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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

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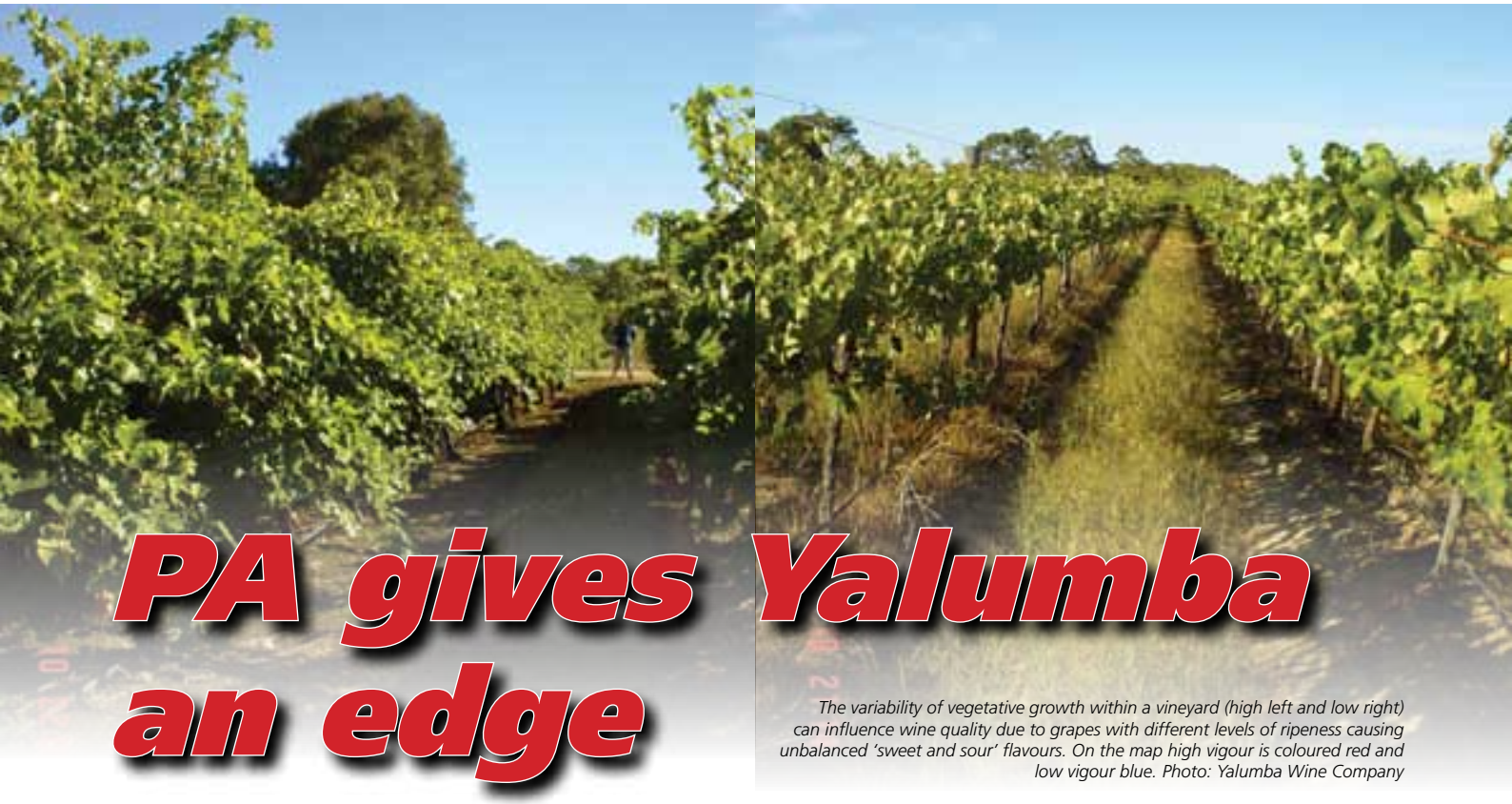

PA gives Yalumba an edge

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

***Emma Leonard**, AgriKnowHow*

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.

The standard analysis process at vintage is to gather 20 bunches randomly across the target harvest area. For the trial the locations of the randomly chosen sample areas were recorded and located across the 15.6 hectare vineyard on the PCD map. It was found that only 20 per cent of samples were collected from high vigour sites but 45 per cent of samples came from low vigour sites, with the remainder from medium vigour areas. This imbalance in sampling locations was highly likely to generate a misleading Baume reading for the whole block.

Sampling highlighted a difference in yield between high and low vigour sites of 5.55kg/vine that equated to 9.2t/ha. Even halving this yield difference would make a substantial impact on the productivity of the vineyard.

