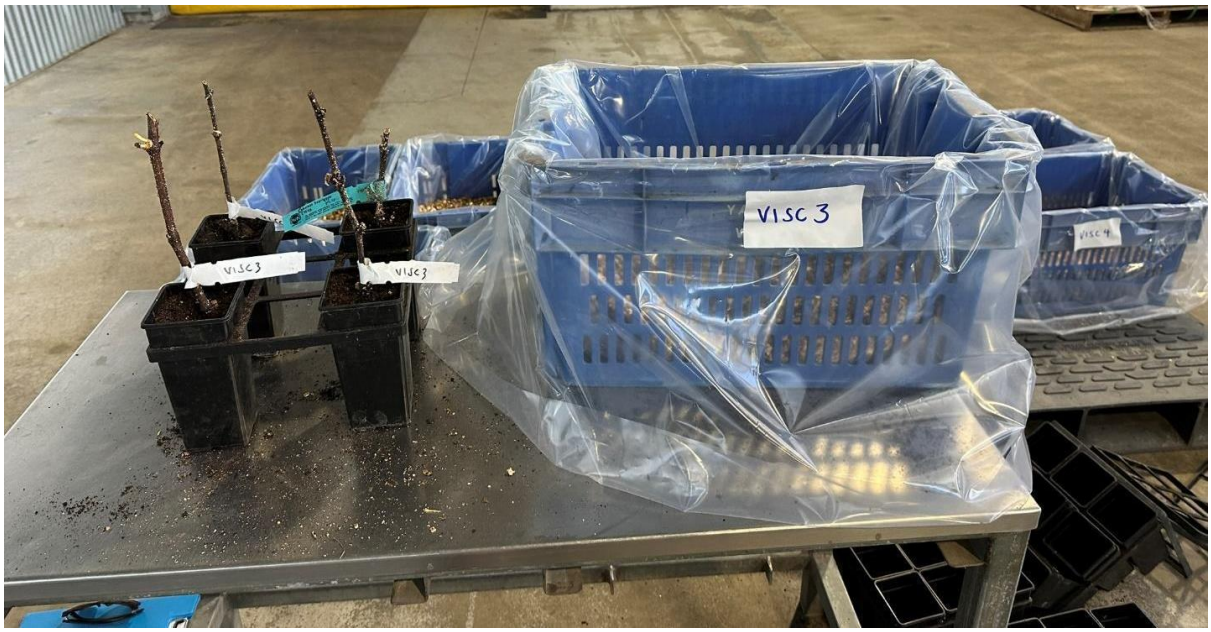
Australian Government

Wine Australia

National Grapevine Collection Coordinator



FINAL REPORT TO WINE AUSTRALIA

Project Number: **FOV 2201**

Principal Investigator: **Nick Dry**

Research Organisation: **Foundation Viticulture**

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Acronyms

AGW- Australian Grape and Wine

ATGA- Australian Tablegrape Association

AVIA- Australian Vine Improvement Association

AWRI- Australian Wine Research Institute

CSIRO- Commonwealth Scientific Research Organisation

CSU- Charles Sturt University

DFA- Dried Fruit Association

GIA- Greenlife Industry Australia

NIASA- Nursery Industry Association Accreditation Scheme Australia

GRBaV- Grapevine red blotch virus

GLRaV- Grapevine leafroll virus

GFKV- Grapevine fleck virus

GPGV- Grapevine pinot gris virus

RSPaV-Rupestris stem-pitting virus

MIAVIS- Murrumbidgee Irrigated Area Vine Improvement Association

RFP- Request for proposal

SARDI- South Australian Research and Development Institute

SAVIA- South Australian Vine Improvement Association

VAMVVIA- Victoria and Murray Valley Vine Improvement Association

VHA- Vinehealth Australia

VINA- Vine Industry Nursery Association

VISC- Vine Integrity and Security Collection

WA DPIRD- Western Australia Department of Primary Industry and Regional Development

WAVIA- Western Australia Vine Improvement Association

Definitions

Accreditation- in grapevine propagation, accreditation refers to an audit of production processes not products.

Certification- in grapevine propagation, certification refers to an audit process which verifies and provides assurance that grapevine cuttings or planting material (i.e. the product) adheres to a set Standard.

Standard- science based documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines or definitions, to ensure that materials, products, processes and services are fit for their purpose (adapted from Dankers, 2003).

Cuttings- the production units of grapevine propagation.

Cultivar- a distinct genetic identity whose origin or selection is primarily due to the intentional actions of humans. In viticulture a cultivar is a variety/clone combination for example Merlot/D3V14. This term is often used interchangeably with 'Accession'.

Candidate mothervine- vine used as the starting point for virus elimination treatments or establishing ex-situ storage such as slow-growth tissue culture or cryo-preservation.

Grapevine collections- a general term for any collection of grapevine varieties, rootstocks and clones. Collections are established with varieties and clones via importation, through local selection or breeding. Collections have a dual role as repositories for the maintenance of genetic diversity and the initial source for the establishment of larger propagation assets (multiplication rows and source blocks). Cuttings produced in collections are referred to as pre-propagation cuttings.

Multiplication row- a block of clonal planting material originating directly from a 'high-health' collection that provides the cuttings for the establishment of source blocks.

Source Blocks- A group of vines that is used to supply cuttings for propagation. Source blocks are established from cuttings taken from multiplication blocks or directly from collections via green propagation. Source blocks supply cuttings for commercial use to either propagation nurseries or directly to vineyard end-users for their own use (for top-grafting and occasionally for their own non-commercial propagation purposes).

Propagation material- includes both cuttings of scion and rootstock used in the commercial propagation process.

Planting material- the planting product outcomes from grapevine propagation. Includes field grown rootlings, callused cuttings and potted vines; all of which may be grafted or ungrafted.

Propagation asset- general term that covers collections, multiplication rows and source blocks.

Pathogen- any species, strain or biotype, or pathogenic agent, injurious to grapevine, grape or grape product, or capable of vectoring a grapevine pathogen.

Off-type- a vine or vines in a propagation batch or vineyard planting that is of the wrong variety, clone or rootstock.

Unique variety or clone- varieties and clones only exist in a single collection.

1. Abstract

The National Grapevine Collection (NGC) program aims to address critical challenges in the Australian grape and wine sector related to management of genetic resources, quality of grapevine propagation material and biosecurity. This project appointed an NGC Co-ordinator, Nick Dry, to implement a strategic framework for delivery of the NGC and to manage activities under the program. Key outputs included: establishing a governance structure to oversee the program; managing ongoing stakeholder engagement; establishing mothervines for a high security collection; supporting Nuclear Collections (WAVIA and SAVIA); identifying and virus testing the priority varieties and clones in the CSIRO and SARDI collections; virus testing the AVIA collection; collating and managing germplasm data; initiating co-funded virus elimination from key varieties; contributing to the development of the grapevine certification program and associated propagation standard; providing input and support to virus management and trunk disease research; and addressing clone identification challenges. The project also played a key role in supporting industry responses to grapevine red blotch virus (previously undetected in Australia) and an outbreak of crown gall-like symptoms.

2. Executive Summary

Grapevine foundation assets help to secure the long-term competitiveness and sustainability of the Australian wine sector through the health, quality and integrity of its vineyards. Investment in these assets will enable industry access to grapevine varieties and clones, provide certainty on the identity and health status of planting material and address the long-term security of germplasm collections. In turn, this will provide greater assurance of varietal claims (and label integrity) on Australian wine products and help maintain our international reputation for innovation and best practice in supply chain management.

The National Grapevine Collection (NGC) program aims to address critical challenges in the Australian grape and wine sector related to management of genetic resources, quality of grapevine propagation material and biosecurity. Poor quality grapevine propagation and planting material (caused by viruses, bacterial diseases, trunk diseases, off-types, and poor performance) create significant cost burdens across the value chain, from cutting suppliers and nurseries to vineyards and wineries. The lack of visible indicators for these issues creates quality uncertainty. While nurseries and cutting suppliers have the substantial responsibility of supplying pathogen-, genetic- and performance-assured cuttings and planting material, they are limited in their abilities to fulfil their responsibilities by the absence of a science-based grapevine propagation Standard which applies across the entire supply chain. Grapevine collections are crucial for preserving genetic diversity and providing high-health, true-to-type material for the industry. As non-profit service providers, these collections require strategic, long-term support to ensure continued access to vital genetic resources and quality-assured propagation material.

The activities in the NGC adapted and evolved over the course of the project to meet the challenges presented by virus and pathogen outbreaks, issues with stakeholder alignment and the general challenges expected in a program that is attempting to implement change. Despite these challenges, the project achieved a significant number of key outputs that contribute to the core objectives of the NGC. These have set the foundations for future activities that will see the NGC embedded as a key contributor to the long-term sustainability and competitiveness of the Australian grape and wine sector, and are summarised below.

NGC objective 1: Protection of Australia's grapevine genetic resources.

- **Vine Integrity and Security Collection (VISC):** The establishment of the VISC, focusing on slow-growth tissue culture of key cultivars, directly addresses the secure storage and preservation of grapevine genetic resources, safeguarding them against threats like *Xylella fastidiosa*. Initial activities to establish mother vines and conduct disease testing are a crucial step towards a secure backup of valuable germplasm.
- **Rationalisation of Germplasm Collections:** Activities to rationalise Germplasm Collections (AVIA, CSIRO and SARDI) included developing a pathway for access to the varieties in the CSIRO collection, identifying and virus testing 137 priority varieties and clones in the CSIRO and SARDI collections, virus testing all 216 cultivars in the AVIA collection and developing contingency options for interim storage of priority varieties and clones. These efforts all contribute to the efficient management and long-term access and preservation of valuable grapevine genetics.

- **Germplasm data collation and management:** Compiling existing data into a master file, including historical data and recent virus testing results, provides a basis for the development of a centrally maintained, publicly available, national database of grapevine varieties, clones, rootstocks and propagation assets (see objective 3). This will ensure the accessibility and usability of information about the collections, which is vital for their protection and effective ongoing management.
- **Co-investment in virus elimination projects**: Co-investment in virus elimination and propagation asset establishment demonstrated how the NGC can work with industry partners to achieve shared goals and maximise the impact of its activities. These projects serve as valuable models for future germplasm enhancement and expansion initiatives.

NGC objective 2: Facilitation and promotion of the supply of commercially relevant, healthy, true-to-type planting material to Australia's grapegrowers and winemakers.

- **Grapevine certification program:** Outputs from the NGC project have made significant contributions to the development of a governance structure for a certification program and the underlying science for the accompanying grapevine propagation standard. Once complete, the standard and supporting certification program will provide a framework for the supply of healthy and true-to-type vines to the grape-growing sector.
- **Virus management R&D projects:** Significant input and support was provided to initiate the project "Best practice sampling and virus diagnostics in Australian grapevine propagation assets" as well as research into virus vector management (scale and mealybug). Both are crucial for ensuring the health of planting material. Improved diagnostics, sampling protocols, and vector management strategies all contribute to reducing virus incidence and improving the quality of planting material.
- **Grapevine trunk disease (GTD) interim management protocols:** Addressing GTD in planting material through development of interim protocols for management of grapevine trunk disease in source blocks and support of ongoing research helps reduce the risks associated with these debilitating pathogens, promoting the long-term health and productivity of vineyards.
- **Reliably and cost-effectively confirm the identity of propagation assets:** Addressing the challenges of clone identification through support of the AWRI genomic sequencing projects and the proposed development of a list of prime clone names and agreed nomenclature for phytosanitary treatments contribute to ensuring the trueness-to-type of planting material.
- **Nuclear Collections (WAVIA and SAVIA):** The initial work undertaken to support the WAVIA and SAVIA collections, including virus screening, a stocktake of genetically verified accessions, and development of management plans, is essential for providing a foundational source of healthy, true-to-type planting material.

