



Wolpert and Yuste Seminar Notes



Are these vines in or out of balance and why??

If you don't know the answer, then perhaps you would have benefited from a viticulture seminar held last week in Lancaster.

They sure look out of balance according to our neat and tidy viticultural sensibilities, but maybe they are just growing into the space that

they need to be happy and productive? The trouble is, this may not be serving our wine quality desires. So what can be done?

Wine growing is equal parts principles and practices. In my experience, it really helps to understand the former in order to achieve the latter, especially in relatively new wine growing areas. In the old ones, you can pretty much watch what your neighbor is doing and not stray too far away from your viticulture goals.

I have a nifty job in that I get to dabble in both the research and commercial wine growing sides of the business. Research can do a lot to help growers. In 1987 in the Willamette Valley when the Pinot Noir crop was hit by severe boron deficiency and yields reduced up to 50% the viticulturist at Oregon State University was able to diagnose the problem and make recommendations to prevent it from reoccurring, and in the following 12 years that I was a grower there boron was never an issue. Often, however, research follows innovative practices developed by growers in order to validate or better understand what they have learned empirically in their vineyards. Coming from a family of science and industry, I believe firmly in a collaborative effort between the disciplines to improve wine quality and ultimately the success and sustainability of the international wine industry. If you want to understand how research and grape growing intermingle, read the viticulture column by Dr. Mark Greenspan in *Wine Business Monthly* or go to the archive section of Mark's *Advanced Viticulture* website. He writes often and superbly about the impact of research in the field.

I pay a lot of attention to new grape growers because they have the greatest need for information to get started and to succeed. But advanced growers need new information and ideas to help to push their quality further. To serve this need I invited two outstanding viticulturists, Dr. Jim Wolpert from the famed viticulture and enology department at the University of California at Davis and Dr. Jesus Yuste, the viticulturist at the Instituto Tecnológico Agrario de Castilla y Leon (ITACyL), a

provincial research station that serves some of the greatest wine districts in Spain. As a bonus, his wife Maria, who is also an accomplished viticulturist, came along for the visit. Jim served as department chair for ten years and probably understands the big picture of viticulture in California more than anyone else. He's from Indiana and studied with Stan Howell at Michigan State so he knows about humidity and winter injury. Jesus has done outstanding work on varieties and clones in Spain, in particular Tempranillo, which includes a voluminous record of experimental clones which, as far as I know, has nothing to compare to it worldwide.

You cannot buy information like this because it is gathered by Jim and Jesus during careers that span decades of experience. It is remarkable how much of viticulture translates across borders and oceans, and different climates and soils. Jim's presentation on vine balance could apply to a grapevine growing anywhere in the world. A creative method of pruning Verdejo vines in Rueda developed by Jesus could be easily adapted to white wine varieties in Pennsylvania. Our industry has evolved into an international network of shared information and ideas that are available to all wine growers and limited only by the imagination and ability of growers to gather, process, interpret, test and utilize it.

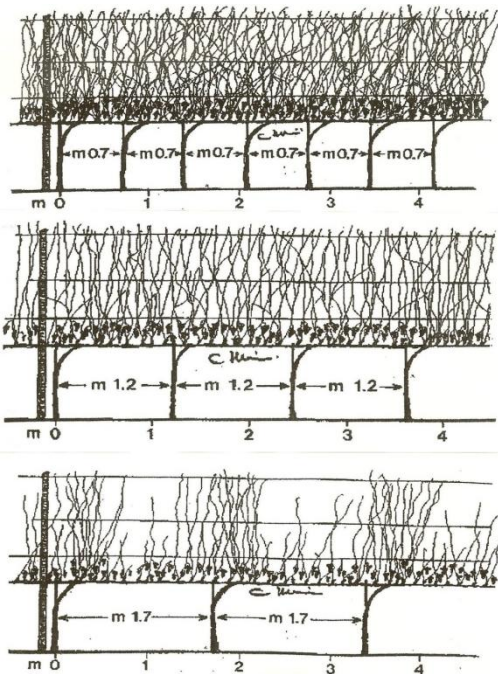
Additionally, Jim had the good fortune to work with one of the greatest viticulturists ever, Dr. Nelson Shaulis at Cornell University. Even 30-40 years after Nelson was in the prime of his research career, much of his work resonates in what we are trying to achieve in the vineyard today. To illustrate the importance of vine spacing to achieving vine balance, Jim offered this Q&A from Dr. Shaulis:

Q: My Pinot Noir vineyard is spaced at 8 x 4 and everyone tells me that it is excessively vigorous; I already have a competitive cover crop growing and it hasn't helped. What do I do?

