

Barossa Future Leaders

Programme 2015

“Agriculture in the Barossa”

Description

Business is an extremely important part of community and it is vital that business supports community. Agriculture in the Barossa is paramount to our economy and supports many aspects of the community. There is an opportunity to explore an agricultural related business idea that is relevant to our region but also gives back. Models such as ‘Love-a-Duck’, ‘Thank you Water’ and ‘Paul Newman Salad Dressing’ are businesses that have been formed to generate profit but also support the local community. Your group’s mission is to invent a new/novel idea for a business that is based around agriculture in the Barossa similar to these models. It could be to support another business or a stand-alone.

Required Outputs

Create a proposal for Agriculture in the Barossa which could generate a revenue stream to support the community.

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Executive Summary

The Barossa Valley has extremely fertile lands which are used mostly for the production of wine grapes, one of the area's leading industries. The land where wine grapes grow is vast, requiring spacing between rows, and only cropping once a year. This brings about an opportunity of utilizing, the otherwise wasted land, in between rows, under vines and surrounding vineyards.

This led to the value proposition of creating insectariums, plant native grasses and plants in under-utilized land, as a pathway towards sustainable agriculture. As a result of grape growers joining our program, attending our workshop and making use of our future opportunities, we believe that take steps will be taken towards organic agriculture. This in turn can lead to a potential of grape price increases itself, but more importantly in a reduction of costs of inputs such as spraying, mowing, diesel, labor, and loss of fruit due to disease.

This report outlines the motivation for creating a workshop in the Barossa which details the reasoning for, literature supporting, and practical knowledge required to undertake planting of insectariums, inclusion of native grasses and potential mid-row crops to benefit Barossa vineyards. With this workshop we plan to raise awareness and to create a network of support for growers who intend to plant insectariums.

The target market for the workshop includes Barossa wine industry and agricultural personnel, including but not limited to grape-growers, viticulturists/horticulturists, winemakers, land owners, vineyard & cellar staff, and students in related fields. The aim of this report is to provide an overview of the intended workshop outcomes for participants.

Following the success of the workshop, future opportunities include developing a starter pack, creating an exhibition vineyard, and executing a bus tour. The starter pack of tube stock or seeds will be created by the Barossa Bushgardens after a site inspection, and soil testing. Profits from this will go directly to the Barossa Bushgardens. We have focused our attention in supporting the Barossa Bushgardens with profits from the starter kits because we believe the Bushgardens can be a great source of native plants for every grower and a great destination spot in the Barossa Valley.

Motivation

The Barossa Valley has extremely rich and fertile soils, however, since viticulture is the leading industry, a monoculture has developed where most growers around the area grow a single crop in their fields at a time, grapes. Continuous years of monoculture can lead to a buildup of pests and diseases. To fight this, growers spray herbicides and insecticides, multiple times in a year to try to encourage the growth of only what they want in the vineyard, to avoid getting pests and to make their vineyards look pristine. It sounds like an easy solution, however this leads to poor soil health and does not promote a healthy environment for other beneficial insects.

Through this project, we aim to increase biodiversity, providing growers with an option that can potentially stop insecticide and herbicide use, save them money in the long run and try to focus Barossa agriculture into a more sustainable practice. This would be achieved by providing growers with knowledge regarding insectariums, native grasses, mid-row and under-vine native plants; allowing them to establish a connection with the Barossa Bushgardens to purchase a 'Starter Kit' appropriate to their vineyard and needs; and to give growers a push towards establishing more sustainable practices in their Vineyards.

Research

In order to research the concept of establishing insectariums in Barossa Vineyards, we spoke to different people about the idea, and possibility of running a workshop. The general response was very positive. Some key discussion points from personal references are below, as well as written text references.

Matthew Bailey – Viticulturist, Taltarni (Wednesday 23 September)

- Established insectariums, and native grasses in the mid-row, under vine and all over headland at Taltarni. The project took around 5 years to establish. The insectariums are dotted throughout the 97 hectare Pyrenees vineyard, based on 'corridors'.
- Has seen a significant increase in biodiversity.
- Aims to have some species from the insectariums flowering all year round.

- Has no need for mid-row or under vine slashing, and does not use any herbicides. Mid-rows are rolled/crimped once per year.
- Rid entire vineyard of competitive weeds before native grasses were established.
- Has noticed native grasses supply home for predatory wasp eggs.
- Identified supplementary income opportunities, e.g. wattle species planted in their insectariums, and they sell wattle seeds to local chefs.

Karl Schiller – Vineyard Manager, Mengler’s Hill Vineyard

- Has intended to establish insectariums, but has encountered time restrictions
- Thinks it's a great idea to increase biodiversity.
- Mentioned native grasses and buckwheat and the fact that not many people use them in the Barossa.
- Would definitely be interested in the starter kit, and be part of the network.

