NSW WINE INDUSTRY ASSOCIATION
2003 SEMINAR

GRAPEGROWING FOR TOMORROW'S MARKET – QUALITY v. VIABILITY

PROCEEDINGS

NATIONAL WINE AND GRAPE INDUSTRY CENTRE,
CHARLES STURT UNIVERSITY,
WAGGA WAGGA
FRIDAY, 20 JUNE 2003

NEW SOUTH WALES WINE INDUSTRY ASSOCIATION

NSW First for Business
Department of State and Regional Development

Grape and Wine Research and Development Corporation

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The NSW Wine Industry Association Inc acknowledges the support of the Grape and Wine Research and Development Corporation, the National Wine and Grape Industry Centre, and the NSW Department of State and Regional Development.

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An electronic copy of these proceedings can be found at www.nswwine.org.au (.pdf file)

INTRODUCTION BY THE HON DAVID CAMPBELL MP

(Minister for Regional Development, Minister for Illawarra and Minister for Small Business)

<<<<<<<<<<<<>>>>>>>>>>>>

For visitors to this region – welcome to Wagga Wagga.

And for those of you who are locals, I'm delighted to be back in the Riverina.

Firstly, thank you Chris Barnes, for your championship of State's wine industry – and congratulations on your recent award officially recognising this contribution.

This seminar is one of the most important for our State's wine industry. And it's vitally important for 16 regional areas across NSW. The NSW Wine Industry is doing great things.

A quarter of Australia's wine grapes are grown in this State. Our current planting is setting new records, increasing by 10 per cent in the last financial year. Production continues to increase – and is forecast to rise by 15 per cent over the next two years. We now produce a third of Australia's total wine production.

More than 2000 people are directly employed in this $700 million industry. And this grew by 15 percent in the last financial year.

Exports now exceed domestic sales. Each day 360,000 bottles of NSW wine leave our shores destined for 104 international markets.

Cellar door sales are strong. Last year, more than four million people visited local wineries – injecting $350 million into our State's economy. All good news for regional towns and businesses in NSW.

Success like this hasn't happened by accident. And it hasn't happened overnight.

Your hard work and tireless commitment has steadily built our State's industry to where it is today. It's vital we plan together for the future of this terrific industry.

NSW Government is committed to supporting and encouraging the growth of our wine industry for generations to come. The NSW Government strongly supports your industry in a variety of ways from promotion to individual business plans

1. We recently secured the next three Wine Australia events for Sydney. Until now this prestigious event was shared between Melbourne and Sydney. Winning this four-day forum was a vote of confidence by Wine Australia that NSW is the best place to do business. Wine Australia 2004 at Darling Harbour will be a great opportunity for our State industry. It'll be a great opportunity for the NSW wine industry to promote itself to a world market - in the heart of Australia's largest domestic market. And it will give many smaller producers an opportunity to showcase their product – to a market that would otherwise be out of their reach.

2. The NSW Government continues to encourage exports through international trade missions.

3. We are helping regional communities unlock the potential for new wine industries.

4. And we support market strategies for emerging wine regions. The synergy between food and wine means we have provided more than $700,000 to promote regional food and wine.

5. We are helping small regional wine makers build cellar door sales and targeting mail order markets.

Over the past three years, the NSW Government has spent $730,000 assisting 30 wine companies. A recent example is Casella Estate – right here - in the Riverina.

Last year we provided assistance to the company to increase its storage capacity. And I am please to say this additional capacity now underpins Casella's export drive in the USA.

And we are helping regional wineries to link themselves to local hospitality industries. Other support comes in the form of cellar door workshops, culinary competitions and food and wine seminars.

Other government assistance includes:

- the Small Business Expansion program,
- -High Growth Companies program and
- the Regional Business Development program.

Last year, the NSW Government provided $1.5 million for pest and disease control within the industry. And we strongly support the promotion of our State's wines via the forthcoming Rugby World Cup – one of the largest sporting events ever. This sporting event is a unique opportunity to target export markets in England, Ireland, the USA, Canada, Japan and New Zealand.

In the face of this continuing stream of good news, it is easy to become complacent about the future of the industry. We need to work together to ensure this bounty of good news continues. Certainly, the NSW Government does not take this industry and its future success for granted. It's vital we continue to work in partnership.

So, what are the challenges?

The success of our wine marketers, particularly in export markets like the USA and the UK, means that after a surplus - at least in some varieties - supply is again looming as a constraint.

- We need to look seriously at our export and domestic markets.

- We need to examine what this means in relation to grape types and quality;

- We need to help growers identify changes they may need to address.

- And how that change will impact on costs, skills, business performance and investment plans.

Marketing is a key to future success. But it is important industry does not pursue sales for their own sake – they must be profitable sales. Education and understanding is vital to all parts of the industry.

One statistic, I noticed recently is that while NSW wine exports in 2001/02 increased by 17% in volume terms on the previous year, these exports increased by less that 1% in value terms. The NSW industry needs to achieve a price premium for our wine, at a time when competition on the domestic and export fronts, is intensifying.

The NSW Government continues to support better planning for the future.

That's why we support the National Wine and Grape Industry Centre - here in Wagga Wagga.

I understand many of you have had the opportunity to see some of the work going on at the centre, at yesterday's open day. The NSW Government supports several projects at the centre, worth $1 million. We have provided $600,000 over three years to survey new viticultural zones for phylloxera. The NSW Government will continue to work with your industry to maximise the jobs, investment, wealth generation, production and exports that the industry can generate for the benefit of everyone in the State.

And I urge everyone here today to show innovation and creativity in planning for the future of your industry

I look forward to hearing of the outcomes of today's seminar.

And I look forward to exploring how we can continue to build on your ideas and recommendations.

Thank you.

AUSTRALIAN WINE INDUSTRY: 15 YEARS OF CHANGE

Statistical overview (Stuart McGrath-Kerr, Secretary NSWWIA)

Introduction

The Australian wine industry has enjoyed a period of sustained growth since 1986, fuelled very much by the rapid expansion of exports but also from a shift in consumption habits from cask wine to the more profitable bottled wine sector. In 1985-6 exports were 11 million litres (ML) – sixteen years later this had risen to almost 420ML valued at $2 billion. This represents 52% of all sales of Australian wine.

The Australian wine industry has set itself an ambitious goal which it believes is both achievable and worth achieving.

> ***"By the year2025 the Australian wine industry will achieve $4.5 billion in annual sales by being the world's most influential and profitable supplier of branded wines, pioneering wine as a universal first choice lifestyle beverage"[1]***

Australia has, in a relatively brief period, established the standards of quality, innovation and style which have swept the world and have become the foundations upon which the industry is now growing.

The industry's 30 year vision to the year 2025 sees three phases of development:

- Volume Growth (1996-2002) during which the rapid vineyard expansion of recent years will overcome product shortages thereby enabling expansion in existing markets and penetration of new markets
- Value Growth (2002-2015) which will place increased emphasis on building brand strength, sector share and margins
- Pre-eminence (2015 to 2025) when Australia will have established brand leadership in specific market segments.

The industry is at the latter stages of volume growth, with the wave of increased wine production from the plantings of the late 1990s starting to ease and the emergence of strong brands.

Brief History

The wine industry in Australia has been a domestically focussed industry for much of its history. Through the late 70s and early 80s per capita wine consumption, particularly for white wine and coolers (remember them?), increased rapidly reaching a peak of 21.6 litres/capita in 1985-86.

At this point the combined effects of two increases in wholesale sales tax, the recession, high interest rates, record grape production, and an easing of domestic consumption lead to massive grape surpluses and an industry in disarray.

It was from this point that the impacts of the industry push to exports first started to be felt.

[1] The Australian Wine Industry Five Year Plan, Winemakers Federation of Australia 1996.

After 1986 domestic wine sales ceased to grow but for a short period the fall in domestic sales was offset by the growing export market. This lead to a sharp increase in grape prices in 1988 and 1989. However by 1989 total Australian sales contracted for two years placing enormous downward pressure on grape prices, effectively stalling investment.

The following table is a useful summary of the last 18 years since the peak of 1985.

Stocks, Sales and Production Summary

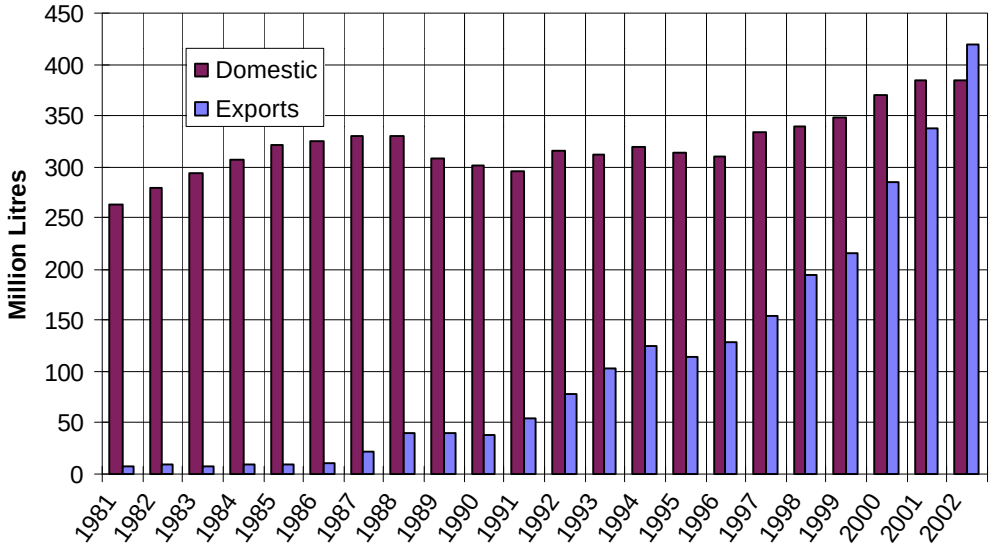
	Stocks	SALES				Grapes
		Aust Domestic	Imports	Export	Total Aust	Tonnes
	Ml	Ml	Ml	Ml	Ml	Kt
1985	552	320	12	9	329	598
1986	528	328	8	11	339	520
1987	524	330	4	21	351	512
1988	494	331	3	39	370	485
1989	548	309	9	40	349	625
1990	567	301	10	38	339	583
1991	585	301	9	54	355	521
1992	611	315	9	79	394	619
1993	587	312	8	103	415	611
1994	657	320	8	125	445	759
1995	642	313	14	114	426	612
1996	782	309	20	130	439	863
1997	818	334	14	154	488	779
1998	900	339	26	193	532	954
1999	1,090	348	24	216	564	1,100
2000	1,191	369	20	285	654	1,119
2001	1,377	384	13	338	722	1,398
2002	1,570	385	14	419	804	1,574

By 1991 exports once more started to grow and with the exception of 1995 which was a drought year with a low crop, exports have increased their volume of sales in every year.

Points to note from the above include:

- The sharp increase in imports (of red wine) in the late 1990s coinciding with the boom in red wine sales and the inability of grapegrowers to keep up with demand. This lead to very high grape prices which fuelled the red grape planting boom.
- The rapid increase in grape production at the end of the decade
- The rapid build-up of stocks in the same period
- Huge volume increases in exports as a consequence
- Export volumes surpassed domestic sales in 2001-02.

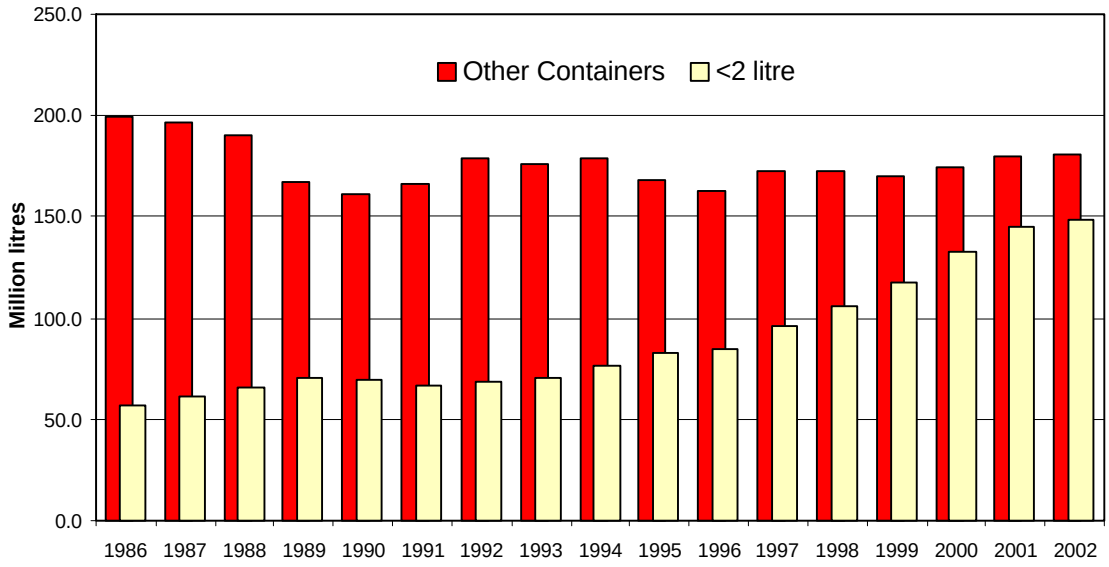
SALES OF AUSTRALIAN WINE 1981- 2002



The above graph shows the growing importance of exports over the past 15 or so years.

The period since 1985 has also seen a growing importance in the sales of bottled wine and stagnation on the sales of cask wine. Today only around 20% of grape production is destined for the cask market, the rest is for the domestic bottled market or exports. It is disappointing therefore to see wine scribes make general statements that the "irrigated" river areas largely produce grapes for the cask market.

SALES OF TABLE WINE BY CONTAINER



Export growth

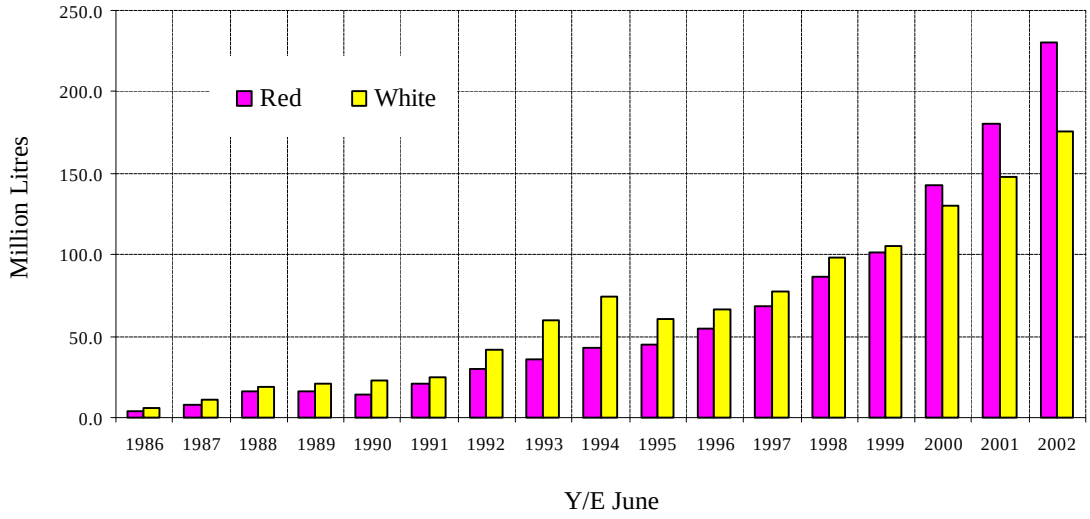
Australian wine exports have driven the wine industry's growth over the past decade. While Australian export growth was fuelled initially by demand for white wine, strongest growth is now for red wine.

For many years growth has been constrained by grape availability, rapid expansion in grape supply, particularly red grapes, has posed some difficulties for the industry to process, store and sell the available product. The 2002 vintage highlighted the industry's capacity limits.

Despite fears that red grape supply would outstrip sales, the industry has demonstrated a capacity to very quickly take up the challenge, with monthly export approvals once again running at record levels in the wake of the 2002 vintage.

There are strong reasons to be positive about Australia's wine export prospects in the medium term. The fundamentals underlying Australia's overseas success over the last 10 years have not changed - it supplies quality wine at key price points, it does this on a consistent basis, the Australian product-offer is widely acceptable to the consumer (particularly those of the emerging consuming nations) and is effectively communicated. Moreover, Australia is still small on the world stage and the potential to expand is considerable.

