

MAKING EFFECTIVE IRRIGATION DECISIONS

August 2021 Irrigation Report: May - July period



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No time for complacency mid-winter!

While late autumn and early winter provided ideal moisture conditions, with consistent, small rates of rainfall keeping soil moisture in the Readily Available Water (RAW) zone without saturation, the second half of winter has brought drying conditions with unpredictable high evapotranspiration (ET_o) days. Increased ET_o is caused by strong/dry winds, sunny days and little or no rainfall resulting in greater demand for water from the plants as they upsurge their daily growth rates.

The *Hunter Smarter Farming: Irrigating for Profit Project* sites have commenced irrigation in response to declining soil moisture, reported on their soil moisture probe graphs. May to mid-June delivered approximately 63mm of rainfall, with only a further 10mm mid-June to the end of July. Both Tom Middlebrook, of Bowman Farm, and Adam Forbes, of Kwong Flat report their surprise that first applications of the “season” delivered little change to downwards trending soil moisture.

Bowman Farm

The challenge for Tom in early May was to rectify compaction issues across the site, caused by the high rainfall events of March. Efforts to aerial broadcast the Italian rye/barley/ brassica mix late in March delivered poor results and pasture coverage was sporadic, with a hard cap of top layer soil restricting root and water penetration.

“The hard capping improved with the peppering of rain we received in May and early June. Whilst first grazing on the 20th of May was not great, the subsequent two grazing were an improvement and we will graze again tomorrow (6th August),” provided Tom.

“Our strategy from here is to graze, follow with fertiliser (100kg/ha each of Urea & Greentop K (32.8:11:2.9) and ProGibb, then apply irrigation if needed.”

Whilst Tom applied 12mm of irrigation on the 31st of July in response to the downwards trend shown on his summed soil moisture graph (Figure 1), there was very limited impact. Figure 2 (stacked graph) demonstrates that a “blimp” can be seen at 25cm and an even slighter response at 35cm, with no moisture increase indicated at 45cm. At this stage of development, barley roots can range from 50-75cm on average, and the tap root of the forage brassica can reach depths of 1-2 metres, therefore the depth of application was only adequate for the Italian rye. Additionally, with ET_o the following day at 4.1mm, and accumulatively nearly 12mm over the three days following, the rate of application was not adequate to stop soil moisture decline.

“We are now truly in an irrigation season,” says Tom. “With no rainfall forecast in the next seven days, our next irrigation will be an initial 12mm fast pass to wash-in the fertiliser, then we will come back more slowly to apply a further 24mm. I will then assess the effectiveness of these applications on the probe and decide on when to apply again after that. We are in the RAW and we will manage to stay in that upper level as we have the water supply and daily growth rates will only keep increasing from here.”

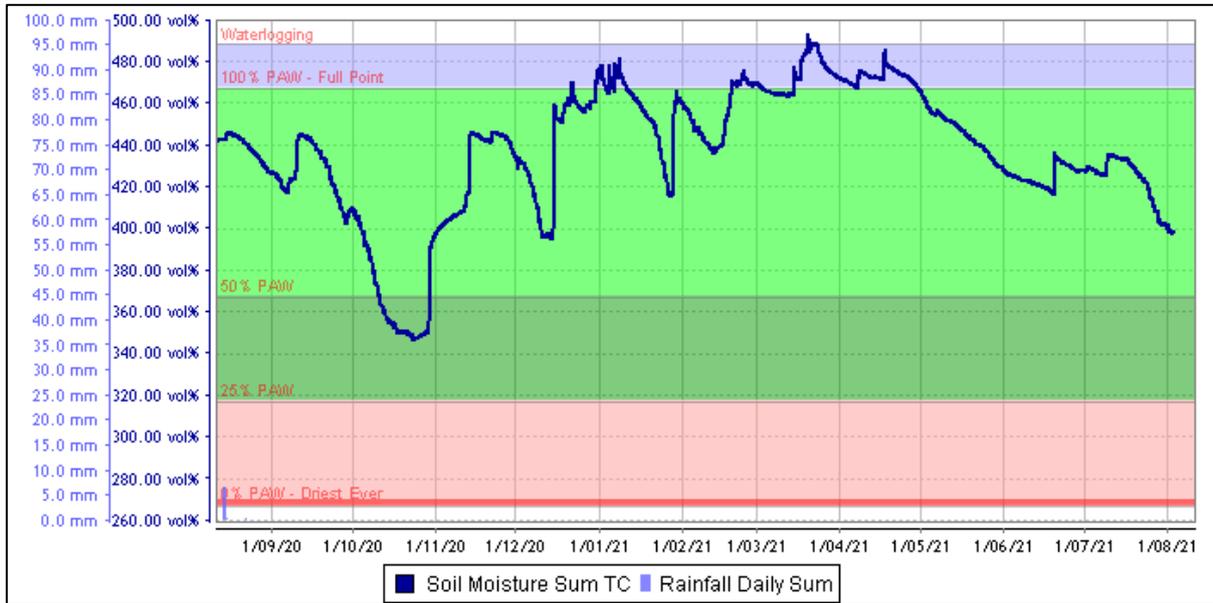


Figure 1- Summed Soil Moisture Graph of Bowman Farm demonstrates ideal conditions until mid-July when soil moisture enters lower zone of RAW.

