



PERENNIAL PASTURE SYSTEMS

MAKING PASTURE GO THE DISTANCE

PPS NEWS

PPS Annual Conference Cancelled

The PPS management committee made the regrettable decision to cancel this year's Annual Conference due to COVID 19 restrictions at the August "Zoom" meeting. The aim is to conduct the proposed program as the 2021 Annual Conference and presenters have committed to be part of the line up if possible. Sponsors have committed their support to the 2021 conference, so support them when you are able. The proposed conference program & sponsor list is on page five of the newsletter.

PPS membership discount; The PPS management committee decided to discount the 2020/2021 membership due to PPS being unable to conduct most of its 2020 events program due to the virus restrictions. The discounted membership will be \$33 (\$30 + GST) per farm business. Invoices will be forwarded during September.

PPS Annual General Meeting; PPS will conduct the 2021 meeting via "Zoom" on Wednesday, October 14th at 7.30 pm. Short presentations on the PPS annuals & weeds project results will follow. An informal chat about seasonal conditions will complete the session. Log in details will be sent to members prior to the meeting.

Other PPS Events; all other proposed events are on hold due to virus restrictions; see page four.

PPS Webinars; PPS has conducted four webinars during the COVID 19 restriction period and all have bought useful information to attendees. Three of the webinars, Tim Leeming (increasing lambing percentage), Michelle Joliffe; Ag Vic (silage in low rainfall areas) & Rob Herrmann; Mercado (market outlook) were recorded, contact the PPS project manager for links if you missed them. The oestrogenic clover webinar with Dr Kevin Foster & colleagues was not able to be recorded but there is a summary on page three of the newsletter. PPS made a donation to the Kasenda Village project in Uganda as a thank you to Rob Herrmann for his webinar presentation. The project assists villagers in Uganda with projects to linked to improved living conditions, access to education and opportunities to enable them to be proudly self-sufficient. Rob gave a short presentation on the project at the end of his webinar.

The webinars were supported by -



Greenfields Project; the Greenfields project was an economic and physical analysis of a land purchase and subsequent pasture improvement program conducted at Glenlofty from 2014 until 2020, which covered the full payback period. The final report has been produced and is available on the PPS website <https://www.perennialpasturesystems.com.au/post/greenfields-project>. The Greenfields Project was supported by a Federal Government Community Landcare grant.



PPS Website; the PPS website has been updated to include links to PPS partners & associate groups; Project Platypus, Gippsland Agricultural Group, Grassland Society, GHCA, NCMA, WCMA & the GPPCP. Website link on page 4.

GSSA conference; The Grassland Society presented its 61st Annual Conference as a series of online events due to the corona virus restrictions. PPS was invited to participate and present information on two demonstration projects. President, Duncan Thomas gave a session on the final results of the "High Production Annual Forage in Perennial Systems" demonstration, Tess McDougall from Ag Vic, who is assisting in the management of the "Annual grass control strategies in a perennial pasture system" project gave a presentation on the year one results. Both projects are part of the MLA EPDS & PDS programs; the annual weed project is being conducted in partnership with Agriculture Victoria.



Soil questions answered; PPS member, Dr Nathan Robinson from Federation University CeRDI unit presented the first presentation for the "Healthy Soils" program. Some interesting questions were submitted & Nathan has answered them on pages 6 - 10 of the newsletter. The "Healthy Soils" program is supported by MLA.



Left; Fletcha fescue & clovers at the "Overdale" fescue site. Part of the PPS "Fescue; a low rainfall pasture tool?" project; funded by the MLA PDS program.

Right; Google Maps satellite image from a PPS member farm near Elmhurst, which briefly added a jumbo jet to its machinery inventory.



Oestrogenic Clover Webinar

PPS conducted a webinar on managing oestrogenic clover issues on July 27th. Over thirty members participated. The webinar was presented by Dr Kevin Foster & colleagues, Mia Kontoolas and Daniel Kidd from the University of W.A. Kevin visited PPS twice during 2019 and gave a presentation at the Annual Conference.

Pasture inspections and clover samples sent for testing suggest that oestrogenic clovers are still present in pasture in most areas of Victoria & South East S.A. The oestrogen content in the clovers can cause fertility issues and other problems in breeding ewes resulting in less than optimum lambing percentages.