Table Wine Exports



Area of Grape Plantings

The following table shows the planted area of grapes for the past nine years.:

AREA OF VINES (including Dry/Table varieties)(Hectares)

	SA	NSW	VIC	WA	TOTAL AREA	NON-BEARING %
1993-94	27,477	14,322	21,047	2,713	67,074	8.5%
1994-95	32,603	14,437	21,591	2,788	72,869	14.3%
1995-96	35,289	16,883	23,088	3,642	80,559	19.5%
1996-97	38,546	19,990	25,356	3,969	89,797	19.7%
1997-98	43,557	22,197	26,251	4,534	98,612	20.8%
1998-99	52,551	28,744	32,299	6,712	122,915	22.5%
1999-00	59,807	32,269	36,257	8,281	139,861	20.9%
2000-01	62,163	34,559	36,924	10,917	148,258	11.9%
2001-02	67,039	37,381	38,653	11,381	158,594	9.6%

New South Wales has increased its planting of grapes by 23,000 hectares (or 161%) since 1993-94. This compares with 144% for South Australia and 84% for Victoria. (The apparent low figure for Victoria ignores the fact that considerable areas of Sultana grapes for drying have been replanted to wine grape varieties)

The following table shows the relative shares of grape plantings:

SHARE OF GRAPE PLANTINGS OF EACH STATE

	SA	NSW	VIC	WA
1993-94	41.0%	21.4%	31.4%	4.0%
1994-95	44.7%	19.8%	29.6%	3.8%
1995-96	43.8%	21.0%	28.7%	4.5%
1996-97	42.9%	22.3%	28.2%	4.4%
1997-98	44.2%	22.5%	26.6%	4.6%
1998-99	42.8%	23.4%	26.3%	5.5%
1999-00	42.8%	23.1%	25.9%	5.9%
2000-01	41.9%	23.3%	24.9%	7.4%
2001-02	42.3%	23.6%	24.4%	7.2%

New South Wales has increased its share of the national total from 21.4% in 1993-94 to 23.6% in 2001-02, South Australia from 41% to 42.3% while Victoria's share has declined from 31.4% to 24.4% over the same period. This latter figure reflects the contribution of the dried fruit industry in the total plantings in the earlier years (that industry is largely found in Victoria) and the decline in importance of the dried fruit industry in recent years.

Grape Production

The following table shows grape production for wine by State from the ABS Viticulture Survey

ORIGIN OF GRAPES FOR WINE (tonnes)

	NSW	SA	VIC	WA	AUST
1989	140,439	310,424	104,279	7,648	563,446
1990	120,062	316,411	85,065	8,910	531,558
1991	111,009	290,825	78,672	7,808	489,441
1992	120,550	327,853	104,400	9,766	563,663
1993	140,655	274,850	118,446	10,170	545,208
1994	141,688	338,572	167,084	12,967	661,790
1995	104,933	317,231	137,949	12,314	575,006
1996	167,555	395,831	199,140	17,236	782,366
1997	174,265	367,792	181,772	17,295	743,382
1998	175,321	455,531	214,462	21,406	870,627
1999	270,236	491,621	277,869	32,067	1,076,207
2000	287,968	478,349	301,908	37,547	1,111,145
2001	323,687	670,758	327,555	61,537	1,391,076
2002	415,027	689,644	338,537	63,560	1,514,504

The following table shows the relative contributions of each State:

WINEGRAPE PRODUCTION - SHARES (%)

	NSW	SA	VIC	WA
1989	24.9%	55.1%	18.5%	1.4%
1990	22.6%	59.5%	16.0%	1.7%
1991	22.7%	59.4%	16.1%	1.6%
1992	21.4%	58.2%	18.5%	1.7%
1993	25.8%	50.4%	21.7%	1.9%
1994	21.4%	51.2%	25.2%	2.0%
1995	18.2%	55.2%	24.0%	2.1%
1996	21.4%	50.6%	25.5%	2.2%
1997	23.4%	49.5%	24.5%	2.3%
1998	20.1%	52.3%	24.6%	2.5%
1999	25.1%	45.7%	25.8%	3.0%
2000	25.9%	43.1%	27.2%	3.4%
2001	23.3%	48.2%	23.5%	4.4%
2002	27.4%	45.5%	22.4%	4.2%

New South Wales share has increased from 21.3% in 1993-94 to 27.4% in 2001-02 while South Australia's share has declined from 51.2% to 45.5% and Victoria's from 25.3% to 22.4% over the same period.

Grapes crushed by State

The following table shows the volume of grapes crushed as measured from the winery crush survey, by location of the enterprise.

GRAPES CRUSHED BY LOCATION (KT)

	NSW	SA	VIC	WA	AUST
1985	151	327	na	na	598
1986	148	278	na	na	520
1987	151	270	na	na	512
1988	157	235	na	na	485
1989	183	301	na	na	625
1990	172	321	100	9	603
1991	169	276	86	7	539
1992	199	323	102	10	636
1993	230	287	98	10	626
1994	239	390	134	14	777
1995	187	320	109	12	630
1996	282	432	149	18	883
1997	265	389	125	18	798
1998	308	485	158	22	976
1999	385	516	190	32	1126
2000	397	511	197	36	1145
2001	430	716	217	56	1424
2002	557	747	235	63	1605

	NSW	SA	VIC	WA	AUST
1987	151	270	na	na	512
	29%	53%	0%	0%	100%
1992	199	323	102	10	636
	31%	51%	16%	2%	100%
1997	265	389	125	18	798
	33%	49%	16%	2%	100%
2002	557	747	235	63	1,605
	35%	47%	15%	4%	100%

The table shows that NSW has steadily increased its share of the National wine grape crush over the past 15 years from 29% to 35%. It should be noted that there are significant crushing facilities at Buronga in the Sunraysia which draw fruit from across the board in Victoria.

Future Production

The industry is entering a period of consolidation with competitive pressures squeezing margins and profitability. The exceptionally high grape prices of the late 1990s which fuelled the planting boom are not likely to be repeated in the future, and future growth will depend on the ability of the major Australian producers to continue to grow their markets.

This is reflected in the projected intake figures from the utilisation surveys as the table below shows:

	NSW(a)	SA	Vic	WA	AUST
2002	313	707	423	51	1,498
2003	333	801	423	61	1,622
2005	370	892	461	61	1,788
2007	391	912	474	61	1,845
07/02%	25%	29%	12%	20%	23%

(a) Excludes the NSW Sunraysia which for methodological reasons is included in the Victoria figures.
(b) Source is the Australian Regional Winegrape Crush Survey 2002

Concluding remarks

The benefits from growth in the wine industry have been spread across all State to varying degrees. New South Wales has achieve a good share of that growth.

Future growth will depend on a number of factors including future demand for Australian wine, availability of production resources, in particular water, and the ability to deliver a return sufficient to encourage the kind of long term investment needed for the grapegrowing industry.

Stuart McGrath-Kerr
New South Wales Wine Industry Association Inc
20 June 2003

FUTURE GROWTH PROSPECTS

Lawrie Stanford, Senior Analyst, Australian Wine and Brandy Corporation

Wine Industry Outlook, June 2003 ….

LAWRIE STANFORD

Manager - Information & Analysis, AWBC

WINE OF AUSTRALIA

Australian Wine and Brandy Corporation

To be discussed ...

- *International context*
- *Opportunities*
- *Threats*
- *Quality the key?*
- *Australian supply & demand*
  - *current boom, supply constraints loom?*

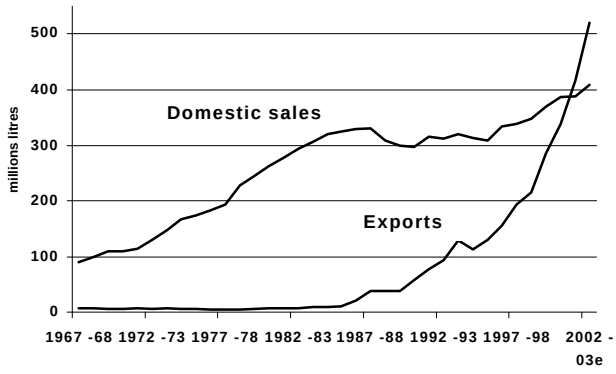
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- Quality and integrity
  - *to protect and enhance the quality and integrity of Australian wine*
- Market development
  - *category status for Australian wine*
- Knowledge development
  - *to assist decision-making in the industry*

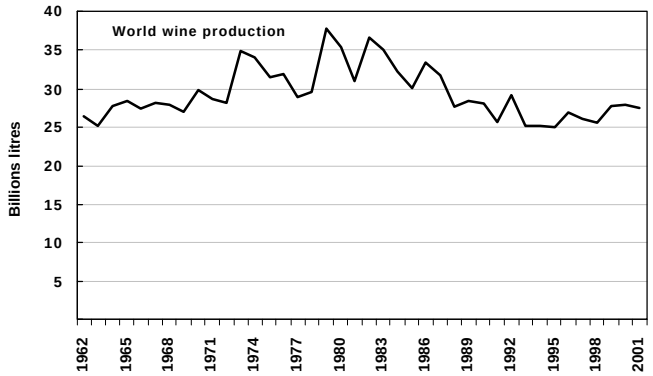
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Australian wine sales ...



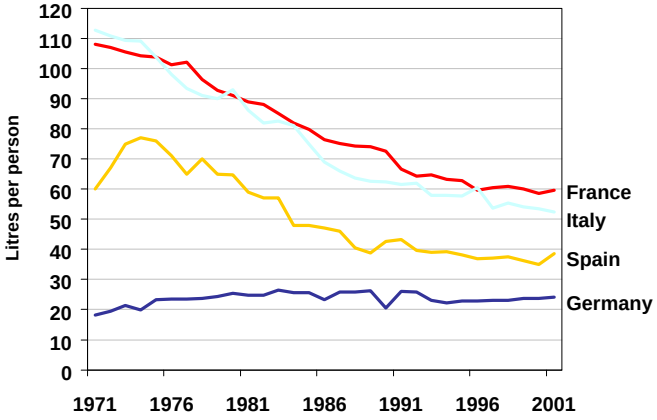
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World wine...



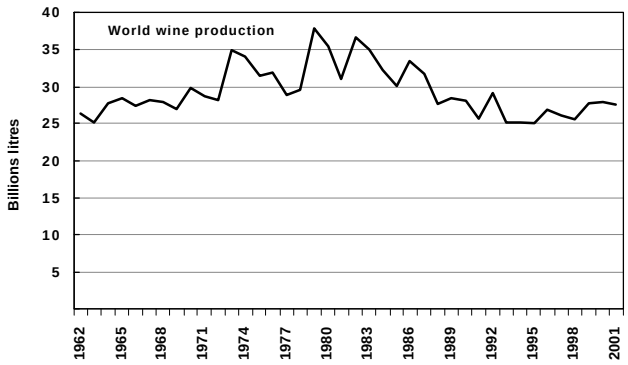
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Traditional wine producing nations ...



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World wine...



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World wine...



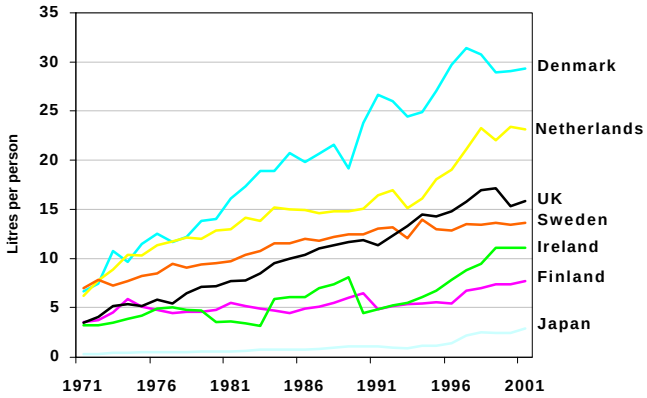
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World wine...



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Emerging wine consuming nations …



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World wine and Australia in context...

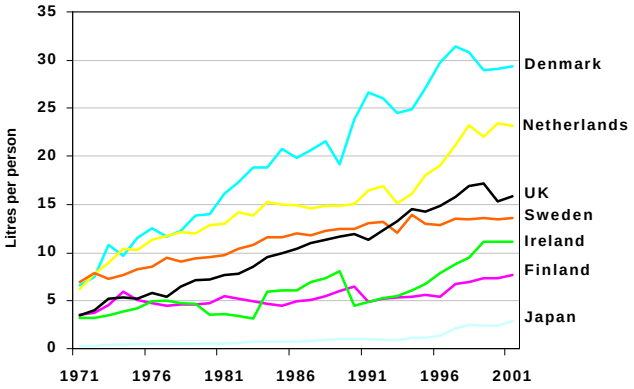


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Opportunities

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Emerging wine consuming nations …



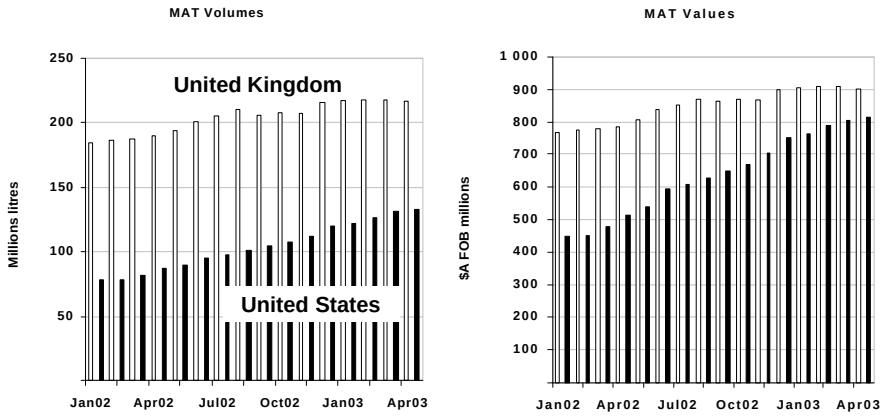
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Market prospects ...

Market …	*Opportunity…*
Germany	Niche
Japan	Niche
United States	Volume
Canada	Volume
United Kingdom	Category segmentation

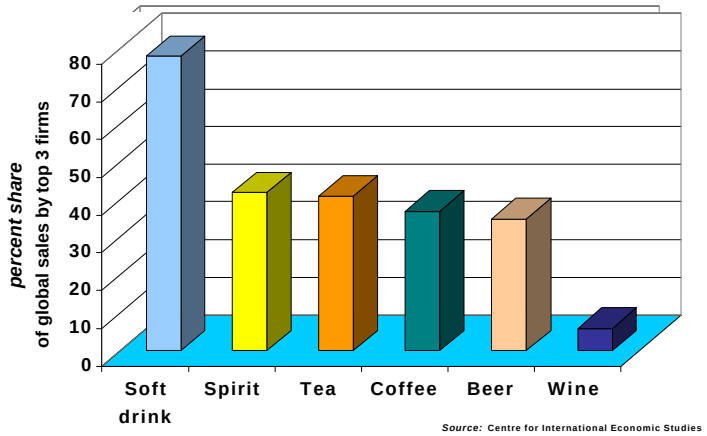
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Australia's two major markets …



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Global expansion?? …



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Threats

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Threats?

The competition is hotting up

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Competition? France...

The heads of France's leading trade institutions asked the Minister of Agriculture to "stop talking and get down to making changes".

- Authorise blending under the label 'Varietal wine from French regions'
- More liberal winemaking techniques such as use of oak chips
- Proactive branding policy
- Consumer-driven research and innovation

La Journee Vinicole, Feb 2003

Australian Wine and Brandy Corporation

Competition? Bordeaux ...

" lack of freedom … can be surmounted by … more regional basis …greater freedom to adjust supply and demand … in the same way (our) leading competitors run their industries"

Bordeaux wine trade board, La Journee Vinicole, Oct 2002

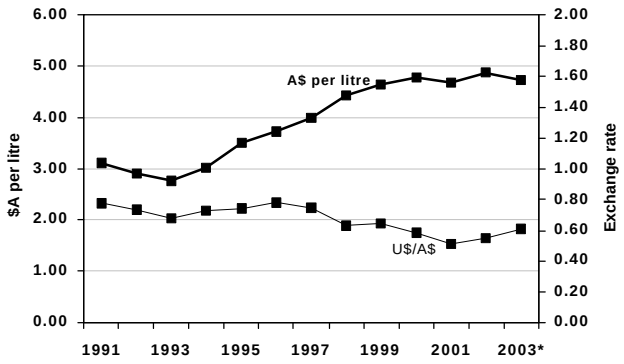
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Threats?

Exchange rates?