Ashley Ratcliff – Production Manager, The Yalumba Wine Company; Managing Director, Ricca Terra Farms

- Suggested that we might struggle to convince traditional local growers to change their ways, but younger generations might be more encouraged.
- Has seen growers in the Riverland plant crops in the mid-row like pumpkins, garlic, broad beans.
- Said having insectariums could help your brand marketing strategy and encourages sustainability.
- Mentioned organic production is quite limited in the Barossa; McLaren Vale and Riverland lead the way in terms of organic production.
- Suggested setting up trials to provide proof to growers the benefits of change.

- Suggested growers might want proof there is a profit to be made.

Darrell Kruger – Barossa/Eden Valley Vineyard Manager, The Yalumba Wine Company
(Wednesday 30 September)

- Explained Yalumba stopped using any insecticide, or employing cultivation in their Barossa and Eden Valley vineyards 25 years ago.
- Noticed significant increase in worm activity after that time.
- Explained some general vineyard management at Pewsey Vale Vineyard, including mulching to increase soil carbon, and retain moisture (started this practice six years ago), and growing wallaby grass and other native grasses in the mid-row.
- Has established many insectariums at the Pewsey Vale Vineyard. The first, 15 years ago; the most recent is still in establishment phase, with species only recently planted.
- Irrigates insectarium via drip irrigation for first two years (using recycled irrigation parts, and running water from vineyard irrigation).
- Planted native species including wattles, bottle brushes, blackwoods, Christmas bush, river red gums (at least 30m from vineyard) in the insectariums.
- Built fences around the insectariums using broken vineyard posts to protect native species from hares.
- Established a ground cover around the vineyard of native grasses including Demeter Fescue and white clover (which suffer some competition from the insectariums).
- Has noticed increase in local birds, including grass parrots, rosellas, wrens, zebra finches, honeysuckles (yellow tail bird).
- Has also noticed increase in spiders and predatory wasps (which target LBAM and vine moth).
- Identified increase in biodiversity, balance in the vineyard, aesthetics, reduction of spray drift, and providing wind breaks as the main advantages of establishing insectariums. As well as less maintenance on land previously actively maintained, e.g. headland between blocks.
- Suggested the establishment of insectariums could also be used as a marketing tool.

- Identified weed control as the biggest disadvantage.

Nicki Robins - Viticultural Development Officer, Barossa Grape and Wine Association (Thursday 01 October)

- Stated there are ~550 growers in the Barossa in total, 70% of which have a permanent sward established.
- Identified ~70 growers as environmentally conscious that she has targeted with these sorts of ideas in the past, and would therefore possibly be interested.
- Said BGWA have been running biodiversity programs for approx. 3 years.
- Estimated 25-55 attendees for workshops they have run.
- Identified nitrogen fixing insects, less sprays, less tractor passes (and therefore diesel use), better soil health, increased water and nutrient infiltration, as the main advantages of insectariums and well managed mid-rows.
- Suggested native grasses are ideal under vine as they grow during winter, and die off during the growing season.
- Emphasized the need to eliminate weed competition first. Then establish grasses first, followed by shrubs, followed by trees.
- Suggested growers may require fencing to prevent livestock eating natives.
- Advised growers may be concerned with provenance for seeds.

Chris Penfold – Research Officer, The University of Adelaide (Thursday 08 October)

- Outlined an under vine management trial he is running at both the PIRSA Nuriootpa Research Centre and a private vineyard in Springton.
- Aims of the trial include in biodiversity, reduction of herbicide use, increase in soil health and quality, increase in fruit quality.
- Demonstrated the control panel of vines which employs hay as under vine mulch (a common yet expensive practice).
- Demonstrated many different species used in the trial, particularly summer dormant perennials.

Prue Henschke – Viticulturist, Henschke (Wednesday 14 October)

- Expressed enthusiasm for the idea, and increasing biodiversity in general.
- Emphasized the importance of nectar producing plants in order to attract beneficial insect e.g. bees.
- Suggested growers would require a soil test, especially to determine Phosphorous levels.
- Identified the potential for seed propagation from native under vine and mid-row growth.
- Proposed the establishment of an exhibition vineyard (potentially at the Barossa Bushgardens, or PIRSA Nuriootpa Research Centre) with different under vine and mid-row plant species.
- Identified fence lines and property boundaries as ideal location for insectariums.
- Acknowledged insectariums can be difficult to manage.
- Is concerned growers might be disheartened as immediate results are not seen.
- Would be happy to speak at a potential workshop.

Dan Falkenberg – Vineyard Manager, Eden Hall Wines (Monday 19 October)

- Thought the concept is a great idea, and would definitely work.
- Suggested people often want to do things, but don't have the knowledge, or know where to get the knowledge from.
- Mentioned Chris Penfold's trial.
- Wants to get away from using chemical sprays.
- Thought you need to have some sort of ground cover, and utilizing native grasses as a permanent sward is the best option.
- Suggested mid-summer would be ideal timing for the workshop as that gives people time to seek consultation from the Bushgardens and be ready to plant by late Autumn.

