

# Partnering with nature in the vineyard

When it comes to vineyard biodiversity, Dr Mary Retallack is a powerhouse of knowledge and practice – and she's been seeding change across Australia's vineyard landscape for decades.

Mary is the managing director of Retallack Viticulture Pty Ltd and the founder/manager of the EcoVineyards program, which promotes practical ecological solutions for a broad range of production systems. Her pioneering work on native insectary plants and associated fauna has been showcased on the ABC's Gardening Australia program.

As an experienced board director, agricultural scientist, agroecologist and third-generation viticulturist, Mary holds a wide range of skills and experience from practical, research, teaching and consultancy roles. She is recognised internationally as a Chartered Agriculturalist (CAG). She has gathered these skills over the past 30 years, along with a PhD in viticulture and plant protection and tertiary qualifications in conservation and park management, natural resource management, education, viticulture and arbitration.

Ahead of her visit to Aotearoa to speak at the Organic and Biodynamic Winegrowing Conference in June, she answered some questions for OWINZ about her work.

**OWNZ: Tell us about the EcoVineyards program. What are some of the key ecological innovations you've seen growers take up through your work there?**

The EcoVineyards program was founded and is delivered by Retallack Viticulture Pty Ltd (also trading as Retallack Ecology). It is an ongoing partnership between more than 160 collaborating businesses, including 75 wine grape growers called EcoGrowers who contribute cash and in-kind time to demonstrate a range of ecological practices on their properties.

We write these insights up as case studies so that everyone benefits and can learn in real time. We run events twice per year in each of the participating wine regions located throughout Australia and have regional on-ground coordinators (ROCs) that can help growers in the field. All of our information is freely available to all on the EcoVineyards website to ensure maximum reach and accelerate practice change.



Dr Mary Retallack

Over the past three years we have focused on soil health; ground covers (including cover crops) and functional biodiversity.

Functional biodiversity encompasses all the flora (plants) and fauna (animal life) found in association, including predatory arthropods (insects and spiders); microbats, which can eat up to half their body weight in insects each night, including moths and other grapevine insect pests; and insectivorous and raptor birds of prey.

We have published more than 1,750 pages of practical extension materials, including case studies, fact sheets, plant community lists and a series of best practice management guides on soil health, ground covers and functional biodiversity, which we call the ladybird series. (The ladybird beetle is our EcoVineyards mascot).

Wine grape growers are leading the way internationally with their approach to ecologically based farming practices, by



Above: A native insectary planting in Bondar Vineyard, McLaren Vale, South Australia.

objectively assessing plant health via leaf sap analysis; growing a diversity of supplementary plants, which increases the functional biodiversity of vineyards; focusing on the microbiology and living elements of the soil to maximise soil and plant health; improving water infiltration; growing and cycling soil carbon; covering bare earth; and understanding the connections between soil and plant health, insectary plants and the predators found in association.

There is a much greater understanding about the soil microbiome and capacity to influence vine health and the nutrient integrity of wine grapes, flavour profiles and potentially fruit quality. We have the capacity to produce grapevines that are healthier and less likely to be subject to insect attack and fungal pathogens, resulting in a better buffered production. I urge all growers to learn more about plant nutrient integrity and the plant health pyramid produced by Advancing Eco Agriculture. It is a game changer and will underpin how we grow commercial crops in the future.

Winegrowers are looking for longer term solutions to conserve water and reduce chemical and synthetic fertiliser inputs which often have unintended consequences, which can be summed up by this quote:

**"When we kill off the natural enemies of a pest, we inherit their work."**

**– Dr Carl Huffaker  
University of California,  
Berkeley**

We are mindful of the urgency to create meaningful practice change to grow resilience and future-proof vineyard production in response to climate change and increasing extreme weather events, and to address the breakdown in function of natural systems. Functional biodiversity

underpins the capacity to create better buffered production systems and is the engine room of ecosystem services (the free services that nature provides).

The national EcoVineyards program aims to accelerate adoption and practice change outcomes specified in Wine Australia's strategic plan for 2020-25, specifically:

- to increase the land area dedicated to enhancing functional biodiversity by 10% (so far, we have seen a change of about 25% since 2021), and
- to increase the use of vineyard cover crops and soil remediation practices by 10%. We don't have readily available metrics for soil remediation practices, but the use of ground covers has changed by about 35% over the same period based on reported metrics for land area.

We are very pleased to see progress in each of these areas, but there is much work to do to regenerate our production systems for future generations.

