Quality management for grain

Despite five years of experience with protein meters James Hassall has yet to have sufficient data to assess the economics of protein maps as a data layer for making nitrogen decisions. Photo: Emma Leonard

***Emma Leonard**, AgriKnowHow*

The strong relationship between soil available nitrogen and grain protein offers an ideal opportunity to match nitrogen inputs to grain quality targets but growers are struggling to turn this into a reality.

For the past five harvests, James Hassall has been experimenting with a Zeltex AccuHarvest® grain protein and moisture meter. James crops 1620 hectares of wheat, canola, chickpeas, triticale, lupins and faba beans, at Gilgandra, NSW.

"My long term objective is to grow a paddock of bread wheat with protein between 12 and 13%; if I achieve this I should not be wasting any nitrogen fertiliser," said James.

James philosophy for matching nitrogen to wheat protein percentage is based on research conducted by Wayne Strong, Queensland DPI&F, which showed that generally when wheat protein fell below 12.5% there was insufficient soil nitrogen.

By using the protein meter on his harvester James is trying to identify areas in his paddocks that have protein levels that vary greatly from the average. With this information he is then hoping to determine what is driving the variation.

To understand the protein variation he is cross referencing the protein maps with current and historical yield and electromagnetic (EM) maps. He has started to gain an indication of whether any large divergence from the average is due to a significant soil type difference and/or due to consistent over or under fertilisation of that part of the paddock.

From this point he wants to build nitrogen removal maps as a basis for variable rate (VR) nitrogen input for next crop.

"2008 was my first year of VR prescription maps, but due to hail and a generally wet harvest, I failed to gather any reliable yield maps and no protein maps."

"For 2009, I will have to base my variable rate nitrogen on historical zones."

James is using a four year rotation and plans to tailor his variable rate nitrogen strategies to each crop and season (Table 1). He is the first to admit this is likely to be the starting point and modifications will occur as he continues.

James has compared the value of using different datasets to calculate nitrogen removal/nitrogen replacement for the next crop. These are average yield and protein to establish a blanket rate across a paddock; a yield map to produce a range of nitrogen replacement rates, or yield and protein maps to produce a range of nitrogen replacement rates.

The statistical analysis indicates that using a yield map and a protein map to produce a nitrogen replacement

Table 1. Nitrogen strategies across the rotation including the role of protein maps.

Year	Crop	Nitrogen strategy
1	Pulse	
2	Wheat	VR Starter N (low rates) based on management (yield potential) zones. Top dress N based on Greenseeker® in crop measurements
3	Canola	VR N at sowing (high rates) based on analysis of previous yield and protein maps. N map based on N removal by previous wheat crop with possible modifications in some areas based on analysis of interaction between protein, yield and EM maps.
4	Wheat or Barley	VR sowing N based on removal by previous canola crop and management zones. Top dressed N based on Greenseeker®. Yield and protein map studied to assess effectiveness of N management strategy
1	Pulse	

Measurement to increase productivity

map should be more accurate than the other two methods.

He proposes that the resultant nitrogen replacement map can be further 'tweaked' to rectify any major soil nitrogen deficiencies highlighted by traditionally medium to high yielding areas where protein levels are extremely low.

However, James admits, "as yet putting a dollar value on all this is still tricky".

Using yield and protein data will result in the production of a more accurate nitrogen removal map. However, James has yet to be prove if the relatively small increase in accuracy over using average protein alone is worth the cost of producing a protein map.

