

The Value of the Last Irrigation – Year 2

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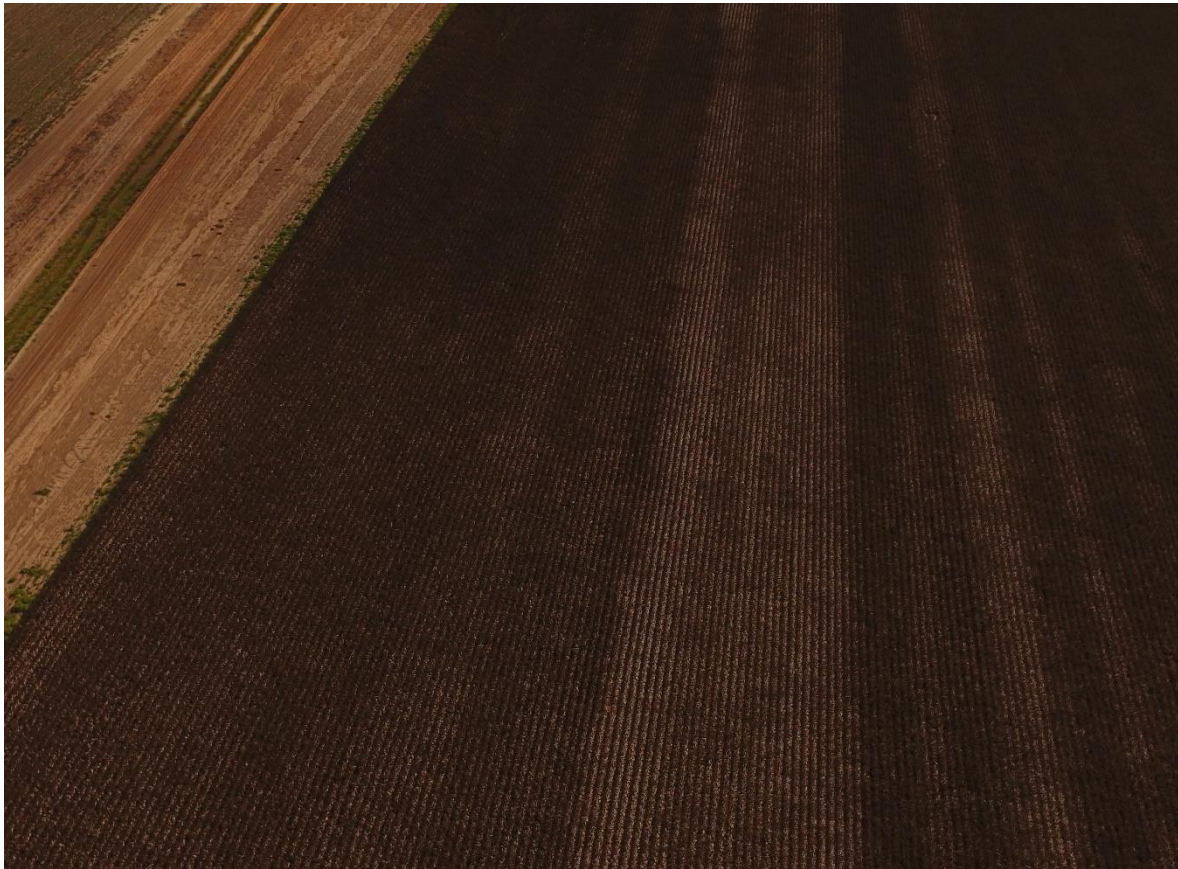


Photo Credit: Kieran O’Keeffe – CottonInfo, Site one crop showing variation in the maturity pre-harvest

