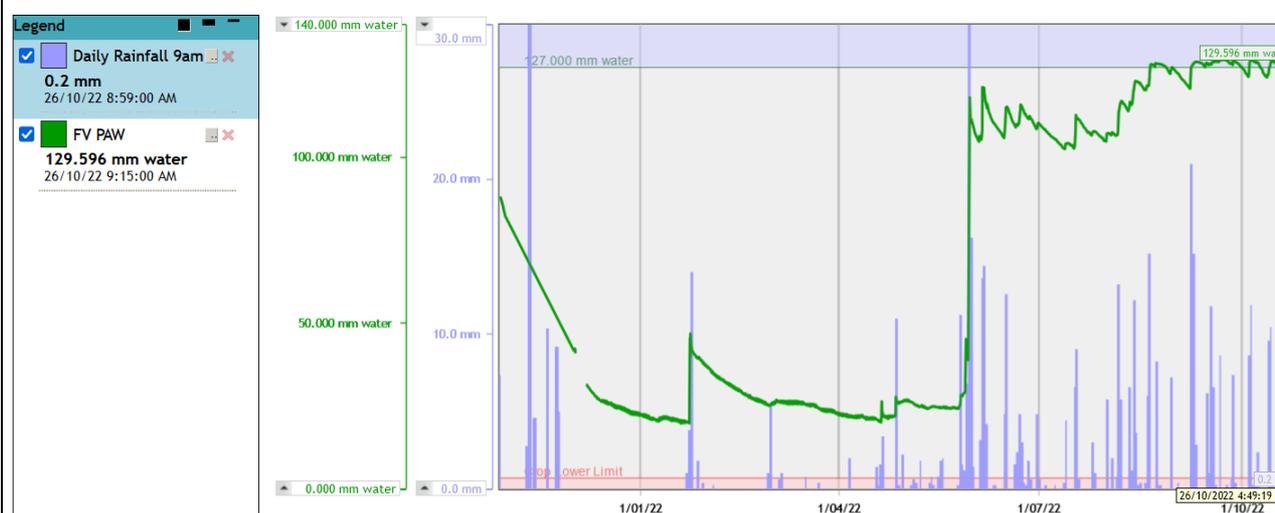


## BIGG Soil Moisture Report – 31/10/22

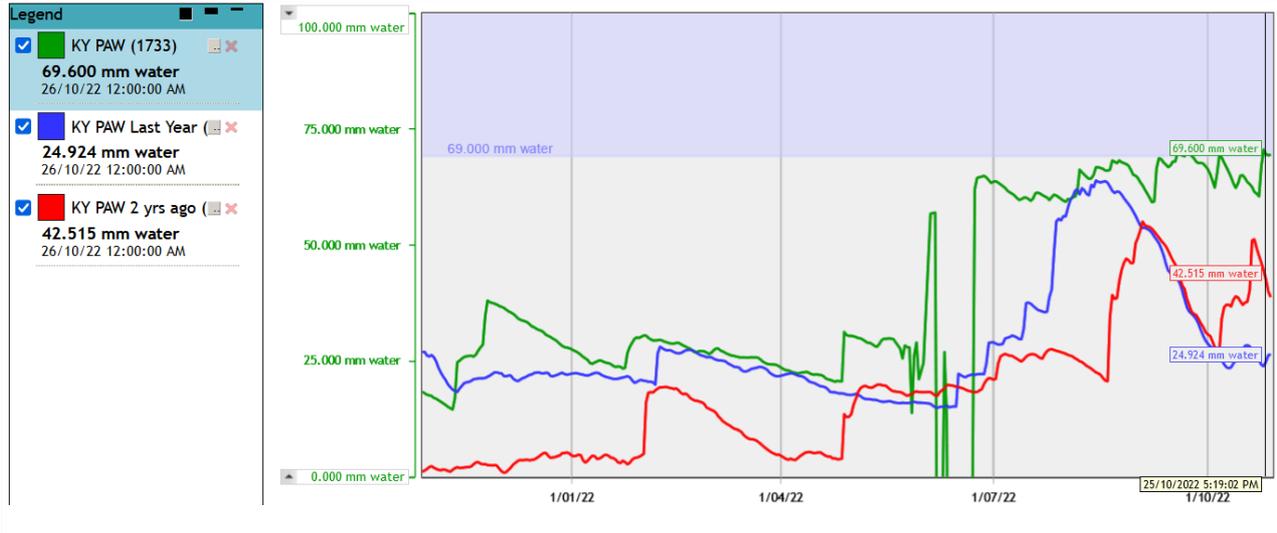
### Flaxman Valley, Keyneton, Koonunga and Moculta Weather Stations