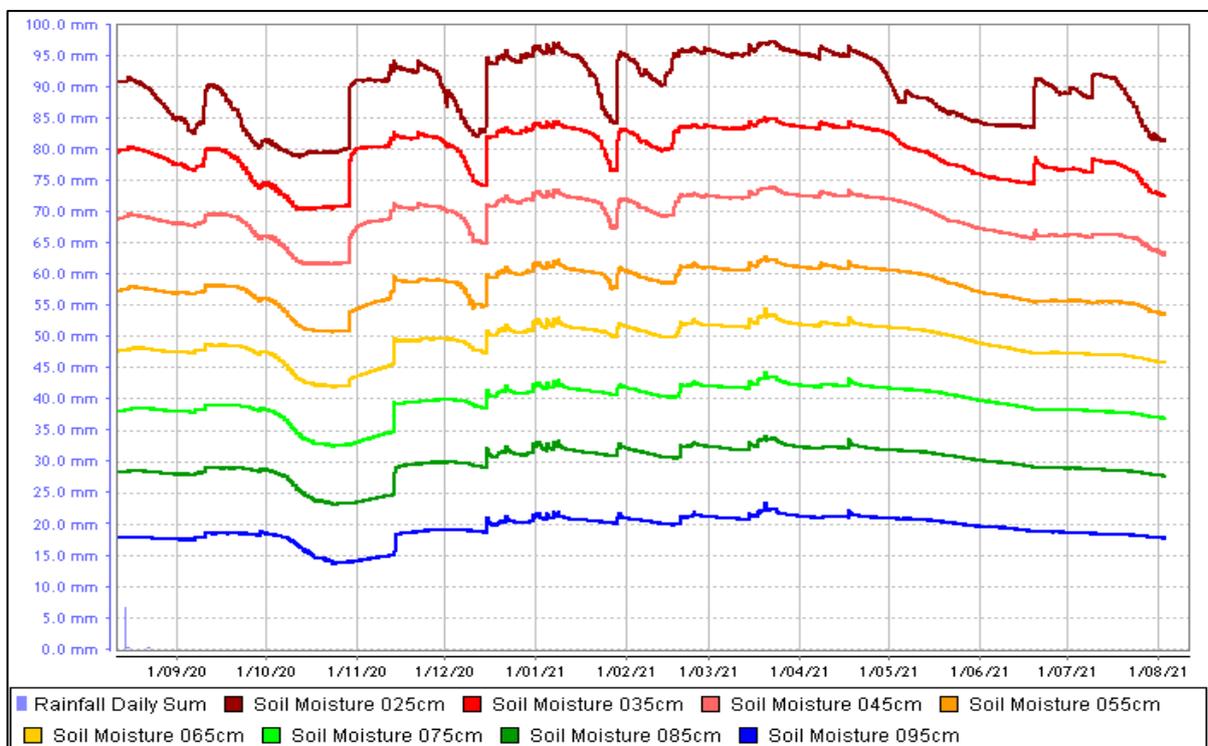


Figure 2- Stacked Soil Moisture Graph of Bowman Farm shows 12mm application on the 31st of July was quite ineffective, especially at-depth.

Kwong Flat

The legacy of March's rainfall event has also been felt at Kwong Flat, with the soil moisture probe telemetry base station (where all the data is received across the farm) remaining off-line until the 23rd of June, when power was returned to the fertiliser shed where it is housed.

"It was one of those situations when you don't know what you miss until you don't have it," said Adam.

"While conditions were quite ideal, I didn't need to refer to the probes, but from mid-June I knew that conditions were changing and I needed to know what was happening below the ground, so restoring power to base station and getting access to the soil moisture monitoring data became a priority."



Figure 3- Adam Forbes has used his soil moisture monitors to start-up irrigation on-time under higher ETo and predicted low rainfall conditions to maintain RAW.

The soil characteristics of the monitored F6 and F3 paddocks at Kwong Flat have responded differently to drying conditions and the season's start-up irrigation application of the 31st of July.

On F6, a slow start under very wet conditions saw 1st grazing take place early May, 60 days after sowing of the Prairie grass pasture (typical first grazing 30-35 days). Whilst a 25-30 day rotation had been planned by Adam last report, the site has been on a 35-40 day rotation but is now "really taking-off". The lighter, free draining soil type of F6 saw soil moisture levels mid-point of the RAW zone once monitoring was reinstated. With the SWAN Systems Weatherwise 7-day forecast predicting no rainfall, it was clear to Adam that moisture levels would continue to trend downwards at the end of July without intervention.

"ETo has been nearly 4mm on some days over the past week as the wind had really picked-up and we have had clear, sunny days. To ensure we maintain RAW, we got the ball rolling and applied 18mm on the 31st of July," he provides.

The 18mm application was effective to 50cm on the F6 stacked graph, though levels quickly started to drop again in the days following. On F3, a heavier and shallower soil type, saturated conditions continued at the Italian ryegrass site until late July, when soil moisture dramatically trended downwards. The pasture was grazed 1st on the 20th of May, 45 days after sowing, and has been on a 35-day rotation.

