.62	5.05	5.24
SOD TRI	4.58	5.61	5.03	5.40
SPRING NONE	5.10	5.53	5.06	5.85
NITRAPYR	5.15	5.83	5.67	5.90
SOD TRI	5.33	5.59	5.33	5.99

N FORM(2)	0	NC 60	NC 70	NC 80	NC 90	NC 100	NC 110	NC 120	MEAN
	3.81	5.11	5.56	5.62	5.72	5.95	6.41	6.19	5.55

GRAND MEAN 5.37

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

TABLE	N FORM(2)	N TIME	NIT INHB	N FORM(1)
SED	0.282	0.081	0.100	0.081

TABLE	N RATE	N TIME NIT INHB	N TIME N FORM(1)	NIT INHB N FORM(1)
SED	0.081	0.141	0.115	0.141

TABLE	N TIME N RATE	NIT INHB N RATE	N FORM(1) N RATE	N TIME NIT INHB N FORM(1)
SED	0.115	0.141	0.115	0.199

TABLE	N TIME NIT INHB N RATE	N TIME N FORM(1) N RATE	NIT INHB N FORM(1) N RATE	N TIME NIT INHB N FORM(1) N RATE
SED	0.199	0.163	0.199	0.282

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

STRATUM	DF	SE	CV%
BLOCK.WP	31	0.282	5.2

GRAIN MEAN DM% 81.6 PLOT AREA HARVESTED 0.00325

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77/W/WW/2 HORSEPOOL(W)

GRAIN TONNES/HECTARE

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

NIT INHB N TIME	NONE	NITRAPYR	SOD TRI	MEAN
AUTUMN	3.19	3.86	3.98	3.68
SPRING	5.04	5.03	5.15	5.08
MEAN	4.12	4.45	4.57	4.38

N FORM(1) N TIME	AMMONIA	UREA	MEAN
AUTUMN	3.49	3.86	3.68
SPRING	5.21	4.95	5.08
MEAN	4.35	4.40	4.38

N FORM(1) NIT INHB	AMMONIA	UREA	MEAN
NONE	4.14	4.10	4.12
NITRAPYR	4.42	4.48	4.45
SOD TRI	4.50	4.63	4.57
MEAN	4.35	4.40	4.38

N RATE N TIME	70	100	MEAN
AUTUMN	3.57	3.79	3.68
SPRING	5.00	5.16	5.08
MEAN	4.28	4.47	4.38

N RATE NIT INHB	70	120	MEAN
NONE	4.12	4.11	4.12
NITRAPYR	4.38	4.52	4.45
SOD TRI	4.34	4.79	4.57
MEAN	4.28	4.47	4.38

N RATE N FORM(1)	70	100	MEAN
AMMONIA	4.23	4.47	4.35
UREA	4.33	4.47	4.40
MEAN	4.28	4.47	4.38

NIT INHB	NONE		NITRAPYR		SOD TRI	
N FORM(1) N TIME	AMMONIA	UREA	AMMONIA	UREA	AMMONIA	UREA
AUTUMN	3.11	3.27	3.68	4.05	3.69	4.26
SPRING	5.16	4.93	5.16	4.91	5.30	5.00

NIT INHB	NONE		NITRAPYR		SOD TRI	
N RATE N TIME	70	100	70	100	70	100
AUTUMN	3.19	3.18	3.94	3.79	3.56	4.39
SPRING	5.05	5.04	4.82	5.24	5.12	5.19

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77/W/WW/2 HORSEPOOL (W)

GRAIN TONNES/HECTARE

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

N FORM(1)	AMMONIA		UREA	
N RATE	70	100	70	100
N TIME				
AUTUMN	3.39	3.59	3.74	3.98
SPRING	5.07	5.35	4.93	4.97

N FORM(1)	AMMONIA		UREA	
N RATE	70	100	70	100
NIT INHB				
NONE	4.15	4.12	4.09	4.10
NITRAPYR	4.36	4.48	4.40	4.55
SOD TRI	4.18	4.82	4.50	4.77