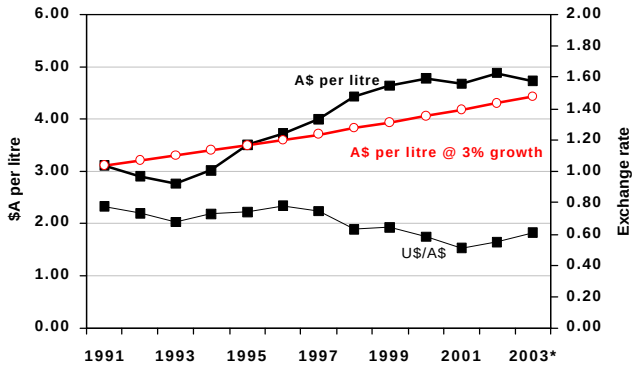
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Threat? Exchange rates?? ...



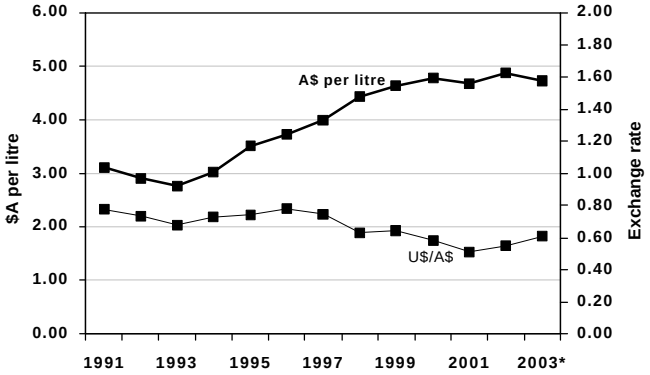
Australian Wine and Brandy Corporation

Exchange rates?? ...



Australian Wine and Brandy Corporation

Exchange rates?? ...

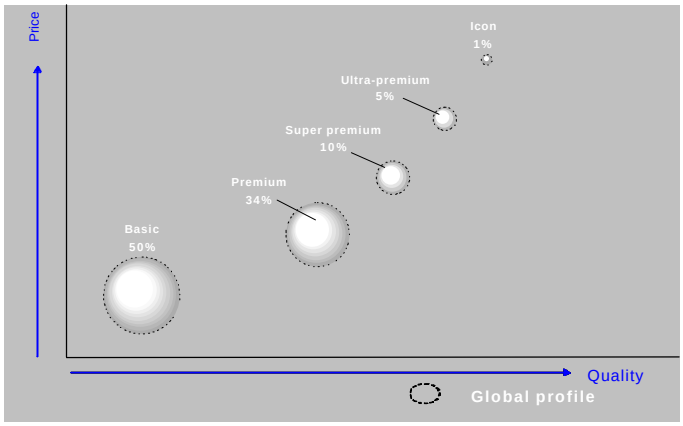


Australian Wine and Brandy Corporation

Where do we want to be?

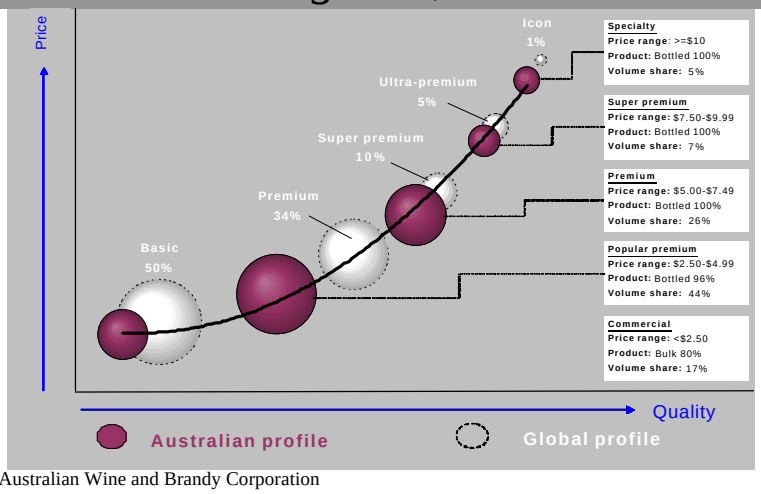
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Global wine categories ...



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Global wine categories, where to? ...

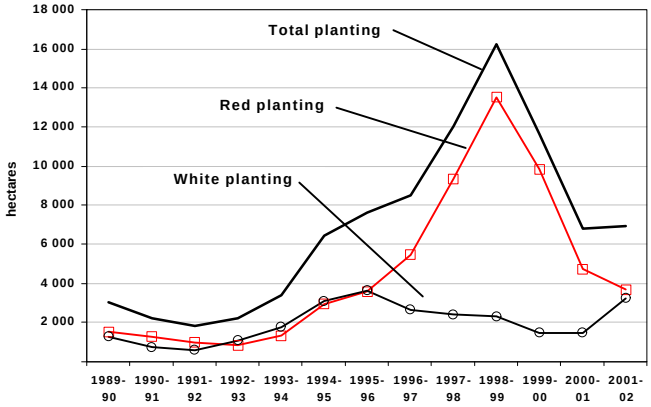


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Where are we headed?

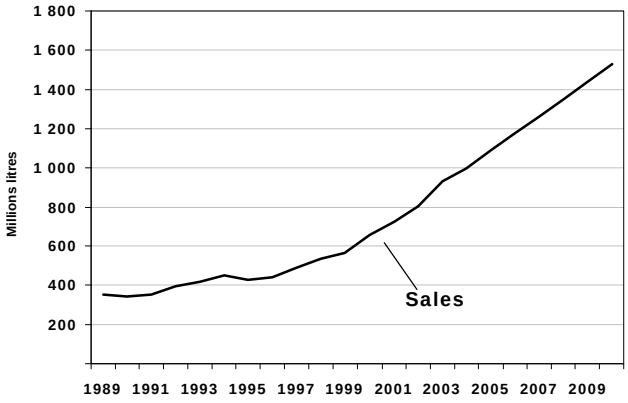
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National planting history ...



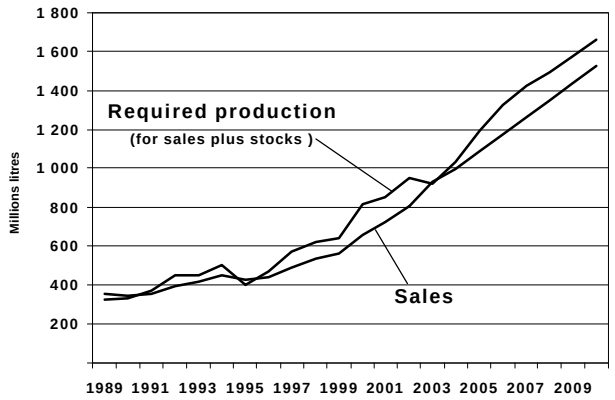
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Supply and demand balance??



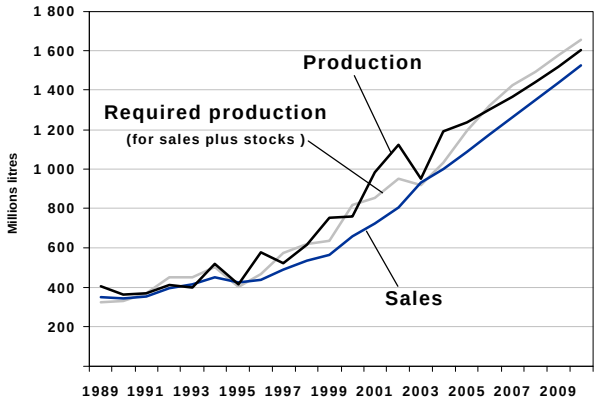
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Supply and demand balance??



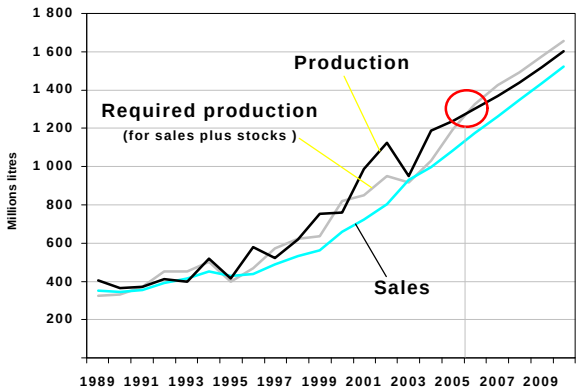
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Supply and demand balance??



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Supply and demand balance??



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In summary ...

- *Australia's advantages are still in place*
- *Major short-term pressures*
  - *– Margins squeezed, small-medium in survival mode*
- *Long-term pressures – need to keep ahead*
  - *– Competition to intensify*

Our industry is based on cycles and seasons

- *– Short-term versus long-term –premium the key*

Australian Wine and Brandy Corporation

CASE STUDY: WINDOWRIE ESTATE

Presentation by David O'Dea, Windowrie Estate

Brief History – Started 1988 with 12 Ha and now own or manage over 250 Ha.

Winery Built – 1999 – 2000 tonnes
2000 – 4000 tonnes
2001 – 5500 tonnes

Marketing Opportunities: Strongly biased towards export and therefore we look at individual markets and ask, what do you want from the Australian Wine Industry. The answers to this question are as varied as the countries to which you are trying to export.

In our particular case I could use examples:

1. U.K. Chardonnay and Shiraz are still king but they are prepared to try other varieties and actually look for them e.g. Cabernet and cabernet Merlot in the reds and Sauvignon Blanc and Verdelho in the whites.
2. Asia on the other hand leans strongly towards red wine but not totally dry, their palates still demand sweetness in the wine.

The golden rule is to have a good product in good packaging. The classic example of this is the meteoric rise of Casella's Yellow Tail from 25,000 cases two years ago into the U.S.A. to 2.3 Million cases last year and potentially 4 Million cases this year.

Don't write off the domestic market especially if you are a boutique producer. Again look at you markets needs. Example N.S.W. and Victoria, more tried and true varieties. Queensland temperature does have an effect on their wine drinking habits – we sell much more light reds chilled and fruit driven whites e.g. Sauvignon Blanc or Verdelho in Queensland than we do in the southern states.

Our grape sourcing at this point in time is all from our own region with small quantities coming from a vineyard we have in the Gilbert Valley next to the Clare Valley in South Australia. We obtain Riesling and Cabernet from this cooler area. The Riesling stands alone while the Cabernet is blended with our own Cabernet to give a boarder structure to the wine. Without doubt every region has its strength and weaknesses. I believe it is important to devote some of our expenditure to trialling new varieties.

Investment in vineyards was very strong in the last few years of the 90's and then petered off but the last twelve months has seen a resurgence particularly for those varieties (e.g. Chardonnay) which five years ago were considered over supplied.

Regionalisation is having a useful and positive influence on the sale of both grapes and wine.

1. Grapes: As the broad industry knowledge of which region produces the premiums in certain varietals so these varieties are especially sought out in that region. On the other side varieties that don't do well in a region generally have little demand e.g. Cowra with Chardonnay being a big positive and Riesling being a tough call.
2. Wine: In both the export and domestic markets wine retailers are becoming much more influenced by the regionally of the wine, maps of Australian wine regions in many outlets in Europe, (seen during a recent visit).

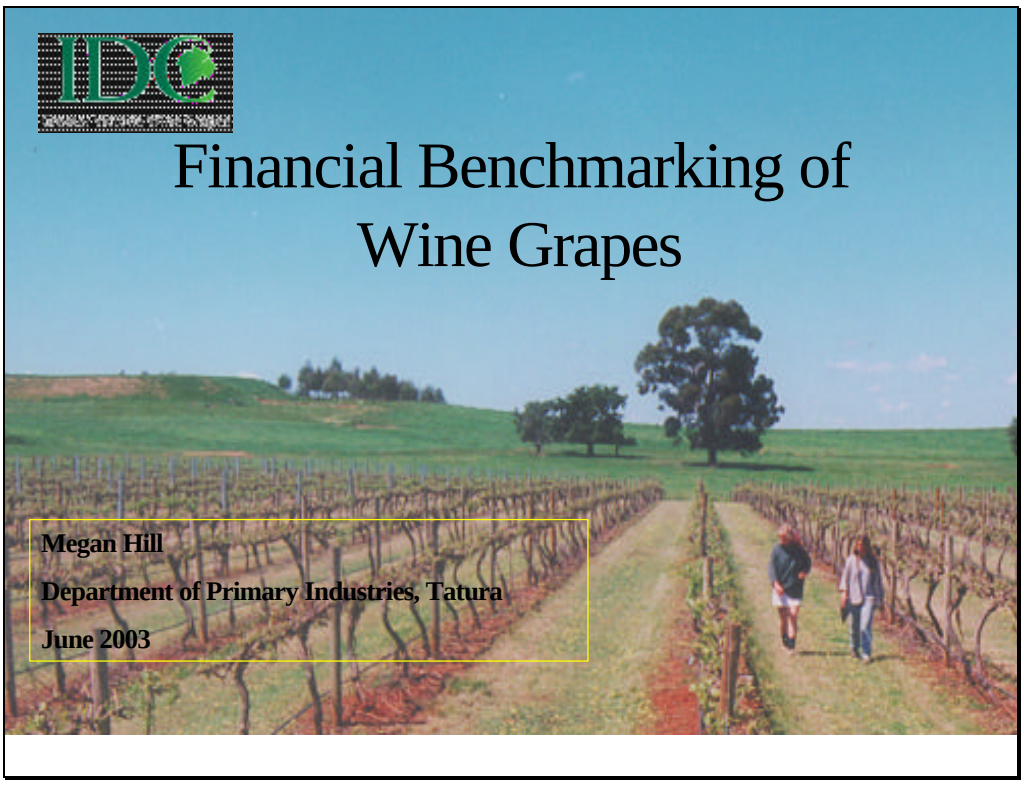
Diversity examples that work are zone wines e.g. Central Ranges i.e. Cowra, Orange, Mudgee and as mentioned earlier our blending of wine from the Gilbert Valley in South Australia with our Cowra wine to broaden the dimensions of the wine.

Processing capacity within our own region has also become a major factor in the overall improvement of wine quality especially our ability to get white grapes into the press within hours of harvest versus 4-10 hours in a skip on the back of a semi after enduring the hot part of the day in February, March does disservice to the grape grower. Skin contact, warm machine harvested grapes and maximum air contact all detract from what the grower has worked hard at for the previous twelve months. Phenolics becomes a big problem when the juice of white wine has extended contact with the skins and in removing these excessive phenolics during the wine making process other positive flavours are also stripped from the wine.

Finally: yields do affect quality but this has to be looked at in conjunction with trellis type, canopy management and many other viticultural practices that most of the top viticulturists in our industry today are now putting into practice.

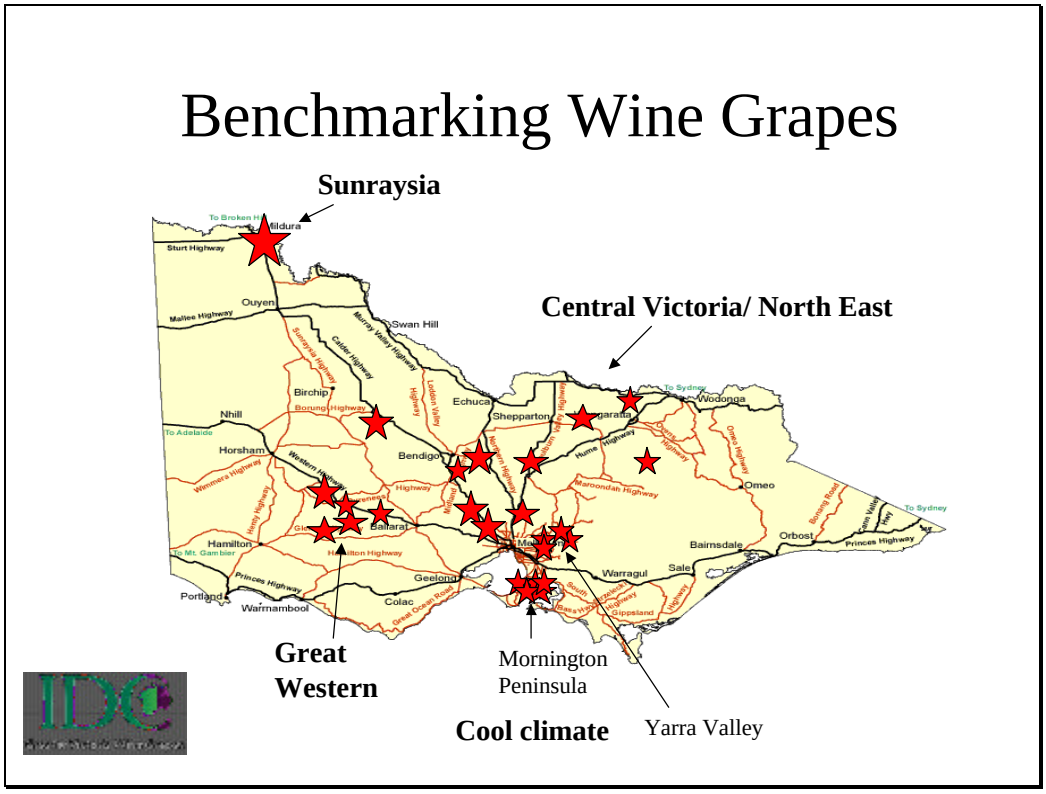
THE COST OF WINE GRAPE GROWING

(Megan Hill, Department of Primary Industries, Victoria)

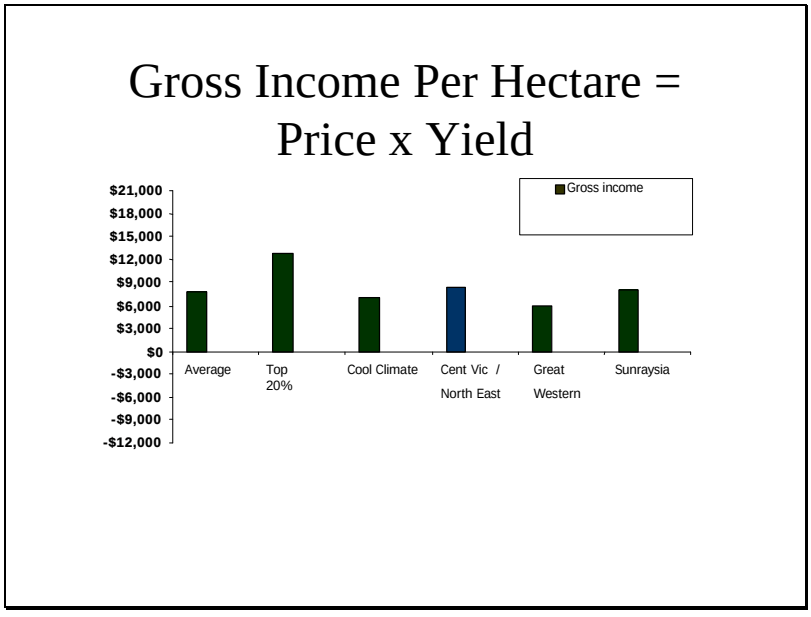


What is Benchmarking?

