Best Practice Reviews
Experiences of successful growers in the 2011 season

New South Wales Wine Industry Association
Grassroots Project
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INTRODUCTION

The NSW WIA R&D Committee asked representatives from each wine region across NSW what the priorities were for extension to their Growers.

These priorities were

- Managing Climatic Extremes
- Pest and Disease Management
- Canopy Management
- Vineyard Floor Management
- Soil Management and Mulching

Some of these priorities were addressed in the 2010 Spring Vine Health Field Day Program in Coordination with the National Wine and Grape Industry Centre.

Grassroots projects involving regional reviews of best practice have been accepted by GWRDC. With invitations arranged by the NSW I&I Regional Viticultural Officers, two Regions were visited to assess ‘Best Practice’ management of the above priorities. Subsequently 4 vineyards in the Canberra/Murrumbateman Region and 8 vineyards in the Hunter Region were evaluated and assessed for ‘Best Practice’.

The results of those visits are in this document. It sets out the practices of those growers who successfully dealt with the challenges presented by the 2011 vintage. The document also contains a guide with check lists of practices to be considered by growers when planning for the coming season.

Richard Hilder and Ken Bray inspect Semillon mulching trial block (left). Shayne Hackett in Canberra District (right). Duncan Farquhar and John Tulloch discussing spray unit maintenance.
CLIMATIC EXTREMES
The 2011 Vintage provided extraordinary challenges in dealing with frequent and heavy rainfall events from budburst to post veraison. This led to flooding and/or water logging of some vineyard blocks as well as causing all vineyards to be vulnerable to pest and disease, particularly Downy Mildew and Botrytis.

Best Practice aspects that were evaluated in dealing with excessive rainfall were -

1) Site Selection
2) Canopy Management
3) Pest and Disease Management
4) Vineyard Floor Management

Best Practice: Site Selection
Site selection plays a major role in the success or otherwise of a vineyard block. In regard to excessive rain it was found that blocks on colluvial soil at the foot of slopes or alluvial soil flats protected by levee banks fared best. The natural drainage ability of these soil types allowed almost immediate access to vineyard traffic. In some instances it was noticed that water diversion measures such as drains and levee banks had been installed to prevent flooding.

Vineyards on slopes with good air drainage and subsoil drainage in the Upper Hunter
Strategies for Improvement: Site Selection and dealing with flooding/water logging.

Install drains and levee banks in flood prone areas.

Have on hand pumps for pumping water from low lying areas to suitable drainage outlets.

Permanent sward between vine rows.

Light equipment such as a Quad Bike with low volume spray unit to use as an emergency during wet conditions.

Winch mounted on the 3 point linkage of 4 Wheel Drive Tractor with pulleys and steel cable to pull out from the headland, equipment bogged in the vine row.

Consider viability of blocks in flood prone areas. Would the land be better economic value used for another enterprise?
**Best Practice: Canopy Management**

It was observed that pruning style based on the required bud number, for the target number of bunches per vine (ultimately yield per HA) set the foundation for “Best Practice” Canopy Management.

Growers that had predetermined the spur spacing or cane length with the aim to create canopies that were well aerated and did not have bunches impacting on one another, caused their vines to be far less vulnerable to Botrytis. As well, during this prolific growing season it made shoot thinning, bunch thinning and shoot trimming a simpler and less frequent operation.

*These aspects took precedence in preventing bunch rots over intensive and expensive spray programs.*

These well-spaced spurs reduce the likelihood of bunch on bunch and allow good airflow.

**Strategies for Improvement: Canopy Management**

Decide on Machine Pruner best suited for your vineyard

Form a good team of pruners that will return each year for pruning to maintain a consistent standard.

As a general rule machine prune early and hand clean up prune later.
Best Practice: Pest and Disease Management

No matter how sound a Grower’s canopy management was strategic proactive sprays were required for the suppression of Downy Mildew and Powdery Mildew due to seasonal climatic events. The Hunter Region, although familiar with wet weather during the Growing season was certainly put to the test this last season. Those that coped best were the Growers that synchronised their spray programs with rainfall events. This applied particularly to Downy Mildew where > 10mm rain events occurred frequently between budburst and bunch closure during which time shoot growth was prolific. Strategic use of Metalaxyl was implemented by best practice growers from the start of cap fall to fruit set.

