Case Study 009 Urea Strip Trial Evaluations using the CropScan 3000H On Cobine Analyser

Introduction:

Strip trials for various nutrients, seed varieties and other plant growth parameters is a common practice in Australia and the world. However evaluating the results of the strip trials is difficult. Yield has been the only measurable parameter available to growers. Now, Protein, Moisture and Oil can also be measured using the CropScan 3000H On Combine Analyser.

This report looks at strip trials conducted by Ashley and John Wakefield, Tingara , Urania, SA, in 2016.

Description:

Figure 1 shows a field where EMI measurements have been made and the field partitioned into three zones, ie, blue, red and yellow. Deep soil tests where performed in each zone prior to seeding. The Nitrogen levels were approximately 80 units, 60 units and 40 units for the three zones respectively.

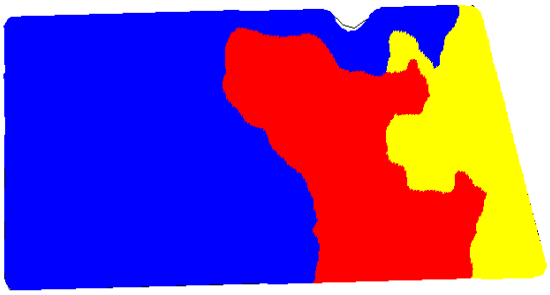


Figure 1. EMI Maps shows 3 zones

Figure 2. Shows the Urea Strip Trials applied to the paddock

The Wakefields applied three strips of Urea across the field as shown in figure 2. The application rates were 120kg/ha in the green strip, 0 kg/ha in the yellow strip and 60 kg/ha in the orange strip.

The Wakefields operate a John Deere S680 combine harvester fitted with a CropScan 3000H On combine Analyser, as shown in figure 3. The CropScan 3000H collects Protein and Moisture results for wheat and barley as the grains are stripped at an interval of between 7 and 12 seconds depending on how heavy is the crop. Real-time protein maps are generated on the in-cabin PC screen.

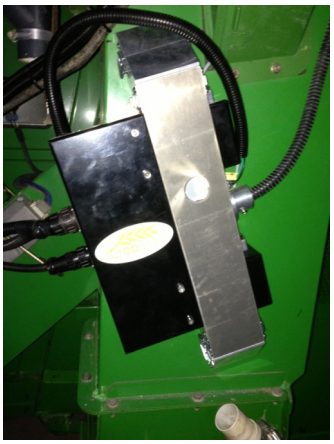
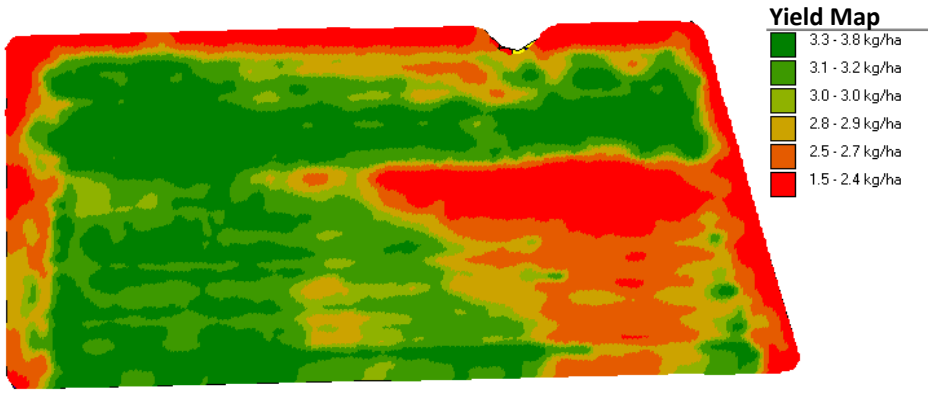


