Sustainability

Diverse cover crops

Improving soil health, pest pressure and fruit quality

By **Simone Madden-Grey**

In response to continued pressure on natural resources, viticulture has extended its focus beyond the vineyard to a broader consideration of ecosystems. Sowing a mixed cover crop supports a diverse ecosystem and offers gains in soil health, pest pressure management and ultimately, the production of quality fruit. As Mike Saunders, viticulturist at Greystone Wines, North Canterbury says, "We work in a diverse, multi-talented, resilient wine industry. Our people aren't a monoculture, so why do we expect our vineyard to be."

Seed diversity

Speaking at the recent series of Organic Winegrowers New Zealand (OWNZ) Symposia, Jono Frew of Natural Performance, recommended working with 20-60 different plant species. He encouraged the audience of organic and conventional producers to "get curious about what is possible", saying, "we need to innovate and it is you on the ground who are going to do that". Saunders agrees, "with a mix of plants, each one contributes something slightly different, allowing you to exploit a different environmental niche, so you have to understand your site and its needs".

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>
> MIKE SAUNDERS

The benefits from planting multi-species seeds are numerous according to Frew, "with a range of plants, a broader community of microorganisms are hosted in the soil. The diversity of root structures will bring porosity back to the soil, aerating it and building the soil food web."

Soil health

A key component in a healthy soil food web, according to soil consultant Lachy Hynd of Soil Matters is humic substances. Speaking at the OWNZ Symposium in Marlborough, Hynd explained that humic substances are a group of organic molecules primarily composed of carbon, hydrogen and oxygen. He describes them as soil conditioners that extract, collate and transport nutrients, while providing matrices for microbes and acting as storehouses for water. Humic substances have a powerful effect on soil due to their ability to hold charged ions, which increases the nutrient exchange capacity of the soil. Hynd characterises them as soil batteries to illustrate the influence they have on redox environments and localised soil pH, both of which are directly related to plant disease resistance.

The primary source of humic substances is necromass, which is the remains of soil microbes, or spent fungi and bacteria that are decomposing in the soil. Sowing a mixed cover crop creates a number of opportunities to increase this content by virtue of decaying plant material and creatures that have been attracted to the various crops. The different root structures also provide soil aeration, helping to create an ideal environment for microbial activity.

With sufficient humic substances and a suitable host environment, microbes themselves will produce humic substances. This in turn produces soil aggregates that help stabilise soil structure and improve soil integrity through increased ventilation and drainage. Additionally, plants provide

AT A GLANCE

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- The benefits of planting multi-species seeds are numerous
- A key component in a healthy soil food web is humic substances
- Feeding soil biology during the winter with root exudates that contain carbon can help maximise nitrogen
- Different plants will attract a range of insects to a vineyard
- Diverse living things can reduce reliance on pesticides
- Planting native species in and around the vineyard can boost biodiversity

OWNZ Marlborough Symposium. Photo: Lisa Duncan

an important energy source for microbial protein synthesis by delivering carbohydrates to the microbes in exchange for nutrients.

"If you give microbes the opportunity", Hynd says, "they will build their own house. If you keep the workforce well-housed, resourced and energised, they will do your job and your job is to build the house and then let them do the job."

Using what is naturally available in order to keep the soil microbial workforce resourced and energised was also discussed at the OWNZ Marlborough Symposium. Saunders said, "there is approximately 75,000 tonnes of nitrogen above every hectare of land, so let's grab that before thinking of adding any kind of fertiliser".

Nigel Sowman of Dog Point Vineyard agreed, citing his experience in converting blocks from conventional to organic farming.

"When you add synthetic nitrogen into the soil, the soil microorganisms either go dormant or disappear. Every time you add nitrogen to the soil, the microorganisms try to balance the N-C ratio by eating the organic matter in the soil," Sowman said.

Feeding soil biology during the winter with root exudates that contain carbon can help maximise nitrogen fixing and increasing the photosynthetic layer over the soil is one way to do this. It is also recommended to leave wintering crops for as long as possible during the cold winter months. This is because the majority of nitrogen that is fixed in the soil may not occur until temperatures have increased sufficiently for microbial activity, usually in the last two or three weeks in Spring.

