

TILLAGE AND STUBBLE EFFECTS ON WHEAT PRODUCTION IN TWO CONTRASTING SEASONS

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Previous studies have reported considerable benefits to soil structure, soil nitrogen and soil biology from direct drilling and stubble retention compared to conventional cultivation and stubble burning (Chan *et al.* 1992). However these benefits are not always shown in terms of crop productivity though advantages are often measured following dry spring months in south-east Australia (Cornish and Lymbery 1987; Heenan *et al.* 1994). This paper reports the effects of tillage and stubble management on wheat yield and grain protein in a wet (1993) and a dry (1994) year.

MATERIALS AND METHODS

Results from a long-term rotation, tillage and stubble experiment commenced in 1979 on a red earth at the Agricultural Research Institute, Wagga Wagga are presented. Treatments from a lupin-wheat rotation were either conventionally (2-3 passes) cultivated (CC) or direct drilled (DD) and stubble either retained or burnt in early autumn. The April-October rainfall was 447 mm in 1993 and 205 mm in 1994. Sowing time was delayed in both seasons to 4 June 1993 and 15 June 1994.

RESULTS AND DISCUSSION

Grain yield differed markedly between seasons from a mean of 6.95 t/ha in 1993 to 0.42 t/ha in 1994. There was no significant effect of tillage on grain yield or grain protein in the wet 1993 season. In 1994, cultivation increased yields but slightly reduced grain protein. Retaining instead of burning stubble slightly increased yields and grain protein in 1993 but not in 1994.

Table 1. The influence of cultivation and stubble on wheat grain yield and grain protein.

Tillage treat	Stubble treat	1993		1994	
		Yield (t/ha)	Protein (%)	Yield (t/ha)	Protein (%)
DD	Retained	6.83	10.5	0.14	16.9
CC	Retained	7.01	10.8	0.44	16.6
DD	Burnt	6.72	10.3	0.19	17.2
CC	Burnt	6.67	10.2	0.54	16.7

Low yields from direct drilling relative to cultivating in 1994 were presumably due to the widely reported reduced root growth phenomenon under the former treatment. This effect apparently reduced the plant's ability to use moisture accumulated at depth from the high summer rains in that year.

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