

# Comparing offset discs and rotary spading for incorporation of clay on non-wetting soils

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<b>Purpose:</b>	To determine whether crop establishment and grain yield gains from claying can be further improved by matching the clay-rich subsoil application rate with the incorporation method.
<b>Location:</b>	Badgingarra Research Station
<b>Soil Type:</b>	Pale deep sand and sandy gravel
<b>Rotation:</b>	Lupins 2006; Oats 2007; Lupins 2008; Wheat 2009; Canola 2010
<b>GSR:</b>	300 mm

## BACKGROUND

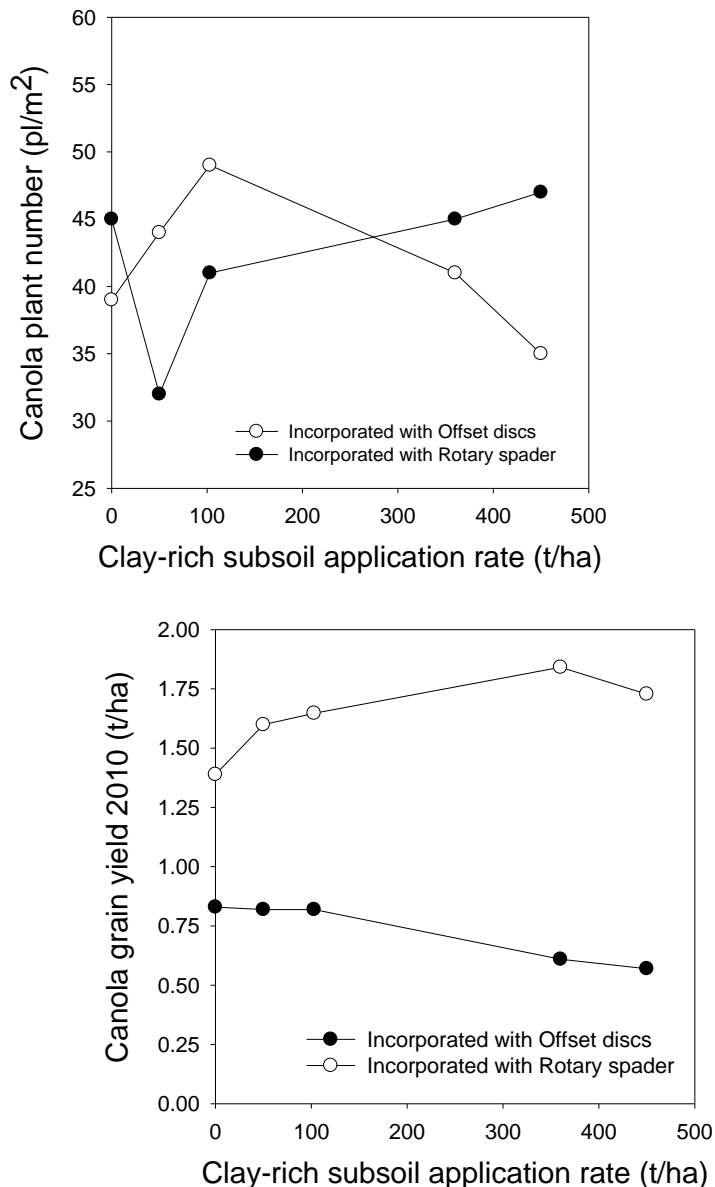
This demonstration trial was established in 2009 when local growers first started to consider the value of rotary spaders as a tool to better incorporate clay-rich subsoil into water repellent sands. Growers and researchers wanted to better understand how much applied subsoil could be incorporated with a spader and was there an optimum subsoil application rate. The incorporation efficacy of the rotary spader was compared to offset discs.

In 2009 clay-rich subsoil (Table 1) was applied at rates of 50, 100, 360 and 450 t/ha in strips 60 m long. Two-passes of a set of offset discs were used perpendicular to the subsoil strips for shallow incorporation of the subsoil to a depth of 10-15 cm; while at the other end of these strips a rotary spader used for deep incorporation of the subsoil to a depth of 25-30cm. In 2010 the trial was bulk sown to canola (Cobbler) along with the rest of the paddock by the farmer. It is an unreplicated demonstration trial with repeated control plots with no applied subsoil.

**Table 1.** Analyses of clay-rich subsoil spread at Badgingarra Research Station in 2009.

pH <sub>Ca</sub>	pH <sub>w</sub>	mg/kg				EC mS/m	Particle size %		
		K	S	P	B		Sand	Silt	Clay
5.8	6.4	54	20	2	1	20	64	5	31

## RESULTS



**Figure 1.** Impact of clay-rich subsoil incorporation using offset discs or a rotary spader on canola establishment and yield

## DISCUSSION

- Incorporation of the lower subsoil application rates (50 and 100 t/ha) with offset discs resulted in increased canola plant establishment compared with the offset disc control plots without subsoil. However, at the higher subsoil application rates (360 and 450 t/ha) establishment was reduced due to inadequate clay incorporation (Fig. 1). Visually it was clear that the high rates of subsoil application resulted in surface sealing due to the poor incorporation by offset discs and this sealing was sufficient to reduce canola establishment. Incorporation of 50t subsoil/ha using a spader appears to have resulted in a reduction in canola establishment (Fig. 1) but there is no apparent reason why this should be the case. Apart from this anomaly there is a trend towards improved plant establishment when higher rates of applied subsoil are spaded (Fig. 1).
- Comparing grain yields between subsoil incorporation using offset disc and rotary spader is not valid on this trial as the offset disc treatments are situated on pale deep sand which has less water holding capacity and lower potential than the sandy gravel on which the spaded treatments are situated. Canola grain yields in 2010 showed

trends not dissimilar to those obtained for wheat on this trial in 2009. For the offset disc treatment there was no impact of the lower subsoil application rates on yield but a trend towards lower yields at the high application rates (Fig. 1) again most likely due to inadequate subsoil incorporation. For the rotary spader there was a trend towards higher yields as the subsoil application rate increased (Fig. 1), indicative of the capacity for the spader to achieve good subsoil incorporation. Overall canola yields were increased by more than 300 kg/ha when either 360 or 450 t/ha spread subsoil was incorporated using a spader (Fig. 1).

- In both the 2009 and 2010 seasons the trends in crop establishment and grain yield have demonstrated the principle that when claying the subsoil application rate needs to be 'matched' to incorporation method that will be used to incorporate the clay. The results suggest that offset discs are only likely to be successful at incorporating lower subsoil application rates, probably of the order of 150 t/ha or less while rotary spaders are more appropriate for incorporating higher subsoil application rates of 250 t/ha or more.

### **ACKNOWLEDGEMENTS/ THANKS**

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