



Smarter Irrigation for Profit Project

Tamworth Optimised Dairy Irrigation Farm (NSW)

'Limestone Park' Irrigated Pasture Update March 2017

Prepared by Peter Smith, Sapphire Irrigation Consulting

Tips for April

- Maintain moist soil conditions with small irrigation applications for germination and establishment of new pasture

General comment for March

The extreme heat of February has passed and conditions have become much milder in March. The autumn 'break' was signalled with a rain event on 5-6 March, which was about double the magnitude at 'Limestone Park' than at the BOM weather station. Milder conditions and consistently lower ETo persisted for the month with further rainfall in the second half negating the need for irrigation. A major rain event 22-26 March set the season on a definite cooling pattern. Total rainfall recorded at Limestone Park was 231 mm, while the rainfall recorded at the BoM airport weather station was about half of this at 124 mm. Most of the fodder species have become almost dormant or have been sprayed out (21 March) and new pasture sown (22 March), with rain conveniently falling immediately after. Irrigation was used to complete the fodder and pasture species growing cycles and prepare the annuals for spraying out and replacing with new winter season species.

The seasonal summaries from the Scheduling Irrigation Diary (below) suggest that the pasture and fodder crops under the two centre pivots were maintained around refill point until they were sprayed out on 21st March. This pattern should have resulted in no loss of production, and any loss would not be a concern anyway as the ryegrass was finishing and early stage natives were active as the growing season came to an end.

Under the lateral move, the Lucerne continued to grow but is moving into a less active phase. The crop was frequently beyond the refill point, until the large rain event in late March. The soil moisture trace suggests the lucerne under the lateral move suffered stress in mid-March but this is not evident in the soil moisture sensors.

Both centre pivots on 'Limestone Park' have been re-evaluated and performance is notably improved from a year ago. The main improvements are that the control panels have been recalibrated and now both systems apply slightly more than indicated instead of around 25% less than indicated, and the pump efficiency has improved to 63% and 75% from 46% and 12%.

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 April

		Forecast	ETo	Chance of rain
Wed	5	Partly cloudy in the morning.	3.3 mm	
Thurs	6	Light rain starting in the afternoon, continuing until evening.	3 mm	53 %
Fri	7	Partly cloudy in the morning.	3.1 mm	4 %
Sat	8	Clear throughout the day.	3.6 mm	1 %
Sun	9	Partly cloudy starting in the evening.	2.9 mm	11 %
Mon	10	Partly cloudy in the morning.	3.1 mm	5 %
Tues	11	Partly cloudy starting in the evening.	3.2 mm	
Wed	12	Mostly cloudy throughout the day.	3 mm	1 %

Data records for March

ETo at Tamworth Airport (mm)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
5.7	6.6	6.9	2.4	3.4	5.6	5.9	6.1	6.1	5.3	6.3	5.9	4.5	4.6	6.1	4.8

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
5.8	5.9	5.5	2.9	4.1	2	4.3	2.4	3.5	3.2	4.7	4.5	4.8	2	4.4	146.2

Rainfall received at Tamworth Airport (mm)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0.8				13.4	0.8							0.2	6.2		

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
	3.8	5	5.8	2.6	40.4	10	4.6	12	2				8	8.6	124.2

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

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
				30.6	4.4								2.2		

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
	5.2	15.2			33	54.2	20.2	2.4	6.4				14.8	16.6	230.8

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	12		12													25
Flats CP		12														
LM				30												

Date	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total
Hill CP																49
Flats CP	12															24
LM																30

