

Mouldboard Plough and Cereal Rye Incorporation Demonstration

Nadine Hollamby, Project Coordinator, Liebe Group



Australian Government



Key Messages

- Cereal rye has been able to establish on poor windblown sand and stop erosion.
- About 8 t/ha of biomass was produced by the cereal rye.
- Using a mouldboard plough to incorporate cereal rye has increased soil organic carbon levels in the subsoil but decreased the topsoil levels.

Aim To evaluate the effects of mouldboard ploughing when incorporating rye stubble.

Background

Mouldboard ploughing involves a complete inversion of approximately the top 30cm of soil. It can help in the control of weeds, burying water repellent topsoil, incorporating lime at depth as well as having a deep ripping effect. Many farmers are considering using mouldboard ploughing as a one-off paddock renovation to overcome one or more of these issues. Cost of the operation is approximately \$100-120/ha (Davies et al, 2012).

The trial is on a problem area of land that has been identified by the farmer as relatively unproductive with poor organic carbon levels and low pH at depth. In 2011 the area was planted to cereal rye in an effort to create some cover, preventing erosion. In 2012 the mouldboard plough was used to invert the top 30cm of soil, burying the rye stubble. Lime was later applied to the top soil.

Trial Details

Property	G & H Pearse Pty Ltd, west Wubin			
Plot size & replication	80m x 15.3m x 2 replications			
Soil type	Yellow sand			
Soil pH (CaCl₂)	0-10cm: 5.1	10-20cm: 4.5	20-30cm: 4.5	30-40cm: 4.5
Organic carbon (%)	0-10cm: 0.36	10-20cm: 0.21	20-40cm: 0.14	
EC (dS/m)	0.028 dS/m			
Sowing date	2013 Self sown			
Seeding rate	In 2012 40 kg/ha of rye seed was spread on ploughed sections only, remainder self sown rye			
Soil amelioration	21/06/12: 1 t/ha lime			
Fertiliser	Nil			
Paddock rotation	2009: wheat, 2010: canola, 2011: rye, 2012: self-sown rye			
Herbicides	28/06/13: 1 L/ha Jaguar + 0.5 L/ha LVE MCPA			
Growing Season Rainfall	228mm			

Results

The cereal rye has done an excellent job of providing ground cover. Approximately 8 t/ha of biomass was produced over the growing season. Figure 1 shows the difference between an area of the paddock sown to wheat (1a) and an area sown to rye (1b).

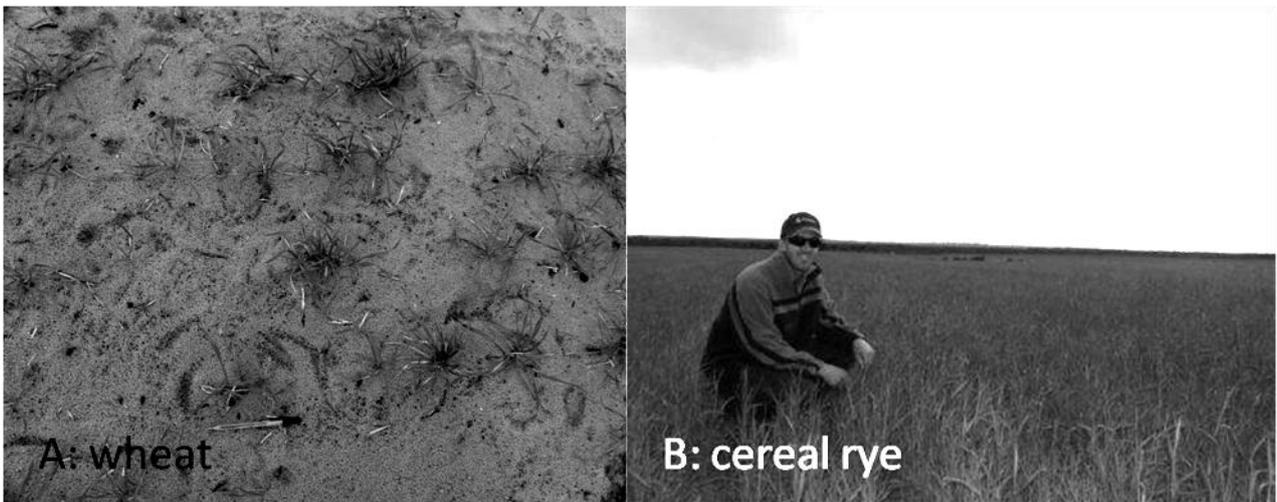


Figure 1: Photos taken in July 2013 of an area of the paddock prone to wind erosion cropped to wheat (A) and an area sown to cereal rye (B).