Formononetin, a substance found in several plant varieties, was identified in the 1960's as causing fertility issues in sheep flocks it occurs at high levels in the problem sub clover cultivars where they are present. In affected flocks, lambing percentage got as low as 20% in the 1970's and by the 1990's it was estimated that 10-15 million ewes in Australia were affected by degrees of clover infertility. Often the effects of clover infertility go undetected as other factors such as suboptimal condition score of ewes or ram infertility get the blame.

The problem sub clovers are Dinninup, Dwalganup, Geraldton, Tallarook and Yarloop. The first four are black seeded cultivars and they may have entered Victoria some years ago as a contaminant with other "safe" seed. Yarloop is a white seeded, waterlogging tolerant cultivar which was sown, mainly in areas north of the divide, as a pasture variety in the years before the oestrogenic issue was identified. Paddock surveys by Dr Foster on PPS member farms in 2019 showed the presence of problem clovers in 3 out of 8 pastures inspected.

If oestrogenic clover presence is suspected (and it should be if pastures have not been resown with new clovers in the past 25 years), a pasture assessment should be conducted. The UWA team suggested a pasture stick method which gives a good idea of problem clover presence as long as you can identify the problem cultivars. The method uses a stick thrown around one hundred times in a pastures with the plant variety touched by the end recorded and the results converted to a percentage. A result of 0—20% oestrogenic clover should mean that the pasture is safe due to the dilution of the problem cultivars with the rest of the pasture sward. 20—40% oestrogenic clovers are a moderate problem and >40% means that the pasture is potent to breeding ewes.

Hay or silage made from green, high-oestrogenic clover is likely still potent, but sub-clovers can be safely grazed when they dry naturally at the end of the season. However, ewes should not start grazing until six weeks after drying starts.

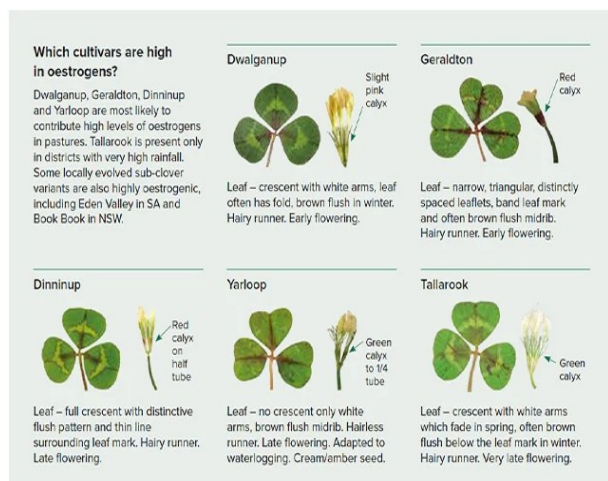
If you have problem clovers in your paddocks, there are management options.

1. Avoid grazing the paddock with young ewes or lambs and limit grazing to wethers but ensure they are monitored for false bladder; (rams are not thought to be affected). Don't 'grass clean' pastures, as dilution of pasture intake is part of the solution. Oestrogenic clovers need to be less than 20% of overall pasture to avoid livestock health issues.

Help livestock avoid the oestrogenic pastures when green by providing other feed sources or using other paddocks. Keep soil phosphorus and sulphur nutrition up to recommended levels for sub-clover, as formononetin in the green leaves can increase when clover growth is limited.

2. Go for the ultimate solution and renovate pasture with a low-formononetin sub-clover cultivar suitable for your district. New cultivars also have other improved traits to enhance productivity. This is also a good opportunity to improve soil fertility and rhizobia for long-term productivity gains. It is important to use certified clover seed to reduce the risk of importing oestrogenic clover cultivars; a survey of 13 uncertified seed samples taken carried out by the UWA team, showed 5 samples at >20% oestrogenic clover and 2 at or close to potent levels. If you are planning to use uncertified seed, it should be tested at a lab by growing out pot samples and inspecting plants to ensure that it is free of problem cultivars.

PPS thanks Kevin, Mia and Daniel for their clear information during the webinar and Tess McDougall; Ag Vic, Ararat for her assistance in facilitation. The PPS webinars are supported by the GHMA and Wimmera CMA through the National Landcare Program. The oestrogenic clover project is co funded by the MLA Donor Company & the UWA Future Farm 2050 National Project. Kevin can be contacted via twitter @kevinfoster_uwa or email kevin.foster@uwa.edu.au



PPS Pasture Survey

Since 2012 PPS has been conducting an annual pasture survey which assists PPS in reporting to funders, applying for future funding and assessing changes in pasture selection. *PPS are again asking members to provide information on completed or planned pasture establishment for 2020 or information from members who chose not to establish new pastures this year.* The information collected will be collated and used to compile the annual report, no individual farm information will be used. **The survey will be sent out by email in mid September.**

