

Stubble retention and nitrogen supply on dryland wheat yield

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The likely significance of stubble retention in cropping systems, particularly dryland wheat production, is currently being explored in southern Australia. The profitability of stubble cropping is influenced by grain yield. However, the extent of this influence has not been fully explored. This system often results in low crop yields compared to those obtained on burnt paddocks (1), an effect which seems to be associated with poor plant establishment, reduced early plant vigour and the incidence of soil borne diseases.

Methods

Experiments were begun in 1980 at Dookie Agricultural College to study the effect of stubble retention and varying supplies of nitrogen fertilizer on wheat yield. The site was on a red-brown earth type with clay topsoil, which was cropped with wheat in the previous year. Wheat (cv. Egret) was sown either conventionally or direct-drilled on stubble burnt or retained. The stubble was cultivated into the soil in the conventional plots. Nitrogen (34 kg ha^{-1}) was applied as ammonium nitrate at seeding (June 19) or at the double ridge stage of development (48 days after sowing).

Results and Discussion

Table 1. Plant establishment (38 days after sowing), ear production and grain yield of wheat.

Treatment	Stubble burnt			Stubble retained		
	Plants m^{-2}	Ears m^{-2}	Yield (kg ha^{-1})	Plants m^{-2}	Ears m^{-2}	Yield (kg ha^{-1})
Conventional						
No nitrogen	129	358	3285	147	342	2010
N- at seeding	144	429	2960	143	330	2460
N- at double ridge stage	145	378	3108	145	362	2603
Direct-drilled						
No nitrogen	110	325	2332	107	211	1378
N- at seeding	119	284	1957	105	296	1505
N- at double ridge stage	106	301	2355	102	306	1543
SE \pm	14	24	323			

Compared with stubble burnt, grain yield was reduced significantly ($P=0.05$) by stubble retention, the reduction being much higher when the crop was direct- drilled (Table 1). While grain yield increases were observed with the application of nitrogen fertilizer on stubble retention treatments, a general reduction of yield was noted under the stubble burnt conditions. However, these differences were not statistically significant. Although plant establishment was reduced on direct-drilled plots compared with conventional treatments under

the stubble retained and stubble burnt conditions, this alone was not adequate to explain the yield variations. The cultural treatments imposed were successful in producing large effects on crop growth.

1. Doyle, A.D. and Forrester, N.W. 1980. Proc. Aust. Conf. Queensland. 212.