N FORM(1)	AMMONIA		UREA	
N RATE	70	100	70	100
N TIME NIT INHB				
AUTUMN NONE	3.18	3.04	3.21	3.33
NITRAPYR	3.79	3.57	4.09	4.00
SOD TRI	3.21	4.17	3.91	4.61
SPRING NONE	5.13	5.19	4.97	4.88
NITRAPYR	4.93	5.38	4.71	5.10
SOD TRI	5.14	5.47	5.09	4.92

N FORM(2)	
0	3.39
NC 60	4.25
NC 70	4.73
NC 80	5.13
NC 90	4.93
NC 100	5.25
NC 110	4.45
AS 100	5.63
AS 100NI	5.71
AN 100	5.08
AN 100NI	5.42
CN 100	4.46
CN 100NI	4.44
MEAN	4.84

GRAND MEAN 4.54

https://doi.org/10.23637/ERADOC-1-29

77/W/WW/2 HORSEPOOL (W)

GRAIN TONNES/HECTARE

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

TABLE	N FORM(2)	N TIME	NIT INHB	N FORM(1)
SED	0.610	0.175	0.213	0.174

TABLE	N RATE	N TIME NIT INHB	N TIME N FORM(1)	NIT INHB N FORM(1)
SED	0.175	0.303	0.249	0.303

TABLE	N TIME N RATE	NIT INHB N RATE	N FORM(1) N RATE	N TIME NIT INHB N FORM(1)
SED	0.248	0.302	0.247	0.431

TABLE	N TIME NIT INHB N RATE	N TIME N FORM(1) N RATE	NIT INHB N FORM(1) N RATE	N TIME NIT INHB N FORM(1) N RATE
SED	0.429	0.350	0.431	0.610

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

STRATUM	DF	SE	CV%
BLOCK.WP	35	0.602	13.3

GRAIN MEAN DM% 83.2

PLOT AREA HARVESTED 0.00279

https://doi.org/10.23637/ERADOC-1-29

77/R/WW/4

WINTER WHEAT

SOWING DATES AND INSECTICIDES

Object: To study the effects of dates of sowing and times of applying insecticides on the incidence of cereal aphids, barley yellow dwarf virus(BYDV) and yield of winter wheat - Bylands.

Sponsor: R.T. Plumb.

Design: 3 randomised blocks of 12 plots.

Whole plot dimensions: 6.40 x 18.3.

Treatments: All combinations of:-

1. SOW DATE — Dates of sowing:

13 SEP	13 September 1976
21 OCT	21 October
26 NOV	26 November

2. INSCTCDE(1) — Phorate granules to seedbed:

NONE	None
PHORATE	Phorate at 5 kg

3. INSCTCDE(2) — Menazon spray:

NONE	None
MENAZON	Menazon (0.7 l 'Saphi-Col' in 220 l on 2 June, 1977)

Basal applications: Manures: (0:20:20) at 310 kg, combine drilled. 'Nitro-Chalk' at 380 kg. Weedkillers: Ioxynil at 0.63 kg with mecoprop at 1.9 kg in 220 l.

Seed: Flanders, sown at 190 kg.

Cultivations, etc.:- Ploughed: 26 Aug, 1976. Spring-tine cultivated: 7 Sept. Phorate applied to early-sown plots, these plots power harrowed and sown: 13 Sept. Phorate applied to middle-sown plots: 20 Oct. Middle-sown plots spring-tine cultivated and sown: 21 Oct. Phorate applied to late-sown plots, these plots rotary harrowed and sown: 26 Nov. N applied to all plots: 9 Apr, 1977. Weedkillers applied: 18 Apr. Combine harvested: 7 Sept. Previous crops: Barley 1975, beans 1976.