Quick Take

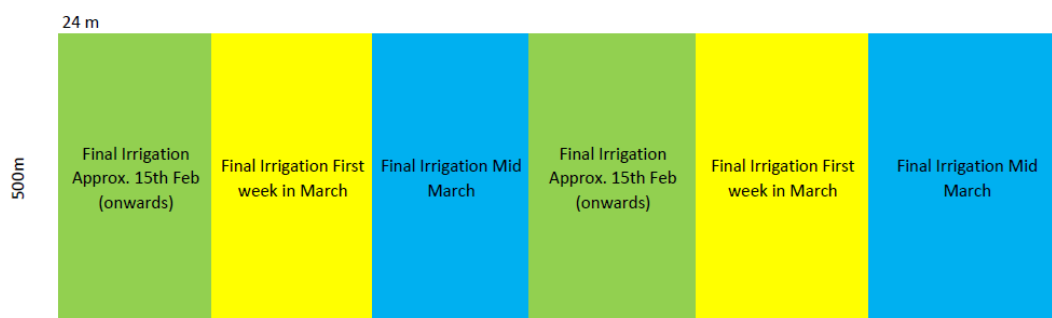
- The second-year study of the values of the last (terminal) irrigation of cotton was run across 5 sites in the Murrumbidgee Valley this year, season 2019-2020
- The mid-February final irrigation treatment was removed as the yield penalty seen last season was too high for it to be considered a practical option for growers
- The value of the data collected this year was confounded by significant rain events in March across most sites with majority having no significant yield reductions
- The more Western sites that received less rainfall showing some good variation across treatments with one site showing an 18 % yield reduction -3 irrigation when compared to the grower standard control
- Micronaire results were variable based on location and likely highly influenced by the amounts and timing of significant rain events.
- The more western fields, although not significant, did trend to the treatments missing irrigations having lower micronaire results.
- The more Eastern fields around Darlington Point/Griffith has an inverse trend in yield and micronaire with the fields cut off “early” yielding better and having better quality compared to crop irrigated out until mid-march. This could be due to the crop holding more later fruit

that was unable to finish in the cool conditions we saw this year, reflective of the area, or the potential for waterlogging slowing development and resulting in slightly lower micronaire

On the back of the work done by Steve Buster in the 2018-19 cotton season looking at the value of the final irrigation in the Southern Valleys the general feedback was that this work was critical to continue to improve the southern farming systems. As such the Southern Valleys Cotton Growers Association put in a Grassroots application to once again look at the value of the final irrigation in the southern systems and build on this knowledge bank and to continue the discussion on the return on investment at different water price points.

Year 2 Paddock Scale Investigation

For the 2019-2020 season the same 4 original farms offered to participate in this trial, along with one additional farm at Darlington Point. The plan was to replicate the similar scenario to the previous season, but with only 3 main timings. 2 replicates where applied this year where possible to try and collect a larger data set for more in-depth analysis. The example layout as shown below:



Plot Siz: 2 ha

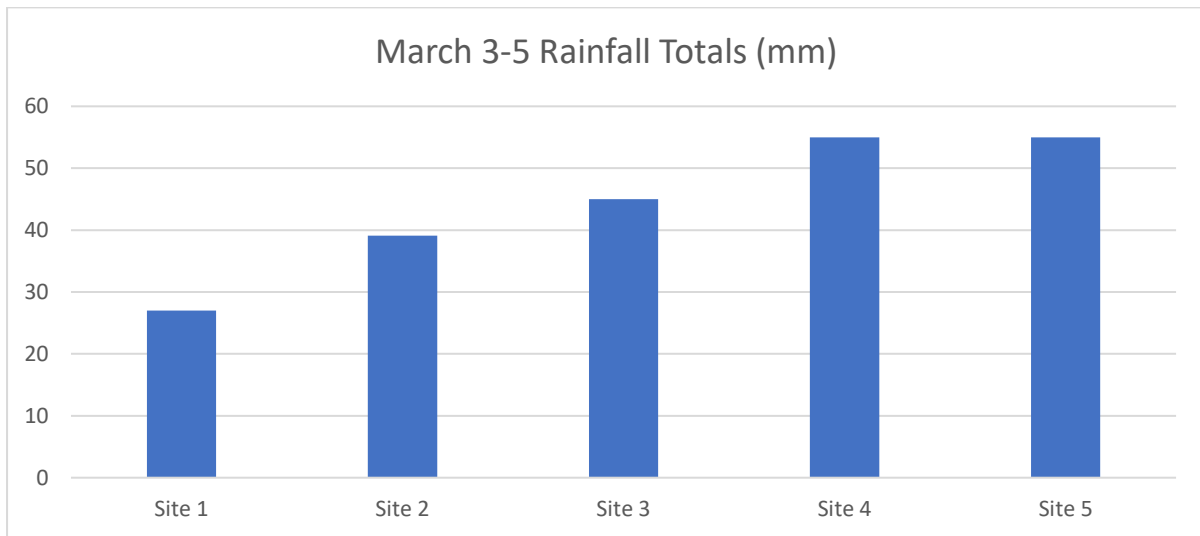
	Soil Type	Rotation	Variety	Water Up Date
Site 1	Med-Heavy Clay Loam	Fallow	746 B3F	7/10/2019
Site 2	Med-Heavy Clay Loam	Fallow	748 B3F	11/10/2019
Site 3	Med-Heavy Clay	Fallow	746 B3F	7/10/2019
Site 4	Med-Heavy Clay Loam	Fallow	746 B3F	5/10/2019
Site 5	Med-Heavy Clay Loam	Fallow	746 B3F	9/10/2019

