



# Shiloh Estate

SHILOH VINES & WINES KNOWLEDGE BASE SERIES

www.shilohestate.com

## Part V: Maintenance & Maturation

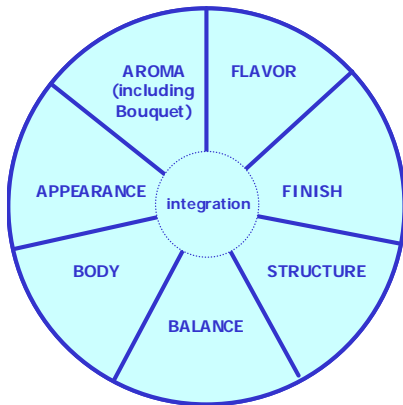
by

Reese C. Wilson

April 2003

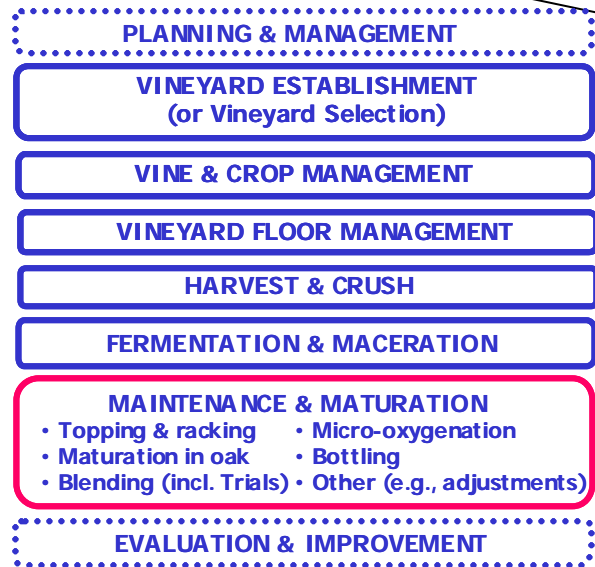
Coordination Draft  
Comments Welcome

### Toward Quality Wine



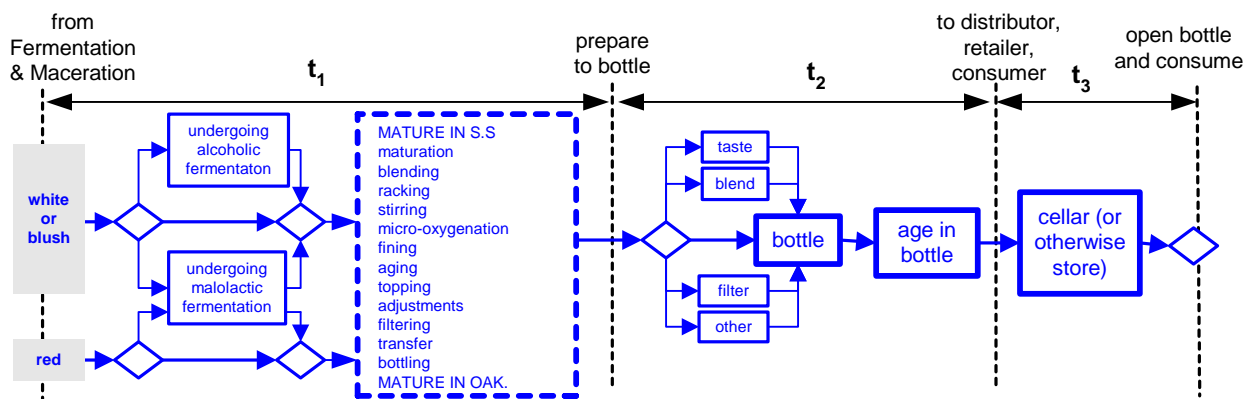
**Quality**—This paper is the last of a series dealing with winegrowing and winemaking. The lead paper "Toward Quality Wine" suggested a pathway to wine quality and quality wine.<sup>i</sup> The *Maintenance & Maturation* stage takes the wine produced in the previous stage, maintains its integrity, and improves its quality vis-à-vis style and sensory goals and objectives up until the time it is provided to distributors, retailers, consumers.

