

# SOIL matters

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Welcome to Soil Matters, a bimonthly newsletter to provide updates and information on soil, weather and industry developments to support on-farm decision making within the SA Murray-Darling Basin. This newsletter will draw together a number of resources including;

- Bureau of Meteorology seasonal outlook
- SA Murray-Darling Basin weather station network
- SA Murray-Darling Basin soil moisture probe network
- Upcoming grant, programs and projects relevant to your region

This is a newly developed newsletter, we would appreciate any feedback on content and are happy to assist with any inquiries with regards to the featured tools and projects. Please contact Eliza Rieger, Regional Landcare Facilitator on [eliza.rieger@sa.gov.au](mailto:eliza.rieger@sa.gov.au) or 0408 416 684 for more information.

Please contact Eliza if you would prefer to receive a hard copy of this newsletter.



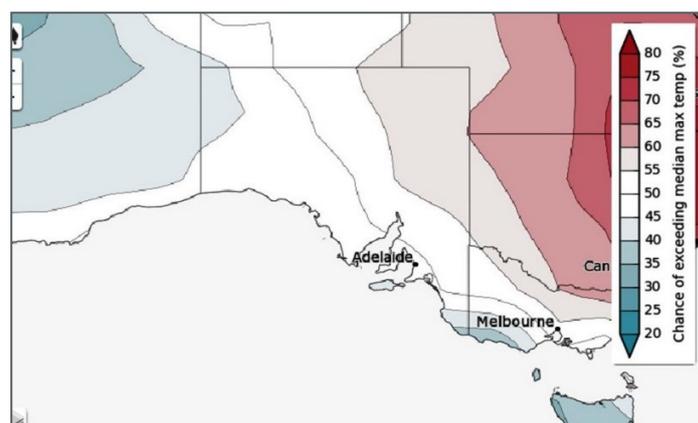
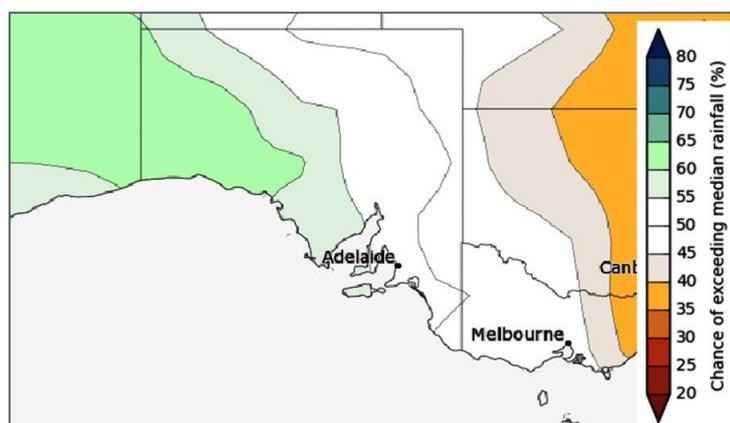
### Photo of the month

This month's photo shows the recent Precision Viticulture workshop held at Kingston-on-Murray. This workshop hosted a number of experts, including Richard Hamilton, Hans Loder, Everard Edwards and Scarlett Lui. Demonstrations and presentations showed how Precision Viticulture can help in vineyard operations.



# BOM Weather Forecast

The following information has been sourced from the Bureau of Meteorology 'Climate Outlook-monthly and seasonal' issued on 15 December 2016.



## Chance of exceeding median rainfall (%)

- There is a 50% chance of median rainfall for the Eastern Mount Lofty Ranges over the January-March 2017 period; recorded median rainfall is 61mm. Past accuracy for this district is moderate.
- There is a 50% chance of median rainfall for the SA Murray Mallee over the January-March 2017 period; recorded median rainfall for Karoonda is 49mm. Past accuracy for this moderate.
- There is a 50% chance of median rainfall for the Overland Corner and Riverland districts over the January-March 2017 period; recorded median rainfall for Renmark is 37mm. Past accuracy for this district is moderate.