Due to the generosity of one of the annual conference sponsors, PPS are asking members to complete the survey and return it prior to November 10th. A prize draw will be held from the completed surveys. Western Quarries at Ararat have again donated a trailer and dog load of crushed rock, suitable for road building purposes with free delivery for up to 100 km from the Pyrenees Hwy quarry. The survey will be emailed to members; please return to the project manager when completed. For more information on Western Quarries products contact 5352 2660 or info@westernquarries.com

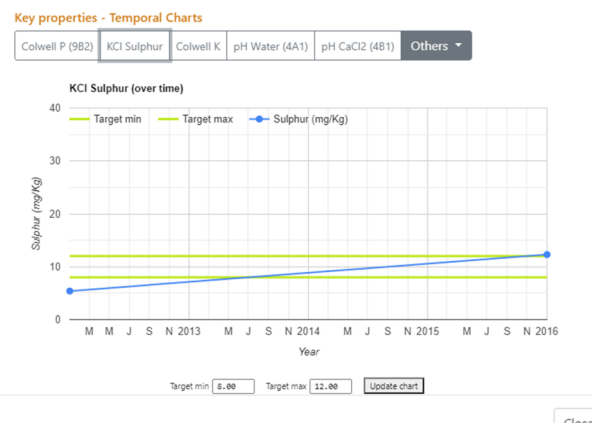
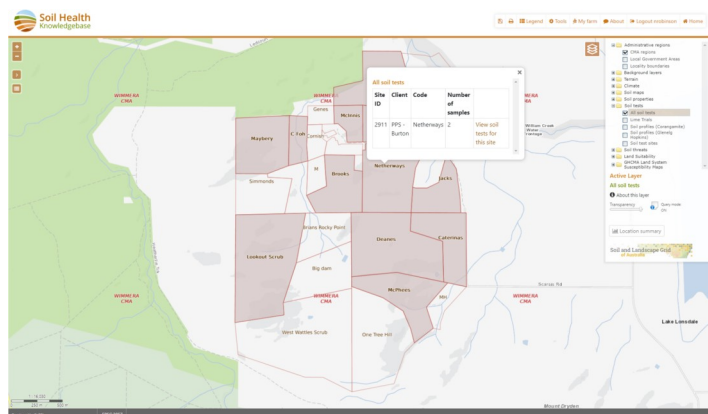


Soil Test Digitalisation Project

The PPS soil test digitalisation project has reached the demonstration stage after work by Dr Nathan Robinson and the CeRDI team at Federation University with assistance from PPS Management Committee members, Wayne Burton, Ben Greene and Duncan Thomas. Getting to this stage has been made difficult by the COVID-19 virus restrictions which have not allowed for face to face meetings but three farms have now been included in the demonstration with current and historic soil test data presented in a digital and visual format.

PPS planned to launch the program for members at an August Healthy Soils Group session but this was postponed to a future date due to virus restrictions.

PPS believes that the project will be a great way for members to store soil test data and assist in fertiliser decisions. When members put their soil tests into the project it will remove the need to retrieve old soil tests when searching for soil data. There will be an option for members to share their data to allow other members to compare nutrient levels which PPS considers will be a valuable tool in making fertiliser decisions. Several members have already committed to share their data. When the program is launched, members will be asked for ideas that help develop the format.



The project has received funding in the recent round of Landcare Victoria Grants through the Wimmera CMA. Federation University are also contributing through "in kind" funding.



Informed Decisions project

PPS has been successful in gaining funding for a new project from the Federal Government: Smart Farms Small Grants Program. The project title is "Informed decisions for managing climate variability in grazing systems" and it aims to enhance the knowledge of farm managers to be able to make more informed decisions in matching stocking rates to predicted pasture growth. PPS currently has a network of soil moisture and temperature probes which provide current information to producers. The use of real time soil and moisture data when combined with the proven pasture growth predictor modelling system "Grassgro" developed by CSIRO will allow producers to make better decisions in relation to the amount of pasture produced in their systems. The predictions will be valuable in dry seasons but will also fine tune grazing management decisions in average or above average rainfall years.

The project aims to produce regional trigger points for action in line with the pasture growth predictions which will alert producers to changes from the average which will aid their planning strategies in both good and poor seasons.

