

Summary

4.2 t/ha of chopped barley straw was either burnt or ploughed down in November both with and without pre-plough mixing. A sugar beet crop was sown in the following April. Crop establishment was not affected by any treatment.

When straw was ploughed down without pre-plough mixing 40 kg/ha of extra nitrogen was required to maintain crop yield.

Object

To assess the effect of incorporating straw by ploughing on the establishment and yield of the following crop and on its long term agronomic effect.

This trial was one of a series carried out on four ADAS Experimental Husbandry Farms, in addition to the Norfolk Agricultural Station.

Treatments

<u>Within 5 days of combine-harvesting</u> (August 1986)	<u>At least 21 days after chopping</u> (November 1986)
1. Chop and burn	Plough
2. Chop	Plough
3. Chop and incorporate with tines	Plough
6. Bale straw and remove	Plough

Nitrogen application (kg/ha)Applied in spring

- (a) 120 (farm standard)
- (b) (a) + 40
- (c) (a) + 80

When winter cereals are grown on the trial, there is an additional autumn nitrogen comparison but this is not carried out for sugar beet.

Three randomised blocks were used with cultivations on main plots and nitrogen treatments on sub plots.

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Results 1986 (second year)

Pre-plough straw treatment	Autumn nitrogen (kg/ha) applied to previous winter cereal*						Mean
	Spring nitrogen	Nil 120	160	200	40 120	160 200	
<u>Plants established 5 June (thousand/ha)</u>							
(ESE)	(±2.46)						(±1.00)
Chop/burn	92.1	89.4	93.5	90.6	91.7	89.4	91.1
Chop	90.2	91.9	91.9	90.8	91.3	95.0	91.8
Chop/cultivate	90.0	92.1	95.0	97.1	89.4	89.4	92.1
Bale	96.0	84.8	89.0	87.9	85.2	88.5	88.6
(ESE)	(±0.84)						
Mean	91.4	89.5	91.3	91.5	90.3	89.6	90.6
SE per plot (60 d.f.) = ±3.58 thousand/ha or 4.0% of G.M.							
<u>Yield of clean beet t/ha</u>							
(ESE)	(±1.52)						(±0.85)
Chop/burn	58.3	58.5	59.2	58.9	59.0	59.9	59.0
Chop	54.6	57.9	57.7	53.4	60.1	57.9	56.9
Chop/cultivate	58.7	58.0	59.3	57.2	57.4	56.1	57.8
Bale	60.0	54.6	55.2	56.2	55.4	57.5	56.5
(ESE)	(±0.76)						
Mean	57.9	57.2	57.8	56.4	58.0	57.9	57.5
SE per plot (40 d.f.) = ±2.64 t/ha or 4.6% of G.M.							
<u>Sugar content %</u>							
(ESE)	(±0.244)						(±0.140)
Chop/burn	20.13	20.27	20.21	19.90	20.21	19.45	20.03
Chop	19.65	19.78	19.19	20.01	19.58	19.09	19.55
Chop/cultivate	20.40	19.90	19.37	20.25	19.39	19.69	19.84
Bale	19.71	19.90	19.87	19.74	19.50	19.39	19.69
(ESE)	(±0.122)						
Mean	19.97	19.96	19.66	19.98	19.67	19.40	19.78
SE per plot (40 d.f.) = ±0.423 % sugar or 2.1% of G.M.							
<u>Yield of sugar t/ha</u>							
(ESE)	(±0.313)						(±0.178)
Chop/burn	11.74	11.86	11.97	11.73	11.93	11.65	11.82
Chop	10.74	11.45	11.07	10.68	11.76	11.05	11.13
Chop/cultivate	11.94	11.53	11.49	11.57	10.88	11.05	11.41
Bale	11.82	10.86	10.96	11.08	10.80	11.14	11.11
(ESE)	(±0.157)						
Mean	11.56	11.43	11.37	11.27	11.34	11.22	11.36
SE per plot (40 d.f.) = ±0.543 t/ha or 4.8% of G.M.							

* It is not expected that the nitrogen applied in the autumn of 1984 would have any effect on the 1986 sugar beet crop, but the results are tabulated in this way to give consistency of presentation over the years.

1. There was no treatment effect on the number of plants established nor on the sugar content.
2. When chopped straw was ploughed down without pre-plough cultivations and when the low level of spring nitrogen (120 kg/ha) was used, the yield of both clean beet and sugar was reduced. This yield loss did not occur when 160 or 200 kg/ha of nitrogen were used.
3. It is also of interest that, when chopped straw was incorporated by cultivations, no equivalent yield loss was recorded at the low level of spring nitrogen.
4. These results suggest that early incorporation of chopped straw allowed straw break-down to proceed during the autumn. Whereas ploughing down in mid November without earlier incorporation possibly delayed breakdown until the spring. At that time the rotting process would be likely to influence the amount of nitrogen available for crop growth.

W.E.R. MADGE

Straw incorporation by ploughing

Method and Diary

16 August	4.2 t/ha of barley straw lying on a 10 cm stubble was chopped using a Reco cylinder/knife type chopper. Chop length varied between 2-5 cm.
23 August	Incorporation with a spring tine cultivator, burning and baling treatments were carried out.
12 November	Trial area ploughed at a depth of 25 cm with a furrow press attached to the plough.
29 April	Sugar beet sown at 15 cm spacing.
5 May	40 kg/ha of nitrogen applied to all plots.
5 June	Balance of differential nitrogen treatments applied.
8 October	Trial harvested.