Site Name: Flaxman Valley (Landholder: Evans)



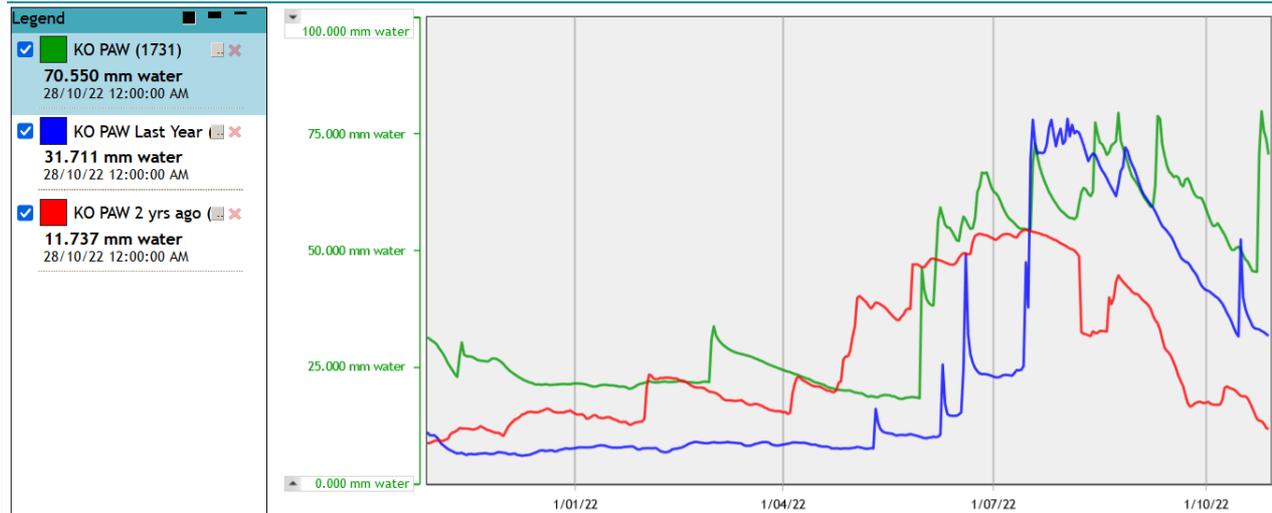
|                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                               |             |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------|
| <b>2022 growing season rainfall (April-current)</b> | <b>494mm</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Estimated soil moisture in the profile</b> | <b>100%</b> |
| <b>Soil type</b>                                    | Sandy loam over clay                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                               |             |
| <b>Pasture type</b>                                 | Phalaris/annual grasses/clover-based pasture                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                               |             |
| <b>Current pasture status (see photo below)</b>     | <p><u>Composition</u>: Phalaris 25%, Annual grasses 65%, Capeweed 10%</p> <p><u>Estimated Feed on Offer (FOO)</u>: 3100 kg DM/ha</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                               |             |
| <b>Recent paddock and grazing management</b>        | At the beginning of October 170 ewes/202 lambs grazed the paddock for one week. Given the current level of FOO in the paddock, stock will graze the paddock again shortly. The dam in the paddock is full.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                               |             |
| <b>Narrative</b>                                    | <p>The year-to-date rain at this site has exceeded the total for 2020-21 and, if it continues will exceed last years. The season started with slightly more water in the profile than either 2020-21 (8mm) or 2019-20 (13mm). The break came later than it did in 2019-20 but earlier than last year. However, when it came, it hit hard: the plant available water (PAW) leapt 80mm in May to reach a total above 100mm. Through August, levels moved even higher and have remained at over 120mm (i.e., 95%+ capacity) since then. The current level is higher than we have seen over all the years the probes have been installed (2014) and, as a result, we have had to increase our estimate of the maximum PAW.</p> <p>The PAW graph tells us an interesting story. Each rain event kicks moisture up nicely and is followed by a clean draw-down as the pasture starts to use the water. There is no flattening of the curve at high levels (which would indicate water logging) or at low levels (moisture stress is a long, long way away). Another way to put this, is that rainfall has not only filled the profile, it has kept up with all the growth needs of the pasture. Unless there are other limitations, such as nutrient shortfall, we would expect dry matter production to be at maximum levels for the conditions. With the predicted rain and current moisture levels, production levels should remain high for the rest of the season.</p> |                                               |             |