- Identified late Autumn as best time to plant insectariums/under vine cover as the soil is still warm enough, and winter should provide enough rainfall. He said you can also plant in Spring, but you need water!
- Suggested potential opportunity to harvest the seed of native grasses from under vine and mid-rows for future planting.
- Acknowledged native grasses can be difficult to establish, but work really well as a permanent sward when they are.
- Wants us to let him know when we present the workshop, so he can get a ticket!

Pam Payne – Nursery Manager, Barossa Bushgardens (Wednesday 21 October)

- Thought a starter kit/pack of seeds could be tailored for each vineyard, based on the area you have, and the pests you're trying to manage.
- Suggested upon consultation and soil testing, she can recommend and match the most appropriate plants to each site.
- Is happy to do this, and would meet the growers and the site and have a look, build the relationship and see what is best for each place.
- Recommended the starter kit be tube stock, not seeds, as seeds are more difficult to source.
- Would be happy to speak at the workshop.
- Suggested she could produce a calendar of events handout for the workshop identifying when to order plants, when to plant, when to prep soil, etc.
- Is working on an insect to plant worksheet, which may also be of interest to growers at the workshop.
- Acknowledged the Bushgardens may not be the best location for an exhibition vineyard given it is managed by committee, and can be difficult to get approval.
- Proposed a bus tour of sites (eg. Henschke, Pewsey Vale, AustWine) for which we could get funding. This can show growers what it would look like without the need to set up an exhibition vineyard immediately.

- Suggested funding from Natural Resource Management in Gawler for this. Potential for someone from there to be a speaker too.
- Suggested Chris Penfold might be able to assist with an alternate site for an exhibition vineyard, or we could seek volunteer growers.
- Identified results could potentially be seen within two years of planting an insectarium, and after five years one would have decent sized plants.
- Is working on herbaceous grasslands for mid-rows, and has a demonstration at the Bushgardens.
- Gave an example of a vineyard in Virginia where they saved \$30,000 in one year from reducing insecticide use after they started their insectarium!

Mary Retallack – Managing Director, Retallack Viticulture (Wednesday 21 October)

- Has worked previously in the Barossa looking at insectary benefits for vineyards from certain species of plants (mainly wallaby grass, Christmas bush and prickly tea tree).
- Strongly encourages anything that increases biodiversity.
- Advised plants in insectariums provide food, shelter, alternate prey for insects.
- Continuously promotes the idea by talking to growers about beneficial insect species.
- Consults with growers, and help track, identify and observe population dynamics in vineyards.
- Expressed the concept of a workshop is a great idea, as there is so much interest already.
- Emphasized the importance of networking, and sharing any first-hand information growers have on the subject.
- Would potentially like to speak at a workshop, provided timing etc. was right.
- Would be happy to share outcomes of her current PhD on the subject.
- Has colleagues with information regarding parasitic wasps and native bee species which might be of interest.
- Identified the main disadvantage of insectariums is unknowns. There is little data so far on these plant species in the vineyard. Enthusiasm can breed unintended consequences.

- Also identified some plants species can harbor pests, e.g. elephant weevil, LBAM.
- Suggested growers might want both environmental and financial benefits of establishing insectariums quantified, and not rely on perceived benefits.

Enhancing Biodiversity in the Vineyard – Workshop Notes, Mary Retallack, Adelaide and Mount Lofty Ranges Natural Resource Management Board (2010)

Integrating Native Biodiversity into Vineyard Production Systems, Mary Retallack, Adelaide and Mount Lofty Ranges Natural Resource Management Board (16 April 2010)

Vineyard Biodiversity and Insect Interactions, Mary Retallack, GWRDC Regional - SA Central (August 2011)

Native Perennial Grasses Reap both Cost and Environmental and Rewards, Kelly Arbuckle, Australian Grape Grower and Winemaker (July 2012).

The Solution

After reviewing all the information gathered and researched, it became clear that a workshop was necessary to encourage growers. As mentioned by Nicki Robins, biodiversity workshops have been run by the BGWA for approximately 3 years now, this workshop needed a point of difference, the idea of the 'Starter Pack' was born. Growers may have heard of all the options out there, and by the sounds of it, have considered establishing insectariums in their own vineyards. The 'Starter Pack' provides the grower with the first steps towards establishing insectariums. It is a bit difficult to put a price on a 'Starter Pack' as each vineyard site will require specific plants, will be of different size, will require to control different pests and will have a different soil profile. At the workshop, the grower will be able to make contact with Pam Payne, from the Barossa Bushgardens and she will be able to help each grower determine their specific needs and tailor a 'Starter Pack' that suits their specific site.

