

MANAGING SUBSOIL ACIDITY (GRDC DAN00206)

3-D Ripping Machine

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<http://www.dpi.nsw.gov.au/agriculture/soils/acidity>

A 3-D (dual depth delivery) ripping machine was designed and fabricated by Adam and Richard Lowrie, NSW Department of Primary Industries. The machine can deliver inorganic and/or organic amendments at two depths from 10 to 30 cm. The machine is also capable of delivering liquid nutrients/fertilisers at depth.

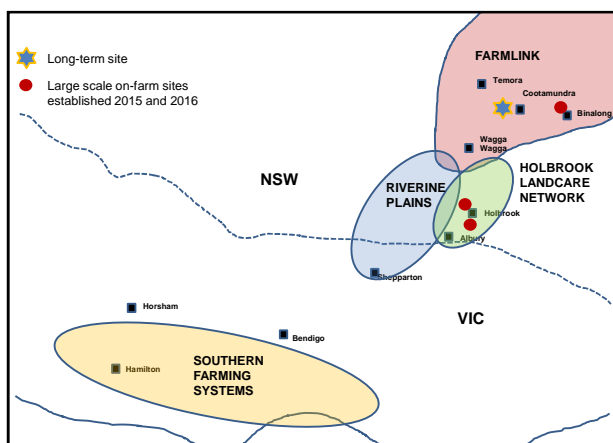
Photo by Guangdi Li



Figure 1. The 3-D Ripping Machine

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 at 10-30 cm.
- Dual metering systems. Two separate fluted-roller metering systems with variable gear boxes to ensure accurate application rates as required.
- Ripping width. A Grizzly Ripper with 5 tynes arranged at 50 cm spacing.
- Ripping depth. Capable of ripping down to 50 cm 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.

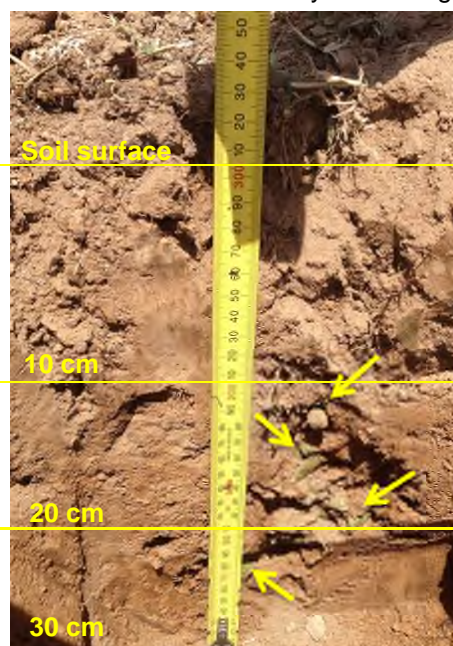


Photo by Guangdi Li

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

Soil strength under amendments

‘Ferndale’, Dirnaseer, west of Cootamundra, NSW

Penetrometer readings

A penetrometer was used to test the soil strength five 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 3).

- 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 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.

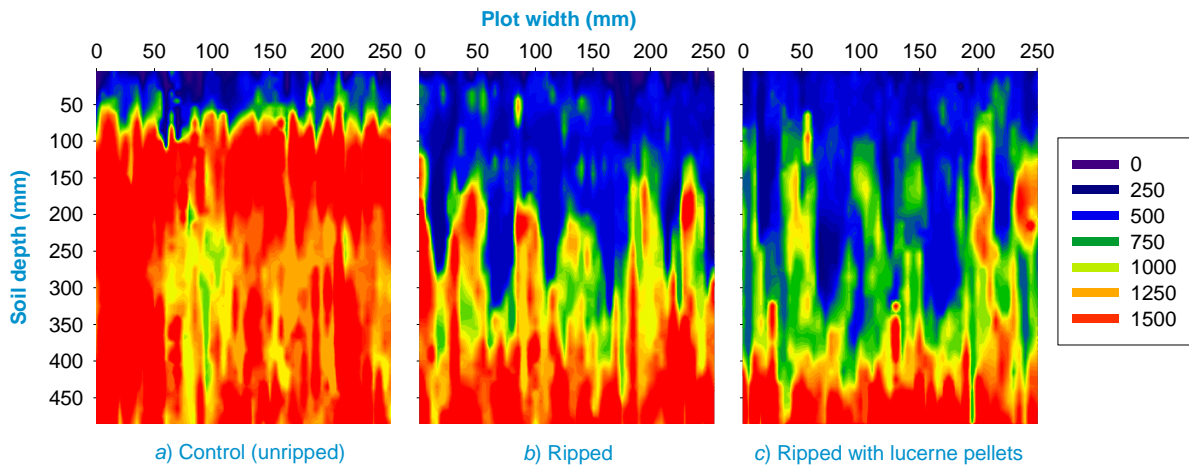


Figure 3. Penetrometer readings (kPa) on plots under a) Control; b) Ripped and c) Ripped with lucerne pellets treatments (5 months after treatments were imposed)

Initial crop responses

There were visible crop responses to soil amendments for wheat, barley and canola crops at the seedling stage in year 1. Crops with deep lucerne pellets was more vigorous than those under the control treatment (Figure 4).

Photo by Guangdi Li



Figure 4. Gregory wheat crops on 29 August 2016. Crop was sown on 21 May 2016

Project partners and contacts

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