- Business improvement tool
- Often linked with financial management
- Compare performance of blocks of vines, varieties or vineyards on or off farm
- Used to identify where performance is strong or improvements could be made
- Collect ideas and suggestions on how vineyard businesses could be improved

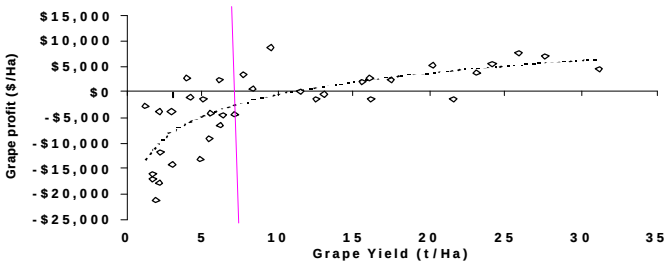


DPI has been running benchmarking for 5 years. The 2001/02 results have also been supported by the GVWGIDC.
Each star represents participating vineyards(except Sunraysia which represents 16 vineyard). This is a total of 39 vineyards representing 938 ha of bearing vines.
This information gives only a snapshot of what is happening in the Victorian industry, it has not been statistically designed or analysed.



The top 20% are the high profit 20% of the sample. These vineyards are the same ones throughout this talk. Many of them are from Sunraysia. The top 20% have a gross income of $13,000/ha. The sample average$7500.

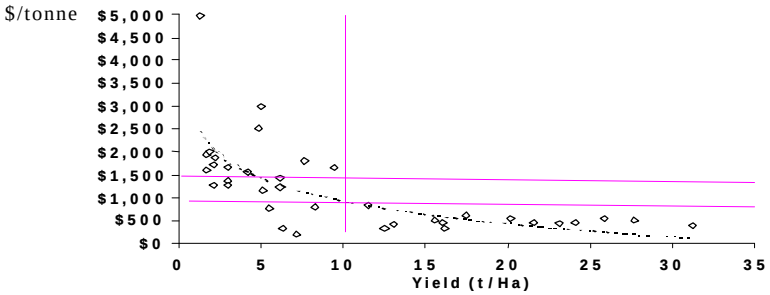
Profit (Income- Costs) v Yield



HIGHER YIELD = HIGHER INCOME

This graph indicates that at less than 7 tonnes/ha it is hard to be profitable.

Price v Yield (2001/02)



THERE IS A RELATIONSHIP BETWEEN PRICE PER TONNE AND YIELD

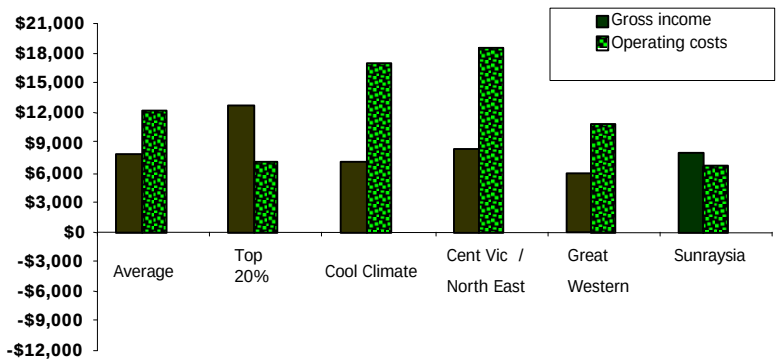
This data may be a little distorted by fixed price contracts.
However it shows us that at yields above 10t/ha do not receive more than $1000 per tonne. At prices over $1500 per tonne, no one is cropping more than 10t per hectare.

No-one is receiving high tonnage and high prices.

OK!

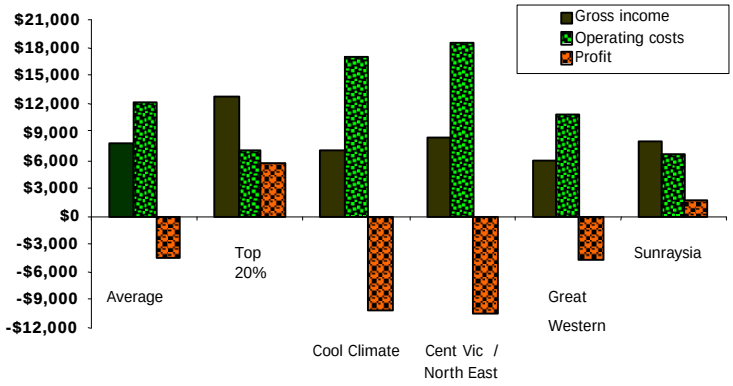
- Vineyards in the sample generally not showing high profits (drought year?)
- Yield is closely related to profit
- There is a relationship between yield and price

Operating Costs Per Hectare

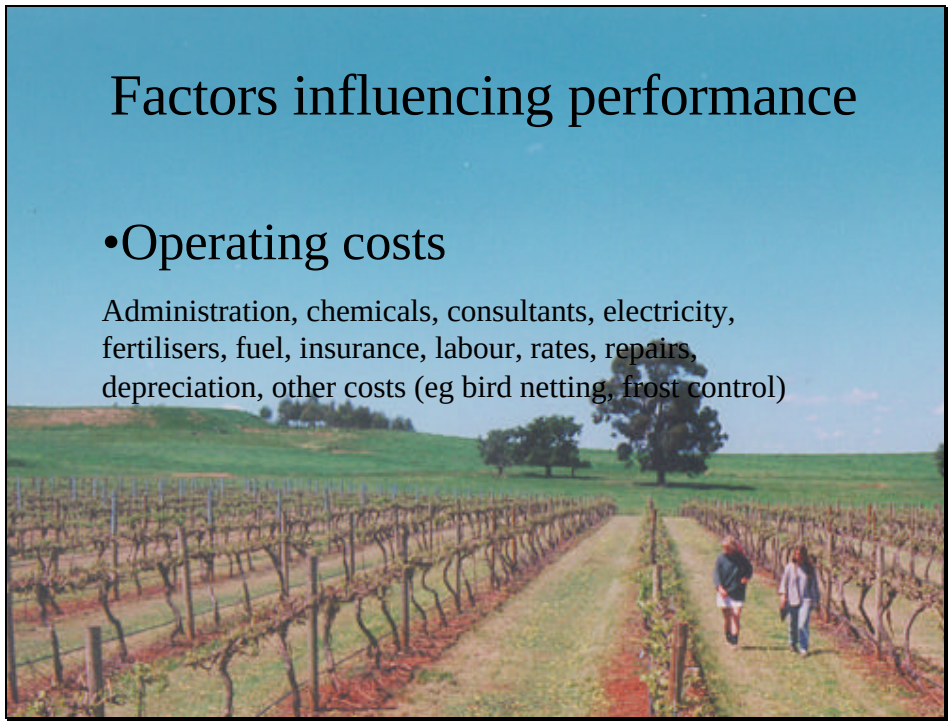


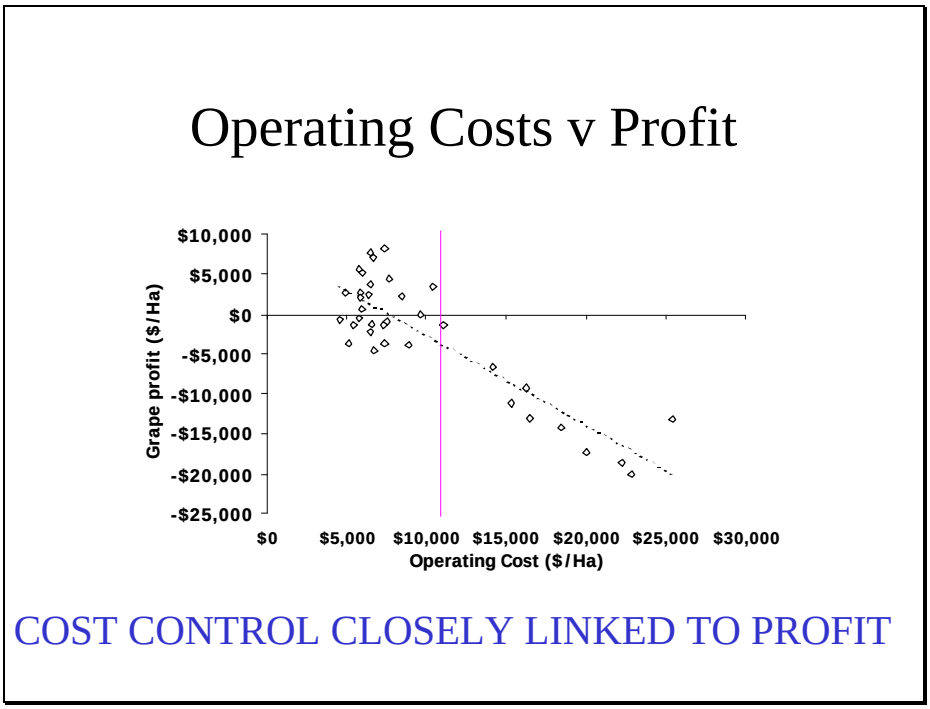
The average operating costs for the sample are $12,000/ha. The top performers are spending $7,000 per ha. There is some variation between the regions.

Profit Per Hectare



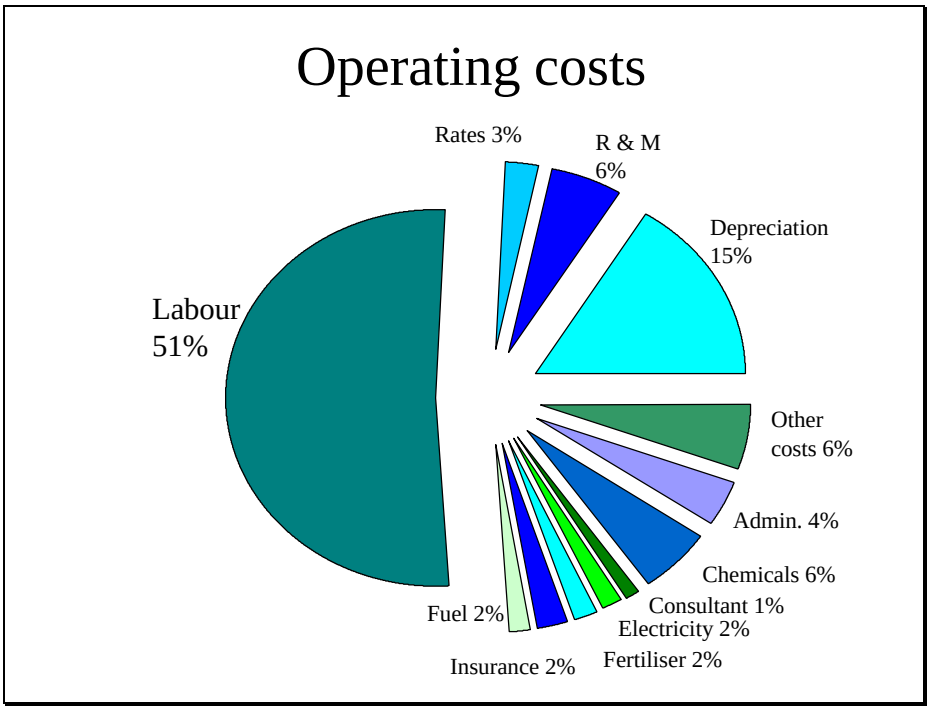
The average loss is $4370 per ha or $1780 per tonne harvested.
The top 20% performers are making $6000 per ha.
Generally 2002 season was hard, however the results of our benchmarking over the years shows that there is always a significant sector of the industry that is non profitable for one reason or another.



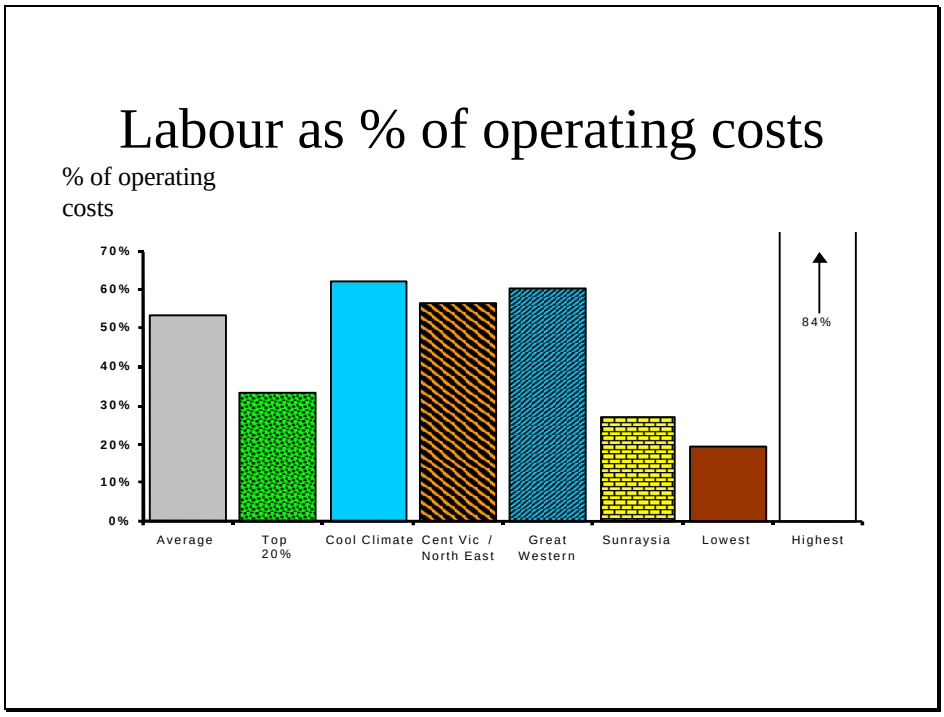


The profitable vineyards have operating costs between $6000-8000 per ha. It is hard for any vineyard to be profitable if their operating costs are $12000.