NOTE: Plant emergence, aphid and virus counts were made during the season, tiller counts before harvest and grains per ear at harvest.

https://doi.org/10.23637/ERADOC-1-29

77/R/WW/4

GRAIN TONNES/HECTARE

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

INSCTCDE(1)	NONE	PHORATE	MEAN
SOW DATE			
13 SEP	7.69	7.47	7.58
21 OCT	6.48	6.68	6.58
26 NOV	5.35	5.76	5.55
MEAN	6.51	6.64	6.57

INSCTCDE(2)	NONE	MENAZON	MEAN
SOW DATE			
13 SEP	7.37	7.80	7.58
21 OCT	6.43	6.73	6.58
26 NOV	5.30	5.80	5.55
MEAN	6.37	6.77	6.57

INSCTCDE(2)	NONE	MENAZON	MEAN
INSCTCDE(1)			
NONE	6.38	6.63	6.51
PHORATE	6.36	6.92	6.64
MEAN	6.37	6.77	6.57

INSCTCDE(1)	NONE		PHORATE	
INSCTCDE(2)	NONE	MENAZON	NONE	MENAZON
SOW DATE				
13 SEP	7.42	7.97	7.33	7.62
21 OCT	6.50	6.47	6.37	6.98
26 NOV	5.24	5.46	5.37	6.14

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

TABLE	SOW DATE	INSCTCDE(1)	INSCTCDE(2)	SOW DATE INSCTCDE(1)
SED	0.241	0.197	0.197	0.340

TABLE	SOW DATE INSCTCDE(2)	INSCTCDE(1) INSCTCDE(2)	SOW DATE INSCTCDE(1) INSCTCDE(2)
SED	0.340	0.278	0.481

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

STRATUM	DF	SE	CV%
BLOCK.WP	22	0.590	9.0

GRAIN MEAN DM% 79.9

PLOT AREA HARVESTED 0.00267

https://doi.org/10.23637/ERADOC-1-29

77/R/WW/6

WINTER WHEAT

RATES AND TIMES OF N AND K

Object: To study the effects of a range of rates and times of applying nitrogen and of forms of potassium on the nutrient uptake, protein quality and yield of two varieties of winter wheat - Fosters West.

Sponsors: O. Talibudeen, A. Penny, M.B. Page, B.J. Miflin, M. Kirkman.

Design: 3 randomised blocks of 2 plots split into 18.

Whole plot dimensions: 5.64 x 46.0.

Treatments: All combinations of:-

Whole plots

1. VARIETY — Varieties:

   CAPPELLE
   FLINOR

Sub plots

2. N S L — Rates, forms and times of applying nitrogen fertiliser (kg N):

	'Nitro-Chalk' in spring (20 Apr)		Urea spray at G.S.11.1 (19 July)
120 30	120	+	30
120 60	120	+	60
120 90	120	+	90

3. K FORM — Form of potassium fertiliser added to urea spray (at a 10:1 N:K atom ratio - urea dressings modified where KNO3 used to maintain correct total N):

NONE	None
KNO3	Potassium nitrate
K2SO4	Potassium sulphate

plus all combinations of:-

Whole plots

1. VARIETY — Varieties:

   CAPPELLE
   FLINOR

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Sub plots

2. N S Rates of 'Nitro-Chalk' in spring (20 Apr) (kg N):

0
30
60
90
120 (duplicated)
150
180
210

Basal applications: Manures: (0:20:20) at 310 kg, combine drilled. Weedkillers: Paraquat at 0.56 kg ion in 220 l, applied in autumn. Ioxynil at 0.53 kg with mecoprop at 1.6 kg in 220 l, applied in spring. Insecticide: Pirimicarb at 0.14 kg in 280 l.

Seed: Varieties sown at 200 kg.

Cultivations, etc.:- Deep-tine cultivated: 25 Aug, 1976, 3 Sept. Autumn weedkiller applied: 27 Oct. Heavy spring-tine cultivated: 20 Nov. Sown: 24 Nov. Spring weedkillers applied: 23 May, 1977. Insecticide applied: 15 July. Combine harvested: 6 Sept. Previous crops: Winter barley 1975, winter oats 1976.