A: If I owned your vineyard, as I perceive it to be now, I would seriously think about removing alternate vines and, in a row or two, I might think about removing them to a 12 foot spacing (i.e. remove 2 of every 3 vines). The point being, I think you have to find from your research people, what is the adequate amount of vegetative growth per unit length of row that you have? The control the viticulturist has on this is in the extent to which he stimulates the vine. Or, the extent to which he affords the room to display the shoots which he grows by his stimulation.

Are you getting this?? Dr. Shaulis is explaining that a given soil capacity will yield a vine of a certain size requiring adequate space to grow. If a grower decides in his mind that he wants to make a Burgundy-like Pinot Noir and thus will place his vines on 3-4 foot spacing, at least in our Eastern growing conditions, he will very likely be disappointed with the results. Vine spacing is one of the variables we can manipulate to achieve vine balance.





This diagrammatic illustration developed by Dr. Cesare Intrieri in Italy is used by Jim to great effect in his lecture. If a picture says a thousand words, this is viticultural treatise. It displays how vine spacing affects balance in both vegetative growth and yield. Needless to say, the middle diagram is what we should strive for but it is only achieved by understanding the unique qualities of the site, vine and the cultural practices that will be applied to them. In other words, you cannot plant a vineyard based on intuition because it is an incredibly complex system and the likelihood of guessing correctly on the dozens of variables that contribute to proper vine balance is miniscule.

In my talk I suggested that viticulture is the band-aid for poor site selection. Just as the best wine makers seek to minimize the amount of input and intervention that goes into their wine making (well, some do), the wine grower hopes that the vine will

achieve a condition of balance that minimizes the amount of manipulation that must be practiced during the growing season. While all vines need pruning, imagine the vine that needs no shoot thinning or positioning, no leaf removal or crop adjustment, no hedging, no irrigation or even no spraying, this would be truly a vine in ideal balance. If these vines exist they tend to be found on the best terroirs that have proven themselves over time.

There are lots of terms in wine that have murky or alternate meanings, just think of “minerality,” or even the ubiquitous “fruity,” or any of the terms on Noble’s aroma wheel. The same problem exists in viticulture and we have to be sure that we’re talking about the same thing when we refer to things like vine balance. Here are a few concise definitions that Jim provided:

- Vine balance
 - When leaf area and amount of fruit are in proper performance...
 - ... and, when grapevine growth is appropriate for the spacing and trellis...
 - ... and, when yield meets the economic target
- Vine size equals the total growth per vine (large vs. small and everything in between)
- Vigor is the weight per shoot
- Capacity is the growth potential of a grapevine

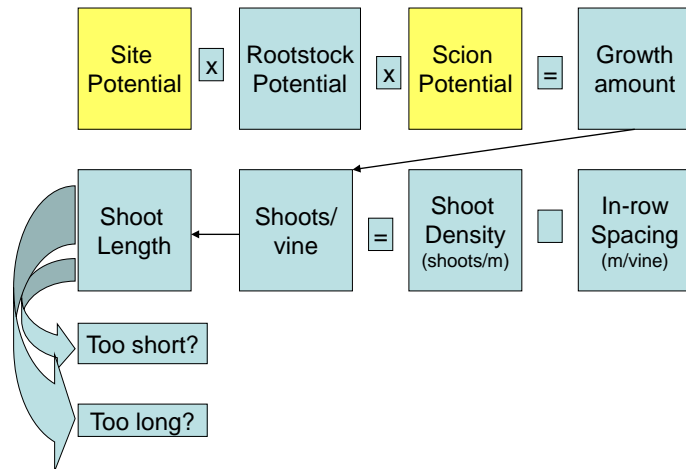
This is where we start and everything from site selection to vineyard design and variety and rootstock choice operates within the context of these definitions.

The starting point for me is deciding what type, style and price-point of wine is going to be made. A Concord wine will have different requirements than a Bordeaux blend. Once the wine is defined, then the proper conditions can be found to grow it. As a general rule, the more expensive a wine is the more defined its growing conditions will be. If the site is already selected then to some extent

there is an optimal wine type and style that can be grown on it. But the same variables of viticulture apply to all sites, no matter what kind of wine is being made.

