UNDERSTANDING WATER MOVEMENT THROUGHOUT DIFFERENT SOIL PROFILES ACROSS THE UPPER NORTH

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This case study aims to exemplify how water movement through soil profiles in the region are impacted by various soil properties and how ameliorating / managing constraints can improve water use efficiency.

Water infiltration in soil profiles is a critical factor to ensure effective storage of moisture in a given soil profile. Infiltration and subsequent water extraction by crops can be influenced by numerous factors and ultimately will have the largest influence on yield potential of soil types in the region. The infiltration rate is a measure of the rate of a known volume of water penetrating into soil. The infil-tration rate is influenced by the interaction of water with the soil surface and subsequent porosity through the soil layers.

Factors to consider when assessing your soils ability to infiltrate water includes;

- **Soil cover**—soil cover reduces the energy of raindrop impact which can break apart the soil aggregates on the surface and block soil pores which are primary infiltration pathways. Soil cover also reduces the velocity of lateral water movement thereby allowing for greater infil-tration over time.
- **Soil Structure**—Soils in the Upper North region can be prone to surface crusting and hard setting. Surface crusting is caused by poor aggregate stability which results in slaking and or dispersion (potentially caused by low organic matter and or high sodium soil). This is often visualised with prolonged ponding of rainfall at the soil surface and crusting of the soil surface upon drying. Surface soil crusting can also impact crop germination.
- **Bulk density/Compaction**—Soils with high bulk density (compaction) have slower infiltration rates due to low pore connectivity and limited number of large pores for water to readily permeate.
- **Non-wetting/ Hydrophobic soils**—Sandy textured soils are prone to non-wetting. Due to the presence of waxes coating the sand particles (derived from organic matter) the water beads on the soil surface and is slow to infiltrate the soils.
- **Soil texture** and soil textural changes throughout the profile - Infiltration of water is a direct function of the porosity of soils. Sand texture soils will generally accept water more readily (unless non-wetting) compared to clay textured soils. However, sandy soil types will also leach water more readily compared to clay soil types.
- **Subsoil condition** will impact the wetting front of soil profiles. Once the water has infiltrated though the surface of the soil profile the movement of water is influenced by the rate at which it can continue to permeate through the profile (hydraulic conductivity). If there are subsoil constraints such as compaction or sodicity, water will not move throughout the soil profile evenly.

UNFS Upper North Farming Systems

Australian Government

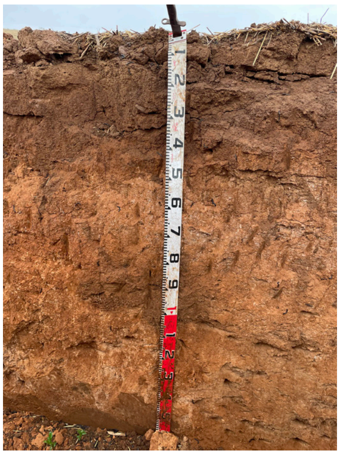
Elders

THIS CASE STUDY LOOKED AT THREE SOIL TYPES, COMMON TO THE UPPER NORTH FARMING REGION;

Site one

A Red Chromosol and a Dermosol South of Jamestown. The chromosol showed soil structural constraints while the dermosol is structurally less constrained.

Chromosols are a common soil type throughout the Upper North region of South Australia and typically are be classified as red or brown. They are characterised by a texture contrast with lower clay content in the topsoil, with clay increasing down the profile. Acidity is commonly observed in the topsoil. Chromosols are typically moderately fertile.
Dermosols are non-texture contrast, typically having similar tex-ture down through the profile and well structured subsoil (B horizon) .



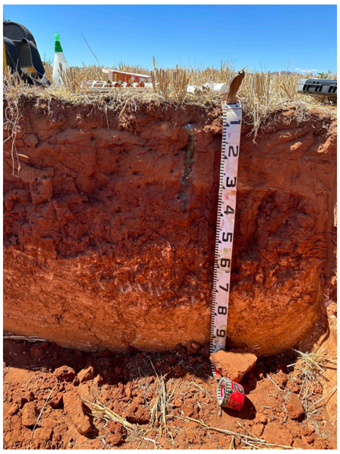
Pit one

Pit two

Site two

A non-wetting Brown Chromosol soil (sand over clay) North, East of Booleroo.

Sandy non-wetting topsoil transitioning to clay topsoil with blocky structure. Presence of topsoil acidity and subsoil alkalinity due to the presence of carbonate.



Pit three

Site three

A deep sandy Tenosol compared to a Brown Chromosol with non-wetting topsoil in the Wandearah area.

A Tenosol is a profile where horizons are hard to identify due to little change throughout the profile. A defining feature is these soils gener-ally are sandy soil texture throughout.
Chromosols are texture contrast soils, often called duplex soils typically having a sand to loam topsoil over a clay textured subsoil. This Chromosols was dominated by the presence of free lime (carbonate) in the subsoil, resulting in alkaline subsoil conditions.

Pit four

Pit five

Words you will need to know:

Soil Horizon: A layer of soil that is chemically, physically or biologically different from the soil directly above and below. Soil pits are split into horizons, or layer to help classify soil type and therefore management of overall soil resources.