## Chance of exceeding median temperature (°C)

- There is a 50% chance of above average daytime temperatures across the Northern and Eastern Murray Mallee over the January-March 2017 period; recorded median temperature for Karoonda during this period is 29.7°C. Past accuracy is low.
- There is a 50% chance of above average daytime temperatures across the SA Riverland and Rangelands over the January-March 2017 period; recorded median temperature for Renmark during this period is 31°C. Past accuracy is low.
- There is a 50% chance of above median maximum temperature for the Eastern Mount Lofty Ranges over the January-March 2017 period; recorded median temperature for Mount barker during this period is 27.2°C. Past accuracy is low.

# SAMDB weather station network



The following rainfall observations have been made over the period from 12 November 2016 to 12 December 2016. Soil temperatures are increasing across the region in line with increasing atmospheric temperatures. Higher rainfall has been recorded in some districts compared to 2015 values, this may have delayed harvest in these areas.

## Burra November/December Conditions:

Average daily maximum temperature for Burra was 25.2°C, five degrees lower than 2015 records. Recorded average soil temperature mirrors the lower atmospheric temperatures with the average recorded value sitting at 22°C, eight degrees lower than 2015 records. Soil records have shown fairly high fluctuations in average maximum and minimum temperatures with ranges of up to 10.7°C in one day, high fluctuations may impact microbial activity and mineralisation. Degree days are nearly half of the 2015 records at 6.1, this may continue to impact pasture growth rates. Daily evapotranspiration values have increased by 1.5mm since October however the continued rainfall may help maintain moisture within the soil profile. Average wind speed is consistent with 2015 values at 9.5km/hour.

## Currency Creek November/December Conditions:

Cooler temperatures were recorded between 12 November 2016 and 12 December 2016 with a daily average of 15.7°C and a daily average maximum of 22.5°C. High diurnal soil temperature fluctuations were recorded with up to 15.5°C difference within one 24 hour period, this may impact the mineralisation potential of soil microbial communities. Good spraying conditions persisted throughout the month with delta T sitting within 2-8 for the whole 30 day period, complementing the relatively high monthly rainfall of 27.6mm and humidity (70%) which may have increased pest and disease pressure. Six days of wind speeds greater than 40km/h were recorded for this period, this may have had a drying effect on pastures and horticultural crops.

## Taylorville November/December Conditions:

Average daily temperatures of 19.7°C were recorded with average daily maximums of 28.2°C, slightly lower than 2015 values for the same period. Average soil temperature of 25.8°C was consistent with 2015 records, the high diurnal soil temperature fluctuations were calculated to an average 14°C daily, similar to 2015 data. Five days of wind gusts greater than 40km/hour may have had a drying effect on crops. Average daily evapotranspiration records of 5.4mm were maintained from 2015 recordings, while the monthly rainfall record totalled 11.6mm, nearly half recorded levels for the same period last year (22.8mm). The combined effect of low rainfall and average evapotranspiration may result in decreased plant available moisture stored within the soil profile.

## Sherlock November/December Conditions:

Average maximum temperatures of 24.8°C were recorded, slightly lower than 2015 records over the same November-December period. Soil temperature records indicate good conditions for mineralisation with a minimum temperature of 19.7°C and maximum temperature of 31.9°C for the 30 day period, average diurnal variations of 3.9°C were recorded. Average daily wind speeds of 9.2km/hours were recorded, similar to the 2015 Nov-Dec period. Maximum wind speeds of 60.3km/hour may have caused damage to crops.

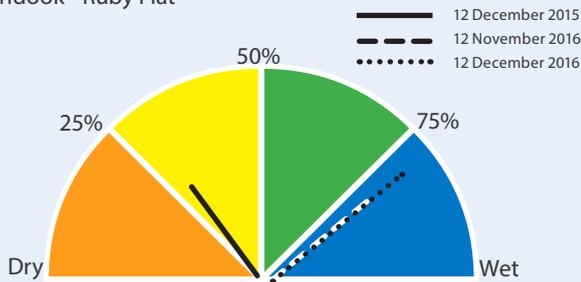
## SA Murray-Darling Basin Soil Moisture Probe Network:

The information below is a dial representation (Dry-Wet) of plant available soil moisture recorded at eight sites from the Natural Resources SA Murray-Darling Basin soil moisture probe network. The information is based on data recorded on 12 December 2016, 12 November 2016 and 12 December 2015.

