



Australian Government
Department of Agriculture
and Water Resources



Smarter Irrigation for Profit Project

Tamworth Optimised Dairy Irrigation Farm (NSW)

‘Limestone Park’ Irrigated Pasture Update

April 2017

Prepared by Peter Smith, Sapphire Irrigation Consulting

Tips for May

- Irrigate newly established pasture to match ET.

General comment for April

April was a quiet month for irrigation with the main focus being to germinate and establish the newly sown pasture under the two centre pivots. Advice from the agronomist, Scott Woods, was to keep the very top soil layer moist to the seed depth, applying enough just to match ETo. As the soil probes are much deeper than seed depth, physical inspection of soil was necessary to ensure watering was sufficient. 6-8 mm every couple of days was advised. Rex aimed to irrigate at night (off-peak rates) as far as possible to minimise costs, but because only one CP can be operated at a time, some day-time operation (shoulder rates) was required.

The seasonal summaries from the Scheduling Irrigation Diary (below) for both centre pivots show the commencement of a new pasture phase, with last season’s plants sprayed out and new pasture sown and becoming established. The aim of the irrigation was to keep the seed bed moist to encourage good germination and establishment and then to irrigate to crop water demand. The summaries for the two centre pivots indicate excessive drying but this is determined using ETo of a mature pasture, not establishing plants.

Under the lateral move, the Lucerne continued to grow but was less active due to a management decision by Mr Tout to slow it down in preparation for oversowing with rye. Hence it was irrigated only once in late April. The seasonal summary shows the crop was beyond the refill point for the second half of the month which was expected as a consequence of this management decision. While the seasonal summary indicates that the lucerne suffered stress, this is not evident in the soil moisture traces.

This Project is funded by Dairy Australia and the Australian Government Department of Agriculture and Water Resources as part of its Rural R&D for Profit programme.

The project is also supported in Tamworth by the following organisations:



**Local Land
Services**
North West



Outlook for 'Limestone Park' from 'IrriSat' for May

		Forecast	ETo	Chance of rain
Sat	6	Partly cloudy in the morning.	1.7 mm	
Sun	7	Clear throughout the day.	1.6 mm	
Mon	8	Partly cloudy starting in the evening.	2.1 mm	1%
Tues	9	Partly cloudy starting in the afternoon, continuing until evening.	2.3 mm	
Wed	10	Clear throughout the day.	2.2 mm	
Thur	11	Clear throughout the day.	2 mm	
Fri	12	Clear throughout the day.	2.4 mm	
Sat	13	Partly cloudy starting in the afternoon.	1.9 mm	11%

Data records for April

ETo at Tamworth Airport (mm)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
3.5	3.3	4.6	4.2	4.3	4.1	4.4	4	4.3	4.1	3.7	4	4.1	3.9	3.7	3.8

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
3.9	4.2	4.3	4.7	4	3.2	3.1	3.4	3.9	3.5	1.4	2.7	2.6	3.4	-	112.3

Rainfall received at Tamworth Airport (mm)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
									11	2.8					13.8

Rainfall at Limestone Park (mm) (automatic rain gauge)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
									11.2	6.4	12.6				30.2

Irrigation events at Limestone Park (mm) (from Scheduling Irrigation Diary)

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Hill CP			3.2			3.5				4.4					2.2	
Flats CP				3			3				3					3
LM																

Date	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
Hill CP							14.4									27.7
Flats CP								10								22
LM								12								12

The Readily Available Water (RAW) at each soil probe is:

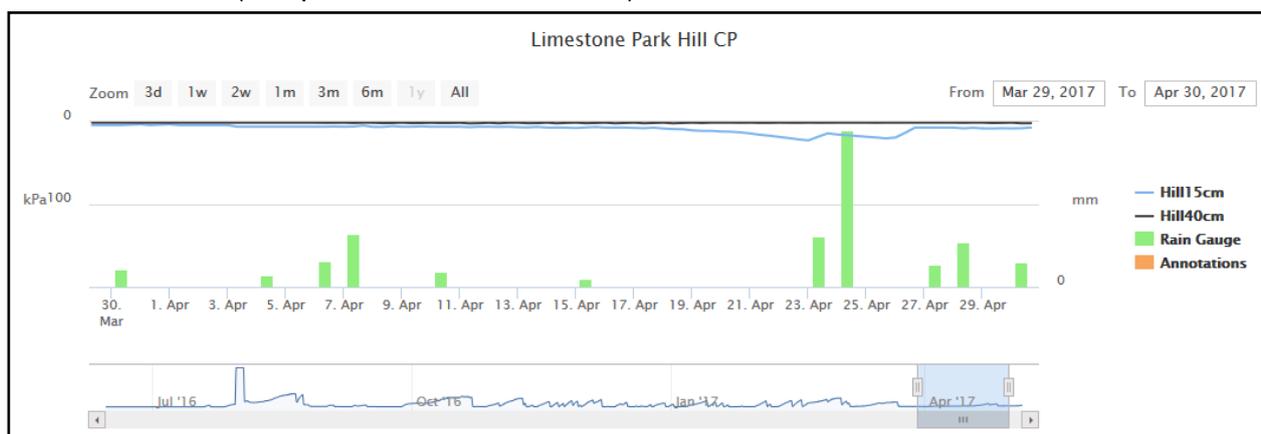
Soil probe site	Crop	Root depth	Soil texture	RAW
Hill centre pivot	Ryegrass	40 cm (assumed)	Medium clay (stoney)	30 mm
Flats centre pivot	Ryegrass	40 cm (assumed)	Light medium clay	27 mm
Lateral Move Field L2	Lucerne	1.2 m (from probe)	Medium clay (gravelly)	66 mm

Soil moisture watch

The trends of the soil moisture probes have the same overall pattern for each irrigation system but there are differences due to the different crops and soil types.

The green bars on the Hill CP are the same as the brown bars on the other two charts but they really only apply to the Hill CP – these are readings from the rain gauge located under this centre pivot, and the events recorded are both rainfall and irrigation events. Generally, the recordings of 10 to 15 mm are irrigation events and the others that are much smaller or much larger are rainfall events. The rainfall events are assumed to be the same for each system. The irrigation events will not be the same but should approximate those under the other systems.

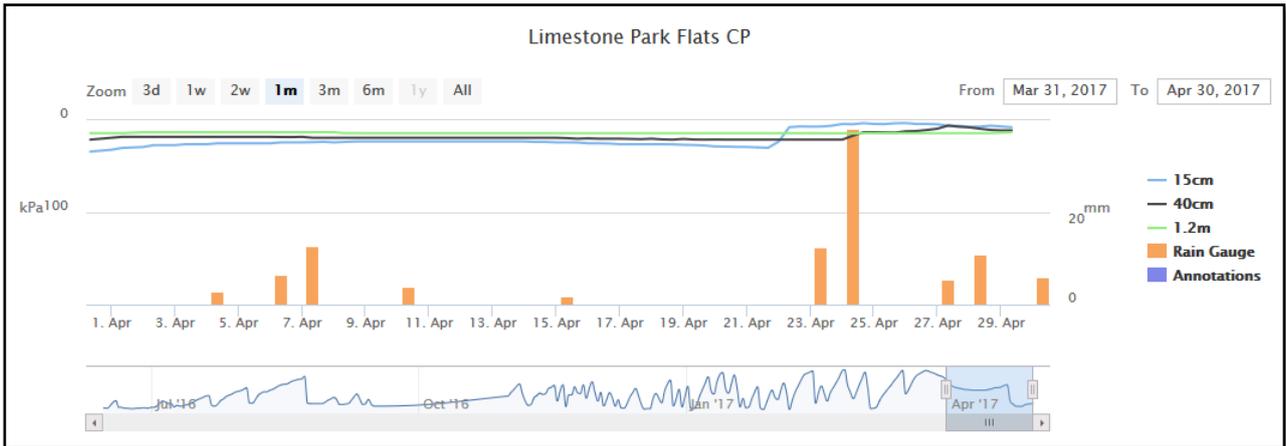
Hill Centre Pivot (Soil probe traces as at 6/5/17)



Under the Hill CP, the shallow 15cm sensor (blue line) is showing response to the many shallow irrigation events throughout the month to establish the new pasture as well as to the rainfall events at the end of the month. It is also showing mild drying from the middle of the month which suggests the new pasture roots were growing and becoming active. The deeper 40cm sensor (black line) shows no movement which was expected as there were no active roots at this depth, leaving the soil to remain wet.

