

Canola in

An update from the GRDC funded project
'The contribution of subsoil constraints to canola yield decline'

Depth

This edition highlights outcomes from the 2007 and 2008 Canola in Depth trials. Unfortunately subsoil moisture has been the major limitation with no yield responses to compaction, subsoil acidity or subsoil sodicity, although dry matter responses indicate there may be potential yield benefits with a wetter spring. Canola does appear to respond to subsoil salinity, however, with the Yuluma site showing negative dry matter and yield responses to increasing salinity levels.

An unfunded extension to the project in 2009 is focusing on the saline site at Yuluma (near Lockhart) and the acidic/compacted site at Culcairn, with the sodic site at Rand to be included if conditions favour responses. The remaining trial sites will be monitored during the season.

Lime response

There were no dry matter or yield responses to subsurface lime injection at any of the acidic sites. Provided the surface soil is not acid, it appears that canola is relatively tolerant of subsurface acidity through a combination of:

- Canola roots being able to push through the 'acid throttle' into the neutral subsoil without damage.
- Manganese (Mn^{2+}), which increases in concentration in acid soils and to which canola is particularly sensitive, not being present in sufficiently high levels in some subsurface soils.

Ripping response

Unlike 2007 where dry matter responses to deep ripping were recorded at both Greenethorpe sites, there were no dry matter responses to deep ripping at any site in 2008, although there was a trend towards higher dry matter at Culcairn before moisture became the limiting factor.

Despite increased dry matter in some cases, there were no (positive) yield responses to deep ripping, although negative yield responses occurred as a result of greater water loss through soil exposure.

A review by John Kirkegaard, CSIRO, of deep ripping trials in south-eastern Australia over the last 25 years suggests there is little current evidence to support

deep ripping in the region, except in combination with gypsum on sodic clay soils in wet years (>400mm rainfall) to alleviate waterlogging. The commonly accepted soil strength threshold of 2MPa (at which root growth becomes restricted) may not apply to the relatively permeable soils in south-eastern Australia. In these instances, cracks and pores in the soil enable root penetration through the compacted layer, allowing roots to access water and nutrients in (non-sodic) subsoils.

Gypsum response

As in 2007, there were no dry matter or yield responses to injected or surface applied gypsum at the sodic sites in 2008. Previous research has shown that gypsum responses are unlikely in dry years.

Organic matter/deep nutrient response

The deep nutrient and surface organic matter (pig bedding straw) treatments at the Wimmera site in Victoria produced significantly more dry matter than the untreated control, resulting in a trend towards higher yields (only significant on the raised bed trial).

Salinity effects

An EM38¹ survey of the saline site at Yuluma, north-west of Lockhart, showed variable salinity levels across the paddock. Although salinity did not affect canola

¹EM38 meters measure apparent electrical conductivity (ECa), which is an indicator of soil salinity.



Photo: I. Swan

Project Partners:



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Project Update 2009

An unfunded 12-month extension to the project has been granted due to successive dry seasons. In 2009, the project team will focus on the saline site at Yuluma (near Lockhart) which showed interesting responses in 2008, with the aim of determining a tolerance threshold for canola. The acid/compacted site at Culcairn will also continue, with some promising dry matter responses starting to show in 2008 before the dry spring masked any outcomes.

Limited monitoring will occur at the remaining sites in anticipation of a better season which may produce responses not evident in 2007 and 2008.

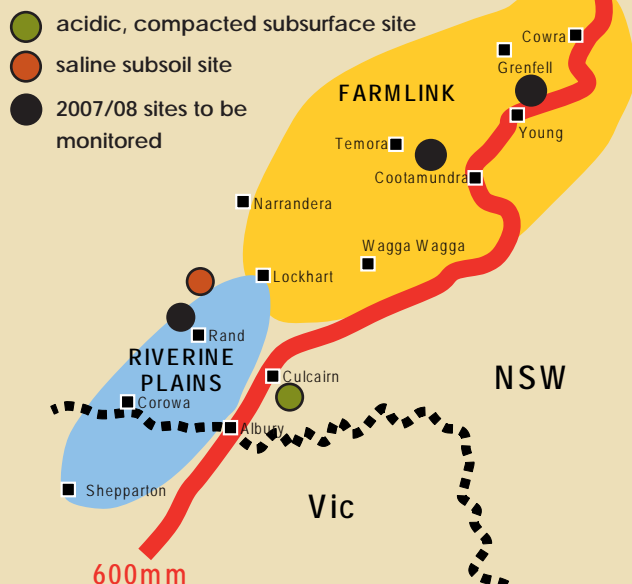
a) Acidic, compacted subsurface sites:

- **Culcairn** - Garnet & Hyola 50 sown 12th May. Residual treatments from 2007 include:
 - ▶ deep rip
 - ▶ deep rip + injected lime
 - ▶ knife point incorporation of surface lime
 - ▶ control
- **Greenethorpe & Milvale** to be monitored at establishment and maturity for responses from lime/deep ripping treatments applied in 2007 and 2008.

b) Sodic, compacted and/or saline subsoil sites:

- **Yuluma** - 45Y77 sown 17th April into paddock with variable salinity levels.
 - ▶ site to be EM surveyed in winter and compared with dry matter, rooting depth & yield
- **Rand & Lockhart** to be monitored at establishment and maturity for responses from gypsum/deep ripping treatments applied in 2007 and 2008.

Location of 2009 NSW trial sites:



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emergence, there was a decline in dry matter, rooting depth (Figure 1) and yield (Figure 2) as EM38 readings increased.

Ground truthing showed EM38 readings correlated well with electrical conductivity and chloride concentration of soil samples, so that high EM readings could be used to identify areas of high salinity. **At locations where gypsum is present in the soil, EM38 readings are affected by gypsum salts which also conduct electricity.** There was no gypsum present at the Yuluma site.

Figure 1 - Root response to EC_a, Yuluma 2008

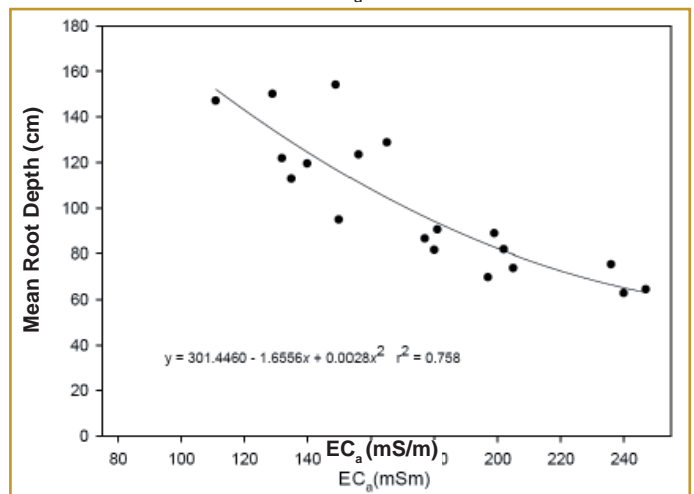
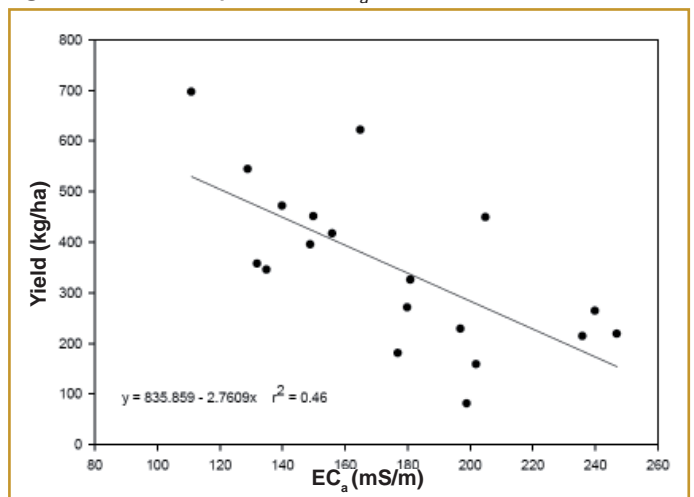


Figure 2 - Yield response to EC_a, Yuluma 2008



For more information...

- **Canola in Depth E-list** - If you are not a member of FarmLink but would like to receive the 'Canola in Depth' fact sheets via E-mail, please E-mail kirily@farmlink.com.au (previous Canola in Depth fact sheets can be downloaded from www.farmlink.com.au)
- **'Subsoils in the FarmLink Region'** - can be downloaded from www.farmlink.com.au, or phone FarmLink on (02) 6924 4633 to receive a hard copy.
- **Project contact** - Mark Conyers, NSW DPI; (02) 6938 1999 or mark.conyers@dpi.nsw.gov.au