A full list of soil moisture probes and their associated 'Plant Available Water Dials' within the SA Murray-Darling Basin network will be made available early 2017.

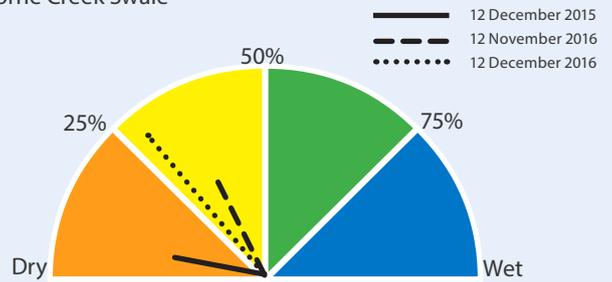
The Lameroo moisture probe is currently offline due to technical issues. The dials below are provided with support from Agriculture Victoria Soil Moisture Monitoring calculations.

Coomandook - Ruby Flat



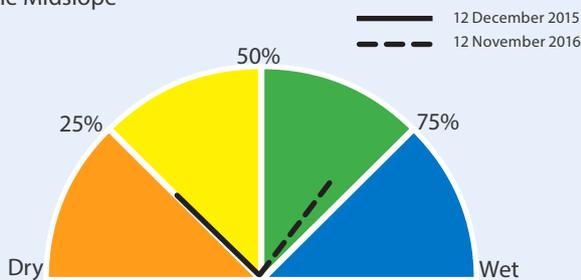
Stored soil moisture has remained over 75% full for the past month. Current soil moisture is significantly higher than 2015 values.

Langhorne Creek Swale



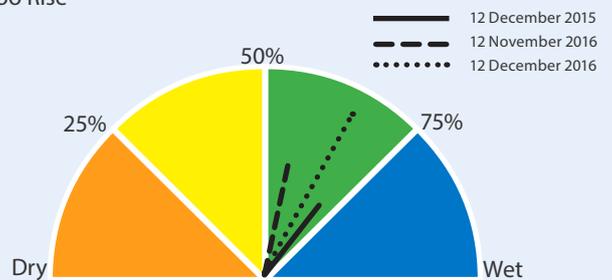
Soil moisture levels have dropped significantly over the last month. Current levels are sitting at approximately 30% capacity. Current levels are higher than 2015 records.

Lowaldie Midslope



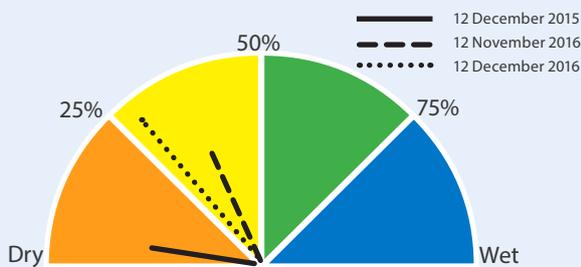
12 November 2016 soil moisture levels are significantly higher than November 2015 records. December 2016 data is currently unavailable for this site.

Pinnaroo Rise



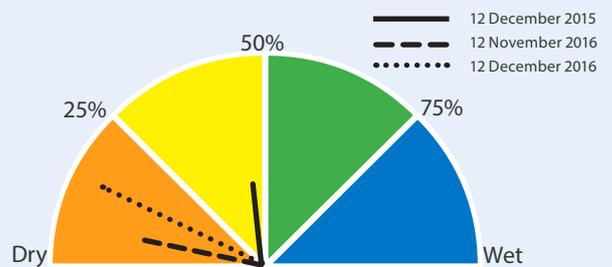
Soil moisture levels have increased over the last month with current levels sitting at greater than 65% capacity. Current levels are slightly lower than 2015 records.