Jane Court from Agriculture Victoria who has an extensive knowledge of pasture systems has been contracted to formulate predictive regional seasonal models of pasture growth using the CSIRO "Grassgro" system. The models would then be overlaid with the soil probe network results and medium term weather forecasts to develop seasonal updates. This method was successfully demonstrated by Agriculture Victoria in the Hamilton region in a 2014 - 2016 demonstration project.

PPS will contract the Federation University CeRDI unit to develop a platform to show the information and pasture predictions in a digital format which would show the results for sub regions in the area covered by the soil probe network.



Beanstalk Project

PPS has also been involved in the Beanstalk program which is looking at on farm technology opportunities. The Wimmera CMA was successful in gaining in kind support through Agriculture Victoria for the program and PPS members took part in two (Zoom) sessions identifying gaps in farm knowledge that could be assisted with current, available technology. Real time pasture growth estimates were identified as an area that would advance both pasture and animal management.

The Beanstalk team came back with possible solutions and two technology companies gained a lot of interest from the group participants. One is a satellite imaging pasture biomass assessment and the other is a farm recording system which is compatible to integrating the pasture biomass assessments with other farm information.

The information provided by these programs could complement the "Informed Decisions" project and help to verify the pasture growth predictions. A couple of PPS members have expressed interest in the products identified in the Beanstalk project and are investigating use on their farms. PPS are investigating the possibility of conducting a demonstration of the pasture growth prediction within the group.



~ PPS DIARY DATES ~

PPS 12th Annual Conference; Ararat Town Hall - **Cancelled**

PPS 12th Annual Study Tour; Tasmania; **Postponed until 2021**

Winter Farm Tour – “Boorook” Woorndoo **Postponed until further notice.**

PPS Healthy Soils Sessions - **Dates TBA when virus restrictions allow.**

PPS end of year farm tour & BBQ - **Date TBA if restrictions allow event to go ahead.**

PPS Girls & Grass group; **Activities on hold due to virus restrictions.**

PPS Annual General Meeting & project results update - Wednesday October 14th 7.30 pm; via Zoom, log in will be forwarded to members prior to the meeting. The session will consist of the AGM & two short presentations on the “High Production Annual Forage in Perennial Systems” project by Duncan Thomas & the “Annual grass control in perennial pastures” project by Tess McDougall. These presentations were part of the Grassland Society Annual Conference.

PPS Pasture Variety Trials

Plant survival counts at the two PPS plant variety trial sites were conducted after the autumn break.

The Eversley site was sown into a granite loam soil in 2012.

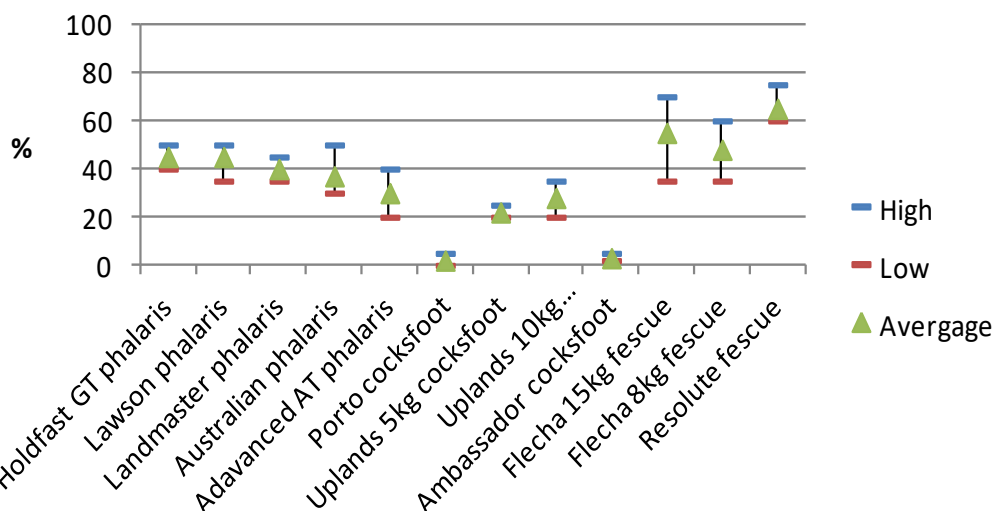
The Tottington site, situated near Paradise, was established on a sandy, loam soil in 2014.

There are 3 replicates of each cultivar at each site.