The aim is to run the workshop over half a day, for growers to gain valuable knowledge from our key speakers who range from technical experts to practical experience. At the conclusion of the formalities, there will be a chance to network with the speakers, other growers to share experiences and discuss what has been reviewed throughout the day. This will encourage growers to contact Pam Payne for their starter kit and be ready to take the first steps towards establishing their own insectariums.

Table 1 highlights and determines the strengths, weaknesses, opportunities and threats of establishing insectariums and planting native grasses and native plants.

Strengths	Weaknesses
<ul style="list-style-type: none">● Increase biodiversity● Decrease need for sprays● Decrease cost of spray and constant management● Less tractor work● Less diesel use● Self-sustaining once established● Increase soil health● Infiltration rates of soil improve	<ul style="list-style-type: none">● If you're organic, weeds might be a problem● Some species of plants can shade vines and compete for water and nutrients if planted too close to vineyard● Seedbed preparation can create temporary erosion risk● Increase in frost risk if cover crop or under vine species are not managed properly

<ul style="list-style-type: none"> ● Can be planted anywhere ● Other growers in the area have successfully established insectariums ● Reduce spray drift ● Can act as wind breaks on edges of properties 	<ul style="list-style-type: none"> ● Difficult to propagate seeds quickly enough ● Soil analysis would be required to determine which plants and grasses would thrive where
Opportunities	Threats
<ul style="list-style-type: none"> ● Younger generations looking at doing things more sustainably ● Plant mid-row crops or insectariums within the vineyard ● BGWA have a network of 25-55 people who have shown interest in the past, but 70 people who are engaged. We would use this network to connect with people and make sure everyone knows there are other like-minded people out there ● Can be used as a marketing tool to build a story ● Organic production in Barossa is limited, opportunity to grow ● A trial or demo might show how margins would increase (profits) ● People have considered starting insectariums but have never just gone out and done it ● Give people the tools (seeds, plants and info) to begin and it could give them the push they needed ● Mid row crops could generate secondary produce income 	<ul style="list-style-type: none"> ● Provenance of seeds ● Established vineyard owners and growers might not be eager to change without proof that it is beneficial to do so ● Native grasses take about 2 years to develop ● Insectarium might take time to establish, results will not be seen instantly ● Insectariums may be perceived as hard work ● Water usage may be required to establish ● Insectariums may harbor pest species (LBAM, vine moth, vine weevil, etc.) ● Insectarium species may attract pests, increasing their population in the vineyard ● Beneficials, like ladybugs and spiders may prefer comfort of insectarium ● May be greater frequency of sapling growth in vineyard (red gums or others) located near vineyard

Table 1. SWOT Analysis of Establishment of Insectariums

Target Market

In the following table we analyze all the groups of people who our program and workshop is targeted towards, as well as potential funding sources and other stakeholders.

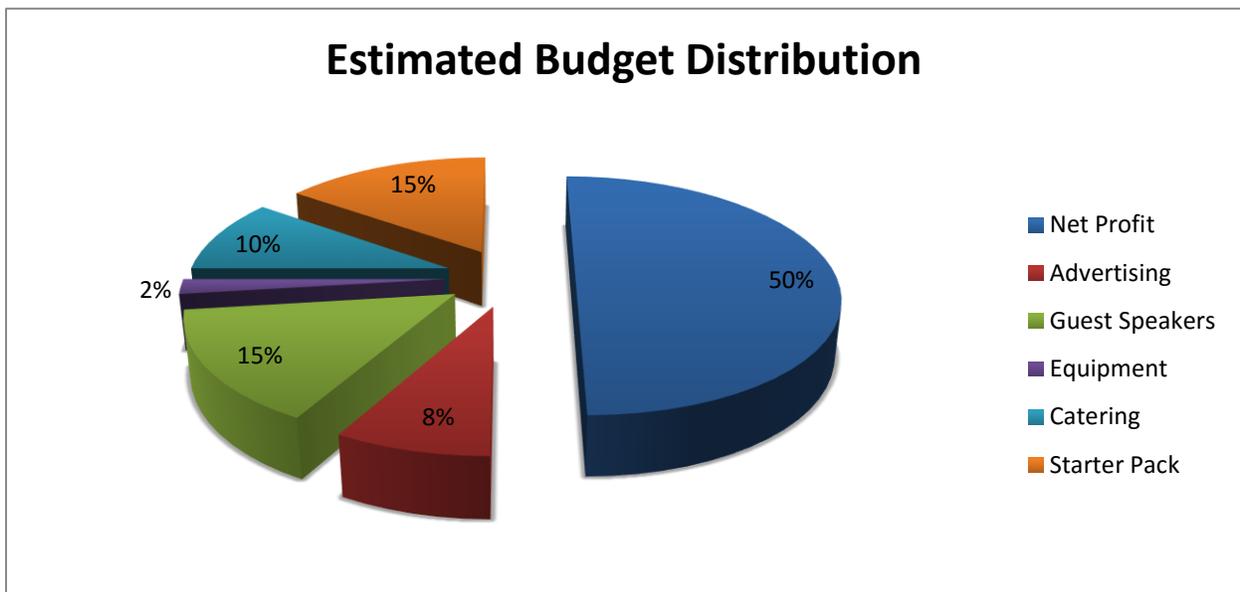
Name/Group/ Organization	Why are they Important?	Current Attitude (if surveyed)/key motivators	What would we like them to do?	How (Tactics)
Viticulturists	Influential to growers, bridge between winery & vineyard	Generally open to concept, interested to learn more	Attend workshop, encourage others to attend	Invite to workshop, provide information pack
Vineyard owners/grape growers	Own and farm land to be used for insectariums	Motivated by potential for cost savings, improvement of land	Attend workshop, establish insectariums	Invite to workshop, provide information pack
Barossa Bushgardens	Source of plants & knowledge	Potential source of income, community link	Supply starter packs	Work with to create appropriate starter packs, invite to talk at workshop
Key workshop speakers	Sharing of knowledge to others	Reward for time?	Prepare & deliver a short segment on their experience, research etc.	Work with to create workshop segment
Winemakers	Influential to vineyard	Improvement of vineyard and subsequently, fruit quality	Attend workshop, encourage establishment of insectariums	Invite to workshop, provide information pack
General Winery Staff (including cellar hands, admin, cellar door etc.)	May be involved in establishing & maintaining (if located near cellar door/admin), connection to public	Marketing aspect, improvement of working environment	Attend workshop, promote benefits to public	Invite to workshop, provide information pack
BGWA	Database of contacts, organizational resources	Branding and promotional opportunity	Promote event to database, support with funding	Contact, submit proposal