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

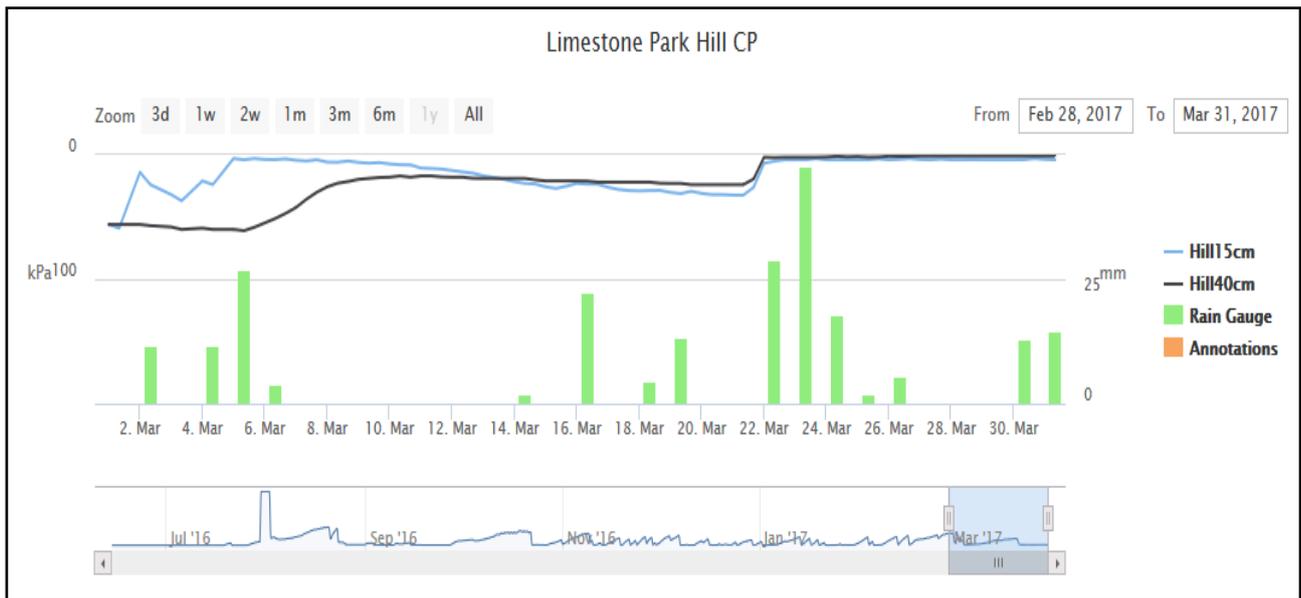
Soil probe site	Crop	Root depth	Soil texture	RAW
Hill centre pivot	Ryegrass	40 cm (assumed)	Medium clay (stoney)	30 mm
Flats centre pivot	Ryegrass	40 cm (assumed)	Light medium clay	27 mm
Lateral Move Field L2	Lucerne	1.2 m (from probe)	Medium clay (gravelly)	66 mm

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.

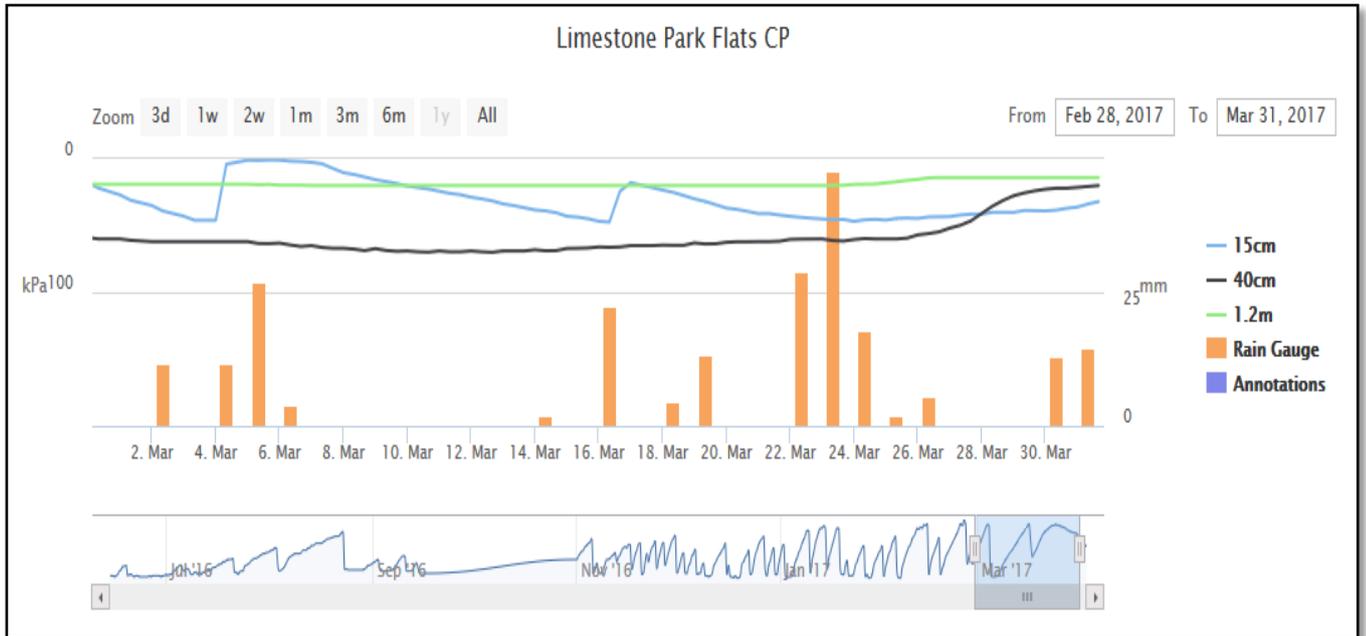
The brown bars on each graph really only apply to the Hill CP – these are readings from the rain gauge located under this centre pivot and the events recorded are both rainfall and irrigation events. Generally, the recordings of 10 to 15 mm are irrigation events and the others that are much smaller or 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



