SOIL HEALTH FOR SUCCESSFUL SUMMER CROPS

JAMES STEWART

I recently spoke at a summer crop workshop hosted by McDonald Rural.

In the majority of cases summer crops are used as a pasture renovation phase. This is a great opportunity to clean up weeds and get some fertility back into your paddock.

How do we get quality pastures? Through good soil fertility.

Soils do not make nutrients.

Soils store nutrients.

What you remove you must replace, otherwise you are going backwards.

Below are our macro nutrient levels we should be achieving:

Phosphorus Olsen – 15mg/kg
Potassium – 150+mg/kg
Sulphur (KCl40) – 8+mg/kg
Soil pH (1:5) water – 5.5 – 6
Aluminium – less than 5% of CEC

Micro nutrients (trace elements) should not be forgotten about.

What are our limiting factors? How do we know what our fertility levels are of our paddock? **We soil test.** When is the best time for soil testing? **Spring.** Spring time is when all pastures are actively growing and the soil is readily cycling nutrients through the system. We can visually assess our pastures for composition, urine and dung patches which are a lot more pronounced.

Sample Name		Urine, Dung patches	Normal Paddock. Non Urine, Dung patches
Sample Type		Soil	Soil
Sample Depth (cm)		0 - 10	0 - 10
Sampling Date		20/10/2015	20/10/2015
Analyte / Assay	**Unit**	**Value**	
Soil Colour		Grey	Grey
Soil Texture		Clay Loam	Clay Loam
pH (1:5 Water)		6.5	6.6
pH (1:5 CaCl2)		5.9	5.9
Electrical Conductivity (1:5 Water)	dS/m	0.16	0.13
Electrical Conductivity (Saturated Extract)	dS/m	1.3	1.0
Chloride	mg/kg	77	48
Organic Carbon (OC)	%	3.9	4.2
Nitrate Nitrogen (NO3)	mg/kg	15	3
Ammonium Nitrogen	mg/kg	9	7
Phosphorus (Olsen)	mg/kg	24	19
Phosphorus (Colwell)	mg/kg	94	70
Phosphorus Buffer Index (PBI-Col)		150	180
Potassium (Colwell)	mg/kg	300	140
Sulphate Sulphur (KCl40)	mg/kg	10	10
Cation Exchange Capacity	cmol(+)/kg	14.2	14.9
Calcium (Amm-acet.)	cmol(+)/kg	11.0	11.0
Magnesium (Amm-acet.)	cmol(+)/kg	2.5	2.9
Sodium (Amm-acet.)	cmol(+)/kg	0.52	0.40
Potassium (Amm-acet.)	cmol(+)/kg	0.69	0.33
Aluminium (KCl)	cmol(+)/kg	<0.1	<0.1
Aluminium (KCl)	mg/kg	<9.0	<9.0
Aluminium Saturation	%	<1.0	<1.0
Calcium % of cations	%	74.0	76.0
Magnesium % of cations	%	17.0	20.0
Sodium % of cations	%	3.60	2.70
Potassium % of cations	%	4.90	2.20
Calcium/Magnesium Ratio		4.4	3.8

These two lots of soil test results that I conducted a couple of years ago are sampled in the same paddock. The numbers on the left are the soil sampled in the urine and dung patches. Numbers on the right are dodging the patches and sampling the true fertility of the paddock. Notice the massive variation in nitrogen, phosphorus and potassium. There is no way you'll see urine and dung patches in your pasture in summer and autumn. I can't guarantee when I'm doing the soil test that I wouldn't be sampling these high fertility patches.

Contents

From a soil test, we receive a lot of information on our macro and micro nutrient status.

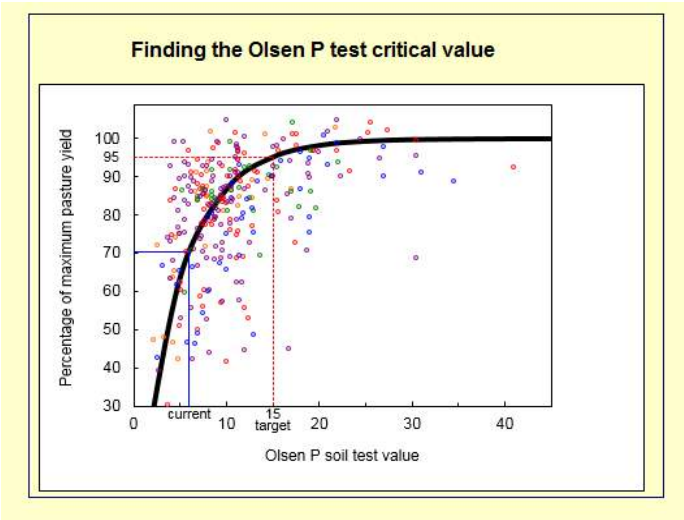
I'll cover two, phosphorus and soil pH.

When paddocks are chosen for renovation and go into the summer crop phase; these two would be the most reoccurring that I see. They are by far the most limiting factor holding paddocks back from maximum yield.

Phosphorus (P)

It is just one of nine macro nutrients and is essential for plant growth. No other nutrient can be substituted for it. The plant must have phosphorus to complete its normal production cycle; it helps roots and seedlings develop more rapidly. Pretty important stuff for a summer crop to establish before the summer months set in.

We are lucky to have some great scientifically proven data on phosphorus right in our backyard. I talk of the long term phosphate trail that started in the 70's.



This graph shows the response curve to increasing Olsen P levels. Our Y axis is a percentage of pasture yield and our X axis is the varying Olsen P levels.

A lot of paddocks that go into summer crop predominately have Olsen P levels below the blue line. Olsen P levels under 6 will be running at less than 70% in productivity. Now check out the red dotted line. If your Olsen P level is above 13, your paddock is yielding 90% or greater in production.