NGC objective 3: Support of propagation supply chain activities that build and strengthen sector resilience and biosecurity outcomes.

- **Establish and maintain groups and committees (IAC, SRC, PWG):** The formation and active participation of these committees throughout the project engaged key stakeholders and facilitated sector input and guidance to ensure alignment of outputs with sector needs and priorities. The evolution of these groups, culminating in the proposed Standards Committee

and Collections Management Committee, demonstrates a commitment to continuous improvement and effective governance.

- **Strategy development:** The development and refinement of the *NGC Investment and Management Plan*, along with the "NGC plan on a page," provided a roadmap for the NGC program, outlining its goals, activities, and resource allocation, with a view to long-term sustainability.
- **Australian Grapevine Germplasm and Propagation Asset Register:** The development of a Request for Proposal for delivery of this project by a third provider is a significant step forward, with the expected outcomes from the register contributing to improved propagation asset management, traceability and biosecurity outcomes.
- **Support of project planning for area-wide virus surveillance:** A number of avenues were explored to deliver a project on virus detection in vineyards at scale, using remote sensing and machine learning. While funding is still being sought, this technology is a potential game-changer for virus surveillance, particularly in source blocks – the technology will provide early detection, significant cost savings and more effective management of economically damaging grapevine virus diseases in both planting material and commercial vineyards.
- **Enhancing and expanding Australia's grapevine germplasm:** Establishing links with UC Davis *via* their local importer is a key step towards obtaining Pierces' Disease-resistant grapevine varieties from the USA, which will offer sector preparedness for the impact of a *Xylella fastidiosa* outbreak in Australia.

Wine Australia has committed to a second term of the project to build on the foundational work delivered here. Future work is required to:

- Solidify the governance structure by establishing two key committees: a Standards Committee to oversee the delivery of the grapevine certification program and a Collections Management Committee dedicated to the collections within the NGC program.
- Formalise management and support arrangements with Nuclear Collection stakeholders to ensure that there is long-term national access to high-health propagation material for source block establishment.
- Build capabilities in high security storage of germplasm through the delivery of a pilot Vine Integrity and Security Collection project to assess and evaluate the economic and technical feasibility for long-term storage of key Australian cultivars in slow-growth tissue culture.
- Initiate plans for accessing and making available the priority varieties and clones from the SARDI and CSIRO collections.
- Support the delivery of the Australian Grapevine Germplasm and Propagation Asset Register, either through the existing RFP or other means
- Support existing and planned research, innovation and capability development projects on virus sampling and diagnostics, virus insect vectors, remote sensing for virus detection, integration of trunk disease protocols into best practices, crown gall symptoms in grapevines, and establishment of standardised clone names and phytosanitary treatment nomenclature.
- Continue to support investment into projects that will enhance and expand Australia's grapevine germplasm.

3. Project Background

Superior planting material is the foundation of the Australian wine sector, helping to secure its long-term competitiveness and sustainability through the health, quality and integrity of its vineyards. Factors that impact the quality of cuttings and planting material, such as viruses, bacterial disease, trunk disease, off-types and poor field performance, are a significant cost burden to not only vineyard end-users and wineries but also grapevine nurseries and cutting suppliers. With minimal or no external or physical attributes indicating that propagation material carries pathogen, genetic or performance risks, 'quality uncertainty' is a significant issue for both customers and suppliers. While nurseries and cutting suppliers have the substantial responsibility of supplying pathogen-, genetic- and performance-assured cuttings and planting material, they are limited in their abilities to fulfil their responsibilities by the absence of a science-based grapevine propagation standard and accompanying certification program that applies across the entire supply chain.

The Australian wine industry is fortunate to have a significant and diverse resource of grapevine germplasm. These comprise physical, organisational and intellectual assets, many of which were developed with industry funding but which are not coordinated or maintained as a national collection. Grapevine collections are key to the protection and maintenance of genetic diversity and access to high health and true-to type grapevine varieties, clones and rootstocks. They also provide the basis for activities such as grapevine breeding, virus elimination, prospecting and selecting new clones, evaluation of varieties and clones and importation of new genetics. Grapevine collections are not-for-profit and are managed as a service to industry by their owners. Without them we would not only lose access to genetic diversity but also high-health material as the starting point for the propagation value-chain. In recognising this we need to strategically support and secure these collections for the long-term.

Until this project commenced, grapevine germplasm collections were managed as a set of separate entities, and the CSIRO and SARDI collections, which house the majority of the unique germplasm in the country, had been closed to industry since 2009. Previous attempts to develop a solution and reopen the collections had not succeeded due to various factors, including lack of national industry leadership.

The concept for a new model for a National Grapevine Collection (NGC) was developed in a project funded by Wine Australia (WAC 2009: *National Germplasm Discussion Paper*) and builds on recommendations from earlier studies (WGG 1401: *Underpinning the competitiveness of the wine sector: a case for strategic national oversight of Australia's grapevine foundation assets*). Consultation during preparation of the discussion paper garnered broad industry support for the model, with input being provided by sector stakeholders including: Australian Grape and Wine, Australian Table Grape Association, Dried Fruits Australia, Vine Industry Nursery Association, state and regional Vine Improvement Groups, CSIRO, Vinehealth Australia and SARDI.

The NGC is designed as a system of coordinated assets and resources that are aligned to fulfil specific functions in the collection, spread risk and achieve the following key objectives:

1. Protection of Australia's grapevine genetic resources.

2. Facilitation and promotion of the supply of commercially relevant, healthy, true-to-type planting material to Australia's grapegrowers and winemakers.
3. Support of propagation supply chain activities that build and strengthen sector resilience and biosecurity outcomes.

A co-ordinator, Nick Dry, was appointed in January 2022 to oversee the delivery of the National Grapevine Collection in a staged approach over three years.

4. Project Aims

The overall aim of the project was to implement a strategic framework for delivery of a National Grapevine Collection (NGC) for the Australian grape and wine sector.

The NGC co-ordinator will achieve this through the following specific objectives:

1. Establish and facilitate an Industry Advisory Committee, including key stakeholders and technical experts
2. Work alongside the Industry Advisory Committee to lead, oversee, drive and manage a nationally co-ordinated grapevine germplasm collection
3. Obtain acceptance and commitment to implementation of the NGC by all stakeholder groups across the grapevine supply chain
4. Manage ongoing stakeholder engagement and act as the point of contact for the sector with the NGC and enabling activities. Sector stakeholders will include owners of collections, vine improvement groups, nurseries, researchers and State and National industry bodies
5. Institute the two supporting pillars of the collection, namely a certification standard for grapevine propagation material and a national database of grapevine accessions
6. Deliver a management and funding plan for securing the future of the NGC beyond the term of this project.
7. Coordinate and integrate outputs from associated key activities into management of the NGC, including administration, sector engagement and R&D projects to fill vital gaps in quality assurance across the grapevine supply chain

5. Results and Discussion

5.1 Ensuring effective program management

Establishing strong governance is crucial for a complex program like the National Grapevine Collection. The outputs and activities associated with project governance included the establishment and ongoing administration of committees and working groups, the development and prioritisation of strategic objectives and the implementation of tools to facilitate program management.

5.1.1 Establishing and maintaining groups and committees

Industry Advisory Committee (IAC)

The Industry Advisory committee was established within 6 months of project initiation, with the first meeting held on the 14th June, 2022. Members included representatives from the nursery industry, vine improvement groups, collection owners, statutory industry bodies and research organisations. Membership was specifically sought from the following organisations:

- Collection owners: SAVIA, WAVIA, SARDI, AVIA, CSIRO
- Peak bodies: VINA, AGW, ATGA, DFA
- Statutory bodies: VHA
- R&D: AWRI

An independent chair, Prue McMicheal, was engaged for the first meeting, with Ian Dry installed as the permanent chair from the 2nd meeting (November 22nd, 2022). A 3rd meeting was held on March 22nd, 2023. Across the three meetings, the IAC provided input and support for the following:

- Input and support for the 'NGC Management and Investment Plan'.
- Support for the process of identifying the priority varieties in the CSIRO and SARDI collections.
- Support for the allocation of $17,000 for virus testing of the top 100 priority cultivars as determined in the review of CSIRO and SARDI collections.
- Support for the allocation of $4,900 for virus testing of 35 composite samples from the WAVIA collection.
- Support for allocation of $34,000 for virus testing of the AVIA collection to determine its virus status and potential function within the NGC.
- Support for the allocation of $15,000 for virus testing of the SAVIA collection.
- Input into the prioritisation of Virus R&D projects.
- Input into the discussion paper on the national register for grapevine varieties, clones and rootstocks.
- Agreement to include vector management as part of the Virus R&D priority project list.

- Support for the proposed re-structure of the NGC management arrangements (see section below).

Review of management arrangements: establishment of the Program Working Group (PWG) and change of name of the Industry Advisory Committee (IAC) to the Stakeholder Reference Committee (SRC)

Following the 2nd IAC meeting it was determined that greater and more regular support for the NGC coordinator was required, particularly in operations and timely delivery of strategic outputs. With the support of the IAC, the Program Working Group (PWG) was established, with membership drawn from the IAC based on a formal application and selection process. The Industry Advisory Committee was changed to the Stakeholder Reference Committee (SRC) to better reflect the role and responsibilities of this committee (Table 1), and terms of reference for both groups were developed and/or revised accordingly.

Table 1. Roles and responsibilities of the SRC and PWG

SRC: Stakeholder Reference Committee	**PWG: Program Working Group**
Purpose: Strategic oversight and communication channel to key stakeholders	**Purpose:** Operational functions, setting and delivering the strategic outputs
Roles and Responsibilities: Overseeing development of the program strategy Overseeing research, development and adoption projects Assisting with identifying funding and/or alignment opportunities Providing specific advice and input based on member and/or organisational requirements Communicating program strategy and outcomes to members and/or stakeholder organisations.	**Roles and Responsibilities:** Updating and aligning the existing program strategy Activity prioritisation Operational planning Identifying and engaging investment partners for projects Project scoping and development of project briefs Assisting in the development of RFPs, and reviewing and making recommendations regarding the responses Monitoring the progress of projects Providing regular updates to the SRC to ensure good two-way consultation and communication with the relevant industry sectors Engaging the TRG as required and appropriate Delegating tasks as appropriate

	Developing a communication strategy to the wider sector, in collaboration with the SRC.

Program Working Group

The Program Working Group (PWG) membership consisted of Steve Partridge (VINA Chair), Chris Bennett (SAVIA executive officer) and Prue Henschke (SAVIA and AVIA chair), as well as Nick Dry (NGC Co-ordinator) and Sharon Harvey (Wine Australia). Between April 2023 and December 2024, the PWG met on 6 occasions to progress the following outputs and activities:

- A review of the NGC project strategy and prioritisation of activities.
- Activities related to the delivery of an Australian grapevine certification program and accompanying propagation standard.
- Virus management R&D projects required to underpin the standard including virus sampling and diagnostics and virus detection in vineyards using remote sensing and machine learning.
- Development of the RFP for the Australian Grapevine Germplasm and Propagation Asset Register.
- Development of grapevine trunk disease interim protocols.
- Rationalisation of the Germplasm Collections and the development of contingency options for interim storage of priority cultivars.
- The development of an operational plan for the Vine Integrity and Security Collection.