Sodic: This refers to a soil that has excess sodium content. Soils classified as sodic when Exchangeable Sodium Percentage >6%.

Dispersion: This refers to a process whereby a soil particle is broken into primary particles, destroying soil structure, when add-ed to distilled water. This is due to excess sodium cations bound to clay particles within the soil resource. This results in murky coloured water. Commonly a symptom of the soil being sodic (refer above).

Non-Wetting: This refers to when the topsoil of a profile does not absorb water, but actively repels it. This commonly occurs in sandy texture soil types and is a result of a wax coating (typically organic matter derived) over sand particles.

pH Stratification: This term is used when the pH of a soil changes abruptly down the profile, which can occur between or even-within soil horizons. For example, if pH changed from slightly acidic (pH6.5) in the 0-5 cm fraction, then shifts to strongly acid (pH 4.8) in the 5-10 cm fraction before then transitioning back to neutral-alkaline conditions below

Acidity: When the pH is below 7

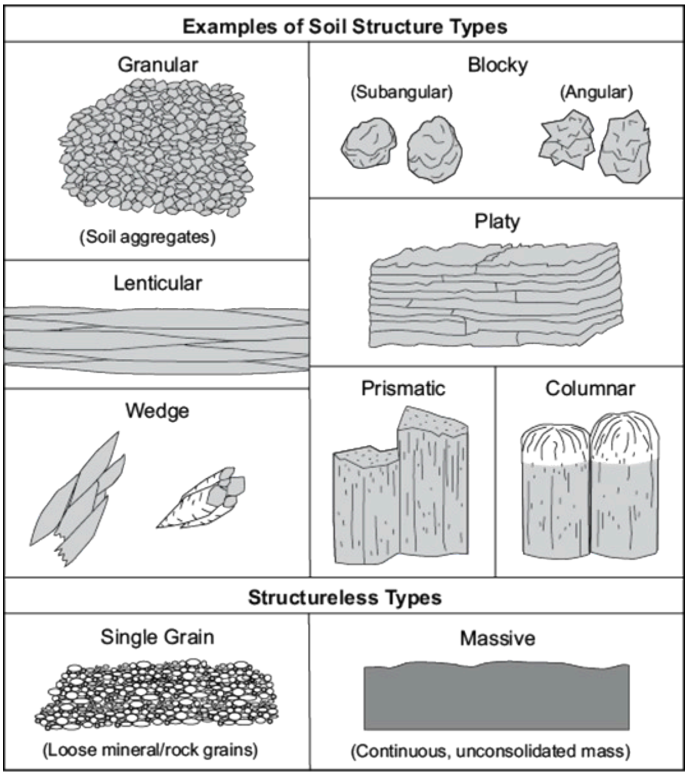
Alkalinity: When the pH is above 7

Compaction: Soil compaction occurs when soil particles are compressed together resulting in reduced soil pore space and a high soil mass relative to its volume, otherwise known as a soil with high bulk density. This can be caused by soil structural de-cline which can be exacerbated by external physical forces such as wheel traffic.

Plant Available Water: The component of water that is available for plants to take up from a soil profile. Different crop types can exude different pressures for extracting water from a soil profile, therefore the plant available water will differ between crop type. Likewise, water is held more tightly in a clay textured soil compared to a sand texture soil, therefore plant available water will differ between soil types.

Field capacity: The remaining water that is held in a soil profile once excess water has drained away / infiltration has reached a steady state.

Soil Structure: The way in which soil particles in a particular soil horizon are arranged around one another to form soil aggre-gates . These aggregates can vary dependant on the percentage of clay and organic matter present. There are 7 different for-mations of soil structure. Not all soils will have a defined soil structure, where soils are compacted there may be no structure present, making them structureless (massive) soil layers.



Infiltration: The movement of water into a soil profile. The time this takes is dependent on soil structure, soil texture and starting soil moisture. Below is a table showing the expected infiltration rate for the different soil textures, when the soil is at field capacity.

Soil Type	Basic infiltration rate (mm/hour)
Sand	<30
Sandy Loam	20-30
Loam	10-20
Clay loam	5-10
Clay	1-5

PROJECT DESIGN

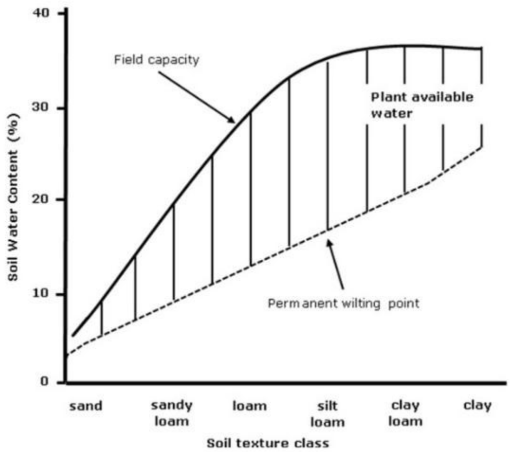
Soil pits were excavated at each site to compare water movement through a low productivity soil type and a highly productive soil type that yields consistently well. Infiltration ring assessments were completed at each site in addition to an infiltration simulation using soil dye to track water movement. The purpose of this investigation was to assess how soil constraints impact ability of soils to harvest water, translating into yield potential.

