

**WINTER BEANS**  
**EFFECTS OF CEREAL STRAW, 1993**

G M Palmer and D B Stevens

*Morley Research Centre*

**Object**

To determine the effect of cereal straw on the emergence and yield of winter beans for two methods of sowing on a medium sandy loam soil.

**Summary**

The presence of chopped straw did not significantly affect the growth or yield of a crop of winter beans (*Vicia fabae*) grown on a sandy loam soil.

**Method**

Straw treatments were applied to main plots. The straw from the preceding wheat crop was removed from predetermined areas after harvest, while on other areas the straw was chopped and spread onto the stubble. Sowing method and plant population treatments were applied to sub-plots. Seed was broadcast on the stubble at two rates before ploughing or was drilled at two rates immediately after ploughing. The trial was laid out as a split plot design with 4 replicates. A summary of the treatments is given in Table 1. Plot layout and experiment method were according to the agreed protocol or standard Morley procedures.

---

\*Not for publication without the consent of both the Director of Morley Research Centre and PGRO. This report deals with only one year's work, so any conclusions given are provisional.

Table 1. *Treatment details*

*Straw treatment (main plots)*

1. Straw removed
2. Straw chopped and spread

*Sowing method (sub plots)*

1. Seed broadcast and ploughed in
2. Seed drilled after ploughing

*Plant population*

1. Target population 15/m<sup>2</sup>
2. Target population 20/m<sup>2</sup>

The straw treatments were applied in early September following combine harvesting in August.

Punch winter bean seed (thousand grain weight: 664 g) was broadcast on the stubble using a conventional cereal drill set to deliver 150 and 200 kg/ha seedrates on the ploughed-in treatments on 12 November. The whole trial area was ploughed immediately. On 13 November the drilled treatments were sown with a Monoair pneumatic precision drill using seed spacings to achieve seedrates equivalent to those on the broadcast treatments.

Crop establishment was differentially affected by rooks feeding in January as the seedlings emerged. Damage was almost entirely confined to the drilled areas so these were redrilled on 1 February.

The whole trial area received normal farm treatments of fungicides, insecticides and herbicides. Assessments of crop establishment were made on 23 March and the trial was harvested on 1 September.

## **Results**

This report presents the results from the ploughed-in treatments only as the date of emergence of the redrilled plots was not comparable with the ploughed treatments.

### **Crop establishment**

Plant counts in mid-March showed that the target populations were achieved by all treatments and the differential between the populations at each straw treatment was sufficient to provide some measure of the possible influence of population on yield.

Table 2. *Plant populations/m<sup>2</sup>, 23 March*

	Straw treatments		Mean
	straw removed	chopped & spread	
Low population	15.90	19.20	17.55
High population	24.35	27.90	26.12
LSD	5.232*		3.700
Mean	20.12	23.55	
LSD	NS		
SE per plot (6 df) or % CV	±3.024 13.8		

\*LSD for comparison within same straw treatment

### Seedling growth

Although there appears to be an interaction between straw and plant population in the frequency of distorted seedlings (Table 3) the assessments were variable and there were no statistically significant differences.

Table 3. *% seedlings with distorted growth, 23 March*

	Straw treatments		Mean
	straw removed	chopped & spread	
Low population	15.0	35.0	25.0
High population	25.0	10.0	17.5
LSD	NS		NS
Mean	20.1	23.6	
LSD	NS		
SE per plot (6 df) or % CV	±21.41 100.7		

## Pest damage

The incidence of plants with slug damage, as % plants with holed leaves (Table 4), was small and variable. Although the presence of straw appeared to be associated with more slug damage, there were no statistically significant treatment differences.

Table 4. % plants with slug damage, 29 March

	Straw treatments		Mean
	straw removed	chopped & spread	
Low population	1.3	3.7	2.5
High population	3.2	5.6	4.4
LSD	NS		NS
Mean	2.3	4.6	
LSD	NS		
SE per plot (6 df) or % CV	±2.75 80.3		

## Grain yield

At harvest the yield of beans (Table 5) appeared to be slightly depressed by the presence of straw but this difference was small and not statistically significant. The influence of plant population was also small.

Table 5. Yield (t/ha at 85% dm)

	Straw treatments		Mean
	straw removed	chopped & spread	
Low population	4.64	4.45	4.55
High population	4.75	4.51	4.63
LSD		NS	NS
Mean	4.70	4.48	
LSD		NS	
SE per plot (6 df) or % CV	±0.255 5.6		

### Discussion and conclusions

These results do not demonstrate any serious harmful effects from establishment of winter beans by ploughing seed under with well spread chopped straw on a sandy loam soil. There was a high proportion of seedlings affected by subterranean growth distortions but there was considerable variability in their frequency and observations suggested this was associated as much with the presence of clods as with straw.

