

MANAGING SUBSOIL ACIDITY (GRDC DAN00206)

3-D Ripping Machine

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Prepared by Dr G. Li and H. Burns (guangdi.li@dpi.nsw.gov.au)
<http://www.dpi.nsw.gov.au/agriculture/soils/acidity>

A dual depth delivery (3-D) ripping machine has been built to provide accurate placement of soil amendments at two depths from 10 to 30 cm. This issue highlights some early observations from the long-term field site near Cootamundra in southern NSW, established in 2016.

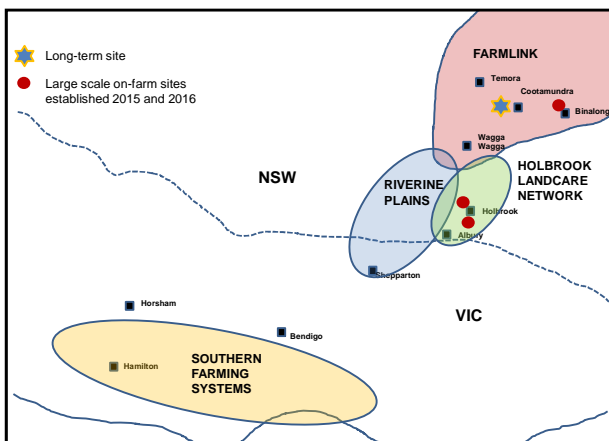
Figure 1. The 3-D Ripping Machine. The coulters in front of each ripping tyne and the back roller produce a flat seedbed



Photo by Guangdi Li

Target region

The project covers major high rainfall cropping areas from southern NSW to south-west Victoria.



Key features

- Dual amendment boxes: two boxes to hold lime (up to 150 kg) and organic amendment (up to 1 tonne) separately
- Dual feeding systems: two feeding augers to deliver lime (up to 4 t/ha) and organic amendment (up to 20 t/ha) simultaneously
- Dual delivery depths: two exit points and plates on each tyne to allow lime and/or organic amendment to be placed evenly from 10-30cm
- Dual metering systems: two separate fluted-roller metering systems with variable gear boxes to ensure accurate application rates as required
- Base unit: Grizzly Ripper
- Ripping tyne: 5 tynes with 50 cm spacing
- Ripping depth: down to 50cm with 200 HP tractor.
- Front coulter: to break topsoil and prevent surface layer being lifted
- Back roller: to compress soil behind the ripper and leave a flat surface ready for sowing.

Figure 2. Dual delivery systems place lime and/or organic amendment at depths from 10 to 30 cm. Yellow arrows are pointing to lucerne pellets

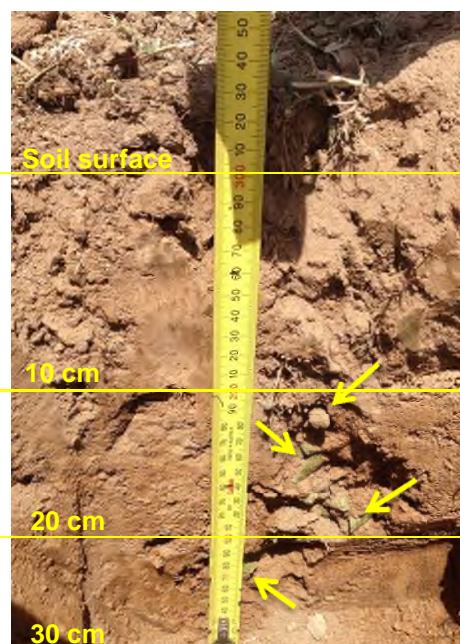


Photo by Guangdi Li

Soil strength under amendments

‘Ferndale’, Dirnaseer, west of Cootamundra, NSW

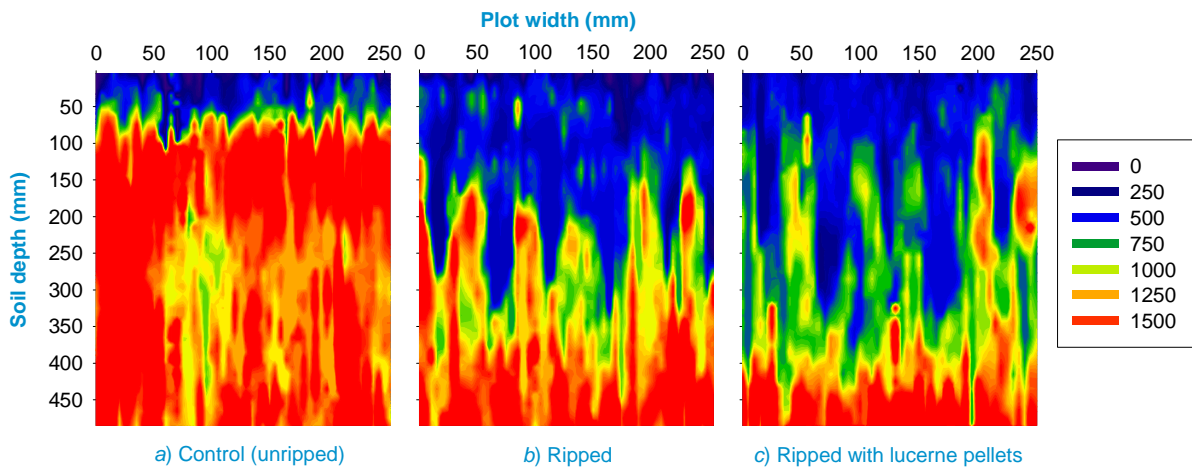
Penetrometer readings

A penetrometer was used to test the soil strength 5 months after treatments were imposed. The contour map was produced from penetrometer readings at 50 mm intervals across a section of plot down to a depth of 485 mm (Figure 4).

- For the unripped treatment, there was an obvious compaction layer at 8-20 cm. The cultivation and sowing operation was at 0-8cm.

- For the ripped treatment, there was distinct ripping effect, showing rip lines at 50 cm intervals.
- For the ripped with lucerne pellets treatment, it seems the ripping effect was beyond the ripping depth (30 cm).
- The long-term ripping effect will be monitored over time.

Figure 2. Penetrometer readings (kPa) on plots under a) Control; b) Ripped and c) Ripped with lucerne pellets treatments (5 months after treatments were imposed)



Initial crop responses

There were visible crop responses to soil amendments for wheat, barley and canola crops at the seedling stage in year 1. Deep ripping with lucerne pellets produced more seedling dry matter compared with the control treatment. The ripping only treatment also improved crop growth.

Figure 3. Gregory wheat plots on 29 August 2016. Crop was sown on 21 May 2016

Photo by Guangdi Li



Project partners and contacts

Organisation	Key contact	Telephone
NSW Department of Primary Industries	Dr Guangdi Li Dr Ehsan Tavakkoli	02 6938 1930 02 6938 1992
La Trobe University	Prof Caixan Tang	03 9032 7416
Charles Sturt University	Dr Sergio Moroni Dr Jason Condon	02 6933 2914 02 6933 2278
CSIRO Canberra	Dr Peter Ryan	02 6246 5053
Farmlink Research	Kellie Jones	02 6980 1333
Holbrook Landcare Network	Dale Stringer	02 6036 3181
Riverine Plains	Dr Cassandra Scheffe	03 5744 1713
Southern farming Systems	Lisa Miller	03 5265 1666

