

# Developing a minimum till cropping package for the lower North Central Catchment of Victoria

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## Abstract

Key areas of the lower North Central Catchment of Victoria have fewer than 10% of farmers using minimum tillage, despite earlier attempts where it was tried but discontinued. Minimum tillage is pivotal to soil health in cropping zones and is a major recommendation for reducing wind erosion and soil structural decline. We aim to increase the adoption of minimum tillage through a format that includes trial/demonstration sites that growers can view and directly transfer techniques to similar soil and environmental types and provide an extension service to support the package. The information and comments presented in this paper are based on preliminary data from trials growing in one of the worst droughts in the regions history that consequently lead to premature death of crops. Results of the trial have shown that;

- minimum tillage systems conserve similar amounts of moisture compared to conventional cropping in a slightly drier than average summer/autumn,
- mineralised nitrogen in frequently cultivated plots did not increase over the summer/autumn period compared to the reduced tillage/direct drill sites,
- plant establishment was not significantly affected in a direct drill system compared to conventional.

## Key words

Minimum tillage, reduced tillage, soil moisture, extension

## Introduction

Poor soil management is a chronic threat to agricultural production, water quality and bio-diversity. It leads to salinisation, declining soil health and a long-term reduction in resource quality. Minimum tillage is a conservation farming system that may encompass reduced tillage, direct drilling and zero tillage, all of which minimise soil disturbance. Soil degradation is prevented by protecting the soil with plant residues and improving soil structure by retaining organic matter to promote growth of soil organisms. Improving soil conditions increases the production potential of farming land in the short term (within five years) and ensures sustainability for the long term (1). Past failures in farmer's attempts to convert to minimum tillage saw machinery changes but didn't incorporate other conservation management practices. The system was expected to fall into place with practical experience but when this didn't develop and no local extension support was available, many growers reverted back to conventional cropping (2). Successful minimum tillage requires a systems or whole farm approach.

## Materials and Methods

Three trial sites in North Central Victoria were used to compare conventional cultivation with various minimum tillage techniques to demonstrate best management practice (BMP). The trial layout is in a nearest neighbour design with 10 treatments and a control that was replicated every 3rd plot. The crop was Schooner barley sown into a 1.25 to 2.2t/ha wheat stubble.

Soil moisture's (0-60cm) were taken after harvest 2001 and Nitrogen status was identified through a deep N soil test. Rainfall was recorded over summer and upon sowing, soil moisture was measured to examine the effect of minimum tillage on moisture conservation. Root disease (0-10cm) and nitrogen testing (0-10 and 10-60cm) were conducted at sowing to see if there were any differences within the systems. Field

days viewing the comparisons of minimum tillage to conventional cropping techniques and demonstrating the best management seeding systems were held in spring. A survey to benchmark local conventional and/or minimum tillage practices along with the results of the trial, will be assessed to prepare a minimum tillage implementation kit with prescriptions for managing different soil types.

## Results

Table 1. Changes in soil moisture under different tillage regimes, and seasonal rainfall at three sites in North Central Victoria.

Site No.	Cropping practice	Initial total soil moisture 0-60cm 1/1/02	Rainfall (mm) Jan 1- June 25	Soil moisture @ sowing 0-60 18-25/6	Change in soil moisture 0-60cm (mm)
1	Min till	44.6	92.5	100.4	+55.8
1	Conventional	53.6	92.5	98.2	+44.6
2	Min till	53.4	75.5	73.1	+19.7
2	Conventional	54.9	75.5	76.5	+21.6
3	Min till	56.2	81.5	107	+50.8
3	Conventional	59.2	81.5	123.2	+64

Site no 1. Sandy loam, site no 2. Duplex red brown earth and site no. 3 Grey loam

## Discussion

The year 2002 has not been typical for the lower North Central Catchment area and was drought declared in September. For most of the year the season was between decile 1 and 1.5, and at the end of the growing season it was decile 0.7 decile, thus one of the lowest rainfall years in recorded history. Summer weed control was only required at one site due to limited weed germination so a major limitation seen with minimum tillage in a typical year was not tested.

Differences in soil moisture between the two systems at sowing were minimal (expected due to the low rainfall), but farmers strategies to work the ground 2-4 times for weed control when weeds were negligible is questionable. Alternative weed control methods will be encouraged in the minium tillage implementation kit and timely press releases will be generated this summer in light of the drought conditions to encourage protection of soil and reduce soil erosion, which this season has the potential to be severe. Research, integrated with BMP for the soil type, conditions and climate will also be included in the kit.

A survey is currently being conducted to analyse local perceptions of minimum tillage and identify limitations so we can formulate a practical application of research results at the farmer level and identify gaps, if any, for future projects. Awareness of the trials, defining minimum tillage methods and reporting of results is continually being publicised to transfer coordinated messages to local growers. Field days at the trial sites during spring demonstrated the practical application of the technology and management used. With the lack of vegetative growth the focus was on seeding systems. The key principles were highlighted and demonstrations of direct drill equipment such as tillage points and coulter discs were shown and discussion were held on how they react with a range of soil/residue conditions. All findings and a minimum tillage kit will be available mid February 2003.

Further work on the project is dependent on future funding, but a strong application has been submitted to extend the trial another year to capitalise on the work conducted this year. We will use the data obtained from the farmer survey to target areas identified needing further research so that our local demonstration will increase practice change to minimum tillage. The trials will continue at the same site. Another years trial results and promotion will be critical in consolidating a minimum tillage package for the North Central Catchment and increasing conservation cropping systems for a sustainable future.

### **Reference**

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