Local Chefs/Caterers	May use insectariums as a source for native bush foods with owner's permission	Opportunity for unique food source	Encourage key people to establish insectariums, provide feedback as to preferred plants	Invite to workshop, provide information pack, link with people who will establish insectariums
Barossa Viti Tech Group (BVTG)	Potential source of funding, knowledge	Branding and promotional opportunity	Promote event to contact database, support with funding	Invite to workshop, provide information pack
Natural Resource Management (NRM)	Potential source of funding, knowledge	Branding and promotional opportunity	Promote event to contact database, support with funding	Invite to workshop, provide information pack

Table 2. Analysis of Target Market

Financial Model

Graph 1 shows an estimated budget distribution for the upcoming event workshop. This takes into consideration all areas of expenditure and shows them weighted according to general cost estimations as well as levels of importance to the project. The cost estimates at each expenditure category are based around a target of \$5000 gross profit. The six categories are explained in greater detail below.



Graph 1 – Estimated budget for workshop

1. Net Profit - \$2500

The target for this project is to achieve a profit margin of at least 50%. It is intended that a portion of this profit will be retained to fund future workshops while the remainder will be donated to Barossa Bush Gardens to promote the continuation of biodiversity initiatives throughout Barossa's agricultural industry. It is our aim to help fund a native undergrowth 'demonstration' at the bush gardens. For example, a few rows of vines planted with native undergrowth to demonstrate the real time effects of this growth.

2. Advertising - \$400

The budget for advertising will be kept to 8% of the events gross profit. It is feasible for the majority of advertising to be done through social media channels, which will be at no cost. Other means of advertising would include running ad's in the local Barossa paper, other local paper's in other wine regions nearby (i.e. McLaren Vale, Adelaide Hills, Clare) and The Advertiser.

Eg. Estimated cost for 3 days of advertisement in The Advertiser from \$88.

3. Guest Speakers - \$750

We wish to attract at least two high quality guest speakers who will share their experience with alternative mid-row plantings and insectariums in their own vineyard. These speakers will be expected to prepare a structured discussion on this topic and provide a great resource to the participants of this workshop. This portion of our cost is weighted at 15% as the guest speakers' involvement is of high importance however, as this workshop is a community initiative it is expected that these speakers would appear at a reduced cost and would donate some of their time to help maximize the profit of this event and, in turn, promote the opportunity for healthier vineyard management across the Barossa. It is likely that this 'payment' will be given in the form of a gift to the speakers.

4. Equipment - \$100

Various pieces of equipment will be required to run this workshop such as;

- Chairs
- Projector
- PowerPoint/laptop capabilities
- Cups, plates, glassware
- Whiteboard
- pens/notepads?

5. Catering - \$500 (\$6.60 per person based on 75 attendees)

This event will run for a half day and basic catering will be provided for all attendees such as;

- water
- tea and coffee
- Sandwiches
- Cakes and slices

6. Starter Packs – varying cost

The Starter Packs will be source by the Barossa Bushgardens and the cost will vary according to site size, needs, plants required and quantity of plants. The Bushgardens will also provide a Calendar Year worksheet that indicates when the best times are to prepare soils, purchase plants, plants new plants, etc. This will be a good guide for growers to follow.

