

Deep tillage research on the southern tablelands of NSW

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Deep tillage is a term used to describe a type of non-inversion, relatively deep (> 15 cm) cultivation which leaves little surface disturbance. Implements designed for this purpose include Agrowplow[?], Wallace Soil Reconditioning Unit[?], Domino Sub-tiller[?] and Paraplow[?]. Deep tillage proponents claim it improves soil conditions and crop and pasture production.

Methods

Since 1980, experiments comparing various deep tillage treatments with untreated controls, have been conducted on the Southern Tablelands in a transect from Bookham to Braidwood. These experiments have covered a range of soil types (from duplex soils with hardpans, to friable loams), seasonal conditions (very dry to very wet), soil fertility levels, and crop and pasture types. On some sites, implements have been used to various depths. Factors measured have been herbage and grain yields; soil strength, pH, moisture content, and chemical composition; and plant tissue composition.

Results and discussion

Responses to deep tillage were highly variable (Table 1).

Table 1. Summary of responses to deep tillage. Southern Tablelands 1980-1983

	HERBAGE OR GRAIN YIELD RESPONSE						
	Nil	Increase			Decrease		
		Slight	Moderate	Large	Slight	Moderate	Large
1980	3	2					
1981	9			1	1	1	
1982	3			2	2	1	
1983	3		1	5			
TOTAL	18	2	1	8	3	2	

Generally, deep tillage: decreased soil bulk density and soil strength; increased soil moisture; had little effect on soil pH.

The variability of response is well illustrated by a 1983 experiment on a duplex soil carrying annual pasture. Deep tillage done in January was compared with that done in March (100 mm of rain intervening) and an untreated control (Table 2).

Table 2. Effect of deep tillage in January and March, 1983, on some soil and plant attributes in June 1983.

Tillage Time	D.M. yield kg/ha	Soil H ₂ O % ²	Soil strength relative to NIL	Soil pH 1:2 CaCl ₂	Soil P Bray 1 ppm	Tissue P %
NIL	603	10.7		4.2	15.5	.25
JAN	2590	18.4	Decrease	4.3	22.0	.33
MAR	363	14.8	Not meas'd	4.1	15.2	.24

Deep tillage in January, before the opening autumn rain, quadrupled yield; associated with this were decreased soil strength and increased soil moisture, available P-and tissue P. Deep tillage in March, after the rain, reduced yield (by disrupting pasture regeneration), with a small effect on soil moisture and no effect on soil and tissue P.

Responses to deep tillage depend on various factors including: soil type and fertility, seasonal conditions, time of tillage, and crop and pasture type.