Stakeholder Reference Committee

Following establishment of the PWG, the Stakeholder Reference Committee met only once, on September 27th, 2023. In this meeting the SRC provided input into the review of the NGC project strategy and prioritisation of activities conducted by the PWG, supported the allocation of a further $7,714 for virus testing of the WAVIA collection and supported the initiation of the P58 virus elimination project and related allocation of $2,500.

5.1.2 Strategy development

An investment and management plan was developed in the first 9 months of the NGC project and submitted to the IAC at the 2nd meeting. This plan was developed following discussions with collection stakeholders and approximated the costs associated with the establishment and maintenance of the collections in the NGC and identified potential funding partners. Further detail on project strategy occurred through the Program Working Group (April 2023-November 2024) and led to the development of a project management platform (see Section 5.1.3).

A ‘plan on a page’ was produced in October 2023 and updated in March 2024 (see Figure 1).

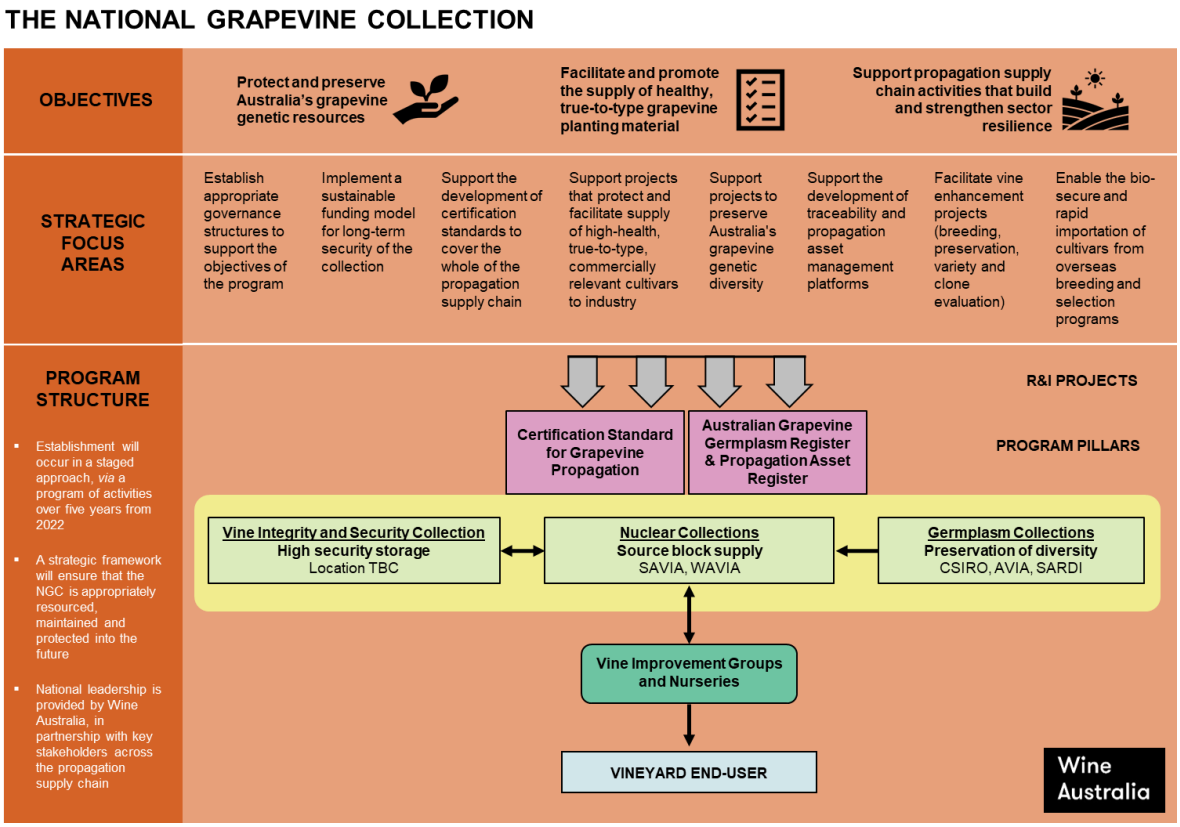


Figure 1. National Grapevine Collection- 'plan on a page'

The NGC essentially comprises a system of coordinated assets and resources that are aligned to fulfil specific functions and spread risk. Existing grapevine collections fill roles in the system in accordance with the number and industry relevance of varieties and clones, level of identity assurance and virus status. At the core of the National Grapevine Collection are the physical collections, each of which fulfils a specific role:

- **Vine Integrity and Security Collection**- High security, selective, high-health, DNA verified, stored in slow-growth tissue culture. This is the collection that is accessed following catastrophic pest or climate events.
- **Nuclear Collections-** Nationally accessible, diverse, high-health, DNA verified, traceable, field collections. These are the collections that are accessed to establish new source blocks from which nurseries access cuttings for the production of commercial planting material (SAVIA and WAVIA collections).
- **Germplasm Collections-** Genetically diverse, variable health, field collections. These are the collections that are accessed for breeding, research and previously untested unique varieties and clones (SARDI, CSIRO and AVIA collections).

The two pillars of the National Grapevine Collection are:

- A national certification standard for grapevine propagation material, to govern the entry into and release of material from the collections, and

- A centrally maintained and publicly available national register of grapevine varieties, clones and rootstocks.

The NGC is managed by a central coordinator with input from a Stakeholder Reference Committee and a Program Working Group. Commitment to the establishment and maintenance of the National Grapevine Collection will lead to benefits to stakeholders across the whole of the wine grape, table grape and dried fruit supply chain:

Stakeholder Benefit	**Peak bodies**	**Grower**	**Breeders**	**Nursery**	**Marketers/ Exporter**
Greater efficiency in the management of biosecurity threats.	✔	✔	✔	✔	✔
Increase sector resilience.	✔	✔	✔	✔	✔
Strengthening of relations between the nursery, table, dried fruit and wine grape sectors.	✔	✔	✔	✔	
Greater assurance of varietal and hence label integrity on Australian grape and wine products.	✔	✔	✔	✔	✔
Better access to planting material with known identity and health status.		✔	✔	✔	✔
Access to DNA verified and virus free grapevine rootstocks for the establishment of high health source blocks.		✔	✔	✔	
Opportunities for the high security storage of private and PBR varieties.			✔	✔	
More rapid access to new varieties, clones and rootstocks from overseas breeding programs.		✔	✔	✔	✔

5.1.3 Development and maintenance of a project management platform

Given the breadth and complexity of the NGC project, the online project management tool 'Smart-sheet' was employed to manage the information such that there is a ‘single source of truth’. The platform was set up as a multi-functional tool to list the NGC project functions and project outputs, assign responsibilities, define the activities required to achieve outputs, prioritise tasks, develop and track project timelines and budgets, maintain and store relevant documents and assist with communication.

5.1.4 Ensuring effective project management: key deliverables

- IAC, SRC and PWG ‘Terms of Reference’ documents.
- Minutes, action and decision registers for the committees and groups.
- ‘NGC investment and management plan’.
- ‘Proposal for the new NGC management arrangements’.
- ‘Program Working Group: briefing paper’.
- Development of ‘Smart-sheet’ project management tool.
- The National Grapevine Collection- ‘plan on a page’.

5.2 Australian Grapevine Germplasm and Propagation Asset Register

A national, publicly accessible database of available grapevine germplasm is one of two pillars of the NGC. Outputs and activities associated with the delivery of the register included determination of the scope and attributes of a register, developing an RFP and investigating opportunities with potential delivery partners.

5.2.1 Partnership opportunities

It was recognised from the outset of the project that there were opportunities to develop partnerships with existing and planned data management projects, to allow leveraging of existing work and avoid duplication. In the course of the project, consultation occurred with the following stakeholders and potential partners:

- Chalmers Nursery
- Vinehealth Australia
- Ebottli
- Australian Agriculture Data Exchange (AADX)
- Wine Australia (The National Vineyard Register project)

5.2.2 Request for proposal (RFP) development

A draft RFP was completed in May 2024. It was based on a previously completed discussion paper developed with input from the PWG and IAC, which outlined the scope, functions, key attributes, data specifications, requirements for entry, options for delivery, examples of data display hierarchy and a review of international germplasm databases.

5.2.3 Germplasm data collation and management

In parallel with the development of the discussion paper and RFP, the NGC coordinator transposed and compiled available relevant collection data into a single 'master' file (in format. xlxs) based on the following data sets:

- The existing Australian grapevine registers which were updated in 2012 and 2019
- Updated data on variety identity for the CSIRO and SARDI collections based on the project CSP 1501 'Grapevine Germplasm Variety identification'
- Virus testing results obtained in 2023/2024 for the AVIA, CSIRO, SARDI and SAVIA collections.

This output also involved communication with current and retired SARDI and CSIRO staff (Paul Petrie, Mike McArthy, Phil Nicholas, Rob Walker and Peter Clingeleffer) to identify and access historical data sources.

This database served as the data collection and management point for the survey, review and prioritisation of varieties and clones from the CSIRO and SARDI collections and included the following:

- Determination of 'unique' varieties and clones in the CSIRO and SARDI collections based on analysis of collection and vine improvement variety and clone lists.
- Inclusion of a link for each unique variety in the CSIRO and SARDI collection to the relevant page (where available) on the Wine Australia 'Variety selector tool'.
- Inclusion of a link for each unique variety in the CSIRO and SARDI collection to the relevant page on the Vitis International Variety Catalogue (VIVC).
- Identification of whether a unique variety in the CSIRO and SARDI collections is potentially 'globally threatened' based on its non- or limited- inclusion in other global collections as determined by the VIVC.

This database also served as the data collection and management point for the stocktake of genetic verification for the SAVIA and WAVIA collections. Liaison with WAVIA and SAVIA stakeholders was required, to gain access to previous DNA verification data, and Anthony Bornemann (AWRI) facilitated access to data from projects AWR 1701-4.4.5: *Sequencing Australian wine grapevine germplasm* and AWR 2202-2.2.1: *Genetic diversity of Australian wine grapevine germplasm* (with permissions from WAVIA and SAVIA stakeholders).

5.2.4 Funding opportunities

A grant application was submitted to the Federal Government's National Agriculture Traceability Grants Program in December 2022 to develop a national register. The application was unsuccessful.

5.2.5 Key outputs: Australian Grapevine Germplasm and Propagation Asset Register

- Consultation with key stakeholders and potential delivery partners.
- Completion of a discussion paper on the Australian Grapevine Germplasm and Propagation Asset Register.
- Completion of a draft RFP for the delivery of the Australian Grapevine Germplasm and Propagation Asset Register.
- Development, collation and management of a grapevine germplasm database as the underlying dataset for the planned register and to facilitate completion of other NGC outputs relating to collection management and variety identification.

5.3 Support the development and adoption of an industry-based accreditation and certification scheme based upon agreed standards

An Australian grapevine certification program which is accepted and adopted across the entire propagation supply chain is the second pillar of the NGC. A significant undertaking, it includes outputs and activities associated with managing the delivery of the program and, more specifically, the stakeholder consultation associated with determining the program management and governance. A large portion of the work was addressed in a complementary Wine Australia-funded project (FOV 2202) and the related final report provides important context and detail to the key activities summarised below. The report can be viewed at: [The implementation of a national standard for grapevine certification – Phase 2a | Wine Australia]

5.3.1 Standards Governance

While there has been general consensus in the propagation sector on the scientific gaps that need addressing in the development of a propagation standard, the key propagation stakeholders (SAVIA and VINA) have differed in their views on how to best manage a certification program. For context:

- VINA has been running an accreditation scheme for nurseries and source block managers since 2004 and has been rewriting their manual with a view to offering its members the opportunity to certify planting material that meets the VINA standard and associated verification process.

