

Mouldboard plough Demonstration

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Aim: To determine the effects of mouldboard ploughing on a Wongan Hills yellow sand when varying lime and nutrient inputs.

Background

Mouldboard ploughing involves a one-off inversion of the topsoil. The plough in this trial was able to invert the top 30cm of soil. Mouldboard ploughing can help in the control of weeds, burying water repellent topsoil, incorporating lime at depth as well as having a deep ripping effect. Cost of the operation is approximately \$100-120/ha (Davies et al, 2012).

This trial looks to determine what impacts crop yield; soil modification, increasing nutrients and/or lime application.

Trial Details

Property	Wongan Hills Research Station
Plot size & replication	10m x 10m x 3 replicates
Soil type	Yellow sand
Soil pH (CaCl ₂)	0-10cm: 5.0 10-30cm: 4.3
Paddock rotation	10 wheat, 11 wheat, 12 wheat
Variety	Wyalkatchem
Seeding rate	100 kg/ha
Seeding date	28/6/12
Soil amelioration	27/6/12: (As per protocol) 2 t/ha Lime
Fertiliser	28/6/12: 80 kg/ha Macropro Plus 5/9/12: (As per protocol) 50 kg/ha Urea
Herbicides	28/6/12: 2 L/ha Sprayseed 250, 118 g/ha Sakura 23/8/12: 670 mL/ha Velocity, 1% Hasten
Growing Season Rainfall	217mm

Trial Design

Table 1: Treatments testing the response to mouldboard ploughing, lime and extra nitrogen applications at Wongan Hills Research Station.

Treatments				
1	Mouldboard	no lime	80 kg/ha Macropro Plus	
2	Mouldboard	no lime	80 kg/ha Macropro Plus	50 kg/ha Urea Topdressed
3	Mouldboard	2 t/ha Lime	80 kg/ha Macropro Plus	
4	Mouldboard	2 t/ha Lime	80 kg/ha Macropro Plus	50 kg/ha Urea Topdressed
5	Control	no lime	80 kg/ha Macropro Plus	
6	Control	no lime	80 kg/ha Macropro Plus	50 kg/ha Urea Topdressed
7	Control	2 t/ha Lime	80 kg/ha Macropro Plus	
8	Control	2 t/ha Lime	80 kg/ha Macropro Plus	50 kg/ha Urea Topdressed

Results

Table 2: Average plant and weed counts observed 14/8/12 at Wongan Hills Research Station.

Treatment	Crop Density (plants/m ₂)	Average Radish (plants/m ₂)	Average Ryegrass (plants/m ₂)
Control	88.3	44	9
Mouldboard	84.2	0	1

Mouldboard ploughed plots controlled 99% of weed seeds, only one patch of ryegrass was observed where poor inversion occurred. The control plots indicated significantly higher weed burden with an average of 53 plants/m₂ (Table 2).

Table 3: Average yield and quality results of different treatments at the Wongan Hills Research Station.

Treatment	Yield (t/ha)	Protein (%)	Screenings (%)	Hectolitre weight
MB	1.11	10.3	4.87	79.47
MB + extra N	1.16	10.2	5.34	78.47
MB + Lime	1.09	10.5	4.75	78.37
MB + Lime + extra N	1.09	11.4	6.18	77.39
Control	1.00	10.0	5.17	78.36
Control + extra N	1.06	10.6	6.58	76.76
Control + Lime	1.04	9.9	5.49	78.42
Control + Lime + extra N	1.05	11.0	7.19	76.76
<i>L.S.D.</i>	<i>NS</i>			

Note: MB = Mouldboard, Lime at 2 t/ha, extra N = 50kg/ha Urea.

Comments

- Yields showed a trend towards higher yields in mouldboard treatments compared to controls however, differences were not statistically significant.
- Trial will be monitored in 2013 to discover any longer term impacts.

Observation: 4/10/12: By Chris Gazey (DAFWA) – Patchy growth of wheat in mouldboard ploughed plots. Closer inspection of the areas of better growth showed reduced inversion of topsoil (closer to surface). Where plants were struggling, the mouldboard plough inverted topsoil better, therefore deeper. Where plough was working better plants took longer to establish as seed had to grow through hostile pH area, resulting in short and stumpy roots. A follow up application of lime may assist in reducing this hostile soil zone.

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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