ECO VINEYARDS
GROWING RESILIENCE NATURALLY

FACT SHEET

INSIGHTS ON WILDFLOWERS AND FORBS FROM WESTERN AUSTRALIA

By Keith Smith, Formosa Flora, and Dr Mary Retallack, Retallack Viticulture Pty Ltd
with input from Craig Neild, Tim Saggers and Dr Todd Erickson

Wine Australia
retallack viticulture
FORMOSA FLORA
NATIVE SEED SUPPLIER

PRACTICAL INSIGHTS

The beauty and functionality of native Australian wildflowers

Native Australian wildflowers produce significant pollen for insects, including bees, and are sought after by a multitude of insect species, with lacewing and spider populations notably higher in rows of wildflowers in comparison to the adjacent field. By providing habitat for predatory arthropods, this will act as a natural control mechanism for managing economically damaging insect pests.

Figure 1. Various everlastings with arthropods found in association [Photo: Keith Smith].

Wildflowers, or everlastings as they are commonly known, are mostly short-lived annual species but can self-regenerate if stands are left to produce mature flower heads.

As a standalone mid-row crop, they will produce a spectacular colour display of tourism value and an important ecological function for supporting beneficial insects. They produce a significant soft stem biomass and natural glues in petals that give soil stability if minimal disturbance occurs, particularly when left to reseed.

Everlastings can boost ecological functions across vineyards and attract insects from remnant vegetation into areas that may otherwise be less attractive as habitat.

Figure 2. A stand of native everlasting daisies, *Rhodanthe chloreocephala* ssp rosea planted in a vineyard mid-row at Beulah Wines, Boyup Brook, Blackwood Valley, Western Australia [Photo: Craig Nield].

Pitfalls to avoid

Everlastings require light to germinate; sowing deep or burying seed can lower germination significantly. Seed is best scattered on or near to the soil surface (less than 5 mm deep). Seed germinates best on well-prepared, weed-free sites. Sites that have had good weed control to remove capeweed, ryegrass, and dominant clovers will give the best results.

As seed is often fluffy and light, it can be coated with mineral powders (e.g. calcium carbonate) and binders to assist with ballistic properties and mycorrhizal fungi inoculation, which in turn aids in efficient broadcasting and precision delivery. This is achieved via improved material flow in machinery and avoiding blockages.

Everlastings can reseed but only if left to drop seed after maturity, so avoid slashing until seed has fallen or reached maturity. Typically, reseeded crops are likely to germinate much earlier with the first rains and, consequently, will also flower earlier than those seeded for the first time in late autumn or early winter (May or June).

Most everlasting wildflowers are soft and prone to damage from livestock and excessive vehicle traffic, and some species can be prone to frost. They are also highly palatable at early stages to slugs, snails, and red spider mite or red legged earth mite (RLEM). Careful management is needed to control these pests (ANBG, 2008).

Tips

Weed control

Everlastings are dicots, unlike grasses which are monocots and consequently, herbicide control in dual planted systems is likely to be more difficult. Twelve to 18 months of weed control prior to sowing is often required. Prior preparation of rows to reduce weed burden in topsoil and minimise the pressure from competitive dicot weeds will give optimum results. Annual weed control is achieved using grass-selective herbicides if grasses are a problem.

When to sow

Successful everlasting production and plantings have occurred on river silts, sand, loams, gravel loams, and clay loams. Light sandy soils have shown a tendency to result in shorter flowering times in dry years and, consequently, lower seed production.

The best seeding times are usually late autumn to early winter, depending on climate and rainfall patterns in your region. Staggering planting times will generate staged flowering events although the growth of plants is hampered by cool weather conditions and soil temperatures. Flowering starts around 10 to 12 weeks from planting, depending on climate, while flowering periods can last from four to 10 weeks for *Rhodanthe chloreocephala* ssp. rosea (ANBG, 2008).

Germination

Everlastings germinate quickly, starting from five to seven days for *Rhodanthe* sp., pink paper daisy and germination, pushing out to seven to 14 days for other species, such as *Schoenia* sp., showy everlasting daisy. Due to this quick germination, it is usually not possible to overspray crops to control dicot weeds.