#### Achievements

Over the past five years, the EcoVineyards program has:

- Raised more than \$2.75M for the environment and to support winegrowers
- Planted more than 100,000 native insectary seedlings in and around vineyards
- Brought together more than 160 program collaborators with a common purpose of fostering environmental stewardship
- Run more than 100 educational events in wine regions to share information
- Shared new information at conferences in Australia, overseas and to the general public via ABC's Gardening Australia program



- Created a searchable knowledge hub which presents more than 1,750 pages of practical resources for wine grape growers, including articles, fact sheets, bird guides, case studies, grower insights, EcoGrower profiles, ground cover ready reckoner, videos, podcasts and posters and regional native insectary plant lists

- Established 76 demonstration sites in 14 wine regions across Australia (installed photo points, raptor perches developed by Ocloc by Ocvitti and 240 microbat boxes produced by volunteers at Seaford Rotary)

- Demonstrated new agtech solutions, including hydroseeding in the undervine area with a diverse range of native and introduced low-growing ground cover plants with a specialised hydroviner unit

- Highlighted the benefits of native grasses and forbs in the midrow pre- or post-vineyard establishment to generate additional income via the production of seed with soil health benefits

- Trialled new solutions including specialised pheromone and lure application technology (SPLAT) for LBAM control

- Helped create new career pathway information and awareness of agroecology, entomology and viticulture for school students

- Accelerated the adoption of ecological practices by 6,251 winegrowers and 2,361 winemakers who collectively manage 146,244 hectares of wine grapes throughout Australia.

The current EcoVineyards program funding cycle concludes in June 2025, and we are actively seeking new funding partners and growers to work with, both within Australia and internationally. The new best practice management guides are available for download via [https://ecovineyards.com.au/bpmg/](https://ecovineyards.com.au/bpimg/) or for purchase as hard copies.

More information is available on the national EcoVineyards website, <https://ecovineyards.com.au>. We invite you to join the EcoVineyards community @EcoVineyards via Facebook, Instagram or LinkedIn and share ways you are growing in harmony with nature.

**What are some of the benefits you've seen in vineyards using native Australian plants to support vineyard health? What has your work with growers shown about the most effective ways to do this?**

Traditionally cover crops have been planted in the midrow area. We are focusing on perennial native grasses and forbs in this area and expanding the use of native ground covers in the undervine area to move away from a reliance on

herbicides and bare earth to improve the functionality of the system. We also encourage planting of ground covers and shrubs adjacent to strainer posts, in shelter belts and on beetle banks (strips of plants intended to attract beneficial insects).

Cover crops can be used to reboot the system to increase biodiversity in the short term. Longer-term benefits arise when we progress from annual cropping to perennial plants, which only need to be planted once and create more fungal-dominated soils, which are also important for perennial crops like grapevines and orchard trees.

More than 90% of Australia's species of flora and fauna are endemic. Many natural enemies are also endemic and have co-evolved with native plants, so we are likely to find them in association. Native plants are also consistently reported as having low occurrence of pests and high occurrence of natural enemies.

The benefits of ecological restoration through the incorporation of locally adapted, native vegetation are unequivocal but often overlooked or underestimated in a farming context. However, this is changing quickly. Many Aussie native plants are also evergreen, compared to European species that are deciduous and lose their leaves. Deciduous plantings create a resource bottleneck where populations of predatory arthropods may crash without suitable habitat. This is another reason why Australian native plants are so fantastic.

We promote permanent ground covers so there is less disturbance and greater habitat for soil organisms (predators, detritivores, mycorrhizal fungi), and greater capacity to improve organic matter, soil structure and nutrient cycling. Native insectary plants are resilient, versatile, and naturally adapted to Australian conditions and can be showcased as marketing collateral to

**EcoGrowers Caroline Smirk, Ianto Ward and Dr Mary Retallack check maturing compost at Juniper Estate, Margaret River, Western Australia.**

differentiate our uniquely Australian products in the crowded international marketplace.

There is likely a complementarity of native insectary plants shared by both Australia and New Zealand, which may provide some insights for New Zealand winegrowers, in addition to the endemic species that are found exclusively locally and provide opportunities to showcase your unique flora to a broader audience of growers and wine consumers.

**There's been some interest in New Zealand in sowing undervine plantings to outcompete weeds without competing with the vines. What progress is there in Australia on that front? Is there anything we can learn from Australian growers about eco-friendly alternatives to undervine cultivation?**

We find that low-growing native insectary plants provide a great opportunity for winegrowers in the midrow and undervine areas; they help create long-term relationships with soil biology and create fungal-dominated soils which are important for perennial crops like grapevines. Importantly, they only need to be planted once and can persist in the landscape for many years to decades with very little or no ongoing management.

The seed can also be harvested as a stacked enterprise to generate another source of income.

