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85/W/CS/321 Soil Compaction and Yield - W. Oats

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85/W/CS/321

SOIL COMPACTION AND YIELD

Object: To study the residual effects of disrupting a compact layer in a sandy soil on the yield of winter oats - Woburn, Butt Close III.

Sponsors: P.J. Welbank, F.V. Widdowson.

Associate sponsors: K.J. Parkinson, J.E. Leach, A.H. Weir, P.B. Barraclough.

The second year, w. oats.

For previous year see 84/W/WW/3.

Design: A single replicate of $2 \times 2 \times 2 \times 2 \times 2 + 12$ extra plots.

Whole plot dimensions: 2.75 x 14.8.

Treatments: All combinations of treatments applied for w. wheat 1984:

Whole plots

1. CULTIVTN(84) Cultivations:

WYE DIG	Deep cultivation with Wye double-digger
PLOUGH	Normal cultivation with mouldboard plough

Sub plots

2. IRRIGATN(84) Irrigation:

NONE	None
FULL	Full (175 mm)

3. WINTER N(84) Amounts of nitrogen fertilizer applied on 30 Nov, 1983 and 31 Jan, 1984 (kg N) as urea:

0
35+35

4. SPRING N(84) Amounts of nitrogen fertilizer applied in spring (kg N) as 'Nitro-Chalk' (26% N):

115
185

5. N TIME(84) Times of applying spring fertilizer:

EARLY	All except 40 kg N on 8 Mar, 1984; remainder on 2 May
LATE	All except 40 kg N on 3 Apr; remainder on 15 May

85/W/CS/321

plus all combinations of the following all given irrigation, winter nitrogen and spring nitrogen timed early:-

Whole plots

1 CULTIVNX(84) Cultivations:

WYE DIG	Deep cultivations with Wye double-digger
PLOUGH	Normal cultivations with mouldboard plough

Sub plots

2. SPRNG NX(84) Amounts of nitrogen fertilizer applied in spring
(kg N) as 'Nitro-Chalk' (26% N):

80
150
220

Plus 2 nil nitrogen plots (given irrigation) and 4 root sampling plots
(given winter nitrogen and 185 kg N applied late)

EXTRA(84)

WY NO I	Deep cultivation, irrigated
PL NO I	Normal cultivation, irrigated
RWY N5 I	Deep cultivation, irrigated
RWY N5 O	Deep cultivation
RPL N5 I	Normal cultivation, irrigated
RPL N5 O	Normal cultivation

NOTES: (1) Deep cultivation was done with the Wye double-digger which turned a furrow with a conventional plough share to a depth of 25 cm and at the same time rotary cultivated the bottom of the adjacent furrow, in this case to a further depth of 23 cm.
(2) Normal cultivation was by mouldboard plough to a depth of 20 cm.

Basal applications: Manures: Magnesian limestone at 7.5 t. N at 30 kg and 120 kg as 'Nitro-Chalk' (27.5% N). Weedkillers: Methabenzthiazuron at 1.6 kg in 250 l. Mecoprop at 2.1 kg in 250 l. Growth regulator: Chlormequat on two occasions (as 'Power 3 C' at 2.0 l and 4.2 l), on the first occasion with the mecoprop, and on the second with the fungicide. Fungicide: Tridemorph at 0.52 kg in 250 l.

Seed: Panema, sown at 180 kg.

Cultivations, etc.: Discd: 7 Sept, 1984. Ploughed: 8 Sept. Magnesian limestone applied: 9 Oct. Power harrowed, seed sown: 16 Oct. Methabenzthiazuron applied: 27 Oct. N applied: 19 Mar, 1985, 16 Apr. Mecoprop with growth regulator applied: 17 Apr. Growth regulator with fungicide applied: 26 May. Combine harvested: 21 Aug.

NOTE: Crop samples were taken before grain harvest to measure total crop produce.

