# Soil biology boost paying off in the Wimmera

GRAEME JENNINGS

A 'soil ameliorant' claimed to stimulate biological activity in the soil is improving crop yields and quality on Brent and Anne Schnaars' Wimmera property.

The family – Brent and Anne, sons Chris and Matt and Chris's wife Amy – crop about 2,000ha a year.

Their farm, most of which is cropped most years, is a mixture of owned and leased land spread across several blocks, all within about four kilometres of the home property located about 16 kilometres north of Nhill.

The spread of blocks and the natural variation in Wimmera soils means they are managing many different soil types. Much of their land is good red loam country but they also have everything from heavy black flats and hard-setting red soil to light sandy country with a tendency to become non-wetting.

The long-term average rainfall in the Nhill district is about 400mm but in recent years the average is closer to 300mm, although last year's rainfall was close to the 400mm figure. They took advantage of that relatively good rainfall to grow canola, an occasional crop for them, and harvested 1.8t/ha of seed with good oil content.

Their target wheat yield is 4t/ha and in 2012, when they received a total of 175mm of rain for the year, with 125mm in the growing season, their wheat all went H1 or H2 grade and averaged 4.1t/ha.

They grow mainly wheat, barley, beans, vetch and oats. Most of the vetch and oats are grown for hay – they produce about 2,000 tonnes of vetch/oats cereal hay for the dairy market each year – but when conditions, including price, are right they also grow oats for grain.

SOME DAIRY FARMERS WHO BUY SCHNAARS HAY ARE REPORTING THAT THEIR COWS PREFER THE HAY GROWN IN TM-TREATED PADDOCKS.

CHRIS AND BRENT SCHNAARS ARE FINDING MANY BENEFITS FROM USING TM AGRICULTURAL.

Seeding is done with a 9,000 litre Simplicity seeder on a 12.2 metre Flexi-Coil cultivator fitted with tungsten-tipped knife points on 228mm spacing. They have experimented with 300mm spacing but found the wider spacing led to higher weed populations.

**They first tried the Canadian product TM, described as a 'liquid soil ameliorant', five years ago.**

They put all their fertiliser in with the seed at sowing, so the tynes are fitted with double-shoot boots that separate the fertiliser from the seed.

Grain crops are harvested with a Case 2588 header with a 10.7 metre front and their sprayer is a 5,000L Sylvan Paddock King with a 30.5 metre boom that has performed reliably over many years.

Their main weed is annual ryegrass, some populations of which appear to be developing herbicide resistance. They also have patches of radish and brome grass, and flaxleaf fleabane is starting to show up on roadsides in the district, but hasn't yet been reported in paddocks.

They use a double knock of glyphosate followed by paraquat when there is enough moisture available early enough to allow time for two sprays ahead of seeding. This year was one of those years, but despite what appeared to be a good knockdown, they are finding brome grass emerging in crop. This observation is in line with the recent finding by University of Adelaide researcher Dr Gurjeet Gill that brome grass populations are adapting under the pressure of repeated consistent use of pre-emergence herbicides and emerging in crop.

The Schnaars have been continuous cropping using a minimum-till, stubble-retention cropping system for close to 20 years but are prepared to explore options in areas from weed control to soil health.

Their standard stubble management practice is to leave cereal stubbles long at harvest then slash them to drop the straw onto the soil surface to accelerate breakdown ahead of seeding. Last season, however, prompted by growing concerns about their reliance on chemicals to control ryegrass populations and experience gained by Matt while working on a property in WA, they set the header low in several paddocks where annual ryegrass was causing concern and dropped the straw in windrows, which they then burnt with the aim of destroying the ryegrass seed.

That appears to have worked well, with noticeably less ryegrass along the lines of the burnt windrows than across the rest of the paddocks after the good early rain they got this season, Anne said.

Several years ago they also tried cultivation as a weed control option but are unlikely to try that again any time soon. The working made things worse, not better, she said, and they 'have been regretting it ever since'.

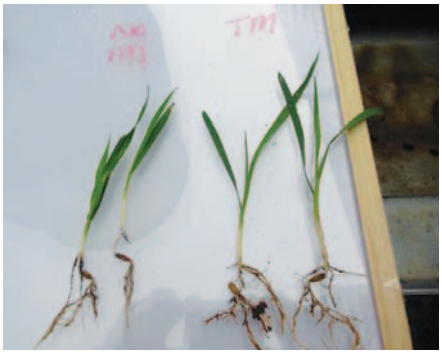
The story with TM Agricultural is quite different.

They first tried the Canadian product, described as a 'liquid soil ameliorant', five years ago.

Agronomist Barry Robinson, who now distributes the product, suggested they try it and they treated two strips in a wheat paddock so they could compare the crop in the strips with crop in the adjoining areas.

During the growing season they saw no difference between the treated and untreated areas, but at harvest the yield from the treated strips was noticeably higher than from the rest of the paddock and the grain quality was better, with higher grain weight and fewer screenings.

The following year they treated two paddocks with similar results, so the next season they applied TM Agricultural, as it is now labelled, on most of their cropping paddocks.


SUPERIOR ROOT DEVELOPMENT IS ONE OF THE OBVIOUS BENEFITS OF CROPS GROWN IN PADDOCKS TREATED WITH TM.

This year is the third in which the Schnaars have applied TM to most of their crops, with generally good results. Last year they did not get the level of response they were expecting, with little yield or quality benefit compared with the grain from a few reference patches they left untreated. The reason for this is not clear, and could include the good growing conditions, but Brent and Anne have a feeling that buying the product early and storing it for a considerable period before it was used could be a factor. Based on their experience it appears to be more effective if it is as fresh as possible.