In an attempt to control the high vigour sites (Figure 1), in-line taps were installed into the drip line to reduce the amount of water/ fertiliser being applied.

The variability of vegetative growth within a vineyard can influence wine quality due to grapes with different levels of ripeness causing unbalanced 'sweet and sour' flavours. Combining information from PCD maps with extensive 'ground truthing' and data collection allowed 'harvest zones' to be identified within the vineyard.

The low vigour sites contained grapes that were constantly exposed to sunlight. These grapes were riper than the grapes found in the higher vigour sites, plus they contained cooked/ stewed characteristics and had a higher anthocyanin and phenolic concentration. The grapes in the low vigour sites displayed a greater intensity of green characters (methoxypyrazines).

These grape characteristics of the low and high vigour sections (cooked/ stewed and green) are not desirable for the making of high quality wine. The balanced sections of the vineyard (medium vigour) displayed grape characteristics that were desirable and variety specific. Harvest zones, based on the PCD maps and on sampling,

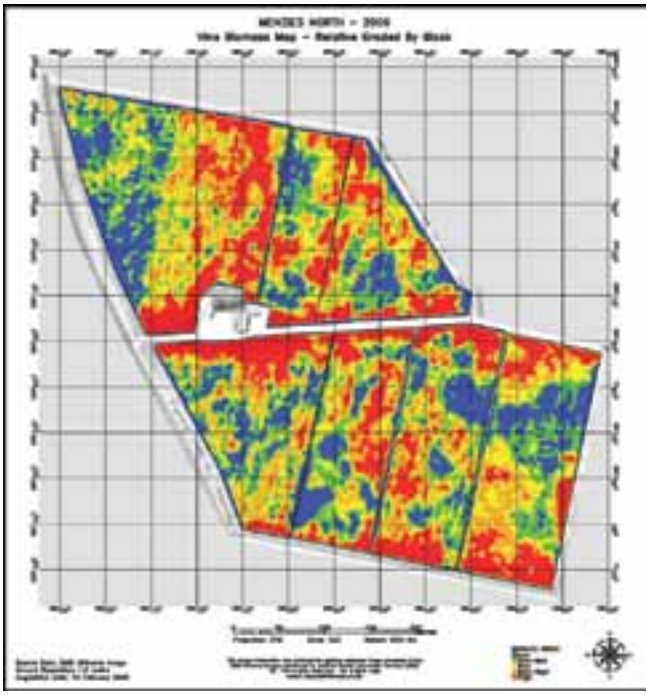

Figure 1. On this PCD map produced prior to changes in management the high vigour is coloured red and low vigour blue.

were developed to ensure that the different sections of the vineyard are harvested at the precise time.

Harvesting of these zones follows one of two methods. If data generated from grape samples collected from each zone identifies low variation between the zones, then all of the zones from the vineyard are harvested at the same time and picked into separate bins. If there is considerable variation between the harvest zones, a number of picks will occur over a period of time. In most cases the harvest zones from an individual vineyard are kept separate during the winemaking process and blended as finished wine where appropriate. The process of harvesting via zones has helped reduce the problems of sweet and sour wines and significantly improved wine quality.

However, the management applied to reduce or work within vineyard variability is considered by Ashley Radcliff to be a band-aid approach. In 2007, part of the Menzies vineyard was redeveloped allowing more comprehensive management of variability to be introduced.

In June 2007, the old Solar A vineyard (5.6ha) was removed and preparations began for the planting of the new vineyard. The soil type

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of the site is terra rossa (light red-brown clay over limestone). While soil pit data already existed for the site, the numbers of soil pits were limited as the old soil survey was based on a traditional 75m x 75m grid. To gain a better understanding of the depth of the limestone a 10m by 10m soil depth survey was completed.

When the soil depth survey and the PCD maps were compared, there was a strong relationship between soil depth and vine vigour. In addition, the change in distribution of vine vigour patterns between the three PCD maps captured in 2003, 2005 and 2006 did not alter greatly. With an understanding of the variation in soil depth and its relationship to vine performance, the Yalumba management team developed a new irrigation system that was tailored to the different vigour sections within the vineyard.

To achieve this, irrigation valves were located in relation to vigour to allow more precise application of water and fertilisers. In this way the low vigour and high vigour sites can be managed completely separately from each other.

In addition, the use of PCD maps enables the precise placement of soil moisture monitoring equipment that further facilitates better management of variable sites. This approach has moved away from the 'band-aid' approach to managing vineyard variability.

For more information

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