

# Changing the vineyard for climate change

Stephanie Timotheou catches up with Dr Sigfredo Fuentes, who is leading the Vineyard of the Future initiative at the University of Melbourne and discusses the latest findings and updates on the global project.

THE EXTREME EFFECTS of climate change are taking their toll on the viticulture industry, making the future of vineyards here and abroad uncertain.

Which is why University of Melbourne wine science lecturer Dr Sigfredo Fuentes and a team of researchers around the world are developing a project to better arm the industry against that change.

Vineyard of the Future (VoF) is being conducted in Australia, Chile, Spain and the US.

Its aim is to develop an integrated device to obtain thermal maps using a mobile system which captures spatial variability of water status within crops.

It also serves as a test-bed for new and emerging technologies which can be applied either for viticultural and oenology research or for practical applications to increase efficiency of management strategies.

While the program has only been running three years it has already made a lot of progress.

Fully-instrumented trial vineyards which consider the soil, plant and atmosphere continuum have been put in place to assist researchers while they study the effects of climate change and grapevine physiology.

Fuentes has been a member of the initiative since Australia jumped on board in 2011 with initial funding by the University of Adelaide's Waite Research Institute (WRI).

The VoF was previously led by WRI professor Steve Tyerman but due to funding issues, Adelaide's participation in the initiative has been put on hold until further notice.

Fortunately this didn't bring the stop the project and Fuentes is still going full-steam ahead to take charge of the fight against global warming.

## AT A GLANCE:

- Vineyard of the Future is a global effort to develop an integrated device to obtain thermal maps using a mobile system to capture spatial variability of water status within crops.
- The future of viticulture and winemaking under a changing environment requires smarter approaches to assess potential impacts of climate change on grapevine growth, water status and the quality of fruit and wine.
- Rapid assessment of specific management strategies on vine physiology, growth, water and nutrient status can be done by growers and winemakers using low cost technology.



Say cheese: Infrared camera taking a thermal image from grapevines in the glasshouse. On top of the camera is an IR scanner with a 1 per cent cost compared to the thermal camera which is currently under testing by the VoF (Australia - Chile).

He said the future of viticulture and winemaking under a changing environment requires smarter approaches to assess potential impacts on grapevine growth, water status and the quality of fruit and wine.

Since joining the project, Fuentes has worked with long, short and proximal

remote sensing using satellites, drones (multicopters) and robots.

He has also been exploring ideas to be incorporated into the VoF such as a robotic pourer for sparkling wine assessment using video and image analysis of foam stability.

This is to be associated with quality descriptors and protein content of wines.

## TYERMAN'S SOLUTION TO CLIMATE CHANGE

While Tyerman's involvement with the VoF is in limbo, he still has strong views about what can be done to prevent global warming.

The viticulture industry is vulnerable to climate change because of the grapevines high sensitivity to temperature and rainfall.

He said to successfully adapt, the industry needs better management systems which allow rapid response to climatic events and other risks.

"We need a complete picture of how the vine is responding to climate variables and soil conditions at any particular time," he said.

Researchers hope the technology will also help the industry become more efficient. ▶



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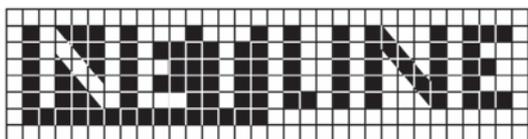
Eye in the sky: Octocopter from the VoF - Chile preparing for a measurement flight. This octocopter carries a thermal camera, a normal visible camera and a multispectral camera.

“Grapegrowers are facing cost pressures and we want to show them it is possible to cut costs and save on labour using modern sensors and imaging,” Fuentes said.

Some of the tested technologies and techniques have been available for growers to monitor their own vineyards for changes in plant water status and canopy growth.

Tools include a wetting pattern analyser to help better target irrigation and fertiliser use, infrared thermography and automated analysis to assess plant water status and canopy assessment using cover photography.

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**Contact Graeme Bertuch**

**E: [mountcole@harboursat.com.au](mailto:mountcole@harboursat.com.au)**

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## THE VoF IN ACTION

SA's Wynns Coonawarra Estate is currently testing applications developed by the VoF including near infrared spectroscopy (NIR) to assess plant water status and canopy vigour assessment using digital cover photography analysis.

Wynn's vineyard manager Allen Jenkins said the near infrared photography is taken by an aircraft which flies over the vineyard at about 7000 feet.

While it can't see into the soil it allows Jenkins to gauge how green the vines are and what the plant cell density of the vineyard is.

“An aerial image which is called a plant cell density map is taken by the aircraft flying over the vineyard which reads, if you like, the vine greenness,” he said.

“It tells us the different levels of vigour in certain parts of the vineyard.

“The green parts indicate the low vigour parts of the vineyard and the black parts mean the vines are growing more vigorously and have denser and greener plant cells, which is probably too healthy for making grape wine.”

He said this makes life much easier for viticulturists and takes the hassle away from everyday viticultural practices.

After a successful series of VoF seminars with viticulturists in Chile, San Pedro vineyards also adopted canopy vigour assessment technologies for the 2013-14 season.

These seminars were held from 13-15 November in Isla de Maipo and Molina.

During the 2013-14 season, VoF in Chile and Australia will be testing octocopters over commercial vineyards to assess plant water status and growth using high spatial and temporal infrared and visible imagery.

## FUTURE OF THE VoF

A multinational competitive project based on the VoF initiative has been successful in obtaining funding and will be executed in three grapevine seasons in the southern hemisphere.

It will run between 2013 and 2018 to develop a low cost infrared scanner on top of unmanned terrestrial vehicles to monitor plant water status at high spatial and temporal resolutions.

The VoF is advocated to develop these new and emerging technologies and to apply them to national and international funding bodies to continue growing in Australia and overseas.

It is also working to develop these new and emerging technologies to facilitate the decision making process within the wine industry to consider the constraints of climate change.

## STRATEGIES FOR A POSITIVE FUTURE

Rapid assessment of the effect of specific management strategies on the grapevine physiology, growth, water and nutrient status can be done using smart, accurate and low cost technology by growers and winemakers.

These strategies vary from monitoring pests and diseases to irrigation techniques such as regulated deficit irrigation or partial root-zone drying to increase the quality of grapes.

The VoF is also exploring novel non-orthodox techniques such as the use of dogs in the field and winery which has great potential.

Fuentes said the group will continue working with the development of these tools which will result in a tighter relationship between scientific research and the industry.

**Contact:** Sigfredo Fuentes.

Phone: 61 3 9035 9670.

Email: [sfuentes@unimelb.edu.au](mailto:sfuentes@unimelb.edu.au).

Website: [www.vineyardofthefuture.wordpress.com](http://www.vineyardofthefuture.wordpress.com).