Infiltration Data

To test the ability of each soil type to infiltrate water, infiltration tests were completed. Metal infiltration rings were hit into the soils surface, creating a dam to add water. 800 ml of water was added to the rings and the time taken for water to infiltrate into the soil profile was measured. This was repeated until the infiltration time plateaued. At this point we consider the soil at field capacity or at steady state. Knowing the ability of a soil to infiltrate water will enable growers to better understand the water harvesting ability of soil types across a farm. This can then be related back to rainfall events and intensity to make calculated predictions on what percentage of rain-fall events has infiltrated into different soil types. This has major implications on yield potential of different soil types and overall management decisions.

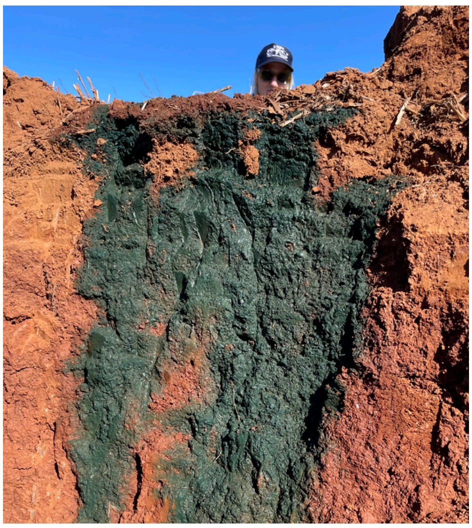
Plant Available Water

Not all soil types store or release the same amount of water. Different soil types will release water at varying potentials depending on soil structure and soil texture. This needs to be considered in addition to crop type and total soil moisture. It is therefore important to link each soil profile throughout this project to the adjacent graph. This will help gain understanding of the total water accessibility and estimated yield potential for different growing season in addition to various soil types across paddocks and over whole farms.



Water Infiltration Simulation

Further visual assessments including blue dye tracer was used to exemplify how water moves throughout the soil profile in relation to structure type, soil horizons and soil constraints. Water containing dye was applied to the top of a dry soil resource and left for half an hour to move throughout the profile. The pit face was then cleaned to reveal water movement, using a blue dye to help visualise.
This shows how water is placed throughout a soil profile and how plant roots are required to move in order to intercept moisture.



RED CHROMOSOL SOIL TYPE

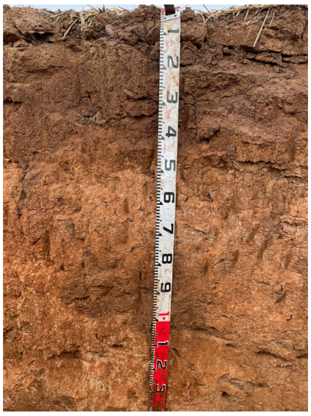
Grower: Scott & Luke Clark

Location: Jamestown, SA
Rainfall: 350mm annually

Background:

This case study focused on a paddock in the Belalie East region, approximately 20 km's south of Jamestown on the Clark's farm. Clark brothers have been following a controlled traffic farming (CTF) system in combination with running a disc since 2013 and a stripper front since 2019. The change from a knife point, press wheel system was prompted by the desire to build soil organic carbon and hence improve soil structure, among other reasons. The brothers follow a rotation of wheat, faba beans and canola, with the occasional barley. They no longer run livestock on the cropping land as a bid to further reduce compaction. Soil moisture probes were installed in 2015, providing another decision-making tool for the farm, particularly around in season urea applications. Antidotally, the Clark's believe that their water infiltration rates have improved since the adoption of their new system, with less compaction outside wheel tracks and increased biomass retention supplying larger amounts of organic carbon sources to the soil.

Soil Pit One – Constrained Due to Compaction



Fraction	Texture	Structure		Roots Score	pH ($CaCl_2$)	EC (sD/m)	Sodium %
		Grade	Type				
0-10cm	Silty Loam	Weak/Mod	Granular	3	4.58	0.086	1.0
10-45cm	Clay	Mod	Sub-blocky	3	6.56	0.067	1.1
45-65cm	Silty Clay Loam	Mod	Sub-blocky	2	7.67	0.16	1.2
65-90cm	Silty Loam	Weak	Poly	2	8.01	0.15	1.8
90-100cm	Rock	Weak	Massive	1	-	-	-
100-140cm	Clay Loam	Weak	Sub-blocky	1	8.23	0.23	5.9

Pit Classification: Red Chromosol with a silty loam surface texture abruptly overlying a red well-structured friable clay

Landscape Positioning: Lower Slope

Structure: Soil structure in the 45-65cm region was subangular blocky, showing reduced ability of this soil area to infiltrate water throughout the season. Throughout this fraction there is clear evidence of the soils ability to shrink and swell with the wetting and drying cycle. This results in the soils ability to re-form soil structure long term.