To look at it a little differently from the graph above, check out the numbers below.

Soil tests and pasture production	Fertiliser application rate (kg P/ha/yr)					
	1	4	8	15	23	33
Olsen P - 2002 (mg/kg)	5	7	8	13	18	39
Winter pasture production (t/ha)	1.6	1.5	2.1	2.8	3.0	3.1
Annual pasture production (t/ha)	6.0	6.7	9.2	12.4	12.7	12.6

Table 3. The effect of fertiliser application rate on soil fertility, winter and annual pasture production

Working on an Olsen P of 7 to an Olsen P of 13, we can grow close to double the tonnes of dry matter per hectare annually. The winter production is also close to double. Significant numbers that back up the graph above.

Soil pH

In this region, the majority of our soils are acidic. Highly acidic soils (low pH) affect plant growth in many ways. Here are just a few:

Nitrogen fixation by legumes is greatly reduced if soils are too acidic.

- The symbiotic relationship between rhizobia and sub clover function is best in a pH range of 4.8 – 6 in calcium chloride.
- You increase the risk of leaching of your soil cations, such as potassium.
- Reduced availability of nutrients, such as phosphorus and molybdenum.
- Concentrations of elements such as aluminium, iron and manganese can reach toxic levels.
- Aluminium toxicity is probably the most important factor for limiting growth of plants in strongly acidic soils.

When soil pH drops, aluminium becomes soluble and the amount in the soil solution increases. When this takes place and aluminium levels become toxic, it affects root cell division and the ability of the root to elongate. The root tips become deformed and brittle, which in turn affects growth and branching. Poor pasture growth occurs as a result of inadequate water and nutrition uptake by the plant. The effects of aluminium toxicity are most noticeable in seasons with a dry finish. Roots are unable to effectively grow through acidic subsurface soil, which restricts access to stored subsoil moisture.

Critical aluminium concentrations for growth

Species	Soil test level above which yields are reduced: Al (% of Cation Exchange Capacity)	0.01M CaCl2 (mg/kg	Sensitivity
Lucerne Barley Medics Canola	5	2	highly sensitive
Red clover Phalaris Sub clover Wheat	10	4	sensitive
Woolly pod vetch Ryegrass Some oats Tall fescue Cocksfoot	20	8	moderately tolerant
Oats Triticale Cereal Rye Lupins	30	13	highly tolerant

Modified from Acid Soil Action, NSW DPI

Looking at the table above showing the critical aluminium concentrations for growth on certain species, you can see that the first group in the highly sensitive range includes canola. Canola is derived from rapeseed, cultivars of Brassicaceae family of plants. Rapes, turnips, kale and radish are genus of the mustard family and are all highly sensitive to high levels of aluminium in the soil.

If we do lime in front of our summer crop, your paddock will be in a far better pH range for when you sow it down to a perennial pasture. As you can see, phalaris is in the sensitive range so it is essential to get the levels right.

Preferred pH range for some common pasture species

Plant species	Soil pH (water)[A]	Soil pH ($CaCl_2$)[B]
White clover	6.0–7.0	5.3–6.3
Sub clover	5.2–7.0	4.5–6.3
Perennial ryegrass	5.3–7.0	4.6–6.3
Annual ryegrass	5.3–7.0	4.6–6.3
Phalaris	5.7–7.5	5.0–7.8
Cocksfoot	5.0–7.5	4.3–6.8
Lucerne	6.0–8.0	5.3–7.3

[A] *Acid Soil Action (NSW DPI).*

[B] *pH ($CaCl_2$), in most soils, pHCa is normally about 0.7 (0.6 in severe acid soils to 1.0 in alkaline soils) units lower than pHw, eg, 5.0 pHw (-0.8) = 4*

I've only scraped the surface of my presentation on summer crops. Hopefully what I have explained gives you a better understanding of how to look at two limiting factors of our soils, and in correcting these we can achieve greater outcomes,

growing more dry matter!

COSTS AND ECONOMICS OF SUMMER CROPS

JOSH BROWN

Summer crops can be regarded as a very highly productive and economically sound grazing management tool. Great for finishing stock or putting condition on breeders depending on your situation; summer crops can increase the profitability of the paddock for years to come. This can often be seen as an unmeasurable benefit. Some see the expenses of properly sowing and fertilising a productive summer crop as a large cost and a risk to the business in unfavourable seasons. Below are a few tables of costs and economics which prove that even in unfavourable seasons, a breakeven can still be achieved while giving your paddock long term gains.

The cost in table 1 adjacent includes full knockdown, full cultivation/sowing & applying capital lime/fertiliser to lift the paddocks fertility. The total cost is $445/ha

Table 1

	Summer Crop Cost $/ha	Capital Cost $/ha	
Contract Spray	15		Total Cost/ha Full renovation using contractors
Chemical	20		
Cultivation		100	
Sowing	60		
Seed	30		
Fertiliser	80	40	
Lime		100	
Total Spend	**$205**	**$240**	**$445**

Using conservative industry average figures for fattening prime lambs, the tables below show we would need to grow 3,857 kgDM/ha to pay for the full renovation of the paddock including capital input costs. You would only need to grow 1777 kgDM/ha to pay for the costs directly associated to the summer crop planting and fertilising.

The figures in table 2 show that if we start with a store lamb worth $95 (35kg live weight) and finished with a prime lamb worth $120 (48kg Live weight) we would be making a profit of $25 per lamb. Finishing 17.8 lambs/ha would pay for the full renovation. To achieve this, lambs would have to put on 13kg (live weight). At an expected daily live weight gain of 250grams, it would take 52 days to reach this target. 17.8 lambs/ha X 52 days to reach weight = 925.6 grazing days. With an average consumption of 2.5kgDM/day/lamb X 925.6 grazing days gives us the figure of 2,314kgDM/ha of utilised feed needed. Using a conservative utilisation rate of 60%, we need to grow 3,850kgDM/ha to pay for the full renovation including capital costs.