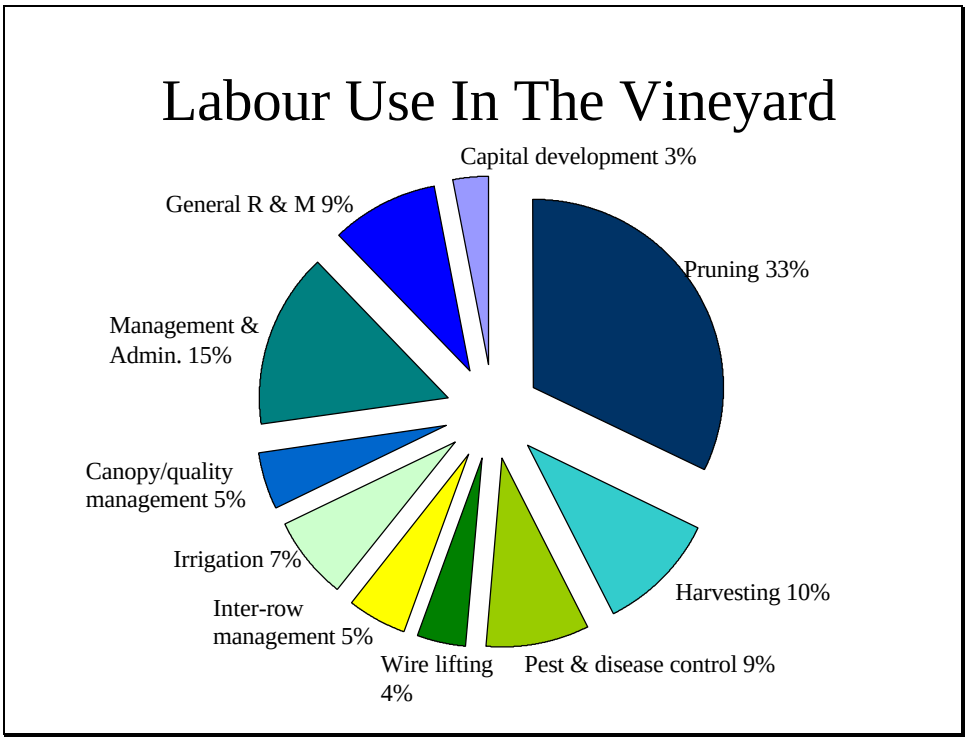
The vineyards down the bottom of that graph are probably small and would be using a lot of owners labour which we value at $45,000 per annum.



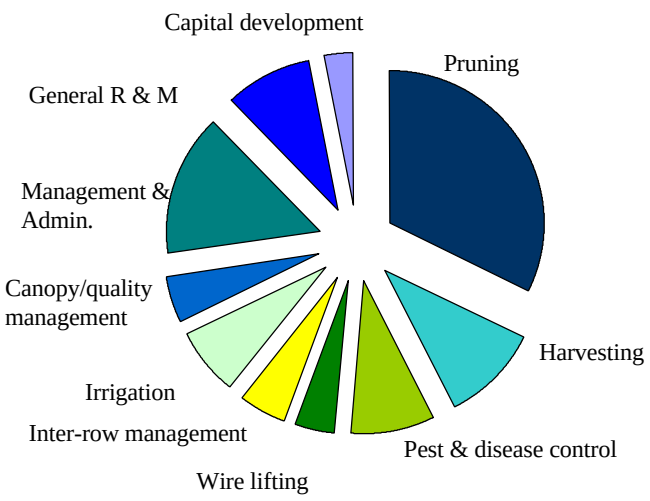
Labour= owners labour, permanent and casual staff and contractors.



Note the large variation between the central regions and Sunraysia.

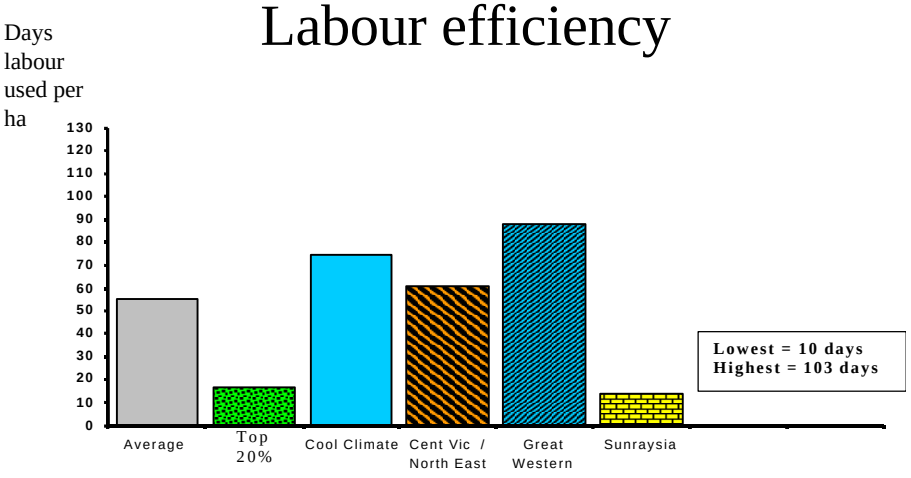


Labour Use In The Vineyard



	$/ha
Capital development	$1,970
Pruning	$761
General R & M	$636
Management & Admin.	$404
Canopy/quality management	$426
Harvesting	$278
Irrigation	$546
Inter-row management	$583
Pest & disease control	$404
Wire lifting	$269
	Total $6,277

Labour efficiency



OK

•After income, managing operating costs is the most important factor in a profitable vineyard

•Labour is the largest operating cost (average 51%)

•Pruning is the largest labour cost (average 33% or $1970/ha)

•There is a large difference in labour efficiency between regions

Characteristics of high/low profit vineyards- 2001 vintage

Characteristic	**Low**	**High**
Size (ha)	23	42
Yield (t/ha)	4.7	10.7
Price per tonne ($)	1777	1602
Income $/ha	8422	17,159
Costs $/ha	17,493	12,130
Includes depreciation and 8% charge on capital		
Profit $/ha	**-9072**	**5030**

What will the future bring? ……..the next five years

Higher prices paid for fruit?

Increased demand?

Will inputs and labour get cheaper?

More likely customers will demand:

•Yield reductions

•Increases in quality (higher labour costs?)

•Prices will stay stable or fall

Where can vineyard performance be improved?

Income

•increase yield

•increase quality

Managing costs

•know where costs are occurring

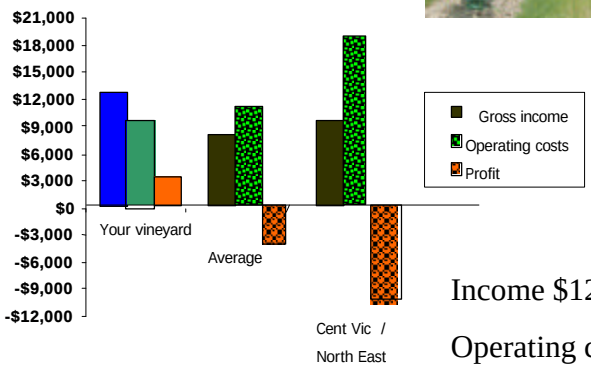
•identify if they can be reduced

•think strategically and objectively about your business

Value adding

A medium to large vineyard-





Income $12,000/ha

Operating costs $9,000/ha

Profit $3,000/ha

Currently……

Large vineyard- economies of scale

Outsource to contractors (saves $150 per ha)

Highly mechanised

Monitor labour use

Spreadsheets for budgeting, monitoring progress and costs

Monitoring labour

Date

Job

Person Hours

Person

Section/rows

Vineyard block- hours worked Shiraz/ Chardonnay/ Merlot/ Riesling

Tractor/ implement

Tractor hours

Comments

Monthly labour summary

	Month				
Item	Shiraz	Chardonnay	Merlot	Riesling	Total
Canopy lifting					
Canopy trimming					
Disbudding					
Fertiliser application					
Frost control					
Grafting					
Harvest, other					
Harvest, picking					
Irrigating					
Irrigation, fertigation					
Irrigation, installation					
Monitoring P&D					
P&D control, birds					
P&D control, other					
P&D control, spraying					
Planting vines					
Pruning, contractors					
Pruning, other					
R&M General					
R&M Irrigation					
R&M Machinery					
R&M Trellis					
Replanting grapevines					
Soil preperation					
Soil testing					
Staff development					
Trellis installation					
Vine training					
Weeds, hand/mechanical control					
Weeds, spraying					
Total					

If vineyard income was going to be reduced by 15%…...

- Use more contract labour
- Look at fine-tuning layout for new vineyard planting
- 12-15 hour days to utilise machinery
- Increase mechanisation further- wire lifting?
- Precision viticulture
- Dual use of machinery

Inefficiencies in the vineyard (Di Davidson)

- Over spraying- calender sprays
- Leaf plucking, thinning fruit $300-500/ha
- Poorly calibrated spray equipment
- Older machines
- Poor timing in the vineyard
- Matching fertilisers to vine needs- petiole tests
- Machinery- share or lease

Case study- Pruning in Great Western (labour management)

Currently costs $1.00 per vine to prune

Other regions cost $0.50 per vine

$825 difference per hectare

Case study- Pruning in Great Western (labour management)

- Pre-pruning
- Pneumatic or electric secateurs
- 2 or 3 pruners per group. 8 to a supervisor
- Keep tally of vines per pruner
- Dynamics male and female, age of staff
- Optimise training
- Retain skilled staff

In conclusion

•The main factor in achieving high income is high yield. Another is cost management

•Management of labour presents the largest opportunity for cost reduction

•An efficient system for collecting, sorting and retrieving useful information is essential

•Objective and strategic thinking is necessary for good business management

•Benchmarking helps identify opportunities to improve business performance

Tomorrow in your vineyard….

Start keeping track/ thinking about, labour use

"Farming is getting more competitive and the input costs get higher and the prices for produce get lower.

To overcome this we need to pay attention to detail and work smarter."

Peter Chambers, Rutherglen



Thanks

Andrew Patterson- Patterson Rural Business Management

Greater Victorian Wine Grape Industry Development Committee

Charles Thompson- Rendell McGuckian Management Consultants

Benchmarking participants- especially for the case studies!

Keith Leamon, John Whiting- Department of

Primary Industries

For further information...

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Wendy Sessions (03) 5833 5315

A comprehensive report on this project will be available August/ September 2003.

COST OF QUALITY – Can growers afford NOT to deliver

Dr. M McCarthy , Senior Scientist Viticulture
SARDI Nuriootpa

(These notes are based on the powerpoint presentation delivered at the seminar and associated comments. They are not intended to represent a structured manuscript.

Its Your Future

- No future for everyone in bottom end. There probably will be a continuing, albeit reducing demand for fruit in this quality bracket however even in this category there will be an ongoing requirement to improve quality.
- Not everyone should strive to produce Super premium or Icon Wines as the market is small & demanding of quality
- Therefore each winegrape grower will need to decide what price/quality segment they want to target

What influences wine quality in the vineyard?

- **Berry colour ?**
- **Yield ?**
- **Berry size ?**
- **Ripeness ?**
- **Time of harvest ?**
- **Botrytis ?**
- **Site ?**
- **Clone/Rootstock ?**

Is there a relationship between yield & wine quality across a region ?
Data collected from a number of Shiraz vineyards in the Riverina indicate that there is no strong correlation between yield per hectare and final wine grade (Figure 1). Similar data has been collected in other regions suggesting that across a grape growing region limits on production per ha should probably not be imposed as a means of manipulating wine quality.

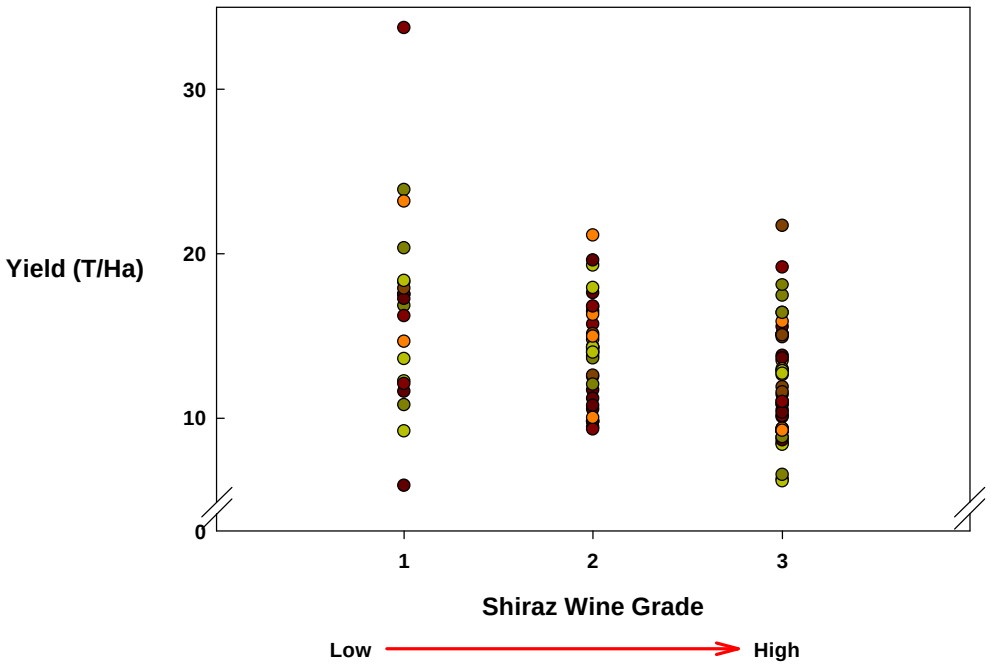


Figure 1 Range in yield of Shiraz vineyards in the Riverina for each of three final wine quality categories

What can I afford to grow?

As there is a range of yield for each final wine grade it is clear that severely restricting yield in the belief that it will improve wine quality needs to be carefully examined. It may be that producing higher yields of lower grade fruit may be more economically viable (Table 1).

	Grade 1		Grade 2		Grade 3	
	T/Ha	Income/ Ha	T/Ha	Income/ Ha	T/Ha	Income/ Ha
Min	6	1800	9	4500	6	4200
Average	17	5100	14	7000	11	7700
Max	34	10200	21	10500	22	15400

Table 1 Income per hectare of the lowest, average and highest yielding vineyard in each final wine grade calculated using $300, $500 and $700 per tonne for Grade 1,2 & 3 respectively.

What tonnage of each grade fruit must I grow?

The data in Table 2 can be graphically represented (Figure 2) to indicate the required tonnes per ha required at each value to cover the cost of production. In this example the annual operating costs have been set at $6000 per hectare, which in some situations with high labour costs is conservative. Higher operating costs will mean higher yield &/or higher value fruit will be needed.

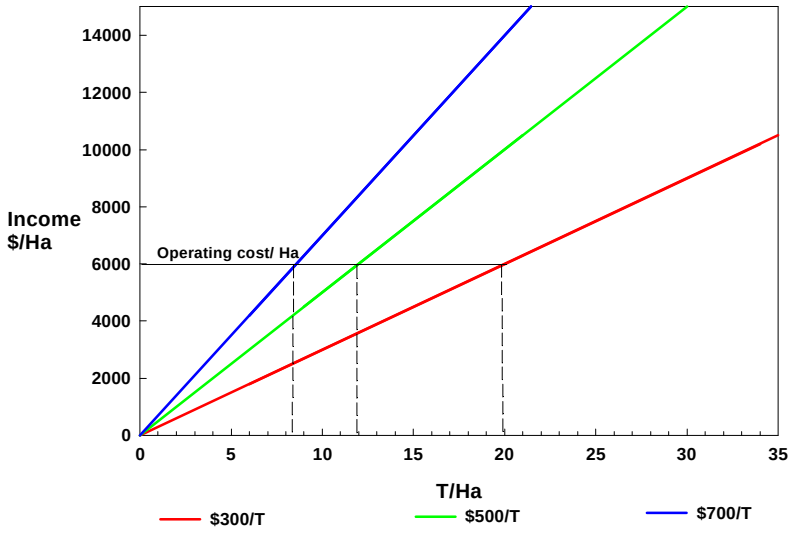


Figure 2 Income per hectare for Shiraz grapes at three prices for a range of yields indicating critical yields necessary to cover the cost of production per hectare.

How can fruit quality be improved?

There is general recognition that the key to improving or maintaining fruit and hence wine quality is correct vine balance, ie the balance between vegetative growth and crop level. Vine balance can be changed either by altering the yield (or its components) or by canopy manipulation through, for example, irrigation, nutrition, rootstock, pruning, trellis etc. The aim is to produce physiologically ripe fruit at harvest. Often growers think that the only way of changing vine balance is to reduce yield, however this may not always be the most economically viable means of achieving this.

Is there a relationship between yield and wine colour across a region?

It was previously shown (Figure 1) that there does not appear to be a strong correlation between yield per ha and final wine quality across a region such as the Riverina. This is probably due to the lack of a significant correlation between berry colour (mg anthocyanins per g berry wt) and yield (Figure 3). It is generally accepted that in the warm irrigated regions berry colour is a reasonable indication of final wine quality, and if correct, data in Figure 3 suggests that adequate colour values can be achieved over a wide range of yields.