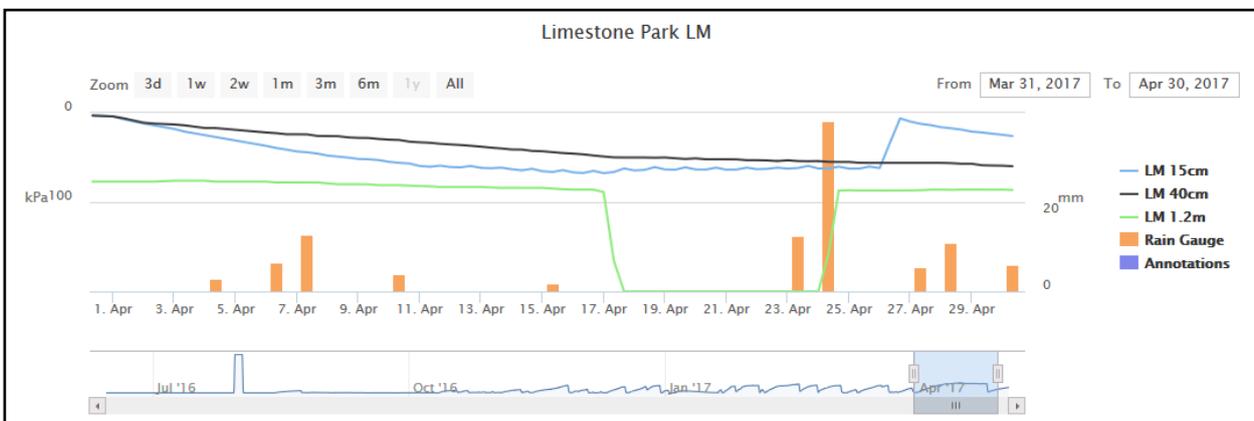
This month, both the record keeping of the farmer and the precipitation readings from the automatic rain gauge have cause for doubt. The farmer, Mr Tout had a disrupted month causing his record keeping to be less reliable than usual, and the precipitation indications in the automatic rain gauge do not line up well with the BOM records nor with the farmer's records. As well, observing the automatic rain gauge indications on days just a few days apart showed unexpected variation in what was recorded, creating doubt about the reliability of these indications. For this month's report, discerning the magnitude of the precipitation readings and determining whether they were rainfall or irrigation is not as robust as usual. In the main, Mr Tout's record were given priority over the automatic rain gauge records. Consequently, a number of the readings are not included in the data record tables above.

Flats Centre Pivot (Soil traces as at 6/5/17)



Under the Flats CP, the shallow 15cm sensor (blue line) continued to show a muted response to the irrigation and rainfall events. It shows a general but slow wetting response to the irrigation events in the first half of the month and a general but muted drying response in the middle of the month, probably because the new pasture roots were becoming active. The 40 cm sensor continued to display a more muted response. The kick on 24 April occurred in response to both the 15 cm and 40 cm sensors being dug up and inspected – they were replaced with a slurry of wet soil around them. The rainfall events on 27 and 28 April pushed the traces even higher, with the 15 cm responding almost immediately and the 40 cm about a day later. While the inspection of the sensors revealed no issues, their responsiveness appears to be restored. The 1.2 m sensor continued to show no activity for the month, as expected.

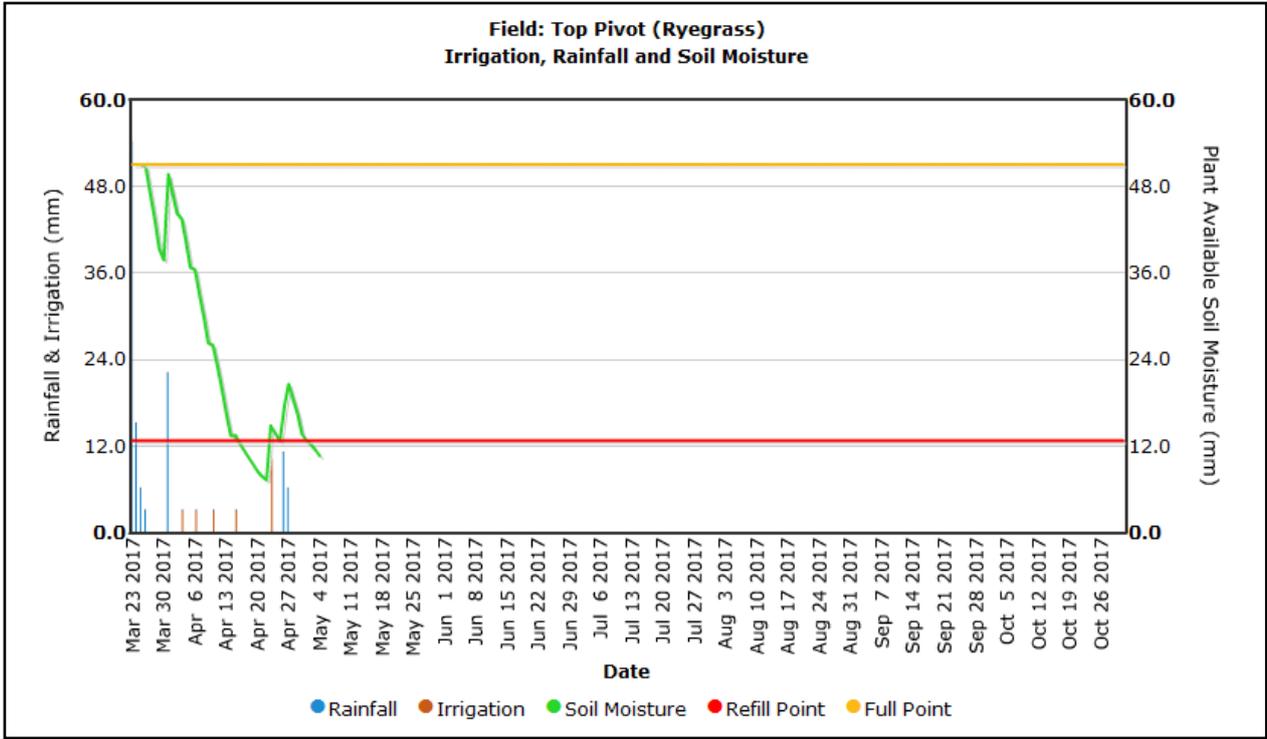
Lateral Move Field L2 (Soil probe traces as at 6/5/17)