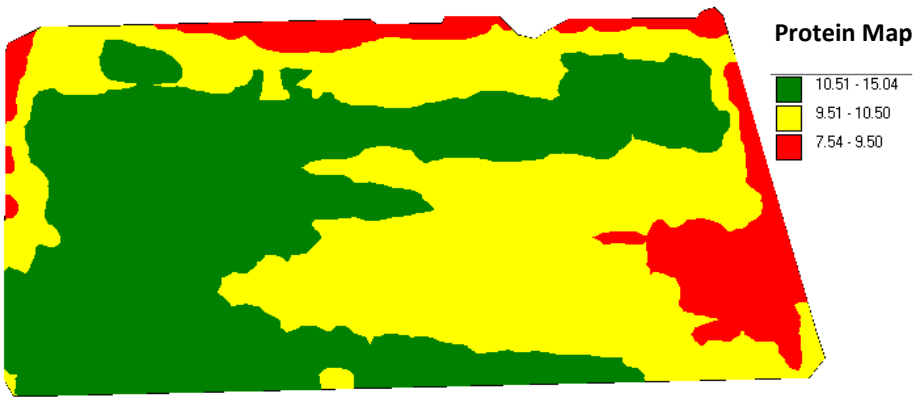
Figure 3. CropScan 3000H Sampling Head mounted on the clean grain elevator.

Results:

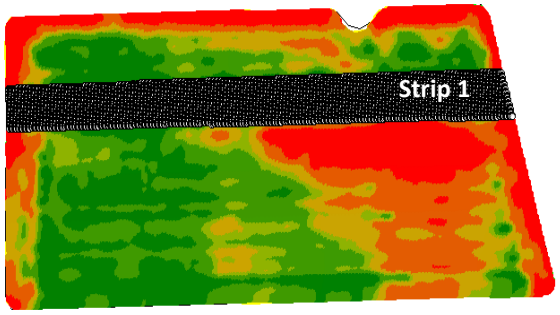
The Yield and Protein maps, figures 4 and 5, allowed the Wakefields to better understand what has occurred in their wheat crop during the 2016 harvest and then to project how to improve their production in future years.

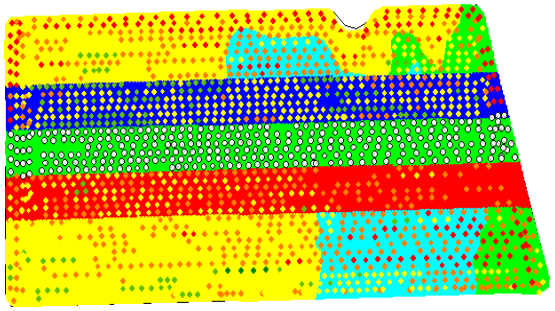
The green strip, where the 120kg/ha of urea was applied, is shown to have increased the yield and the protein in the red and the yellow soil zones, but not in the blue zone. The yellow and orange strips where 0 and 60kg/ha of urea were applied, show the protein in the red and yellow soil zones has increased marginally but the yield did not. The significance of the measurements of protein and yield are discussed below.





Figures 4 and 5 show yield protein paddock maps generated for this paddock

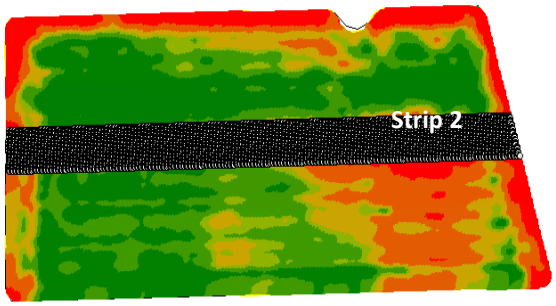


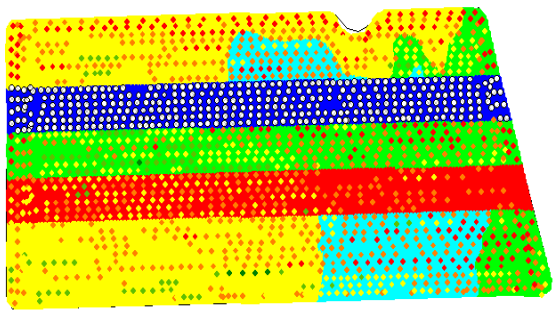


	Min	Max	Avg	Std Dev	Total
Dry Yield	1.9	3.8	3.3	0.3	40,795.8
Moisture					
Protein					

	Min	Max	Avg	Std Dev	Total
Dry Yield					
Moisture	9.7	11.2	10.4	0.2	3,128.4
Protein	8.02	13.01	10.48	0.95	3,153.03

Figures 6 an 7 show the computed Min, Max and Ave Yield and Protein data within Strip 1 (Green Zone).