The PPS plant variety trials sites are supported by

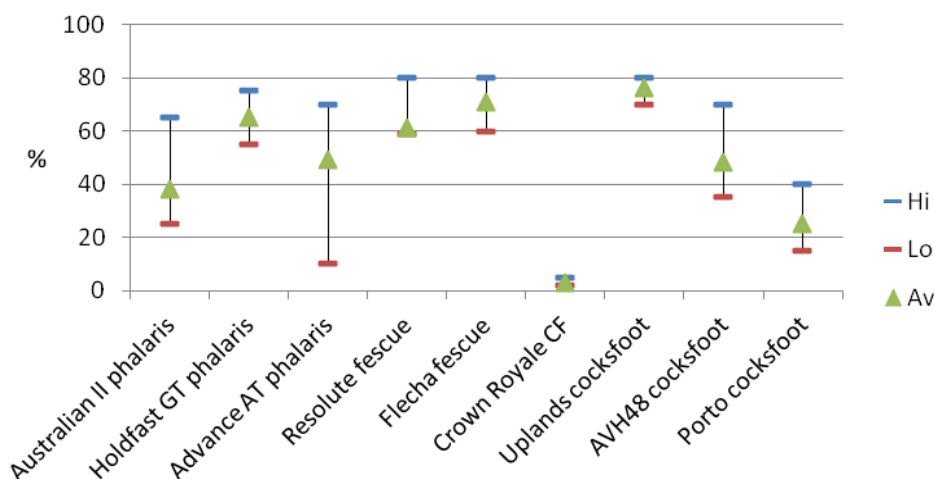


Tottington Replicates Survival 2020



Tottington Pasture Variety Trial site
May 2020

Eversley Replicates Survival 2020





12th ANNUAL CONFERENCE
CANCELLED
 due to COVID 19 restrictions
 Ararat Town Hall – Barkly St Ararat

Fine tuning the farm business
“Polishing what we know; shining a light on what we don’t”.

World Meat & Wool outlook; Simon Quilty, independent meat and livestock analyst
 Rob Herrmann, Ag Concepts

Fine-tuning a grazing business for increased returns; James Whale, James Whale Consulting

Fine tuning pastures; Jim Virgona, Graminus Consulting

Putting It Together On Farm, Nigel Kerin, Kerin Poll Merinos

CO2 & red meat; Margaret Jewell; MLA

Presenter Panel; Facilitated by Charlie de Fegely

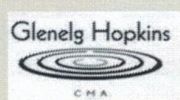
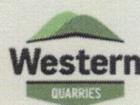
PPS Conference Tour – A.F. Gason, Ararat

~~Annual Dinner and Meeting; Chalambar Golf Club; Golf Links Rd Ararat, 6 pm~~
~~(Dinner must be pre booked; Dinner & Drinks purchased on the night)~~
 Guest Speaker: Simon Quilty; Analyst of international meat markets.

~~Conference only (includes seminar, conference book, morning tea, lunch & tour)~~
 PPS members – \$50 (membership includes anyone involved in member enterprise). Agricultural Students: \$0
 Non-members – \$75 (new members can join on the day & receive member rate. PPS annual membership \$66)

Further information contact PPS Project Manager Rob Shea – 0438 521357, yadin@netconnect.com.au