Soil Chemistry: Beyond the 100 cm mark there is limestone (carbonate), resulting in an alkaline soil pH.

No salinity issues were identified at this site throughout the 0-100 cm fraction, further influencing good soil structure at this site. There is excess sodium in the 100-140 cm fraction. Topsoil is considered acid, requiring lime to correct this constraint.

Plant Roots: Roots are in high abundance in the 0-45cm zone. As clay content increases beyond the 45 cm point, the abundance of roots decreases. The reduction in root abundance is most evident at the 90cm mark, where the calcium carbonate content increases.

Soil Pit Two – Higher Productive

Fraction	Texture	Structure		Roots Score	pH ($CaCl_2$)	EC (sD/m)	Sodium %
		Grade	Type				
0-10	Silty Loam	Weak/mod	Granular	3	6.92	0.23	0.7
10-45	Silty Loam	Mod/strong	Sub-blocky	3	7.04	0.09	0.9
45-65	Sitly Loam	Mod	Sub-blocky	2	7.85	0.12	0.7
65-100	Silty Loam	Weak	Poly	2	7.93	0.11	0.8

Pit Classification: Brown Dermosol with a silty loam throughout and no major constraints.

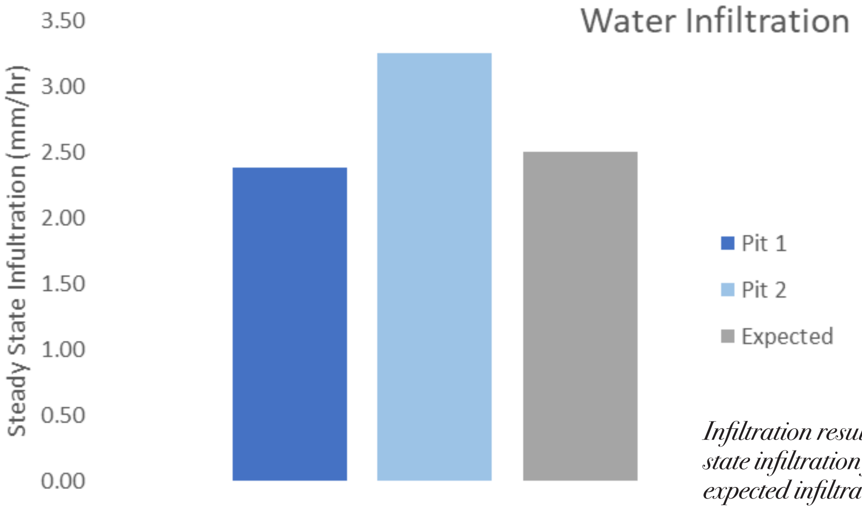
Landscape Positioning: Lower Slope

Structure: Good structure throughout with evidence of compaction, especially under when tracks.
Soil Chemistry: There is no major chemical constraints in the upper profile. There is an increase in calcium carbonate below 60cm

Plant Roots: Plant roots are concentrated evenly throughout the profile with no evidence of constraints to rooting depth at this site.

Infiltration Data

Infiltration results found that both soil pits were within the expected range of 1-5 mm/hr. Pit two, which showed fewer soil constraints when compared to pit one, had a greater ability to infiltrate water having an infiltration rate of 3.25 mm/hr. With both pits having the similar soil texture (silty loam) throughout the topsoil it is reasonable to conclude pit one showed a slower infiltration rate due to soil compaction. This reduced ability to harvest rainfall events will have negative repercussions on yield potential at the site. Both soil pits have capacity to infiltrate another ~0.5 mm/hr with improved soil structure.



Infiltration results averaged from three treatments, using the steady state infiltration from each site. This is compared to the average expected infiltration rate for the soil texture at this site.

Infiltration Simulation

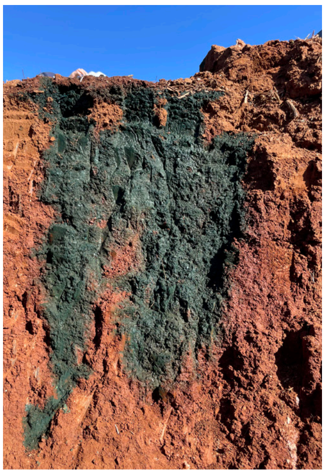
Pit one

From this simulation, the dye indicates that the water is moving down the profile via old root channels and vertical cracks down the soil profile. This is common to clay-based soil profiles where a subangular blocky soil structure is observed. You can expect infiltration to be slow in these soil types. Implications include increased likelihood of run off with heavy down pours of rain, when compared to a sandy soil type. Therefore, stubble retention is important at this site. Additionally, with smaller pore spaces between soil particles, more osmotic pressure is required for plants to extract water from this soil type. Therefore, in drier seasons, crops will become water stressed sooner compared to crops on lighter soil types—such as pit two.

Anecdotally it has been observed that the infiltration rate is improving at this site. Historically this site has been sodic, causing soil dispersion and hence loss of soil structure. To correct this constraint, the Clark's have spread numerous applications of gypsum to displace sodium particles, allowing them to leach beyond the plant root zone. The re-gaining of soil structure is observed at this site from evidence of the clay particles shrinking upon drying and swelling upon wetting, causing slickensides. Once soil structure has been corrected, it is expected that the wetting front at this site will be more horizontal, rather than spikes of water following old root channels.