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Fundamentally, the specifics of each site will determine the ultimate schedule for cover crop sowing. For example, the continental climate of Central Otago means that André Lategan, vineyard manager at Amisfield, will make use of a midrow irrigation dripline to focus on a summer crop of legumes for nitrogen fixing. This is because winter

Top: OWNZ Marlborough Symposium. Photo: Lisa Duncan Bottom: OWNZ Central Otago Symposium, Jono Frew speaking. Photo: Briar Hardy-Hesson

OWNZ Central Otago Symposium, Vaughn Bell speaking. Photo: Briar Hardy-Hesson

temperatures in the region regularly fall below optimum for microbial activity.

Biodiversity

Sowing a mixed species cover crop has a role to play in attracting a variety of living things to the vineyard, thus increasing biodiversity in the vineyard ecosystem. Different plants will attract a range of insects to the area and in doing so, create the possibility of attracting and retaining those insects beneficial to the management of some vineyard pests. Additionally, a diverse group of living things provides more than one measure as to the overall health of the ecosystem and the prospect of reducing reliance on pesticides has both financial and environmental rewards.

In June this year, two five-year studies concluded in which Vaughn Bell, senior scientist at the New Zealand Institute for Plant and Food Research, and his team investigated the use of biological control and cover crops for mealybug management. The results are currently being finalised and will soon be peer reviewed with a view to publication in 2022.

In the first study, Entomologist Asha Chhagan compared a range of food sources for the wasp, *Anagyrus Fusciventris*, a known parasitoid, or natural enemy, of the mealybug. The purpose of the study was to investigate if wasp longevity could be increased through the presence of a particular food source. The study trialled a sugar solution, buckwheat, mealybug honeydew (the waste by-product of mealybug feeding), alyssum, white clover, crimson clover and a water control. The results were encouraging and for the first time, data

Mealybug parasitoid, Anagyrus Fusciventris. Photo: New Zealand Institute for Plant and Food Research

demonstrated at least one of the parasitoid species feeding on buckwheat had increased longevity of up to 20 days for the males and females, as compared with other potential food sources such as white clover and water. This establishes an apparent benefit of planting buckwheat in the vineyard as a means of increasing the presence of a mealybug parasitoid.

The second study investigated separating the mealybug from the grapevine through the provision of an alternative food source. If this is achieved, there is potential to greatly reduce the risk of mealybugs spreading the grapevine leafroll disease. The plant selected to host mealybugs was white clover, where it was planted undervine. The study took place over five years on a 19ha block of Merlot vines in Hawke's Bay. The effect on quality and yield from undervine white clover planting was also measured. Microvins from vintages 2020 and 2021 were produced and a sensory panel tasted the wines. Preliminary results indicated there was no difference between wines from the clover-added plots or the standard under-vine herbicide plots.

The study also found no difference in terms of mealybug population between the clover treated vines and the herbicide treated vines. Bell is quick to point out the merits of the results, in that no increase in mealybug population on the vines was observed and no new instances of leafroll virus were detected in the clover treated plots relative to the herbicide control plots. The mealybugs remained associated with the white clover for the duration of the five year study. Through monitoring the vines and the ground cover plants three times each year, there was no evidence of mealybugs reinvading the grapevines.

A number of vineyards across New Zealand are also planting native species in and around the vineyard to boost the biodiversity of the vineyard ecosystem. The role of non-Vitis plantings has benefits beyond attracting beneficial insects to include continuity of habitat for insects that fly shorter distances. The creation of these corridors, Bell says, provides stepping stones or resting places. Flowering plants also offer additional energy supplies for insects that wouldn't ordinarily fly long distances from outside the vineyard to midrow. A specific example of this, he says, is that most mealybug parasitoids are not more than 2mm in length, meaning they will not be strong flyers so resting places have a key role in supporting these insect communities. Bell is also a proponent of planting an assortment of flowering exotic and indigenous plants. This is, in part, due to the accessibility of different floral architecture to a broader range of insects and their different mouth parts as well as differing nectar preferences. He also cites different flowering times as being important to address seasonal activities, to provide continuity of floral resources and to extend nutritional availability to beneficial insects.

As viticulture continues to investigate the sustainable management of natural resources, planting multi-species cover crops and plants in and around the vineyard is bringing biodiversity to the ecosystem. This creates a measure as to ecosystem health, provides a foundation for longevity and realises a paradigm for producing healthy vines and quality fruit.