Table 1: Field Details

	Early Feb	Mid Feb	Early March	Grower Standard
Site 1	8/02/2020	21/02/2020	1/03/2020	13/03/2020
Site 2	-	-	28/02/2020	15/03/2020
Site 3	-	23/02/2020	2/03/2020	13/03/2020
Site 4	-	10/02/2020	20/02/2020	1/03/2020
Site 5		10/02/2020	22/02/2020	13/03/2020

Table 2: Final irrigation timings at each site

Over the end of the season there were some significant rainfall events recorded in March that in some locations offered a “final water” for the final irrigation in February treatments. For the period of the 3rd-5th of March rainfall totals shown below:



Graph 1: Rainfall from the most significant event that impacted the mid-February final irrigation event.

Each of the plots were picked individually with a commercial picker, avoiding areas like tail drains where water backed up where possible. Plant heights, nodes and NAWF were collected at commencement, but as were not influenced by the trial have been omitted from this report.

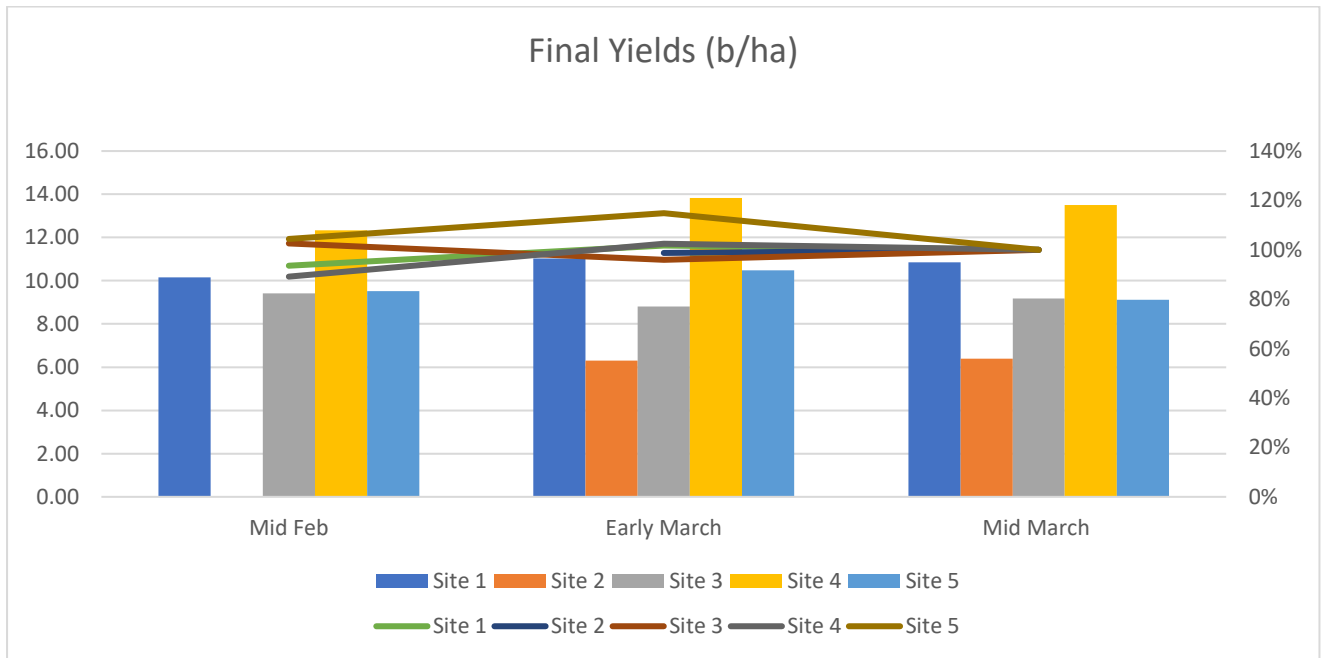
The rounds were weighed with a hand sample of lint taken from each round which were then hind ginned by Kieran O’Keeffe (CottonInfo) thanks to the DPI and then classed by Pro-Cass using their HVI (High Volume Instrument) Machine. The sites in general had similar final irrigation dates, excluding site 4 which was an earlier crop. Due to the cool finish and issues with micronaire the decision was made to take a deeper dive into how this trial effected the quality of the lint produced.