- SAVIA has been actively pushing for the delivery of a certification program, has revised the 'National Vine Accreditation Scheme' manual and been actively pursuing R&D outcomes to fill the acknowledged gaps in the science.

One of the key drivers for initiating the Program Working Group (Section 5.1.1) was to provide the opportunity for SAVIA and VINA representatives to meet on a regular basis and progress the standard. Through discussions within the PWG the two organisations acknowledged that they needed to develop an agreed structure for a cost-effective certification program which encompasses the whole of the propagation supply chain. These discussions have resulted in an agreement to establish a Standards Committee, as a first step towards a decision-making process on how a certification program will be managed. VINA, SAVIA and their representatives should be commended and recognised for their role in achieving this important output.

5.3.2 Development of Best Practice Guidelines

Best practice guidelines that cover the whole of the propagation supply were developed based on quality assurance objectives established during an October 2021 workshop with grape, wine, and propagation stakeholders (part of WAC 2101), as well as a review of international grapevine certification standards. The objectives were further refined using a Hazard Analysis Critical Control Point (HACCP) approach, identifying critical control points, associated risks, and necessary control measures. While the guidelines require further refinement through additional research and input from sector stakeholders and technical experts, they serve as an incredibly valuable resource for the grape and wine sector, laying a solid foundation for the development of the final written standards that will be used for the certification program.

The 31-page guidelines document appears in the final report for project FOV 2202 as Appendix 2.

5.3.3 Key outputs: Support the development and adoption of an industry-based accreditation and certification scheme based upon agreed standards.

- Establishment of the PWG as a vehicle for bringing key propagation stakeholders together to discuss the issues around governance and management of a certification program.
- Agreement from key propagation stakeholders to establish a Standards Committee.
- Development of best practice guidelines that cover the whole of the propagation supply chain.

5.4 The science to support the standards and protocols

This tranche of work will support the development and implementation of a science-based written standard by addressing critical knowledge gaps in virus management, vector control, disease management, and genetic identification through targeted research. There was significant overlap with the Wine Australia funded project 'The implementation of a national standard for grapevine certification- Phase 2a' (FOV 2202) and the related final report provides important context and detail to the outputs reported in Section 5.4. The report can be viewed at:

https://www.wineaustralia.com/research_and_innovation/projects/the-implementation-of-a-national-standard-for-grapevine-certification-phase-2a

5.4.1 Development and initiation of project: Best practice sampling and virus diagnostics in Australian grapevine propagation assets (AVR 2402)

The outcomes related to this project were identified as the highest priority in the list of virus R&D priorities determined through consultation with the IAC/SRC and PWG. The request for proposal (RFP) was developed over a two-year period based on an initial project brief completed in August 2023 by the NGC coordinator and Chris Bennett (SAVIA). The RFP also took into consideration further input from the PWG, gaps analyses performed in a previous national project (PFR 2001 '*Identifying knowledge gaps and prioritising future research for grapevine leafroll disease and Shiraz disease in Australia*') and by groups such as SAVIA, along with discussions with virus diagnostic laboratories. The RFP was issued by Wine Australia in June 2024, and a project developed with the successful applicant - a consortium of the diagnostic labs led by Agriculture Victoria Research. The three-year project was approved by the Wine Australia Board and commenced on 1 November 2024. Total cash value is $1,602,878 over three years. The research partners will be guided by an Industry Reference Group that includes members of the propagation sector as well as industry stakeholders. The project will inform best practice in both the propagation supply chain and commercial vineyards through five main activities:

1. Review and evaluate current virus management practices.
2. Assess the commercial impact of virus infections.
3. Develop best practice sampling protocols.
4. Support the Biometry Hub (University of Adelaide) in developing a sampling rate decision matrix.
5. Review and enhance diagnostic protocols.

5.4.2 Grapevine virus vector management

Managing virus in grapevine propagation assets and nursery grow areas includes adequate monitoring and control of virus vectors (scale and mealybug). The priority research gaps identified in project PFR 2001 as specific requirements for the development of a science-based grapevine propagation standard were:

1) Training tools for vector identification
2) Best practice protocols for vector management in propagation assets and nursery growing areas (grow houses and field nurseries) including recommendations on frequency of monitoring and thresholds for intervention.

While these provide an ideal starting point, it is recognised that the findings from PFR 2001 were based on New Zealand experience and may need validation in Australian conditions.

Two planning and prioritisation workshops '*Sustainable management of scale and mealybug in Australian vineyards*' were held by Wine Australia in October 2023, in response to heavy scale

infestations across the industry in previous seasons and attended by the NGC coordinator. The following key research questions were identified:

- What is the relationship between scale and mealybug and virus vectoring?
- Is there a link between vector species and virus spread? Are some species better vectors than others?
- What is the population threshold for propagation assets compared with commercial vineyards? Does the tolerance for vectors in vineyards vary depending on virus incidence?
- What is best practice for protecting your investment in clean planting material?

Grapevine Scale

As a result of the workshops, a three-year project SAR 1701-1.4 '*Grapevine scale biology and monitoring in Australian vineyards*' was initiated, co-funded by SARDI and Wine Australia and guided by an Industry Reference Group. Commencing in July 2024, the project has the following objectives:

1. Define scale species distribution across Australia.
2. Quantify key aspects of scale insect biology including number of generations per year, timing of crawler emergence, and prediction of when crawlers are present in different wine-growing regions and seasons based on temperatures, as well as optimisation of routine sampling methods.
3. Understand current vineyard practices for scale management and their impact on scale insect populations.
4. Conduct lab trials of pesticide efficacy against different life stages of scale.

While this project is focussed on commercial vineyards, there will be outcomes which will be applicable to propagation assets and grow areas and contribute to the identified gaps.

Grapevine Mealybug

There is currently no further research planned on grapevine mealybug.

5.4.3 Virus detection in vineyards using remote sensing and machine learning

Vinay Pagay (University of Adelaide) has developed methodologies for large-scale surveillance of viruses in winegrape vineyards based on optical remote sensing technology. This technology offers the potential for significant economic and biosecurity benefits and if implemented commercially will revolutionise virus surveillance in grapevine vineyards. The methodologies have undergone initial research and testing, however there is further work to be completed to validate the existing methodologies across different varieties, regions and growing seasons. As part of this NGC project, we have been exploring funding opportunities to develop it further:

- In May 2023 the NGC coordinator and Chris Bennett (SAVIA) completed a project brief *'Develop the capabilities through training and technology to accurately and efficiently identify virus infected vines in collections, source blocks and grow areas'*.

- In September 2023 the University of Adelaide, Wine Australia, SAVIA, Treasury Wine Estates and Yalumba partnered on a CRC-P application titled 'Virus detection in vineyards using remote sensing and machine learning'. The project team was advised in January 2024 that the application was unsuccessful.
- Following the unsuccessful application, the NGC coordinator held a series of meetings with Vinay Pagay and Chris Bennett to determine future directions and identify alternative funding opportunities. As part of these discussions, the NGC coordinator, with input from Vinay Pagay, updated the 'cost comparison between virus detection methods' table based on Wang *et al.* (2022) so that the data was relevant for source blocks rather than 'typical Australian' vineyards.
- In August 2024, Wine Australia worked with Vinay Pagay to draft an application for an 'Ignite' grant through Australia's Economic Accelerator, but we were unable to meet the University's internal deadline for submission. AEA Ignite Grants are intended to complete basic research, laboratory testing and establish proof-of-concept in an industry-relevant environment, and advance technology with a current Technology Readiness Level of (TRL) of 3-5. Further rounds are likely.

5.4.4 Management of grapevine trunk diseases (GTDs) in the propagation supply chain

As part of a broader Wine Australia-funded project on '*Management and diagnosis of grapevine trunk disease in vineyards and nurseries*' (SAR1701-1.3), pathologists at SARDI and CSU are working closely with the propagation sector on activities that aim to address some of the questions surrounding GTDs in propagation and young vine decline, specifically:

1. Surveying source blocks to understand which GTD pathogens are present.
2. Optimising diagnostic techniques.
3. Examining thresholds of infection on vine establishment.
4. Assessing the efficacy of biocontrols for sustainable disease management in the nursery.

The outputs of the work will provide evidence-based recommendations for the grapevine propagation standards. The NGC coordinator met annually with project lead, Dr Mark Sosnowski, to ensure that project outcomes are aligned with the requirements of the grapevine propagation standard. The PWG and NGC coordinator met with the GTD project team on November 17th, 2023 to discuss current, planned and completed work. Furthermore, interim protocols for management of grapevine trunk disease in source blocks were developed by the NGC coordinator and PWG members, with input from the GTD project team.

5.4.5 Management of crown gall-like bacterial pathogens in the propagation supply chain

Crown gall-like symptoms were observed in a number of grapegrowing regions across Australia during the 2022-2023 and 2023-2024 growing seasons. While crown gall is endemic and affects grapevines as well as many other horticultural crops, the disease only occurs intermittently in

vineyards. The recent outbreak seemed to suggest the involvement of infected planting material, though environmental factors, cultural practices and/or unknown factors also appeared to contribute. The lack of reliable diagnostic tools and the observation that batches of infected planting material could be symptomatic in some locations but not in others, complicated the problem. The NGC coordinator was involved in managing this issue and specifically contributed to the following:

- Informal discussions with propagation stakeholders and impacted vineyard owners/managers (December 2022- December 2023).
- Initial discussions with Wine Australia on the potential risks and a response strategy (January 2024).
- As a member of the Crown Gall Industry Response Group that was initiated to provide expert input into the development of an industry response plan (late January 2024- July 2024).
- Reviewing the RFP for a Wine Australia funded project 'Identification of cause and origin of crown gall-like symptoms in Australian vineyards' (June 2024).
- As a member of the Industry Reference Group for the research project at The University of Adelaide (UA 2401) that resulted from the RFP and commenced in October 2024. This project aims to identify the causative pathogen, develop a diagnostic test that can be used in grapevines and improve our understanding of symptom expression and mode of spread.

The project will contribute findings that will provide the basis for best practice guidelines for the propagation supply chain and be integrated into the grapevine propagation standards.

5.4.6 Reliably and cost-effectively confirm the identity of propagation assets

There are three main challenges with confirming the identity of grapevine varieties and clones within propagation assets:

1. Lack of ampelographic differences between grapevine clones.
2. Incomplete or non-existent traceability data linking source blocks to collections.
3. Lack of uniformity in reporting of clone names and phytosanitary treatments.

The whole genome sequencing work completed by AWRI in previous projects and the current project AWR 2202-2.2.1: *Genetic diversity of Australian wine grapevine germplasm* has gone some way to addressing the first two issues and provided the basis for a commercial service for identifying grapevines to clone level.

To ensure that the project outputs are aligned with the requirements of the grapevine propagation standard, the NGC coordinator has been involved in regular discussions with project lead Anthony Bornemann (AWRI) and also provided advice on selection of clones for the study and information on clone synonyms. Furthermore, the NGC coordinator has initiated discussions on a process for developing a list of prime clone names and agreed nomenclature for phytosanitary treatments which will address the lack of uniformity in reporting.

4.4.7 Key outputs: The science to support the standards

- Completion of a virus R&D priorities list with input from the IAC/SRC and PWG
- Completion of project brief 'Virus Sampling and Diagnostics'
- Completion of RFP and initiation of project: Best practice sampling and virus sampling in Australian grapevine propagation assets (AVR 2402)
- Contribution to the Wine Australia planning workshops for scale and mealybug management.
- Completion of project brief 'Develop the capabilities through training and technology to accurately and efficiently identify virus infected vines in collections, source blocks and grow areas'.
- Completion of interim protocols for managing grapevine trunk disease in source blocks
- Involvement in the crown gall response through membership of the industry response group and industry reference group.