85/W/CS/321

GRAIN TONNES/HECTARE

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

IRRIGATN(84)	NONE	FULL	MEAN
CULTIVTN(84)			
WYE DIG	6.47	6.36	6.41
PLOUGH	6.19	6.59	6.39
MEAN	6.33	6.47	6.40
WINTER N(84)	0	35+35	MEAN
CULTIVTN(84)			
WYE DIG	6.52	6.30	6.41
PLOUGH	6.38	6.40	6.39
MEAN	6.45	6.35	6.40
WINTER N(84)	0	35+35	MEAN
IRRIGATN(84)			
NONE	6.20	6.46	6.33
FULL	6.71	6.24	6.47
MEAN	6.45	6.35	6.40
SPRING N(84)	115	185	MEAN
CULTIVTN(84)			
WYE DIG	6.10	6.73	6.41
PLOUGH	6.33	6.45	6.39
MEAN	6.22	6.59	6.40
SPRING N(84)	115	185	MEAN
IRRIGATN(84)			
NONE	6.06	6.60	6.33
FULL	6.37	6.58	6.47
MEAN	6.22	6.59	6.40
SPRING N(84)	115	185	MEAN
WINTER N(84)			
0	6.25	6.66	6.45
35+35	6.18	6.52	6.35
MEAN	6.22	6.59	6.40
N TIME(84)	EARLY	LATE	MEAN
CULTIVTN(84)			
WYE DIG	6.28	6.55	6.41
PLOUGH	6.50	6.29	6.39
MEAN	6.39	6.42	6.40
N TIME(84)	EARLY	LATE	MEAN
IRRIGATN(84)			
NONE	6.28	6.38	6.33
FULL	6.49	6.46	6.47
MEAN	6.39	6.42	6.40

85/W/CS/321

GRAIN TONNES/HECTARE

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

N TIME(84)	EARLY	LATE	MEAN	
WINTER N(84)				
0	6.50	6.40	6.45	
35+35	6.27	6.43	6.35	
MEAN	6.39	6.42	6.40	
N TIME(84)	EARLY	LATE	MEAN	
SPRING N(84)				
115	6.16	6.27	6.22	
185	6.61	6.56	6.59	
MEAN	6.39	6.42	6.40	
IRRIGATN(84)	NONE		FULL	
WINTER N(84)	0	35+35	0	35+35
CULTIVTN(84)				
WYE DIG	6.26	6.67	6.78	5.94
PLOUGH	6.13	6.26	6.64	6.54
IRRIGATN(84)	NONE		FULL	
SPRING N(84)	115	185	115	185
CULTIVTN(84)				
WYE DIG	5.99	6.94	6.21	6.51
PLOUGH	6.13	6.26	6.53	6.64
WINTER N(84)	0		35+35	
SPRING N(84)	115	185	115	185
CULTIVTN(84)				
WYE DIG	6.12	6.93	6.08	6.52
PLOUGH	6.39	6.38	6.28	6.52
WINTER N(84)	0		35+35	
SPRING N(84)	115	185	115	185
IRRIGATN(84)				
NONE	6.04	6.35	6.08	6.85
FULL	6.46	6.96	6.28	6.19
IRRIGATN(84)	NONE		FULL	
N TIME(84)	EARLY	LATE	EARLY	LATE
CULTIVTN(84)				
WYE DIG	6.28	6.66	6.27	6.45
PLOUGH	6.29	6.10	6.71	6.47
WINTER N(84)	0		35+35	
N TIME(84)	EARLY	LATE	EARLY	LATE
CULTIVTN(84)				
WYE DIG	6.45	6.60	6.10	6.50
PLOUGH	6.56	6.21	6.43	6.37
WINTER N(84)	0		35+35	
N TIME(84)	EARLY	LATE	EARLY	LATE
IRRIGATN(84)				
NONE	6.16	6.23	6.40	6.53
FULL	6.84	6.58	6.14	6.34

85/W/CS/321

GRAIN TONNES/HECTARE

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

SPRING N(84)	115		185	
N TIME(84)	EARLY	LATE	EARLY	LATE
CULTIVTN(84)				
WYE DIG	5.89	6.31	6.66	6.80
PLOUGH	6.43	6.24	6.57	6.33
SPRING N(84)	115		185	
N TIME(84)	EARLY	LATE	EARLY	LATE
IRRIGATN(84)				
NONE	6.14	5.99	6.43	6.77
FULL	6.18	6.56	6.80	6.36
SPRING N(84)	115		185	
N TIME(84)	EARLY	LATE	EARLY	LATE
WINTER N(84)				
0	6.16	6.35	6.85	6.46
35+35	6.16	6.20	6.37	6.67
SPRING NX(84)	80	150	220	MEAN
CULTIVNX(84)				
WYE DIG	6.30	6.74	6.40	6.48
PLOUGH	6.75	6.40	6.30	6.48
MEAN	6.52	6.57	6.35	6.48
EXTRA	WY NO I	PL NO I	MEAN	
	6.37	6.06	6.21	

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

SED APPLY TO MAIN FACTORIAL PLOTS ONLY

MARGINS OF TWO FACTOR TABLES	0.173
TWO FACTOR TABLES	0.244
THREE FACTOR TABLES	0.345

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

STRATUM	DF	SE	CV%
WP	6	0.489	7.6

GRAIN MEAN DM% 80.1