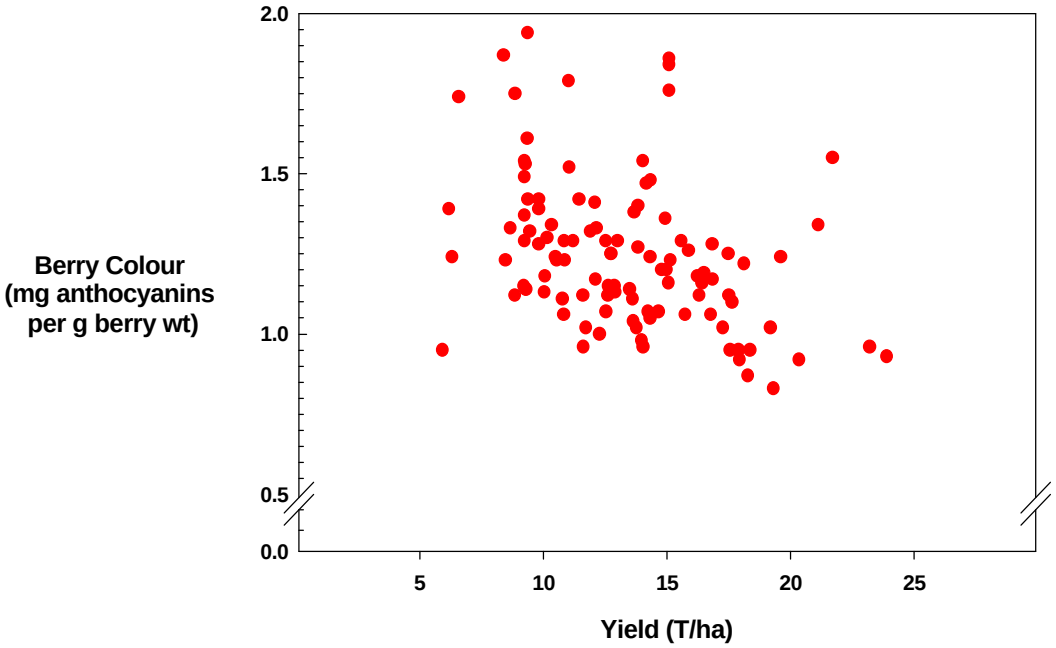


Figure 3 Relationship between berry colour (as mg anthocyanins per g berry wt) and yield (T/Ha) of Shiraz vineyards in the Riverina

Effect of crop removal on yield, wine quality & income

Previous data indicated that across a region there is no strong correlation between yield and wine quality. However, within an individual vineyard there probably is. To test this hypothesis a range of yields within a clonal Shiraz planting was achieved by a combination of irrigation and pruning techniques. Yields ranged from about 5 to 20 T/ha (Table 2). At each crop level bunch thinning was carried out at veraison by thinning to one bunch per shoot.

	Control	Thinned
Crop level 1	5.5	3.9
Crop level 2	15.2	10.0
Cop level 3	19.7	12.6

Table 2 Yield (T/ha) of Shiraz vines at three cropping levels achieved by additional irrigation and lighter pruning and yield following bunch removal.

Results

Crop removal on crop levels 2 & 3 resulted in a significant increase ^{o}Brix and wine colour density at harvest, however, crop removal on the lowest cropping level caused a reduction in ^{o}Brix and wine colour density (Figures 4 & 5). Across all treatments there was a close correlation with yield indicating that within an individual vineyard crop removal may be a management option to improve quality

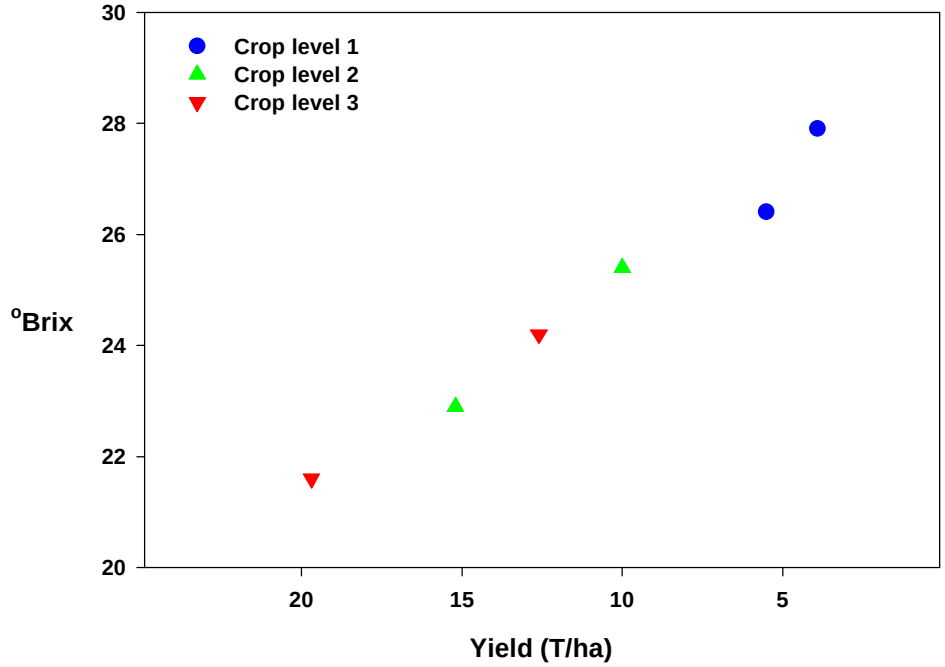


Figure 4 °Brix at harvest of vines at a range of cropping levels (note reverse scale)

However, what additional income is necessary to compensate for the reduction in yield/ha? Based on assumed base prices ranging from $250 to $1000 per tonne for the cropping levels in Table 2 the fruit must attract between about $100 to $560/T (Figure 6) to compensate just for the loss in crop and without including the cost of crop removal by hand or machine. Clearly the cost of crop removal in an attempt to improve quality must be carefully considered.

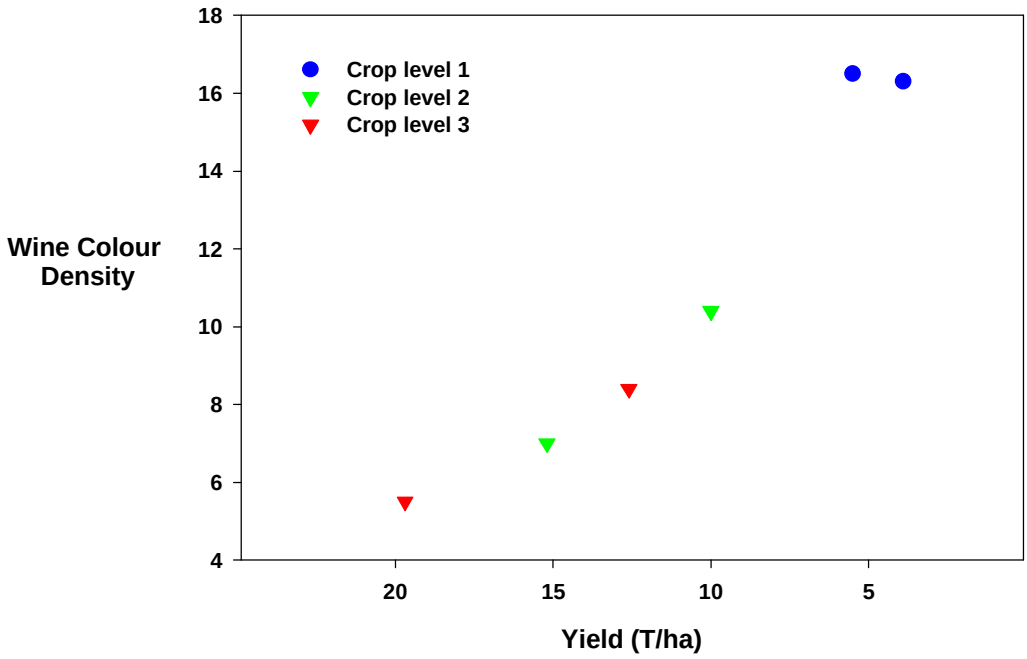


Figure 5 Wine colour density of Shiraz wines made from fruit of vines from a single site at a range of cropping levels achieved by a combination of irrigation, pruning and bunch removal.

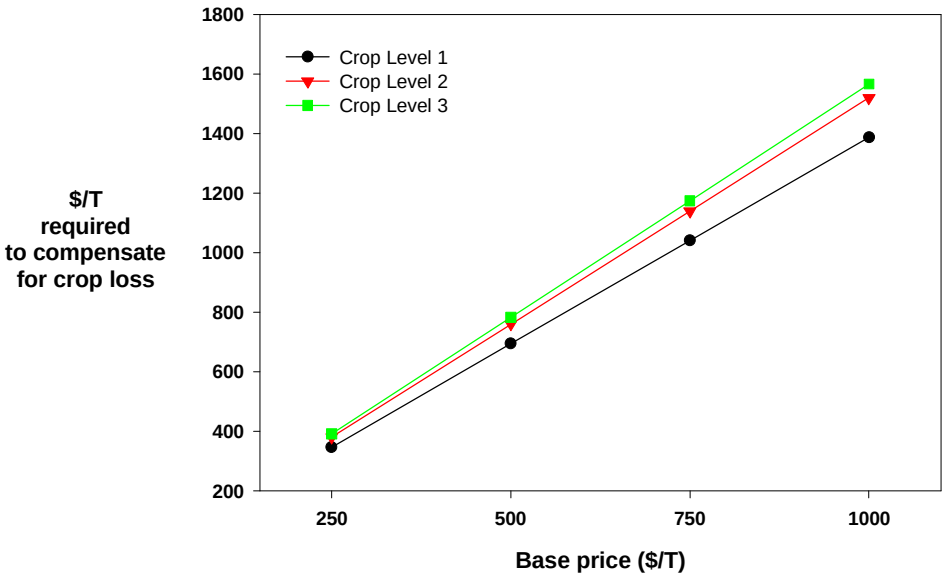


Figure 6 Dollars per tonne fruit required to compensate for yield loss from crop removal at a range of base prices.

How important is berry size?

There is a widespread belief that smaller berries will result in higher wine quality, in particular for Shiraz. This is partly supported by data presented in Figure 7, which suggests that grade 3 wines tend not to be sourced from vines with berries heavier than about 1.2 g at harvest. In some Shiraz vineyards berry weights at harvest are significantly heavier than 1.2g indicating that perhaps a reduction in berry size will result in higher grade wine. Regulated Deficit Irrigation (RDI) is commonly used to reduce berry size, however, the challenge is to be able to reduce berry size while maintaining an economic yield, perhaps by lighter pruning. Unfortunately there are too many cases where RDI has not been properly implemented and growers have lost income. The most common problem is inadequate monitoring of soil water content during the deficit period resulting in excessive levels of soil water deficit or keeping the vines under water deficit for too long after flowering. The deficit should only be applied between fruit set and veraison and only for sufficient duration to control shoot growth and berry weight increase.

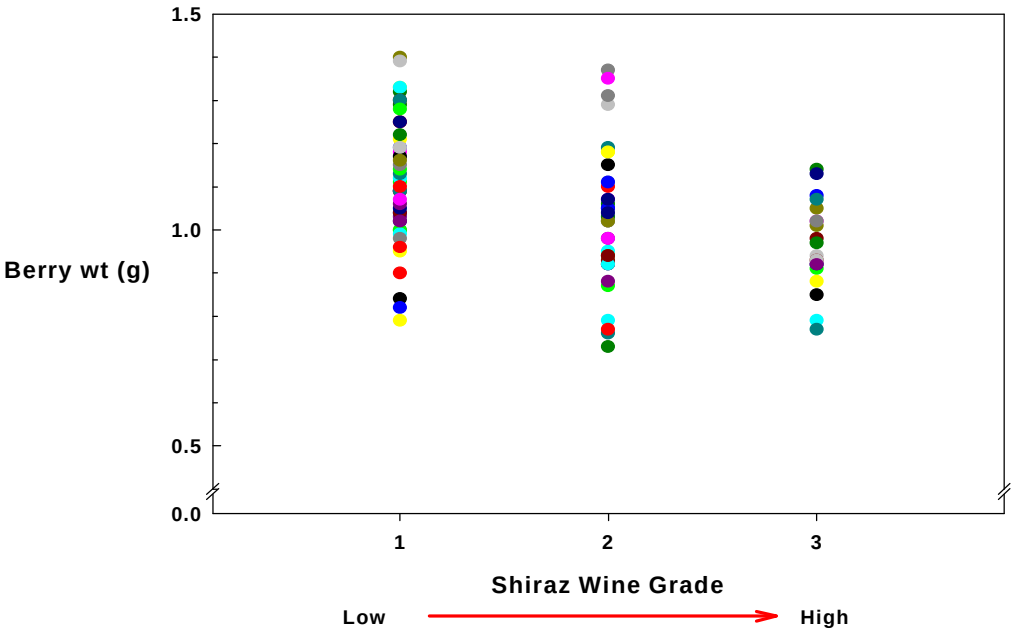


Figure 7 Range in berry wt (g) of Shiraz vineyards in the Riverina for each of three final wine quality categories

How important is ^{o}Brix at harvest?

Grapes of adequate maturity are required to ensure adequate alcohol in the finished wine and for red wines grapes should also have sufficient colour. As there is a close relationship between ^{o}Brix and berry anthocyanin concentration (Figure 8) for Shiraz in warm irrigation districts, in general, if adequate maturity can be achieved the fruit should have acceptable colour. However, as described below, the time taken to achieve adequate ripeness also appears to be critical. The dilemma facing Shiraz growers is the loss in berry weight that commences about 90 days after flowering (Figure 9).

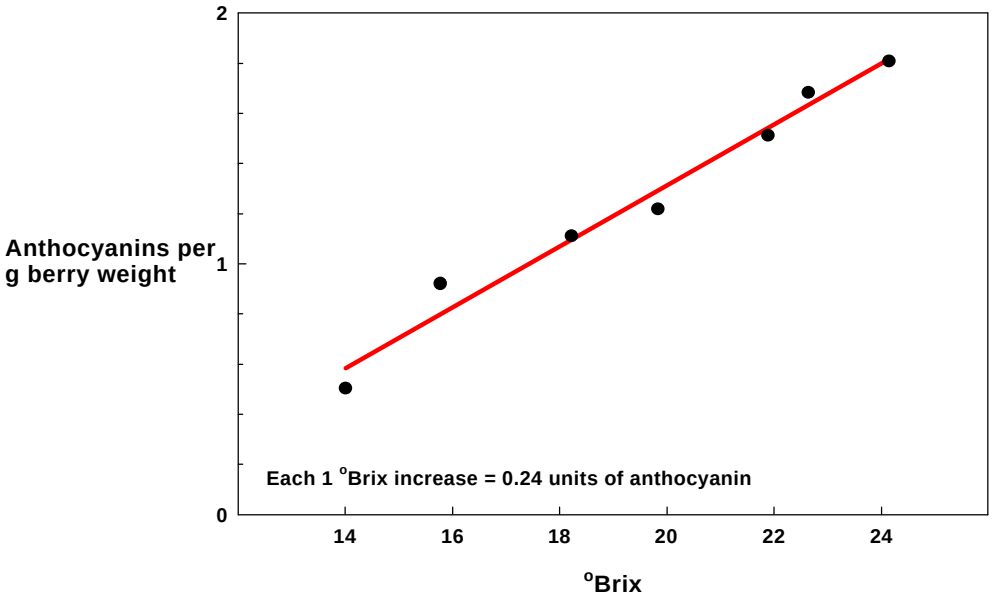


Figure 8 Increase in anthocyanin per g berry weight with increasing ^{0}Brix of Shiraz berries.

