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## Yields of the Field Experiments 1990

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### 90/R/CS/309 and 90/W/CS/309 Long-term Straw Incorporation - W. Wheat

#### Rothamsted Research

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## 90/R/CS/309 and 90/W/CS/309

### LONG-TERM STRAW INCORPORATION

**Object:** To study the effects of mixing and depths of incorporation of straw on straw decomposition, soil nitrogen content, soil physical condition, pests, diseases and on the establishment, growth and yield of w. wheat - Rothamsted (R) Great Knott III and Woburn (W) Far Field I.

**Sponsors:** R.D. Prew, E.T.G. Bacon, D.G. Christian, R.J. Gutteridge, J.F. Jenkyn, B.R. Kerry, W. Powell, A.D. Todd.

**Associate sponsor:** D.S. Powlson.

The sixth year, w. wheat.

For previous years see 85-89/R&W/CS/309.

**Design:** 4 randomised blocks of 12 plots (R).  
2 randomised blocks of 12 plots (W).

**Whole plot dimensions:** 9.0 x 28.0 (R).  
9.0 x 30.0 (W).

Treatments, applied cumulatively in successive years: All combinations of:-

1. **STRAW**                      Treatments to straw from previous wheat:  
  
    BURNT                      Burnt  
    CHOPPED                    Chopped and spread (duplicated)
  
2. **CULTIVTN**                  Cultivations:  
  
    TINE 10                    Tine cultivated to 10 cm depth  
    TN10PL20                  Tine cultivated to 10 cm depth, ploughed to 20 cm  
    TN10TN20                  Tine cultivated to 10 cm depth and again to 20 cm  
    PLOUGH20                  Ploughed to 20 cm depth

- NOTES:** (1) Straw was chopped by trailed straw chopper and spread on 8 Aug, 1989 (R), 22 Aug (W) and burnt, 9 Aug (R), 24 Aug (W).
- (2) A heavy spring-tine cultivator was used to cultivate to 10 cm depth, on 15 Aug (R), 30 Aug and 21 Sept (W). A chisel plough was used to cultivate to 20 cm depth, on 16 Aug (R) and a deep-tine cultivator to 20 cm on 11 and 21 Sept (W).
- (3) Ploughed plots were ploughed to 20 cm depth, on 15 Aug (R), 11 Sept (W).

**Basal applications:**

Great Knott III (R): Manures: 'Nitram' at 120 kg, followed by 580 kg.  
Weedkillers: Paraquat at 0.40 kg ion with a wetting agent, 'Enhance' at 100 ml, in 200 l. Chlorotoluron at 3.0 kg with cyanazine at 0.75 kg in 400 l. Isoproturon at 2.1 kg in 200 l. Fluroxypyr at 0.20 kg with fenoxaprop-ethyl at 0.18 kg in 200 l.  
Fungicides: Chlorothalonil at 1.0 kg with propiconazole at 0.12 kg in 200 l.

90/R/CS/309 and 90/W/CS/309

**Basal applications:**

Far Field I (W): Manures: 'Nitram' at 120 kg, followed by 560 kg.  
Weedkillers: Glyphosate at 0.36 kg in 220 l. Isoproturon at 1.5 kg with isoxaben at 0.075 kg in 220 l. Metsulfuron-methyl at 6.0 g in 220 l. Fungicides: Chlorothalonil at 0.50 kg with propiconazole at 0.12 kg in 300 l.

**Seed:** Pastiche, sown at 180 kg.

**Cultivations, etc.:-**

Great Knott III (R): Paraquat and wetting agent applied: 2 Oct, 1989.  
Rotary harrowed: 4 Oct. Seed sown: 5 Oct. Harrowed and rolled: 6 Oct. Chlorotoluron and cyanazine applied: 22 Nov. Isoproturon applied: 23 Feb, 1990. N applied: 2 Mar and 12 Apr. Fluroxypyr and fenoxaprop-ethyl applied: 30 Apr. Fungicides applied: 31 May. Combine harvested: 13 Aug.

Far Field I (W): Subsoiled with vibrating tines 50 cm apart and 40 cm deep, glyphosate applied: 6 Oct, 1989. Rotary harrowed with crumbler attached, seed sown: 7 Oct. Isoproturon and isoxaben applied: 11 Dec. N applied: 23 Feb, 1990 and 5 Apr. Metsulfuron-methyl applied: 24 Apr. Fungicides applied: 22 May. Combine harvested: 6 Aug.

- NOTES:** (1) Small yields from CHOPPED TINE 10 and CHOPPED TN10TN20 at Rothamsted were attributed to the much smaller plant populations occurring on these treatments following the application of the weedkillers on 22 Nov.
- (2) Establishment counts were made in autumn and total dry matter was measured in spring.
- (3) Pests and fungal diseases were assessed at intervals during the season.
- (4) Components of yield were measured and numbers of volunteer ears counted.

90/R/CS/309 GREAT KNOTT III (R)

GRAIN TONNES/HECTARE

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

CULTIVTN	TINE 10	TN10PL20	TN10TN20	PLOUGH20	Mean
<b>STRAW</b>					
BURNT	6.72	6.35	6.00	6.32	6.35
CHOPPED	3.47	6.22	4.83	6.18	5.18
Mean	4.55	6.26	5.22	6.23	5.57

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

STRAW	CULTIVTN	STRAW	CULTIVTN
		0.529	min.rep
0.229	0.305	0.458	max-min
		0.374	max.rep

**STRAW**  
 min.rep BURNT only  
 max-min BURNT v CHOPPED  
 max.rep CHOPPED only

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	37	0.748	13.4
GRAIN MEAN DM%	90.3		
PLOT AREA HARVESTED	0.00621		



90/W/CS/309 FAR FIELD I (W)

GRAIN TONNES/HECTARE

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

CULTIVTN STRAW	TINE 10	TN10PL20	TN10TN20	PLOUGH20	Mean
BURNT	5.69	3.45	5.84	3.87	4.71
CHOPPED	4.67	4.82	5.54	4.26	4.82
Mean	5.01	4.36	5.64	4.13	4.79

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

STRAW	CULTIVTN	STRAW CULTIVTN	
0.276	0.368	0.637	min.rep
		0.552	max-min
		0.451	max.rep

STRAW  
min.rep BURNT only  
max-min BURNT v CHOPPED  
max.rep CHOPPED only

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.637	13.3
GRAIN MEAN DM%	90.7		
PLOT AREA HARVESTED	0.00638		