I JUST STOMPED MY GRAPES – NOW WHAT?

John Troiano, June 17, 2020

fatcatjt@sbcglobal.net

1. Goals - Personal preference in wine, what style do you want to make?:

What defines the wine you want to make?

Kermit Lynch on oak in Adventures on the Wine Route pg 20

"'Why did Monsieur X use old Barrels? [reply] 'New oak masks everything 'he growled. 'The virtues and the flaws. I have nothing to hide behind the taste of new oak. On the Contrary.'"

Kermit Lynch on addition of metabilsulfite in Adventures on the Wine Route pg 24

" I tasted the sulfur-laden wines. They were all alike, poor things. I walked out without placing an order. I drove away swearing out loud. The horse's ass ruined my Sancerre!"

Initial chemistry measuring sugar content (Brix), pH, and total acidity is important in crafting the final flavor and texture profile of the wine.

- Musts lower than pH 3.4, high in acid, brix around 22% sugar and lower: Higher acid wines produce leaner tasting wines with very bright fruit. White wines reflect apple (Malic acid) and citrus (citric acid) flavors, such as grapefruit. Red wines reflect bright, light fruit such as raspberries and bright cherries. These grapes could potentially not be ripe where flavors of green fruit such as green beans, asparagus, grass dominate. Champagne is a special case where additional sugar and yeast is inoculated back into finished wine which adds flavors produced from the yeasts.

- Musts between pH 3.4 and 3.7 brix around 25% sugar: Range where most grapes are considered as ripe. Wines are more balanced with potential for developing complex flavors, deeper color, and more mouth filling due to more developed tannin structure. White wines have deeper fruit flavors such as apricots. Red wines with more complex flavors of deeper fruits such as Bing cherry or plummy fruit flavors and with more developed spices such as licorice and mint flavors. These wines can also marry well with oak where flavors such as vanilla, spices add complexity.

- Must above pH 3.8 with low acid at 0.6% and lower, and with brix higher than 26% sugar: Grapes could be considered overripe. If the must is not adjusted the wines will be low in acidity, a condition some consider as flabby. Higher sugar content of finished wine has fruit flavors reminiscent of jams so non-descript. Many zinfandels are marketed with high alcohol and with descriptors as jammy flavors.

2. What to make?

Our focus is on full body red wines with maximum extraction of tannin from the skins, coaxing as much flavor from the grapes as possible. Target values for harvested grapes are:

- 25 to 26 brix, which in most cases will provide
- pH of must around 3.6
- total acidity around 0.7%.
- If harvested grapes do not meet these specifications then the must is adjusted.

- Goals could change if say a lighter Pinot Noir or a white wine is made where brix would be lower and initial acidity levels higher.

What is your preference and which parameters meet it?

3. Measuring Brix, pH, and acidity in must:

- Brix: Hydrometer is used to measure the initial sugar content. Measurements made in a well-mixed solution of must.

- pH: pH meter is used. I now use an inexpensive meter made by Apera. I find this one to be more stable and it provides a faster reading than the Hanna I used previously. This one can be standardized to 3 pH levels: 4, 7, and 10. I keep the standards in a refrigerator so I pour some into the measuring cups and let them warm up to room temperature because most chemical measurements are affected by temperature. Pipette 10 ml of juice into a small container and measure the pH.

- Acidity: Use 0.1 normal (N) sodium hydroxide (NaOH) added to the 10 ml juice sample. Count the amount of sodium hydroxide it takes to raise the pH to 8.2. The amount of sodium hydroxide as measured in milliliters is then multiplied by 0.075 to produce total acidity in percent tartaric acid.

  Example:
  1. pH of 10 ml sample of must at 3.7.
  2. 8.3 ml of 0.1 N NaOH added to the 10 ml juice samples raises pH to 8.2. – Don't get too specific about the end number because small addition of NaOH produces a large change in pH near pH 8.0.
  3. 8.3 ml x 0.075 = 0.62 % Total acidity expressed as tartaric acid.

4. Corrections to Must: Based on the goals set for the wine, corrections are made immediately to the must to adjust sugar and acid content.

- Sugar
  - Low sugar: Mostly reflective of unripe grapes except for champagne or some crisp white wine styles. Low Brix might be considered when measured at 22 or lower. Home winemakers can add sugar to bring up sugar content. Some folks prefer to invert the sugar prior to addition by heating to 140 degrees Fahrenheit for 20 minutes with addition of lemon juice as suggested by Rex Johnson. A reason to invert the sugar is to reduce the energy expanded by the yeast to invert the sugar so that processes are focused on fermentation.

  - High sugar: In many cases unexpected rise in sugar is experienced near harvest when the grape crop is exposed to a heat spell at the end of the season. Musts above 26 Brix considered as contenders for correction. In the examples in section 5, there is a formula that I use to figure the the amount of *purified* water to add (do not use tap water because it is chlorinated).

- Acidity:
  - Low acidity: Normally encountered with wines that are high in Brix. Tartaric acid is usually used to adjust acidity. The amount to add is based on the initial measurement with the targeted amount

based on the gallons of must that will be produced after the water I added to lower the percent sugar content into a desired range.

