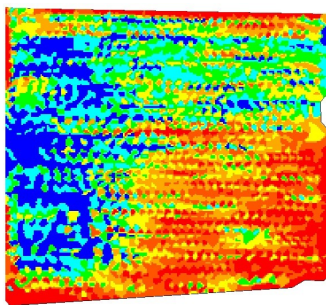


Nitrogen Removal Maps help find the "Sweet Spot" in the Protein/Yield Balance

Nitrogen Removal Maps provide farmers a more complete understanding of the uptake and availability of Nitrogen across their paddocks. The CropScan 3000H On Combine Analyser measure protein in real-time and saves the data along with the GPS coordinates across paddock approximately every 15 meters. This high density protein data can then be combined with the yield map for the paddock to generate a Nitrogen Removal Map which then lead to Variable Rate Nitrogen Fertilization application.

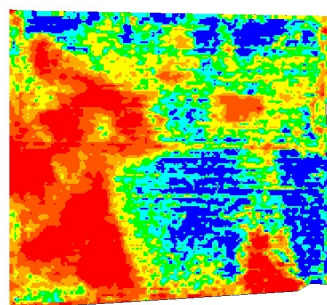
VRF has two major benefits for farmers:

- 1) reduction in N fertilizer costs
- 2) Optimization of the protein/yield balance.



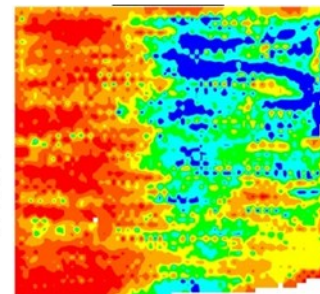
PROTEIN

- 15.04 - 12.23
- 14.51 - 15.03
- 14.07 - 14.50
- 13.59 - 14.06
- 13.06 - 13.56
- 12.46 - 13.04
- 8.37 - 12.45



YIELD

- 36 - 50 kg/ha
- 33 - 35 kg/ha
- 30 - 32 kg/ha
- 25 - 29 kg/ha
- 22 - 25 kg/ha
- 18 - 21 kg/ha
- 0.0 - 17 kg/ha



Nitrogen Removal

- 0.077 - 0.087
- 0.072 - 0.076
- 0.068 - 0.071
- 0.064 - 0.067
- 0.061 - 0.063
- 0.055 - 0.056
- 0.029 - 0.049

The Protein Map, Yield Map and Nitrogen Removal Maps shown below are taken from a property on the York Peninsula, South Australia. In the Nitrogen Removal Map, the red zone that covers the left half of the paddock, shows that the yield has been effected by too much fertilizer. The protein content has been increased such that the grade of the wheat jumps to APH1, ie, >13.5% protein, yet the yield is less than the right half of the paddock. The "Sweet Spot" is shown in the bottom right hand corner where the yield is maximized and the protein is below 12.5%.

The Nitrogen Removal Map should be used in the following season to balance out the application of Nitrogen fertilizer so that the more Nitrogen is applied to the top right hand corner and less on the left hand side and the same in the bottom right hand

Discussion:

It is recognized by agronomists and farmers that the "Sweet Spot" for optimizing profit is to maximize the yield and the protein. There is a point at which adding more Nitrogen fertilizer reaches the optimum yield after which more fertilizer can build protein. The trick is to work out where the "Sweet Spot" is for your paddocks.

In Australian hard wheat crops, a protein content of 11-11.5% is where the yield/protein balance is most likely to be optimized.

corner.

Cost Benefit Analysis:

In 2015 the farmer applied a blanket rate of Urea across this 185 Ha paddock of 56kg/Ha. Based on the price of Urea at \$437/tonne, he spent \$12,194 on Urea. However based on the applying a Variable Nitrogen Rate, he should have only spent \$10,632 and thereby saved \$1,562.

The table shows the cost savings in Urea if he had applied fertilizer at a range of rates.

	VRF Loading		Blanket Urea Loading			
	Cost of Urea using N Removal Map	Cost of Urea at 40kg/H	Cost of Urea at 56kg/H	Cost of Urea at 60kg/H	Cost of Urea at 70kg/H	Cost of Urea at 80kg/H
Cost	\$10,632	\$8,710	\$12,194	\$13,065	\$15,243	\$17,420
Savings		-\$1,922	\$1,562	2433	4611	6789
Savings/H		-10.4	8.4	13.2	24.9	36.7
% Savings		-22	13	19	30	39