Donations

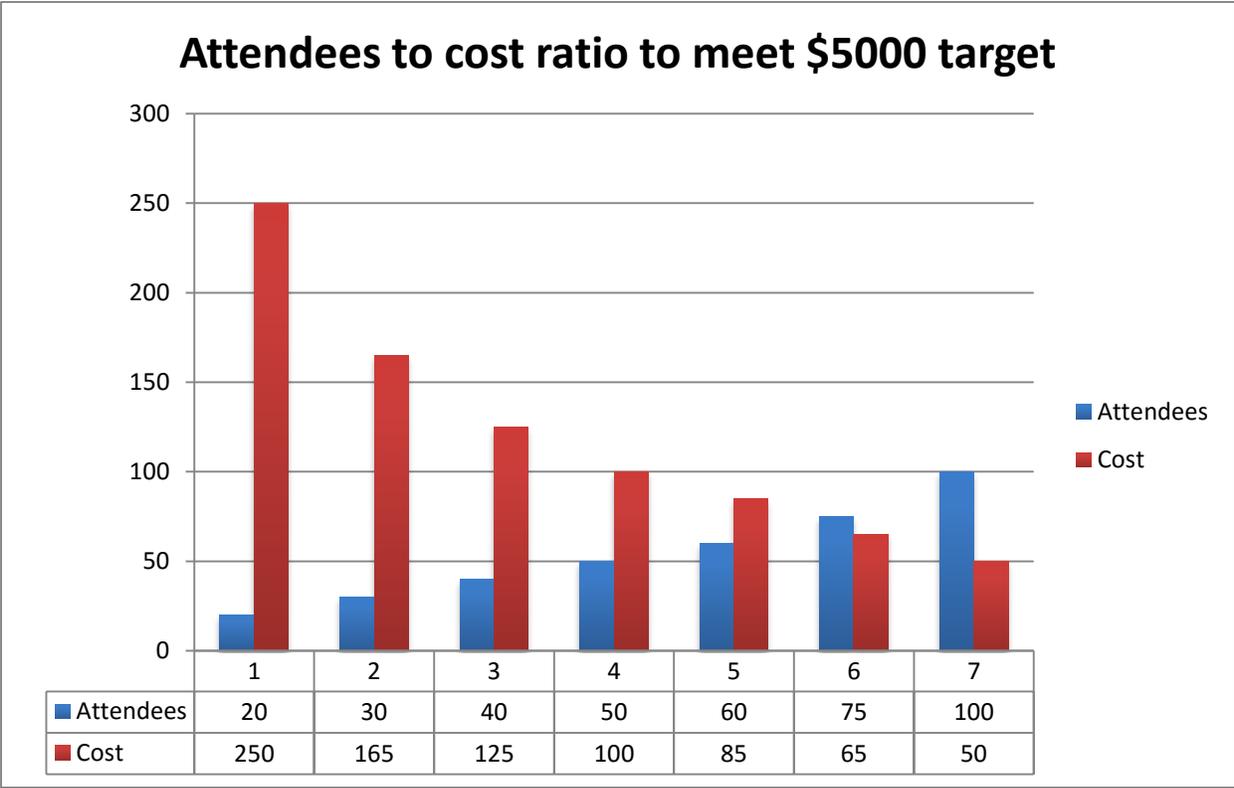
This workshop would not be possible without the donations of its generous sponsors.

- Lambert Estate – Venue
- BGWA/RDA – funding/donations to Barossa Bushgardens
- NRM – funding towards different aspects of programs
- Hentley Farm and Rolf Binder – donations of wines for networking/drinks session once the workshop concludes
- Appellation Restaurant – nibbles for networking session

Target Gross Profit

With a reasonable target gross profit, we should be looking at this first workshop to generate \$5000. With that in mind, the chart below demonstrates the cost per ticket in relation to our target set of attendees. After analyzing this chart, it seems that the best balance would be to

aim for 75 tickets sold at \$65 each. A lower cost should attract more interest. This also allows for appropriate expenditure in relation to the workshops estimated budget distribution.



Graph 2 – Attendees to cost ratio to meet target

Recommendations

We recommend that, in order to lead the Barossa Valley's agriculture towards sustainable agriculture, the workshop discuss in this report takes effect in January 2016. The following points should be taken into consideration for the workshop:

Location – Lambert Estate Wines

- Central location
- Venue donation
- Meets space requirements

Workshop Schedule – 1pm start

- half-day format
- afternoon tea provided
- networking time after with drinks
- 4 speakers

Mary Retallack – 45 minutes

Prue Henschke – 45 minutes

Pam Payne – 30 minutes

Darrell Kruger – 30 minutes

Guests – 50-70 guests invited from BGWA network, advertising, social media, etc.