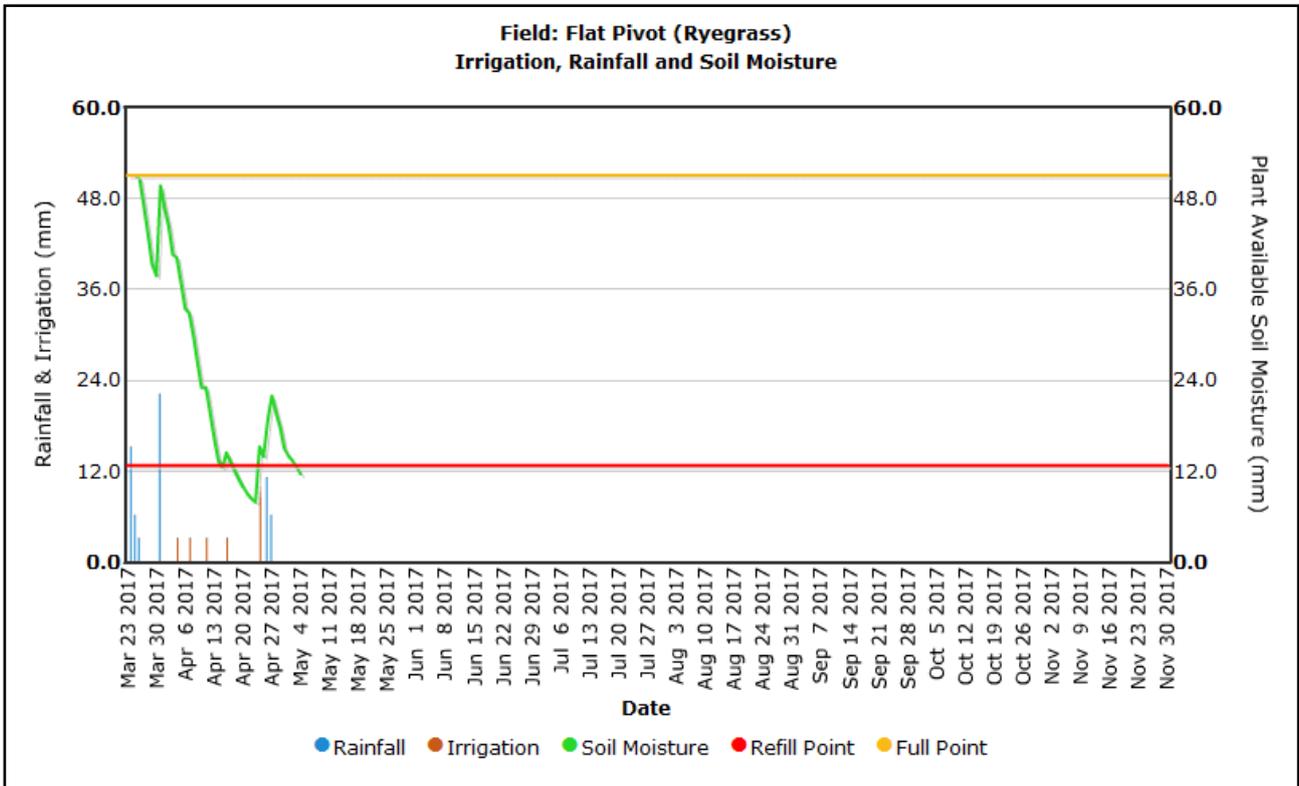
Under the Lateral Move, the shallow 15 cm sensor (blue line) displayed a slow drying trend following the rain event at the end of March. This was expected as the Lucerne is now in a phase of near dormancy and received almost no irrigation. The kick on 26 April is in response to the 12 mm irrigation event on 24 April. The deeper 40 cm sensor (black line) displays a similar response although the 12 mm irrigation was insufficient to penetrate to this depth. This means the Lucerne was extracting water slowly from the upper levels of the soil profile. The very deep 1.2 m sensor (green line) shows a flat response which was expected given the relative inactivity of the lucerne. The steep dip on 17 April is due to a broken electrical connection which was repaired on 24 April.