## Site Name: Keyneton (Landholder: Hollitt)



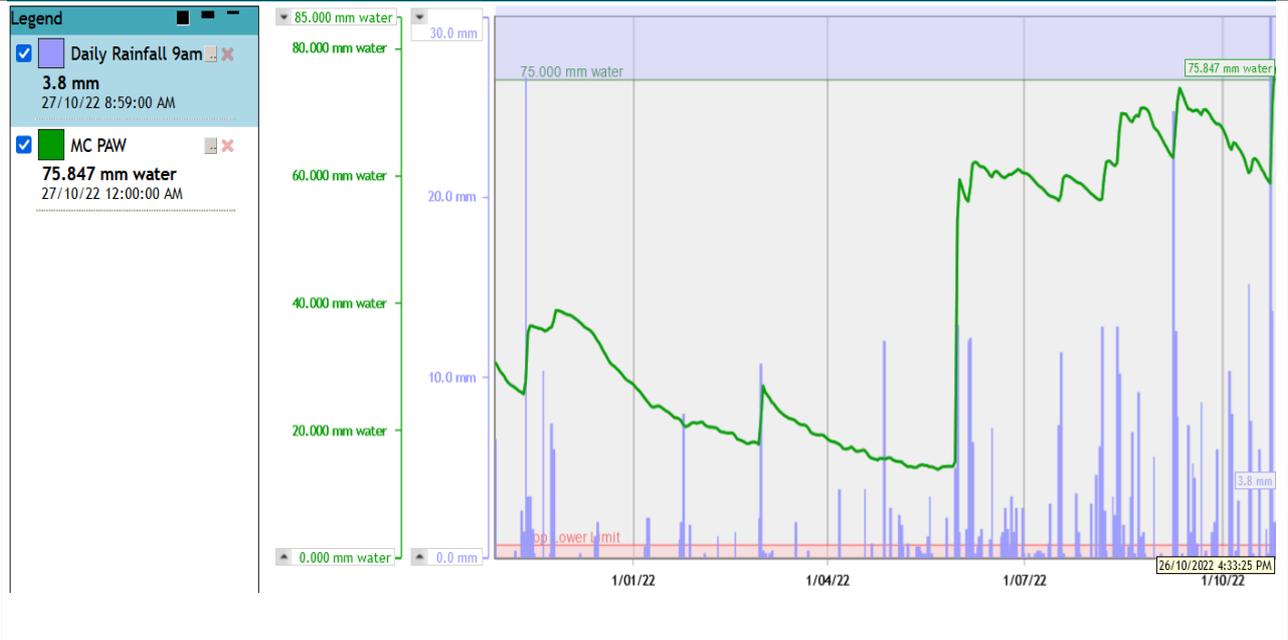
|                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                               |            |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|------------|
| <b>2022 growing season rainfall (April-current)</b>       | <b>359mm</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Estimated soil moisture in the profile</b> | <b>99%</b> |
| <b>Soil type</b>                                          | Red loam over clay                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                               |            |
| <b>Pasture type</b>                                       | Forage brassica                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                               |            |
| <b>Current pasture status</b><br><i>(see photo below)</i> | <u>Composition:</u> Forage brassica 70%, Annual grasses 15%, Geranium 15%<br><u>Estimated Feed on Offer:</u> 2600 kg DM/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                               |            |
| <b>Recent paddock and grazing management</b>              | <p>This paddock has traditionally been a grassy/clover pasture, but this year was sown to Greenland forage rape (on 25/5/22 at 3.5kg/ha).</p> <p>The paddock has been continually grazed for the last six weeks. On 15/9/22, 600 ewes/940 lambs were in the paddock for two weeks. The ewes were then removed and since then only the lambs have grazing.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                               |            |
| <b>Narrative</b>                                          | <p>A hiccup on the soil moisture probe meant we lost some data at the start of the season break. But the graph still shows the rapid increase in PAW and the fact that it has stayed high all year. Current moisture levels are 30mm above last year and 40mm above where they were 2 years ago. Like the Flaxman Valley site, the profile is holding more water than we thought possible, and we have increased the PAW estimate to suit.</p> <p>On this site also, the rain is more than meeting the growth needs of the pasture and dry matter production rates should be at maximum for the conditions. One way to check this is to look at what is being returned by the weather stations NDVI sensors. The unit is made up of upward and downward looking radiation sensors, which measure the difference between radiation at visible and infra-red wavelengths. The ratio of these measures the green-ness of the crop, which in turn can be related to the Crop Coefficient (Kc).</p> <p>The crop coefficient is used in the Evapo-transpiration model (ET<sub>o</sub>) to estimate plant water use (ET<sub>c</sub> = ET<sub>o</sub> x Kc). But the NDVI peaked at 0.77 in September and has fallen since. Why? Because the paddock has been grazed since the 15<sup>th</sup> of Sept. This shows the value of the in-field sensors: if a standard growth model was being used, dry matter production estimates based on the expected (fixed) crop coefficient for the month would be high. But the sensors are giving us the true picture, automatically adjusting for the reduction in plant material levels as a result of grazing.</p> |                                               |            |

