# Brehm Vineyards'
# Bordeaux Grape Wine Beginnings Guide

v2.0



## Introduction to Bordeaux Grape Wine Beginnings

The grapes provided for your Bordeaux Grape Wine Beginnings are a powerful mix of classic grape varietals, which will produce a rich, dark, fully scented wine. A blend of Cabernet Sauvignon, Cabernet Franc and Merlot, the wine will be finished with medium toasted French oak. Brehm Vineyards will guide you from the opening of your pails to bottling your wine. This Bordeaux Grape Wine Beginnings Guide, the Bordeaux Grape Wine Beginnings Log, the grapes, yeast, malolactic culture, oak cubes and a convenient way to get all the essential supplies are what we have put together for you.

If you follow these instructions and monitor your winemaking progress in the included Bordeaux Grape Wine Beginnings Log, you will produce approximately 5 cases of full-bodied, full-flavored Bordeaux style wine. This should be a wine of 'Chateau' quality, capable of serious cellaring.

There are many ways to produce this style wine. The following is a personal method based on classic winemaking techniques that has been proven over decades. It is the way Peter Brehm, our winemaker, wishes to guide you through the production of fine wine - it is not the only way.

The first two weeks of winemaking requires you to devote fifteen minutes, at least twice a day, to tend to your fermenting grapes. You'll also need a couple of hours to press the wine when it has finished fermenting. After the first fifteen days, the winemaking requires only monitoring (tasting and smelling) and predictable chunks of time. You should smell and visually inspect your

wine every 5-14 days. Racking the wine will require 1-2 hours and bottling will require 2-4 hours.

## Grape Fermentation

Grape fermentation refers to the transformation of grapes into wine by the actions of yeast reproduction. Yeast are single celled organisms that, under anaerobic conditions (oxygen-free environments), can use sugar as a carbon source to grow and divide. As the yeast reproduces, sugar is converted into alcohol. This process is known as alcoholic fermentation. In winemaking, alcoholic fermentation by yeast is also known as the 'Primary Fermentation' or 'Sugar Fermentation.'

As the yeast multiply, the sugar in the grapes is first converted into pyruvate. Through a series of enzymatic reactions, pyruvate is converted to acetylaldehyde, releasing carbon dioxide ($CO_2$) and eventually into ethanol (ethyl alcohol) as a by-product.

Production of ethanol by the yeast is a natural part of their life cycle. However, it is not the primary goal of the yeast to produce ethanol, but rather to produce energy carrying molecules to be used in other biological reactions. It is the winemakers' goal that yeast consumes the sugar in the grapes and excretes alcohol.

Winemakers endeavor to use yeast that match their future wine's desired style, alcohol content, age, related enzymatic activity and fermentation characteristics (fast, slow, foamy, etc). The presence of alcohol in high concentrations will actually impede yeast growth and may eventually kill yeast.

Brehm Vineyards has provided a winemaking yeast, Lalvin's D254, for use with our Bordeaux Grape Wine Beginnings.

This commercial yeast originated from 'natural' syrah fermentations in France. The yeast purveyor tells us "it was selected for its ability to

ferment in low nitrogen musts. It is a low foaming yeast. It has an alcohol tolerance of up to 16%." They say that in red wine, this yeast strain develops ripe fruit, jam and cedar aromas together with mild spiciness. They promise a big, mid-palate mouth feel with intense fruit concentration and a smooth tannin, mild spicy finish. These folks are poets.
In most cases, the sugar content of the grapes in conjunction with the use of proper winemaking yeast will effectively convert all of the grape sugar into alcohol. Grape must or juice that is 24% sugar (or 24° brix / balling) will produce a wine of approximately 14% alcohol.

Winemaking yeasts are usually not adversely affected by the alcohol concentration as a result of sugar fermentation in the presence of adequate nutrient sources until about 15% alcohol; some are happy at up to 17%.

## Winemaker Preparation

A good winemaker is ready for anything. Their equipment is clean and their fermentor sterile prior to taking receipt of their grapes. This should be your goal as well.