Table 2 below shows the same calculations indicating we would need to grow 1,777kgDM/ha to pay for just the cost of the summer crop. Using the guide of a knee high summer crop having 4,000kgDM/ha and a 30cm high crop having 2,000kgDM/ha. You can see that paying for our full renovation with a good crop is achievable by the first graze. A poor summer crop that only reaches 2000kgDM/ha is easily still going to cover the actual cost of the summer crop.

Remember some summer crop options are quite hardy and will regrow, giving extra grazing. This can provide invaluable autumn feed and be grown right through until the next spring. In a climate where out of season rainfall is becoming more frequent, having a summer crop can be a great way of capturing some of the opportunities this creates and turning it into more farm profit.

Table 2

Economics to pay for the full renovation including capital costs - $445/ha

Starting prime lamb to go onto summer crop	Finished lamb weight 48kg x 46% = 22kg dressed weight	Cost of summer crop $445/ha / $25(profit per lamb)	Days to reach 13kg target weight gain	18 lambs/ha X grazing days 52 = 925.6 total grazing days	Total kgDM/ha growth needed if only 60% utilised
Store lamb 35kg live weight market price	22kg x $5/kg market price +$10 skin	Break even finished lambs/ha	13kg / 250gr (growth rate/day)	925.6 total grazing days x 2.5kg/day consumption	Break even TOTAL kgDM/ha
$95	$120	17.8 Lambs/ha	52 Grazing days	2314	3,857

Table 3

Economics to pay for the cost of the summer crop only - $205/ha

Starting prime lamb to go onto summer crop	Finished lamb weight 48kg x 46% = 22kg dressed weight	Cost of summer crop $205/ha / $25(profit per lamb)	Days to reach 13kg target weight gain	8.2 lambs/ha X grazing days 52 = 426.4 total grazing days	Total kgDM/ha growth needed if only 60% utilised
Store lamb 35kg live weight market price	22kg x $5/kg market price +$10 skin	Break even finished lambs/ha	13kg / 250gr (growth rate/day)	426.4 total grazing days x 2.5kg/day consumption	Break even TOTAL kgDM/ha
$95	$120	8.2 Lambs/ha	52 Grazing days	1066	1,777

CAN I DIRECT DRILL MY SUMMERCROP?

HARRY ARMSTRONG

A knockdown herbicide and full cultivation is still the most common method used when establishing summer crops.

This method of establishment is well known and usually very reliable. However, there are options in the right situation to direct drill these crops. In situations where there is heavy onion weed or bent grass present, full cultivation is still the preferred option. Likewise, if the area is very rough and in need of levelling, then cultivation is still required and recommended. However, if we are simply updating or renewing an existing pasture that has previously been ploughed or has some history of cropping, then these paddocks can be considered for either direct drilling or minimum cultivation; maybe a pass with a speed tiller.

Before rushing to renovate a pasture, it is critical that an assessment is done to determine the cause of that pasture failing in the first place.

If your intention is to grow turnips rather than rape, cultivation is probably preferable as the bulb which represents half the crop yield needs cultivated soil to develop fully.

At a recent fodder crop information morning held at McDonald Rural, the cost of establishing a summer crop was estimated at around $280/ha. The biggest single component of the cost was cultivation @ $100/ha. So, eliminating that cost has a dramatic effect on the cost of establishment.

Knockdown herbicide becomes more critical if you intend to direct drill. Robust rates need to be used and a split application should be considered. The initial spray will not only kill weed and existing pasture but also lock up any available soil moisture, so timing is critical for this one. The second spray can be applied immediately prior to sowing. Keep water rates on the high side if doing the second knockdown as weeds are obviously very small at this time. The second spray is not absolutely essential but if sowing is delayed to try and pick up a decent rain event, then it may be necessary.

Timing of sowing is more important when not cultivating. Ideally, sowing should be done the day before a significant rainfall event. Delay sowing if there is significant smearing in the drill rows. Drill rows can be left open if a rain event is imminent, otherwise harrow and roll.

Obviously, when direct drilling into uncultivated soil, the drill used needs to be of good quality and capable of accurately sowing into a slot deep enough to find some moist soil.

Fertiliser and sowing rates are similar whether direct drilling or cultivating. Even if capital fertiliser is applied prior to sowing, some should be sown “down the tube” as well. Well-fertilised summer crops resist insect attack. When you consider some crops are sprayed up to three times with expensive insecticides, increasing the fertiliser applied can seem cheap. There are also long-term benefits for the new pasture sown in the following autumn. We tend to think of only applying capital amounts of phosphorus (P) to summer crops, but it is equally important to consider potassium (K) as well. To sum up, there are advantages of direct drilling summer crops in the right situation. Like most things we do, success is a result of careful planning

LUCERNE MANAGEMENT & PERSISTENCE

LEIGHTON REES

Lucerne is a very popular option for many farmers and grown correctly with the right inputs & management, can be a highly productive alternative to our normal pasture based systems.

Establishment of lucerne should not start before some thought has gone into preparation & planning. Lucerne can be a very resilient & robust plant but if not sown in an ideal environment, production will be limited.

Some things to look at during the planning phase:

Site selection

Is the area well drained?

If the answer to this is no, then think again about sowing lucerne. Lucerne will not tolerate waterlogging for any period of time. As a guide, if you can't drive over the proposed paddock in 2wd during the wettest period of the year then this paddock probably won't be suitable for lucerne.

Is the paddock selected free from undesirable weeds?

