Conservation farming methods for western New South Wales

N.A. Fettell

Agricultural Research and Advisory Station, Condobolin N.S.W. 2877

Cereal production in western N.S.W. has traditionally been limited to less than 30% of the farm area each year, allowing an adequate pasture phase for the maintenance of soil structure and fertility. The first crop after pasture is usually preceded by an eight to ten month fallow as this practice gives higher yields (1). Changing economic conditions, however, have led to a lengthening of the cropping phase with more crops being stubble-sown. Common practice has been to burn cereal stubble and then cultivate from one to four times prior to sowing. With increased cropping frequency, these practices could result in soil structure problems and increased risk of soil erosion. Research at Condobolin is examining alternative systems including stubble retention and the replacement of tillage by herbicides.

Methods

The following seven tillage treatments were imposed after the 1978 wheat harvest :

- stubble burnt, 2 passes with a scarifer;
- stubble burnt, knockdown herbicide, direct drilled;
- stubble burnt, knockdown herbicide, direct drilled;
- stubble incorporated by a heavy offset disc, 2 passes with a scarifier;
- stubble retained, cultivated with a blade plough;
- stubble retained, cultivated with a chisel plough and sweeps; (vii) stubble retained, chemical fallow using knockdown herbicides.

Treatments (i), (ii) and (iv) were sown with a standard combine giving full soil disturbance whereas treatments (iii), (v), (vi) and (vii) were sown with a narrow-tined presswheel seeder. The plots have been sown to wheat each year and the tillage treatments have been reimposed on the same plots.

Results and Discussion

Grain yields for three years are shown in Table 1, drought conditions causing crop failure in 1980 and 1982. Yield levels have varied greatly from year to year, but stubble retention has consistently given higher grain yields. Of particular interest are the results from 1983, as the crop failure in 1982 left all plots bare of stubble and burning was not possible. The burnt plots, however, still gave lower yields in 1983, suggesting that stubble retention in previous years has given long-term benefits, perhaps an improvement in soil structure resulting from a higher organic matter content.

Equivalent yields have been obtained from direct drilled and cultivated plots, although reduced early growth has been measured in the direct drilled and no tillage crops. The type of tillage implement used has also had little effect on grain yield.

Table 1. Effects of stubble and tillage treatments on grain yields.

Stubble treatment	Tillage method	Sowing implement	Grain yield (t/ha) 1979	1981	1983
Burn	Scarifier	Combine	0.57	0.91	3.58
Burn	Direct drill	Combine	0.56	0.98	3.57
Burn	Direct drill	Presswheel	0.40	0.91	3.36
Incorporate	Offset disc	Combine	0.66	1.22	3.87
Retain	Blade plough	Presswheel	0.65	1.28	3.97
Retain	Chisel plough	Presswheel	0.66	1.27	3.88
Retain	Chemical fallow	Presswheel	0.81	1.24	4.13

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