Native grasses and forbs sown as seed require thorough preparation to establish and are slow-growing. Most of the energy is focused on establishing a shallow root system rather than on vegetative growth in the first 18 months, but once they are established, they provide the capacity to outcompete weedy species that often favour compacted, anaerobic and bacterial-dominated soils. In our experience, any drawdown in vine vigour is likely to be a result of weedy species growth during the first year of establishment, and any downside is often overcome by year two or three, with many ecosystem service benefits thereafter.

We advocate for 100% functional ground cover (and root growth), 100% of the time, wherever possible. This is to maximise the photosynthetic potential and ensure exudates are being transferred into the soil to nourish populations of microbes that in turn provide nutrients in a plant-available form, reduce soil pathogens and increase soil structure.

Healthy soils and functioning ecosystems represent a significant opportunity for sequestering and cycling carbon. Recent research by the University of Adelaide found that cover crop-managed soil undervine sequesters up to 23% more soil organic carbon (SOC) than the traditional herbicide practice over a five-year period of growth; and microbial activity increased by more than double in cover-cropped soils.

We have been trialling the use of 20 different species of low-growing woody plants in the undervine area using hydroseeding, where specialised equipment is used to combine water, wood fibre, seed and other inputs as the carrier which is sprayed in the undervine area. Vortec Global tailor-made a hydroviner machine for use in vineyards and this was showcased at EcoVineyards events in autumn 2024. The EcoVineyards vineyard hydroseeding Q&A sheet, available on our website, highlights the hydroseeding process, costs and benefits.



Dr Mary Retallack and participants at the EcoVineyards event on soil health discuss macroorganisms found in a surface soil sample at Mt Bera Vineyards, Adelaide Hills, South Australia.



Brendan Pudney and Kerri Thompson assess growth of native shrubs and ground covers on a beetle bank at Skilloalee, Clare Valley, South Australia.



Native insectary tubestock at Bleasdale Vineyard, Langhorne Creek, South Australia.



Photo: Rebecca Archer



We spread seed from individual species in each panel and then sprayed wood fibre mulch over the top to see how well each species performed. The next step is then combining the top-performing species into regional multispecies blends and scaling up the area covered, which is currently occurring in several EcoGrower demonstration sites. Some of the low-growing (<30 cm) species that have performed well in a very dry growing season include:

#### Native ground covers

- *Atriplex semibaccata*, creeping saltbush
- *Bothriochloa macra*, redgrass
- *Chloris truncata*, windmill grass
- *Dichondra repens*, tom thumb
- *Linum marginale*, native flax
- *Microlaena stipoides*, weeping grass
- *Rytidosperma geniculatum*, kneed wallaby grass
- *Vittadinia cuneata*, fuzzy New Holland daisy
- *Vittadinia gracilis*, woolly New Holland daisy

#### Introduced ground covers

- *Trifolium subterraneum*, subterranean clover
- *Lobularia maritima*, alyssum

For more information on multispecies cover crop selection and native ground covers please see the 'EcoVineyards best practice management guide on ground covers in Australian vineyards' online.

#### You've received an impressive collection



Photo: Mary Retallack

#### of awards and accolades for your work. What drives you to step forward as a leader? What personal qualities have helped you lead in this space?

There has been a lot of grit and determination involved and a desire to help growers future-proof production while nurturing the environment. I grew up on a fruit block in the late 1980s during the 'vine pull', and we lost the property that was farmed by our family for more than 50 years when my dad died suddenly.

Much of my satisfaction comes from empowering growers with the tools and confidence to grow resilience and profitability in their production systems, and observing the 'lightbulb moment' when each discovers how much an ecological approach makes sense.

We also discuss culture and foster a polyculture of thought. We wish to move beyond the conditioning that 'we often do more of the same and expect a different outcome' and draw from an ecology analogy to reset our aspirations: moving from a monoculture to a polyculture of thought and practice change.

A monoculture (or simple structure) is a fragile and poorly buffered system where problem species often dominate, and regular intervention is required to produce a crop.

Conversely, a polyculture (or complex

structure) with good functional biodiversity, plant nutritional integrity and soil health has greater resilience, can rebound more quickly after disruption (including extreme weather events), is able to self-regulate with less intervention, and can save both time and resources for growers.

I like the following quotes which I have modified from regenerative winegrower Richard Leask from McLaren Vale:

"Have a clear picture of where you want to get to, be open to change, don't get stuck on 'this is the only way to do it', as certainty traps you into that thinking. Be flexible, don't be afraid to fail or to be wrong and challenge yourself."

"Beware of the imposters of denial – those that say, 'That won't work here, that's not possible, we can't do it...' and despair – 'This is all too hard, where do I start?'... Because they take no effort."

