# CropScan 3000H On Combine Analyser

*… Push your paddock to its fullest potential*

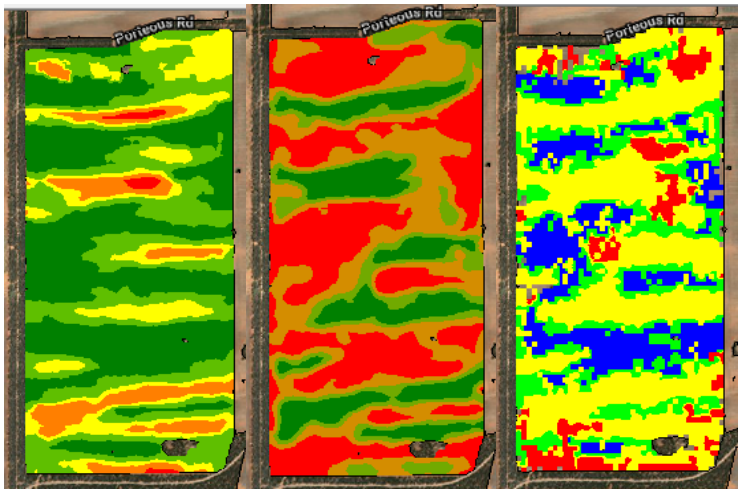
## Closing the Yield Gap:

The Yield Gap is defined as the difference in actual yield to potential yield across a region. Australia's wheat yields fluctuate from state to state and year to year. Nonetheless the Yield Gap has not closed since 1990. Change in climate causing rising temperatures and reduced rain fall. Are important factors affecting grain production and so Australia farmers have to adopt new varieties, new technologies and new farming practices in order to optimise yield across there fields and close the Yield Gap.

With the introduction of the CropScan 3300H On Combine Grain Analyser in 2013 more than 1.2 million hectare of Protein/Nitrogen data has been collected. This large spread of field data offers a new direction for farmers and their agronomists whereby they can adopt simpler Variable Rate Nitrogen Fertilization (VRF) strategies in order to increase yield and increase crop payments.

Next Instruments has worked closely with many users and reviewed Protein/Nitrogen field maps around the world. By combining the Protein and Yield data a Protein/Yield Correlation map can be used to simplify the layers into soil performance zones showing:

- Low Yield - High Protein
- High Yield - High Protein
- High Yield - Low Protein
- Low Yield - Low Protein



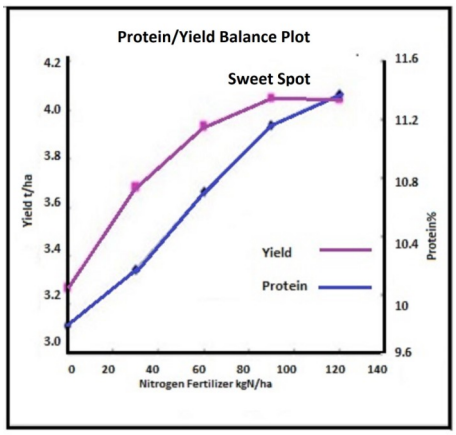

**Protein** **Yield** **Correlation**

## Protein/Yield Reponses:

Research has shown that a positive Yield Response can be achieved when the Protein in the grain is less than the 11.5%. By identifying low Protein zones in the field (Yellow and Red), then a better VRF Nitrogen strategy can be used to increase Yield.

In 1963 JS Russell reported on the relationship between Yield response and grain Protein content in an article written for the Journal of Australian Agriculture and Animal Husbandry. He showed that Yield Response is positive to Nitrogen fertilizer up to 11.4% protein. If the grains are harvested and have less than 11.4% protein, then the full Yield potential has not been achieved. In other words, if the grain Protein content is less than 11.4% then you are leaving money on the paddock.

McDonald and Hooper, University of Adelaide, Dept of Agriculture, reported 50 years later that their trials across southern Australian crops showed that Russell's findings were still valid.




The above plot comes from the CSIRO, Brill et al, 2012. The data was produced from trial in the Parkes area of NSW. The plot shows the effects of increased Nitrogen fertilizer on Yield and Protein. At approximately 11.5% protein the Yield plateaus where as the Protein continues to increase. Where the Yield is optimum and the Protein achieves the best grade payment, is called the "Sweet Spot". The optimum Yield can vary for different varieties and growing conditions.

**Implications for Farmers:**

The average wheat Yield across Australia is 1.6T/ha and the average Protein content is 9.5%. The Potential Yield is 2.9T/ha. The Yield Gap is approximately 1.3T/ha. Across all the farms where Protein Field Map have been collected using the Cr3300H, approximately 30% of fields exhibit low Protein and Low Yield zones. If the Yield in these zones is less than the paddock average and the Protein content is less than 11.5% then there was insufficient Nitrogen available for the plant to achieve the full Yield Potential. Applying more Nitrogen in these zones will produce a positive Yield Response in the following season.