Soil organic carbon levels are low on this site, as is often the case with poor quality sands. The mouldboard plough has picked up the top soil which originally had an organic carbon percentage of 0.5% and buried it at a depth of ~ 20cm, leaving the top soil with a very low organic carbon percentage but increasing the amount of soil carbon buried in the subsoil. By comparison, the area which had cereal rye growing but was not incorporated, has a higher top soil organic carbon level of 0.5% than the ploughed (0.2%) but the soil carbon level declines rapidly in the subsoil.

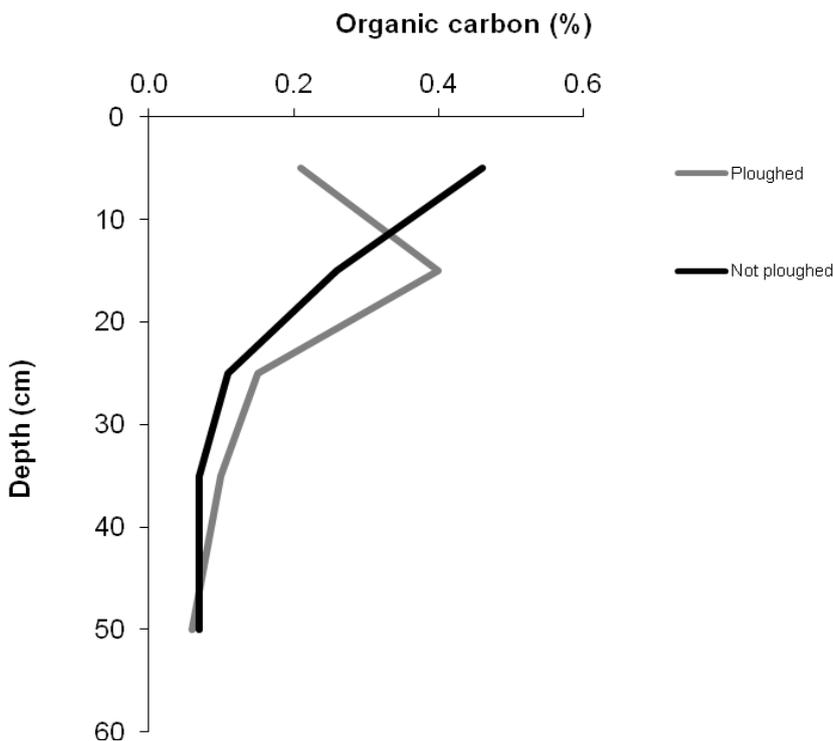


Figure 2: Soil organic carbon as a percentage of soil after cereal rye has been incorporated by ploughing (grey line) compared to no ploughing (black line), west of Wubin, October 2013. The ploughing occurred in 2012.

Comments

The planting of the cereal rye has done an excellent job of providing ground cover to prevent wind erosion. This is not a fully replicated trial so it is difficult to tell how the mouldboard ploughing has affected soil carbon but at this stage it does not appear to have affected the amount of cereal rye that has grown. The Pearse family are now asking themselves is there a future for this ~2 hectare area? Should it be brought back into the cropping rotation and by doing so is the area prone to wind erosion risk again?

References

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

Pluske, W., Murphy, D. and Sheppard, J. 2007. *Total Organic Carbon*. Soilquality.org.au

Paper Reviewed by: Jeff Pearse, Grower

Contact

Clare Johnston, Liebe Group

clare@liebegroup.org.au

(08) 9661 0570