The workshop is our initial step towards improving biodiversity. We also see future opportunities to enhance our program, the details below outline potential additions.

1. Exhibition Vineyard – at the Bushgardens or at an existing site, will showcase working vineyard with examples of mid-row and under vine insectariums

2. Bus Tour – visit vineyards with established insectariums and native grasses and plants, eg. Henschke, Pewsey Vale, AustWine
3. Starter Pack – at the workshop growers will be able to make contact with Pam Payne, from the Bushgardens, which will be able to work independently with them to come up with a Starter Pack that is specific to the area they are looking at and that focuses on the pests they might encounter
4. Seed Propagation Program – a calendar specific program that will provide growers with the right information of when to do what, so they can plan their year accordingly
5. Network – contact with like-minded people and support from knowledgeable people in the subject and growers with experience to share their experience and expertise

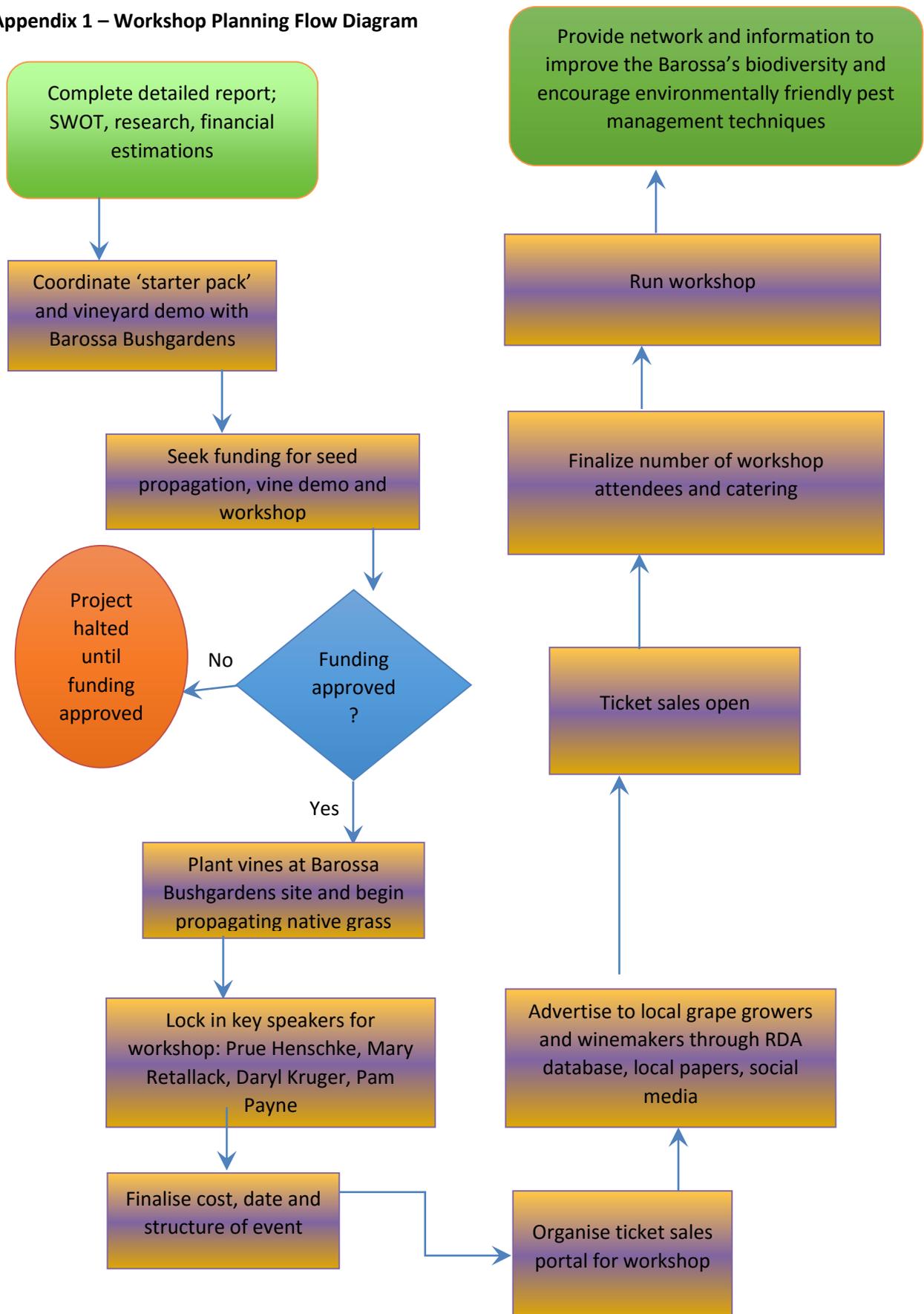
Conclusion

This report determines that a focus on native biodiversity within the grape growing industry will be beneficial in the long term for vignerons and vineyard owners as well as the environment. We have found that key industry leaders are supportive and encouraging of this initiative, which has been outlined throughout our research for the purpose of this report.