The PPS Conference is supported by



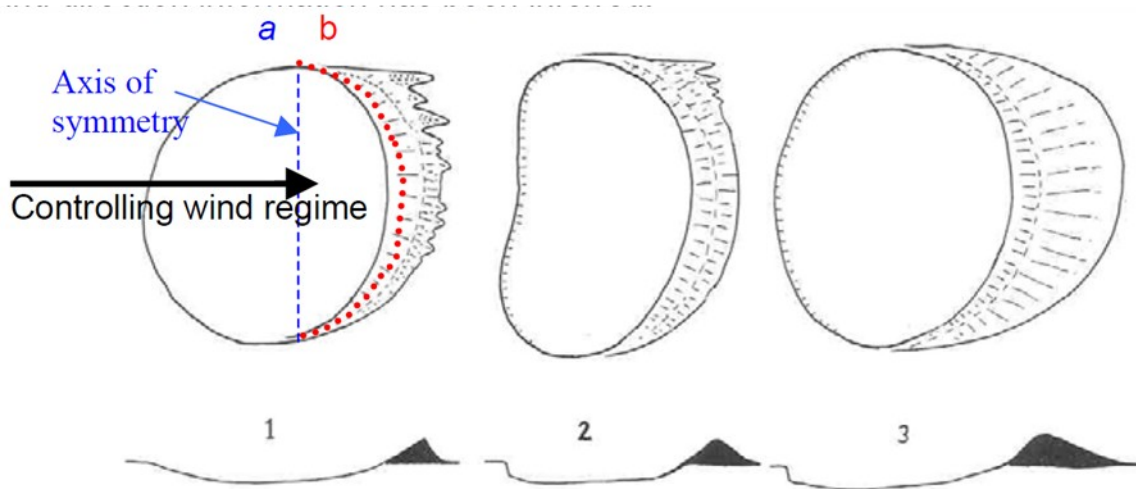
Soil Questions Answered

PPS member & Senior Research Fellow | Soil Science at the Centre for eResearch and Digital Innovation; Federation University Australia, Dr Nathan Robinson did a presentation on soil types and constraints at the first PPS Healthy Soils workshop last year. Some questions were answered by Nathan during the workshop & he has expanded on his answers in the following paper; they are presented in no particular order. The PPS Healthy Soils workshops are supported by MLA.



What is a lunette?

A lunette is a feature associated with a lake/swamp that occurs as a crescent dune shape on the leeward side. It is formed from wind sourced sediments during an arid phase of instability, a period related to last glacial aridity about 22 -15,000 years ago.



Lunette formation reflecting dominant wind patterns in arid phases (Hocking, 2004).

Lunettes are crescent-shaped, fixed dunes along the edges of swamps and wetlands in arid and semi-arid lands. They are crescent shaped (like a lunar eclipse) and reflect the prevailing wind directions at the time of formation. Varying lunette forms reflect their compositions, from sand dominant to clay dominant left to right respectively, where a = chord length, b = axis length (source: Bowler, 1983 p. 154; from Hocking 2004).

They vary in size from very large (a great example is Lake Tyrell) to smaller local examples such as Greens Swamp. Lunettes are mostly formed from fine-grained silt, by trapping of atmospheric dust by the moist air being blown from the lake basin at times when water was present, the trapped dust being deposited on the eastern margin of the lake, being carried by the westerly winds.



Small lunette at Greens Swamp; Greens Creek.

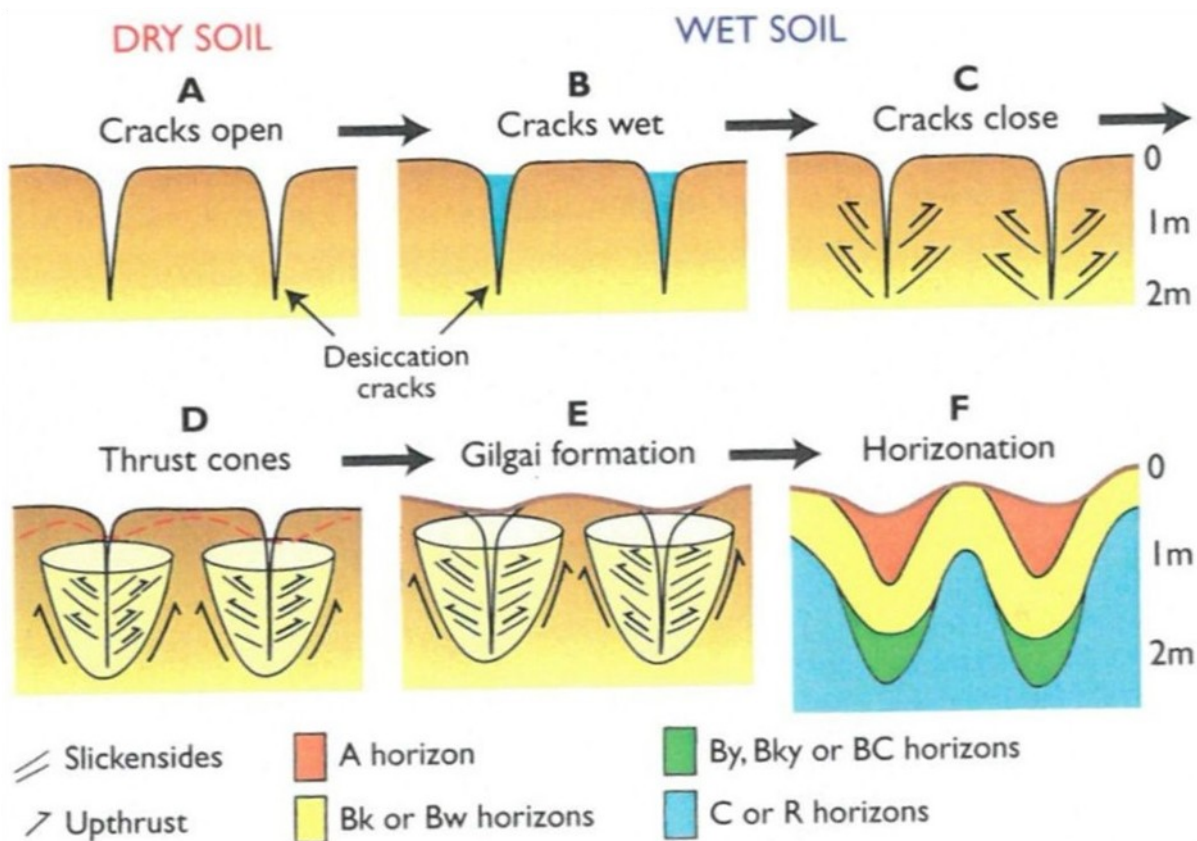
Sodic soils – what happens when they get wet?

