

ADVANCED WINEMAKING

FOR THE SERIOUS HOME WINEMAKERS

3/3/2012

While this is not a complete course in home winemaking, it does provide guidance for the serious home winemaker. Its author is Henry Street, owner and winemaker at Ponderosa Valley Vineyard and Winery. It reflects his advice, tips and pitfalls to avoid, gleaned from his years of making award winning wine.

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SERIOUS HOME WINEMAKERS
March 3, 2012

Problem wines display one or all of the following:

1. pH imbalance, generally low acid. (high pH)
2. Hydrogen Sulfide (H₂S) in the nose - (lack of yeast nutrients)
3. Bitterness (lack of fining /over-extraction)
4. Oxidation (low free SO₂ in wine/or careless handling)
5. Protein Haze (heat in-stability)

Recommended Tools needed

1. pH meter 0.1 resolution
2. Ripper Test Kit. (to measure free SO₂)

Things to Remember

White wine ph 3.2 to 3.4

Red wine ph 3.4 - 3.6 <3.65

Additions to wine

Potassium Sorbate 1g/gal (never more)

Citric Acid addition before bottling

0.5g to 1g per gal

Oak chips additions during fermentation

Red wine 4g to 6g/ltr

White wine 2g/ltr (Chardonnay)

Bentonite additions to start (Heat stability)

Vinifera grapes 3.5 to 4 lb/1000gal

Hybrid grapes 4.5 to 5lb/1000gal

Example: How much Bentonite would you add to 50 gal of Riesling?

454g = 1 lb.

50 gal (454 g/lb.)(3.5lbs Bentonite)/1000 gal= 79.5g Bentonite

Yeast

For home wine makers I recommend only two (2) yeasts.

Red wine - EC1118 (Prise de Mousse)

White wine - K1-(V1116)

Both yeast are cheap, available and dependable.

Note: Experimentation with different yeasts is always recommended

- Some yeasts are better for under ripe or rotten fruit.

Yeast Rehydration Nutrients

Dynastart from Laffort 1.2 x (yeast amount)

Go Ferm is my 2nd choice 1.25 x (yeast amount)

Fermaid K

Should be used in conjunction with one of the two nutrients listed above. Addition rate 9 gr/gal

Add Fermaid K at 1/3 sugar depletion

EXAMPLE: If starting sugar is a 21% Brix. When do you add

Fermaid K?

21% Brix (.67) = 14% Brix

ALL WINE

Yeast & yeast nutrients addition

All yeast: 0.3g/gal (min) - 0.9 g/gal max

Dynastart yeast nutrient (Go Ferm 2nd choice)

Dynastart 1.2 x total yeast addition

Example: 100 gal of juice

(0.3x100g = 30g yeast)

30g yeast (1.2) = 36g Dynastart

Add Dynastart to warm water (110°F) (stir well)

Let mixture cool to below 100°F

Add yeast. Wait 20 minutes.

Slowly (over 5 minutes) add small amounts of juice to be fermented, to yeast/Dynastart Slurry. Add to bulk juice to be fermented.

Add the following as per attached feeding schedule

Fermaid-K - 0.9g/gal

Dap -0.9g/gal

Adjusting pH in juice or wine

Use only Tartaric Acid

1g/ltr Tartaric Acid will drop pH of juice or wine approx 0.1pH point.

Example: Red wine juice is pH 3.8 - (50gal)

To reduce pH (increase acid) to pH 3.6

$$50\text{-gal (3.785 ltrs)}(2\text{g/ltr}) = 387.5\text{g}$$

Never add more than 4g/ltr to any wine or juice at one time.

If more acid is needed, wait 24 hours before second addition.

Red Wine Fermentation Schedule

De-stem grapes and place in your choice of fermentor -

Allow to sit at least two hours.

Measure pH of juice (remember pH of 3.4 to 3.6)

If juice needs acid adjustment do it now.

Add 4 to 6g/ltr oak chips.

Example: To 50gal add 6g/ltr oak chips

$$50(3.785)(6) = 1,135\text{g chips} \qquad 50 \text{ gal} \frac{6\text{g}}{\text{L}} \frac{3.785\text{L}}{\text{gal}} = 1136 \text{ g}$$

Note: 1 ton of grapes produce approximately 150 gal of juice.

How much juice is in 700 lbs of red grapes -

$$700 \text{ lbs} (150\text{gal}) / 2000 \text{ lbs} = 52.5 \text{ gal.}$$

Allow to soak overnight -

Check pH first: Make acid addition if necessary.