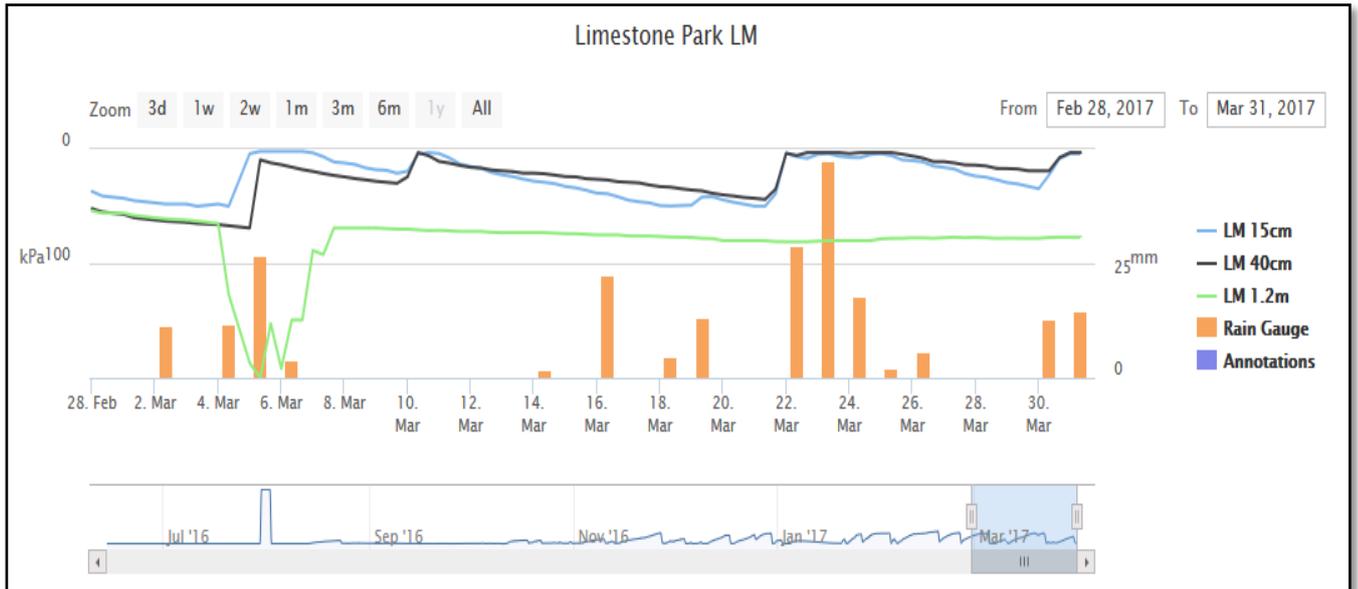
Under the Hill CP, the shallow 15cm sensor (blue line) is showing response to the two irrigation events at the beginning of the month and the rainfall events scattered through the rest of the month. It is also showing response to the water use of the crop, particularly the period from 6th to 21st March. The deeper 40cm sensor (black line) shows the profile continuing its decline from February until the rain event on 6th March where it is replenished to below Field Capacity and is drawn on only slightly until 21st March. The irrigation event on 16th March was applied to stimulate the crop in preparation for spraying out. Both sensors are fully replenished by the rain event on 22nd March and filled to saturation by the successive rain events following. The profile remained in a saturated condition for the rest of the month, reflecting that the ryegrass and native species have finished for the season.

