

Evaluating stubble management techniques

G.R. Steed

Rutherglen Research Institute, Department of Agriculture and Rural Affairs, Victoria.

A five year experiment at Rutherglen showed that crops of wheat and lupins could often be grown, without yield penalty, by sowing into the standing residue of the previous crop (1). The major problem encountered was sowing through very heavy quantities of stubble (for example wheat yields of 4-5 t/ha left 8-9 t/ha of stubble). Our sowing equipment, and those of most farmers in the region, could not place the seed into the soil under these conditions. This paper reports results from field experiments which compare three different techniques of stubble management with the more conventional treatment of stubble burning.

Methods

Sites were established at Rutherglen (1984) and Wilby (1985). Stubble treatments at both sites were burning, incorporation, mulched and standing. The rotation at Rutherglen has been wheat (after wheat)-lupins-wheat. At Wilby both wheat and lupins were sown into a wheat stubble in 1985 then the crops reversed in 1986. Measurements include crop emergence, soil mineral nitrogen, soil water content and grain yield. The selection of stubble incorporation and stubble mulching as treatments was based on their popularity with farmers who practice conservation tillage. These farmers had not based their choice of stubble management systems on scientific evidence but rather on a practical need to reduce stubble quantities at sowing.

Results and discussion

Stubble retention, in any form, has had no effect on crop emergence, however very heavy quantities of straw have yet to be achieved in each experiment. Best soil moisture conservation (autumn measured, 0-10 cm) was achieved by standing and mulched stubble. Stubble incorporation is no better than stubble burning with both treatments showing less ($P < 0.05$) soil water at sowing time than in standing and mulched stubble. At the Rutherglen site stubble incorporation (of both wheat and lupin straw) has reduced soil mineral nitrogen levels ($P < 0.01$) compared with the other three treatments. At Wilby stubble incorporation also decreased soil mineral nitrogen after one year however after the second year there were no treatment differences.

Table 1 Crop yields (t/ha) and stubble treatment

Stubble	Rutherglen (1983 wheat)			Wilby (1984 wheat)			
	84 (W)	85 (L)	86 (W)	85 (W)	85 (L)	86 (W)	86 (L)
Burnt	2.5 ^B	2.9 ^A	2.9 ^A	2.1 ^A	2.6 ^A	3.6 ^A	1.0 ^A
Incorporated	2.2 ^A	2.9 ^A	2.9 ^A	2.1 ^A	2.5 ^A	3.4 ^A	1.0 ^A
Mulched	2.1 ^A	2.9 ^A	3.1 ^A	2.0 ^A	2.7 ^A	3.2 ^A	1.0 ^A
Standing	2.1 ^A	2.9 ^A	3.4 ^B	2.1 ^A	2.6 ^A	3.3 ^A	0.7 ^A

W = Wheat, L = Lupins. Figures within columns followed by different letters are significantly different ($P < 0.05$).

Yields from the Rutherglen site (Table 1) show that after an initial decrease associated with all forms of stubble retention (1984) yields of lupins and wheat (stubble retained) have been at least as good as those after stubble burning. At Wilby there have been no yield differences between any stubble treatment.

1. Steed, G.R. and Reeves, T.G. (1985). Proc. 3rd Aust. Agron. Conf. p. 373.

