

Drivers of tillage system decisions in the Mallee

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Key messages:

- The Mallee has had one of the largest increases in no-till adoption over the past decade from a relatively low base.
- Some large differences between no-till users and non-users have emerged such as the use of a cropping consultant being more than 5 times more likely among no-till users.
- Those who use no-till extensively are significantly more positive about the affect of no-till on moisture retention, the ability to seed earlier on less rain and the reliability of wheat yields over the long-term compared to non-users.
- Changes in these key agronomic perceptions are also associated with more growers using no-till on all of their cropping land.

Aims:

- To identify no-till adoption trends across southern cropping regions including the Mallee
- Identify opportunities for R, D & E to facilitate widespread and sustainable use of conservation cropping practices

Background:

The proportion of Mallee growers using no till has increased dramatically over the past 5-10 years. From a relatively low level of adoption 10 years ago, the Mallee has had the fastest rate of increase in no-till adoption in Australia over this period. Around 70% of growers in the SA and Vic Mallee used at least some no-till to establish crops in 2008. As the extent of Mallee cropping land under no-till use still remains lower than many other cropping regions around Australia, there is ongoing interest in future increases in no-till adoption and what the drivers of this are likely to be.

This study looks at data collected in 2008 as part of a GRDC-DAFF-SANTFA supported project involving 1170 farmers across Australia (Llewellyn & D'Emden 2009). This included 181 Mallee grain growers from the SA and Vic Mallee (Table 1) and the Wentworth and Balranald statistical local areas in NSW (11).

A relatively broad definition of no-till seeding was used in the study based around seeding with low soil disturbance (points or discs) and no prior cultivation. Differences in farm and farmer characteristics between adopters and non-adopters are shown, including differences in the perceived effects of no-till with stubble retention compared to a cultivation-based system. Regression analyses have been conducted to determine which factors are most strongly associated with the decision to use or not use no-till.

Table1 Regions, respondent numbers and Statistical Local Areas used to define regions.

Regions	Resp.	Statistical Local Areas
VIC Mallee	80	Mildura, Swan Hill(s), Buloke N , Yarriambiack N
SA Mallee	90	Loxton-Waikerie; Karoonda East-Murray, Southern Mallee, Coorong

Results:

The characteristics of adopters and non-adopters of no-till were compared and significant differences in the Vic and SA Mallee are shown in Tables 2 & 3. There are very large differences between adopters and non-adopters in both regions for some factors such as use of a paid consultant. Compared to non-users, those who have used no-till are much more likely to believe that no-till with stubble retention leads to the opportunity to sow earlier (less rain needed for reliable seeding) and greater soil moisture retention. While proportion of land under crop was substantially different between users and non-users in each region, total arable area managed was not.

Table 2. Victorian Mallee region: differences between current no-till users and non-users. Results presented only where significant differences were found.

Characteristic	Non-users	Users	Sig
Pay a consultant for cropping advice (%)	12	70	***
Stated preference for cropping rather than livestock (%)	69	89	**
Average proportion of arable land cropped over past 3 years (%)	61	77	***
Proportion of farm described as erosion prone if not managed carefully (mean %)	8	38	***
Have a yield map (%)	4	32	***
Ever been member of no-till or conservation farming association (%)	12	50	***
Proportion (%) of growers with belief that, relative to cultivation-based systems, no-till with stubble retention will lead to:			
• More crop disease	65	44	*
• More moisture retention	46	76	*
• Less weed emergence	42	63	*
• Less rain needed to allow reliable seeding	23	63	***
• Higher reliability of wheat yields	15	46	*

While the differences in the tables exist, they are not necessarily all influential factors. Analyses using multiple factors together to explain both use of some no-till and extensive use (use of no-till at least 90% of cropping land in 2008) were also conducted (logit regressions). Using a small set of explanatory factors, these models were able to correctly classify at least 80% of Mallee growers according to their no-till use.

Table 3. SA Mallee - differences between current no-till users and non-users. Results presented only where significant differences were found.

Characteristic	Non-users	Users	Sig.
Mean increase in arable area managed since 10 years ago (%)	22	41	*
Member of local farmer group looking at cropping issues in the district (%)	37	67	***
Pay a consultant for cropping advice (%)	4	32	***
Higher education (%)	11	29	*
Stated preference for cropping rather than livestock (%)	33	70	***
Average proportion of arable land cropped over past 3 years (%)	50	60	**
Have a yield map (%)	4	23	*
Ever been member of no-till or conservation farming association (%)	11	38	***
Proportion (%) of growers with belief that, relative to cultivation-based systems, no-till with stubble retention will lead to:			
• More soil moisture retention	56	86	***
• Lower fuel costs	59	89	***
• Less rain needed to allow reliable seeding	33	59	*
• Higher reliability of wheat yields	7	44	***
• Less days to get the crop in	37	73	***
• Less soil erosion	59	94	***

When a range of variables are considered together, the following factors are shown to result in **use of at least some no-till** being significantly more likely:

- Use of a crop consultant
- Perception that long-term wheat yields under no-till with stubble retention are relatively more reliable
- Years since first aware of someone using no-till in the local district
- Higher average annual rainfall
- Higher education

The following factors are shown to result in **extensive no-till use** (no-till used to sow at least 90% of crop) being significantly more likely:

- Use of a crop consultant
- Perception that long-term wheat yields under no-till with stubble retention are relatively more reliable

- Perception that using no-till with stubble retention won't lead to much higher herbicide resistance
- Perception that using no-till with stubble retention allows more reliable seeding on less rain
- Perception that using no-till with stubble retention increases soil moisture retention
- Years since first aware of someone using no-till in the local district
- Higher education

Future Directions:

The study highlights agronomic and extension-related factors that are influential in tillage system choice in the Mallee and some factors that could be targeted to support tillage system decisions. The results of the national study and the regionally-specific results are being used to inform research, development and extension planning for both current no-till users and non-users.

References:

Llewellyn RS, D'Emden, F. 2009. Adoption of no-till cropping practices in Australian grain growing regions. CSIRO report for GRDC, SA No-till Farmers Association and CAAANZ. 84pp.

Acknowledgements:

Funding for the SA No-till Farmers Association/Conservation Agriculture Alliance of Australia and New Zealand initiative that has supported this study has come from the Grains Research and Development Corporation, Department Agriculture, Fisheries and Forestry, SA No-till Farmers Association, WA No-till Farmers Association and CSIRO. Gratefully acknowledged is the time offered by the farmer participants.

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