This season they bought their TM just before seeding, increased their fertiliser rates a little, just in case – they reduced their fertiliser rate by 40% in 2012 – and are optimistic that, given sufficient moisture, they will again see good results from using the product.

**Establishment pests which used to require spraying each year ceased to be an issue after widespread use of TM.**

While using TM has enabled them to produce more grain with less fertiliser, the reduction in fertiliser inputs has produced little up-front cost saving because the cost of the product tends to be about the same as the value of the fertiliser savings.

Improved grain weight appears to be the key factor in the yield increase, with grain weight and yields consistently higher but no increase in vegetative growth, which means the improved performance is being achieved without any increase in the amount of residue in the paddock.

Brent and Anne find that the yield benefit from using TM Agricultural tends to be greater on lighter soils than on heavier soil types, and that TM-treated crops tend to 'hang on longer' in seasons with a 'hard' finish or seasons that cut out early.

Last year, in what was a good season, they were one of the latest in their district to start harvest because their crops ripened later. Until they began using TM they were usually one of the earliest in the district to begin harvest.

While the grain yields and quality are the 'headline' benefits of using TM Agricultural the Schnaars are also seeing numerous less easily defined benefits, many of which are also reported in organic production systems.

These benefits, or in some cases indicators, include more extensive root systems on crop plants, improved soil condition – their paddocks are now softer under foot than they were before they began using the TM product – and a noticeable increase in earthworm activity.

Using TM has reduced waterlogging in several low-lying areas and has helped bring areas of very poor, non-wetting sand they had given up seeding into full production, Anne said.

Some time ago they made a decision to not seed some patches of very poor country, each about 20ha in area, because the inputs were costing more than the grain from them was returning, but after seeing the impact of TM on other areas of poor soil decided to try it on the unproductive patches they had stopped cropping and they are now in full production and growing average crops.

The improved grain yields are being achieved without extra vegetative growth, but there is evidence that TM also changes the nutritional value and palatability of vegetation, Anne said, with some of the dairy farmers who buy their hay reporting that their cows prefer the Schnaars' hay over hay from other producers who don't use TM Agricultural. At the time of feeding the farmers were unaware the Schnaars were using TM and pointed out to Brent that the cows had a natural preference for the Schnaars' hay.

Other benefits include fewer problems with pests and diseases.

The most spectacular example of the 'insect resistance' effect of TM was in 2011 when vetch in a paddock that had not been treated with the product was effectively wiped out by locusts. An adjoining paddock, sown to the same variety on the same day and treated in exactly the same way, apart from the recommended two applications of TM, was largely untouched. There was some evidence of feeding on the edges of the treated paddock, Anne said, but the insects did not continue attacking it and 'basically left the treated paddock alone'.

They are seeing a similar effect with red-legged earth mite and lucerne flea. These

establishment pests, which used to require spraying each year, particularly in vetch on light soil, ceased to be an issue once they began widespread use of TM and since then Brent has not had to spray for them until this season, when he has had to spray some cereal crops sown on leased land they have had for only a short time.

Nor have they had to spray for aphids since they began using TM.

Disease issues have also reduced.

Rhizoctonia bare patch has been a constant part of their cropping program for decades, particularly on their lighter soils, Anne said, but since they began using TM across the property they have not seen rhizoctonia patches in their crops; a change they attribute to the better root growth resulting from use of the product and enhanced activity of 'good' soil organisms.

There is a similar effect with foliar fungal diseases, with no stripe rust issues in the past two years and much less fungal disease on their beans, though they still occasionally need to use a fungicide in a bean crop.

**TM Agricultural can be used in certified organic production systems.**

Brent and Anne follow the recommended program of two applications of TM Agricultural each season, one at or immediately prior to seeding and a second in crop during the early growth stages.

The formal recommendation for cropping is two applications of 250mL/ha, the first two to eight weeks before sowing with adequate soil moisture and the second with an in-crop with herbicide application.

The product is compatible with liquid fertilisers and most herbicides and The Schnaars apply their treatments as a tank mix with glyphosate ahead of seeding and with a post-emergence herbicide in crop.

This generally works well, but last season they used Terbyne herbicide in one paddock and did not achieve the expected level of weed control, which has raised questions about whether there is a compatibility issue with TM and Terbyne.

According to literature from the TM manufacturer, Canadian-based Best Environmental Technologies, rainfall increases the benefits of TM Agricultural once the product is in the soil or on the plant and when spraying it is advisable to use non-chlorinated water.

Water rate is important when applying TM, with 30L/ha of water the recommended minimum for boom spray applications, though 50L/ha can improve performance of the product in Australian conditions.

TM Agricultural is a liquid product designed to be applied direct to the soil at a rate of 250mL/ha.

However, it can also be injected into the seed row with water or fertiliser or used as a seed pickle, with 250mL in five litres of water (1:20 TM:water) sufficient to treat seed to sow one hectare. It should not be mixed with fungicides or insecticides.

TM Agricultural is registered by Australian Organic and can be used in certified organic production systems.

The product is claimed to Australia to 'increase/stimulate the beneficial native biology', increase the population of native beneficial micro-organisms and to kick start and increase beneficial biological activity in the soil by using 'trigger' technology to activate the native biology in all soil types.

Information from the manufacturer says TM is formulated from 'plant root exudates' to 'restore soil health and balance' and that its use results in 'plants that are high in mineral content and carbohydrates'.

It is made from components variously reported to be 'plant extracts, mainly from wheat and barley', and 'plant extracts, mainly from kelp, aloe vera, soya lecithin and alfalfa (lucerne) meal'.