Read through this comprehensive guide and the included Bordeaux Grape Wine Beginnings Log so you will be prepared to make wine once you receive your grapes. After receiving your grapes, you have approximately a 2-week period where you are tending to the fermenting wine daily. This is not for a long period of time, but daily. A few hints to prepare yourself for this endeavor:

- Make sure that you read through and understand this Bordeaux Grape Wine Beginnings Guide before you notify your supplier (or Brehm Vineyards) to ship you the grapes.

- Read and familiarize yourself with the included Bordeaux Grape Wine Beginnings Log.

- Purchase and receive the necessary winemaking equipment.

- Read and understand all the instructions that come with your equipment as well as reading the recommended book.

- Familiarize yourself with the other books and articles posted at Brehm Vineyards' web site.

-It is also recommended that you read the books listed in the Bordeaux Grape Wine Beginnings Log as Optional Equipment.

## Where To Ferment Your Grapes

The location you choose to ferment your grapes should be temperate, around 70°F / 21°C, dry and free of any airborne contaminates. Anything that falls into your must can impart off flavors or cause other problems with the wine. A wash down floor is a real plus. Make sure to keep your winemaking environment as clean as possible

To maximize temperature and achieve the best marriage of the Cabernet Sauvignon, Merlot and Cabernet Franc musts, it is recommended that the sugar fermentation take place in a food grade plastic container of at least 28-gallon capacity. The container must be covered, or have a polyethylene sheet tied down over it. Do not make this cover airtight.
We have found that Rubbermaid's 28-gallon *RuffTote* container works very well for a primary fermentor.

## Sterilize Equipment

Before, as well as during the primary sugar fermentation, other biological organisms such as fungi, bacteria, and naturally occurring wild yeast can, and will, contaminate your wine and compete with your selected winemaking yeast for critical nutrients. These biological infections can cause incomplete sugar fermentation, create off flavors in the wine, as well as a host of other winemaking misfortunes. Therefore, it is very important that your winemaking equipment be as sterile as possible before you begin to ferment.

For Brehm Vineyards' Bordeaux Grape Wine Beginning*s,* you will need to sterilize your fermentor and other pieces of winemaking equipment so that you don't contaminate your grapes. The most convenient method of sterilization is to use common household bleach. The bleach will kill any live contaminants as well as dissolving dormant mold and fungi spores.

Use the following method for sterilizing your fermentor, carboys and winemaking equipment.

DO NOT USE THE BLEACH SOLUTION ON YOUR PVC TUBING!

- Fill your fermentor and carboys about 3/4 full with water and then add 2 fluid ounces of liquid (non-scented) bleach to the water. Then fill your containers to the top with water. This will thoroughly mix the bleach.

- Allow your containers to sit in the bleach solution for at least 15 minutes.

- After 15 minutes, safely dispose of the bleach solution. This bleach solution can also be used to sterilize your other equipment.

Bleach is a highly basic solution (with a pH much greater than 7). Simply rinsing your containers and equipment with water will not be enough to remove the bleach. To completely remove the bleach, an acid must neutralize the bleach. If the bleach is not neutralized, a slick residue will remain (as well as the smell of bleach).

Follow these steps to neutralize the bleach solution when rinsing your containers:

- Rinse containers thoroughly with cold water.

- Fill the containers 3/4 full with water and add 1/4 cup of Citric Acid crystals.

- Fill the container to the top with water.

- Stir the citric acid solution thoroughly so that all the crystals have dissolved.

- Let sit about 5 minutes.

- Pour out the acidulated water (you can pour this out directly, or use it to neutralize the bleach used on your other equipment).

- Rinse containers and equipment thoroughly with water.
- Smell the containers and equipment for bleach.

Make sure you smell your containers and equipment after you have completed the rinsing process. If you can smell bleach, repeat the rinsing process with citric acid until you cannot smell the bleach. When you are satisfied that your containers are clean, sterile and free of residual bleach, place the containers upside down to allow the containers and equipment to drain and dry completely.

You won't need the carboys until after the primary fermentation is over. Once the carboys are thoroughly dry, you can simply cover the mouth of your carboy with some plastic wrap and use a rubber band to secure the seal. Store until needed.

## Receiving Your Grapes

It has been our experience over the years that occasionally a pail of frozen grapes will slightly implode during the defrosting cycle causing the pail to appear dented. There is nothing wrong with the pail or the grapes within; it is the natural consequence of the ice thawing. However, you should not leave these pails upside down.

