Stubble retention in N.E. Victoria

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A field experiment was conducted from 1981 to 1983 to determine the effects of retaining stubbles on growth and yield of wheat. Stubble retention and direct drilling are techniques which reduce soil erosion and compaction and improve soil structure. Thus stubble retention is part of a soil management package which is becoming increasingly important as farmers increase the area of their cropping enterprise and keep paddocks in crop for longer periods.

Methods

Continuous wheat (cv. Oxley) and lupin-wheat rotations were compared where the stubble of the previous crop was either burnt or retained at the soil surface. In the continuous wheat, stubble burnt treatments, direct drilling was also compared with sowing after conventional cultivation. Measurements included crop emergence, crop growth, soil temperature, soil mineral nitrogen, soil water content and crop yield.

Results and Discussion

Each year, stubble retention has significantly increased ($P<0.05$) the surface soil water content (0-10 cm) at sowing time. Reduced early growth of wheat has occurred where stubble is retained. When dry, frosty conditions prevailed measurements of soil temperature showed that the maximum daily temperature beneath stubble was 4 to 5?C lower than in bare, cultivated soil. Prolonged exposure to reduced soil temperatures affected wheat growth in this stubble retained treatment. Stubble retained wheat had increased dry matter production in spring, when soil temperatures were higher, but did not fully compensate for the earlier restriction.

After one year of retaining stubbles there was less soil mineral nitrogen (0-20 cm) under stubble, however, after two years there was more soil mineral

nitrogen under stubble (35 ppm) compared with stubble burning (29 ppm),)$P<0.05$).

Lupins increased the yield of the following wheat crop regardless of stubble treatment. To date there has been no significant difference between continuous wheat yields, stubble burnt or retained, but over three years direct drilled, stubble retained wheat has yielded 0.5 t/ha more than wheat sown after stubble burning and cultivation (Table 1). Crop diseases have not been a problem.

	Wheat grain yield (t/ha)		
	1981	1982	1983
W,WB-CC	0.79^{a*}	0.46^{a}	1.97^{a}
W,WB-DD	1.08^{b}	0.50^{a}	2.12^{a}
W,WUB-DD	1.20^{b}	0.38^{a}	2.11^{a}
L,WB-DD		1.08^{b}	2.96^{b}
L,WUB-DD		1.22^{b}	2.76^{b}

W = Wheat, L = Lupins, B = Stubble burnt, UB = Stubble retained
CC = Cultivation, DD = Direct drilled

* Figures within columns, followed by the same letter, are not significantly different ($P<0.05$) when tested using Duncan's Multiple Range Test.