Pit two

The wetting front at this site was uniform, showing that water didn't intercept any compaction layers. This site is considered less constrained and would take up water uniformly. Therefore, the yield potential at this site is greater than the yield potential of pit one. Additionally, having a lighter soil texture throughout the subsoil compared to pit one will result in moisture being more accessible to plants in tight season.



Pit one

Pit two

SAND OVER CLAY SOIL TYPE

Grower: Joe & Jess Koch
Breezey Hill Ag

Location: Wepowie/Morchard, SA
Rainfall: 300mm annually

Background:

This case study focused on a problematic soil type north east of Booleroo at Breezy Hill. This is a flip-flop soil type, performing quite well in drier years, but then poorer in good years compared to surrounding soil types.
Breezy Hill use RTK guidance which allows them to use the same wheel track from year to year, to reduce soil compaction. Whilst Breezy Hill do not follow full controlled traffic farming, they do ensure the same wheel tracks are used throughout the growing season when soil structure is at its most vulnerable.
They also moved away from a traditional knife point seeding system on 9-inch row spacing to a Conserver pack seeding set up on a 12-inch row spacing. This has minimised soil disturbance and allows Breezy Hill to better harvest moisture from rain-fall events in the furrow. This is particularly important when considering their growing environment, where crops need to germinate on minimal soil moisture.

Soil Pit Three—Constrained Due to Non-Wetting and Compaction

Fraction	Texture	Structure		Roots Score	pH ($CaCl_2$)	EC (sD/m)	Sodium %
		Grade	Type				
0-10	Sand	Weak	Granular	3	6.31	0.088	1.5
10-30	Loamy Sand	Weak	Blocky	1	5.82	0.021	0.8
30-60	Clay Loam	Moderate	Blocky	2	7.37	0.039	1.2
60-100	Clay Loam	Weak	Subangular Blocky	1	8.61	0.13	1.5

Pit Classification: Brown Chromosol with a sandy textured topsoil, moving to a clay loam subsoil.

Landscape Positioning: Mid Slope

Structure: Structure throughout the sandy topsoil was very weak, with the clay subsoil showing signs of compaction and blocky structure.

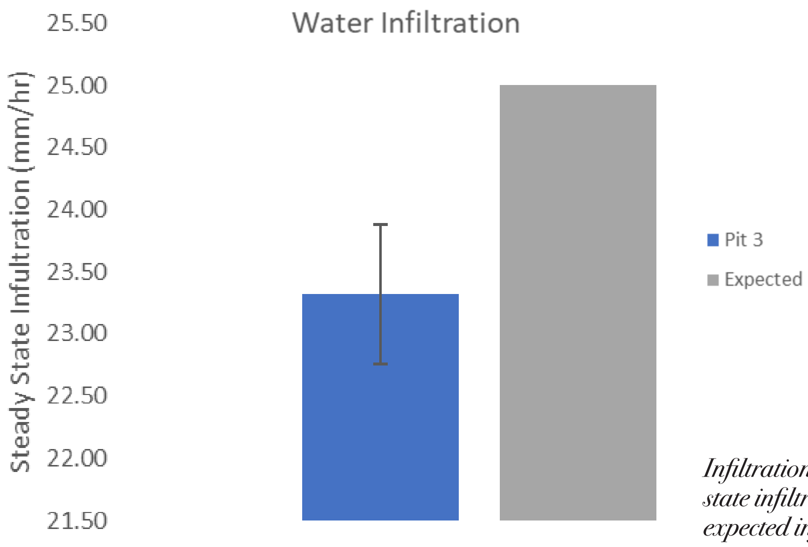
Plant Roots: It is evident that crops have limited access to resources such as water and nutrition from the sub-soil fraction of this site (60 cm+). This is highlighted by the limited rooting depth of previous crops, with 75% of roots concentrated to the top two layers of this site.

Soil Chemistry: The subsoil is dominated by calcium carbonate. This is a limitation that is not economically viable to correct. Management is around adjusting yield potential and therefore inputs accordingly.

Physical Soil Characteristics: The topsoil of this site is moderately non-wetting, impacting the ability of this site to infiltrate water. This is a constraint that could be corrected to potentially improve yield potential.