- High acidity: Acidity could be lowered prior to fermentation by addition of potassium carbonate. Or it could be adjusted in the finished wine.

5. Examples:

For these examples one ton of grape yields between 120 and 150 gallons of finished wine. For lower volumes 250 lbs of grapes yields approximately 15 gal of red or 12 gal white wine.

Example 1. Addition of only Water to lower Brix where grapes have a high acid content: 2015 Merlot

- Brix: 28.5
- pH: 3.22
- TA: 10.5 ml x 0.075 = 0.79 %
- Estimated 130 gal of finished wine from 1 ton of grapes.
  Note: 1 ton of grapes yields between 120 to 150 gallons of finished wine. Merlot grapes were smaller, well-formed so estimate was at 130 gallons.
- Water addition calculated as the volume of must that would be added to lower the 28.5 Brix reading to 26 brix:
  Formula: 28.5 Brix/X gal= 26 Brix/130 gal
  Solving for X gal rearranges the formula as:
  Estimated Must Volume = (Estimated gal x Measured Brix)/Target Brix
  X = (130gal*28.5 Brix)/26 Brix = 142.5 gal**:**
  142.5 gal -130 gal = 12.5 gallons of water to add
- After water addition Brix approximately 25; pH 3.47; TA 9.1 ml x 0.075=0.68%. Note the addition of water lowered the TA value but it was near the 0.7% goal so no futher adjustment was made.

Example 2. Addition of only acid where Brix and pH reading are in range: 2014 Cab Franc

- Brix: 23.5-24
- pH: 3.65
- TA: 8 ml x 0.075 = 0.6
- Estimated 130 gal of finished wine based on 1 ton of grapes
- Amount of tartaric acid to add is based on raising TA to 0.7% so addition to 0.1% in the must.
  Addition of 3.8 g of tartaric acid into 1 gallon of must equals a 0.1% rise in TA.
  3.8 g x 130 gal = 494 g Tartaric acid
  494 g/28 g per fluid ounce = 17.6 fluid ounces to add to must

Example 3. Addition of water to dilute Brix and addition of tartaric acid to raise TA: 2013 Cab Franc

- Brix: 30
- pH: 3.8
- TA: 8 ml x 0.075 = 0.6
- Goal is to bring Brix down to 26 and raise TA to 0.7%
- Estimated 60 gal of finished wine from ½ ton of grapes.

- Water addition:
  (60 Est Gal x 30 Brix)/26 Target Brix = 69 gal:
  69 gal – 60 gal = 9 gallons of water to add
- Tartaric acid addition based on amount present in wine compared to amount at 0.7% in 69 gal.
  Amount in 69 gal at 0.7% = 0.7 % x 3.8 g/gal x 69 gal= 183.54 g
  Amount in 60 gal at 0.6% = 0.6 x 3.8 x 60 = 136.8 g
  Amount to add: 183.54 g - 136.8 g = 46.74 g/28 g per ounce = 1.7 ounces
- Tartaric acid is dissolved in water and then mixed back into the must.

6. Fermentation notes – MY PROTOCOL!!

1. If grapes look good small addition or no addition of SO2. If acetic acid smell or see rotted grapes add 50 ppm SO2. Note that I have not come across grapes that have been infected so I have not been adding SO2 to the must.

2. Take out some juice. Hydrate yeast by adding dried yeast to 90 F water for 20 min. Inoculate hydrated yeast into juice taken from must. After 6 to 8 hours inoculate must.

3. Add yeast nutrient after inoculating must with yeast.
   Add ½ amount of FermaidK, a yeast nutrient, in beginning
   Example formula (see attached example of 2019 Barbera fermentation log):
   FermaidK addition is 5 grams / 20 Liters which is close to 1 g/1 gal
   140 gal x 1 g/gal = 140 g Fermaid K
   140 g FermaidK/**28 g per fl oz** = 5 fl oz of Fermaid K
   Added 2.5 ounces at inoculation into must and then second half when Brix around 10.

4. Malo-lactic bacteria (ML) inoculation: Importance of ML fermentation is to help stabilize wines. ML bacteria use nutrients in must that spoilage organisms could grow on, such as Brettanomyces, Dekkera, Lactobacillis and others. Authors of book referenced below state that ML fermentation is inhibited by high acid, high alcohol, high SO2 (additions at 50 PPM kill all bacteria), and high tannic musts. Musts in the range of pH 3.5-3.6 is an optimal condition:

   4.1. Co-fermentation is recently the suggested method of inoculating with ML bacteria. This is the addition of the bacterial inoculum when yeast are added. We use a freeze-dried formulation that can be added directly to the fermentation. Addition of ML early in the inoculation reduces the buttery di-acetyl formation. If one wants a higher buttery content then inoculate after fermentation.