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

TABLE	N S L	K FORM	N S	VARIETY N S L	
SED	0.161	0.161	0.278 0.241	0.227*	MIN REP MAX-MIN

TABLE	VARIETY K FORM	N S L K FORM	VARIETY N S	VARIETY N S L K FORM	
SED	0.277*	0.278	0.394* 0.341*	0.394*	MIN REP MAX-MIN

* WITHIN THE SAME LEVEL OF VARIETY ONLY

	N S
MAX-MIN	120 V ANY OF REMAINDER
MIN REP	ANY OF REMAINDER

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	70	0.482	9.2

GRAIN MEAN DM% 79.3

SUB PLOT AREA HARVESTED 0.00073

https://doi.org/10.23637/ERADOC-1-29

77/R/WW/6

GRAIN TONNES/HECTARE

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

UREA SPRAYS APPLIED

N S L / VARIETY	120 30	120 60	120 90	MEAN
CAPPELLE	5.57	5.50	5.56	5.54
FLINOR	5.30	5.19	5.37	5.29
MEAN	5.43	5.35	5.47	5.41

K FORM / VARIETY	NONE	KNO3	K2SO4	MEAN
CAPPELLE	5.62	5.73	5.28	5.54
FLINOR	5.50	5.03	5.34	5.29
MEAN	5.56	5.38	5.31	5.41

K FORM / N S L	NONE	KNO3	K2SO4	MEAN
120 30	5.49	5.54	5.27	5.43
120 60	5.50	5.40	5.14	5.35
120 90	5.69	5.20	5.51	5.47
MEAN	5.56	5.38	5.31	5.41

VARIETY	K FORM / N S L	NONE	KNO3	K2SO4
CAPPELLE	120 30	5.45	6.04	5.21
	120 60	5.59	5.71	5.19
	120 90	5.83	5.42	5.43
FLINOR	120 30	5.54	5.03	5.33
	120 60	5.41	5.08	5.09
	120 90	5.54	4.97	5.59

UREA SPRAYS NOT APPLIED

VARIETY / N S	CAPPELLE	FLINOR	MEAN
0	3.00	2.97	2.98
30	3.34	3.79	3.56
60	4.36	4.49	4.43
90	5.68	4.77	5.23
120	5.97	5.41	5.69
150	5.68	5.74	5.71
180	6.72	5.76	6.24
210	5.57	5.74	5.66
MEAN	5.14	4.90	5.02

GRAND MEAN 5.22

https://doi.org/10.23637/ERADOC-1-29

77/S/WW/1

WINTER WHEAT

RATES AND TIMES OF N AND FUNGICIDE

Object: To study the effects of fungicide and rates and times of applying nitrogen fertiliser on the incidence of foliar diseases and on yield - Saxmundham.

Sponsors: F.V. Widdowson, A. Penny.

Design: Single replicate of 4 x 2 x 2 x 2 fully randomised plus 4 extra plots.

Whole plot dimensions: 2.74 x 6.10.

Treatments: All combinations of:-

1. S N RATE — Rates of solid nitrogen fertiliser (kg N):

   0
   50
   100
   150

2. S N TIME — Times of applying solid nitrogen fertiliser:

   APRIL — 28 April
   MAY — 19 May

3. L N RATE — Rates of applying liquid nitrogen fertiliser, half on 16 June, half on 6 July (kg N):

   0
   50

4. FUNGCIDE — Foliar spray to control fungi:

   NONE — None
   B+MB+MZ — Benomyl + maneb + mancozeb

plus four extra plots not given liquid fertiliser but given benomyl + maneb + mancozeb as above, and testing solid nitrogen as follows (kg N):-

XTRA S N	G.S.3(16 Mar)		G.S.5(28 Apr)		G.S.8(25 May)	
20+60+20	20	+	60	+	20	(duplicated)
30+90+30	30	+	90	+	30	(duplicated)

NOTE: Benomyl applied at 0.28 kg with mancozeb plus maneb ('Kascade' at 2.24 kg) in 340 l on 19 May, 16 June, 6 July.