Mt Compass Dryland Hill



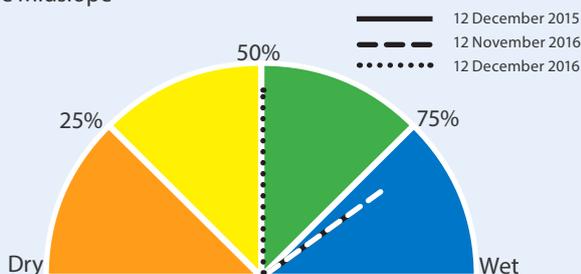
Mount Compass soil moisture levels have continued to drop and current levels are sitting at approximately 30% capacity. Current levels are significantly higher than the near dry December 2015 records.

Pinnaroo Swale



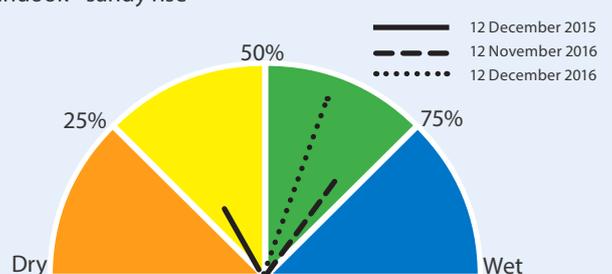
Soil moisture levels have increased over the last month with current levels approaching 20% capacity. The current soil moisture values for Pinnaroo are less than 2015 records.

Waikerie Midslope



Soil moisture at the Waikerie site has decreased over the past month with current records indicating the soil is at 50% capacity. Current soil moisture records indicate there is less plant available moisture than December 2015.

Coomandook - sandy rise



Soil moisture levels have decreased over the last month. Soil moisture records at 12 December 2016 are less than 60% full. Current levels are significantly higher than the records from this time last year.



# Soil of the month: Shallow loam over red clay on calcrete

This soil profile information has been compiled drawing on information from 'The Soils of Southern South Australia Volume 1' (James Hall, David Maschedt and Bruce Billing).

## Production:

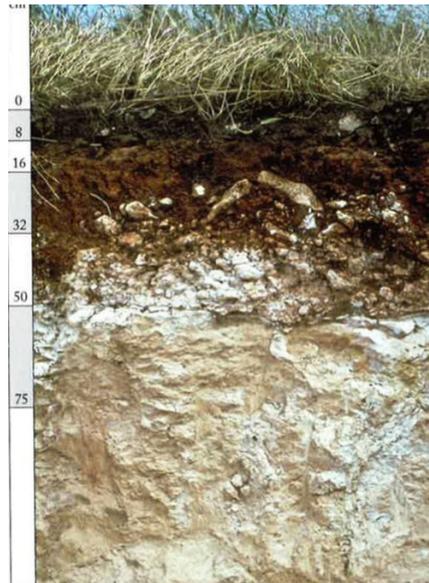
Shallow loam over red clay on calcrete soil types are widespread in the Upper South East districts such as Coomandook where it can make up to 30% of the district's soil types. These soils types make up 0.9% of South Australia's soils, covering over 143,000 ha. These soils types are valued by the wine industry for growing grape vines and hold moderate to moderately high potential for both dryland and irrigated agriculture (where suitable irrigation water is available).

## Nutrition:

Calcrete can be a significant impediment to root development preventing roots from accessing deeper nutrients. The calcrete layer often causes these soils to have a neutral to alkaline pH, this can act as a chemical barrier locking up available nutrients. Although having a shallow profile, these soils are inherently fertile with a clay subsoil that helps to increase fertility.

## Management:

The shallow soil profile with restricted drainage can lead to water erosion under high rainfall or irrigation and a build-up of salts. Erosion and salinity risks can be managed by working to increase soil organic carbon levels, achieved by increasing ground cover or feeding out over problem areas. In some cases, deep ripping can fracture calcrete to allow for better drainage and deeper root development but the effectiveness is dependent on the thickness of calcrete layers. The low organic carbon content may also decrease soil structure and can result in hard setting soils which prevent good root development.