Figure 3. Mass planting of *Rhodanthe chloreocephala* ssp. rosea and *Schoenia filifolia* var subilifolia [Photo: Keith Smith].

Sow everlastings on or near the surface onto a tilled or prepared soil, then roll in using roller or rubber tyred machine to set the seed onto the soil. Heavily cultivated prepared sites benefit from the rolling to remove the aeration from soil and enable seedlings to establish. Rainfall immediately following seeding will also compress the soil and set the seed or bond it to soil. Coated seed has greater potential to flow without blocking hoppers or seed drills. Seed should not be drilled at depths, rather sown within a few millimetres of the soil surface.

Coated seed is heavier than uncoated seed, so seeding rates (grams/ha) potentially need adjusting to compensate for actual seeds per gram. Success rates appear to be marginally better using coated seed and application is easier. Coating also allows other germination or growth-promoting compounds to be added (e.g. microbes and mycorrhizal fungi), which can both benefit the seed recruitment stage and the soil microbiome. Although these additions are not essential for everlastings, they will likely improve the overall outcome.

Seeding rates are typically up to a gram per square metre in a garden setting, depending on the desired thickness of plants. However, seed quality should be considered to determine the supplier's viable seed per gram of product. In agricultural settings and viticulture, rates could be reduced to 5 kg/ha or less if mixed with other species.

Seed could be sown over existing mid-rows, but competition from other crops and lack of ability to prepare soil will reduce germination and density, so plantings would not be as spectacular as stand-alone crops.

Management considerations

A bare earth insect control for RLEM is essential in areas prone to this pest and can be achieved immediately after seeding. Snails and slugs commonly attack young stages of everlasting growth and can decimate plantings. Pre-planting control or management in the early growth stages is essential before damage is too severe.

Everlastings respond well to applied or available nutrients, in particular nitrogen and potassium. Greater growth, branching, and flowering occurs when additional nutrition is applied in light sandy soils. However, identical species sown in a drier climate on a richer loam soil with only historic pasture use achieved exceptional results. Production systems have used NPK and straight nitrogen (urea) for stem length and density. However, this is more related to outputs and end use, with high rates not necessarily essential.

Successful crops have been grown using animal manures incorporated prior to seeding when these are weed free. Soils with pre-existing nutrient loads in loamy soils have produced spectacular results.

Severe frost can cause significant loss to *Rhodanthe chloreocephala* ssp. rosea, pink everlasting. The same weather event can be less severe or have minimal impact on Rhodanthe manglesii, sunray everlasting or *Schoenia filifolia*, showy everlasting daisy. Extensive hail has the potential to severely damage the fleshy stems and strip plants.

Everlastings produce copious amounts of seed in good seasons. If left to mature, it is light and fluffy with an ability to spread with the wind. The seed has an ability to stick and bond to soil with moisture and then will germinate with the first significant rains of the season. False breaks have been known to occur from summer thunderstorm events. However, usually the seed bank is sufficient and secondary germination will occur for the growing season. Native everlastings and wildflowers can also be potentially harvested for cut flowers, thereby providing an additional income stream.

Figure 4. *Rhodanthe manglesii* grown without fertiliser and is reliant on residual nutrient loads, Katanning Research Station Restoration (left), and *Rhodanthe chloreocephala* ssp. rosea (centre) and bunched flowers for displays (right) [Photo: Keith Smith].

Useful under-vine or mid-row forbs

Apium prostratum subsp. prostratum, sea celery and var. filiforme, headland sea celery

Family, Apiaceae

Apium sp. is a prostrate or ascending biennial or perennial herb, typically 0.15 to 1 m high with white to pink umbels of flowers in August to April. Tolerating a range of soils, including sand, granite, and limestone, this species has attributes worthy of consideration. Flowering is often protracted, giving it a high insectivore value.

This species germinates readily from seed and tolerates mild waterlogging and would suit under-vine or mid-row mixed species plantings. Obtaining reliable seed supply may be problematic; however, seedlings from nurseries are relatively easy to obtain. The species var. filiforme is suitable for bushfood while subsp prostratum is typically bitter.

The species is salt tolerant and grows in saline coastal systems and granitic and estuarine areas. Management techniques need to consider the plants are unlikely to tolerate heavy vehicle traffic and that any slashing or grazing should be after seed set has occurred.