**Integrity**—Quality wine results from strategic decisions and best practices impacting winegrowing, winemaking, and management—practices that maintain the integrity and enhance the *aroma*, *flavor*, *structure*, and other sensory components of the wine. In this stage, reds are usually "wine" but whites may be still be undergoing a slow fermentation (and reds may be completing malolactic fermentation while some whites may be awaiting MLF). By definition, wine *matures* in "bulk" vessels (e.g., stainless steel tanks, oak barrels) and *ages* in the bottle.<sup>ii</sup>



**Interventions**—The quality of wine in a glass is the product of natural phenomena coupled with winegrowing and winemaking decisions and practices (as well as consumer perceptions). Although forces of nature can and do intervene, winegrowers and winemakers can also decide to intervene or not intervene. Dictionary definitions for *intervene* include:<sup>iii</sup> (a) **act to produce change**: to take some action or get involved to change what is happening, (b) **happen so as to impede**: to occur and as a result stop or delay something from happening, (c) **elapse**: to elapse between one point in time and another, (d) **be situated in between**: to be located between two things. Decisions taken in this stage of the winemaking process are generally *interventions* intended to produce, promote, or prevent change commensurate with wine type, style, and sensory goals and objectives.

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## Interventions

### General Discussion

**Winemaker Interventions**—Some *style* goals and objectives are furthered by interventions (or non-interventions) in the cellar. Bruce Rector's definition of wine styles was included in Part I.<sup>iv</sup>

Style	Description
<b>Light &amp; Fruity</b>	Easy drinking, fun, affordable, quaffable, poolside, bright, fresh, cash flow, luncheon, everyday, table wines, dry to semi-dry.
<b>Dinner Wines</b>	Varietal, enjoyable now but could benefit from aging, balanced, classically varietal, food compatible, table wines, high-end generics, "elegant"
<b>Big Wines</b>	Age-able, special occasion, big inky monsters, not necessarily but typically high alcohol and oak aged

Some interventions are inevitable (e.g., transfer), others are generally practiced (e.g., topping), and still others are at the discretion of the winemaker.

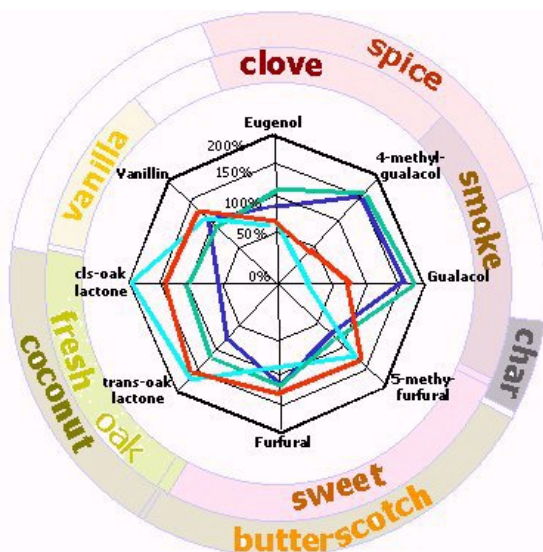
**Potential Interventions**—The *Maintenance & Maturation* stage is subdivided into three time-periods:  $t_1$  maturation in winery,  $t_2$  bottling and aging in winery, and  $t_3$  handling and aging post-winery. The winemaker may intervene in several ways prior to distribution of the wine.

Common Interventions
<b>Promote Significant Positive Change</b>
Maturation in oak barrels (stainless steel has less impact)
Blending of different lots to improve final wine quality
<b>Promote Moderate Positive Change</b>
Racking of wine to separate from lees
Stirring of wine to mix in lees ( <i>sur lies</i> )
Micro-oxygenation of wine for structure (not yet common)
Fining of wine to soften tannins, remove impurities
Aging in bottle prior to shipment
<b>Protect Wine or Prevent Negative Change</b>
Topping of vessels to prevent oxidation
Adjustments such as SO <sub>2</sub> additions
Filtering of wine to remove unwanted particles
<b>Standard Operations</b>
Transfer of wine from one vessel to another
Bottling of wine for winery aging and subsequent shipment

### Promote Significant Positive Change

**Maturation in Stainless Steel Tanks**—Wines with a light and fruity style (and some dinner wines) are generally transferred to steel tanks for maturation pending bottling. Time-period  $t_1$  is usually short, e.g., days. Whites still undergoing fermentation may be in  $t_1$  for weeks. During maturation, the primary objective is to maintain the integrity of the wine and achieve integration of *sensory components*. Note that if oak inserts or chips are used in the tank, some oak impact will be achieved.

**Maturation in Oak Barrels**—Maturation of wine in oak can enhance sensory components by adding desired and/or masking undesirable *aromas* and *flavors*. Additionally, barrel maturation can affect *body, structure, finish, and balance*.