Infiltration Data

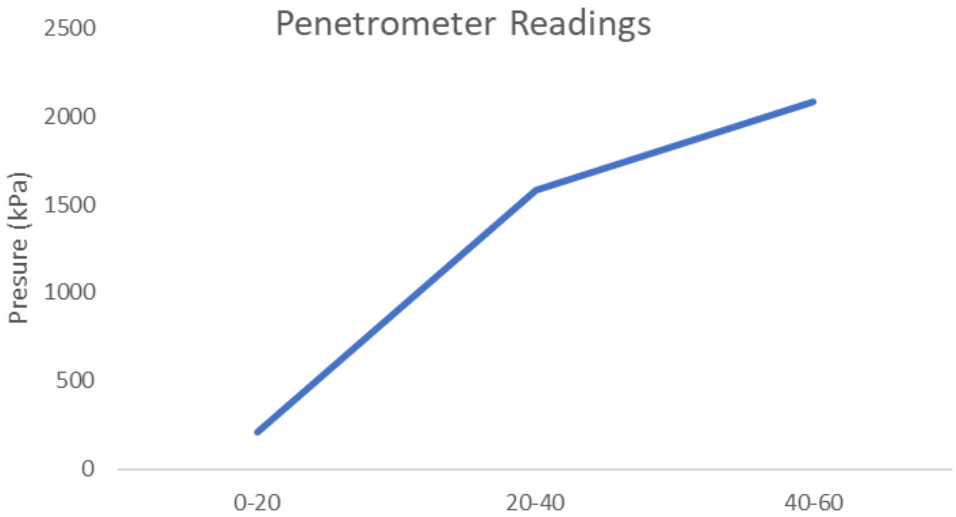
Infiltration at this site was inhibited by a moderately non-wetting top soil. Results varied dependent on where the infiltration rigs were placed in relation to the previous years crop row, as shown by the high standard deviation. Crop rows were found to significantly speed up infiltra-tion, with knife points separating surface soil particles, exposing new soil that did not have non-wetting properties. Overall, infiltration at this site was marginally below the average expected infiltration rate for a sandy loam textured topsoil. This could be moderately improved with clay spreading, increased organic carbon or the use of a soil wetting agent at sowing time.



Infiltration results averaged from three treatments, using the steady state infiltration from each site. This is compared to the average expected infiltration rate for the soil texture at this site.

Penetrometer Data

Penetrometer readings taken at this site found that the 0 to 20 cm fraction has little resistance. However, resistance increases down the profile, with a hard pan at the transition from sandy loam textured soil to clay loam at the 30 cm mark. The clay loam fraction shows signs of compaction, with a blocky soil structure and evidence of poor water movement. Plant root biomass reduces into this fraction of the profile, meaning crops have limited access to resources (water and nutrients) throughout this soil fraction.

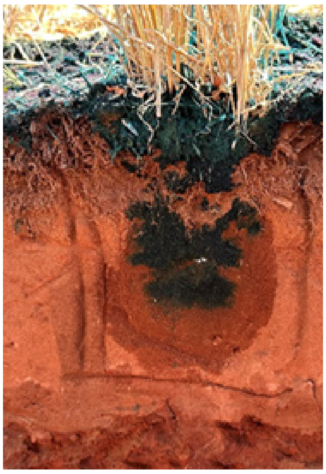


Averaged penetrometer readings taken as replicates follow-ing an infiltration test, to ensure the soil resource was at field capacity.

Simulated Water Infiltration

Pit three

The blue dye was able to highlight that majority of water entering this profile was via historic crop rows, where non-wetting soil had been moved into the interrow. While this slows infiltration rates at this site, it is re-directing majority of moisture into the crop row. This maybe of benefit at the start of growing season, with this region commonly required to germinate crops on minimal rainfall events. Moving forward, a good strategy for this soil type is on row sowing, where the non-wetting soil has been displaced.



Pit three

SANDY SOIL TYPE

Grower: Chris Crouch,
Crouch Agricultural Group

Location: Wandearah, SA
Rainfall: 330mm annually

Background:

This case study focused on two soil pits located South of Wandearah on the Crouch's family farm. These pits were approximately 100 m apart, highlighting how rapidly soil type can change west of the ranges. The eastern pit (pit four) was located on rising ground, with sand throughout and typically only achieving a 1 to 1.5 t/ha cereal yield. In contrast, the pit to the west (pit five) had a sandy top soil from 0-20 cm's, then transitioning to a loam textured soil dominated by free lime (carbonate). This site is capable of cereal yields between 3 and 3.5 t/ha, more than twice the yield of site one.
Crouch's use a knife point, press wheel seeding set-up, aiming to on-row sow where topsoil non-wetting is a major issue. As there is no good clay source close by, and delving is not an option due to subsoil toxicities, Chris has opted to spread manures instead. When necessary, sandhill paddocks will receive extra nitrogen throughout the season to address increased nitrogen leaching. Overall, Chris adopts to KISS mentality, focusing on the major pillars of broadacre crop production such as correct crop rotation, sowing time, cultivar choice and weed control.

Soil Pit One – Constrained Due to Compaction

Fraction	Texture	Structure		Roots Score	pH ($CaCl_2$)	EC (sD/m)	Sodium %
		Grade	Type				
0-10	Coarse Sand	Weak	Granular	4	7.53	0.11	0.7
10-20	Sand	Weak	Massive	3	8.1	0.083	0.4
20-40	Fine Sand	Weak	Massive	1	8.28	0.073	0.2
40-60	Fine Sand	Weak	Massive	1	8.23	0.066	<0.2

Pit Classification: Tenosol, the soil texture throughout this pit did not change significantly throughout, with no major chemical changes either.

Landscape Positioning: Rising ground, in a dune swale system

Structure: The structure was this site was weak throughout , with compaction found at 40 cm's.