The major constraint in sodic soils is the free movement of water and air (therefore nutrients) between the topsoil and subsoil. Sodium in excessive quantities on the exchange sites of clays result in the clays dispersing, and effectively blocking pores where water and air can move freely. When sodic soils get wet, this tends to result in water ponding or pooling on the surface and leads to waterlogging conditions. This can occur even when the deeper subsoil may be dry. Gypsum and deeper rooted crops that can create 'preferential' pathways for air and water to move are the best options currently available to reduce the impacts of sodicity.

Gilgai – if you flatten them, will they come back?

Gilgai soils are most common in clay rich soils which expand and contract with wetting and drying cycles. Many gilgai have been flattened due to historical cultivation practices to enable farmers to sow and harvest with greater ease and efficiency. Depending upon the type of gilgai (e.g. crab hole, melanhole, lattice, linear, etc) and the clay minerals present, some gilgai will return to their original (or near original state) with time.

As illustrated in the figure below (from McKenzie et al., 2006), gilgai will often come back through wetting and drying cycles that cause the upwards thrusting of soil.



Wetting and drying cycles of gilgai (from McKenzie et al., 2006)

Basalt dust – will it cause beneficial changes in calcium?

Basalt dust can be quite variable depending upon the age, weathering condition and mineralogy of the basalt. There does not appear to be a disbenefit from basalt dust, and it may have positive effects for some soil properties. This would include the Cation Exchange Capacity and may include an increase in calcium. However, it is likely that large quantities would be required to make a significant change to soil properties.

Holes (e.g. crab holes) in paddocks – where does the soil go?

Sinkholes generally occur where underlying material is dissolved, or finds a pathway to move underground, e.g. pre-existing caves or channels in limestone. In the Victorian Mallee for example, sinkholes often have a thin layer of clay above a calcareous layer (e.g. calcrete). Due to extensive clearance of existing vegetation, there are many examples where the removal of large trees has left large networks of decaying tree roots below the surface. With time and the decay of these roots, the occupied voids will be filled with soil from above and may lead to the formation of a depression. Often with the removal of tree stumps, some of the stump is likely to have been from below the original ground surface and this may result in a depression eventuating.

There may also be the combined effects of clay rich soils that are prone to gilgai; removal of existing vegetation; and calcareous subsoils that may lead to large sinkholes occurring. There are anecdotal examples of cars, wheels of headers and livestock all ending up in these holes.

Depressions can occur where perennial crops and pastures such as lucerne and phalaris are introduced. As both phalaris and lucerne are deep-rooted species, they consume considerably higher volumes of available soil water compared to annual crops and pastures. As these species dry the soil profile, there is the potential for shrinkage in expansive clay subsoil at depth that may lead to depressions occurring.

It should be noted however that there is still very little information on the occurrence of holes in paddocks in our region and the movement of associated soil.

Soil tests – on what types of soils (how to account for soil variability)?

Soil variability is a common feature of nearly every paddock we manage. In many respects, as practitioners, farmers probably tend to manage for the median (average) soil of their paddock rather than the extremes. But, are there rules of thumb that can be applied to account for this variability?

Here are three potential variability scenarios:

- 1 Your soil types and characteristics vary across a paddock with distinct classes or 'zones' evident where management can be tailored.
- 2 Your soil types occur in an 'association as short range' (e.g. gilgai with clay soils and texture contrast soils) that have very different characteristics.
- 3 Your soil properties or characteristics gradually changing across a paddock, often for the same soil type, but usually in association with another feature (e.g. slope, drainage).