In the case of Powdery Mildew best practice growers accept that Powdery Mildew will occur rain or shine if protective sprays are not applied and therefore apply proactive sprays accordingly.

*Downy Mildew Sporulation from a secondary infection on a berry that has just set (and will soon abort).*
**Best Practice: An example of a Conventional Chemical Spray Program - To demonstrate strategic timings (to be coordinated with weather forecasts).**

EL3-4 Powdery Mildew and Mites

EL 9 Phomopsis, Powdery Mildew, Downy Mildew and LBAM

EL 15 Phomopsis, Powdery Mildew and Downy Mildew

EL 18 Powdery Mildew and Downy Mildew

EL 19-20 (10% cap fall) Botrytis, Powdery Mildew and Downy Mildew

EL 25 (50%-80% cap fall) Botrytis and LBAM

EL 26-27 Powdery Mildew and Downy Mildew

EL 31-32 (Pre Bunch Closure) Botrytis, Powdery Mildew and Downy Mildew

EL 33 Powdery Mildew and Downy Mildew.

EL 33 Powdery Mildew and Downy Mildew.

EL33-34, Botrytis, Powdery Mildew and Downy Mildew (last proactive spray for white varieties)

EL 34-35 (Pre Veraison) Downy Mildew, Powdery Mildew and Botrytis (proactive spray for red varieties only)

For grapevine growth stages please see the following reference:

Best Practice: Reactive Sprays - strategic timings.

Best Practice Growers applied Metalaxyl + copper hydroxide or mancozeb after >8mm rain events just before flowering to fruit set, before the Downy Mildew oil spots appeared, to prevent primary infection of this disease. In many cases in 2010 it was not possible to apply this spray at the optimum time due to persistent rain over flowering, associated vineyard access issues and bogging.

Desperate attempt to spray terraced vineyard in this extremely wet season.

Hydrogen peroxide + peroxyacetic acid sprays were used to good effect to prevent incipient Botrytis after veraison.

Potassium bicarbonate was reported to be useful for eradicating mild infections of Powdery Mildew in bunches after veraison.
No crop loss in this Canberra vineyard due to bunch rots with one pre bunch closure the only botrytis spray.

Some Semillon Vineyards in this area of the Hunter Valley were not sprayed for botrytis control to encourage Botrytis (noble rot) for dessert wine.
The fact that Botrytis did not come in the above vineyards, and similar observations in other regions, demands we consider the ecology and dynamics of botrytis and alternative approaches.

**Best Practice: Organic and Biodynamic Spray Program that worked well-strategic timings.**

Around Budburst  Wettable Sulphur alternated with Eco – Oil as a Miticide and protection against Powdery Mildew.

After 100mm shoot extension (E-L 12) Copper and Sulphur Sprays were applied to cope with the prolific growth and counteract the regular rainfall events. This season these sprays were applied at around 5 day intervals compared to 10 to 15 day intervals in the past.

From E-L 12 to Flowering (E-L 19) During this time Copper and Sulphur sprays were interspersed with the biodynamic sprays compost tea and seaweed tea. The biodynamic sprays were included during flowering. Copper Sulphur sprays were not included at this time in case of interference to the flowering from the Copper sprays. However a Downy Mildew primary infection occurred on unprotected shoot leaf growth that developed during flowering. These shoot tips were later trimmed off with the vine hedger. Biodynamic spray Chamomile tea was used to desiccate any remaining active Downy Mildew spores.

At fruit set Copper sprays were recommenced until the berries began to soften (E-L34). Post veraison Eco- Carb and Eco- protector were used to suppress Botrytis, Powdery Mildew and Downy Mildew.

The vineyard that used this program had negligible losses due to Botrytis, Downy Mildew and Powdery Mildew.

The fact that this program worked highlights the need for research into the ecology and dynamics of botrytis to develop an alternative approach to the conventional chemical spray programs.

**Best Practice: Timing of Pest and Disease Sprays.**

While applying the right spray to prevent and control a particular pest and disease is crucial, the timing of the spray is critical for it to be effective. Best Practice Growers accept there is no hard and fast rule for timing. Instead their decision making on when to spray is governed by the following factors.

1. Previous history of incidence of the Pest or Disease.
2. When last proactive or reactive spray was applied.
3. Rain events since last spray and immediate forecasts of pending rain events.
4. Predicted weather conditions i.e. rain, dew, temperature and wind force/direction.
Best Practice: Application Rate of Pest and Disease Sprays.