	Treatment	Turnout %	Yield (bales/ha)	Yield % of fully Irrigated	Micronaire	Micronaire Grade	Estimated Discount
Site 1	-3	47.9	8.86	82%	3.40	G4	57.14
	-2	47.2	10.15	94%	3.51	G5	0.00
	-1	47.9	11.03	102%	3.46	G5	0.00
	Grower Standard	46.4	10.84	100%	3.60	G5	0.00
Site 2	-1	46.8	6.31	99%	2.99	G3	88.00
	Grower Standard	45.9	6.39	100%	2.98	G3	88.00
Site 3	-2	45.375	9.42	103%	2.88	G3	88.00
	-1	43.7	8.81	96%	2.95	G3	88.00
	Grower Standard	44.175	9.18	100%	2.95	G3	88.00
Site 4	-2	46.6	12.33	89%	3.55	G5	0.00
	-1	46.4	13.83	100%	3.41	G4	57.14
	Grower Standard	46.6		100%	3.23	G3	88.00

Site 5	-2	43.9	9.52	104%	3.19	G3	88.00
	-1	43.96	10.48	115%	3.08	G3	88.00
	Grower Standard	44	9.13	100%	2.90	G2	109.42

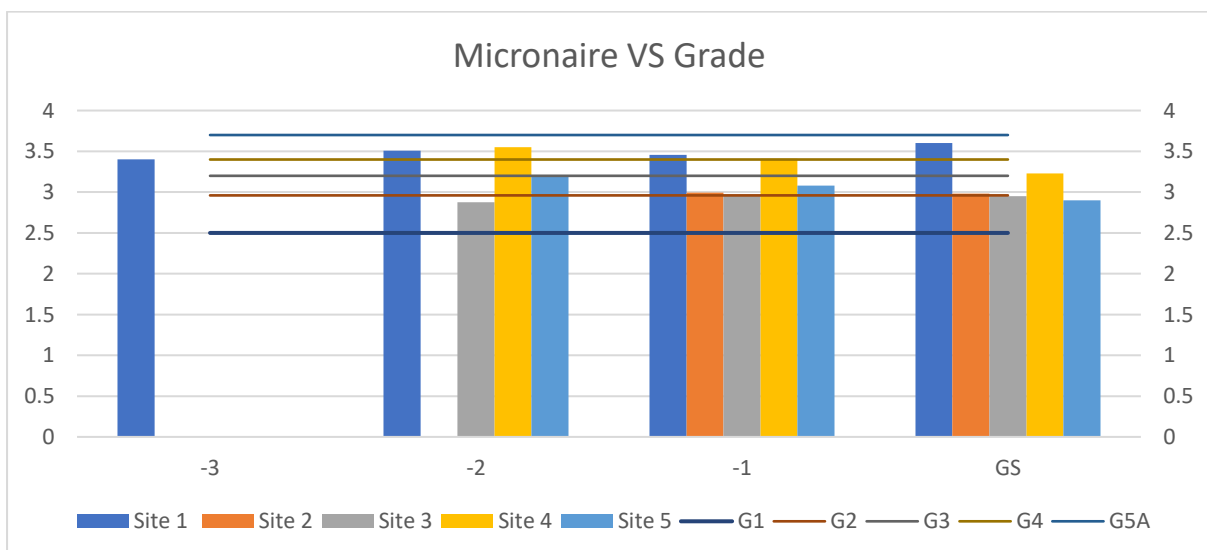
Table 3: Study Summary

The overall yields of most fields were below average due to lower than average day degrees accumulated for the season. With such a mild finish and some significant rain events the crops were not pushed in terms of their end of season water use which saw only small variations in yield. In some fields there was actually a slightly inverse trend of yield to irrigations.



Graph 2: Site yields overlaid with the percentage of the fully irrigated.

It can be seen from the data above that the yields were a bit all over the place likely due to rain events that were large enough to supplement some of the shortfalls in irrigations.



Graph 3: Average micronaire of samples by site and timing with the boundaries of grades shown.

It can be seen from the data above that there is an inverse trend between the number of irrigations and the micronaire at site 4 and 5. This is an interesting trend that could be hypothesised to be related to geographic area, as they are both the more eastern areas, and could indicate that later irrigation encouraged more late fruit set or got waterlogged due to irrigations and then significant rain events. The true cause is difficult to determine exactly but luxurious water coupled with below average day degree accumulation does appear to have a negative impact on crop micronaire.

Season		Day degrees accumulated
19/20	12th Feb DD accumulated	880.2
18/19	13th Feb DD accumulated	1005.15
12.5% less heat from Oct 1st to 12th Feb		
19/20	Day Degrees Accumulated 12th Feb - 30th April	318.65