Both leaf and stem can be eaten, and dried leaves are used in native Australian spice mixes.

Figure 5. *Apium prostratum* subsp prostratum var. filiforme, sea celery [Photos: Keith Smith].

Figure 6. *Apium prostratum*, sea celery [Photos: Keith Smith].

Atriplex semibaccata, creeping saltbush and *Enchylaena tomentosa*, ruby saltbush

Family, Chenopodiaceae

Both are prostrate, short-lived perennial saltbush species producing a mat-like ground cover and can be planted in the under-vine area and mid-rows. *Atriplex* sp. produces bright red fruits, and *Enchylaena* sp. produces yellow, white, cream or red fruits in summer and autumn.

These species are very hardy in dry conditions but thrive following spring or summer rainfall. Additional moisture from irrigation would make both a very prominent blanket under mid-rows in lower rainfall areas, providing significant habitat, ground cooling and a less flammable to partial fire retardent option for under-vines plantings.

Propagation from direct seed is easy and plants are likely to colonise and proliferate with some disturbance. They are palatable to livestock so grazing management is possible but be cautious not to over graze.

Due to their prostrate nature, if planted with other multispecies in mid-rows they could be slashed over easily. Enchylaena can vary in forms across regions but the Western Australia south west and wheatbelt form is typically a spreading ground cover rather than the more upright forms in other regions or states.

Figure 7. *Atriplex semibaccata*, creeping saltbush [Photos: Keith Smith and Mary Retallack].

Figure 8. *Enchylaena tomentosa*, ruby saltbush [Photos: Mary Retallack].

Chenopodium baccatum (Syn. *Rhagodia baccata*), berry saltbush

Family, Chenopodiaceae

Berry saltbush is a low ground cover to ascending shrub endemic to Western Australia. The low nature provides for a significant ground cooling effect and habitat potential, with the fleshy nature of the plant giving some fire protection.

Readily available in nurseries and relatively easy to grow, this species deserves some consideration.

Livestock will readily feed on this species and it can be grazed slightly harder than most. Slashing is possible but the plant height is likely higher than other ground cover options. Coastal forms maybe more appropriate if available.

Figure 9. *Chenopodium baccatum* (Syn. *Rhagodia baccata*), berry saltbush [Photo: Kevin Thiele].

Dichondra repens, tom thumb or kidney weed

Family, Convolvulaceae

Dichondra sp. is a prostrate perennial herb that prefers sandy soils (Florabase 2024). It favours slightly moist sites, or at least shaded, and doesn't tolerate extreme temperatures or waterlogging at all well. In a vineyard system it is possible to plant it under-vine and allow it to spread from the drip zone to the mid-row area, or consider incorporating it into multispecies plantings in mid-rows.

Dichondra sp. is a creeping plant that self layers so has a great ability to colonise favourable areas. Found across Australia it is used as a lawn substitute and is readily available as plants or as seed. Flowers are relativley insignificant and seed is not easily noticeable although it is large.

Figure 10. *Dichondra repens*, tom thumb in the Hunter Valley, New South Wales [Photos: Mary Retallack].

For more insights on growing *Dichondra repens*, tom thumb see the fact sheet on Grower insights: Brent Hutton, Keith Tulloch Wines

Disphyma crassifolium, round-leaved pigface/salty fingers; *Carpobrotus virescens,* coastal pigface and *Carpobrotus modestus*, inland pigface

Family, Aizoaceae

The pigface group are coastal and inland succulent salt-tolerant ground covers. Flowering prodigously with colourful pink flowers, they provide a spectacular under-vine planting option, amenity planting or added to mid-rows; however, they can be susceptible to damage from traffic.

Due to the high water content in the foliage they are a useful tool in fire management as they are less flammable in an under-vine situation. They have the capacity to take in salts from the ground and are favoured as an edible bushfood due to the either fleshy salty fruits, *Carpobrotus* sp. or salty succulent foliage *Disphyma* sp. (Tim Sagers, *pers. comm*. 2024).

All are very hardy and provide good cover and habitat, making them a worthy consideration as an under-vine planting. Propagation is most likely to be achieved through nursery tube stock as seed is expensive and small, making direct seeding a potentially cost-prohibitve option. They will all grow from small plantlets so once established, further establishment is relatively easy and cost effective.

