Digging deeper: Why it's important to test subsoil to 30cm





Project Snapshot

| Project Name: | Intensive soil testing to depth following liming |
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| Objective of the project: | To undertake soil testing to 30 cm and evaluate the mid and subsoil characteristics |
| Land Manager Names: | Rob & Gary Sawyer & families |
| Property Name: | Wimmera Farm |
| Property Size: | 22000ha |
| Location: | Dalwallinu Shire |
| Annual Rainfall (mm): | 293mm |
| Enterprise Mix: | Cropping |
| Soil Types/Vegetation Types: | Varied |

Key messages

- Soil acidity is an on-going issue on the farm and annual liming will be used for the foreseeable future.
- Addressing soil acidity issues will reduce weed burdens, assist crops to better survive dry finishes, improve nutrient use efficiency and ultimately improve soil health.
- The Sawyers have successfully used liming, deep ripping and topsoil slotting to manage their acidity issues.



This project is supported by Wheatbelt NRM, through funding from the Australian Government's National Landcare Programme.

The move to subsoil testing

Like many growers in the Wheatbelt, the Sawyers had over the last 30 years completed regular topsoil testing (0-10cm) across their property however, had never sampled deeper.

When you consider the roots of most crops have the ability to reach depths in the soil of a metre or more, topsoil is a relatively minor contributor to the volume of the soil that can be potentially accessed by plant roots. Understanding constraints at depth is necessary before amelioration options can be investigated.

With this in mind, in 2014 Rob Sawyer, Gary Sawyer & families (with encouragement from their consultant Ty Henning) commenced a Wheatbelt NRM funded project to

explore subsoil pH on paddocks that had previously been limed. At the time, it was suspected that subsoil acidity might be limiting productivity in some areas of the farm and that surface applications of lime may not be 'hitting the spot'. Soil samples were collected and analysed from depths 10-20cm and 20-30cm and subsoil pH's as low as 3.9 were identified.

These initial results sparked the Sawyers and their management team into action. They realised that for larger scale acidity management practices to be implemented, to improve farm productivity and profitability, a more comprehensive understanding of the farms subsoils would be required.

The knowledge of their soil health was identified and the Sawyer's started the process in identifying the actual pH levels within the soil at 0-10, 10-20 and 20-30. Since 2014, the Sawyers have started a comprehensive sub soil testing program and now have tested most of their 22,000 ha property, with the aim of this large personal investment paying off by assisting them to make more informed management decisions that improve farm productivity, profitability and overall soil health.

We will be liming forever ... and a lot of it while we improve our soil and pH.

Liming decisions on the back of subsoil test results

For the last 20 years, the Sawyers have spread lime on an almost annual basis at rates of around one tonne to the hectare. Rob Sawyer explained that they have an annual liming budget, however, where possible aim to increase the annual area covered (depending on the previous season).

Since participating in the Wheatbelt NRM funded project and having a better understanding of subsoil pH, the Sawyers have spread approximately 15000 tonnes of lime and have increased spreading rates to 1.5t/ha on average. Liming to date has focussed on the higher production paddocks whereas some of the more marginal country and

> land further from the coast, that attracts increased cartage costs, has not been limed due to budget constraints.

> The Sawyers strongly believes that increasing the soil pH will improve soil health and therefore increase the productivity of the entire property. He believes his current liming program is perhaps below district average and has plans to increase the amount of lime spread, especially in the more marginal country, as budget allows.

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Experimenting with lime incorporation

The Sawyers first dabbled with deep ripping in the 1990's, with mixed results. Now with the

knowledge they have gained from the extensive soil testing, the Sawyers are again giving deep ripping go, albeit with some changes. To counteract some of the negative effects of the deep ripping done in the 1990's, that may have brought acid subsoil to the surface, they are spreading lime before ripping and have installed inclusion plates to the ripper tynes. The hope is that the lime will move down with the topsoil into the slot created by the inclusion plates increasing the rate of subsoil neutralisation, improvements in productivity and a quicker return on investment.











Wheatbelt NRM 75 York Road PO Box 311 Northam WA 6401 Phone: (08) 9670 3100 Fax: (08) 9670 3140 Email: info@wheatbeltnrm.org.au Web: www.wheatbeltnrm.org.au

Other crop management advances

In addition to their focus on increasing the pH of their subsoils, the Sawyers have set up some other systems on farm to more efficiently manage their crops.

Yield Prophet®

Seven 'Yield Prophet[®]' sites with automatic weather stations have been set up across their property.

A core sample is taken at these locations at seeding time to a meter depth to test/account for the moisture, Nitrogen and nutrients that are currently available. This data is then used to predict a potential yield average and then the data from the harvest is then compared and if there is discrepancies further research is conducted.

Yield Prophet® is a web-based tool that

can incorporate soil test results (including soil core samples, analysing soil moisture and nitrate content immediately prior to seeding), paddock specific rainfall, seasonal fertiliser applications and BOM historical and current climate data, to generate reports that help with crop input decisions based on potential yield predictions The Sawyers predominately use the Yield Prophet[®] sites for the collection of weather data, however, they are interested in exploring further functionality of this tool going forwards.

There is no right and wrong in different farming management practices, it's just what works for your business.

Variable Rate Technology (VRT)

In 2016, the Sawyers commenced using VRT for their fertiliser applications. Rob Sawyer commented that like with all changes in crop management, VRT came with its share of 'teething issues'. Staff upskilling was a challenge with a large staff group and the base fertiliser rates could perhaps have been higher given the wet year and subsequent good early crop growth.

Summary

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Subsoil acidity is a major constraint of crop production in the Wheatbelt. The first management step is to understand the extent of the issue at a farm level and

subsoil testing is the key.

Since extensive subsoil testing across their property, the Sawyers have been able to implement specific management practices (liming, deep ripping and topsoil slotting) to address their acidity issues. Rob Sawyer admits that although it would be nice to have a 'quick fix' solution, soil acidity will be an on-going issue on farm and annual liming part of the program for the foreseeable future. He also believes that addressing soil acidity issues will reduce weed burdens, assist crops to better survive dry finishes, improve nutrient use efficiency and ultimately improve soil health.







wheatbeli natural resormanagement Wheatbelt NRM 75 York Road PO Box 311 Northam WA 6401 Phone: (08) 9670 3100 Fax: (08) 9670 3140 Email: info@wheatbeltnrm.org.au Web: www.wheatbeltnrm.org.au