Swollen pails, pails venting $CO_2$, leaking pails (probably not usable), and any other serious conditions as a result of the shipment of the grapes should be received from the transport agent "with exception" to the specific condition. You should write a detailed description of the condition and have the driver, or agent write their name, date, and recognition of the condition on the bill of

lading or air waybill BEFORE you leave with the pails. Please notify your supplier, or Brehm Vineyards immediately of the problem.

## How to Thaw Your Grapes

Depending on the method used to ship you the grapes for your Bordeaux Grape Wine Beginnings, you will need to let the pails of grapes thaw for 1-4 days. It is important that you thaw your grapes in an environment at a constant temperature. You want to thaw the grapes quickly and evenly. Room temperature, 70°F / 21°C, is ideal for thawing, as well as for conducting the primary sugar fermentation.

Under no circumstances should you let your grapes thaw slowly in a refrigerated environment. If you let the grapes thaw out slowly, you greatly increase your chance of allowing a bacteria, fungi or mold from taking hold and contaminating your grape must.

Your goal is to thaw your grapes quickly and evenly so that the grapes get to proper fermentation temperature as soon as possible. Once you add your yeast and the primary sugar fermentation begins, the bubbling $CO_2$ released as a by-product of the sugar to alcohol fermentation acts as a natural barrier against bacteria, fungi or molds. Take advantage of this $CO_2$ barrier by keeping the fermenting must always covered while in an open fermentor, or always sealed with a fermentation airlock when in carboys.

When you receive your grapes, to determine the degree of thawing, take one of the pails by the handle and twist the pail in your hand. If you can hear and feel the must (crushed grapes) sloshing around inside, they are well on their way to being thawed. If you don't hear anything, then the grapes are still frozen solid inside.

Take the lid off the pail and visually inspect the grapes. Remove and freezer burned or

moldy berries. After removing and bad berries, stir the must to promote thawing. After stirring, make sure to replace your lid to prevent anything from falling into your must. You will continue to stir the grapes until they are fully thawed.

Each pail in Brehm Vineyards' Bordeaux Grape Wine Beginnings is 5 U.S. gallons of de-stemmed and crushed grapes contained in a 6-gallon pail. There is roughly one gallon of air space above the must. The air space, in contact with moist grape skins, is an ideal environment for mold to take hold and begin to grow. By turning the pails over during thawing, you help to prevent mold from forming. The mixing of the grapes will not allow a single surface layer to remain in contact with the air space for very long. This decreases the chance of mold formation.

After a day or so of turning the pails over, go ahead and take the lids off the pails. Visually inspect the must. If you see any moldy or freezer burned berries, simply remove them. Make sure your hands are clean and then go ahead and mix the grapes in the bucket thoroughly. Stir the pails with your hand and arm. If the must is completely thawed, you will be able to move the entire must around. The temperature of the must might still be cold. Stirring the grape must will speed the thawing process.

Once your pails of grapes are completely thawed, pour the contents of each pail into your fermentor. Make sure that you scrape out everything that remains in the pail, especially the syrupy 'stuff' at the bottom (which is a combination of sugars and cream of tartar that settle on the bottom of the pail during the freezing / thawing process). Add this to the fermentor. Now mix the must together thoroughly. Cover your fermentor so that no contaminants can fall into the must. The cover should not be air tight to allow the $CO_2$ to leak out.

<u>As an educational aside</u>*:*

The freezing and thawing of juice (to a lesser degree in the crushed grapes than juice) efficiently separates and concentrates the principal components of the grapes. You may recall that ice burgs are made of ice without salt. As water freezes, sugars and acids are concentrated by density. Grape's principal acid is 'tartaric', which decreases in solubility with a decrease in temperature and/or an increase in alcohol, producing cream of tarter. You can adjust the amount of sugar and the amount of tartaric acid of almost any juice by freezing.

## Take Initial Readings

Now that your grapes have thawed and you have mixed the different varietals together to make your blend, it is time to take your first analysis of the wine.