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In 2017 the farmer grew wheat again on the same field. The rainfall was average and the yields across his farm were less than the previous year. He applied the Urea according to the above formula several weeks after sowing.

Figure 5 shows the Protein and Yield maps for 2017. Figure 6 shows the Protein/Yield Correlation Quadrant map for 2017.

The zone marked Field 1 had previously a below average yield and protein less than 11.5%. The application of extra Urea, i.e., 120kg/ha, in this zone resulted in an increase in yield and a jump in protein grade from APW to H2. The bulk of Field 2 where 100kg/ha of Urea was applied, jumped form H2 to H1 grade. The yield in this zone did not increase as compared to 2016 crop.

There is another zone marked Variety Trial in the 2017 Protein map. The farmer had planted a different variety of wheat in this corner. Although the fertilizer rate in this zone was 120-100kg/ha, the protein did not match the rest of the field, i.e., APW and ASW as compared with H2 and H1. However the yield was higher in this zone. Obviously the plant had responded well to the extra Nitrogen in the growth stages but run out of Nitrogen in the flowering and filling stages.

The farmer made three significant observations about the 2017 result in relation to his Variable Rate Fertilization program.

1) He calculated that the variation in yield across this field had been reduced by 40% as compared to 2016. The VRF program, although quite simple, achieved a significant improvement in the consistency across the field in terms of yield and protein.
2) He also calculated that he realised an additional $5000 income based on in field blending to raise the wheat from H2 to H1 grade and thereby gaining an extra $10 per tonne.
3) The zone marked Variety Trial was also separated out from the rest of the field based on protein. If he had blended the wheat from this zone with the other zones then he would have down graded the H2 to APW and potentially lost $30 per tonne.

His final comments was that his simple approach to VRF quickly captured the low hanging fruit. Further understanding of the protein and yield maps will possibly allow them to increase productivity even further.

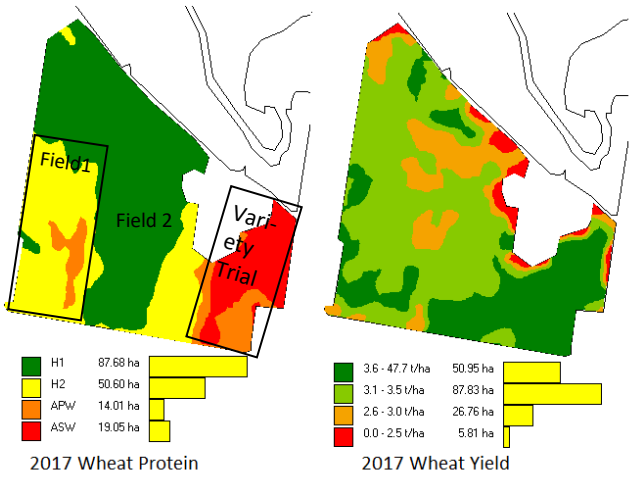


Fig 5. Protein and Yield Maps for 2017

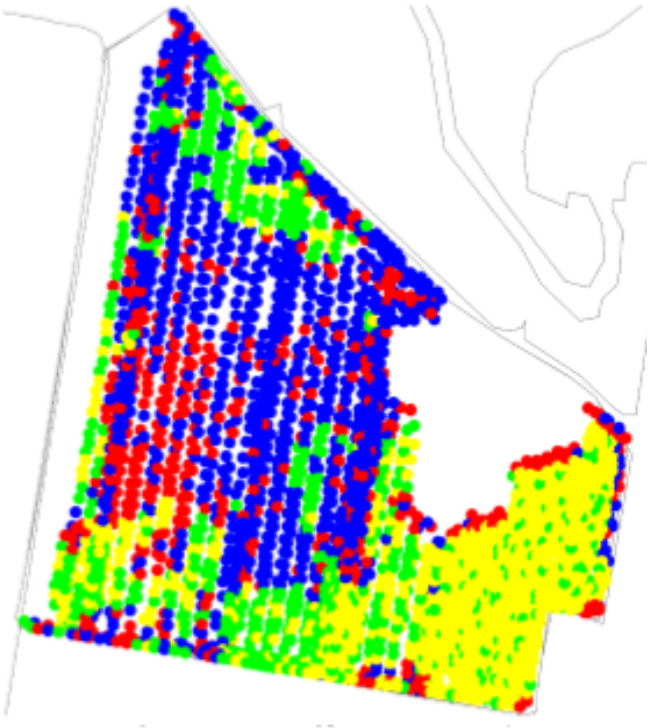

Fig 6. Protein/Yield Correlation Quadrant Map

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