Figure 11. *Disphymma crassifolium*, salty fingers at Wandooland, Kendenup, Western Australia [Photos: Tim and Val Saggers].

Figure 12. *Carpobrotus virescens*, coastal pigface [Photo: Keith Smith].

Kennedia prostrata, running postman; *Kennedia carinata*, clover carpet

Family, Fabaceae

Prostrate kennedias, such as *K. prostrata* and *K. carinata*, are species that hug the ground, providing a buffering affect to the soil from high temperatures. As legumes they also can potentially fix nitrogen while mature plants can tolerate a reasonable amount of traffic. Seeding, ideally, would be positioned in the central area of the mid-row to minimise tyre traffic damage over several years, or in the under-vine areas.

Kennedia can live for several years, have deep roots, and produce significant seed set; and, if the area is cultivated in the future this disturbance is likely to cause recruitment. They produce nectar, have stunning red flowers and provide valuable fodder, indigenous food, habitat, and cover (Hansen et al. 2019, Crisp 2019).

They are also an early succesion or colinising species after soil disturbance or fire, and are legumes so the rhizobium bacteria found in assocation with root nodules help to fix nitrogen (Crisp 2019).

Grazing should be only short and after seed set has occurred. Mowing is possible as the plants are usually prostrate and under 15 cm in height.

They can be easily direct seeded or planted as tubestock.

Figure 13. *Kennedia prostrata*, running postman [Photo: Mary Retallack].

Rytidosperma caespitosum, common wallaby grass; *Rytidsperma occidentale*, wallaby grass

Family, Poaceae

Wallaby grasses are more prominent in disturbed areas in the drier regions of the Great Southern region and wheatbelt of Western Australia. However, it is extremely hardy and tolerates a range of conditions and soil types (Florabase 2024). Exceptional stands can often be found on clay dam banks with minimal topsoil.

As a hardy tufted perennial grass, both species could be good options for Western Australian viticulture given that *Rytidosperma* species have already been sucessful in eastern Australia. *Rytidosperma occidentalis* typically prefers moist sites, tolerates some waterlogging, and grows to 1 m in optimum conditions. *Rytidosperma caespitosum* prefers drier situations or more free-draining soils and grows to slightly less height of usually around 50 cm.

The seed is often sold as florets and comprises an extended awn and dense hairs that can make seeding difficult as bridging issues occur with conventional equipment. A recently developed cleaning technique, called flash flaming, now has the abililty to remove these unwanted awns and hairs in a precise manner.

On occasions, higher germination is also achieved, presumbly through the weakening of the floret. Rapidly exposing the awn and hairs to the flash flaming process singes and removes these bulky appendages, improving the floret geometry and, in turn, flow properties through cleaning and sowing equipment. Flaming also improves the ability to potentially coat the seed, which can also further improve flowability (Berto et al. 2021, 2023, Ling et al. 2022, Erickson et al, 2021).

As with most grasses and species, they are best planted into a well prepared site with minimal weed seed banks in the topsoil to enable the seedlings to compete in the first few years. However, once established they are a fantastic grass and, after seeding, can be mowed or grazed easily.

Figure 14. Flaming seed (left) [Photo: The University of Western Australia provided by Todd Erickson] and a multispecies mix of *Rytidosperma* ssp. in a vineyard mid-row in the Barossa wine region, South Australia [Photo: Mary Retallack].

