

Post-pasture Sowing Demonstration: No-Till vs Cultivation

Author: Ruth Sommerville, Joe Koch, Matt McCallum and John Carey

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Key Points:

- All machines tested in this trial successfully established a no-till wheat crop after pasture
- On average across all machines, there was no positive response to pre-sowing cultivation on yield

Background to the demonstration trial

Pre-sowing cultivation after 2-3 years of pasture remains a common practice in the Upper North. Reasons for this practice include,

- Surface compaction by livestock, particularly on heavier soil types, resulting in poor crop establishment with no-till and possible reduced yield
- Cultivation to control woody and other hard to kill weeds which are prevalent after a longer pasture phase

This trial aimed to demonstrate whether current seeder set ups within the region are capable of successfully sowing wheat into a pasture with no-till. Four different machines were used across cultivated and uncultivated areas of the paddock at “White Cliffs”, Booleroo Centre. The machines used were commercial units set up and modified to suit each individual farmer’s needs (Table 1).

Table 1: Seeder Units used in the Post Pasture Sowing Demonstration

Machine Specifications	Owner
John Shearer Universal, Agmaster 12mm points and 70mm press wheels, 9" spacing	John Carey
Flexi Coil 5000 Airdrill, Agmaster points, 100mm press wheels, 10" spacing	Gavin Schwark
Bourgault 8810, Agmaster points, 70mm press wheels	Tony Jarvis
Ausplow DBS, 10" parallelogram, 70mm press wheels	Dustin Berryman

Over twenty treatments were implemented in this paddock scale demonstration, however only ten of these treatments are examined in this paper, shown in Table 2.

Table 2. Treatments examined in the comparison of no-till and cultivation effects on post pasture wheat establishment.

Treatment Number	Grower	Treatment
1	Carey	No-till
2	Carey	Cultivated January
3	Carey	Cultivated April
4	Carey	Cultivated January and April
5	Jarvis	No-till
6	Jarvis	Cultivated April
7	Schwark	No-till
8	Schwark	Cultivated April
9	Berryman	No-till
10	Berryman	Cultivated April

The treatments were sown to Mace wheat (75kg/ha) on 21/5/2014 with 120kg/ha of 32:10 fertilizer. Trifluralin at 1.3L/ha was the pre-emergent herbicide used. Plant counts and sowing depth were conducted on 18/6/2014. Ryegrass numbers were assessed on 21/8/2014.

The paddock was harvested using a commercial harvester and the paddock yield mapped. The yield maps have not been presented here as the other treatments have made the comparisons difficult visually. The additional treatments included in this demonstration paddock to create farmer discussion at field days were fertiliser rates (0, 60, 180kg/ha 32:10), sowing speed, deeper working and increased pre-emergent herbicide rate (2.6L/ha). These treatments did show differences when yield mapped and will be explored further in future demonstration paddocks.

Results and Discussion

On average, the no-till and the April cultivated treatments had similar plant numbers and average sowing depth (Table 2). However, the range in seed depth appeared to be less pre-sowing cultivation. This would indicate that the tynes were under more pressure in the no-till plots, and more tyne movement resulted in a greater variation in seed depth. Conversely, where the soil was cultivated prior to sowing, the tynes were likely to be under less pressure resulting in a more even seed placement.