Add yeast and yeast nutrient slurry (pour yeast/nutrient slurry
in one location)

Every other day check pH and make acid addition if necessary.

Red Wine Fermentation schedule Cont'd

When sugar level drops by 1/3. add Fermaid K.

- Ferment to dryness or $<5^{\circ}$ Brix

Press wine off lees and allow to set for 24 hrs.

Check pH. Make any pH adjustment needed at this time.

If you have kept your wine in the proper range (3.4 to 3.6 pH)

You should NOT need additional tartaric acid.

Add 60 ppm free SO_2 (K-meta).

$$50 \text{ gal (3.785 L/gal) (0.06 ppm) (2) = 22.7 grams}$$

Tannin additions

I recommend "Scottzyme Color Pro" enzyme

See attached handout, page 8.

This is a pectinase that helps break down the cell walls of red grapes to extract more anthocyanins, polymeric phenols and tannins.

I recommend using Color Pro on grapes that are under ripe.

Add Color Pro to the grapes as soon as they are de-steamed and allow

to set for 24 hrs.

Scottzyme ColorPro

Scottzyme ColorPro is a specialty pectinase with protease side-activities.

CHARACTERISTICS

Scottzyme Color Pro is a specialty pectinase with protease side-activities. These side-activities are important for helping break down the cell walls of red grapes to gently extract more anthocyanins, polymeric phenols and tannins. This gentle extraction creates wines that are rounder in mouthfeel and bigger in structure, with improved color stability. Wines made with Color Pro tend to have increased tannins, improved clarity and reduced herbaceous or "veggie" character. Lower doses of Color Pro are recommended for red varieties that are underripe, low in anthocyanins or high in seed tannins. For "big" reds from ripe fruit with mature seeds, higher doses of Color Pro are recommended.

Color Pro can also be used in white winemaking for settling and clarifying juice.

RECOMMENDED DOSAGE

For Whites:

Crushed Grapes = 15-20ml/ton

Juice = 50-60ml/1000gal

*Wine = 100-200/1000gal

For Reds

Crushed Grapes = 60-100ml/ton

Juice = 125-150ml/1000gal

*Wine = 150-300ml/1000gal

*Bench Trials recommended prior to treating wine

DIRECTIONS FOR USE

Crushed Grape Additions:

Dilute Scottzyme ColorPro to approximately a 10% solution in cool water.

Sprinkle the solution over the crushed grapes.

For cellar additions:

Dilute Scottzyme ColorPro to approximately a 10% solution in cool water. Add during a pump-over for even distribution.

NOTE: If tank temperatures are 30-60°F, we recommend gently stirring the tank 1-2 times per day for 10-30 minutes depending on volume. In cold temperatures, enzymes are slower to react and can pool at the bottom of the tank. Wait 4-7 days for a complete reaction to occur. Tanks that are 60+°F do not require agitation. Wait 2-3 days for reaction to complete.

BENCH TRIAL PREPARATION

Per 375 ml Bottle

For lab trial additions, use a 2.5% solution (add 2.5 ml ColorPro plus 97.5 ml DI water). Execute trials at room temperature. Reaction time can vary between samples.

Results of clarification may or may not include a precipitation.

Addition Rate/1000gal	Ml's of ColorPro Lab Dilution
100 ml	0.36
110 ml	0.40
120 ml	0.43
130ml	0.47
150ml	0.54
200ml	0.72

Storage:

Keep Scottzyme ColorPro tightly closed in a cool environment.

Activity loss decreases about 5% each year.

Packaging: 1kg = 890ml

1kg, 25kg

Presented by
Henry Street
Ponderosa Valley Winery

White Wine Fermentation Schedule (1)

In order to produce fruity, aromatic wines, the juice must be fermented at or below 60 deg F. (55-60 deg F).

Purchase an old refrigerator, this is the best option.