**Site Name: Koonunga (Landholder: Kleinig)**



|                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                               |            |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|------------|
| <b>2022 growing season rainfall (April-current)</b>       | <b>407mm</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Estimated soil moisture in the profile</b> | <b>70%</b> |
| <b>Soil type</b>                                          | Red brown earth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                               |            |
| <b>Pasture type</b>                                       | Regenerated clover pasture                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                               |            |
| <b>Current pasture status</b><br><i>(see photo below)</i> | <u>Composition:</u> Clover 80%, Barley grass 10%, Brome Grass 10%.<br><u>Estimated Feed on Offer:</u> 4800 kg DM/ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                               |            |
| <b>Recent paddock and grazing management</b>              | In May 2021, the paddock was sown to a mix of clovers and cereals for pasture. This year the clovers have regenerated with 146 lambing ewes initially grazing the paddock for a two-month period from mid-May (including being supplementary fed with grain and hay). In mid-August the paddock was further grazed by 110 ewe hoggets for a 10-day period before it was locked up. The paddock will soon be cut for hay.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                               |            |
| <b>Narrative</b>                                          | <p>Growing season rain at this site has gone over 400mm and is 55mm above the same time last year and 20mm above the year before. Totals for the previous 3 years were 327, 460 and 500, so only another 100mm is needed in order to exceed the 2021-22 figure. And with current rain forecasts, that is highly likely. At the start of the season, there was nearly 20mm of available water (which is about 20% of capacity).</p> <p>If we have adjusted the PAW estimates at the earlier sites, you may ask why have we not had to at this site? The reason is 2015-16, when rainfall at the site passed 650mm for the year – which was 300mm above the previous 2 years. Last year’s tally was still 100mm down and this year has just crossed 400mm. Which means a lot more rain would need to fall before the current PAW figure was tested. What is interesting about this season, is that the accumulated rain graph is going up linearly: once the rains started, they have been regular and consistent. And this is reflected in the PAW, which, at 70mm, is 50mm above the same time last year and 60mm above the year before.</p> <p>Dry matter production through September should have been excellent, with the PAW graph showing a lovely pattern of drawdown, well above the incoming rain levels. Then, once available water got down to 50%, the heavy rains of early last week, kicked up back up to 90% again. This is a great position to be in at the end of October, with the profile holding enough water to meet the needs of the pasture for a couple of months.</p> |                                               |            |