Flats Centre Pivot



Under the Flats CP, the shallow 15cm sensor (blue line) is showing an inconsistent response to crop water use and irrigation and rainfall events. It shows a response to the rain event on 6th March which closely followed an irrigation event, causing saturation and waterlogging for a couple of days. The native pasture then recommenced using water at a consistent rate until around 22nd March, partially replenished along the way by the 12 mm irrigation application on 16th March. Its response to the major rain event 22-26 March is muted, with a slow and ill-defined up-swing that continued to the end of the month. This muted response is unusual and difficult to understand especially as just prior to the rain event the old ryegrass-native pasture mix was sprayed out and new ryegrass sown. The deeper 40cm sensor (black line) is showing a very muted response to any of the rainfall or irrigation events. The rainfall event of 22-26 March totalled 116 mm which is more than sufficient to completely refill the soil profile to the depth of the 1.2m sensor. The lack of response of the top two sensors suggests a problem has developed with the sensing or recording of the data. The 1.2 m sensor (green line) shows a response to this rain event, indicating that the moisture reached that depth. The 1.2m sensor is showing only a little movement and is around Field Capacity readings for the whole of the month.

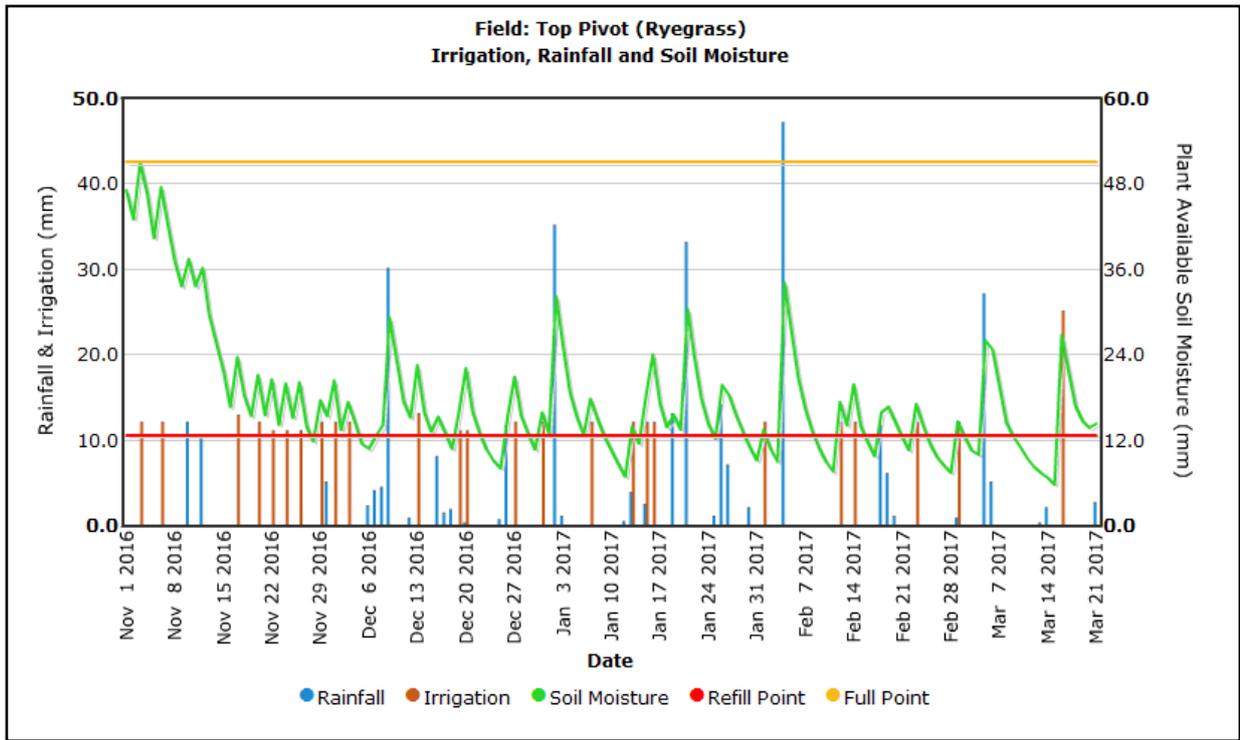
Lateral Move Field L2



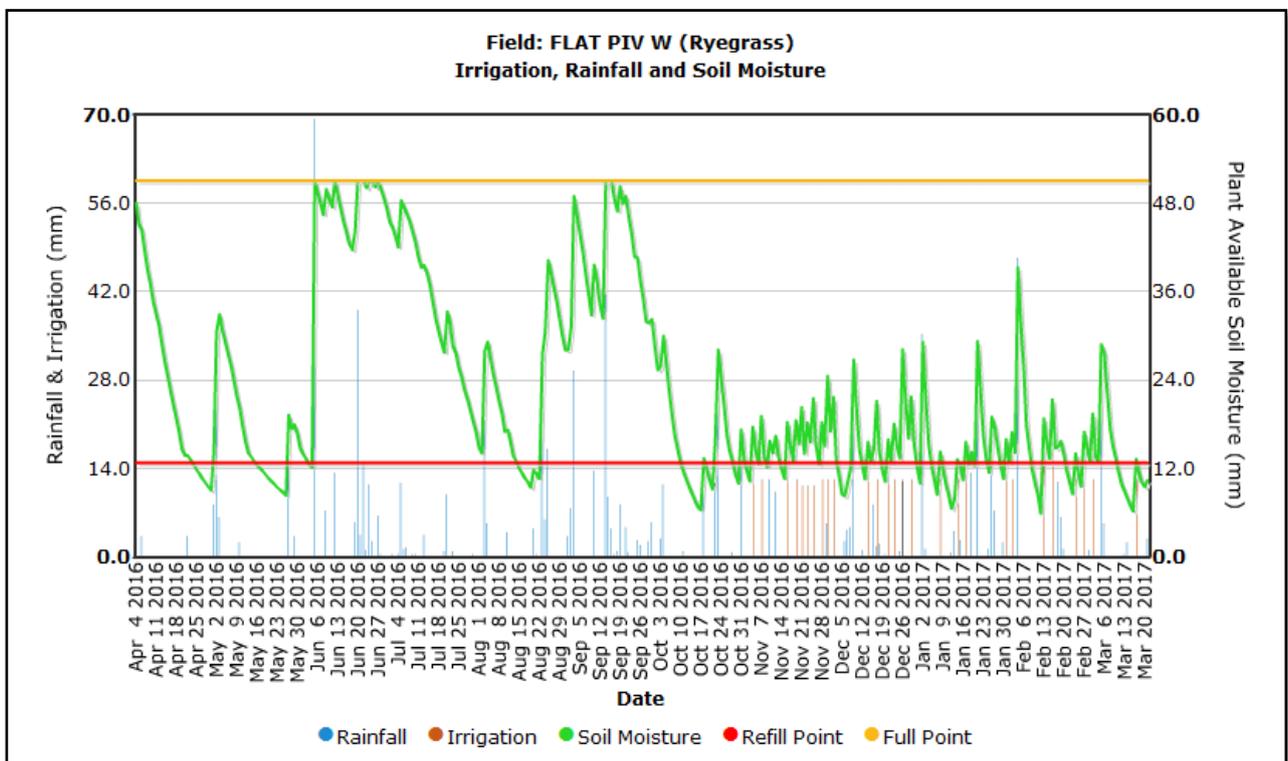
Under the Lateral Move, the shallow 15 cm sensor (blue line) shows high response to the rainfall and irrigation events throughout the month. The deeper 40 cm sensor (black line) shows a similar response. The up-tick on 10th March evident in both sensors was an irrigation event. The rainfall event of 22-26 March was sufficient to saturate the soil profile and create waterlogged conditions for several days to at least a depth of 40 cm. The Lucerne was extracting water from the upper levels of the soil profile all month, except for the first few days where it continued extracting water to 1.2 cm. The very deep 1.2 m sensor (green line) is showing an unusual response for the period 4-7 March. There is nothing about the growing conditions to explain this pattern. It may be an issue with faulty connections of some electrical joints. If this period is ignored, this sensor shows a consistent, very slow decline indicating the slightest of water use from this depth, until the rain event of 22-26 March which reversed the slow decline for a short while, indicating that the water infiltrated to this depth.