1. De-stem the fruit and press.
2. Cool juice to 60 deg F and allow to set over night.
3. If a large amount of sediment is present you may wish to rack-off the lees.
4. Adjust pH after wine is cool. Remember 3.2 to 3.4 pH.
5. After acid adjustment add yeast/yeast nutrient slurry.
6. After 24 hrs. check pH and adjust if necessary.
7. When sugar level drops by 1/3, add Fermaid K.
8. Fermentation should be complete in 10 days to 2 weeks.
9. Remove wine from cooler as soon as possible. Remove "bubbler" from top of carboy and replace with two layers of cellophane wrap and secure with rubber bands. Make free sulfur addition to 60 ppm. 5 gal (3.785 L) (0.060 g/L) (2) = 2.21 gr. KMeta

10. Within two weeks, rack wine off lees. (H_2S) is produced in lees.
11. Check pH and adjust if necessary.
12. Bench test for H_2S (1% copper sulfate) make addition if
Necessary.
13. Heat Stabilize (Bentonite additions) allow to settle for at least
one week.
14. Rack off Bentonite and check heat stability or heat test
(Ever Clear + wine). Make second addition if necessary.
15. Rack again, and filter to 1 micron if possible.
16. Check free SO_2 again and make adjustment if necessary.
(Free SO_2 at 50 - 60 ppm).
17. If the weather is now dropping below freezing at night, place
wine outside to cold stabilize. (Do not leave wine in the sun during
the day.)
18. Rack for final time and do recommended tests.
19. Filter to 0.45 micron. Bottle wine as soon as possible, or
by the end of January if possible.

Sugar Additions

Use this chart for your sugar additions

Sugar Additions

Use this chart for your sugar additions

%	Grams per liter	Ounces per gallon	Pounds and ounces per 100 gallons
.25	2.5	0.33	2 lbs 1.1 oz.
.50	5.0	0.66	4 lbs. 2.3 oz.
.75	7.5	0.99	6 lbs. 3.4 oz.
1.00	10.0	1.33	8 lbs. 4.5 oz.
1.25	12.5	1.66	10 lbs. 5.6 oz.
1.50	15.0	1.99	12 lbs. 6.7 oz.
1.75	17.5	2.32	14 lbs. 7.8 oz.
2.00	20.0	2.65	16 lbs. 9.0 oz.
2.25	22.5	2.98	18 lbs 10.0 oz
2.50	25.0	3.31	20 lbs. 11.2 oz.
2.75	27.5	3.64	22 lbs. 12.3 oz.
3.00	30.0	3.97	24 lbs. 13.4 oz.
3.25	32.5	4.31	26 lbs. 14.5 oz.
3.50	35.0	4.64	28 lbs 15.7 oz.
3.75	37.5	4.97	31 lbs 0.8 oz.
4.00	40.0	5.30	33 lbs. 1.9 oz.
4.25	42.5	5.63	35 lbs. 3.0 oz.
4.50	45.0	5.96	37 lbs. 4.2 oz.
4.75	47.5	6.29	39 lbs. 5.3 oz.
5.00	50.0	6.62	41 lbs. 6.4 oz.
5.25	52.5	6.96	43 lbs. 7.3 oz.
5.50	55.0	7.29	45 lbs. 8.6 oz.
5.75	57.5	7.62	47 lbs. 9.7 oz.
6.00	60.0	7.95	49 lbs. 10.9 oz.
6.25	62.5	8.28	51 lbs. 12.0 oz.
6.50	65.0	8.61	53 lbs. 13.1 oz.
6.75	67.5	8.94	55 lbs. 14.2 oz.
7.00	70.0	9.27	57 lbs. 15.3 oz.
7.25	72.5	9.60	60 lbs. 0.4 oz.
7.50	75.0	9.94	62 lbs. 1.6 oz.
7.75	77.5	10.27	64 lbs. 2.7 oz.
8.00	80.0	10.60	66 lbs. 3.8 oz.

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Henry Street
Ponderosa Valley Winery

Heat and Cold Stabilization

White Wine: Heat/cold Stabilization

1. Add bentonite at recommended rates (see page 2) Allow to settle for 1 week. Rough filter (1 micron) and do Ever Clear test.
2. Place wine in freezer (or outside in the cold) and allow to set at 26 deg F for a week. (Be sure to adjust Free SO₂ to approx 60 ppm to prevent browning.)

Red wines. I do not stabilize my red wine. I use Gum Arabic Inogum 300.

Make sugar additions at this time See Chart page 14.

To determine if you have Heat Stabilized your wine with Bentonite:

Obtain a small jar with lid (50 to 100 ml).

Add: equal parts, wine to be tested to Ever Clear grain alcohol.

Shake well and allow to sit over-night.

If sediment is present at the bottom of jar, additional Bentonite addition will be required.