	Min	Max	Avg	Std Dev	Total
Dry Yield	1.7	3.5	2.6	0.5	32,788.4
Moisture					
Protein					

	Min	Max	Avg	Std Dev	Total
Dry Yield					
Moisture	9.9	10.8	10.3	0.2	3,655.7
Protein	8.38	12.86	11.12	0.70	3,949.35

Figures 8 an 9 show the computed Min, Max and Ave Yield and Protein data within Strip 2 (Yellow Zone).

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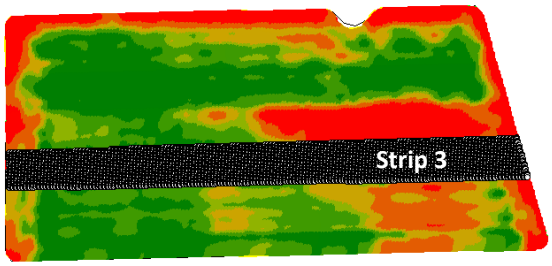
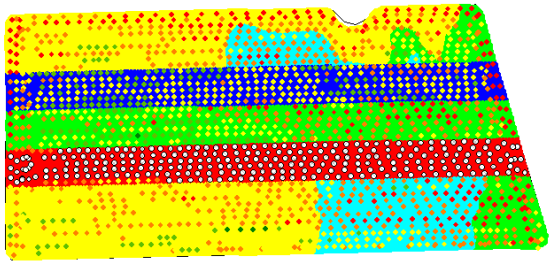


	Min	Max	Avg	Std Dev	Total
Dry Yield	1.6	3.4	2.9	0.4	39,730.5
Moisture					
Protein					



	Min	Max	Avg	Std Dev	Total
Dry Yield					
Moisture	10.0	12.3	11.2	0.4	3,037.0
Protein	7.87	11.93	10.09	0.81	2,734.93

Figures 10 and 11 show the computed Min, Max and Ave Yield and Protein data within Strip 3 (Blue Zone).

Discussion:

This field had grown canola in 2014, wheat in 2015 and 2016. The starting Nitrogen was highest in the blue soil zone. 120kg of urea was applied in all three zones during the growing period. The rainfall during the growing period on the Yorke Peninsula was exceptionally good. As such, the Yield potential was not limited by soil moisture content.

Figures 6, 8 and 10 show that the Ave Yield for the three zones was 3.3, 2.6 ad 2.9 T/ha. Figures 7, 9 and 11 shows that the Ave Protein for the three zones was 10.5,11.2 and 10.1% respectively.

The Yield and Protein maps show that the Strip 1, ie, green zone, where the 120kg of Urea was applied realised an increase in both the yield, ie, 3.3 tonne / ha with a protein grade of APW and above. This is the Sweet Spot where they achieved the optimum yield and the correct protein grade. This strip had sufficient Nitrogen to ensure the full tillering and head development plus grain filling and protein production.

Strip 2, ie, yellow zone, had the lowest yield but the highest protein which indicates that there was insufficient Nitrogen for head development and for grain filling.

Strip 3, ie, blue zone, had reached mid Yield Potential which indicates that there sufficient Nitrogen for head development but not for grain filling.

Using Strip 1 as a bench mark for full Yield Potential, the it is possible to calculate the Lost Revenue across this paddock. The total area of the paddock is 33ha. At a yield of 3.3 tonne/ha, the Wakefields should have reap 128tonne of wheat at APW grade at a price of $220/tonne. The total potential revenues could have been $28314. The actual revenues for this paddock were $26450. The lost potential was $1864 or $47,80/ha.

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