5.5 Collection Coordination

Support and coordination of existing, nationally significant grapevine collections is a core function of the NGC program. Activities associated with the three tiers of the collection (Figure 1) included the establishment of the Vine Integrity and Security Collection, the support of Nuclear Collections (WAVIA and SAVIA) and the rationalisation of the Germplasm Collections (AVIA, CSIRO and SARDI).

5.5.1 Establishment of the Vine Integrity and Security Collection (VISC)

Consultation sessions for the WAC 2009 *'Germplasm Discussion Paper*' emphasised the critical need for high-security storage of Australia's grapevine genetic resources *via* a Vine Integrity and Security Collection (VISC). Stakeholders recognised this as a crucial component of a robust germplasm system, particularly to mitigate the risks posed by highly mobile and destructive vector-borne pathogens like *Xylella fastidiosa*, which can devastate field collections. It was determined that establishment of critical cultivars in slow-growth tissue culture was the most cost-effective method to minimise risk. Two duplicated VISC collections were recommended to spread risk, with each collection consisting of 25 cultivars - 5 grapevine rootstock varieties and 20 scion varieties.

During the operational planning phase, concerns were expressed by PWG members that establishment of this collection was not financially justified. To ensure that the NGC project was meeting the obligations of stakeholders and respecting the views of the members of the PWG, a revised plan was developed for the establishment of a reduced number of 10 cultivars (7 scions and 3 rootstocks) in slow-growth tissue culture at one site only, and a shift in project focus towards development of protocols, identification of optimal conditions and an assessment of economic and technical feasibility. From June 2024- January 2025 the initial mother vines for the VISC were established, and wood tissue sampled for crown gall and GTD diagnostic testing.

5.5.2 Establish Nuclear Collections through support of the WAVIA and SAVIA collections

The maintenance and supply of healthy, true-to-type propagation material from a foundation source (i.e. Nuclear Collection) is a critical requirement for the Australian grape-growing sector. Nuclear Collections are an elite collection of carefully selected cultivars with the primary purpose of supplying high integrity cuttings for the establishment of source blocks. In WAC 2009 the WAVIA collection at Manjimup (Western Australia) and the SAVIA collection at Monash (South Australia) were identified as having the best potential to be transitioned to Nuclear Collections within the NGC model.

The main objectives associated with these two collections were to:

1. Complete a full virus screen of each collection.
2. Identify genetic identity gaps and conduct genetic testing as required.
3. Identify capital investment requirements.
4. Develop long-term formal funding and management arrangements.
5. Ensure that the collections are nationally accessible.

The WAVIA germplasm collection

The WAVIA collection contains 162 winegrape and rootstock varieties and clones. The management and associated costs for the WAVA collection is currently funded by W.A. Department of Primary Industries and Regional Development (DPIRD), with annual virus surveillance and the distribution of cuttings funded and managed by the WAVIA committee. During the course of the current project two quarantine notices have been put on the site - for grapevine red blotch virus (GRBaV) which was discovered in winter 2022 and more recently for the fungal pathogen Phomoposis (*Diaporthaceae ampelin*), which is associated with trunk disease. While GRBaV has been eradicated from the vineyard, the quarantine notice for Phomopsis is still in place and has created general uncertainty around the future of the WAVIA collection. Nonetheless, the following activities were completed to support transition of the collection to a Nuclear Collection in the NGC.

- The first round of comprehensive virus testing[1] (in winter 2022) covered approximately one-third of the collection and was initially carried out on 10-vine composites, and then individual vine testing where a composite tested positive. This work led to the discovery of grapevine red blotch virus (GRBaV) in Australia.
- The second round of testing (in summer 2022) was based on the 10-vine composite extracts from surveillance for GRBaV following its detection. This work identified 19 composite samples with single or multiple virus types including GVA, grapevine leafroll-4 (GLRaV-4), grapevine leafroll-4-9 (GLRaV4-9) and grapevine fleck (GFKV). The collection is notably free of grapevine leafroll 1 (GLRaV-1), GLRaV-3 and GPGV.

[1] Virus testing of the WAVIA collection included: GLRaV-1,2, 3, 4, 5, 4-9 and 9, GVA, GVB, GPGV, GRBaV and GFKV by PCR analysis.

- The work described above indicated that individual testing of 196 vines was required to complete a full virus screen of the collection. Testing was quoted at $15,428, with the cost agreed to be split equally between WAVIA and Wine Australia, and WA DPIRD providing in-kind support through sampling. Although the work was scheduled for winter 2023, and then for winter 2024, the issues with Phomopsis and general uncertainty around the future of the collection means that it has not been carried out.
- Determination of genetic status of the WAVIA collection is partially complete. A set of 71 accessions was sampled as single vines and included in the AWRI clone identification projects (AWR 1701-4.4.5: Sequencing Australian wine grapevine germplasm and AWR 2202-2.2.1: Genetic diversity of Australian wine grapevine germplasm). An additional 31 accessions have been previously DNA tested for variety, with 65 accessions still requiring genetic verification (quoted at approximately $150 per sample = $9750 at current commercial prices).
- A paper outlining a proposal for long-term support of the WAVIA collection was prepared for WA DPIRD by the NGC coordinator on behalf of WAVIA, Wines of WA and Wine Australia. It proposes that the three organisations partner with WA DPIRD to provide financial and in-kind support for the collection through a two-stage process that would result in the eradication of Phomopsis and ultimately provide long term access to the WAVIA collection. The discussion is ongoing.

The SAVIA germplasm collection

The SAVIA collection contains 466 different cultivars, with a strong focus on winegrape varieties (only 5 multi-purpose/tablegrape varieties). The SAVIA committee owns the collection and leases the land from Riverland Vine Improvement Committee (RVIC) and has a management agreement with RVIC to physically manage the collection. The following activities were completed to support transition of the collection to a Nuclear Collection in the NGC:

- Virus testing[2] of the SAVIA collection was completed in June 2023 as a part of the GRBaV response, using $15,000 of funding from the NGC project (via Wine Australia).
- Determination of genetic status of the SAVIA collection is partially complete. A set of 252 accessions was sampled as single vines and included in the AWRI clone identification projects (AWR 1701-4.4.5: Sequencing Australian wine grapevine germplasm and AWR 2202-2.2.1: Genetic diversity of Australian wine grapevine germplasm). An additional 85 accessions have been DNA tested for variety verification by SAVIA in previous projects, with 129 accessions still requiring genetic verification (quoted at approximately $150 per sample = $19,350 at current commercial prices).
- Significant endeavours to engage SAVIA and support the collection as a national asset through the NGC have been only partially successful. As it currently stands there is no formal arrangement in place.

[2] Virus testing of the SAVIA collection included: GLRaV-1,2, 3, 4, 5, 4-9 and 9, GVA, GVB, GPGV, GRBaV and GFKV by PCR analysis.

5.5.3 Nuclear Collection contingency planning

Duplication of key cultivars is a guiding principle of germplasm management and was highlighted as a critical need during stakeholder consultation for the NGC project. Given the uncertainty around long-term access to the WAVIA collection, the establishment of a new collection has been contemplated and captured in a briefing paper by the NGC coordinator.

The collection would be established with a practical, commercial focus aimed at supporting the establishment of new source blocks (including rootstocks) and supplying semi-commercial volumes for growers. It would also support the distribution pathways for the CSIRO grapevine breeding lines, the 'unique' priority varieties and clones from the CSIRO and SARDI collections and industry critical imports (e.g., Pierce's disease-resistant varieties).

5.5.4 Implement strategic rationalisation of the Germplasm Collections (CSIRO, SARDI and AVIA collections)

The majority of Australia's unique grapevine germplasm is held in the CSIRO and SARDI collections located at Irymple, Victoria and Nuriootpa, South Australia, respectively. Based on the analysis undertaken for the purpose of this project, there are 205 unique winegrape/multi-purpose varieties and 574 unique winegrape/multi-purpose clones. As the long-term future of these collections is not assured, the NGC coordinator has completed a number of activities which will ultimately facilitate the transfer of selected 'priority' cultivars from these collections into the National Grapevine Collection system:

- A survey of sector specialists in emerging and alternative varieties, nurseries, vine improvement groups and key plant material decision makers was conducted to identify the priority cultivars in the SARDI and CSIRO collections. This process identified 137 cultivars (both unique varieties and unique clones) out of a total of 869 cultivars across both collections (see Appendix 5 for a full list of these varieties and clones).
- Virus testing[3] of the priority cultivars in the CSIRO collection in May 2023 identified that all were infected with at least one virus. GLRaV-3 and GPGV were found in 60% and 98% of composite samples (by cultivar) respectively. A total of 24 priority cultivars were found to be infected with only GPGV and non-transmissible lower risk virus types GLRaV-4-9 and GFLV.
- Virus testing[3] of the priority cultivars in the SARDI collection occurred over two dates in June and July 2024. In total 32 samples were collected and submitted for a full virus screen. GLaRV-1, GLaRV-3 and GVA, or a combination thereof, were found in 28 of the 32 samples submitted. During the sampling activities, as a value add, missing and poor health vines were noted and based on this, an updated planting details spreadsheet has been developed and supplied to SARDI collection stakeholders.
- Virus testing[3] of the 216 cultivars in the AVIA collection was completed in June 2023. This activity identified that 40% of composite samples (by cultivar) were positive to GPGV and based on comparisons with previous testing, the virus is spreading through the collection.

[3] Virus testing of the AVIA collection and priority varieties and clones in the CSIRO and SARDI collection included: GLRaV-1,2, 3, 4, 5, 4-9 and 9, GVA, GVB, GPGV, GRBaV and GFKV by PCR analysis.

During the sampling activities, as a value add, missing and poor health vines were noted and based on this an updated planting details spreadsheet has been developed and supplied to AVIA collection stakeholders.

- A cost comparison for interim storage options of priority cultivars has been completed.
- A pilot program for cost-sharing (between Wine Australia and an industry partner) of virus elimination of eight priority varieties from the CSIRO collection has been initiated.

5.5.5 Key outputs: Collection Coordination

- Establishment and phytosanitary testing of mother vines for the VISC.
- Financial support for virus testing of all the cultivars in the SAVIA collection.
- Virus testing of 50% of cultivars in the WAVIA collection and subsequent discovery of Grapevine Red Blotch virus.
- A briefing paper which fully scopes the establishment of a new purpose-built Nuclear Collection, including the current status, vision, design elements, estimated costings, potential income and risks.
- Identification and virus testing of 137 priority cultivars from the CSIRO and SARDI collection
- Virus testing of all cultivars in the AVIA collections

5.6 Enhancing and expanding Australia's grapevine germplasm

Having a secure National Grapevine Collection offers the opportunity to conduct projects that enhance and unlock the potential of Australia's unique and heritage grapevine genetics, as well as providing a platform for importation of industry-critical grapevine varieties from overseas breeding and selection program. This part of the project aimed to explore partnership opportunities, particularly with industry, to conduct such activities under the NGC program.

5.6.1 Chardonnay P58 project

In June 2023, Pinnacle Drinks requested that the NGC coordinator manage the virus elimination of Chardonnay clone P58 (which is widely grown and sought after but its background is a mystery and it is known to carry Grapevine Leafroll 2 virus). A three-year, $17,500 project co-funded by Pinnacle Drinks and Wine Australia was initiated. It includes partnership with Yalumba Nursery, Affinity Labs (to perform the virus elimination), and the AWRI (to confirm the genetic identity of P58 by whole genome sequencing). Planned outputs include:

1. Provision of Pinnacle Drinks with a virus free P58 selection for establishment of their own source block.
2. Establishment of a virus free P58 selection in a nationally accessible Nuclear Collection, available to vine improvement groups and nurseries for their own source block establishment to enable access by industry.