Disclaimer

EcoVineyards
GROWING RESILIENCE NATURALLY

PROGRAM PARTNERS

Wine Australia

retallack viticulture
wine growing for the future

REGIONAL PARTNERS

Adelaide Hills Wine Region

Wine Grape Council SA

riverland wine

Clare Valley

The Orange Wine Region
where altitude is the difference

Langhorne Creek Region Wine

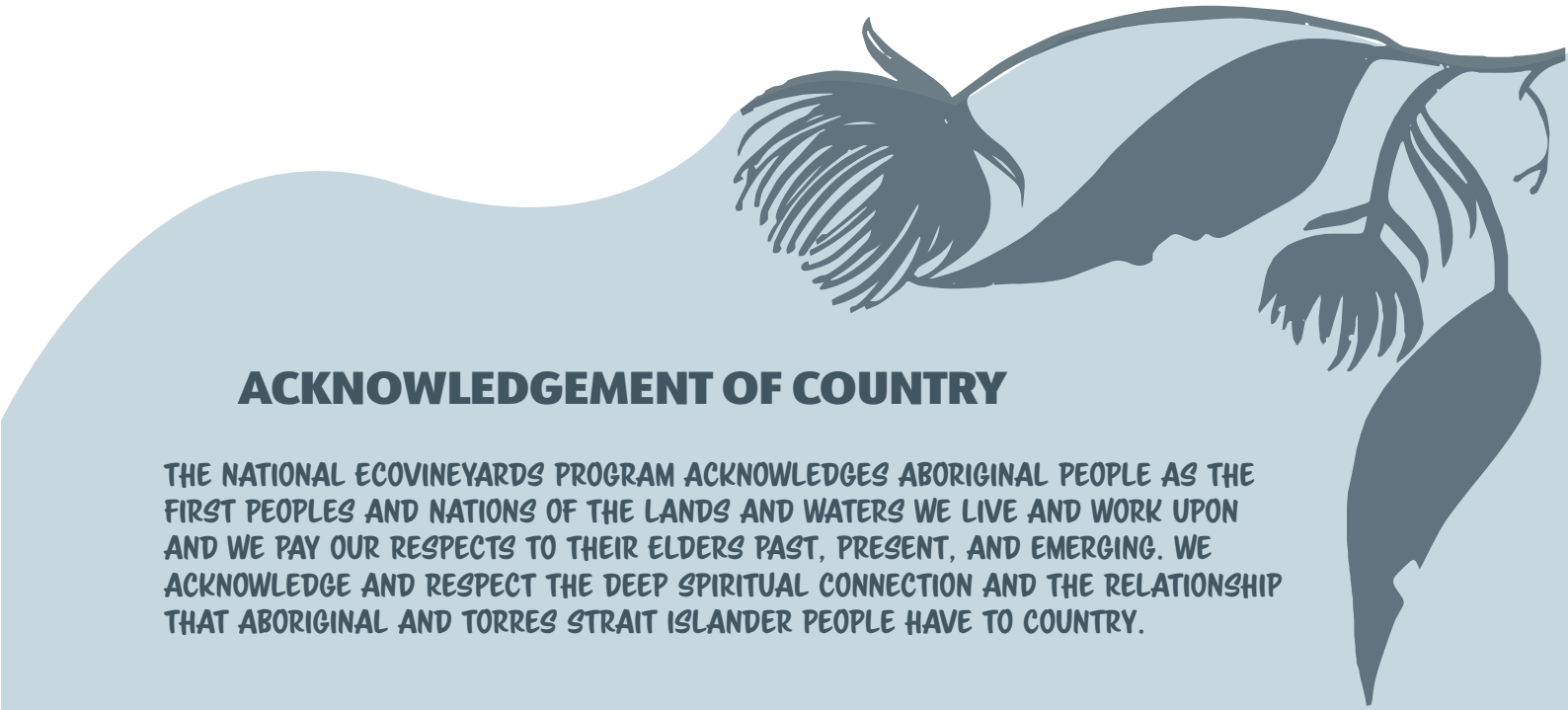
wine. Yarra Valley

MPW Mornington Peninsula Wine

Margaret River Wine

Hunter Valley Wine and Tourism Association

The National EcoVineyards Program is funded by Wine Australia with levies from Australia's grape growers and winemakers and matching funds from the Australian Government.



ACKNOWLEDGEMENT OF COUNTRY

THE NATIONAL ECOVINEYARDS PROGRAM ACKNOWLEDGES ABORIGINAL PEOPLE AS THE FIRST PEOPLES AND NATIONS OF THE LANDS AND WATERS WE LIVE AND WORK UPON AND WE PAY OUR RESPECTS TO THEIR ELDERS PAST, PRESENT, AND EMERGING. WE ACKNOWLEDGE AND RESPECT THE DEEP SPIRITUAL CONNECTION AND THE RELATIONSHIP THAT ABORIGINAL AND TORRES STRAIT ISLANDER PEOPLE HAVE TO COUNTRY.


ECO VINEYARDS
GROWING RESILIENCE NATURALLY