Above: Image credit Andy McCord, Coomandook



Above: Shallow loam over red clay on calcrete soil types are commonly found in old coastal dune ranges and flat to gently undulating landscapes. Photo taken southwest of Coomandook



# Post fire soil conservation demonstration- broadacre cropping

## Background

On 25 November 2015 a fire burned approximately 1700 ha of cropping land near Lameroo in South Australia's Murray Mallee. The extreme wind and temperatures on the day helped to fan the fire which went on to burn stubble, unreaped crops and roadside vegetation. The fire left the soil surface bare and susceptible to wind erosion over the summer months. By January 2016 the light sandy soils were reported to be drifting while heavier soils such as the loams and sandy clays had greater resistance to wind erosion. Natural Resources SA Murray-Darling Basin teamed up with local landholders to establish demonstration sites on options available to tackle post fire soil recovery. The application of manure to the soil surface and delving subsoil clay were highlighted within the demonstration.

## Method

In 2016 a paddock scale demonstration was established to highlight the value of spreading piggery manure across the soil surface as post fire soil erosion control method.

- Eco-shelter piggery manure was spread at 5-6 t/ha.
- The paddock was dry sown in early May 2016.
- The fire affected paddock was sown to oats for hay as a precaution against any potential weed seeds introduced through the manure application.
- Rivulets within the soil surface which formed as a result of localised erosion were evened out using a land plane and re-sown on 10 July 2016.
- Following crop establishment (approximately three weeks after germination) the planed areas were again rolled "just to flatten it off" (Gary Flohr, landholder and farmer).
- The crop was fertilise with 90 kg/ha urea to help compensate for lost nutrients following the fire event



Above: Pig manure applied at 5-6 tonnes/ha (left), control site of 0 manure/ha (right). Some heavy clumping in the piggery manure, this texture is desired to help weigh down the sandy topsoil

## Results

The surface manure application performed an important role in protecting the topsoil by providing direct cover and reducing wind speed at the soil surface. Some soil surface rivulets formed as a result of localised soil movement however these problem patches were easily managed through the use of a land plane. The majority of the soil surface was stabilised and allowed the farmer to transition smoothly into sowing the 2016 season crop.

"It was a compromise between the cost of the manure and getting enough to perform the function of holding the soil in place. Some were talking 10-12 tonnes/hectare but 5-6 tonnes/ha was enough. We needed just enough solids to make some roughage and slow down the wind speed" (Gary Flohr, landholder and farmer).

Soil testing highlighted both the 'fire affected' and 'non-affected' sites were low in nitrates, organic carbon (OC) and had a low phosphorus buffering index; while the fire affected site had lower total sulphur and OC. The pig manure applied to the fire affected site had high OC (33%), N (40 mg/kg) and S (0.6%); nutrition provided as manure would have supplemented the loss of nutrients as a result of the fire and those lost over summer mineralisation.

## Conclusion

The demonstration sites for both the deep ripping clay and surface manure application treatments enabled establishment of healthy crops for the 2016 cropping season. Both actions succeeded in decreasing the impact of wind at the soil surface, preventing the dramatic movement of topsoil. The demonstration highlighted that these are options for landholders seeking to conserve their topsoil following a fire event. While deep ripping enabled the landholder to utilise the



Above: Results of surface application of piggery manure: Crop showing good growth and development at tillering growth stages

clay resource already available in the subsoil, it is critical this clay is tested to prevent pH, sodicity or toxicity issues which may be present. Manure spreading provided the double benefit of soil protection following the fire and additional nutrition.

“I would do it again; if you can’t find clay then this (surface application of manure) is a great option” Gary Flohr, landholder and farmer.

#### Want to know more?

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## Is On-the-Row the go?