3. Determination of the provenance and history of P58.

Key outputs: P58 project

Sampling took place in Spring 2023, following the identification of suitable vineyards. Results from genomic sequencing showed that the original P58 cuttings were likely imported as a mass selection. This was supported by further investigations and interviews with key people including Brian McGuigan and Andrew Calliard. These investigations also uncovered that the original source material for P58 very likely came from Montrachet in Burgundy and that P58 was imported in 1959, not 1958 as previously assumed.

Findings were presented at the Chardonnay Symposium Australia in November 2024 to great interest. Following the presentation, two new partners joined the project (Jackson Family Wines and Yarra Yering) and an additional 13 vines were sampled for genomic sequencing (5 from each of the new partners and 3 from Pinnacle Drinks). This sampling represents an additional $13,500 of new investment into the project.

The project demonstrates how co-investment can work under the NGC program to benefit partners and meet the objectives of the NGC, and serves as a test case for future virus elimination/ importation projects under the program.

5.6.2 Godello virus elimination project

Gapstead Wines recently initiated virus elimination of the Iberian variety Godello, sourced from the CSIRO collection. Godello is a highly regarded white wine grape grown primarily in Spain and Portugal and was identified as a priority variety in the survey of the CSIRO and SARDI collections. A project was initiated to leverage the privately funded virus elimination opportunity to make clean Godello material available to the sector through the propagation supply chain *via* Yalumba Nursery and nationally accessible Nuclear Collections. Specifically, the project will fund and facilitate the propagation process and establishment of a Godello source block (via Affinity Labs and Yalumba Nursery) and organise transfer of mother vines to the national Nuclear Collections of the NGC.

Key outputs: Godello project

Following the completion of the virus elimination process the NGC coordinator, facilitated the production and potting out of 50 tissue culture plantlets *via* Affinity Labs. These plantlets have since been transported to Yalumba Nursery where they are being grown for budwood production.

This is another model of how co-investment can work under the NGC program for mutual benefit of partners and the intention of the NGC program to serve the wider grape and wine sector.

5.6.3 Pierce’s disease resistance varieties

Pierce's disease in grapevines is caused by the bacterium *Xylella fastidiosa*, which is considered Australia's number one ‘National Priority Plant Pest’. One promising approach to mitigating the risk of Pierce's disease to Australia is to import and trial the five resistant grape varieties bred and released by UC Davis. While not immune to bacterial infection, these varieties have a greater tolerance for the disease, reducing its impact on yield and vine health.

Key outputs: Pierce's disease resistant varieties

The NGC coordinator has identified a pathway for the importation of the Pierce's Disease resistant varieties from UC Davis through their Australian master licensee. This involved following up on previous correspondence between Craig Elliot (ex Wine Australia) and contacts at UC Davis, a meeting with New Zealand propagation stakeholders and a meeting with UC Davis's Australian import agent Matthew Cottral.

The main roadblock is that one of the parent species (*Vitis arizonica*) is not on the Department of Agriculture, Forestry and Fisheries (DAFF) permitted plant species list - this would need to be rectified prior to importation *via* a risk assessment process.

5.7 Impact of grapevine red blotch virus, crown gall-like bacterial pathogens and Phomopsis on the NGC project

The discovery of grapevine red blotch virus in the WAVIA and CSIRO collections, issues with crown gall-like pathogens and the discovery of Phomopsis in the WAVIA collection, as described in sections above, presented several challenges to the NGC project, including:

- **Reduced capacity and availability of key stakeholders:** Response efforts required considerable attention and resources from stakeholders and the NGC coordinator which reduced their availability to participate in NGC activities and contribute to the delivery of project outputs.
- **Lack of certainty on availability of propagation assets:** The potential presence of these pathogens in grapevine collections created uncertainty and necessitated increased testing and surveillance efforts to ensure the health of the collections.
- **Challenges in delivering project outputs:** The potential presence of these pathogens impeded the delivery of NGC project outputs, slowed down progress and increased the complexity of the project.

Despite these challenges, the NGC project identified opportunities to leverage outcomes, such as reducing costs of virus testing through shared resources and expertise. The project also worked to develop strategies for managing these pathogens and mitigating their impact on the collections and the industry.

6. Recommendations

6.1 Ensuring effective project management

Moving onto the next phase of the NGC project it is recommended that a Standards Committee and Collections Management Committee be established, to effectively take the place of the PWG and SRC, respectively.

The Standards Committee (which is currently being jointly initiated by propagation stakeholders including VINA and SAVIA with input from industry peak bodies Wine Australia, ATGA and DFA) will have the specific role and responsibilities associated with delivering and maintaining the grapevine certification program including:

- Developing and refining the written standard.
- Identifying and addressing propagation issues.
- Identifying gaps in research and potential new technologies or techniques that would contribute to best practice.
- As a conduit to providing information and updates to the member organisations to which they represent.
- Reviewing the written standard on an agreed cycle or as critical new information or technology becomes available.

The new Collections Management Committee will have a specific focus on the management of the collections in the NGC and allocation of funding for collection-specific activities. It will be comprised of collection owners with input sought from research organisations and wine sector representatives on an as needs basis.

The establishment of two separate committees for Standards and Collections will help delineate and clarify responsibilities, which on occasions became blurred with the previous governance structures. Further work on the ongoing requirement for the PWG, roles and the responsibilities, terms of reference and alignment between the Standards Committee and Collections Committee will be completed in the early stages of the second phase of the NGC project.

6.2 Australian Grapevine Germplasm and Propagation Asset Register

- Reconsider the existing Request for Proposal in the context of the proposed National Vineyard Register, potential third-party certification program managers (i.e. Greenlife Industry Australia) and existing nursery and vine improvement data collection and storage platforms.
- Assist Wine Australia in procurement of a delivery partner for the register as required.
- Provide ongoing support for a project to develop the register, including provision of expertise and information and facilitation of engagement with key stakeholders and end-users.

6.3 Support the development and adoption of an industry-based accreditation and certification scheme based upon agreed standards.

After extensive reviews and consultation as part of Wine Australia funded projects WAC 2101 and FOV 2202, it is recommended that the grape, wine and propagation sector engage an independent service provider, such as Greenlife Industry Australia (GIA)*, to support the standards committee in delivering the objectives of the certification program.

*Greenlife Industry Australia (GIA) is the peak industry body for businesses and organisations that are involved in nursery production. Greenlife Industry Australia owns and administers the Australian Plant Production Standards (APPS) which is the over-arching framework for the Australian nursery industry's Best Management Practice (BMP) programs. GIA administers sector sub-programs for propagators of Avocado, Banana, Landscape tree stock, Macadamia and Strawberry, and is currently developing a program for citrus.

6.4 The science to support the standards

- **Best practice sampling and virus diagnostics (AVR 2402):** Initiate the sampling rate decision matrix project with the Biometry Hub at Adelaide University and continue to support the broader project through membership of the Industry Reference Group.
- **Grapevine virus vector management (scale and mealybug):** Continue to monitor the national scale project for outputs of relevance to virus management and integrate new knowledge into the grapevine propagation standards. A new project is recommended specifically addressing mealybug and building on existing research (PFR 2001).
- **Virus detection using remote sensing:** Continue pursuing funding opportunities, prioritising the AEA Ignite grant in 2025, and refine methodologies for different varieties, regions, and seasons.
- **Grapevine trunk disease (GTD) management:** Maintain annual meetings with the project team. Identify opportunities for integrating the interim protocols into existing source block practice.
- **Crown gall-like pathogens:** Support existing research through membership of the Industry Reference Group and integrate new knowledge into the grapevine propagation standards.
- **Genetic identity confirmation:** Convene a working group to develop a list of prime clone names and agreed nomenclature for treatments.

6.5 Establishment of the Vine Integrity and Security Collection

- Conduct pre-establishment virus and genetic testing (February 2025).
- Transfer material to Affinity Labs under VISC pilot project (March 2025).
- Slow growth tissue culture and assessment phase (March 2025-June 2027).

- Based on results of feasibility study, develop options for long-term funding and potential expansion of the VISC.

6.6 Support of the SAVIA collection

The SAVIA collection has an important role to play in helping to meet the objectives of the NGC program and so while there have been challenges with stakeholder engagement over the past three years it is imperative that renewed efforts are made to develop long-term support and management arrangements.

6.7 Support of the WAVIA collection

- Obtain formal agreement between WAVIA stakeholders outlining funding responsibilities.
- Complete virus testing of the WAVIA collection.
- Initiate stage 1 of the support plan for the collection.

6.8 Implement strategic rationalisation of the Germplasm Collections

- Confirm CSIRO's policy on the potential release of cultivars with virus types of concern (GLRaV-1,-3 and GVA) into interim storage sites.
- Confirm CSIRO's policy on the potential release of cultivars with virus types of low economic consequence into the AVIA collection.
- Based on results of discussions with CSIRO, develop a pipeline for movement of cultivars out of the CSIRO and SARDI collections for virus elimination, re-establishment and propagation.
- Further refine the list of 137 priority CSIRO/SARDI cultivars identified as part of the initial survey process.
- Continue with the pilot program for cost-sharing virus elimination of eight priority cultivars.

6.9 Vine enhancement projects

Seek further opportunities to partner with industry on projects for mutual benefit within the National Grapevine Collection program, and continue existing projects as below:

P58 project

Results of the second tranche of genomic sequencing should be available in autumn 2025. New activities will specifically address the analysis of these results, the selection of a candidate 'P58' mother-vine and facilitation of virus elimination to develop a 'virus free' P58 clone.

Godello virus elimination project

Determine and support ongoing propagation requirements for the Godello source block and confirm the delivery timeline for source block and collection establishment.

Pierce's disease resistant varieties

Communicate with the DAFF to understand the process required for addition of *V. arizonica* (as a parent species of Pierce's Disease-resistant varieties) to the permitted plant list for import from UC Davis.

Appendix 1. Communication

Updates on the progress of the NGC project have been provided regularly to industry and stakeholder groups including:

- Stakeholder Reference Committee of the NGC
- Program Working Group of the NGC
- AGW's Wine Biosecurity Committee, on the following dates: 1/6/22, 8/11/2022, 2/6/23, 8/11/23, 24/5/2024.

Presentation on *'Propagation Standards, Challenges and Opportunities'* at the Plant Biosecurity Research Symposium 12th May 2022.

ABC news article *'Australian Wine Industry future proofed with plans to store varieties in high security labs'*. https://www.abc.net.au/news/rural/2022-11-24/wine-industry-future-proof-varieties-stored-high-security-labs/101685096

Wine Australia RD&A news article, 16 December 2022. ASVO Viticulturist of the Year 2022 – Nick Dry | Wine Australia

Wine Australia R&I News article, 15 December 2023. Collaboration key to success for the National Grapevine Collection | Wine Australia

AWRI Webinar: *Update on the National Grapevine Collection*. Presented October 19th 2023. https://www.youtube.com/watch?v=WLrIk3ZDvy4&t=691s

Presentation on '*the P58 Project'* at the Chardonnay Symposium Australia in the Yarra Valley on 13th November 2024 https://www.chardonnaysymposium.com.au/program

Appendix 2. Intellectual Property

Relevant collection data was compiled into a single ‘master’ file (in format .xlxs) based on the following data sets:

- The existing Australian grapevine registers which were updated in 2012 and then again 2019. Note: 2019 register does not contain CSIRO and SARDI collection data
- Updated data on variety identity for the CSIRO and SARDI collections based on the project CSP1501 ’Grapevine Germplasm Variety identification’
- Virus testing results obtained in 2023/2024 for the AVIA, CSIRO, SARDI and SAVIA collections.