Plant Roots: Majority of root activity was observed in the top 0-20 cm's at this site. The compaction from 40 cm's has prevent-ed historic crop roots from accessing resources (water / nutrient) beyond this point—ultimately limiting yield potential at this site.

Soil Chemistry: No major changes to soil chemistry throughout the profile.

Soil Physical Characteristics: Soil structure is weak throughout, with the subsoil showing little to no structure. When using the soil penetrometer, a hard pan was observed at the 30 cm mark.

Soil Pit Five – Higher Productivity

Fraction	Texture	Structure		Roots Score	pH ($CaCl_2$)	EC (sD/m)	Sodium %
		Grade	Type				
0-10	Sand	Weak	Granular	4	7.76	0.11	0.6
10-20	Sand	Weak	Granular	3	8.11	0.073	0.3
20-40	Loam	Moderate	Subangular Blocky	2	7.95	0.14	0.9
40-55	Loam	Moderate	Subangular Blocky	2	8.12	0.15	1.7
55-100	Clay Loam	Moderate	Subangular Blocky	2	8.53	0.36	9.7

Pit Classification: Calcarasol, this pit had carbonate (free lime) starting from 10 cm's, meaning the profile was dominated by carbonate.

Landscape Positioning: Depression

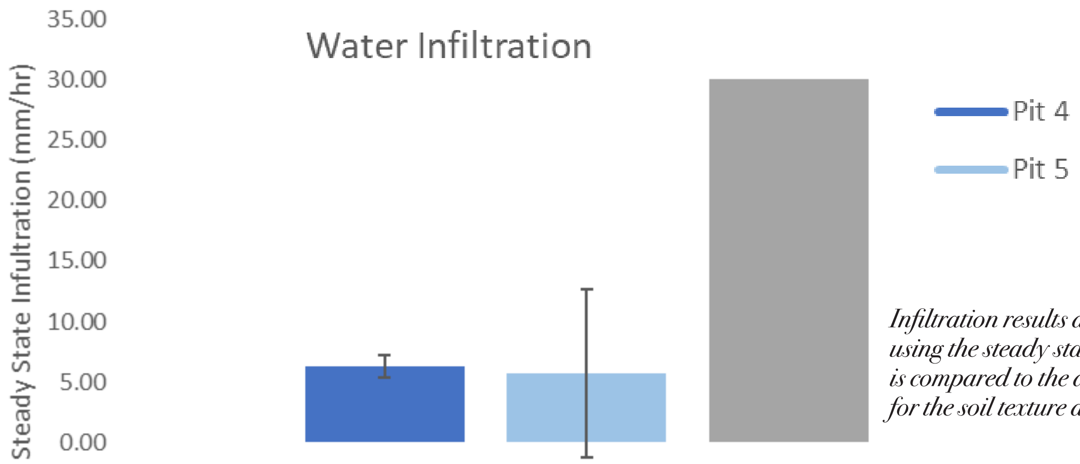
Structure: Soil structure from 0-20 cm at this site was weak, due to low levels of clay and organic carbon. Below 20 cm's structure improved due to increased presence of clay particle. Compaction, driven by the presence of sodium (causing dispersion) was observed throughout the 20 to 100 cm fraction of this site.

Soil Chemistry: The subsoil of this site is dominated by free lime (calcium carbonate). This has a strong influence on nutrient availability due to an alkaline pH.

Plant Roots: Roots were most prevalent from 0 to 20 cm's at this site, with the sudden increase in carbonate and salts limiting rooting depth at this site.