Basal applications: Manures: K20 at 150 kg as muriate of potash. (30:13:0) at 190 kg. Weedkillers: Ioxynil at 0.53 kg with mecoprop at 1.6 kg in 340 l. Growth regulator: Chlormequat at 1.7 kg in 340 l.

Seed: Maris Huntsman, broadcast at 200 kg.

Cultivations, etc.:- K applied: 17 Aug, 1976. Ploughed 3 Sept. Seed broadcast, NP applied: 23 Nov. Spring-tine cultivated: 24 Nov. Weedkillers applied: 14 May, 1977. Growth regulator applied: 19 May. Combine harvested: 1 Sept. Previous crops: Beans 1975, wheat 1976.

https://doi.org/10.23637/ERADOC-1-29

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GRAIN TONNES/HECTARE

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

INCLUDING S N RATE 0

S N RATE	0	50	100	150	MEAN
L N RATE					
0	3.20	4.72	5.29	5.76	4.74
50	3.61	4.64	4.77	5.71	4.68
MEAN	3.40	4.68	5.03	5.74	4.71

S N RATE	0	50	100	150	MEAN
FUNGCIDE					
NONE	3.38	4.80	4.78	5.43	4.60
B+MB+MZ	3.42	4.56	5.28	6.04	4.83
MEAN	3.40	4.68	5.03	5.74	4.71

FUNGCIDE	NONE	B+MB+MZ	MEAN
L N RATE			
0	4.65	4.84	4.74
50	4.55	4.82	4.68
MEAN	4.60	4.83	4.71

EXCLUDING S N RATE 0

S N RATE	50	100	150	MEAN
S N TIME				
APRIL	5.49	5.84	6.53	5.95
MAY	3.88	4.22	4.94	4.35
MEAN	4.68	5.03	5.74	5.15

L N RATE	0	50	MEAN
S N TIME			
APRIL	6.06	5.85	5.95
MAY	4.46	4.24	4.35
MEAN	5.26	5.04	5.15

FUNGTIME	NONE	B+MB+MZ	MEAN
S N TIME			
APRIL	5.63	6.27	5.95
MAY	4.38	6.38	4.35
MEAN	5.01	5.29	5.15

XTRA S N	20+60+20	30+90+30	MEAN
	6.19	6.69	6.44

GRAND MEAN 4.91

https://doi.org/10.23637/ERADOC-1-29 *pp 20*

77/S/WW/1

GRAIN TONNES/HECTARE

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

TABLE	XTRA S N	L N RATE	FUNGCIDE	S N RATE
SED	0.369	0.131 0.151*	0.131 0.151*	0.185

TABLE	S N TIME	L N RATE FUNGCIDE	S N RATE S N TIME	S N RATE L N RATE
SED	0.151	0.185	0.261	0.261

TABLE	S N TIME L N RATE	S N RATE FUNGCIDE	S N TIME FUNGCIDE
SED	0.213	0.261	0.213

* USE ONLY WITH TABLES EXCLUDING S N RATE 0

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

STRATUM	DF	SE	CV%
WP	15	0.369	7.5

GRAIN MEAN DM% 76.8

PLOT AREA HARVESTED 0.00089

https://doi.org/10.23637/ERADOC-1-29

77/R/WS/1

SPRING WHEAT

FUNGICIDES AND GRAIN MICROFLORA

Object: To study the effects of a range of fungicides applied at a range of times on the yield, quality and grain microflora of spring wheat - Summerdells II.

Sponsor: R.A. Hill.

Design: Two replicates of 3 x 2 x 2 x 2 fully randomised.

Whole plot dimensions: 4.27 x 13.1.