Seasonal summary from the Scheduling Irrigation Diary (SID) for Limestone Park

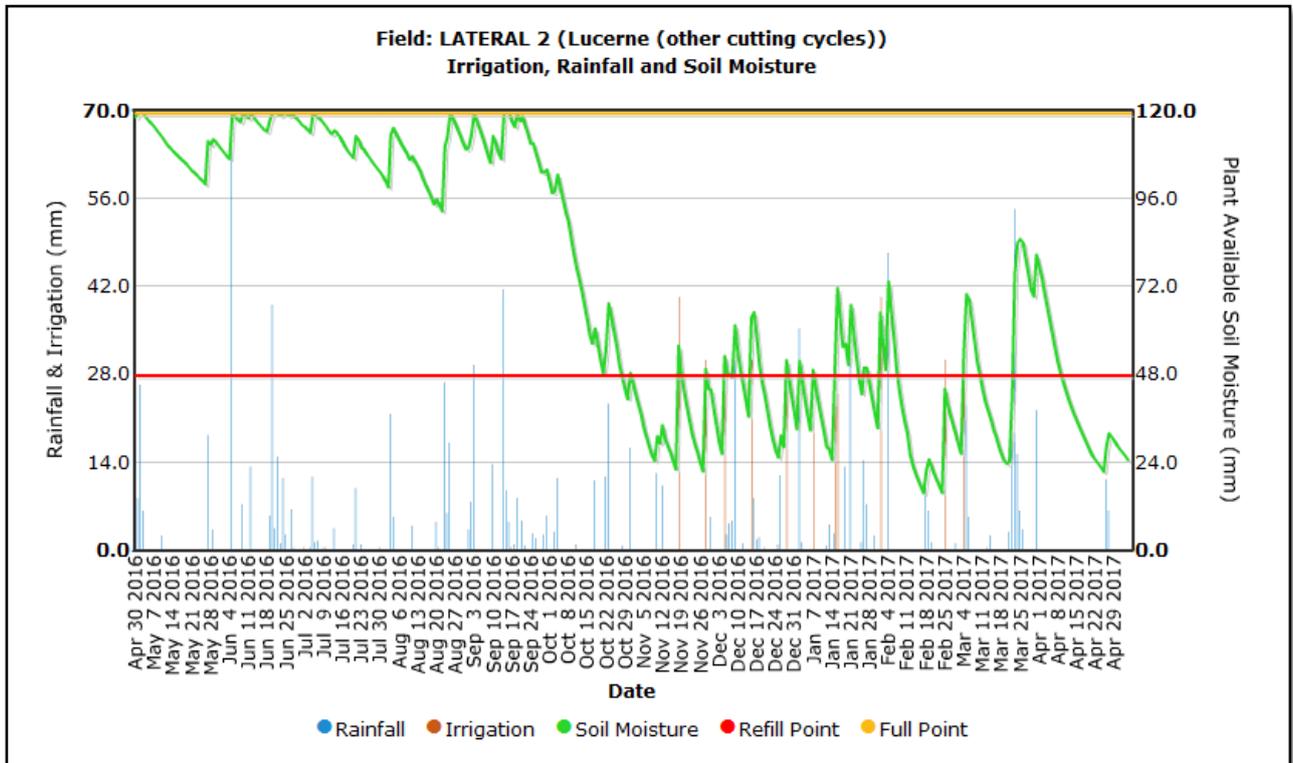
Hill Centre Pivot



Flats Centre Pivot



Lateral Move Field L2



To find out more about the Smarter Irrigation for Profit- Tamworth Optimised Dairy Irrigation Farm Project, please contact:

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