Source: See: <http://www.bouchardcooperages.com/>

As suggested above, different barrels have different aroma and flavor impacts. The impact that an oak barrel has on the wine depends on:

**Origin**—French, American, slow growth, etc.

**Toast level**—Light, medium, medium plus, heavy, heads.

**Size**—225 L (59-gallons) and 228 L (60-gallons) barrels are most common. Smaller barrels have greater impact as there is more surface area of the wine exposed to oak. Conversely, larger barrels have less impact.



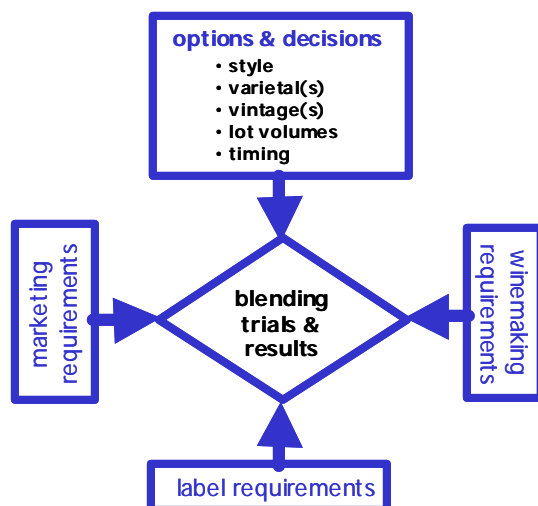
**Barrel mix**—Although a few wineries use 100% new oak barrels for their wine, most have a three- or four-year regime (e.g., a three-year program might have 1/3<sup>rd</sup> new oak, 1/3<sup>rd</sup> one-vintage-old oak, and 1/3<sup>rd</sup> two-vintage-old oak).

**Time on oak**—Exposure of wine to oak varies from widely from wine to wine. Usually it is a few months up to a year and one-half. Micro-oxygenation can reduce the time somewhat.

**Environment**—Temperature and humidity also play a role with a wine's maturation with cool and somewhat humid the norm.

Winemakers can seriously influence all sensory components of the wine through management of these variables. Usually some experimentation is required to find the best combination (and the combination may vary from vintage to vintage).

**Blending**—Some wines—for example, Bordeaux Blends—are always blends. Others are blended solely to improve quality by enhancing color, body, structure, balance, or other sensory component (or to mask an undesirable odor).



**Practical considerations**—As suggested above, numerous requirements and realities must be included in blending decisions (including profits).

**Sensory evaluation**—Berries, juices, musts, and wines are tasted throughout the winegrowing and winemaking processes (as well as after the bottle is opened). Winemakers typically maintain a record of each lot's sensory (and other) properties in order to take necessary steps to maximize desirable and minimize undesirable attributes.

**Blending trials**—Generally, a panel of winery "experts" taste and rate each lot separately first, repeating the process for each trial blend. This can be done in January (give or take) after the harvest or just prior to bottling. When the final blend is reconciled with requirements and constraints, and adjustments and final tweaking are accomplished to the winemakers and bookkeepers satisfaction, the stage is set for bottling.

### Promote Moderate Positive Change

**Racking**—Removal of wine from its lees in order to clarify wine and lessen extraction of phenols from skin, seeds, yeast hulls, *et al* contained in the lees. Racking can occur at any time during this stage (or earlier stages) and can happen more than once. The general idea is to transfer the wine to a temporary or "permanent" vessel and dispose of the lees. (Gross lees are removed after pressing.)

Rack and return is most commonly used during the *Fermentation & Maceration* stage as a "pump-over" that has lower extraction of bitter and astringent components along with increased polymerization of phenols, richer mouth-feel, and more fruity flavors.

**Stirring (Sur Lie)**—Wines like Chardonnay may benefit from being matured on the lees (accompanied by routine stirring); the wine gains complexity and develops a creamy, yeasty flavor.

**Micro-Oxygenation**—Oxygen is bubbled into the wine in highly controlled doses—a substitute for porosity of oak—to promote very slow oxidation while tannins lose their astringency and harshness and become softer and more supple. This improves *structure* by softening tannins and can shorten maturation time.

**Fining**—Addition of bentonite, egg white, gelatin, or other agent to wine in order to reduce or eliminate undesirable haze, instability, *aroma*, *flavor*, color, tactile sensation, etc.