Lucerne, like many plants, does not like competition from weeds during establishment and it is much more cost effective to control weeds before sowing than when it is established. There are many options available for weed control in Lucerne, but the need for selective herbicides will mean that chemical costs will be higher.

If possible, look at double knockdowns before sowing to reduce weed burdens, or pick a paddock that has been in a renovation phase for at least 2 rotations. There are also pre-emergent options available.

Has the paddock been soil tested? Do you have an idea of nutrient levels, pH, calcium, aluminium levels etc?

Lucerne has a high demand for calcium. Equivalent of approximately .5 tonne of a good quality lime per hectare, per year.

Lucerne will not handle any aluminium in the soil profile. A pre incorporated application of 2.5t lime per hectare, if shown as required on the soil test, will reduce most available aluminium. In some circumstances there may be a requirement for a higher application.

Soil testing the top 10cm, as well as a deep soil test to check for aluminium at depth, is recommended.

Good levels of nutrients are also required to maintain a highly productive lucerne stand.

Olsen P 15 and above.
Available potassium 200mg/kg and above
pH close to 6 or above.
Aluminium levels below 1%
Sulphur around 10mg/kg

Selecting a variety

Choosing a variety will depend on your particular situation and when you most require the feed. If you are looking for summer feed, choose a lucerne variety with an activity of around 6 or below. If you require winter feed, look for a lucerne activity of 7 and above.

Seedbed preparation & sowing

- Lucerne, being a small seed, requires a good seed bed for ideal germination. Graze down any trash after spraying if direct drilling.
- Cultivating the proposed area first will reduce any slug/snail populations.
- If direct drilling, baiting before may be worthwhile.
- Typical seeding rates vary from 8-12kg/ha. Cross sowing at half rate either way will give better seedling distribution.
- Rolling the paddock after sowing will increase germination and, in very sandy soils, rolling prior to sowing can reduce the chance of sowing seed too deep.

Maintaining your existing stand

Once established, lucerne still requires a reasonable level of management to ensure it stays productive for many years to come. Good levels of soil fertility need to be maintained and any removal of nutrient e.g. hay; needs to be replaced.

Regular soil testing of stand to ensure pH, calcium, and aluminium levels are satisfactory for optimal production. This may mean liming again in 5 years to ensure the lucerne stand has adequate calcium.

Insect pests can also significantly reduce yields and these pests, along with snails and slugs, should be monitored regularly and controlled when necessary.

Lucerne stands will inevitably become over run with weeds over time; there are many chemical options available for control of most weeds.

Winter cleaning is a coming option for much of our weed control in this particular area. This is best done when the lucerne isn't overly active; this will also mean that potential yield losses will be reduced.

In most cases it is wise to graze lucerne stands heavily before application of chemical to reduce the effect the chemicals may have on the lucerne.

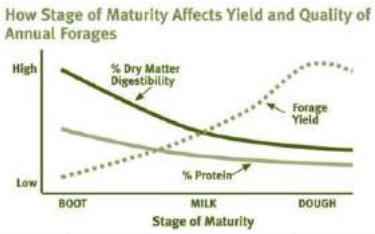
SILAGE & HAY SEASON 2017

ROGER GEE

Given the rainfall across Western Victoria through August, you would not be alone in thinking this is shaping up for a good spring to replenish silage & hay reserves. While there's a reasonable supply of hay still on farms, the quality was not up to expectations due to the long cool spring of 2016.

Which leads me into this season's silage and hay. There's a good deal of information about which is better and how to make it, so I'm not about to enter that area. But what is not in question is quality; quality silage or quality hay is king when it comes to conserved fodder, otherwise it's expensive feed.

The following chart and graph illustrate clearly what we should target when harvesting silage or hay and quality feed has true value.



Analysis Measurement	Very high	High	Average	Poor	Very Poor	Target Values
Dry Matter Content (% DM) Bulk silage	30 - 35[1]	30 - 35[1]	30 - 35[1]	<30 - >38	<25 - >40	30 - 35[1]
Dry Matter Content (% DM) Baled silage	40 - 50[2]	40 - 50[2]	40 - 50[2]	37 - 55	37 - 55	40 - 50[2]
Metabolisable Energy (ME/kg DM)*	>11.0	10.5 - 11.0	9.0 - 10.0	8.0 - 9.0	<8.0	>10.5
Crude Protein (% CP)	>18	14 - 18	10 - 14.0	8.0 - 10	<8	14 - 20
Neutral Detergent Fibre (NDF)	30 - 36	34 - 40	41 - 55	56 - 65	>66	30 - 36
Ammonia-Nitrogen as % of total N (% NH-N)	<5%	5 - 10.0	10 - 15.0	15 - 20	>20	<5
Acidity (pH)**	4.50 - 4.65	4.50 - 4.65	4.20 - 4.40	3.5 - 4.2	<3.5	4.50 - 4.65

[1] Precision chopped silage 30 - 40 %
[2] Large square baled silage 40 - 60 %
* Metabolisable Energy (Megajoules of Metabolisable Energy per Kilogram Dry Matter)
** pH varies with DM content and less useful if >35% DM such as with baled silage, normall, about 5'/. 2 units

So, what can we control to ensure quality silage & hay?

Watch for prevalence of insects such as red-legged earth mite, lucerne flea, aphids, blue oat mite and spray with an appropriate pesticide before the population increases dramatically. Pastures, especially legume dominant, once locked up are most at risk of pest infestations.

Where capeweed or other weeds have infiltrated large areas of the paddock, spray with an appropriate herbicide as soon as possible. Weeds reduce the quality of crops and are competition for valuable nutrients and moisture.

Paddocks that have been earmarked for fodder production should ideally be soil tested to check that there is adequate soil fertility. High quality hay and silage production requires good soil fertility to produce the best possible fodder.