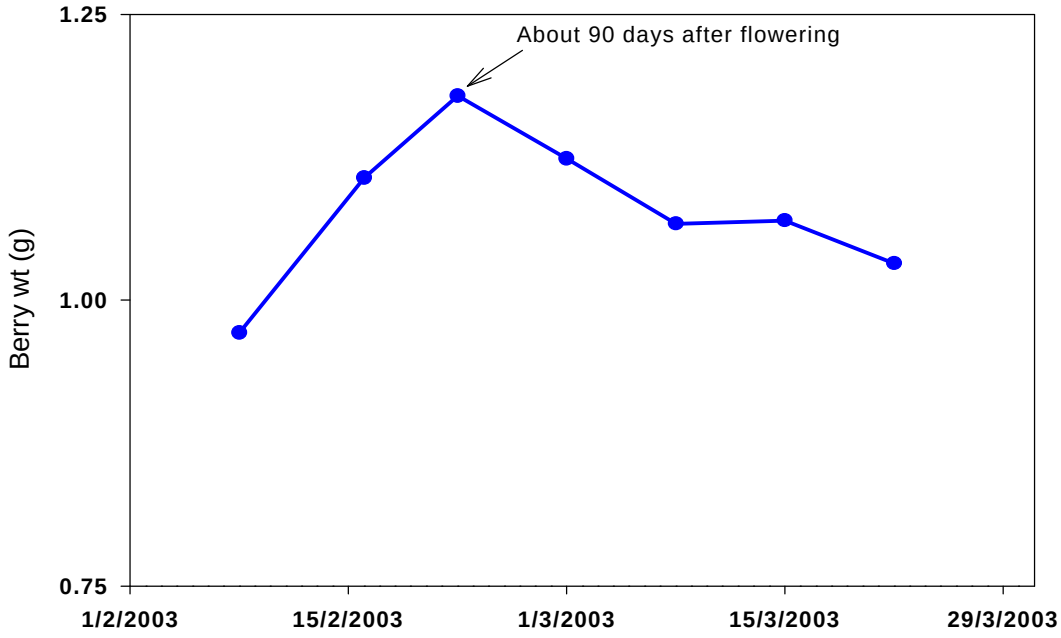


Figure 9 Change in the weight of Shiraz berries from days after flowering indicating loss in weight after about 90 days.

The reduction in yield per Ha due to berry weight can be related to °Brix and in the example in Figure 10 there is a reduction in yield of about 0.27 T/ha for each 1°Brix increase. However, it must be remembered that fruit less than 20-22 °Brix may not be accepted in the future.

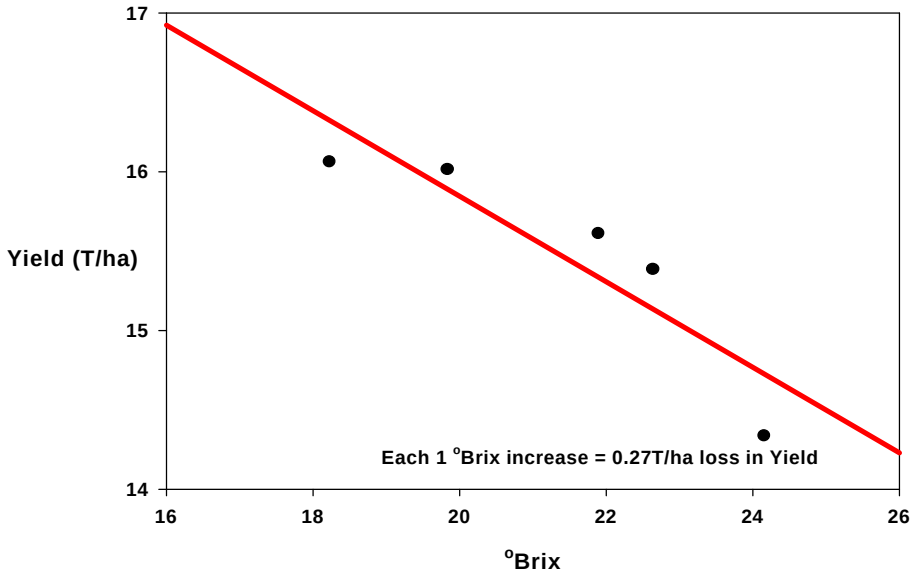


Figure 10 Loss in yield (T/Ha) with increasing maturity of Shiraz berries due to berry weight loss after about 90 days after flowering.

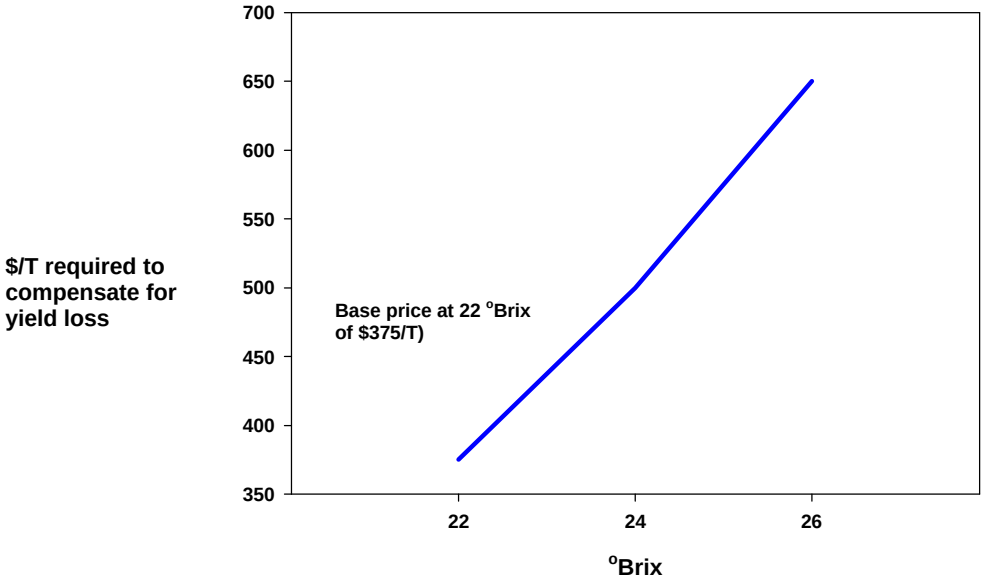


Figure 11 Additional dollars per tonne of Shiraz fruit required to compensate for berry weight loss incurred at higher ^{0}Brix.

In an attempt to compensate growers for the yield loss penalty some wineries have introduced bonus payment schemes and in the example in Figure 11 the additional $/T does compensate for the yield loss incurred in achieving 26 °Brix

Speed of ripening

Balanced vines will result in a rapid and steady increase in ripeness and this is often associated with higher wine quality. Fruit that takes an extended period of time to reach target maturity (Figure 12) in general will not produce wine of the same quality as earlier ripening fruit as during the extended ripening period there may be a further decline in acid, a rise in pH, a concentration of undesirable flavours and perhaps even a loss in colour (Figure 13).

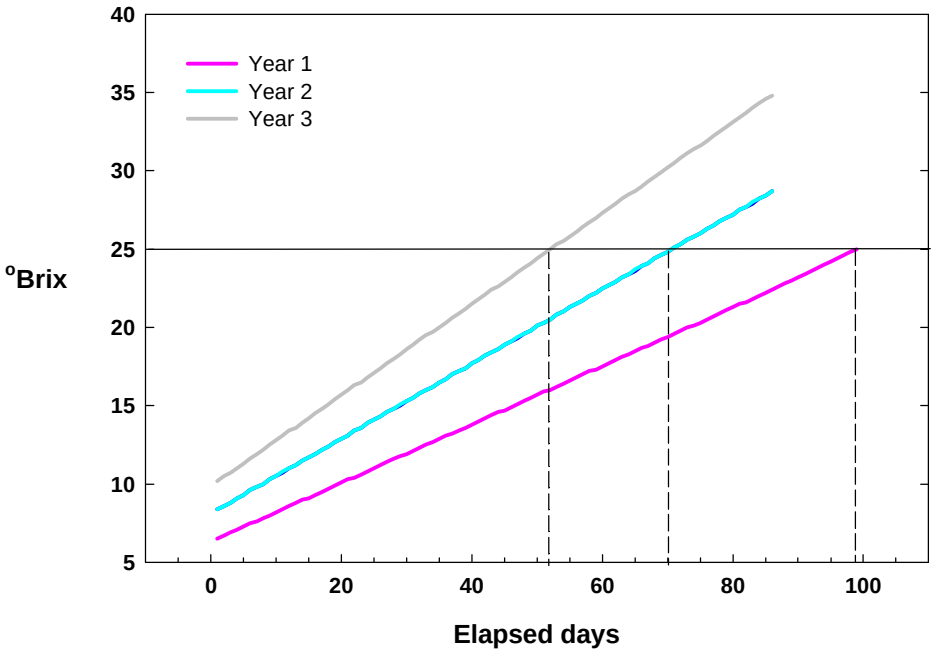


Figure 12 Days after the onset of ripening to attain 25 ^{0}Brix in a single Shiraz vineyard over three successive seasons.

The loss of colour in ripening berries may be due to excessive sunlight exposure and associated heat loading or Botrytis infection. Recent work both in California and Australia has highlighted that under conditions of high light intensity berries may be subjected to excessive light exposure and when this is associated with excessive heating of berries there is a loss in anthocyanin and phenolic concentration. Under such conditions additional fruit shading is needed to protect the fruit.

Botrytis destroys colour even when no spores are visible on the berry. The enzyme laccase oxidises phenolics in the berry and this results in a loss of colour. Laccase in wine will further reduce the colour. Clearly the longer fruit is left to reach target maturity the greater the risk of Botrytis, especially in regions where late summer-early autumm rains are not uncommon. In these situations the cost of flowering & post veraison botrytis fungicide spray is economically justified.

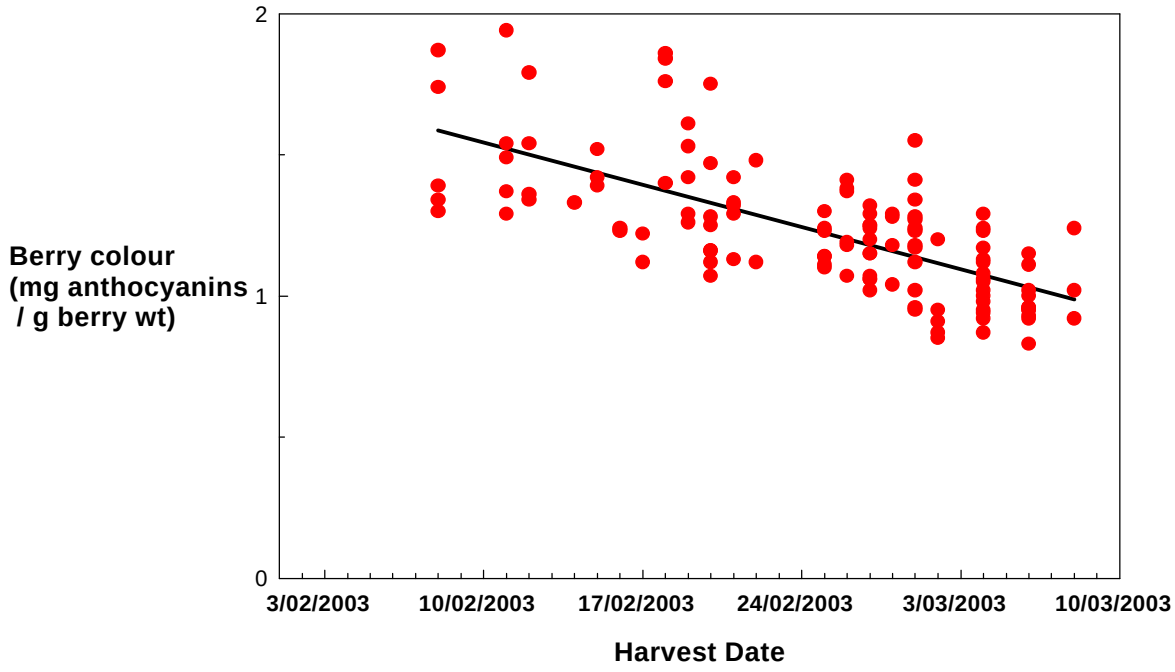


Figure 13 Shiraz berry colour (mg anthocyanins per g berry weight) at a range of harvest dates of selected Riverina vineyards

Summary

- Decide what you want to grow
- Manage the vineyard accordingly
- Monitor vineyard performance through the season
- Soil water monitoring
- What will be the environmental cost if not done
- Disease & pest monitoring
    - Rejection levels may become more stringent
    - Crop development
    - Ripening 'windows' may become a specification

MANAGEMENT TOOLS TO MANIPULATE SHIRAZ QUALITY IN THE RIVERINA

Kerry De Garis, McWilliam's Wines, Griffith

History of project

- A survey of 13 vineyards within the Riverina over the 1999 and 2000 vintages (Holzapfel et al 2000) indicated varying rates of sugar and colour accumulation.
- Variations in yields between 8.74 – 27 T/ha and colour values ranged from 0.50 – 1.2mg/g fw.
- From this initial work a project was developed to assess what affects source sink relationships within a grapevine and what affect by altering these relationships may have on the end quality of the grapes produced.
- Source sink relationships can be described as the movement of sugars within a vine. Sources are termed parts of plants that generate sugars and sinks are those that use them.

2001 Vintage

- One of the initial 13 vineyards from the initial survey was selected on its consistent ripening patterns for both Brix and colour (called Vineyard A).
- At veraison (Jan 6), 5 treatments were applied in a 5 x 5 Latin square design
- The 5 treatments were:
    - 50 % Bunch Removal (every second bunch removed)
    - 50%Leaf Removal (every second leaf removed)
    - Girdling (removal of phloem 25 cm below crown)
    - Girdling + 50% Bunch removal (combination between 2 treatments)
    - Control (no treatments applied)

Bunch Removal

- Removal of bunches (sinks), is seen as a way to reduce higher than optimal yield.
- Crop levels affects berry and cluster size, accumulation of sugar and colour, flavour components and vegetative growth.
- Sugar levels will increase after thinning until a specific fruit load is reached.
- Lower fruit loads have demonstrated an increase in pH, lower TA (titratable acidity) and increase in colour and enhanced wine quality.

Leaf Removal

- Partial defoliation (source) has been shown to increase sugar levels within the berry in some cases.
- This can be due to an increase in the photosynthetic activity of the remaining leaves, remobilization of stored carbohydrates or improved light microclimate.
- Severe defoliation can be detrimental to sugar and organic acid accumulation.
- This is due to the fact that the removal of too many leaves means there are not enough 'factories' to produce sugars
- Reduced anthocyanin accumulation in high defoliation treatments (66%), was attributed to high bunch temperatures.
- Anthocyanin development is highly temperature dependent.



Figure 1. Picture of leaf removal treatment immediately after being plucked (note leaves on ground). Also not the high amount of bunches visible to the naked eye.

Girdling

- The removal of a small strip of phloem
- Prevents the movement of sugars to the roots
- Girdle tends to close over within a short period of time (2-4 weeks)
- Stimulates the production of Absisic Acid (ABA)
- This causes the plant to react by the closure of its stomates, which in turn slows down photosynthesis.
- In the 2001 season the vines were girdled 3 time



Figure 2. Picture of freshly girdled vine (left) and closed over girdle (right).

Sugar Accumulation

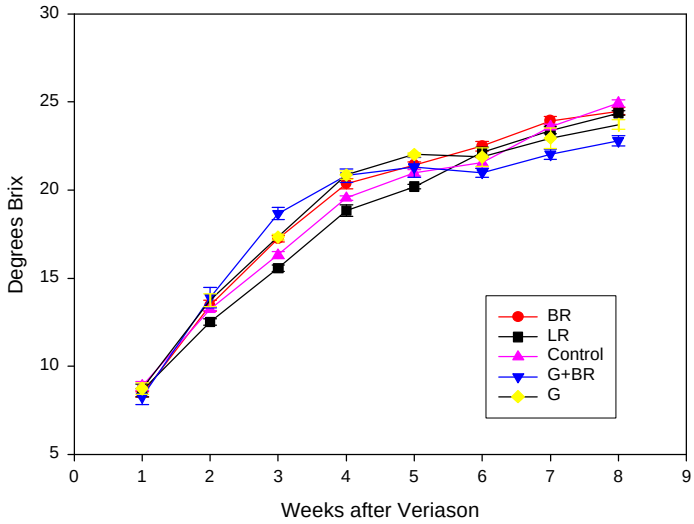


Figure 3. Sugar Accumulation curve for Vineyard A in 2001

- Sugar accumulation in 2001 indicated very little difference between treatments at harvest.
- The control had the highest reading of 24.94° Brix and the girdling + bunch removal the lowest 22.80° Brix

Colour Accumulation

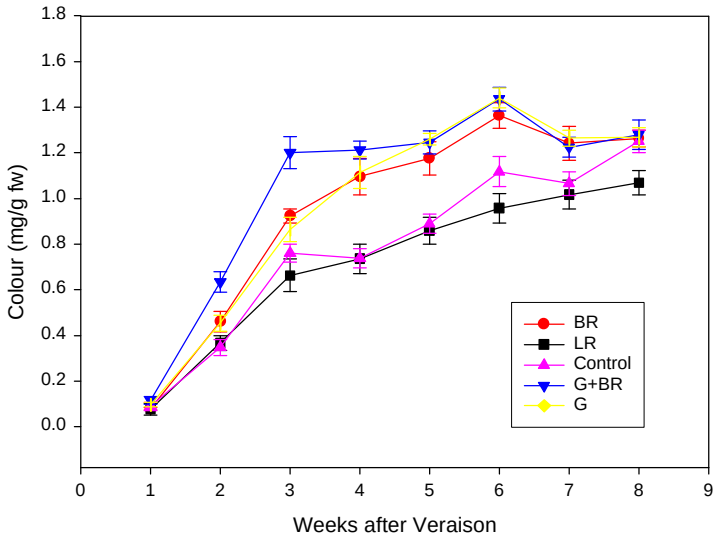


Figure 4. Colour Accumulation for Vineyard A in 2001

- Colour accumulation in 2001 demonstrated no significant difference between treatments at harvest, except for leaf removal.