18/19	Day Degrees Accumulated 12th Feb - 30th April	492.25
35% Less heat from previous year to finish crop		
19/20	Day Degrees Accumulated LEF to 1st pass 12th April	300.2
18/19	Day Degrees Accumulated LEF to 1st pass 15th April	432.3
31% Less heat from LEF to 1st pass defoliation		

Table 4: Day Degree Accumulation

It can be seen from the information above that the biggest factor effecting the lower micronaire is the lower amounts of day degrees accumulated, it is interesting to see that in the more eastern blocks increased irrigations compounded on this and resulted in even further reduced micronaire.

There were no other trends out of the quality results.

Conclusions

The return on investment of the final irrigation in the 2019.2020 season was an interesting study that was ultimately impacted by rain with the more eastern sites showing no significant differences in yield. The key take home messages from the second year of this trial are:

- That the cut out of irrigations in early February is yield limiting, even in a cooler wetter finish, with the second year of this result backing up Steve’s findings from last year.
- In climatic conditions that are cooler and trending towards damper there is no yield benefit to continuing to irrigate into mid-March, with site 3 and 5 having a slightly inverse trend of more irrigation resulting in a slightly lower yield.
- At the two eastern site (4 and 5) there was an inverse relationship between irrigations and micronaire indicating that final irrigations when coupled with significant rain events produced poorer quality. Site 4 went from an estimated \$88/bales discount at grower standard irrigations to no discount when final irrigation was at the end of February.
- At site 1 we saw a 6% yield increase when going from a late Feb to an early March final irrigation so water at \$300/meg, 0.8 megs/ha applied would cost approximately \$240, the yield increase of 6% on a 10 bale/ha crop assuming lint price at \$600 would be \$360/ha, resulting in a positive return on investment.
- Hindsight is a wonderful thing.



Photo: Site 1 modules post picking showing variations in lint picked off plots of the same size. Photo Emma Ayliffe, Summit Ag

Acknowledgements

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