Applying nitrogen will generally increase pasture/fodder crop growth but the poorer the fertility, the poorer the response to nitrogen. An application range of 30-60 kg N/ha is generally the most effective. Expect pasture responses of about 15 - 25 kg/DM/Ha for every kg N applied about 4 - 6 weeks after the nitrogen application during spring. Higher responses on some newer varieties of ryegrass will be achieved.

Other critical nutrients for successful hay and silage production are potassium & magnesium. Pastures and fodder crops can take up luxury amounts of potassium shortly after application. If there is a known potassium deficiency, consider split applications. One in autumn and then again at paddock lock up. Magnesium is not only required by the plant for quality growth but it helps address Grass Tetany.

Applying a complete NPKS blend can address other nutrient deficiencies, thus reducing fertility limitations to the quality and quantity of fodder produced. Consideration should be given to applying NPKS blends to new perennial pastures in spring, to not only extend the grazing season, but to also give them some extra vigour going into their first summer.

Representative nutrient concentrations in hay and silage grown in southeastern Australia
(P.Finn, Hamilton Pastoral and Veterinary Research Institute, Vic)

Hay & Silage - Average Nutrients in kg/tonne							2/12/2000
Type of Hay or Silage	Moisture	Mean Nutrient Concentration (kg/t FW)					
	(%)	N*	P	K	S	Ca	Mg
Legume hay (clover or medic)	89	22	1.7	18	1.6	8.6	2.3
Lucerne hay	87	30	2	24	2.6	9.9	2.7
Legume / Grass hay	88	21	2	18	1.7	5.3	1.9
Oaten hay	90	13	1.6	17	1.1	2.3	1.2
Pasture hay	88	18	1.8	15	1.6	5	1.8
Grass silage	44	24	2.8	24	2.2	5.3	2.1
Maize silage	62	12	1.9	15	1	2.1	2.4
Pasture silage	48	26	2.8	26	2.3	5.9	2.1
Oaten silage	45	20	2.5	23	1.8	3.7	1.7

* N concentrations expressed on an oven dry basis

From the table shown we can calculate that the removal of a 4 ton/ha hay crop will remove 7.2kg/ha of P, 60kg/ha of K, 6.4kg/ha of S and 7.2 kg/ha of magnesium. Replacing these nutrients will require approximately 250kg/ha of super potash 1:1 + 5kg of magnesium or an equivalent. This assumes that the entire crop is taken from the paddock and none is returned.

Replacing the nutrients removed is essential. You should consider the effect of harvesting silage or hay, and this impact on the whole farm's fertiliser profile.

Allowing continued depletion of nutrients, even from fertile paddocks, will eventually reduce yields and decrease the productivity and quality of future production.

Regular soil tests will keep track of nutrients transferred both around and off the farm. Tissue tests will enable close monitoring of trace elements.

Removing nutrients from a hay or silage paddock may also reduce the pH of the soil. Areas that are harvested for hay or silage regularly will acidify more quickly, requiring semi-regular applications of lime.

Following these few rules/guidelines will ensure the pasture/fodder crops you are growing have every opportunity of reaching the highest quality.

WARRATAH PHOSPHOPRUS TRIAL (YEAR 4)

HARRY ARMSTRONG

In 2014, Bruce Lewis set up a trial at Waratah, north of Cavendish, to compare capital phosphorus treatments. The intention was to compare an RPR based P fertiliser to traditional superphosphate.

Species composition of the existing pasture was basically onion grass dominant with some sub clover and some phalaris/ryegrass present.

The site was soil tested at the start. The pH in CaC12 was 4.40 (5.10 in water), Aluminium was 16 %, Olsen P was 5.69mg/kg, potassium 140mg/kg and sulphur 8.80mg/kg. The phosphorus buffering index (PBI) was 220 which is classed as moderate.

The trial consisted of 29 plots, with 9 treatments replicated 3 times, plus 2 demonstration plots to test sulphate of potash. These 2 plots were not replicated.

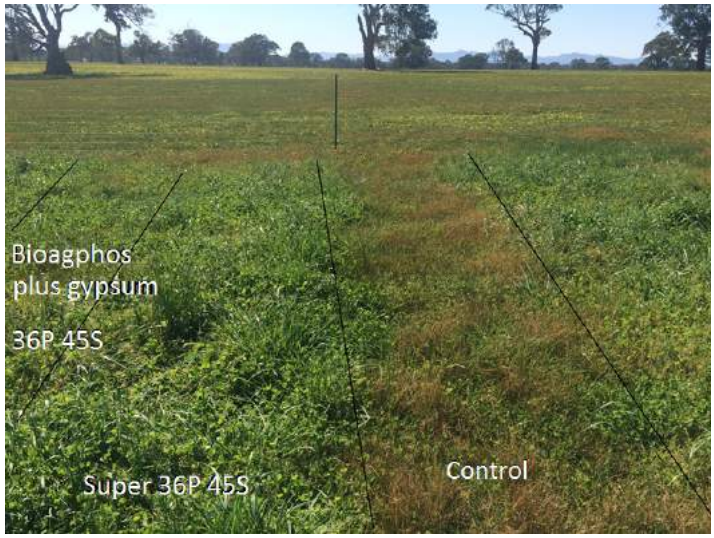
As mentioned previously, the main intention of running the trial was to compare RPR based P to a conventional superphosphate treatment. 36kg/ha of P was applied annually.

In the first year of the trial, the RPR products did not produce any additional dry matter than the control treatments, although the pasture composition had changed. In the second year, visual and measured responses to RPR could be observed but were still behind the superphosphate plots. In 2016 (third year), the RPR had produced significantly more dry matter than the control plots. Superphosphate plots still, however, produced significantly more dry matter than both the control and the RPR plots.

