7.3 Achieving improved crop water use efficiency through amelioration of hostile subsoils - Penshurst, Derrinallum, Wickliffe and Mt. Pollock, Vic

Location:
Penshurst, Derrinallum, Wickliffe and Mt. Pollock.

Researchers:
Renick Peries (DPI), Jaikirat Singh Gill (LTU), Ben O'connor (SFS).

Authors:
Renick Peries (DPI/SFS) and Jaikirat Singh Gill (La Trobe University)

Funding: GRDC

Acknowledgments:
Brent Herrman, John Sheehan, George Budett & Rowan Peel (Farmer collaborators)

Background/aim:
There was growing farmer interest in subsoil manuring during the year. Our published data and information attracted the attention of farmers in Northern Victoria to Western Australia where farmers are now making an attempt to set up demonstration trials on subsoil manuring. Our work concentrates on heavy clay and duplex soils where the plant available water capacity at depth is restricted by low porosity, water extraction and root growth. This soil is also impacted by hostilities such as high exchangeable sodium. La Trobe University is currently funded by GRDC to work together with SFS and DPI to take preliminary results for field testing for farmer adoption and its economic viability.

Summary of findings:
- Subsoil manuring continues to attract farmer attention
- Two new sites will be set up during 2011
- On a grey Sodosol at Wickliffe, the manure treatments produced significantly higher yields (11-12 t ha-1 compared to control
- The above average rainfall in the 2010 season, resulted in the lack of response to treatments in many cases

Trial information
During the year, work on the Winchelsea site (reported last year) had to be temporarily suspended as the site was returned to pasture as a part of their planned rotations. A replacement site was established at Mt Pollock on similar soil. An extra site (Wickliffe) was added to the project. Winchelsea site soils will still be monitored during its pasture phase. Proposed trial sites at Inverleigh and Lake Bolac had to be postponed to 2011 due to logistical reasons.

Results and Discussion:
The yield results at the four sites are summarised in Table 1. Due to a wet winter and a wet spring, there was widespread waterlogging across most trial sites and a near saturated soil profile during most of the growing season. Differences in soil water could not be detected at any time during the trial through neuron moisture metre readings. A significant yield result with manuring (poultry manure) was obtained only at Wickliffe where waterlogging was not an issue and the soil profile remained near field capacity during grain fill. The weather during the season and the crop management information for the different sites are shown in Table 2.

Summary:
Work on these trials will continue in 2011 with greater emphasis on assessment of soil water and fallow efficiency as a result of manuring and its contribution to the water use efficiency of the crops

Table 1: Grain yield harvested from quadrant cuts in the different subsoil manure trial sites. Poultry manure was used in all these trials. In 2009, Derrinallum and Penshurst produced significant yield differences in wheat on these sites.

Treatments	Wheat sites		Canola sites	
	Wickliffe	Mt. Pollock	Derrinallum	Penshurst
Control	9.2	7.8	0.5	0.8
Deep-rip only	8.6	8.4	0.9	1.2
10 t ha^{-1} manure	12.0	5.8	0.9	1.4
20 t ha^{-1} manure	11.6	7.8	0.8	2.0
DAP	9.3	8.7	1.2	1.3
10 t ha^{-1} + DAP	11.3	7.1	0.9	1.3
lsd	**1.7**	**ns**	**ns**	**ns**

Table 2: Paddock and management information for the subsoil manuring sites

	Wheat sites		Canola sites	
	Wickliffe	Mt. Pollock	Derrinallum	Penshurst
Total rainfall 2010 GSR 2010	836 mm 577.3 mm	655mm 125mm	914 mm 633 mm	840 mm 595 mm
Variety	Revenue	Derrimut	46Y78 (Clearfield)	46Y78
Date of sowing	19 April 2010	May 20th	16 May 2010	3 May 2010
Basal fertiliser Nitrogen –top dressing	65 kg ha^{-1} MAP 70 kg ha^{-1} 8Aug 70 kg ha^{-1} 28 Aug 70 Kg ha^{-1} 25 Sept	2.5t/ha poultry manure 55kg/ha MAP 60lt/ha UAN	100 kg ha^{-1} MAP n/a	80 Kg ha^{-1} MAP 100 Kg ha^{-1}
Paddock yield	6.8 t ha^{-1}	4.3t/ha	1.1 t ha^{-1}	1.9 t ha^{-1}