Further tests need to be made under a range of conditions before this result is accepted as typical. It is possible that in the presence of larger quantities of decaying straw such as might occur with poor spreading there may be a higher incidence of seedling interference and poorer establishment in those areas where a mat exists.

### Appendix

The following information is presented as an appendix which is available on request.

Field details  
 Method  
 Experiment diary  
 Results

Table A1. Plant vigour score

## Field details

**Site:** Morley Research Centre

**Field reference:** 9 Clampe Close

**Crop:** Winter beans

**Variety:** Punch

**Previous crop:** 1992 Winter wheat  
1991 Winter wheat  
1990 Sugar beet  
1989 Linseed

**Soil type and series:** Sandy loam over chalky boulder clay (Ashley series)

### Soil analysis:

	pH	P	K	Mg
06 September 1991	8.0	3.3	1.2	2.1

**Seed:** Commercial, cvar Punch      **Seedrate:** As treatment

**Date sown:** 12 November 1992

**Nutrients applied:** nil

**Cultivations:** 12 November 1992 Ploughed and pressed

**Applications to crop:**

<b>Date</b>	<b>GS</b>	<b>Item</b>	<b>Rate/ha</b>
14 April	103	Ambush C (cypermethrin, 100)	0.25 l/ha
27 April	104	Basagran (bentazone, 480)	3.0 l/ha
15 May	201	Pirimicarb (pirimicarb, 500)	0.28 kg/ha
15 May	201	Mantec (manganese sulphate)	3.5 kg/ha
15 May	201	Carbate (carbendazim, 500) + Bravo (chlorothalonil, 500)	1.0 + 1.0 l/ha
19 June	205	Pirimicarb (pirimicarb, 500)	0.28 kg/ha
19 June	205	Mantec (manganese sulphate)	3.5 kg/ha
19 June	205	Carbate (carbendazim, 500) + Bravo (chlorothalonil, 500)	1.0 + 1.0 l/ha

## **Method**

### **Plot layout**

Plot areas were established with reference to pegs placed at the field margin adjacent to the trial. Straw treatments were applied to these areas by mechanically raking straw from areas where straw was not required or was chopped and spread on the other areas. Within these areas seed was broadcast by farm drill immediately prior to ploughing or drilled immediately after ploughing using a Monoair precision drill with rows 50 cm apart. The plots comprised a harvest area of 2.15 m x 20.5 m within a treated area of 4 m x 36 m.

Common treatments such as insecticides and herbicides were applied across all plots with farm machinery using wheelings, 12 m apart.

### **Plant population**

The mean plant density of each sub-plot was determined by counting the number of emerged seedlings in 5 randomly selected areas of 1 m<sup>2</sup>.

### **Pest damage**

The incidence of slug damage was determined by counting the number of seedlings with and without any holed leaves in randomly selected areas totalling 2 m<sup>2</sup> per sub-plot.

### **Crop vigour**

A score for overall crop vigour ( based on a 0-9 scale, where 0=dead and 9=good ) was made independently by two observers, their scores being meaned for the record.

### **Seedling deformity**

Emerging seedlings excavated and examined for irregular growth habits and allocated to two categories: normal or deformed, depending on the severity of shoot or root bending.

### **Harvest details**

Plots were harvested using a Claas Compact combine which was modified for plot work and used electronic weighing (Novatech M864 Loadmeter). Trials were harvested by replicate.

### **Post harvest determinations**

Moisture content was determined by taking a 500 g subsample, oven drying it for 48 hours at 101 °C and weighing at ambient temperature.



### Experiment diary

<b>Date</b>	<b>GS</b>	<b>Treatment applied or action</b>
17 September	-	Straw treatments applied
12 November	-	Seed broadcast on stubble, trial area ploughed
13 November	-	Seed drilled
1 February	004	Redrilled 'drilled' treatments
23 March	102	Plant growth assessments
29 March	103	Slug damage assessments
31 August	410	Combined trial

## Results

Table A1. *Plant vigour score, 23 March*  
(0=dead, 9=good vigour)

	Straw treatments		Mean
	straw removed	chopped & spread	
Low population	6.0	6.0	6.0
High population	8.0	8.0	8.0
LSD	0.00*		0.00
Mean	7.0	7.0	
LSD	NS		
SE per plot (6 df) or % CV	±0.00 0.0		

(\*for comparisons within same straw treatment)

The vigour difference between the plant population treatments is probably more apparent than real as the plant densities were low and competition effects were small.