Appendix 3. References

Bell V, Chooi K. August 2022. Grapevine leafroll disease and Shiraz disease: interim recommendations for management in Australian vineyards. Final report to Wine Australia. Project PFR 2001. Best practice management of grapevine viruses in Australia | Wine Australia

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Maul, E., Ganesch, A., Röckel, F. and Töpfer, R. (2021) Vitis International Variety Catalogue. www.vivc.de

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Wang, Y.M.; Ostendorf, B.; Gautam, D.; Habili, N.; Pagay, V. (2022) Plant Viral Disease Detection: From Molecular Diagnosis to Optical Sensing Technology—A Multidisciplinary Review. Remote Sens.14, 1542.

Appendix 4. List of priority varieties and clones in CSIRO and SARDI collections

Note: Determined by industry consultation and survey. Varieties highlighted in yellow exist as 'conditional varieties' - varieties that are planted in collections but supplied under conditions (i.e. non-propagation agreements and possibly royalties).

CSIRO Collection

Prime Variety name	Clone name collection identifier	2023 Virus status	Colour	Justification for inclusion as a priority cultivar
AGIORGITIKO		LR1, GPGV, GVA, RSPaV	R	Identified as having current use value. Classic Greek variety.
AGIORGITIKO	ex Athens, HT ex quar.	LR1, GPGV, GVA, RSPaV	R	Identified as current and future use value. Quality Greek variety. Medium acid, high quality potential.
ALBARAS	as Triexadura Blanca	LR2, LR3, GPGV, RSPaV	W	Global threatened (3). Spanish origin.
ARBANE	FSAC CSIRO	LR3, GPGV, GVB, RSPaV	W	Identified as having current and future use value- old aromatic white variety from southern Champagne. Small grapes and bunches. Vigorous, early budding, mid to late ripening.
ARBOIS BLANC	ex VRS Rutherglen	LR2, LR3, LR4, GPGV, GRBV, GVB, RSPaV	W	Globally threatened (4), potential heritage selection, late ripening, flavours similar to Chardonnay
ARINTO	FSAC	LR3, GPGV, GVB, RSPaV	W	Identified as having current and future use value. High Quality Portuguese white. Available under license from RVIC
ASPIRAN NOIR	R1V12#	GPGV, RSPaV	R	Heritage selection from Bests Nursery Block
ASPIRAN NOIR	R2V40#	GPGV, RSPaV	R	Heritage selection from Bests Nursery Block

BAGA	ex VRS Rutherglen Syn. Baga	LR1, LR2, LR3, GPGV, GRBV, GVA, GVB, RSPaV	R	Identified as having future use value. Heritage selection. Portuguese origin.
BIANCHETTA TREVIGIANA	FVH8V1 syn. Vernaccia	Mistakenly not included on original list to Agribio	W	Identified as having current use value. Typically blended with Prosecco.
BIANCHETTA TREVIGIANA		Mistakenly not included on original list to Agribio	W	Identified as having current use value. Typically blended with Prosecco.
BIANCOLELLA	FSAC	LR3, GPGV, GVB, RSPaV	W	Identified as having current and future use value. Strong interest in varieties from Campania. Good acid retention
BLAUFRAENKISCH	Merbein	LR3, GPGV, RSPaV	R	Identified as having current use value. Cool climate alternative variety. No known virus free sources in Australia
BOBAL		LR2, LR3, GPGV, RSPaV	R	Identified as having current and future use value. Drought resistant. Widely planted in Spain.
BRAQUET NOIR	R5V59 (Braquet)	LR3, LR5, LR9, GPGV, GVA, RSPaV	R	Heritage selection from Bests Nursery Block
CABERNET FRANC	1959 Bord. V1	LR1, LR2, GPGV, GRBV, GVA, RSPaV	R	Only one registered selection in France.
CABERNET SAUVIGNON	ex MD10-13/15 ex McWilliams	LR3, LR9, GPGV, GVA, RSPaV	R	Heritage selection
CABERNET SAUVIGNON	1959 Bordeaux ex Griffith	LR3, GPGV, GRBV, GVA, GVB, RSPaV	R	Heritage selection

CABERNET SAUVIGNON	ex G.W. Vine 4	LR4, LR9, GPGV, GVA, RSPaV	R	Heritage selection
CADRETE	ex VRS Rutherglen see Bonvedro	GFkV, LFR1, LR2, LR3, GPGV, GVA, RSPaV	R	Globally Threatened (2). Heritage selection. Spanish origin.
CAMARAOU NOIR	Merbein	LR2, LR3, GPGV, RSPaV	R	Heritage selection, possibly Busby import
CAMARAOU NOIR	ex VRS Rutherglen	LR3, GPGV, RSPaV	R	Heritage selection high colour and high TA
CATARRATTO BIANCO COMUNE	ex MD11-79/81	LR1, LR2, LR3, LR5, GPGV, GVA, GVB, RSPaV	W	Identified as having current use value. Strong interest in Sicilian varieties.
Chardonnay	1959/NX/Eur ex single vine Griffith	Fleck, LR1, GPGV, RSPaV	W	Early French import
CHENIN BLANC	ex G.W., Best's R5V32	LR2, LR3, GPGV, GVA, RSPaV	W	Heritage selection from Bests Nursery Block
CHENIN BLANC	ex G.W., Best's P, R1V28	LR3, LR4, GPGV, RSPaV	W	Heritage selection from Bests Nursery Block
CINSAUT	ex VRS Rutherglen	GPGV, RSPaV	R	Heritage selection
Clairette	ex Hunter Valley	LR4, GPGV, RSPaV	W	Heritage selection
CLAVERIE	ex Great Western R1V48	LR3, GPGV, GVA, RSPaV	W	Heritage selection from Bests Nursery Block
CROATINA			R	Italian red variety used for blending.

DUNKELFELDER		LR1, LR3, GPGV, GVA, RSPaV	R	Interest in this variety for its high colour and blending in red wines
EHRENFELSER	1974/CX/Gm	LR3, GPGV, GRBV, RSPAV	W	Identified for current use value. Performs well in cool areas
ETRAIRE DE LA DUI	ex Rutherglen FSAC	Mistakenly not included on original list to Agribio	R	Heritage Selection. Swiss variety with good disease tolerance.
FETEASCA ALBA	FV13V5	GPGV, RSPaV	W	Identified as current use value- Eastern European variety producing good quality crisp, aromatic wines
FETEASCA REGALA		Fleck, GPGV, RSPaV	W	Identified as current use value- Eastern European variety producing good quality fuller bodied, aromatic wines
FREISA	FVH8V3	LR1, LR3, GPGV, GVB, RSPaV	R	Identified as current use value- relative of Nebbiolo
FRIULANO	(SNIP 2009) as Chateau Tahbilk #6	LR2, LR3, LR9, GPGV, GVA, RSPaV	W	Heritage Selection
GALEGO DOURADO	R15V92 ex Great Western	GPGV, GVA	W	Heritage selection from Bests Nursery Block
Gamay	ex VRS Rutherglen as Pinot Noir	GFkV, LR2, LR3, GPGV, GVA, RSPaV	R	Strong interest in this variety- this selection is not commercially available
Gamay	Freaux	LR1, RSPaV	R	Strong interest in this variety- this selection is not commercially available
Garnacha	C4-60/C/Merb	LR3, GPGV, RSPaV	R	Previously unavailable selection, strong interest in Grenache

GASCON	as Cabernet Gros ex VRS Rutherglen	GPGV, RSPaV	R	Heritage selection
GRAND NOIR	FVF9V1	LR3, GPGV, GRBV, GVA, RSPaV	R	Identified as having future use value. Terinturier (red flesh) variety
GUEUCHE NOIR	ex Great Western as Best's D	LR3, LR4, GPGV, RSPaV	R	Heritage selection from Bests Nursery Block. Globally Threatened (2)
LEN DE L'EL	ex Vassal, HT ex quar. V1	No Result provided	W	Identified as current use value- older French variety.
LILIORILA		LR3, GPGV, RSPaV	W	Identified as current use value. Hybrid with Chardonnay parentage. Recently added to the permitted list of varieties in Bordeaux AOC
MALVASIA COMUN	ex VRS Rutherglen	LR2, LR3, GPGV, GVA, RSPaV	W	Globally Threatened (1). Heritage selection. Spanish origin
MALVASIA FINA	FVI14V11	LR3, GPGV, GVB, RSPaV	W	Identified as having current and future use value. High yield and high acid variety.
MARUFO	FVI11V10 Incorrect FV13V3	LR3, GPGV, RSPaV	R	Old variety from Portugal- used in the production of Port
MEDINA	IC82.8396	LR3, GPGV, GVA, RSPaV	R	Globally Threatened (1). Early ripening, powdery and down mildew resistant, Hungarian origin
MINELLA BIANCA	HT ex quar.	LR3, GPGV, GVA, RSPaV	W	Globally Threatened (4). High acid variety originating from Etna

MINELLA BIANCA	ex Catania	LR2, LR3, GPGV, GVA, RSPaV	W	Globally Threatened (4). High acid variety originating from Etna
MOLINARA	FSAC	LR3, GPGV, GVA, RSPaV	W	Identified as current use value- older French variety.
MONASTRELL	ex Esparte ex Great Western	LR4, GPGV, RSPaV	R	Heritage selection
MONASTRELL	ex Stanthorpe as Black Cluster	LR3, GPGV, GVA, RSPaV	R	Heritage selection
MONASTRELL	Local unselected Vine 1 is AC74.8227	GPGV, RSPaV	R	Heritage selection
MONTILS	as Aucarot ex Tulloch's, Hunter Valley	LR3, GPGV, RSPaV	W	Heritage selection. Minor variety of Cognac
MTSVANE KAKHURI	FVH4V15	GPGV, GVA, RSPaV	W	Identified as current use value-Georgian variety.
Muscat a petits grains	ex MD9-22/24	Fleck, LR1, GPGV, RSPaV	R	Heritage Selection. No available selections of Black Frontignac
MUSCAT OTTONEL	FVG8V9	GPGV, GVA, RSPaV	W	Aromatic, cold resistant.
NEBBIOLO	Chiavenas	LR3, GPGV, GVA, RSPaV	R	Currently unavailable clone
Palomino	R5V104#	LR1, LR9, GPGV, GVA, RSPaV	W	Identified as having current use value. Italian origin, typically used for dessert wines.