This is illustrated in a very nifty flow chart that Jim devised. After the Intrieri graphic, it may be the most universally explanatory piece of viticultural principles that I have encountered.

For my money this chart pretty much says it all. Of course, the hard part is filling in the little boxes. Site potential is a huge one. In an area of contiguous vineyards it might not be so hard because you can just see what your neighbor's vines are doing but here it is all about predicting vine size. Assigning rootstock is no picnic either, although we are learning more everyday about the relative merits of lower vigor rootstocks like *Riparia Gloire* and 420A. We sort of know the scion potential but even that can offer surprises. Then we get to manipulate variables like vine spacing and density that will have downstream effects on vine performance and wine quality. The end product of this balancing act is shoot length, which, in a sense, is the final arbiter of balance if all the other variables are in proper range. Of course, we are not growing shoots to make wine but if shoot length is correct then hopefully vine's crop is also in balance. All of this works together to create a harmonious system with the intention of fully maturing fruit to make the best possible wine, regardless of vine size.



If shoot length is the gold standard then varying shoot number will certainly have an effect of shoot length across a vine. Within the finite capacity of a vine adjusting numbers up and down, along with other carbohydrate sinks such as fruit and roots, will influence the amount of shoot growth, i.e. more shoots will decrease shoot length but research has shown that total leaf area will remain consistent. What changes with shoot number is the relative proportion of primary to lateral shoot surface area with the former increasing as shoot numbers rise. Total growth is set by site, variety, and conditions. Andy Reynolds at Brock University in Ontario demonstrated that altering bud numbers does not significantly change pruning weights.

The most flexible part of this equation is the in-row spacing which Dr. Shaulis alluded to. It is flexible in the sense that it has infinite possibilities in vineyard design, but inflexible because once the vines are planted it's very difficult (and usually expensive) to alter in-row spacing. So let's try to nail this from the start and a lot of it begins with understanding the relationship between site capacity and vine size. If the wrong decision is made, then we fall back on Nelson's strategy and start pulling vines out until balance is achieved, or inter-planting if insufficient capacity exists to fill

the trellis. No matter what you do, typically for high quality wine a (balanced) shoot density of 12-15 shoots per meter of trellis is the target with average shoot length of 1.2m.

Once potential soil capacity is known then the next usual step is to assign a rootstock to help nudge a vine into balance along the wire according to viticultural and wine needs. But rootstock is not the only option. Jim cited, and Mark Greenspan has written about, growers in the north coast who are using variable in-row spacing to help achieve balance across soils with varying capacity. So in a lighter, shallower soil the vines are closer and in deeper, more fertile soils the vines move further apart. This is an elegant and practical way to accommodate soil changes that affect vine size and get the vines into balance.

Rootstock selection is still important to achieving balance if a *vinifera* scion is being used. Jim gave the example of a grower who planted on 4 foot spacing but his vines were too crowded. When asked why he used 039-16 he answered for fan leaf virus resistance which is a good reason but not in the context of vine balance. Jim understands our issue with rootstocks in the humid soils of the East and appreciates that the rootstock research in California does not address our issues, but he suggests a wider use of low vigor rootstocks like *Riparia Gloire*.

Some conclusions that Jim has reached in his vine balance work include:

- Balance is best achieved by vineyard design. It is his opinion that in California there is a greater risk to plant vines too close together than too far apart.
- Pruning severity is not one of the practices to achieve balance
- Annual practices can be tools to achieve balance but inputs can be expensive
- Correct choice of rootstock is critical to achieving proper vine balance

Jim has generously agreed to let me post his presentation on the *Pennsylvania Wine Grape Network* (<http://pawinegrape.com/>) as a PDF file and I encourage wine growers to review it carefully as this is just a summary of what he talked about.