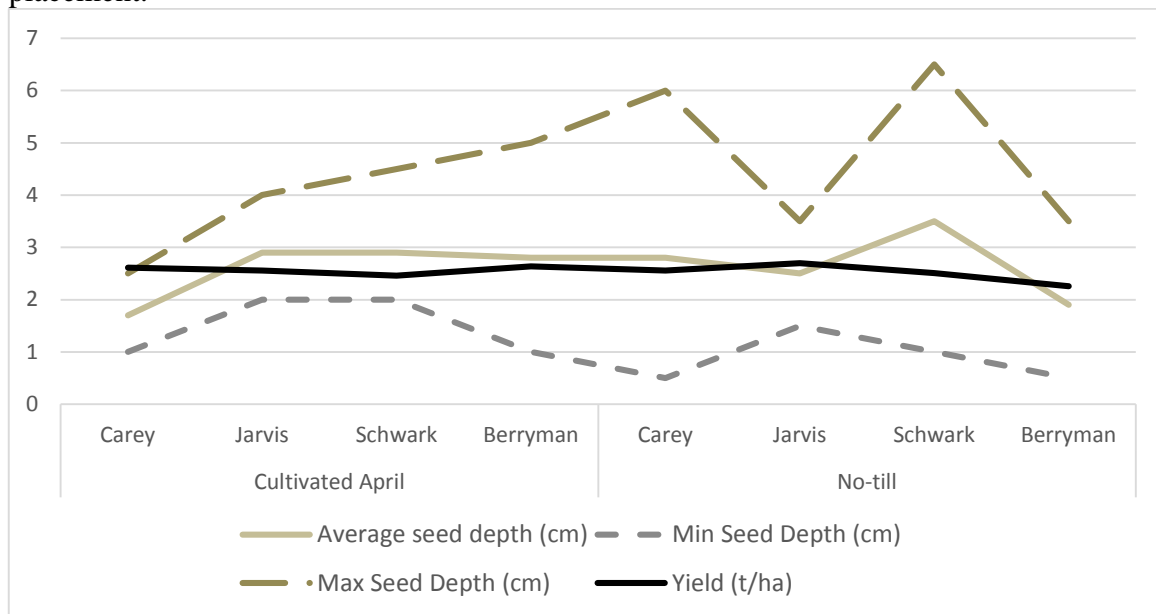


Figure 1: Seed Placement and the Resulting Average Yield of the four machines in cultivated and no-till post pasture sowing demonstration.

Table 2. Crop establishment and yield results

Grower	Treatment	Plants/m ²	Average seed depth (cm)	Range in seed depth (cm)		Yield (t/ha)
Carey	No-till	120	2.8	0.5	6.0	2.56
Carey	Cultivated January	142	2.8	1.5	4.5	2.25
Carey	Cultivated April	109	1.7	1.0	2.5	2.61
Carey	Cultivated January and April	104	3.9	3.0	5.5	-
Jarvis	No-till	108	2.5	1.5	3.5	2.70
Jarvis	Cultivated April	116	2.9	2.0	4.0	2.56
Schwark	No-till	136	3.5	1.0	6.5	2.51
Schwark	Cultivated April	149	2.9	2.0	4.5	2.46
Berryman	No-till	136	1.9	0.5	3.5	2.26
Berryman	Cultivated April	104	2.8	1.0	5.0	2.64
Average No-till		125	2.7	0.9	4.9	2.51
Average Cultivated		124	2.6	1.5	4.1	2.50
Average all data		122	2.8	1.4	4.6	2.51

Yield varied from 0.76 to 4.03t/ha across the paddock according to the yield map. Most of the yield variation was due to soil type with higher yield on the limey rising ground and the lower yield on the clay soil type. On average, there was no positive response to cultivation on yield (Table 2 and Figure 1). In many plot comparisons, yield decreased with cultivation, however the data has not been statistically analysed due to the lack of replication.

The assessment of impact on Annual Ryegrass populations found Ryegrass numbers to be low across the paddock ($<1/m^2$) and there was no difference between treatments. Most of the ryegrass was present in the crop furrows and on the shoulder of the press wheel furrow. This would indicate that Trifluralin is still working well in this paddock, and a pasture phase is helping to preserve this chemistry. There was some variation in ryegrass numbers on different soil types. There was little ryegrass on the loam, but some patches of ryegrass (20-45 plants/ m^2) on the lower lying clay soil type.

Summary

- On average this demonstration showed limited to no gain in plant establishment from working the paddock prior to sowing with plant numbers of 125/ m^2 for no-till treatments and 124/ m^2 for cultivated treatments.
- On average this demonstration showed limited to no gain from working the paddock prior to sowing with an average yield of 2.51t/ha for no-till treatments and 2.50t/ha for cultivated treatments.
- All machines successfully sowed through the un-cultivated post pasture soil conditions, though for some machines it did result in reduced precision of seed placement. In poorer season breaks, or with other crops this could have a significant effect on plant establishment.
- There is a significant cost to working a paddock prior to sowing in time, machinery costs and fuel. There needs to be a significant benefit of working the paddock prior to sowing to warrant this input. The gross margins of working this paddock in 2014 prior to sowing would have resulted in a significant loss in comparison to direct sowing of the post pasture phase.
- Cultivation prior to sowing will result in significant losses of stored soil moisture. The effect of this was seen in the two plots worked in January with reduced yield in the January only working and reduced plant establishment in the dual cultivation treatment.
- This demonstration showed limited benefit for weed population control through cultivation, though the total weed levels were low across the paddock.

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Image 1: UAV footage taken on the 7/08/2014 clearly shows no visual difference between no-till and cultivated strips which run Left to Right across this image. The different seeders and other treatments run Top to Bottom in this image, clear fertiliser responses are visible in the middle of the photo.



Photo: Todd Orrock