See: <http://www.bcawa.ca/winemaking/fining.htm>

<http://members.tripod.com/~BRotter/CalcInfo/fining.htm>

**Aging**—By definition, wine ages in the bottle. Some wines are made to drink early. Others have the structure to age for years (and years).

**Protect Wine or Prevent Negative Change**

**Topping**—Topping is carried out on a routine basis in most wineries to replace liquid that has evaporated. Topping is necessary to ensure there's no airspace that would allow air contact with the wine. Tanks and barrels are topped from completion of fermentation right up to bottling to prevent oxidation and microbial spoilage.

**Adjustments**—Sulfur dioxide is the most common adjustment made to juices, musts, and wine. SO<sub>2</sub> may be added at crush and any time after fermentation is complete. Many winemakers maintain free sulfur levels about 30 ppm to prevent oxidation and microbial spoilage. SO<sub>2</sub> is also usually added just prior to bottling.

Tartaric acid may be added to lower pH (and raise titratable acidity). Taste trials are recommended prior to selecting the level of tartaric acid to add.

Numerous other compounds can be added, for example, fining agents (see below), enzymes, or other such as copper to reduce undesirable sulfides. For example, see Page 27 in the catalog: [http://www.thewinelab.com/filecabinet/WineLabCatalog\\_2002.pdf](http://www.thewinelab.com/filecabinet/WineLabCatalog_2002.pdf)

**Filtering**—Wine is pumped through one or more filters—e.g., cellulose, diatomaceous earth, or fine membranes—to remove yeast cells and other microorganisms that could spoil the wine, as well as any remaining sediment could that mar its clarity. However, filtering may extract *flavor* and character that the sediment lends the wine.

**Standard Operations**

**Transfer**—Movement of grapes, must, juice, or wine from one step to the next occurs throughout the winemaking process with transfer accomplished by conveyor belts, gravity, lines or hoses, pumps, inert gas pressure, etc. Different means often support different objectives with transfer often accompanying other interventions such as topping, racking, blending, and filtering. In the cellar, at least two dimensions of transfer are important:

Severity of Movement	Exposure to Oxygen		
	With Aeration	Some Aeration	Without Aeration
Gentle			
Moderate			
Harsh			

Transfer can be done without pumps (gentle) or with pumps (varies from near-gentle to harsh). The transfer can be accomplished with significant, some, or almost-no exposure to oxygen.

**Bottling**—Wine is carefully put into bottles that are first sparged and then corked (or screw-capped), labeled, foiled, put into cases, etc. and stored prior to distribution.

**Potential Contribution**

**General Discussion**—Interventions promote the wine's organoleptic characteristics—i.e., those relating to perception by a sensory organ—commensurate with achieving style goals.

**Promoting Positive Change**—In order of impact: maturation in oak barrels, blending, racking, micro-oxygenation, adjustments (tartaric acid), stirring, aging (big wines), fining, and filtering.

**Preventing Negative Change**—In order of impact: topping, adjustments (SO<sub>2</sub>), bottling, transfer.

**Potential Contributions**

Winemaking Step	Wine Components						
	A	A	F	F	B	S	B
Potential contribution of step to component:	P	R	L	I	O	T	A
Strong	E	M	V	I	Y	U	A
Moderate	A	A	O	S		C	N
Weak	R		R	H		T	A
	A					U	N
	N					R	C
	C					E	E
	E						
Maturation (esp. oak)	M	S	S	S	S	S	S
Blending	M	S	S	S	S	S	S
Racking	M	M	M	M	M	M	M
Stirring (esp. Chard)	W	W	W	W	W	W	W
Micro-oxygenation	W	W	W	M	M	S	M
Fining	M	M	M	M	M	M	M
Aging	M	W	W	W	W	M	M
Topping	W	W	W	W	W	W	W
Adjustments	W	W	W	W	W	M	M
Filtering	W	W	W	W	W	W	W
Transfer	W	W	W	W	W	W	W
Bottling	W	W	W	W	W	W	W

<sup>i</sup> See "Toward Quality Wine": <http://www.shilohestate.com/>  
<sup>ii</sup> VWT 180 Fundamentals of Enology, Napa Valley College (Fall 2002)  
<sup>iii</sup> Microsoft's Encarta World Dictionary  
<sup>iv</sup> "The Consideration of Every Step of the Crush & the Stylistic Options" by Bruce Rector, Glen Ellen Winery & Vineyards (undated) VWT 270 Advanced Winemaking, Napa Valley College