I remember my first visit to Tuscany, a wine region of great history, tradition and fame and seeing a lot of vines that reminded me of very traditional Eastern vineyards with high wire training, multiple fruiting appendages and, well, rather rough looking in the field. I wondered what was going on. Then I was shown some vineyards with the modern technology that I was accustomed to and felt a bit more comfortable. The back story here is that every wine region in the world, new and old, is adopting the same principles and practices with minor adjustments for local conditions – VSP, higher vine densities, rootstocks and clones. The differences in Old World wine areas are the wide variety of interesting grape varieties and clones they have to choose from, and traditional growing systems such as head training on wide spacing in hot, dry areas or the use of the pergola system for training Albarino in Rias Baixas. But it was no surprise to me when Jesus Yuste talked about limiting berry size by regulating water using tools like irrigation and cover crops. His clonal work with Tempranillo has no peer, I am certain, in the world. After an industrial white variety called Airen, with over 300,000 ha planted mostly in Castilla-La Mancha, Tempranillo is the second most widely planted variety in Spain. Fortunately, most of it appears to be directed at wines of distinction. With these vast amounts of vineyards you can bet that they are moving rapidly towards changing their vineyards to adapt to mechanization, such as the traditional gobelet to VSP. Since 1996 irrigation has been allowed in Spain and there will always be a debate in a tradition rich wine

region of the relative wine quality merits of high density, irrigated vineyard vs. low density, dry-farmed, old vines. This becomes part of the unique terroir across the landscape of Spain. Spanish growers have been slow to adopt new rootstock technology and currently 110R is the standard rootstock and in calcareous soils 41B is used. Canopy management practices are being modernized with use of early leaf removal to reduce cluster compaction and open the canopy for better disease control, and green pruning is now practiced, especially in red wine vineyards. Jesus said they are testing early mechanical cluster thinning to adjust yields. A.O. regulations for “high expression” wines is 3,000-4,000 kg/ha (1.4-1.8 t/a) which is very restricted by our yield expectations. Regulated deficit irrigation is being used based on evapotranspiration and stem water potential rates to manage berry size and improve quality of red wines. With one million hectares of grapes, zonal mapping of wine districts is helping to quantify soil and climate effects for better vineyard management practices.

Spain has an extensive effort to revive old varieties that have fallen out of use but may offer good wine potential. Among the established varieties, like Albarino and Tempranillo, extensive clonal selection work continues. This appears to be a major focus of many of the viticulture research resources. The information at right is a sample of the data collected on Tinta del Pais clone 98 (a synonym for Tempranillo). In my limited tasting and travel experience, I think the white variety Godello and the red Mencia may have excellent adaptability for moderate climates in Pennsylvania and around the Mid-Atlantic. Wineries like Black Ankle Vineyard (MD) and Chrysalis (VA) are already making notable Albarino. While Tempranillo may not be well-suited for our climate there are surely many other Spanish varieties that may find a comfortable home here.

CERTIFIED CLONE OF TEMPRANILLO - ITACYL

TINTA DEL PAÍS CL - 98		Valladolid	
Agromony	Variety	Clone	Valuation
Budbreak	8 Apr	11 Apr	
Yield (t/ha)	8.78	8.26	Med-low
Pruning weight (kg/vine)	1.04	1.11	Medium
Cluster weight (g)	257	226	Low
Berry weight (g)	1.94	1.99	Medium
Ravaz Index	3.31	2.92	Med.-low
Enology			
Alcoholic degree (% v/v)	12.7	13.0	Med.-high
Titrateable acidity (g/l)	5.3	5.6	Med.-high
pH	3.47	3.44	Medium
Total polyphenols	14	14	Med.-high
Valuation of wine			
Tasting	Excellent		
Main organoleptic feature	Structured		

To view the presentations given by Jesus Yuste and Jim Wolpert, please visit the *Pennsylvania Wine Grape Network* website and go to Information Resources > Meeting Summaries > Wolpert and Yuste.

I would like to thank RdV Vineyards, Boxwood Vineyard, Linden Vineyards, Waltz Vineyard, Nissley Vineyards and Galer Estate Vineyard for extending their hospitality to our guests. Our special appreciation goes to David Othmer and Maureen Barden of Haywagon Vineyard for hosting us for a special evening. Jeff Zick, Carl Helrich, and Ed Lazzarini also helped me. This is what the wine industry is all about, exchanging information, ideas and experience along with fellowship, good food and wine. That's what keeps me in this business.

Reference Resources:

1. Viticulture and Enology at UC Davis: <http://wineserver.ucdavis.edu/index.php>
2. ITACyL: http://www.itacyl.es/opencms_wf/opencms/index.html
3. Dr. Mark Greenspan and Advanced Viticulture: <http://www.advancedvit.com/>

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