More information about Organic Winegrowers New Zealand can be found online: www.organicwinenz.com

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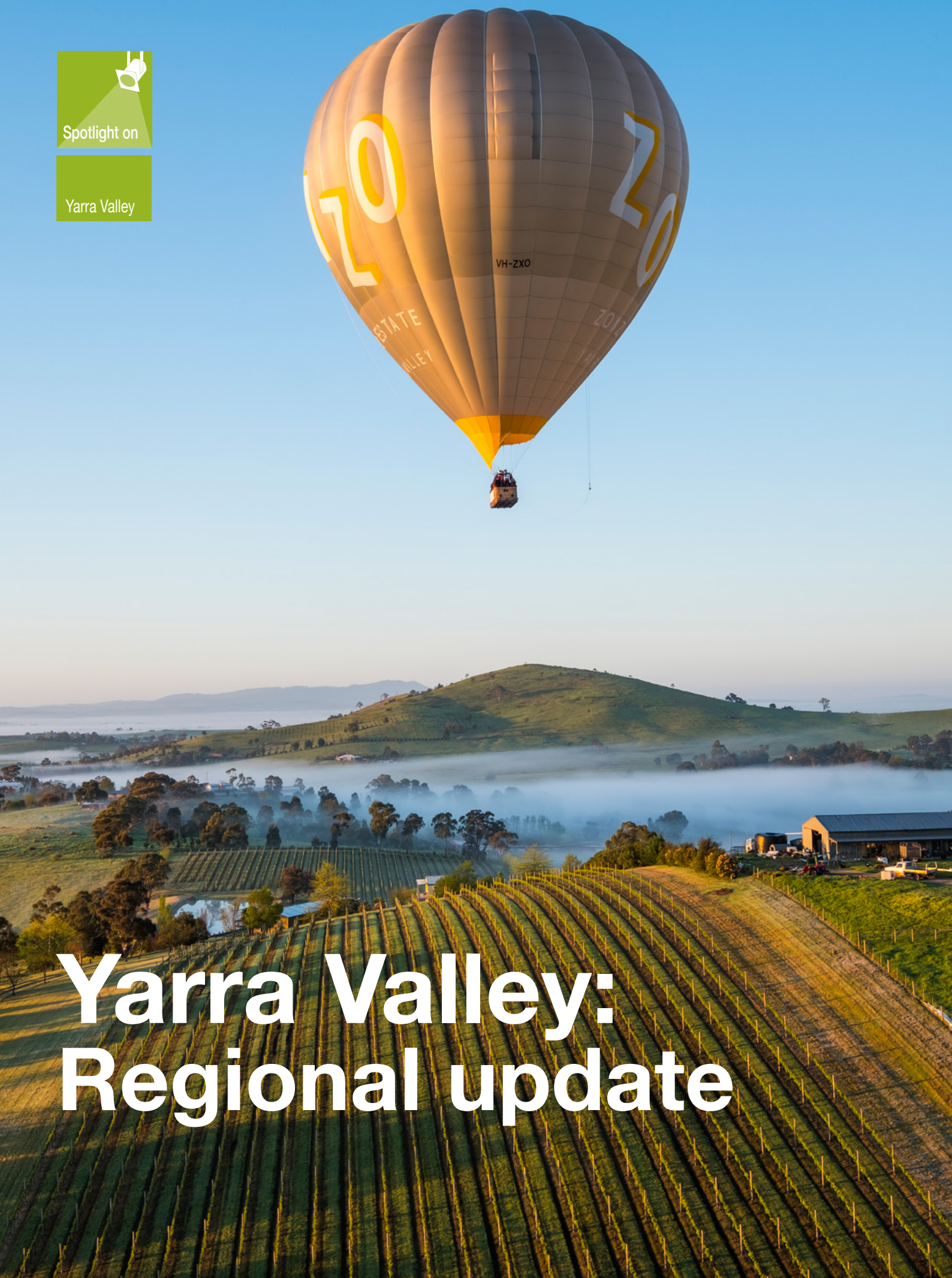
Spotlight on

Yarra Valley



Yarra Valley: Regional update

The Yarra Valley is the closest wine region to Melbourne and, despite being a mostly rural area, was included in Australia's most severe COVID-19 lockdown restrictions along with Metro Melbourne. The president of Wine Yarra Valley, **Sandra de Pury**, provides an update and outlines what's next for the vibrant region as its wineries and cellar doors again open for business.

Closing the borders in March 2020 had an immediate and significant impact on the region, which had been the wine region in Australia most visited by international wine lovers.

Over the next 18 months, the Yarra Valley had six different lockdowns: 263 days in total.

During this time cellar doors and restaurants were closed, as well as accommodation, tour providers, transport services and, of course, retail and all the fabulous attractions, who all strongly felt the impact.

At its most severe, we had five kilometre travel restrictions (interesting with country distances!) and were limited to one-hour daily exercise and nightly curfews.