**Temperature:** Record every 12 hours the temperature, date and time in your Bordeaux Grape Wine Beginnings Log. You wish to see a steady gain in the temperature of the must.

Yeasts are able to ferment grape must at low temperatures, albeit inefficiently. The natural yeast present on the grapes will be greatly diminished with freezing. The survivors will start to multiply once the juice is thawed. The initial goal is to get the must to 70°F / 21°C within a few days from the date of shipping. You will add the selected winemaking yeast included with your Bordeaux Grape Wine Beginnings at approximately 55°F / 12.8°C.

With the help of the heat from the fermentation, your next goal is to raise the temperature of the fermenting must to 85°F / 30°C. From the date of yeast addition (Fermentation Day 1), the must should reach its top temperature of 85°F / 30°C on Fermentation Day 3 or 4 with a sugar reading of at least 12° Brix.

**Measure Sugar:** Degrees Brix or Degrees Balling are identical units for measuring the percentage of sugar in your

grape must. Specific Gravity is another method for measuring sugar concentration in your must.

Please review the Brix/Balling/Specific Gravity at then end of your Grape Wine Beginning Log. Degrees Brix and Balling will be used interchangeably throughout this guide.

To take a sugar sample of your must, you will want to fill your hydrometer container with clean juice. Avoid collecting seeds, pulp and skins, which will give you an incorrect reading. An easy way to get clean juice is to cover the container with the palm of your hand and plunge it into the grape must. Skins and pulp will tend to float to the top of the must, therefore get the opening of the hydrometer container below this level and move your hand slightly to allow the juice to fall into the container. You will feel the air being pushed out of the hydrometer container. Once the hydrometer container is full with juice, raise it above the skins and seeds. Slowly insert the Hydrometer. (You may want to insert the Hydrometer as you hold the container over your must. The hydrometer will displace some of the juice, which will spill out of the container. Simply let the juice fall back into the fermentor.) Take the reading from the bottom of the meniscus between the hydrometer and the jar. Be sure to pour the juice back into the fermentor!

Record the degrees brix in your Bordeaux Grape Wine Beginnings Lo*g*. The temperature of the juice has an effect on the hydrometer reading, as does the alcohol content of the wine. These conditions are minor for our purposes.

Monitoring the degrees brix is your fermentation speedometer. It will show you where you are in the race to total conversion of sugar to alcohol. The race starts with a slow rate of sugar consumed per hour. A cold environment really slows down the start of fermentation. It is critical that the must be warmed

to at least 85°F / 30°C before the sugar consumption begins in earnest. If it is too warm, the yeast can take the grape must from 18° brix to 8° brix in the blink of an eye, or overnight at least!

It is good to remember that you slow the fermentation with cold and accelerate the fermentation with heat.

After 8° brix, the alcohol content in the fermenting must will begin to be toxic to the yeast. The combination of increasing alcohol content and diminishing nutrients in the fermenting must will cause the fermentation rate to dramatically decrease.

## Total Acidity and Tartaric Acid

Total acidity in American wines, is measured in grams of Tartaric Acid per 100 ml. The acidity in the wine is a major flavor component. Tartaric acid adjustments are common in home winemaking. The home wine maker can add tartaric acid to their grape must prior to fermentation or to the wine after fermentation.

The purpose of adding tartaric acid is two-fold. Acid addition will increase the total acidity of the grapes as well as lowering the pH.

The grapes included with your Bordeaux Grape Wine Beginnings when blended, have a balanced total acidity. Therefore, it is not necessary to add any tartaric acid.

You can contact your equipment supplier to purchase a total acidity testing kit. It is good practice to learn to test your grape must, juice or wine for total acidity.

## Fermentation Temperature

Temperatures are extremely important in winemaking. Winemaking usually occurs in the late summer or early fall when ambient temperatures are enough to warm grape musts to proper fermentation temperatures. You want your

grape skins cap to reach a temperature of 85°F / 30°C within 3 or 4 days of adding the yeast. This is the optimal temperature for extracting the most color and phenolic structure from the grape skins.

Take an initial temperature reading of your grape must. If it is soon after thawing, the must might be too cool to add yeast. You'll want to get the must up to a temperature of at least 55-60°F / 12.8-15°C before adding the winemaking yeast. Make sure to keep stirring the must, at least 4 or 5 times a day before you add the yeast. This helps to equalize the temperature in the must as well as prevent mold formation.

