

Equipping Winemakers to Respond to Smoke Taint in Real Time

Empowering Australia's Wine Industry with On-Site Diagnostic Tools to Support Rapid, Informed Decisions During Bushfire Events

Bushfire smoke poses an escalating threat to the Australian wine industry, with more than \$400 million in grapes lost or downgraded over the past decade due to smoke taint.

With climate change increasing the frequency and intensity of fire events, winemakers are under pressure to make fast, high-stakes decisions about whether to harvest potentially contaminated fruit. Yet until recently, they've had no practical, rapid way to assess smoke exposure in the field. To address this urgent challenge, a QUT research team from the Centre for Agriculture and the Bioeconomy - led by Professor Kirill Alexandrov in collaboration with the Australian Wine Research Institute and CSIRO - developed the first portable diagnostic test for detecting smoke contamination in grapes.



Sampling grapes for smoke taint detection
Source: ARC Centre of Excellence in Synthetic Biology

This innovative test replaces the need for laboratory analysis, which previously required sending samples to South Australia, often delaying results for days during peak harvest periods.

The research team combined organic synthesis, nucleic acid (aptamers), and protein engineering to create biosensors that detect phenolic glucosides, the chemical markers of smoke taint. The result is a simple, cost-effective field test that can be used directly in vineyards or wineries—providing grape growers and winemakers with timely, evidence-based information to guide harvesting and processing decisions.



Impact highlights

- Pioneered a rapid, field-deployable diagnostic test for grape smoke contamination, replacing time-consuming lab-based testing.
- Provided winemakers with timely, science-based tools to inform harvesting and processing decisions during bushfire events.
- Supported industry resilience by reducing uncertainty and financial risk associated with smoke taint in a changing climate.
- Research team included Professor Kirill Alexandrov, Dr Elena Eremeeva and Ms Micaela Belen Sequeira.



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