Best Practice Growers pay strict attention to calibrating their spray rig before applying any spray by ensuring the following procedure is followed and noted.

1. Test spray rig in a stationary position within the vine rows to determine nozzle type and pressure required to provide complete coverage of the spray target whether it be foliage and bunches or primarily the bunches. For best results to assess spray coverage use one or a combination of the following. Water sensitive paper, fluorescent dyes (with UV light later that night) or kaolin clays can help.

2. Establish the speed at which the rig is required to travel to provide complete coverage of the spray target.

3. Once steps 1 and 2 are completed. Record the nozzle size, spray pressure, tractor gear and tractor revs.

4. Fill the spray tank to its top level. Then following the data collected in step3, run the spray rig over a measured distance (1/10thHA) and then measure the amount accurately to fill the tank again to the top level mark. Then the volume of water applied per HA can be calculated. For instance if the amount collected was 25L then the spray volume per HA would be 250L.

Once the volume of water per HA to be applied is established then the amount of product for the particular pest or disease can be determined. Bearing in mind that when manufacturers have their product registered the rate of product to be optimally effective is applied in a water volume of 1000L per HA, which is considered to be the “point of run off” or when the target area is completely covered by the spray. The label rate invariably is given as the amount of product to add per 100L litres assuming that 1000 litres of water per HA is going to be applied. For example this means that a rate of 100g or 100ml per 100L will give a delivery 1kg or 1L per HA.

The various types of air blast sprayers have been proven to give effective water coverage at water volumes far less than 1000L per HA. This of course reduces vineyard spraying time as the spray vat has to replenished less often.

In the example given above where the volume rate is 250 L per HA; then if the spray vat was 1000L capacity and the recommended rate on the label was 100g per 100L then the amount of product to add to the spray tank would be 4kg (1000 over 250 *100*10g). The spray concentration rate in this instance is 4, (1000 over 250). If the concentration rate exceeds that recommended on the label then the volume of water applied needs to be increased and the rate recalculated.
Strategies for Improvement: Pest and Disease Management

Ensure canopies are dry (i.e. no dew on leaves) when applying sprays to prevent dilution reducing efficacy of the spray product being applied. Due to time constraints some growers were spraying around the clock and found Downy Mildew outbreaks to be associated with early morning sprays when dew was present. No Downy Mildew was found where leaves were sprayed dry.

It is advisable not to use wetters or adjuvants for bunch rot protection. They damage the protective layer on the berry skin and otherwise reduce the effectiveness of bunch rot sprays.

Complete over haul and maintenance of Spray Rigs. This needs to be top priority for ‘winter rainy day jobs’.

Review previous season spray program and note strengths and weaknesses.

Consult with Industry Advisers, Supplier and decide on products to use next season.

To manage scarcity of spray products purchase next seasons whole supply, or secure their supply at critical times through the forthcoming season.

Consider aerial spraying in flood prone or water logged areas to avoid bogging (see page 7).

John Tulloch maintained and painted his spray rig (circa 1970) in early winter to be ready for the 2011/12 season.
Servicing pumps is a priority winter job and all aspects of spray rig maintenance needs to be attended to at this time.

A spray rig ready to go for the 2011/12 season.
Vineyard Floor Management and the use of Mulch and Compost

Most growers choose to have ground cover between the rows. Generally this is volunteer growth through the spring and summer with a cover crop direct sown during the autumn. Tillage is kept to a minimum. Ground cover is maintained at a suitable height by slashing. Most growers have a plan to chisel plough every alternate row every 2 to 3 years. Often this is done after broadcasting fertiliser, lime or gypsum to facilitate incorporation of these products.

In one instance a grower is using traditional ploughing out of the under vine bank to incorporate into the mid row. After incorporating it, by disc cultivating the mid row, the under vine bank is then reformed, with a throw-on disc mounted to the under vine attachment. This relates to best practice in that with drip irrigation there can be a build-up of acidity or salt under vine. Some under vine cultivation every three to five years or so could be a good idea. This job requires precision to avoid damaging vines. This particular grower does a very thorough job using this equipment and is therefore an example of best practice.