## Site Name: Moculta (Landholder: Koch)



|                                                     |              |                                               |            |
|-----------------------------------------------------|--------------|-----------------------------------------------|------------|
| <b>2022 growing season rainfall (April-current)</b> | <b>487mm</b> | <b>Estimated soil moisture in the profile</b> | <b>98%</b> |
|-----------------------------------------------------|--------------|-----------------------------------------------|------------|

|                  |                                          |
|------------------|------------------------------------------|
| <b>Soil type</b> | Shallow clayey red brown earth over lime |
|------------------|------------------------------------------|

|                     |                |
|---------------------|----------------|
| <b>Pasture type</b> | Native pasture |
|---------------------|----------------|

|                                                 |                                                                                                                                           |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Current pasture status (see photo below)</b> | <p>Composition: Annual/native grasses 60%, Capeweed 20%, Geranium 10%, Native medic 10%</p> <p>Estimated Feed on Offer: 3200 kg DM/ha</p> |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|

|                                              |                                                                                                                                                                                           |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Recent paddock and grazing management</b> | Since mid-August the paddock has been rotationally grazed by 500 ewes for a period of one week in every four. In early November the paddock will be set-stocked with 100 ewes for mating. |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Narrative</b> | <p>Moculta was the last of the sites to be installed (2019) and had the lowest PAW. With this year's rain we have increased the estimate to 75mm, putting the holding capacity between that of the Keyneton and Koonunga sites. The profile is sitting at this new full point, with 98% currently remaining. Rain to date is 480mm, comparing well to the previous year tallies of 290, 450 and 425mm. So, by far the wettest year for which the equipment has been installed. The rains started on the 30<sup>th</sup> of May and have been very regular since. The largest daily fall was 42mm on Oct 23<sup>rd</sup>. You may ask what happens when this amount of rain hits in a short time? We can turn to the soil moisture probes for an answer.</p> <p>The PAW graph is shown above, but you may be interested in having a look at the <a href="#">Soil Moisture Separate graph</a> for Moculta on the web. The story is pretty much about what is happening in the upper and lower parts of the profile. Above 55cm, things have been very dynamic as the pasture grabs all the water it can easily obtain. But what is re-assuring is that at no depth has there been any sign of moisture stress: the daily stepping never flattens, and each level has been regularly refreshed from rain. The height and density of the pasture (see site pic below) also means that, even though the ground is sloping, less rain is being lost to runoff. Of the 42mm which fell, over 20mm was captured in the profile. What makes the rain event of the 23<sup>rd</sup> noteworthy is that over the next 3 days, the water infiltrated right down to 85cm. Then when the rain eases, we see moisture use return quickly right down to a depth of 55cm. That is pasture which is happy: it has well established roots to depth and is transpiring at capacity to turn as much of the moisture it can into grass.</p> |
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## Photos of BIGG Weather Station paddocks – 25/10/22

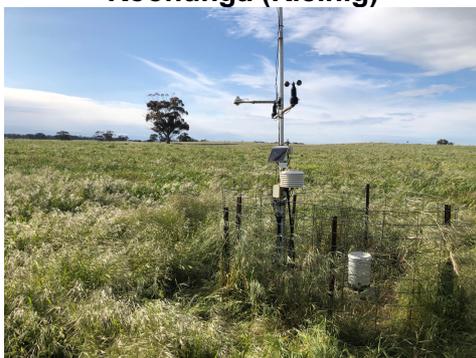
**Flaxman Valley (Evans)**



**Keyneton (Hollitt)**



**Koonunga (Kleinig)**



**Moculta (Koch)**



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