Alcoholic, yeast fermentation is an exothermic reaction which will only slightly increases the temperature of the must, so you may need to help your must reach this temperature. Many winemakers will cover their fermentor with an electric blanket or set a space heater nearby to help raise the temperature of the room to at least 70°F / 21°C.

## Make A Yeast Starter

Lalvin's D254 yeast provided with your Bordeaux Grape Wine Beginnings has been freeze-dried. You can simply sprinkle the freeze-dried yeast onto your grape must and fermentation will eventually begin. This is a quick and dirty method and not very efficient.

A better way to add the yeast to your must is to make a Yeast Starter. The yeast starter is a way to wake up the yeast and build up a large, active population of healthy yeast. Adding a good starter to your grape must will more efficiently, and quickly, ferment the sugar.

Since the yeast is freeze-dried, it must first be re-hydrated before the yeast can be used. Take 1 cup of water at 100°F / 38°C and add the yeast to it. Do not mix the yeast, simply pour the yeast over the water and let it sit for 20

minutes. Be sure to use a large bowl to hydrate the yeast because the yeast will foam.

In the meantime, take a sterilized ladle or cup and take about 250 ml of the juice from the grape must (avoid skins, pulp or seeds) and pour this juice into a sterilized wine bottle.

After letting the yeast re-hydrate for 20 minutes, pour the yeast into the bottle with the grape juice. Put a cotton plug into the bottle and let the starter sit in a warm location for a few hours to overnight. (If you let the starter sit longer than a day, your will need to add more juice to the bottle to feed the yeast.)

## Add Yeast Nutrient

A yeast nutrient is to be purchased as part of the Essential Equipment for your Bordeaux Grape Wine Beginnings. The yeast nutrient gives your proliferating yeast vitamins and minerals to keep them healthy while fermenting the sugar in your grape must.

Read the instructions provided with your yeast nutrient and add the recommended amount to your yeast starter and to the grape must in your fermentor. Mix well.

If your grape must is not at the proper temperature, you can continue to feed your yeast starter by adding more juice. This will create a bigger starter. Make sure you continue to feed the starter if you do not add it to your juice within 24 hours.

## Add The Yeast Starter

Once your grape must has reached the proper temperature and you have a good yeast starter prepared, it is time to begin the sugar fermentation by adding the yeast starter to the must. Before you add the yeast starter, record the following in your Bordeaux Grape Wine Beginnings Log:

- Temperature of grape must

- **Degrees brix** of grape must

It is also a good time to record any sensory perceptions you have about the grape must including taste and smell. Use the space provided in your Bordeaux Grape Wine Beginnings Log to do so.

Once you have updated your records, and have made sure your hands are clean, add your yeast starter to the grape must. Use your hand to make an indentation in the grape must, exposing the juice below the floating skins. You want to move aside any floating skins or seeds to allow the yeast direct access to the juice. Slowly pour the yeast starter into this indentation.

Do <u>not</u> mix the yeast into the must just yet. Allow the yeast to acclimate to its new environment (which will most likely be a different temperature). If you mix the yeast around right away, you run the risk of shocking the yeast and lowering the yeast population.

Cover your must and let it sit for a few hours to overnight. After this acclimation period, wash your hands and arms again, and plunge your hand down into the must. Stir the must around completely.

Record the Temperature and Degrees Brix reading again, in your Bordeaux Grape Wine Beginnings Log.

## Keep Must At Proper Fermentation Temperature

Red wine grapes should be fermented at a warm temperature. To do this, folks usually keep the environment around the fermentor warm. There are many ways to keep the environment warm from using space heaters to wrapping the fermentor in blanket or towel. Rigid foam insulation has also been constructed around fermentors.

If you find your must getting too hot, above 95°F / 35°C, you need to cool it down. Place towels tightly around fermentor

with their ends in a cool water bath. Direct a fan at the wet towels so it creates an evaporative cooling affect on the fermentor.

You can also fill a clean, stoppered glass jug with ice water and plunge this into the must to cool the must from the inside. Do not let your must go over 95°F / 35°C.