Infiltration Data

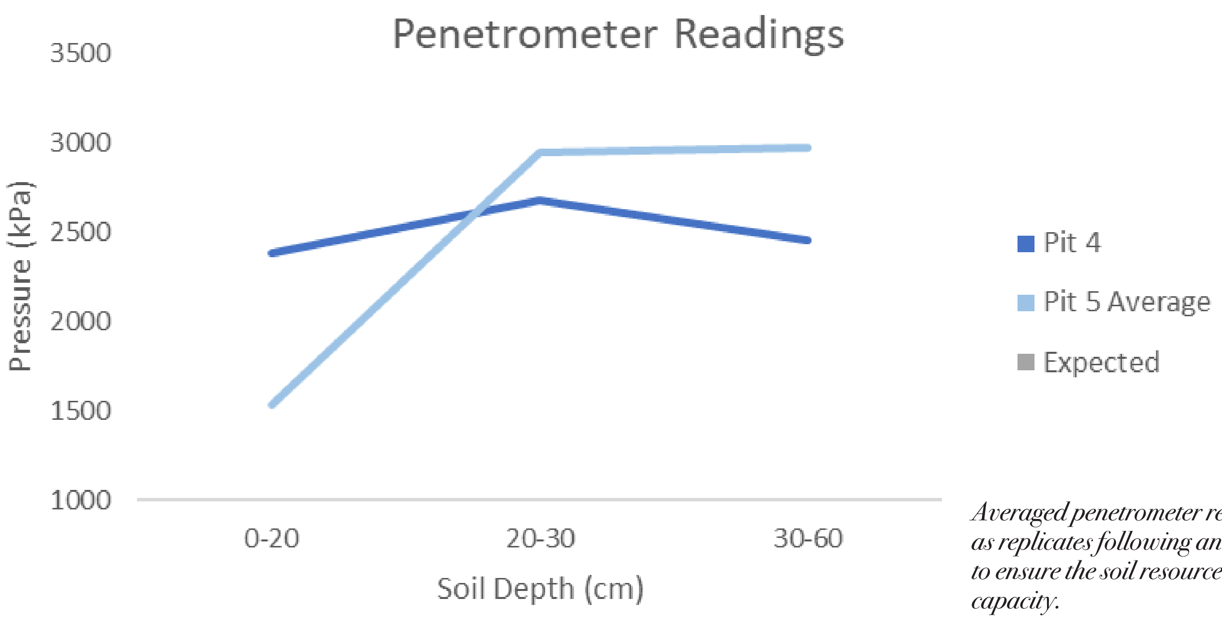
Infiltration at both sites was below the expected rates for a sandy textured soil, mainly due to non-wetting topsoil properties. Research shows that an unconstrainted sandy textured soil that is at field capacity, can take up an average of 30 mm rain-fall over a one hour time period. These soils are currently taking in closer to 5 mm/hr as shown by the infiltration data. Therefore, throughout the season once the profile has wet up, you can assume that these soil types will not be harvesting 100% of rainfall events greater than 5 mm across one hour.
The standard error at pit five was significantly greater when compared to pit four. Infiltration data was highly dependent on the placement of rings in relation to the previous crop rows. If a crop row was placed directly through the middle of the ring, infiltration rates increased to 22.4 mm/hr, much closer to the expected rate for a sand. In contrast, if the ring was placed directly on the inter-row, infiltration rates reduced to 3.3 mm/hr. The significantly higher on row infiltration at pit 5 is translating into higher yield compared to the poor infiltration across the whole soils surface at pit 4.



Infiltration results averaged from three treatments, using the steady state infiltration from each site. This is compared to the av-erage expected infiltration rate for the soil texture at this site.

Penetrometer Data

Soil structure at pit four was considered massive, meaning there was no defined soil structure at this site. A strong compaction layer was found at 35 cm's, at which point it was difficult to move the penetrometer through the profile. It was observed that there were less plant roots beyond the 35 cm point as a result. Therefore, crops would have limited access to resources (water and nutrients) be-yond the 35 cm point of this profile.
Pit five showed less resistance throughout the top-soil, with more organic matter helping to form structure throughout the 0-20 cm fraction of this site when compared to pit four. When transitioning into the clay loam textured soil, resistance in-creased. However, with increased clay particles throughout this fraction, soil structure also improved.

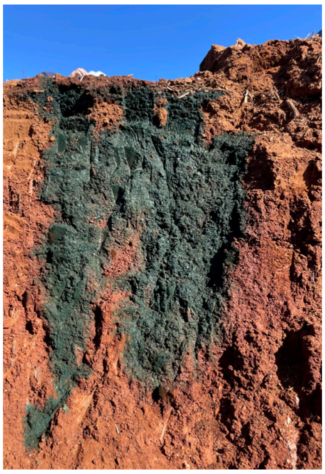


Averaged penetrometer readings taken as replicates following an infiltration test, to ensure the soil resource was at field capacity.

Simulated Water Infiltration

Pit four

Water moved into this profile in a vertical bulb shape. Movement slowed at the transition point between the coarse sand from 0-20 cm and the fine textured sand which is compacted from 20 cm's and beyond. Whilst water will readily move into this profile, it will also easily be lost via either evaporation or leaching beyond the plant root zone due to soil texture at the site.



Pit five

The wetting front at this site was determined by historical crop rows, where non-wetting topsoil had been thrown into the interrow. This slowed water infiltration rates significantly. Additionally, when moisture reached 20 cm's, it began to move laterally throughout the profile. This is due to the sudden textural change. As Sand particles have larger pore spaces in comparison to clay textured soils, it is easier for water to move into these pores, avoiding the small pore spaces throughout the clay. Water will only move into the clay fraction of this site once the 0-20 cm sandy fraction is saturated.

CONCLUSIONS

This case study aimed to exemplify how water harvesting and infiltration can differ between soils with different textures, structures and constraints. Soil types across paddocks and over whole farms have different yield potentials due to these factors and not all soils have the capacity to utilise 100% of each rainfall event. This is an important consideration when assigning inputs to soil types throughout the growing season. Additionally, understanding the current water harvesting ability of soils, verses the water harvesting potential can help to show the importance of soil amelioration. Water harvesting ability directly transfers into yield potential of soil profiles. Where soil constraints were observed throughout this case study (pits 1, 3 and 4) , infiltration was limited. Likewise, where historical soil constraints were corrected (pit 2 and 5), infiltration rates were improved.

Methods used throughout this project can be easily replicated by growers, should they want to gain a better understanding of different soils types and the associated ability to harvest water. Considerations include starting soil moisture, soil texture and soil constraints at the site. Results can be compared to the expected infiltration rate for different soil textures on page 3 and the graph on page 4.

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