Protecting fragile Mallee sands at seeding time with good crop emergence is critical to sustainable farming in this region. The latest research by Mallee Sustainable Farming, CSIRO and Grains Research and Development Corporation (GRDC) has identified some critical sowing options to protect our soils. Last year’s crop row can provide an environment with more moisture at seeding for improved early crop emergence on non-wetting sands and higher Nitrogen supply potential.

“Delivering multiple benefit messages – a partnership with NRM” is an innovative GRDC funded project bringing together grains industry and natural resources management people to work together in extending sustainable farm practices on important production issues that have clear environmental outcomes. This project is a partnership between the Ag Excellence Alliance and Mallee Sustainable Farming.

Read More: <http://www.msfp.org.au/wp-content/uploads/2016.08.04-Karoonda-FD-booklet.pdf>

## Australia’s Farmer of the Year

Australia’s Farmer of the Year is a cane farmer turned rubbish warrior, who has turned his business into a recycling facility.

Matthew Keith farms 600 hectares of sugarcane at Woongoolba, half way between Brisbane and the Gold Coast.

“Our family business started back in the 1940s when my grandfather, from very humble beginnings, started farming sugarcane,” Mr Keith said.

Mr Keith has since transformed the business by taking the green leaves left on the ground after harvesting and turning them into mulch.

“Depending on the price of sugar at the time, this mulch can be up to 50 to 100 percent to the value of sugar,” Mr Keith said.

“Sugar cane prices fluctuate and you never know what the weather’s doing, so it just gives you a bit more security.”

In 2001 the family started Rocky Point Mulching, selling packaged sugarcane mulch to hardware stores.

The company now has an annual turnover of \$30 million, sourcing cane waste from growers throughout south east Queensland and northern New South Wales.

“A lot of [local farmers] say it’s the difference between being viable with growing sugar and not,” Mr Keith said.

For whole article: <http://www.abc.net.au/news/2016-11-10/farmer-of-the-year-awards-2016/7967632>

Below: Matthew Keith, farmer of the year.  
Image credit ABC Rural Marty McCarthy





# Whats on in the region

## Scratching the Surface: Soil Biology in Agriculture

Natural Resources SA Murray-Darling Basin and Adelaide Mount Lofty Ranges are hosting 'Scratching the Surface: Soil Biology in Agriculture'; a forum designed to link soil biology to more sustainable, productive farming systems

- Are you wondering about soil health on your farm and how it effects your productivity?
- Do you want to learn how to encourage soil organisms for the health of your farm?
- Do you want to meet likeminded farmers who are viewing the health of their business from the soil up?

Join us on Wednesday 1 March 2017 at One Paddock Vineyard, Currency Creek and meet leading producers, agro-ecologists and microbiologists to help us understand the latest science and how to apply theory to our practical agricultural and horticultural systems

Contact Jeff Edwards 0437 652 674 or Eliza Rieger 0408 416 684 for more details.



## Farmers Markets in the region

### Adelaide Hills Farmers Market

Where: 23 Mann Street, Mount Barker  
When: 8:30-12:30 every Saturday

### Goolwa Wharf Markets

Where: Goolwa Wharf, Goolwa  
When: first and third Sunday of every month at 9am to 3.30pm

### Mount Compass Produce and Craft Market

Where: Wetland Car park, Sam Court, Mount Compass  
When: Markets are held on the first Saturday of January, February, March, April, October, November and December.

### Murray Bridge Farmers Markets

Where: The Wharf area, Sturt Reserve, Murray Bridge  
When: every Saturday at 8am to 12pm

### The Riverland Farmers Markets

Where: Berri Senior Citizens Hall, Crawford Terrace, Berri  
When: 7:30-11:30am every Saturday

### Strathalbyn Farmers Markets

Where: On South Terrace near the Old Strath Railway  
When: Every third Sunday of the month

## Contacts

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For more information on natural resources management in the region, the SAMDB NRM Board and its activities, please visit [www.naturalresources.sa.gov.au/samurraydarlingbasin](http://www.naturalresources.sa.gov.au/samurraydarlingbasin)

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