Spotlight on vine dormancy

With constant reminders of the potential impact of global warming in decades to come, Australian wine researchers are looking to unlock the secret to how vines cope with heat. A vine’s ability to survive hotter and warmer summers could lie in its ability to breathe new life into its shoots at bud burst.

Undertaken at the University of WA, and funded by the Grape and Wine Research and Development Corporation, the 12-month research project, titled Investigation of Respiratory Control in Dormant Grapevine Bud, has offered fresh insights.

Project head Michael Considine believes a better understanding of respiratory control during vine dormancy could offer new knowledge to improve vineyard management practices, particularly in marginal viticulture areas, as well as for other vine stresses such as drought and salinity.

“This project generated the base information in respiration and oxidation during bud burst, but by comparison to knowledge in more simple plant species this is quite superficial,” Assistant Prof Considine said.

Respiration is the fundamental driver of metabolism, growth and adaptation in plants. In grapevines, respiration of grapevine buds has a significant influence on fruitfulness and spatial variation.

“We expected that respiratory control and ‘redox’ metabolism was regulated and important during bud dormancy and bud burst,” he said.

“However, we still do not understand the intricate details of the network that regulates respiratory control or the effects of altered respiratory control in bud dormancy and bud burst.

“This project has given us a better understanding, but importantly provided a platform to accelerate this research.”

The next step would be to investigate how oxidation is signalled during dormancy and bud burst – whether it is an initial signal of other events in bud growth or whether there are signals such as hormone changes that lead to oxidation.

University of WA PhD student Karlia Meitha, who carried out this project, and other PhD students are already studying respiration, oxidation and the cell cycle in bud dormancy, with a view towards an integrated understanding of dormancy control.

As part of the first research project, Prof Considine and Mrs Meitha travelled to the United Kingdom to work with Christine Foyer at the University of Leeds.

“Prof Foyer is an international expert in translation of basic plant sciences to agriculture,” Prof Considine said.

“She also has experience in grapevine and has a wealth of expertise in simple plant species that are highly relevant to bud dormancy.

“The grapevine is a complex plant, and not the easiest system to study. Great advances in plant biology have been made through translating knowledge from other, more simple plant species to crops – which is why it was such a privilege to meet and share our research with Prof Foyer.”

Prof Considine holds a shared position between the Department of Agriculture and Food Western Australia and the University of Western Australia.

“Scientifically, I am interested in how perennial fruit, particularly grapevines, respond to the environment from year to year, through developmental cycles from dormancy, shoot growth, flowering, fruitset, ripening and senescence back to dormancy,” he said.

“Dormancy is my main interest, as I find it fascinating that plants possess the ability to conditionally maintain a resting state, and evolved to use climate cues to sense when enough winter is enough.”

• Details: gwrdc.com.au

Key Points
- Focus on respiratory control
- Intricate details not understood
- PhD students research issue
LESS STRESS: A better understanding of respiratory control during vine dormancy could offer new knowledge to improve vineyard management practices, particularly in marginal viticulture areas, and to tackle other vine stresses such as drought and salinity.