   4.2. ML nutrient (Leucofood) addition is also added with addition of Fermaid K. Suggested rate of addition is 1g/5gal or 0.2 g/1 gal:
   Example in attachment:
   140 gal x 0.2 g/1 gal = 28 g ML food
   28 g ML nutrient / **14 g per fl oz** = 2 fl oz of ML food
   1 oz added in the beginning and the other 1 oz at around 20 brix

   4.3. I also add a food supplement that is supposed to enhance ML, named ML Red Boost
   Calculation for that is:
   140 gal x 0.725 g/1 gal = 101.5 g ML food
   101.5 g ML nutrient / **16.8 g per fl oz** = 6 fl oz

Reference: Malolacic Fermentation – Importance of Wine Lactic Acid Bacteria in Winemaking. 2015. Numerous authors. Lallemand Inc, Montreal Canda. ISBN: 978-2-9815255-0-5. http://www.lallemandwine.com/wp-content/uploads/2015/10/Lallemand-Malolactic-Fermentation.pdf

7. Post Fermentation

1. Rack: 1-3 weeks after pressing. Note in log of the 2019 Barbera fermentation the grapes were pressed after 20 days of fermentation. The first racking was 3 weeks later, the second occurred 2 months later in December. Subsequent racking is conducted upon bottling when wine from siphoned from barrels in a back air-condition room to be bottled. This opens up space for racking the wine from the uncontrolled front room into the back room.

2. SO2 addition; Grapes were in good condition upon harvest so I did not add any SO2 prior to crushing and pressing. Since the wines are still quite active after fermentation I did not add any SO2 at the 2 subsequent rackings because the environment is still quite anaerobic. Our pressings are most likely more active than others because we put whole berries into the fermentation which upon pressing releases some additional substrates that support additional yeast activity. SO2 was added at the third racking in the spring with the level at 30 ppm.

3. Maintenance of stored wine: By maintenance I mean the appropriate care for the wine in the barrels. Topping is quite important to decrease the chance of spoilage organisms taking hold. But perhaps even more important is the application of a concentrated spray of metabisulfite solution every time the wine is tested, which is especially important if the container is not immediately topped. To answer Judy Pinegar's annual question of how is the solution made, the solution can be made by adding 0.22 fl oz of Potassium Metabisulfite to an ounce of pure water. That would be 3.2 fl oz of powder per 16 oz water (1 pint). A good spray can is one sold at Emighs that has a yellow top.

8. **Highly** suggested reading

'Adventures on the Wine Route'. Kermit Lynch.

'Wine analysis and Production'. Bruce W. Zoecklein, Kenneth C. Fugelsang, Barry H. Gump, and Fred S. Nury

'Postmodern Winemaking'. Clark Smith

Example of fermentation log used by John Troiano

2019 Barbera - September 14 - 1 ton			
Brix	**28**	**16 Gallons of Water added to lower Brix to 25 where 8 gal added to bin and**	
		and 4 gal to each 44 gal barrel	
pH	**3.2**		**1/2 addition**
TA New	**16**	**ml 0.1 NaOH x 0.075 = 1.2 %Total Acidity**	
Fermaid K	**140**	**Gal x 1 g Ferm/gal = 140 g/(28g/Fl Oz) =5.0 Fl Oz**	**2.50**
ML food	**140**	**Gal x 0.2g ML Food/gal = 56 g/(14g/Fl Oz) = 2.0 Fl Oz**	**1.00**
ML Red Boost	**140**	**Gal x 0.725g MLRB/gal = 101.5 g/(16.8g/Fl Oz) = 6 Fl Oz**	**3.00**
ML	**140**	**0.038 g/gal = g**	

Note half of chemcials added split among fermenters according to proportion of gallons in fermenter

Date	Days	Bin 75 gal		WhiteBarrel 1 44 ga		WhiteBarrel 1 44 gal		Room	
		Brix	Temp	Brix	Temp	Brix	Temp	Temp	Notes
14-Sep		Grapes keep overnight - picked up next moring							
15-Sep		25.0		25		25.0			Innoculed PM
16-Sep		25.0		19		23.0			1/2 added and ML
17-Sep		18.5	90-iced	12	88	17.0	88		
18-Sep		11.0	93	6.5	85	12.0	86	76	Second half added
19-Sep		6.5	91	3.5	82	7.5	83	76	
20-Sep		4.0	88	1.5	80	5.0	81	79	
21-Sep									
22-Sep		2.0		-0.05		2.0			
23-Sep		1.0		-1		1.0			
24-Sep		0.5		-1		0.0			
25-Sep		0.0		-1		-0.5			
26-Sep		-0.5		-1		-1.0			
27-Sep		-0.5		-1		-1.0			
28-Sep		-0.5		-1					
29-Sep		-0.5		-1					
30-Sep									
1-Oct									
5-Oct		Pressed							
25-Oct		Racked 2 x 60; 1x30: 2x5							
20-Dec		Racked Barrel 2 pH 3.48 Ta 11.5x0.075=0.86 %							
3/30/20		Barrel 1 racked 100 ml SO2 added							
4/10/20		Barrel 2 Racked 100 ml SO2 added							
5/26/20		2.x 60; 1x15; 1x 6.5; 1x3; 1x1							
27-May		Barrel 1 pH 3.48; Ta 10.2 ml =0.77% EtOH 13.8%							
		Barrel 2 pH 3.42; TA 11.05 = 0.83%							