I am in a privileged position of having the knowledge, skills, and confidence to help lead in the farming revolution that is occurring now and share knowledge from a broad range of practitioners, growers and my personal observations. I will continue to write materials and share practical insights to accelerate practice change. I can grow the EcoVineyards program internationally and cross-sectorally.

I have done several leadership programs, and one of the things I learned is how to create luck, which is preparation meeting opportunity. I have spent my career preparing, so I am ready to seize opportunities as they arise. Also, the more you learn, the more you realise you don't know. But nature has the answers, and through observation and an openness to trialling different techniques, we are learning better ways to farm, while nourishing ourselves and our communities. We are nature, and what we do to nature, we do to ourselves.

My work has also taught me how to respond when things don't go as expected and the challenges of leading

**At left: Demonstration of the Vortex Global hydroviner at Keith Tulloch Wines, Hunter Valley, NSW.**

when there are a diverse range of personalities, needs and expectations. Overall, it has helped me become more resilient and understanding that everyone has a different perspective, story to tell and different values, and this informs who they are and how people respond in different situations. It is important to celebrate diversity and be open to different points of view and a diversity of thought.

#### In challenging times for the wine industry, it can be hard to sway growers to take on new ecological practices. How do you approach that in your work?

There are growers in distress in some regions that are unable to find a market for certain varieties. This provides a great opportunity to diversify into cash crops and maximise the income generated via the production system while complementing existing production, especially in the midrow, which is often underutilised.

We are demonstrating the benefits of stacked enterprises where it is possible to grow native grass seed to boost income from the vineyard while healing the soil. One of our EcoGrowers is producing gin from native lemongrass grown in an insectary area, and another is growing everlasting daisies in the midrow, which not only looks great and provides insectary benefits but provides another source of income via cut flowers.

Growers are coming up with lots of innovative ideas and collaborations that we hadn't initially envisaged, and service providers are coming to us with solutions like specialised hydroseeding equipment for the vineyard and fish waste products that can be used as biostimulants as a part of a circular ecology where nothing is wasted.

However a grower chooses to manage their vineyard – conventional, minimal input, regenerative, organic or biodynamic – we complement these practices by offering a range of ecological approaches that can be applied incrementally. We start small and then scale up over a larger area as the grower gains confidence and sees the benefits.

We endeavour to remove any roadblocks to adoption and ensure information is practical and science-based and can be readily adopted. Growers are teaching

other growers, and we now have a critical mass of interested growers that just keeps growing. We are sharing information about how to work smarter rather than harder to break the cycle of intervention to achieve longer term solutions, and with the intelligence of nature rather than against it.

I am a third-generation viticulturist and grew up on a fruit block in the Riverland of South Australia. My initial undergraduate and postgraduate training was in ecology. I have six tertiary qualifications, including a postgraduate diploma and PhD in viticulture and plant protection and 30 years of practical viticultural knowledge, and I bring a different perspective.

**"We cannot solve problems with the same thinking we used to create them."**  
– Albert Einstein

This accumulated knowledge gives me the confidence to know where there are opportunities to do things differently, applying an agroecology approach. I think it is important to challenge the status quo, especially if our current practices are not providing the desired outcomes. I believe, as Albert Einstein said, "We cannot solve problems with the same thinking we used to create them."

I conducted PhD studies focusing on functional biodiversity, native insectary plants and the arthropods found in association. I found that it is possible to boost functional diversity by more than 3x when native insectary plants are incorporated near grapevines, and it is possible to increase the net number of predator morphospecies (visually distinct species) by around 27% when wallaby grasses, *Rytidosperma* ssp., are planted in combination with grapevines.

Once the system starts to self-heal, there are many benefits that follow, including the capacity of the land to produce high-quality crops more consistently with less intervention and a higher profit margin. It may take new thinking and a change in culture, but the potential benefits are significant and long-lasting. There is a



**Above: Dr Mary Retallack demonstrates the use of a vacuum sampler to assess arthropods in the midrow at Karanto Vineyard, Langhorne Creek, South Australia.**

groundswell of interest from winegrowers, who are arguably leading the way internationally.

It is important to remember that technology provides a range of tools, but it is agroecology that provides the long-term answers we are seeking to combat climate change, sequester more carbon in our soils via the liquid carbon pathway, rebuild the soil water sponge, and feed the world.

The underlying principles of agroecology are complementary to achieving positive outcomes in the vineyard. The living components of soil underpin soil health and our capacity to grow healthy grapevines; this leads to healthy production systems and supports greater resilience.

We work from a position of generosity and kindness and find that if we share, we generate trust and a culture of reciprocity, and everyone benefits.

I look forward to continuing the conversation, sharing lots of practical examples of ways winegrowers can grow in harmony with nature, and learning from New Zealand winegrowers when I visit Hawke's Bay and Marlborough in June 2025.