Treatments: All combinations of:-

1. FUNGCIDE — Broad spectrum fungicides (in addition to basal specific fungicide tridemorph)

CAPTAFOL	Captafol at 1.4 kg
CARB+MAN	Carbendazim at 0.25 kg + maneb at 1.6 kg
BENOMYL	Benomyl at 1.1 kg

2. APP TIME — Application times of broad spectrum fungicides:

	7 July	28 July	30 Aug
NONE	None	None	None
E	Sprayed	None	None
M	None	Sprayed	None
L	None	None	Sprayed
E+M	Sprayed	Sprayed	None
E+L	Sprayed	None	Sprayed
M+L	None	Sprayed	Sprayed
E+M+L	Sprayed	Sprayed	Sprayed

NOTE: Treatment sprays were applied in 340 l.

Basal applications: Manures: (20:14:14) at 440 kg, combine drilled. Weedkillers: Dicamba with mecoprop and MCPA ('Banlene Plus' at 4.9 l in 220 l). Fungicide: Tridemorph at 0.53 kg in 340 l. Insecticide: Pirimicarb at 0.14 kg in 270 l.

Seed: Sappo, sown at 190 kg.

Cultivations, etc:- Ploughed: 13-18 Oct, 1976. Spring-tine cultivated: 7 Mar, 1977. Spring-tine cultivated, seed sown: 4 Apr. Weedkillers applied: 26 May. Fungicide applied: 19 June. Insecticide applied: 14 July. Combine harvested: 23 Sept. Previous crops: Winter oats 1975, 1976.

NOTE: Grain microflora were assessed weekly after heading and at harvest. 1000 grain weights were taken and grain was assessed for breadmaking quality.

https://doi.org/10.23637/ERADOC-1-29 *pp 22*

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GRAIN TONNES/HECTARE

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

APP TIME FUNGCIDE	E	M	L	E+M	E+L	M+L	E+M+L	MEAN
CAPTAFOL	6.18	6.15	6.01	6.21	6.22	6.37	6.35	6.21
CARB+MAN	6.28	6.34	6.10	6.36	6.42	6.16	6.39	6.29
BENOMYL	6.19	6.44	6.18	6.48	6.26	5.74	6.48	6.25
MEAN	6.22	6.31	6.09	6.35	6.30	6.09	6.40	6.25

APP TIME NONE 6.15

GRAND MEAN 6.24

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

TABLE	FUNGCIDE	APP TIME	FUNGCIDE APP TIME
SED	0.079	0.120	0.209

SED OF FUNGCIDE.APP TIME V APP TIME NONE 0.170

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

STRATUM	DF	SE	CV%
WP	26	0.209	3.3

GRAIN MEAN DM% 77.4

PLOT AREA HARVESTED 0.00195

https://doi.org/10.23637/ERADOC-1-29

77/R/WS/2

SPRING WHEAT

IRRIGATION, LODGING, N, CCC AND MICROFLORA

Object: To study the effects of irrigation, artificial lodging, nitrogen fertiliser and a growth regulator on grain microflora and yield - Long Hoos V 2.

Sponsor: R.A. Hill.

Design: 2 randomised blocks of 2 plots split into 8.

Whole plot dimensions: 9.75 x 17.4.

Treatments: All combinations of:-

Whole plots

1. IRRIGTN — Irrigation:

NONE	None
FULL	Full (75 mm)

Sub plots

2. N — Nitrogen fertiliser (kg N):

25
100

3. LODGING — Lodging:

NONE	None, supported by netting
LODGED	Lodged, under netting

4. GRWTHREG — Growth regulator:

NONE	None
CHLORMEQ	Chlormequat (CCC) at 1.1 kg in 340 l on 19 June, 1977

NOTES: (1) N applied on 9 May.
(2) Irrigation was applied at 5 mm on each dry day during the season, divided equally between morning and afternoon.

Basal applications: Manures: (0:14:28) at 940 kg. Weedkillers: Dicamba with mecoprop and MCPA ('Tetralex Plus' at 5.6 l in 340 l).

Seed: Sappo, sown at 180 kg.