Alternate Heat Stability application -

Scott Lab sells an Arabic Gum product called Inogum 300 that will prevent colloidal sedimentation.

Dose rate of 3.32L/1000 gal is recommended.

Example: To add Inogum 300 to 50 gal wine (3.2ltrs/1000g)

50gal (3200 ml/1000gal = 160 ml Inogum 300

Note: This product works as well on cold stabilizations.

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INOGUM 300



Gum arabic for colloidal stabilization
White, Rosé, Red, Fruit, Cider, Mead

#15793	1 L	\$19.70
#15794	5 L	\$59.85

Inogum 300 is a clear, 25% solution of purified liquid gum arabic. Gum arabic products help reduce the risk of colloidal deposits collecting in the bottle in wines bottled without filtration. Its colloidal protection helps prevent precipitation of unstable color while preserving flavor and structure.

USAGE

Inogum 300 should be the last commercial product added to a wine. Ideally it should be added to wine using a dosing pump. If the wine is to be filtered it is recommended that the additions be done 24-72 hours prior to the membrane filtration and that filterability trials be conducted. If the wine is not to be filtered Inogum 300 may be used immediately prior to bottling.

IOC RECOMMENDED DOSAGE*

440-770 ppm	40-70 mL/hL	1.5-2.65 L/1000 gal
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**The current TTB maximum dosage guidelines allow for 2 lbs/1000 gal of pure gum arabic. This figure was established many years ago. If you wish to use Inogum 300 at higher rates, a letter must be sent to the TTB and a positive response must be received from them prior to use. A sample letter can be found on our website (www.scottlab.com).*

TTB LEGAL DOSAGE OF INOGUM 300

958 ppm	87 mL/hL	3.3 L/1000 gal**
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***Bench trials are always recommended*

STORAGE

Dated expiration. Store in a dry, well ventilated environment at temperatures less than 25°C(77°F).

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Henry Street
Ponderosa Valley Winery

Fining Your Wines

I recommend only one product - Gusmer Enterprises - Isinglass "Drifine".

This product is the easiest to use with the best and quickest results.

For bench testing add 6g Drifine into 1 ltr of Distilled water. Mix well.

(Stir, let sit, and stir again.)

.46ml = 1/2oz Drifine in 750ml wine

.93ml = 1 oz Drifine in 750 ml wine

1.40ml = 1.5 oz Drifine in 750 wine

1.86ml = 2 oz Drifine in 750 wine

Note: This bench test slurry will last years in the refrigerator.

Typical application 1 oz/1000gal

1 oz = 28.7gr = use 30g/1000gal

Example: 1.5 oz Drifine is desired addition.

How much do you add to 50gal wine?

$50(45g)/1000 = 2.25g$ Drifine

You must filter or rack after you have made a Drifine addition.

Tests to Run on all Wine

Before you Consider Bottling

1. Check pH - Red 3.4 to 3.6 pH

White 3.2 to 3.4 pH

2. Hydrogen Sulfide Test - 2 drops of 1% Copper Sulfate ($CuSO_4$)

Into $\frac{1}{4}$ glass of wine. If you can smell a difference between the standard and the wine w/ $CuSO_4$ you need to make the addition.

Typical addition: 0.15ml/gal - 1% $CuSO_4$. If you need more than 0.15ml $CuSO_4$ you should filter the wine or fine with Bentonite.

However, add as much 1% $CuSO_4$ as necessary to remove "BAD" smells.

3. Drifine; Fining test as described on attached sheet. Use at least three tests $\frac{1}{2}$ oz - 1 oz - 1.5 oz - against standard.

4. Free SO_2 ck - Free SO_2 at 50 to 60 ppm

If you are using a Ripper test - Remember this test Always reads 20% above real free SO_2 - make adjustment.

For Red wine use a yellow "Bug Light" and you can see the color change

better.

Example: How much Potassium Metabisulfite would you add to 50 gal, if the free SO₂ was at 20ppm? (60 ppm - 20 ppm = 40 ppm required)

$$50\text{gal} (3.785)(.04)(2) = 15.15 \text{ grams k-meta}$$

Note: Potassium met bisulfite contains 58% sulfur, measurement must be doubled to obtain required dose.

See (2) in above aquasion.

Let sit for 24 hrs and test again.

5. Potassium Sorbate Addition - add 1g/gal (no more or less)

6. Filter wine.

7. Inogum 300 addition 3000ml/1000gal - always make this your last addition before bottling.