No fertiliser was applied in year 4, and measurements taken in August 2017 indicate there was no significant differences between the plots that had received P, regardless of what form was applied. The use of RPR had a large production penalty in the first 2 years. After 3 years, the difference was not as extreme but still significant. After the fourth year, and with no more P applied, the gap between RPR and superphosphate has closed. We intend to keep measuring this trial site with no more fertiliser applied over the next year and measure any residual benefits of the RPR.

As can be seen from the photos, the difference between the control plot and surrounding paddocks which have been untreated; and the trial area which has had capital P applied, is quite striking. What is more surprising, is the reversal of the pasture composition in the P plots. They have basically gone from onion grass dominant with a little clover, to the complete reverse of being clover dominant with a small amount of onion grass. Improved grass species such as phalaris/ryegrass have also become much more apparent.

A more in-depth article will appear in our summer newsletter regarding capital applications of P to run-down pastures.



IMPORTANCE OF POTASSIUM FOR CLOVER GROWTH

FRANZI RIEGGER

We all know the benefits of reasonable clover content within a pasture. Besides the "free" source of nitrogen, we can also benefit from the enhanced feed quality. Higher animal performance is achieved on pastures with high clover content due to improved digestibility and protein.

By having adequate clover content within the pasture, Grass Tetany can also be reduced as pastures mainly consisting of grasses have lower magnesium levels than clovers and lucerne. Clover, therefore, is pretty much every grazier's best friend and it is in our best interest to keep it in our grazing system.

How do we get more clover?

There are three things every plant is competing for, and these are: light, water and nutrients.

When competing for nutrients, the grasses are always the winners and the clovers the losers.

Clover needs 16 nutrients and can only grow as fast as the most limiting nutrient. It has a poor root structure compared to grasses and, as a consequence, has a hard time accessing these nutrients. The clover, therefore, needs higher concentrations of nutrients in the soil to optimise its production relative to grasses.

If these higher levels are not achieved, the clover struggles to compete against the higher producing grasses and the clover content will decline. Hence, less clover nitrogen will be fixed and returned to the soil, decreasing total pasture growth even further.

We can also influence the competition of light in favour of the clover by specific grazing management. Graze pastures in late-winter early-spring to open up pastures and provide the clover with more daylight. Try also not to leave too much dry feed in paddocks coming out of summer to give the clover the best ability to get out of the ground quick in autumn.

Potassium is one key nutrient.

For optimum clover growth in pastures, potassium (K) is an important nutrient. It plays a big role in cell division, water uptake, guard cells, cold tolerance, moisture stress and many other functions.

While many soils have adequate soil potassium, there are still many that don't and then, in most cases, it is the limiting factor and needs to be addressed in order to improve pasture growth. Low potassium levels are mostly the result of years of mining the soil's potassium reserves.

We are also seeing large variations in potassium within paddocks. This is more noticeable on the more undulating lighter grazing country, where slopes will often be low, while the tablelands have adequate levels. This is due to nutrient transfer by stock as well as soil type changes.

Keep on the lookout; visually assess pastures to recognise the symptoms of a potassium deficiency.

Legume plants will be sparse and display scorching or spotting on the margins of older leaves.

By the time these symptoms are visible, large losses in pasture productivity will already have occurred.

Potassium is known to affect the susceptibility of plants to pests and diseases by influencing tissue cell structure. This leads us to another common sign of a potassium deficient pasture; being overrun by insects, e.g. Red Legged Earth Mite.

As with everything to do with soil fertility and pasture nutrition, it is recommended to put a soil testing plan into place and also carry out clover-only tissue tests to manage fertiliser inputs for optimal pasture growth.

Reminder: Spring time is the best time to undertake soil and tissue tests, as manure and dung patches are clearly visible. These show that there is a nutrient deficiency and that the paddock would be capable of growing more feed in general if those deficiencies were eliminated.

CROP DISEASE UPDATE 2017

REBECCA STEWART

With the 2017 season shaping up the way it has, growers need to be actively managing their crop diseases as the pressures are quite high in some areas. Trying to minimise yield losses through the active use of fungicides dramatically reduces the losses that can occur.

This month we saw a lot of septoria tritici blotch in the earlier sown crops. It is now fairly widespread throughout the Wimmera and inspection of crops is a must. If warranted, a fungicide treatment should be used as losses of up to 50% can occur in these wet favourable conditions. In the Wimmera last year, the disease was fairly common at low levels but the inoculum carry over in the stubble combined with the wet conditions has increased the disease pressure especially in the early sown crops this year.

Throughout the summer and autumn this year, a green bridge was present providing a good opportunity for rusts to carry over. With yield losses of up to 60% it is essential to begin observing rust development at the start of August, with foliar fungicides applied as soon as possible. So far there have only been a couple of sightings of rust as the conditions have not been favourable for spore multiplication.

PredictaB (DNA based) soil test results from this year have indicated that take-all and crown rot throughout the southern region and later sown crops will be at a great risk. Once the crop has been sown, apart from good nutrition there is little growers can do to assist. White heads may develop in the late spring due to crown rot and/or take-all. Crop roots should also be examined during spring in case of root lesion nematode damage.

Within some regions, canola growers have experienced white leaf spot throughout the early stages of growth. It is usually not severe enough in Australia to cause yield losses, however it can cause significant defoliation obviously reducing plant vigour which leads to a loss of yield. It usually doesn't move up the canopy to the upper leaves but under ideal conditions (prolonged wet periods) the fungi can start to move.

Growers around eastern SA and VIC have been advised to keep an eye out for ascochyta blight as it has been found in chickpea crops. With all cultivars now being susceptible or moderately susceptible, farmers need to be cautious when applying fungicides.