A Silly Plough allows under vine cultivation when required from time to time.
Silly Plough pattern after ploughing out under vine.
Close up of Silly Plough showing hydraulic controls for adjusting plough depth and swinging the plough under the vines.

Under vine weed control is invariably done with herbicides. Some growers are using mulches to suppress weeds.

Layer of mulch under vine suppressing weeds used in combination with a mixed cover crop.
Compost is used by growers to manage soil biology and to boost nutrient cycling in the vineyard system.

Both the Hunter and Canberra district have shown interest in using compost and mulching in managing the vineyard floor. This is primarily for boosting nutrient cycling and better utilising soil moisture. Soil temperature, structure, nutrient buffering, weed competition and water holding capacities are all affected. Cover crops, cultivation, sown pastures and volunteer inter row cover are options that were observed in these visits. Choice amongst these depends on the vineyard soil and other site characteristics. These approaches are used in managing vine vigour, vineyard access and air movement. The importance of these factors in dealing with a difficult season has already been outlined. Some practical observations are included below:

Mulches and composts come in different qualities. Particle size is an important factor for mulches. Longer lasting larger sized mulch is often cheaper.

A local supply and order size is important in managing costs associated with mulch as transport is a significant cost component.

Mulching was used effectively to even out variability in vineyard vigour.

Manufacturing complete compost with good microbiological activity is best done with the assistance of a specialised machine for turning the compost properly. Other approaches are harder work and are unlikely to give the required aerobic conditions and consistency of product.

Making good compost is a microbiological succession resulting in a stable living product. Substrate, turning and moisture content are important factors in achieving this process. The machine above turns the compost row and adds water.
Best practice soil, under vine management, composting and mulching can include a wide range of practices which effect plant growth. Some photographs from our vineyard reviews are included as a reference for people as they consider their own approaches.

*Sheep can play an important role in winter for managing nutrient cycling with permanent swards.*
Permanent ground cover with a mowed mid row sprayed under vine, is the floor management practice in this vertical shoot positioned vineyard.
Growers are encouraging native grasses and herbage as an integral part of their vineyard floor management.

Permanent ground cover mid row, under vine weeds suppressed with weedicides.
Direct drilled cover crop in alternate rows maintains soil structure.
Permanent mid row has hayed off grasses. The under vine bank has been treated with a herbicide. Since photo taken there has been 44 ml of rain which will result in groundcover growth. The mid row will be slashed after pruning to incorporate the prunings.
Clean cultivation with mounds under vines reformed.

Cultivation and ripping of alternate rows every two to three years is a common practice to prevent compaction.
Cultivation and ripping of alternate rows every two to three years is a common practice to prevent compaction.

Cover crops and coarse mulches used to build fertility, biological activity and fruit quality.
Conclusion

Reviewing best practice is a normal part of the annual cycle of a vineyard enterprise. During these visits we were really pleased with grower’s willingness to share their knowledge.

However as an individual reading this material it is important to remember that these practices need to be adapted to your environment. Adapting best practice to a particular environment is an ongoing part of good vineyard management.

We encourage you to develop your own approaches in the following notes pages.

Further Reading

Presentations on Spring Vine Health Field Day web sites

Australian Society of Viticulture and Oenology Seminars

Grape and Wine Research and Development Corporation Innovators Network Materials

Australian Wine Research Institute Agrochemicals information

Managing Heat Effected Vineyards – A GWRDC Grassroots Report
PLANNING FOR NEXT SEASON – What do you intend to do?

Canopy management

Spray Program

Powdery Mildew

Downy Mildew

Botrytis

Mites

Light Brown Apple Moth

Spray products to be purchased

Spray Rig Calibration notes

Dealing with flooding/waterlogging

Notes for vineyard goals and objectives – what results do we hope to achieve?
Vineyard Planner

Every vineyard needs a record keeping and planning system. A spreadsheet is available in Excel soft copy from [www.nwgic.org](http://www.nwgic.org) for you to use as a basis for your yearly management program. You will be able to change headings where required and also add rows or columns where needed for extra detail. This can be your own personal vineyard plan for the seasons ahead. The headings below are an example for you.

**PLANNING FOR NEXT SEASON**  
2011/12

*Notes for Overall Aims and Objectives - the results we hope to achieve.*

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*Dealing with flooding/waterlogging, bushfire prevention/control, heat damage prevention, other natural hazards.*