Cultivations, etc.:- Deep-tine cultivated: 13 Sept, 1976. PK applied: 8 Nov. Ploughed: 9 Nov to 14 Dec. Power harrowed and seed sown: 14 Apr, 1977. Weedkillers applied: 1 June. Combine harvested: 27 Sept. Previous crops: Lupins 1975, spring oats 1976.

NOTE: Grain microflora were assessed during the season and at harvest. Grain was assessed for mycotoxins before and after harvest and after storage.

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GRAIN TONNES/HECTARE

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

N	25	100	MEAN
IRRIGTN			
NONE	2.43	2.64	2.54
FULL	2.43	2.38	2.40
MEAN	2.43	2.51	2.47

LODGING	NONE	LODGED	MEAN
IRRIGTN			
NONE	3.77	1.30	2.54
FULL	3.72	1.09	2.40
MEAN	3.74	1.20	2.47

LODGING	NONE	LODGED	MEAN
N			
25	3.58	1.29	2.43
100	3.91	1.11	2.51
MEAN	3.74	1.20	2.47

GRWTHREG	NONE	CHLORMEQ	MEAN
IRRIGTN			
NONE	2.38	2.69	2.54
FULL	2.31	2.50	2.40
MEAN	2.35	2.60	2.47

GRWTHREG	NONE	CHLORMEQ	MEAN
N			
25	2.35	2.51	2.43
100	2.34	2.68	2.51
MEAN	2.35	2.60	2.47

GRWTHREG	NONE	CHLORMEQ	MEAN
LODGING			
NONE	3.60	3.89	3.74
LODGED	1.09	1.30	1.20
MEAN	2.35	2.60	2.47

N	25		100	
LODGING	NONE	LODGED	NONE	LODGED
IRRIGTN				
NONE	3.51	1.36	4.03	1.25
FULL	3.64	1.22	3.79	0.96

N	25		100	
GRWTHREG	NONE	CHLORMEQ	NONE	CHLORMEQ
IRRIGTN				
NONE	2.30	2.56	2.46	2.83
FULL	2.41	2.45	2.22	2.54

https://doi.org/10.23637/ERADOC-1-29

77/R/WS/2

GRAIN TONNES/HECTARE

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

LODGING	NONE		LODGED	
GRWTHREG	NONE	CHLORMEQ	NONE	CHLORMEQ
IRRIGTN				
NONE	3.56	3.99	1.20	1.40
FULL	3.65	3.79	0.97	1.21

LODGING	NONE		LODGED	
GRWTHREG	NONE	CHLORMEQ	NONE	CHLORMEQ
N				
25	3.53	3.62	1.18	1.39
100	3.68	4.15	0.99	1.22

	LODGING	NONE		LODGED	
	GRWTHREG	NONE	CHLORMEQ	NONE	CHLORMEQ
IRRIGTN	N				
NONE	25	3.35	3.67	1.25	1.46
	100	3.76	4.30	1.15	1.35
FULL	25	3.70	3.58	1.11	1.33
	100	3.59	3.99	0.84	1.08

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

TABLE	N	LODGING	GRWTHREG	IRRIGTN* N
SED	0.065	0.065	0.065	0.092

TABLE	IRRIGTN* LODGING	N LODGING	IRRIGTN* GRWTHREG	N GRWTHREG
SED	0.092	0.092	0.092	0.092

TABLE	LODGING GRWTHREG	IRRIGTN* N LODGING	IRRIGTN* N GRWTHREG	IRRIGTN* LODGING GRWTHREG
SED	0.092	0.129	0.129	0.129

TABLE	N LODGING GRWTHREG	IRRIGTN* N LODGING GRWTHREC
SED	0.129	0.183

* WITHIN THE SAME LEVEL OF IRRIGTN ONLY

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

BLOCK.WP.SP	14	0.183	7.4

GRAIN MEAN DM% 76.0

SUB PLOT AREA HARVESTED 0.00087

https://doi.org/10.23637/ERADOC-1-29