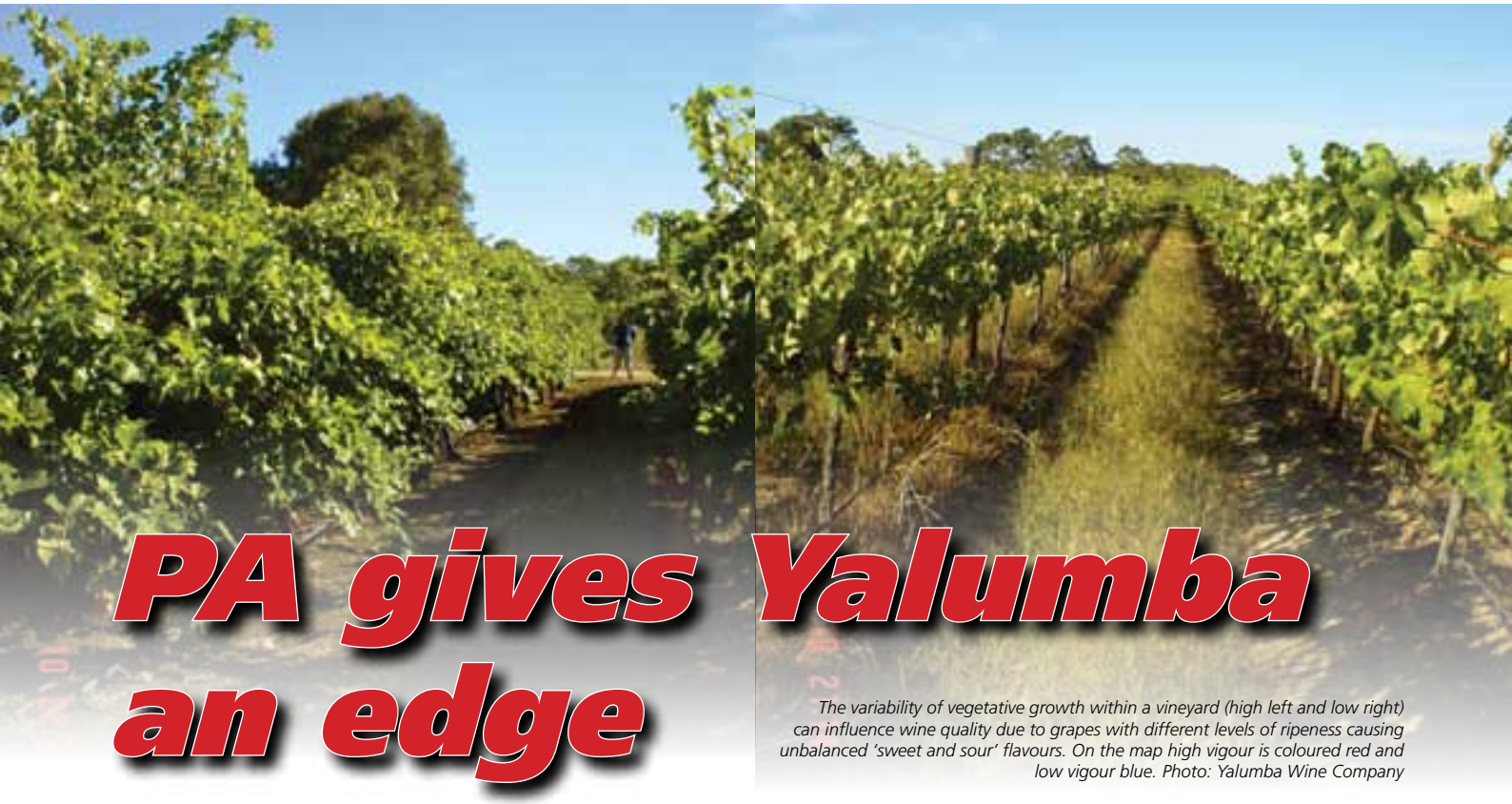
"I still feel that the main benefit of a protein map is that it provides another layer to help me better understand field and crop dynamics."

James Hassall has recently embarked on a Nuffield Farming Scholarship and hopes to learn more about how PA tools including those to measure and manage crop quality can benefit grain production in Australia. To keep in touch with his progress over the next few months visit his blog at http://jhassall.blogspot.com/

Several grain growers tested protein meters in 2008 and it is hoped to report more details of their experience in future publications.

For more information

James Hassall,
02 6848 8214,
j.hassall@bigpond.com



PA gives Yalumba an edge

The variability of vegetative growth within a vineyard (high left and low right) can influence wine quality due to grapes with different levels of ripeness causing unbalanced 'sweet and sour' flavours. On the map high vigour is coloured red and low vigour blue. Photo: Yalumba Wine Company

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At the SPAA Crop Scanning Forum in August 2008, Ashley Ratcliff, Agribusiness/Technical Manager for the Yalumba Wine Company explained how by using PA tools to improve their wines Yalumba aims to achieve a market edge.

Yesterday, the fact that grapes were hand picked was used as a sales tool to promote wine quality. Today the Yalumba Wine Company knows that PA picked grapes help improve wine quality and is keen to demonstrate this to consumers.

Yalumba owns and manages vineyards in the South Australia, Central Victoria and Tasmania. In addition grapes are purchased from about 180 growers.

Since 2003, plant cell density (PCD) maps created from satellite images have been used to identify variation in vineyard vigour. In the same year a project was started to establish if the use of PA tools, primarily PCD maps, could help improve wine quality and improve profit.

The Menzies is a premium, Cabernet Sauvignon wine produced from a vineyard in the Coonawarra, SA and retails for about $45/bottle. In 2003, the vineyard was considered to be under performing and became the location for the PA adoption trial. In the trial, pruning weights, maturity data, yield, vine nutrition, grape quality and sensory analysis were measured for three years.