Through feedback we have learned that the key to implementing a greater native biodiversity and alternative, 'low-impact' vineyard practices lies to the effective communication of this message through the community. This is why well-advertised workshops and a demonstration area at the Barossa Bushgardens will ensure the successful implementation of this initiative across the region.

Within this report we have addressed the strengths and weaknesses of the project through SWOT analysis, compiled research and opinions of industry experts and submitted a flexible operational plan (Appendix 1) to follow in the months ongoing. By adhering to the recommendations detailed throughout this report it will secure the effective application of a new wave of native plantings and disease management within the industry.

Appendix 1 – Workshop Planning Flow Diagram



Appendix 2 – Costings for vineyard floor management – 2012

Authors: Russell Johnstone and Dan Falkenberg

Assumes 3.6 m row spacing with 1 m sprayed under vine for all three scenarios



Nativegrasses

Task	No. passes (maximum)	1st year preparation	2 nd year seeding	3rd year maintenance	4th year maintenance	5th year maintenance
Materials						
Four species mix of <i>Austrodanthonia</i>			\$333.33			
Herbicide mid-row		3	2	1	1	
Jaguar			\$18.00	\$9.00	\$9.00	
Spotlight	5	\$15.10				
Roundup	5	\$21.20				
Undervine	3	\$13.25	\$13.25	\$13.25	\$13.25	\$13.25
Undervine	3	\$9.44	\$9.44	\$9.44	\$9.44	\$9.44
Operations						
Seeding			\$180.00			
Mid-row herbicide		\$59.52	\$39.68	\$19.84	\$19.84	
Undervine	3	\$59.52	\$59.52	\$59.52	\$59.52	\$59.52
Slashing	1	\$35.71	\$35.71	\$35.71	\$35.71	\$35.71
\$/ha/year		\$178.04	\$653.23	\$111.05	\$111.05	\$82.21
Total 5 year period	\$1,135.58					

Green manure cover cropping

Task	No. passes	1st year	2nd year	3rd year	4th year	5th year
Materials						
<i>Triticale</i>	120 kg/ha	\$88.89	\$88.89	\$88.89	\$88.89	\$88.89
Fertiliser -DAP	100 kg/ha	\$53.00	\$53.00	\$53.00	\$53.00	\$53.00
Basta	1	\$21.94	\$21.94	\$21.94	\$21.94	\$21.94
Roundup	2	\$8.83	\$8.83	\$8.83	\$8.83	\$8.83
Spotlight	1	\$3.15	\$3.15	\$3.15	\$3.15	\$3.15
Stomp	1	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00
Gallery	1	\$44.22	\$44.22	\$44.22	\$44.22	\$44.22
Operations						
Seeding	1	\$46.30	\$46.30	\$46.30	\$46.30	\$46.30
Rotary hoeing	3	\$239.58	\$239.58	\$239.58	\$239.58	\$239.58
Cultivating	2	\$55.56	\$55.56	\$55.56	\$55.56	\$55.56
Undervine herbicide	3	\$59.52	\$59.52	\$59.52	\$59.52	\$59.52
\$/ha/year		\$542.85	\$542.85	\$542.85	\$542.85	\$542.85
Total 5 year period	\$2,714.24					

Manage volunteer growth

Task	No. passes	1st year	2nd year	3rd year	4th year	5th year
Materials						
Sprayseed	2	\$10.83	\$10.83	\$10.83	\$10.83	\$10.83
Basta	1	\$21.94	\$21.94	\$21.94	\$21.94	\$21.94
Hasten	3	\$2.54	\$2.54	\$2.54	\$2.54	\$2.54
Stomp	1	\$25.00	\$25.00	\$25.00	\$25.00	\$25.00
Gallery	1	\$44.22	\$44.22	\$44.22	\$44.22	\$44.22
Spotlight	4	\$12.58	\$12.58	\$12.58	\$12.58	\$12.58
Roundup	2	\$8.83	\$8.83	\$8.83	\$8.83	\$8.83
Operations						
Slashing	4	\$142.86	\$142.86	\$142.86	\$142.86	\$142.86
Undervine herbicide	5	\$99.21	\$99.21	\$99.21	\$99.21	\$99.21
\$/ha/year		\$368.02	\$368.02	\$368.02	\$368.02	\$368.02
Total 5 year period		\$1,840.11				

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References

- *Enhancing Biodiversity in the Vineyard – Workshop Notes*, Mary Retallack, Adelaide and Mount Lofty Ranges Natural Resource Management Board (2010)
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- *Vineyard Biodiversity and Insect Interactions*, Mary Retallack, GWRDC Regional - SA Central (August 2011)
- *Native Perennial Grasses Reap both Cost and Environmental and Rewards*, Kelly Arbuckle, Australian Grape Grower and Winemaker (July 2012).