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FarmLink Research Report 2015

Innovative approaches to managing subsoil acidity in the Southern Grain Region

GRDC Project code – DAN 00206

Project Partners

FarmLink
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NSW Department of Primary Industries

Funding Partners

GRDC
Grains Research & Development Corporation

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Introduction

FarmLink has partnered with NSWDPI to deliver local trials as part of the Southern Region GRDC funded project "Innovative approaches to managing subsoil acidity in the Southern Grain Region.

This regional project includes a combination of paddock scale replicated experiments and establishment of a long term small plot experiment all in the high rainfall zone of the southern region. Over the next five years the project will investigate more aggressive ways, such as the deep placement of lime to the subsoil where it is most needed, with or without organic amendments to achieve more rapid changes to pH at depth. Other novel materials, such as calcium nitrate fertiliser, nano-lime and silicate-based materials, either separately or in combination, will be tested in different soils with difference crop species in both controlled environments and under field conditions. Detailed studies are essential to increase our understanding of these plant-soil interactions and the mechanisms involved.

Objectives

FarmLink's role will be to establish paddock scale replicated experiments designed to -

- Increase awareness of subsoil acidity and,
- Demonstrate effectiveness of innovative technology to ameliorate and/or prevent subsoil acidity on farm scale.

Method

FarmLink will establish two large scale on-farm experiments on highly acidic soils (pH about 4.0-4.5 at 10-20cm) in the high rainfall zone in the East of the FarmLink region. One trial will be established in each of two consecutive years in 2016 and 2017. Both sites will be maintained and assessed for three growing seasons after being established.

We are targeting sites with the following characteristics -

- Target sub-surface soil acidity
  - 0-10cm, prefer to acidic, but if limed pH < 5.0
  - 10-20cm, pH 4.0-4.3, Al% >20%
- Locations (rainfall >500mm)
  - Two separate sites in consecutive years
  - Each site to be sown to crop for at least 3 years
- Paddock selection
  - Preliminary soil tests (0-10 cm, 10-20 cm) to confirm sub-surface soil acidity
  - No resistant or problem weeds
  - Either crop or pasture in 2015
  - Three years cropping for next 3 years
  - The crop sequence to match the cropping program for the balance of paddock

In 2016 we have selected a site near Binalong but if you have a site you think would be suitable for 2017 please contact the FarmLink office.

Each experiment consists of at least four treatments with three replicates on a large scale. The core treatments include surface liming (control), deep ripping, deep ripping + lime at depth and deep ripping + organic amendment at depth (eg lucerne pellets, manure or composts). Additional treatments could be added as desired the options include –

	Treatments	Description
1	Surface liming	Lime rate is depending on the current pH in 0-10cm and liming history, ideally to bring pHCa up to 5.5. The lime will be incorporated into 0-10 cm. Lime rate to be calculated based on preliminary soil test result and pH buffering capacity (NSW DPI)
2	Deep ripping only	Ripping depth 30cm and width 50 cm. Surface soils limed to pH 5.0, same as Treatment 3.
3	Deep ripping + lime	The soil will be surface-limed (to pH 5.0) and deep-limed to 10-30cm, but the combined lime rate will be same with Treatment 1 (surface liming). For example, if soil pHCa is 4.0, it will need ~ 4t/ha lime to increase pH to 5.5. For this treatment, we would apply 2.5t/ha to the surface to increase pHCa to 5.0, and place 1.5t/ha at 10-30cm to target subsoil acidity.
4	Deep ripping + organic amendment	As above with organic amendment (e.g. lucerne pellets) at 10t or 20t/ha (to be confirmed by Steering Committee based on results from incubation study and ash alkalinity titration test).

Assessment will include –

- Initial and final soil sampling and assessment down to 100cm
- Agronomic data looking at plan establishment, growth and final crop yield over three years for each trial site.

Outcomes

As results become available from the trials FarmLink will capture these in our Annual Research Report (the first set of data will appear in the 2016 edition) and these trial sites will be used for field events as and when it is appropriate.