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

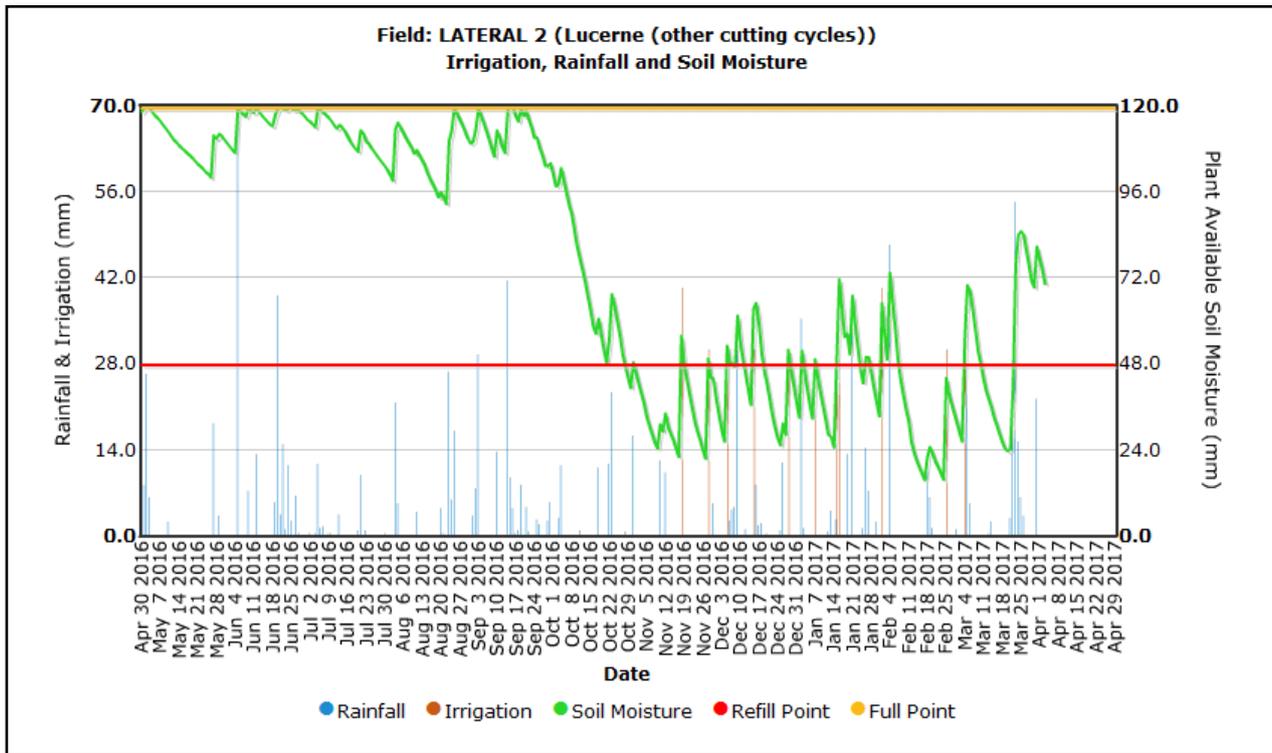
Hill Centre Pivot



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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