Yield and Pruning Weights

Table 1. Yield and Pruning Weights for vineyard A in 2001

Treatment	**Yield (kg/vine)**	**Yield (T/ha)**	**Pruning Weight (kg/vine)**
BR	3.52	6.52	1.46
LR	5.19	9.61	1.44
Control	6.17	11.42	1.54
G+BR	3.13	5.79	1.81
G	6.44	11.92	1.88

- Yields are considered low for this vineyard when compared against the district average for Shiraz (15T/ha).
- The higher pruning weights demonstrated in the girdling treatments would suggest a lot of the sugars are moved into the woody structure, possibly as a survival technique.

Photosynthesis

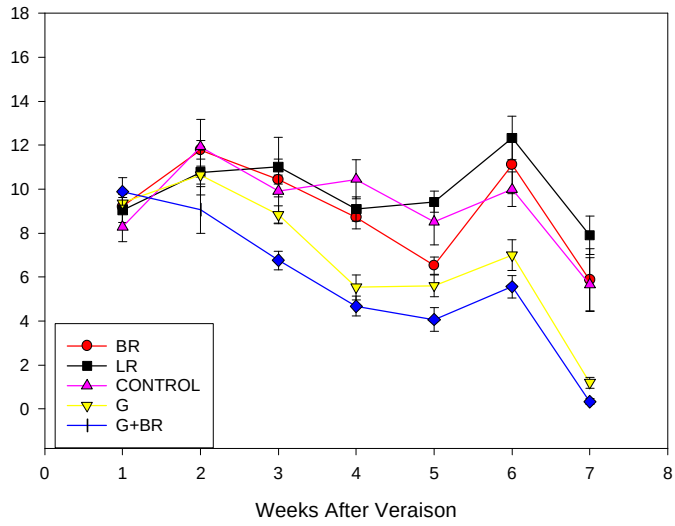


Figure 5. Photosynthesis measurements on vineyard A in 2001

- As mentioned previously girdling does affect photosynthesis and this is demonstrated in figure 5.
- By harvest both girdling treatments are not photosynthesizing at all
- The leaf removal treatment had the highest photosynthesis all though not significantly, and this supports the theory of the remaining leaves being more active.

2001 Conclusions

- Repeated girdling affected photosynthesis and ultimately ripening rates
- It has also been shown to be detrimental to vine health
- The girdling + bunch removal treatment indicated the highest colour readings earlier in the season

- No significant differences between treatments at harvest
- The inconclusive results from the 2001 vintage lead onto the 2002 season to investigate if the trends were a seasonal effect and /or site specific.

2002 Vintage

- Two vineyards were used in 2002
- Vineyard A (same as 2001), and Vineyard B.
- Treatments were applied at veraison (Jan 9), with only one girdle applied.

Sugar Accumulation

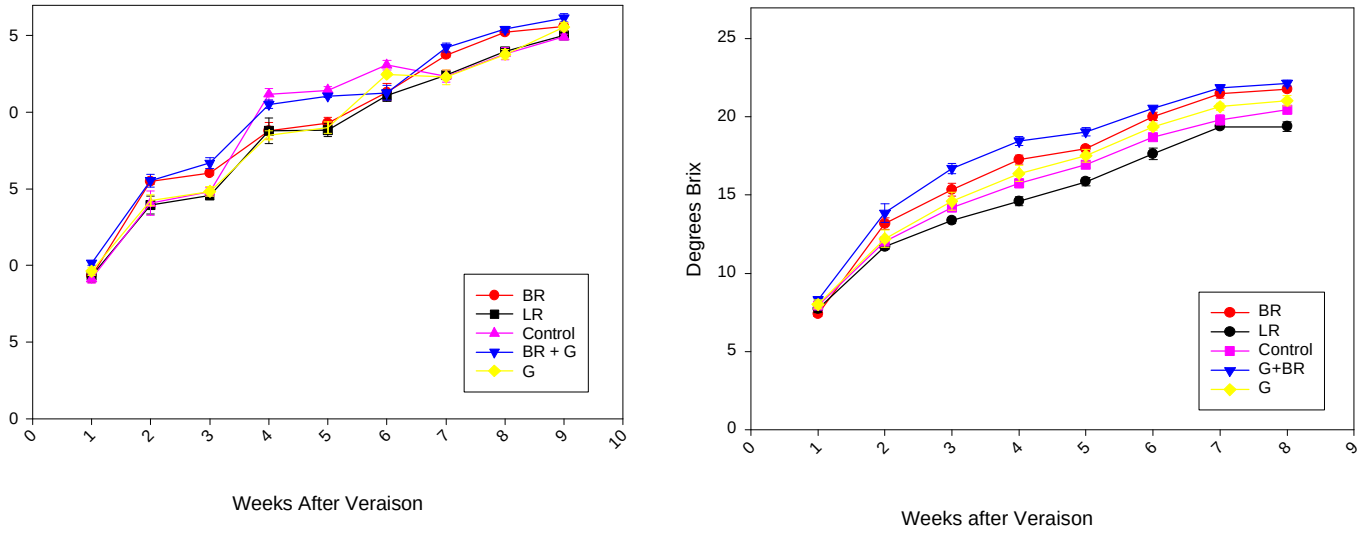


Figure 6. Sugar accumulation Vineyard A (Left) and Vineyard B (Right) in the 2002 Vintage

- Vineyard A produced a much higher Brix level at harvest, although there was no significant difference between treatments at harvest
- Vineyard B had significant differences between the treatments from three weeks after the initial application of treatments and this followed through until harvest.

Colour Accumulation

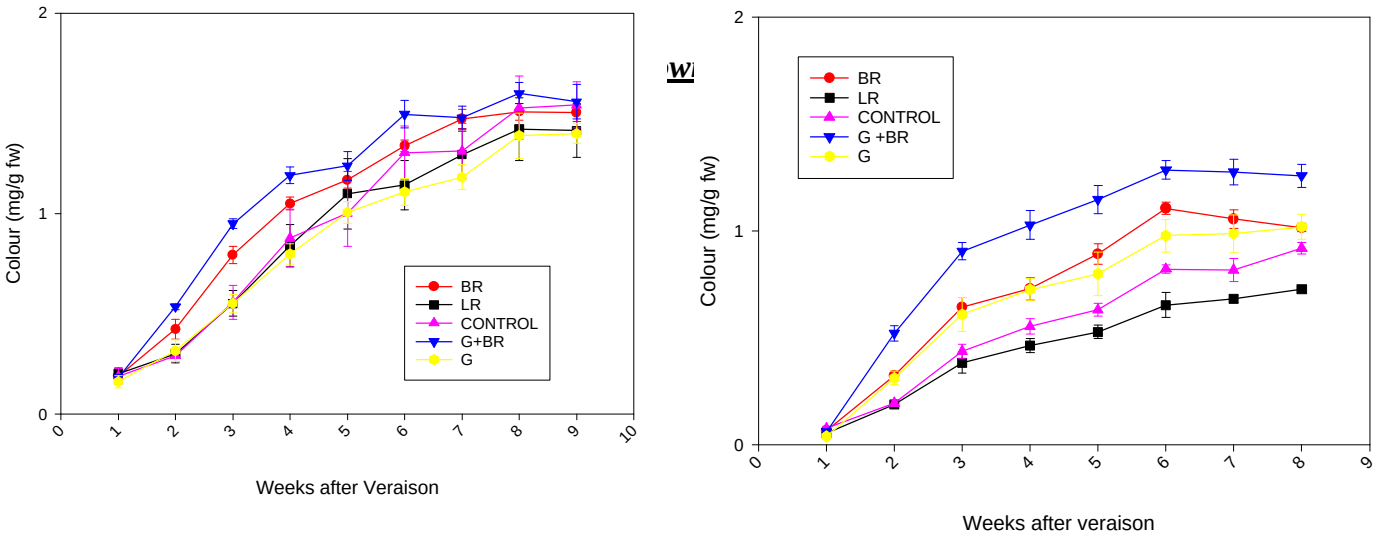


Figure 7. Colour accumulation Vineyard A (Left) and Vineyard B (Right) in the 2002 Vintage

Table 2. Harvest Colour (mg/g fw) for vineyard A & B in 2002 vintage.

Treatment	Vineyard A	Vineyard B
BR	1.50	1.02
LR	1.41	0.73
Control	1.54	0.92
G+BR	1.59	1.30
G	1.40	1.02

- The trends seen for colour accumulation at both sites follow a similar trend as seen for the sugar accumulation.
- Vineyard A saw very little difference between treatments although it was the G+BR treatment that had the highest colour levels at harvest.
- This treatment was also highest in vineyard B although it was significantly higher than any of the other treatments.

Yields

Table 3. Yields from vineyard A and B in 2002 vintage

Treatment	**Vineyard A (T/ha)**	**Vineyard B (T/ha)**
BR	9.14	9.27
LR	13.60	24.25
Control	15.49	22.08
G+BR	9.31	10.10
G	20.49	24.09

- The yields experienced on Vineyard A were higher than the previous year
- Vineyard B had a much higher yield than vineyard A
- The girdling treatment produced the highest yields at both sites

Return per Ha

Table 4. Returns per Hectare for Vineyard A and B

Treatment	Vineyard A ($/ha)	Vineyard B ($/ha)
BR	4570	3244
LR	6800	0
Control	7715	6624
G+BR	6982	5555
G	10245	8431

- The higher yields obtained in the girdling treatment would result in this treatment having the best returns per hectare.
- It should be pointed out that implementing this treatment would be cost prohibitative to most growers.
- Gradings are hypothetical as there is no way of knowing how the wines made out of this fruit would have ended up.
- The leaf removal treatment at vineyard B would have not been harvested due to the low Brix levels.

Conclusion

- Different blocks respond differently to the same treatments
- Blocks that are already in balance (Vineyard A), produce similar results regardless of the treatments applied.
- Unbalanced blocks respond to manipulating source sink relationships
- Treatments applied are a 'quick fix" solution rather than a long-term strategy.
- Wineries are working with their growers to improve grading systems that reflect the true quality that is produced.

IRRIGATION STRATEGIES FOR QUALITY AND VIABILITY OF SHIRAZ IN THE RIVERINA

Jessica Wade[1, 2], Bruno Holzapfel[1,2] and Kerry DeGaris[1,2,3]

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[2] National Wine and Grape Industry Centre

[3] McWilliam's Wines Pty Ltd

The effects of irrigation on *Vitis vinifera* cv. Shiraz have been investigated in a CRCV project in the Riverina. One of the objectives of this project has been to determine the effects of irrigation management on fruit quality and yield. The irrigation strategies partial rootzone drying (PRD) and regulated deficit irrigation (RDI) have been compared to 'Control' irrigated vines. In terms of viability of the wine grape industry, the question we need to ask is this; is it possible to improve vineyard viability through irrigation management?

The definitions of quality and viability for the purpose of this paper are as follows.

Quality There is not an exact formula we can use to determine fruit quality, despite much research effort into this area. However, factors that have been found to correspond with quality include sugar (how ripe the fruit is), amount of bunch rot (in particular *Botrytis cinerea*), colour (red grapes), and the quality of the resulting wine. These factors can be used by wineries when grading the fruit at harvest.

Viability The factors used to calculate viability for purposes of this paper are cost of production (only water is considered here) yields produced (tonnes/hectare) and $ return per tonne paid by the winery. The $ return per tonne can be closely related to fruit quality, depending on the method of fruit grading by the winery.

The field trial is a commercial Shiraz vineyard (McWilliam's wines) at Hanwood. The vines were planted in 1994 on own roots on a heavy clay loam, and are drip irrigated. All three irrigation treatments have had 40kg/ha N post harvest application, in the form of ammonium nitrate.

The three treatments are as follows. Control irrigated vines had no water deficit imposed throughout the growing season. Each half of the rootzone area of PRD vines was subjected to alternate wetting and drying cycles of the rootzone. The two halves of the rootzone were alternated every 7-10 days. RDI vines were subjected to controlled water deficit between fruitset and veraison, and irrigated to the same level as the Control vines for the rest of the season. Irrigation was scheduled using a neutron probe.

I will discuss the results from 2001-02 season and 2002-03 season. In both seasons, treatments were imposed in the same manner. However each season resulted in a different outcome for viability, partly due to differing climactic conditions.

The 2001-02 season was hot and dry, with a total rainfall in the growing season of 161mm. All treatments were harvested at 12.5 baume. There was a difference in harvest date, with RDI vines harvested first, followed by PRD vines (1 week later), followed by Control vines (1 week later. This resulted in Control vines being harvested 2 weeks after the RDI vines. Water use efficiency (WUE, amount of fruit produced per ML water applied) was improved by PRD

while RDI caused a reduction in WUE compared to the Control vines, due to the large decrease in yield. The best results in terms of colour, however, were achieved with RDI. PRD also improved colour, but to a lesser extent. This is following the general view that berry colour is negatively correlated with yield. That is, in order to achieve higher levels of colour in the fruit there must be a sacrifice of yield. Although 2001-02 was not a problematic season for bunch rot, the severity of *Botrytis* bunch rot was still reduced by PRD and RDI.

The $ return for this fruit was calculated. The prices are based on the winery fruit grading for 2001-02 and based on baume, colour and bunch rot assessment. The cost of water and potential resale of unused allocation is also incorporated (based on high security water prices). Providing that the fruit is ripe and with minimal bunch rot, the vines on this site, in this season and under this particular fruit grading scheme were best grown for yield, not quality, as the return per hectare is clearly higher for higher yielding vines.

Season 2002-03 is different due to a large rainfall event at the beginning of March. This rainfall made the vines susceptible to bunch rot, which was particularly high in the Control vines. Unfortunately this led to needing to harvest all treatments on the same day, before optimal baume was reached, as the bunch rot was setting in. The Control treatment was particularly unripe and had a high level of bunch rot. Therefore this fruit would have been outright rejected by the winery. The yields from the trial in the second season were higher than the first season, however RDI still reduced yield compared to Control and PRD irrigated vines. The WUE trends were similar to the first season, with PRD increasing WUE, and RDI decreasing WUE compared to the Control vines. Colour trends were also similar to the first season with RDI having the highest colour per berry weight. Colour values overall however, were markedly lower than in the previous season.

When income is calculated for this season, Control irrigated vines are definitely not the best option as they would actually loose money. However RDI is still not the best option. The PRD irrigated vines resulted in the best price per hectare, even though the winery paid less $ per tonne for this fruit.

Data from this trial site has reinforced the fact that results can be site specific and season specific. The income data is also dependent on the payment plan of the particular winery. Wineries need to continue monitoring fruit grading methods for encouraging quality versus quantity. Growers also need to continue talking to the wineries about what levels of quality and yield they should be aiming for. WUE of vineyards will also become an increasingly important issue for growers, with the lack of availability of water and potential reductions in allocations.

Research will be continuing into the effects of vineyard management strategies on fruit yield and quality. This knowledge will better equip growers for producing the 'target' fruit yield and quality, and ultimately lead to the optimised viability of the wine grape industry.

Acknowledgements

We gratefully acknowledge the support of McWilliam's wines and the WGMB.

Table 1. Yield and WUE, season 2001-02

	Harvest	tonnes/ha	ML/ha	WUE
Control	15 March	21.9	5.5	3.98
PRD	8 March	15.2	3.0	5.11
RDI	1 March	10.4	4.0	2.64

Table 2. Potential income, season 2001-02

	$/tonne	$/ha	Cost of Water ($)	potential water saving ($)	net income ($/ha)
Control	350	7665	182		7483
PRD	350	5320	100	285.00	5505
RDI	500	5200	133	171.00	5238

Table 3. Yield and WUE, season 2002-03

	Harvest	tonnes/ha	ML/ha	WUE
Control	3 March	29.9	6.5	4.63
PRD	3 March	29.6	4.2	7.01
RDI	3 March	18.1	4.7	3.82

Table 4. Potential income, season 2002-03

	$/tonne	$/ha	Cost of Water ($)	potential water saving ($)	net income ($/ha)
Control	0	0	215		-215
PRD	300	8880	139	262	9004
RDI	350	6335	155	205	6385