Peloursin	ex VRS Rutherglen as Pinot Hermitage	LR3, GPGV, GVA, RSPaV	R	Identified as having future use value. Heritage selection.
PICOLIT	IC84.8473	LR3, GPGV, RSPaV	W	Identified as having current use value. High acidity
Pinot	IC79.8310	LR1, LR3, GPGV, GVA, GVB, RSPaV	W	Only two clones commercially available (54 and GM2). Increasing interest in this variety
Pinot	1968/CX/NZ	LR3, GPGV, RSPaV	R	Only one clone selection (H10V5) is commercially available. Increasing interest in this variety for both table and sparkling wine.
Pinot	ex Mount Pleasant, Hunter Valley	GPGV, RSPaV	R	Heritage Selection. Highly probable MV6 origin.
Pinot	FVF6V7	GPGV, GVA, RSPaV	R	FPS12. Beba clone, from Spain, Pinot fin type. Small bunches, moderate yield. (3) No longer registered at FPS- removed because of 'tested +ve to RSP' (8)
Pinot	Clone 2 (PRI. IMP. TALTARNI	GFkV, LR3, GPGV, GVA, RSPaV	R	Only one clone selection (H10V5) is commercially available. Increasing interest in this variety for both table and sparkling wine.
RABIGATO		LR3, GPGV, GVA, RSPaV	W	Identified as having future use value. High acid white with early ripening. Portuguese origin
RABOSO PIAVE	FVK7V4 IC73.8213	GPGV, RSPaV	R	Identified as having future use value. Deep colour and high tannin. Northern Italy
REFOSCO DAL PEDUNCOLO ROSSO	G1. IC84.8447	LR3, GPGV, GVA, RSPaV	R	Identified as having current use value. High colour and quality potential. Italian origin.

REFOSCO NOSTRANO		LR1, LR3, GPGV, GVA, RSPaV	R	Identified as having current and future use value. Late ripening, lighter style.
RIESLING WEISS	R2#1	GPGV, RSPaV	W	Heritage selection, possibly originating from Victoria (Graytown)
RIESLING WEISS	1959/NX/Europe clonal	GPGV, RSPaV	W	Previously unavailable early French import.
RONDINELLA		LR3, LR9, GPGV, RSPaV	R	Identified as having future use value. High yield, with thick skins from northern Italy.
ROTGIPFLER	FVH6V11	Fleck, LR3, GPGV, RSPaV	R	Identified as having future use value. Cross between Traminer and Veltliner Rot.
ROYALTY	FVC8V9/VX/UCD	LR3, GPGV, RSPaV	R	early ripening Terniturier (high colour) with high acid, interspecific cross
RUFETE		GFkV, LR1, LR3, GPGV, GVA, RSPaV	R	Identified as having future use value. Later ripening, good colour and acidic Portuguese variety .
SAINT LAURENT	FSAC	GPGV, GVA, RSPaV	R	Identified as having current use value. Aromatic with good colour. Widely planted in Austria and into Eastern Europe.
SANGIOVESE		LR3, GPGV, RSPaV	R	Previously unavailable selection
SANGIOVESE	X.	LR3, GPGV, RSPaV	R	Previously unavailable selection
SAUVIGNON BLANC		LR1, LR2, LR3, GPGV, GVA, RSPaV	W	Previously unavailable selection
SCARLETT		LR1, RSPaV	R	Very high anthocyanins, high acidity, low yield, interspecific cross (13)

SYRAH	ex MD10-7/9 ex Murray, Merbein South	GPGV, GVA, RSPaV	R	Previously unavailable selection
SYRAH	(Gros Syrah) AJA (was Xeres) ex MD10-40/42	LR2, GPGV, GVA, RSPaV	R	Previously unavailable selection
SYRAH	local unselected Vine 17	GPGV, GRBV, RSPaV	R	Previously unavailable selection
Tibouren	R3V47#	GPGV, RSPaV	R	Heritage selection from Bests nursery block. Ancient and rare variety from Provence used for Rose production. possibly extinct variety in France
TOURIGA NACIONAL	WA2V37 as Alvarelhao	GPGV, RSPaV	R	Previously unavailable selection. Two other Touriga Nacional selections available E6V12 and Rutherglen- some increasing interest in Portuguese varieties
TRINCADEIRA	R3V54#	GPGV, RSPaV	R	Heritage selection from Bests nursery block. High coloured grape from Portugal.
Trousseau	FVD6V15	GPGV, RSPaV	G	Increasing interest in Trosseau. Grey variant. Performs well in hot regions. Produces aromatic wines.
Trousseau	syn. Grey Riesling FVC12V16	GPGV, RSPaV	G	Increasing interest in Trosseau. Grey variant. Performs well in hot regions. Produces aromatic wines.

Trousseau	syn. Bastardo MD10-46/48 ex Rutherglen	LR1, LR2, LR3, GPGV, RSPaV	R	Heritage Selection.
TROYEN	Best's No. 18 ex Great Western	LR1, LR3, LR9, GPGV, GVA, RSPaV	R	Heritage selection from Bests nursery block. Ancient champagne grape, possibly extinct variety in France
TROYEN	ex Great Western as Best's V R4V100	LR9, GPGV, GVA, RSPaV	R	Heritage selection from Bests nursery block. Ancient champagne grape, possibly extinct variety in France
UVA DI TROIA		LR3, GPGV, RSPaV	R	Identified as having current use value. Italian variety (Puglia), suited to Mediterranean conditions.
VELTLINER ROT		GPGV, RSPaV	R	Identified as having current use value. High quality potential. Austrian origin
VERDEJO BLANCO		LR2, GPGV, RSPaV	W	Identified as having current use value. High quality potential Spanish variety with good acid retention.
VERDICCHIO BIANCO	1969/CX/VS	LR3, GPGV, RSPaV	W	Identified for current use value.
VERDICCHIO BIANCO	FVD8V1 IV64.2096	LR3, GPGV, RSPaV	W	Identified as having current and future use value. High acidity
VESPOLINA	FVH4V5 (Vespolina)	LR3, GPGV, RSPaV	R	Identified as having current use value. Italian variety, relative of Nebbiolo
VIOSINHO	as Weisser Riesling 110-18	Mistakenly not included on original list to Agribio	W	Identified as having future use value. High acid variety from Portugal.
VIURA	H62-LN/CX/UCD	Mistakenly not included on original list to Agribio	W	Identified as having current and future use value- Late budburst, late ripening, thick skinned, likes warm dry sites.

WHITE MUSCAT		LR2, LR9, GPGV, GVA, RSPaV	W	Globally Threatened (1), heritage selection
WILDBACHER DE HONGRIE	#10 ex Graytown	No Result	R	Globally threatened. Possible Busby selection. Examples apparently planted in Torbreck vineyard
XYNOMAVRO		Mistakenly not included on original list to Agribio	R	Identified as current and future use value. Quality Greek variety. High acid, high quality potential.

SARDI Collection

SARDI collection ID	Prime Variety name	Clone name collection identifier	2024 virus result	Colour	Justification for inclusion as a priority cultivar
Bonvedro SA 146-Nuriootpa	PARRALETA	SA 146	GVA, LR3	R	Heritage Selection. No available selections of Bonvedro
Terret Noir ex BVRC VC	TERRET NOIR	ex BVRC VC	GVA, LR1, LR3, LR4-6	R	Heritage selection. Dark skinned, high acid minor variety of the Rhone.
Trousseau Noir syn. Bastardo FVD3V3/CX/UCD	Trousseau	FVD3V3	GFKV, GVA, LR2, LR3	R	Increasing interest in Trosseau.
Fer ex Great Western	FER	ex Great Western	GVA, LR3	R	Heritage selection from Bests Nursery Block. Has shown good disease tolerance overseas.
Constantia (f) ex BVRC VC	Tibouren	(f) ex BVRC VC	GVA, LR3	R	Identified as having future use value-performs well in hot areas. Old French Rose variety.
Trajadura ex Portugal	TRAJADURA	ex Portugal	GFKV, GVA, LR1, LR3	W	Identified as having future use value. Iberian variety, Aromatic, used in blends.

Verdicchio ex CSIRO	VERDICCHIO BIANCO	ex CSIRO	GVA, LR3	W	Identified as having current and future use value. High quality potential Italian variety with good acid retention.
Riesling Ugody	RIESLING WEISS	Ugody	GVA	W	Previously unavailable heritage selection.
Bonvedro SA 164-Nuriootpa	PARRALETA	SA 164	LR3	R	Heritage Selection. No available selections of Bonvedro
Chardonnay 84/NX	Chardonnay	84	GFKV	W	Early French import.
Black Frontignan BVRC 3	Muscat a petits grains	BVRC 3	GVA, LR1	R	Heritage Selection. No available selections of Black Frontignac
Brown Frontignan LC2	Muscat a petits grains	LC2	GVA, LR3	R	Only one registered selection in France.
Brown Frontignan LC 8	Muscat a petits grains	LC 8	GVA, LR3, LR4/9	R	Only one registered selection in France.
Chardonnay Original ex Clare (White)	Chardonnay	Original ex Clare (White)	GVA, LR3	W	Heritage selection
Chardonnay Red Sport ex Clare	Chardonnay	Red Sport	GVA, LR3	W	Selection of interest due to red skin
Clairette Blanche (false) FVI4V11/CX/UCD	MALVASIA FINA	FVI4V11	GVA, LR3	W	Identified as having current and future use value. Late bursting and early ripening.
Xarello H61.1LN/CX/UCD	Xarello	H61.1LN	GVA, LR3	W	Identified as having current and future use value. One the three varieties used in the production of (Sparkling) Cava in Spain.

Petit Meslier ex Great Western	MESLIER PETIT	ex Great Western	GVA, LR3, LR4/6	W	Heritage Selection. High acid sparkling variety
White Muscat CSIRO C30-1	WHITE MUSCAT	CSIRO C30-1	GVA, LR3, LR4/9	W	Globally Threatened (1), heritage selection
Cabernet Sauvignon	Cabernet Sauvignon	Vereb 2	none detected	R	Genetically dissimilar to currently available clone selections based on analysis of genomic sequencing results from AWR 2202-2.2.1
Cabernet Sauvignon	Cabernet Sauvignon	Vereb 1	LR4/6	R	Genetically dissimilar to currently available clone selections based on analysis of genomic sequencing results from AWR 2202-2.2.1
Cabernet Sauvignon	Cabernet Sauvignon	Great Western VIW	GFKV	R	Genetically dissimilar to currently available clone selections based on analysis of genomic sequencing results from AWR 2202-2.2.1
Cabernet Sauvignon	Cabernet Sauvignon	SA 14	GVA, LR4/9	R	Genetically dissimilar to currently available clone selections based on analysis of genomic sequencing results from AWR 2202-2.2.1
Cabernet Sauvignon	Cabernet Sauvignon	SA 36	GVA, LR4/9	R	Genetically dissimilar to currently available clone selections based on analysis of genomic sequencing results from AWR 2202-2.2.1
Cabernet Sauvignon	Cabernet Sauvignon	SA 84	GVA, LR4/9	R	Genetically dissimilar to currently available clone selections based on analysis of genomic sequencing results from AWR 2202-2.2.1
Cabernet Sauvignon	Cabernet Sauvignon	SA 90	GVA, LR4/9, LR1, LR3	R	Genetically dissimilar to currently available clone selections based on analysis of genomic sequencing results from AWR 2202-2.2.1
Shiraz	Shiraz	1413	LR3	R	Genetically dissimilar to currently available clone selections based on analysis of genomic sequencing results from AWR 2202-2.2.1
Shiraz	Shiraz	41	LR3	R	Genetically dissimilar to currently available clone selections based on analysis of genomic sequencing results from AWR 2202-2.2.1

Shiraz	Shiraz	33	LR3	R	Genetically dissimilar to currently available clone selections based on analysis of genomic sequencing results from AWR 2202-2.2.1
Shiraz	Shiraz	121	none detected	R	Genetically dissimilar to currently available clone selections based on analysis of genomic sequencing results from AWR 2202-2.2.1
Shiraz	Shiraz	Tahbilk R7V13 EAST	LR3	R	Genetically dissimilar to currently available clone selections based on analysis of genomic sequencing results from AWR 2202-2.2.1
Shiraz	Shiraz	CW 73-3	LR3	R	Genetically dissimilar to currently available clone selections based on analysis of genomic sequencing results from AWR 2202-2.2.1