Soil management for intensive cropping on krasnozems

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Krasnozems on the north coast of Tasmania are cropped intensively, and are often rotary hoed and compacted with tractors and harvesting equipment. Are crop yields affected in the short term by these management practices?

The objective of this one experiment at Forthside Vegetable Research Station was to measure the effect on crop yields of two soil management systems in combination with green manure crops.

Methods

The site had been in pasture for two years prior to the experiment, which was carried out over the period 1981 to 1984. Crops were irrigated and grown in the following sequence: 1981/82 Kennebec potato, 1982/83 - Kennebec potato, 1983/84 - poppy.

The treatments consisted of two soil management systems (SM1 and SM2) with and without green oats between crops:

SM1 = plough, deep till, Roterra, plant or sow
SM2 = compact, plough, deep till, rotary hoe twice, Roterra, plant or sow.

Compaction was carried out with a laden tractor or truck in the autumn or winter when the soil was at field capacity. The oats, direct drilled without fertilizer after the potato harvests, produced about 3 t DM/ha/annum.

Results and Discussion

The crop yields are summarized below:

Soil Management System	Green Oats	1981/82 - potato Processing Tubers		1982/83 - potato Processing Tubers		1983/84 - poppy Capsule Yield
		t/ha	000's/ha	t/ha	000's/ha	t/ha
SM1	+			55.1	229	1.20
	-	57.5	258	50.3	222	1.33
SM2	+			52.1	231	1.17
	-	58.3	255	55.2	233	1.38
L.S.D. (P=0.10)		1.8	6	7.7	35	0.36

The severe soil management system, SM2, did not reduce potato or poppy yields, nor did ploughing in of the oat crop increase the potato yield in 1982/83 or the poppy yield in 1983/84.

Krasnozems are well structured and stable (1), and therefore it is logical that in the short term, yields would be insensitive to soil management practices. I have demonstrated that satisfactory seed-beds and yields can be expected with minimum cultivation. The effect in the long term of the current severe soil management practices needs to be evaluated.

1. Coughlan, K.J., Fox, W.E. and Hughes, J.D. 1973. Aust.J. Soil Res. 11 65-73.