

# Mouldboard plough demonstration - Buntine

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## Aim

To evaluate the effects of mouldboard ploughing a soil with and without TM21.

## Background

Mouldboard ploughing involves a one-off inversion of the topsoil. In this trial the plough was able to invert the top 30cm, larger ploughs can get deeper. Mouldboard ploughing can help in the control of weeds, burying water repellent topsoil and incorporating lime at depth. The cost of the operation is approximately \$100-120/ha (Davies et al, 2012).

TM21 is a product developed by BEST who describes it as a bio-stimulant soil ameliorant that increases the population of native beneficial micro-organisms in the soil.

The trial was mouldboard ploughed on the 17<sup>th</sup> June 2012 after receiving 55mm of rain in the previous week. This allowed the soil profile to fill up at least the top 30cm, required for best inversion.

The deep ripping treatment was included to take into account the ripping effect of mouldboard ploughing and if that produced a yield improvement. The paddock was deep ripped in 2009, therefore it was predicted that there wouldn't be a significant difference in yield between deep ripped and control plots.

## Trial Details

Property	Michael and Narelle Dodd, west of Buntine			
Plot size & replication	168m x 18m, not replicated			
Soil type	Yellow sand			
Soil pH (CaCl <sub>2</sub> )	0-10cm: 6.2	10-20cm: 4.8	20-30cm: 5.0	30-40cm: 5.3
EC	0.045 dS/m			
Sowing date	18/6/12			
Seeding rate	80 kg/ha			
Variety	Mace			
Soil amelioration	2010: 1.5 t/ha Lime			
Fertiliser	26/4/12: 60 kg/ha Muriate of Potash			
	18/6/12: 45 kg/ha Agstar Extra, 15 kg/ha Muriate of Potash, 30 L/ha Flexi-N			
	18/6/12: TM21 plots only - 250 mL/ha TM21			
Paddock rotation	2009 wheat, 2010 wheat, 2011 pasture			
Herbicides	18/6/12: 1 L/ha Roundup, 1.2 L/ha Treflan			
Growing Season Rainfall	170mm			

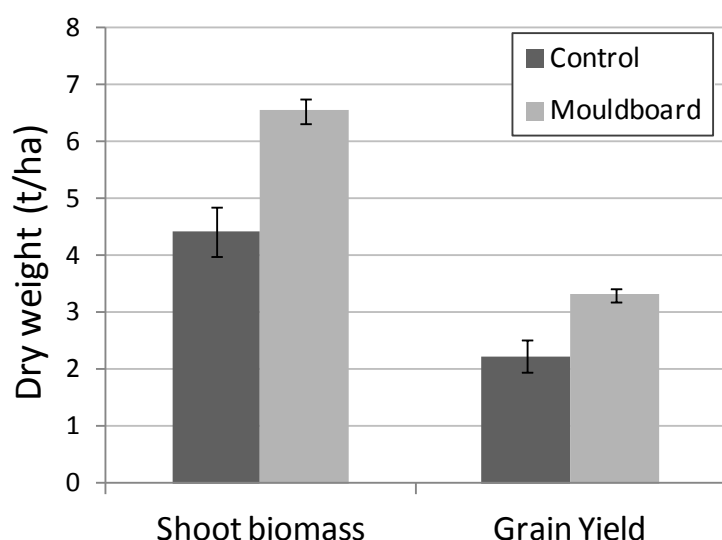
## Results

Paired hand harvest samples were taken to get a measure of whole plant biomass, head number, grain yield and harvest index. Cuts were taken in areas that were not affected by wheel tracks and as re-compaction is quite a problem in mouldboard ploughed plots, the cuts represent the maximum benefit that the ploughing could achieve. While care was taken to take random yet representative paired samples in non-compacted areas, final yield comparisons were also recorded using the machine harvest data (Table 2).

**Table 1:** Hand harvest samples taken from control plots and mouldboard plough plots (avoiding compacted areas).

Treatment	Shoot biomass (t/ha)	Head number (heads/m <sup>2</sup> )	Head weight (g/head)	Grain Yield (t/ha)	Harvest Index
Control	4.4	170	1.8	2.2	0.50
Mouldboard	6.5	207	2.2	3.3	0.51
<b>Difference (MB-Con)</b>	<b>2.1</b>	<b>37</b>	<b>0.4</b>	<b>1.1</b>	<i>ns</i>
<b>% increase to MB</b>	<b>48</b>	<b>22</b>	<b>22</b>	<b>50</b>	-

Shoot biomass and grain yield were increased by about 50% due to mouldboard ploughing based on hand harvest cuts. The yield increase was the result of a 22% increase in head numbers and heavier heads that were noticeably larger. The site had strong sandplain soil, a deep sandy earth, with a gradational increase in clay content with depth and due to its clay content would not be water repellent. Typically this soil type would not be ploughed unless there was a major herbicide resistant weed problem, with soil inversion used to bury the weed seedbank or possibly to incorporate lime into an acid subsoil.

**Figure 1:** Harvest hand cuts measured shoot biomass and grain yield.**Table 2:** Machine harvest yield with nearest neighbour control and quality results of Mace grown west of Buntine.

Treatment	Yield (t/ha)	Nearest Neighbour Control (%)	Protein	Hectolitre weight	Screenings
TM21 Control	2.56	100	9.9	80.4	1.81
TM21 Deep rip	2.40	94	9.8	80.88	1.22
TM21 Mouldboard	2.26	88	10.0	80.62	1.63
No TM21 Control	2.34	100	10.1	81.22	1.69
No TM21 Deep rip	2.37	101	9.8	81.43	1.11
No TM21 Mouldboard	2.33	105	10.1	80.93	1.44
No TM21 Control	2.21	100	9.8	80.78	2.45

**Comments:**

- This trial was an un-replicated farmer demonstration, results should be interpreted with caution.
- Observations: 13/7/12: Crusting of the surface reduced germination in mouldboard ploughed strips.
- Hand harvest cuts indicated a yield response to mouldboard ploughing, however, this was not reflected in the machine cuts due to re-compaction. The hand harvest result could be a response to buried lime and/or simply a response to low competition from other plants as the mouldboard ploughing left the plots patchy.

- Trial demonstrated the risk of re-compaction on mouldboard ploughed treatments with visual differences in yield between wheel tracks and remainder of plot. There was a trend towards increased yield where TM21 was applied, when compared across control treatments and deep ripped treatments, although this response is small and was not evident when comparing across mouldboard ploughed plots. The farmer observed wheat roots in the soil pit at 1.8m in both Mouldboard and Control plots after a soil pit was dug, indicating unrestricted root growth in this soil type.

### **Acknowledgements**

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### **References**

Davies, S., Blackwell, P. And Newman, P 2012. 'The role of mouldboard ploughing in cropping systems', *Spring Field Day Booklet 2012, Liebe Group*.

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