"Although off to a slow start, the three grazings have been good. Coming-up to the fourth grazing, and being at the 2-leaf stage, the pasture is demanding more water under these dryer conditions and so once we had made the 18mm application, the soil moisture levels dropped within 48 hours

(Figure 3) to pre-application levels- so we have maintained RAW but it demonstrates we need to continue to apply about that amount every 2-3 days while there is no significant rainfall forecast.”

Tom’s response to soil moisture monitoring has seen him respond in-time to maintain soil moisture on both sites within RAW and it places him in a good position to continue to apply irrigation within the capacity of his irrigation system using off-peak power of night and weekends.

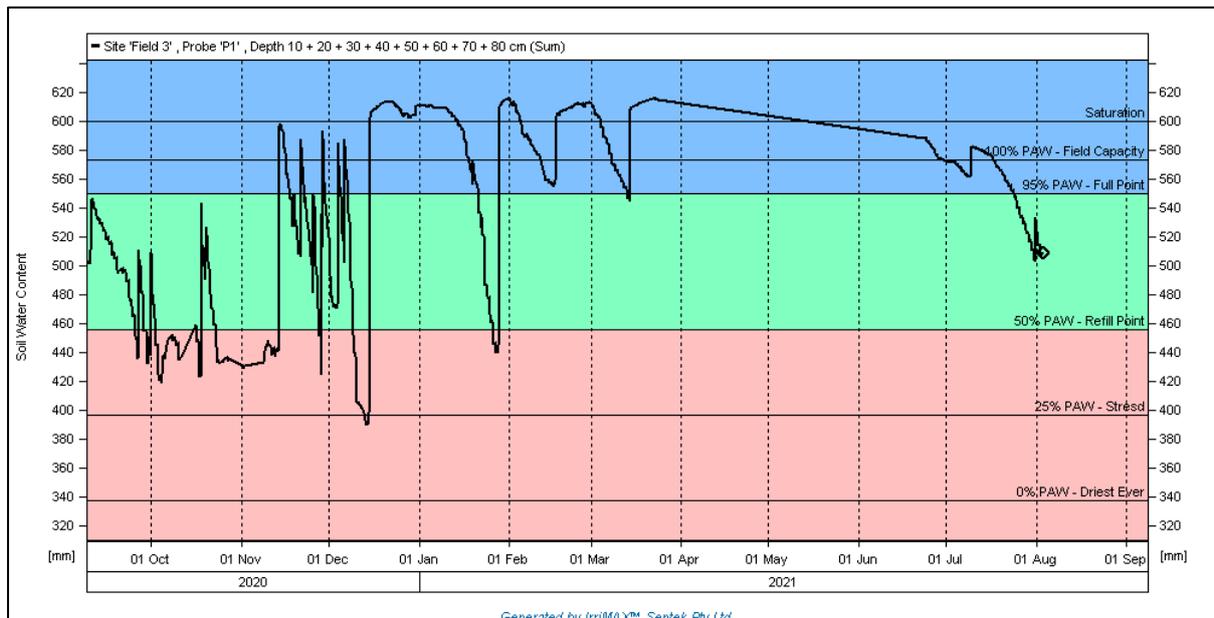


Figure 4- The F3 soil moisture summed graph shows that the application of 18mm on the 31st of July increased soil moisture but it rapidly returned to pre-irrigation levels due to windy, dry conditions and increased plant demand.

Keeping proactive plays dividends

During the first irrigation of the season, after the pivot had passed both monitored sites (F3 & F6), the pump at Kywong Flat had operating issues and irrigation of other sites was delayed for 24 hours.

“This event was another demonstration that not waiting until moisture levels are close to the refill point is important. By starting to irrigate when levels are mid-point of the RAW, we allowed ourselves some breathing space to rectify the issue and this ensured we did not enter a critical point of stressed levels,” says Adam.

Upcoming considerations

- The Bureau of Meteorology’s prediction for the remainder of August is 75% chance of only 5-10mm rainfall, but an improved September to November period of 75% chance of 200-300mm.
- Late winter is transpiring into a true irrigation season and with available water on both farms, irrigating to maintain RAW within the mid-point will provide optimum growing conditions as soil temperatures rise and daylight hours increase.
- Using soil moisture monitoring will assist both farms to assess the impact of increasing ETo and the effectiveness of irrigation applications. With weekly ETo currently 18-20mm/ week, irrigation events need to provide at least this amount.

- Application rates per event need to consider depth of application (more irrigation to penetrate deeper) and frequency (ensure soil moisture of shallowest rooting plant is not depleted).
- Making sure irrigation starts on-time, before soil moisture is nearing stress levels, is important for all irrigators of the Mid-coast and Hunter.
- Undertaking system checks of irrigators prior to irrigation start-up is essential- access irrigation system check-lists and soil moisture monitoring equipment decision resources on the Dairy Australia Website: <https://www.dairyaustralia.com.au/land-water-and-climate/water/irrigation/smarter-irrigation-for-profit#.YJR8c7UzaUk>

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