We all became adept at interpreting the various and evolving government guidelines to keep ourselves, staff and visitors safe during the pandemic.

Wine Yarra Valley quickly introduced a virtual cellar door for members as another means to sell their wine. Cellar doors themselves retrained staff to work in vineyards during pruning season and to deliver wine.

Marketing and sales teams took an exponential direct-to-consumer (DtC) focus and embraced their 'inner Zoom'. Many regional restaurants and wineries developed a home delivery model. The variety and choice was amazing.

"We decided to offer the local community extraordinarily fresh seasonal food and produce in a central location in Healesville. It kept us active, helped out the suppliers and was embraced by the locals," said winemaker Jayden Ong.

Some smaller operations took the opportunity to invest in fancy sheds and many who were concurrently juggling home learning took the opportunity to sample and research many vintages.

Several Wine Yarra Valley members successfully held online virtual tastings, from smaller invitation only tastings to some with hundreds participating, enabling producers to connect with customers everywhere.

It is likely to remain a part of the marketing mix in the future. At Yeringberg we held our first ever virtual tasting expecting perhaps 50 participants, but were overwhelmed by the response.

Wine Yarra Valley also moved into the virtual space, hosting a weekly WineDown – chats with a winemaker or a group of winemakers over glass of wine on Thursday afternoon on IGTV, as well as a Yarra Valley virtual Chardonnay tasting for trade in the UK hosted by Max Allen.

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YARRA VALLEY PROFILE

- There are more than 80 wineries in the region, ranging from tiny five acre vineyards and ultra-boutique winemakers to well-known brands and major producers.
- With a seven-month growing season and annual rainfall averaging between 750-950mm, the Yarra Valley is famously cool climate – colder than Bordeaux but slightly warmer than Burgundy.
- Varying vineyard elevation, ranging from 50-430m above sea level, also plays a significant part in the hallmark diversity of the region's wines.
- There are over 2,500 hectares of vineyards.
- In the north, the soil tends to be grey-brown with a consistency of sand to clay loam, with red-brown clay subsoils. It is relatively acidic, low in fertility and well drained.
- The southern part of the regiony is younger and more fertile, featuring intensely red volcanic soil.
- 2020 and 2021 were contrasting seasons: 2020 yielded very small crops across the region and was one of the few regions in eastern Australia that was not affected by smoke taint.
- 2021 was an outstanding vintage; mainstayers suggest one of the best vintages in decades. Luckily, vintage time did not coincide with the most severe COVID restrictions in either year so it was possible to harvest the grapes and make wine without too many impositions.

> As an association, we're well into planning wine events and technical workshops for 2022, with an optimism that has been missing for some time.

When restrictions eased slightly, some of the annual winter Fireside events were able to go ahead and were well attended, particularly Rob Dolan's Folk and Fire; a celebration of music, local food and wine in a COVID-safe setting,

The Yarra Valley Wine Show, although delayed for a few months, was conducted in both the lockdown years, albeit with a lot of judge shuffling due to closed state borders.

Whilst challenging logistically, and with various degrees of stamina, we tried to fit in what technical workshops and supportive campaigns we could amidst the restrictions – there was certainly a lot of rescheduling!

Keeping businesses afloat

It really was an impressive feat for all to adapt, push through and keep trying to keep their businesses afloat.

From bagels to hand sanitisers; reinvention around the Yarra Valley was inspiring and there were beautiful face masks even on the relatively deserted streets.

One clever company pivoted their day tour bus 180 degrees. Pre-COVID, it brought wine lovers to the Yarra Valley; during COVID it delivered wine from the Yarra Valley to Melbourne customers in lockdown.

Many accommodation and experience providers drastically struggled with their businesses. It's been an extremely tough time for many and the effects will be felt for years to come.

The pent-up demand for out-of-town wine experiences is real, and with restrictions easing and borders re-opening, we are really looking forward to people visiting again.

Staffing, however, continues to be a challenge, particularly for hospitality venues, forcing many to adapt and change their offering.

Rose Evolution – the annual spring focus on pink wine – was perfectly timed at the end of lockdown and was a real celebration of reopening. The James Halliday combined Chardonnay and Cabernet Challenge was also judged in the Yarra Valley in late November.

Most importantly, the rhythm of nature has not waned. Our growers' focus is on preparing for vintage 2022: it's been a wet start to the growing season with some storm events, but vine growth is certainly strong and healthy.

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** Photos courtesy of Yarra Valley Wine*

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