Fungicide management for foliar diseases will be required and should be applied at growth stage Z31. With a possibility of a wet spring, a follow up application should be applied at growth stage Z39. Foliar fungicide applications can be delayed until Z39 if flutriafol treated fertiliser is used. This will help protect crops from scald, rust and take-all. If you are able to treat your barley seed with fluxapyroxad, foliar diseases will be controlled up until Z39.

If you don't seem to be able to get on top of disease throughout the season with management and fungicides, a PreDicta B soil sample will specifically tell you what disease is present within the soil and what levels of infection are there. For crop management, reducing the risk of yield losses and making an informed decision about crop/pasture plans a PreDicta B is essential.

The PreDicta B sample will test and assess the levels of the following:

- Crown Rot (cereals)
- Rhizoctonia root rot
- Take-all (including oat strain)
- Pratylenchus thornei
- Pratylenchus neglectus
- Cereal Cyst Nematode (CCN)
- Stem nematode
- Blackspot (field peas)

BLUEGUM FIELD DAY

REBECCA STEWART

On the 18th of July, the Western District branch of Grasslands held a "Bluegums to Pasture" day at Cavendish where over 200 people filled the hall. Feedback from the day was quite positive and there seemed to be a lot of upbeat growers in the group keen to purchase land and have a crack.

What we have learnt from this update, compared to the 2014 "Beyond Bluegums" field day held in Macarthur, is the varying methods of converting the planted land back to pasture, and also the costs associated are more accurate than when we first began.

The understanding of what needs to happen, and research about plantations and land left behind, has increased dramatically. Ed Dunn from PF Olsen highlighted the company's evolution towards plantation management, and also their agriculture division which has started focusing on reclaiming large pockets of land for customers over in Western Australia. Ed produced some great numbers on the conversion costs for large scale properties over in the West.

The removal of stumps with a grinder, and the use of a disc machine, raking, mulching and stick picking to get the ground arable, will cost $900-$1000/ha depending on how the trees were removed, how much residue/trash was left over and how big the stumps were.

One of the programs they had in place is costing $2,500/ha in total to get the land back to producing what it normally would. This cost includes:

$450/ha for fertiliser and lime

$300/ha for sowing

$250/ha fencing for 100ha paddocks

$100/ha for reticulated water system

$400/ha for infrastructure and stock yards

The above figures are working on a 2000+ha land parcel and the cropping rotation is in canola then wheat.

With the program currently running, it is taking three seasons to get the land back to "normal" production (100%). Within the first year, production is usually around 70% and during the second year, it jumps up to 85%.

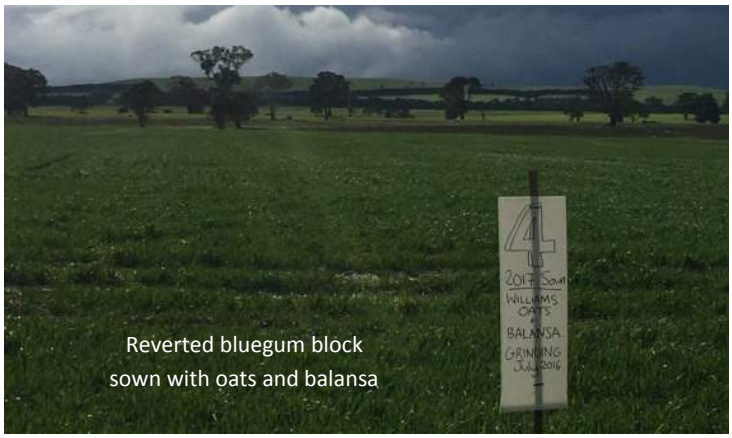
A large highlight of the day was the three farmers who got up and spoke about their different techniques in reverting their land back to pasture. Letting the stumps rot in the soil or grinding the paddocks all have their advantages and disadvantages, depending on your enterprise and situation. It is quite a balancing act between spending the extra money on grinding the stumps for improved future management and traffic ability, or letting the stumps rot with the hassle of waiting for them to disintegrate.

A great point that was made by one of the speakers is the proximity of land to your current farm, and the value it has to you and your business. When purchasing a rundown block in close proximity, the same costs on fencing, water, infrastructure, fertiliser, pasture and labor need to be taken into account. Whether you have stumps in the ground, or a low fertility run-down neighboring property, you will, most times, have to spend the same amount on whole farm renovations to get it to where it needs to be.

All speakers expressed the importance in soil testing, so you know what you are looking at and where you need to spend your money. With one of the major issues being the pH of the soils after bluegums, it is extremely important that soil tests are taken to assess how much lime is needed, so the crop/pastures have the right conditions for good establishment and are not affected by the often high levels of aluminum. Large applications of major nutrients such as phosphorus, potassium, and sulphur are paramount for the success of the establishment and production of the crop/pastures after the bluegum phase. It is also essential to make good plans when purchasing large blocks of bluegum land at this time, as there is a clean slate to work with. Initially looking at the varying soil types, and then fencing to these parameters with consideration of required paddock sizes, laneways, water points and management, is a good way to start. With all blocks of land after bluegums, there is going to be a change in the soil structure and profile, whether the stumps are left to rot or they are ground. Different techniques for reverting this land and different soil types all mean that not everyone will have the same successes/failures, so each block needs to be looked at closely to see how it can be best managed to suit your enterprise.

After listening to the speakers for the morning, the group headed out on farm to look at a reverted bluegum block which had been ground and now is in a cropping phase. There were also many different companies showcasing their machinery on the property, which greatly assisted growers in seeing the processes and talking face to face with industry experts.

Looking at the property which had the stumps ground in 2016, the current crop growth looked fantastic and really proved how much you can turn around the land within 12 months.