For scenario **a**, this can be managed by using paddock zoning where soil sampling and analysis is focused on the primary observed differences. This will enable you to tailor management to suit limitations and constraints of that zone, e.g. variable rate liming in response to soil pH differences.

For scenario **b**, this can be problematic as you are trying to effectively manage for short range variability that is generally beyond the capabilities of current modern machinery. A possible solution is to focus on the properties of interest (e.g. soil water, nutrition) and how these soils are likely to behave in dry, normal, and wet conditions. There is no absolute to managing this scenario. An option could be if you have two different soils (e.g. sandy surface soil versus clayey surface soil) is to base management on the average of the two, or if seasonal conditions were more likely to prevail (e.g. dry finish to a season), you may focus on optimising production characteristics for the sandy soil where soil water and nutrition may be more accessible to the plant than clayey soils where water can be bound up and not available.

For scenario **c**, this could be managed by accounting for changes in soil characteristics across a field. For fertiliser application, the rates applied would proportionally fit with the change in existing soil nutrition to achieve a desired fertility level rather than a blanket application across the paddock. This is likely to reduce fertiliser use but also ensure that fertility is non-limiting and that other characteristics (e.g. waterlogging) can be rectified to further increase yield potential for these poorer performing areas.

Ferrosols – does the soil go back to the original form?

A key characteristic of ferrosols is their strong structure that enables water and air to move freely within. These soils are generally whole coloured (tend to be red, brown, or black) and do not tend to suffer from water-logging as many other texture contrast soils will. Where these soils are continuously cropped, it has been demonstrated that significant reductions in crop yield will occur (Bell et al., 1995) through the depletion of potassium, zinc, organic carbon, and nitrogen. Crop – pasture rotations are one such solution to reduce this decline in fertility.

The key factor is the resilience of Ferrosols is its ability to repair itself (increase aggregation to pre-existing conditions) post cropping. Soil compaction is a potential limitation of these soils when they are wetter than the plastic limit. Their shrink-swell behaviour makes them more likely to 'self-repair' from cultivation, however it is important to include pasture phases that will enable organic matter levels to increase and aggregation to improve as a result.

http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/grains_vic_soils-ferrosol



What bulk densities can pasture and crops handle?

The higher the Bulk Density (BD), the greater the physical impediment to the plant to access the soil and the water and nutrients it contains. Perennial species tend to have more advanced rooting architectures than annual crops and pastures. Some of these perennial varieties are used as 'primer' crops to provide preferential pathways for roots from following annual crops and pastures that may otherwise be limited in accessing water and nutrients from the subsoil.

As a rule of thumb, the BD will limit plant roots for sands at >1.7 , for loams at >1.6 and for clays at >1.4 .

Testing for phosphorus?

These are many different analytical tests used to measure available phosphorus. The most applied in Australia are the Colwell P test (Method 9B), the Olsen P test (Method 9C) and the Mehlich 3-P test (Method 9K). A more recently developed test is the DGT method from the University of Adelaide.

The Phosphorus Buffering Index (PBI) uses the Colwell P-test as the measure of the current soil P fertility and enables the determination of the P fertiliser requirements to raise the P level to an appropriate critical level (Rayment and Lyons, 2011). Conventionally, the Olsen P test has traditionally been used more extensively in managing soil nutrient for pasture soils, while the Colwell P test has its foundations in cropping.

An important consideration in selecting a test is the cost of the method, its accuracy, precision, and the ability to interpret the test values with confidence from a nutrient management perspective. The Colwell P test and PBI are currently the most widely used across Australia and fulfill these key considerations in selection of a test. The DGT method has demonstrated good results and will be a test to keep an eye on.

How much organic carbon do most of our soils have?

Recent research led by Fiona Robertson (Robertson et al., 2016) identified that from 50 sites sampled in the Central slopes of Victoria:

	Mean (SOC % 0-10 cm)	Range (SOC % 0-10 cm)
Crop-pasture rotation (n=26)	2.29	0.76 – 3.80
Pastures (n=24)	3.01	0.61 – 4.98

For the Victorian Volcanic Plains,

	Soil type	Mean (SOC % 0-10 cm)	Range (SOC % 0-10 cm)
Crop-pasture rotation (n=23)	Sodosols / Chromosols	2.80	1.63 – 4.01
Pastures (n=45)		3.42	1.29 – 5.28
Crop-pasture rotation (n=11)	Vertosols	3.15	2.13 – 5.46
Pastures (n=29)		4.02	2.28 – 5.59

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