Reverted bluegum block sown with oats and balansa

TIMERITE FOR RED LEGGED EARTH MITE (RLEM) CONTROL

HARRY ARMSTRONG

A commonly held view is that unless red legged earthmite (RLEM) are in extreme numbers then you don't do anything about them. This view is valid when heavy infestations of RLEM are damaging a crop or pasture. However, taking a long term view on RLEM control and reducing infestations for the following year is worthwhile. To achieve this using Timerite, a predicted spring spraying date to control RLEM the following autumn, is critical.

Three generations of mites are produced each year from April through to November. The third generation dies, leaving behind eggs inside the female's body (the RLEM population is female biased – there are more females than males). The carcass acts like an egg case protecting the eggs from the hot, dry conditions of summer. These egg filled carcasses blow around like grains of dirt in the summer and spread mite eggs across significant areas. The eggs lie dormant over summer and when the temperature is right and there is enough moisture in the soil, they hatch out and the cycle begins again. As new pastures and crops are emerging, so are millions of hungry sap-sucking insects.

Achieving long term RLEM control requires breaking the breeding cycle. Timerite's efficacy is based on breaking this breeding cycle. Spraying on the prescribed day aims to destroy all of the last generation of adults before they produce their summer eggs. Spraying on a date before the Timerite spray date will wipe out nearly all the adults, but if there are eggs present they will survive, hatch, and breed, causing ongoing problems.

The time at which these mites produce eggs and die is triggered by specific climatic conditions. These conditions are unique and there is one day that's the optimum for any property - one kilometre away and it might be a day later, so timing of spraying is critical.

The economic impact of RLEM is significant. RLEM numbers on affected paddocks and/or farms frequently exceed more than 12,000 per square metre - the equivalent of running one additional sheep per hectare. On a 2000 hectare property, that can mean a mite infestation can consume the same as 2000 sheep. In addition, RLEM have the biggest impact in autumn when pastures are re-establishing after summer dormancy, or when newly sown crop or pasture seedlings are establishing, potentially causing pasture or crop failure or reduced production into the future.

To determine your spray date you will need to access the Timerite website (**www.timerite.com.au).** Once there, you will first need to determine the longitude and latitude co-ordinates of your property. You can source this information from either Google Earth or lookup "latitude longitude finder" on your web browser. Choose a site (world atlas seems to work) and enter the property address. Your latitude longitude co-ordinates will be given. Enter these into the Timerite website, fill in your details and your spray date will be given instantly.

This date will not change from year to year so remember to write your RLEM Timerite spray day in your dairy.

Below is a list of Timerite dates for some local towns.

Timerite dates

Apsley	**36°58' S 141°05' E**	**30th September**
Balmoral	**37°15' S 141°51' E**	**3rd October**
Casterton (Bahgallah Bridge)	**37°35' S 141°24' E**	**10th October**
Cavendish	**37°31' S 142°02' E**	**10th October**
Coleraine	**37°36' S 141°42' E**	**11th October**
Edenhope	**37°03' S 141°18' E**	**2nd October**
Frances	**36°42' S 140°57' E**	**28th September**
Hamilton	**37°44' S 142°01' E**	**15th October**
Harrow	**37°10' S 141°36' E**	**1st October**
Heywood	**38°08' S 141°37' E**	**16th October**
Penshurst	**37°53' S 142°17' E**	**16th October**
Hawkesdale	**38°5' S 142°30' E**	**18th October**

COMPANY UPDATE

BRUCE VICKERY

Farm safety has come under increasing scrutiny as the rate of agricultural related incidents attracts serious attention. Vickery Bros. is committed to the continual evolution of our on-farm risk management. This commitment is driven with both the safety of our spreader drivers in mind and the necessity to demonstrate that our company is a provider of responsible and professional services.

At Vickery Bros., the health and safety of our employees is a key business principle. Within our company we believe that all parties working together to identify and manage workplace hazards and control risks, is an important responsibility.

In this article, we would like to share how we are working to manage the hazards and risks that our spreader operators are exposed to.
Unlike conventional workplaces, spreading operations can be exposed to varied and sometimes extreme environmental and seasonal conditions. Every track our spreader operators make on farms is new and every farm is a different work place.

In this context, information about existing hazards supports improved decision making and job safety planning. To support spreader job safety planning, Vickery Bros. has initiated a double pronged approach to on-farm hazard management.

Heavy rains can present risks in the form of erosion and washaways

The first level is a **Farm Hazard Analysis**.
This aims to provide advice about known hazards at the location to be spread.
In conjunction with our agronomists, logistics team and spreader drivers, the initial hazard identification applies prior knowledge and seeks information from clients about known hazards on their property.
Typically, this advice involves information about the terrain, occurrence of erosion/washouts, crossings/bridges, drains/culverts, power lines, accessibility, and other obstacles.

The information becomes a living document that can be continually updated by anybody involved and is available each time we visit that location.

The second level of managing on-farm risks is a **Job Safety Analysis**.
The spreader driver interprets the farm hazard information along with weather conditions, length of grass, trafficability etc, on that day. Considerations are made based on the existing conditions as to what effects these will have on the job intended. This analysis provides opportunity to consider how to make sure the job can be completed safely. The job safety analysis together with information about new hazards is recorded electronically and reported back to Vickery Bros administration on completion of the job. Any new information recorded is transferred to the existing farm hazard analysis and saved on the property file.

We take this opportunity to invite all our clients to work with us in making sure that our spreading operations are completed safely, effectively and all our drivers return home to their families at the end of the working day. These live documents along with our continuously updated farm maps are always available for our clients to use and incorporate into their own systems.

SEASONAL REMINDERS

- Hay and silage boosters
- Soil and tissue test for next season
- Monitor spring sown pastures for
  - Fertiliser
  - Insects
  - Weeds
- Nitrogen for maximum yields