## Punch Down The Cap Often

Within 48 hours of adding your yeast starter, you will begin to see the signs of active fermentation. In an anaerobic environment, yeast use sugar as their primary carbon source for growth and replication. The conversion of sugar into ethyl alcohol releases carbon dioxide ($CO_2$) in the process. As the yeast proliferate, more and more $CO_2$ is released. This $CO_2$ gas will rise through the grape must until it reaches the surface and escapes.

As the $CO_2$ rises, it will bring to the top the skins and pulp of the must. This is known as the wine's "cap."

$CO_2$ is heavier than air and can settle into low places where it will remain undisturbed. This means that a $CO_2$ layer will cover your fermenting must and basically sit below the cover of your fermentor.

When you lift off the cover of your fermentor, make sure to fan this $CO_2$ layer away before you smell your grape must. Otherwise, you will take in a deep breath of $CO_2$. In home winemaking, carbon dioxide production is quite minimal, however, it was once common for one, often two men to die each harvest from $CO_2$ suffocation during the production of California wines from hidden $CO_2$ in large fermentation vessels.

The more active the yeast, the quicker the cap forms. Except for Alicante Bouchet, the juice of red wine grapes is actually white. The red color comes from the grape skins. To extract the most color and flavor from the

skins, you must punch this cap back down into the fermenting wine. The grape skins must be kept in contact with the juice for maximum extraction. You should punch down this cap at least 2 to 4 times a day for the first 4 to 6 days of the active fermentation.
Each time you check your fermenting must, it is extremely important that you monitor the temperature, both in the cap and in the juice. You want your wine to ferment within a narrow temperature range. If the temperature gets too cool (below 85°F / 31°C) the yeast will grow slowly and the extraction of flavor and color components will be minimal. If the temperature gets too hot (above 95°F / 35°C) the yeast could be killed and off flavors could result.
After taking the cap temperature, punch the cap down into the juice and mix everything together thoroughly. Since heat rises, the juice at the bottom of your fermentor may be at a much lower temperature than that at the top of the fermentor. Therefore you must mix the juice and skins thoroughly.

Ideally, the temperature of the cap and the mixed must will be within 5°F /
1-3°C of each other. The temperature of the cap should reach between 83-90°F / 29-32°C.

## Measuring the progress of the yeast

By recording the degrees brix or balling of the fermenting must at least once a day, you will be able to track the progress of the yeast. As the fermentation progresses, there will be less and less sugar available. The degrees brix will be lower each day. Try to take the brix measurement at the same time each day. This way, you can chart sugar consumption as actual data points. For example, measure the sugar level every morning when you punch the cap down for the first time that day.
Use the Fermentation Log Chart in your Bordeaux Grape Wine

Beginnings Log to record he progress of your fermentation.

## Know Your Wine

It is essential that you become one with your wine throughout the winemaking process. Even though the wine can't talk, it will be able to communicate with you in many other ways.

- *Smell your wine.* From start to finish, you must smell your wine. Fruit and alcohol and other natural grape and wine smells will be apparent.

Also apparent is the presence of Hydrogen Sulfide ($H_2S$). $H_2S$ smells like rotten eggs or sulfur and can be perceived at the level of a few molecules per million. By smelling your wine, you can take action early to prevent problems later.

- *Taste your wine.* Taste is the ultimate gauge. As the must ferments, you will be able to notice that the sweet taste of the sugar will subside as the fermentation progresses. Tasting your wine is a critical way to monitor the health of the wine as it ages.

## When To Press The Wine

You want to keep the wine on the skins for as long as the primary, sugar fermentation is vigorous. The yeast will continue to work as long as their sugar fuel source is available. Since there is a finite amount of sugar in the grape must, once this sugar is used up, the yeast will die and the sugar fermentation is over. The sugar fermentation may take as long as a few weeks or as little as a couple of days to completely finish. Due to a lack of nutrients and sugar, the yeast growth will be slower near the end of sugar fermentation. With this slower yeast growth, less $CO_2$ and heat are produced. Thus, a good indication when the primary sugar fermentation is near completion is when the cap weakens and the temperature of the must decreases.

Each day as you punch down your cap, you will be able to gauge the strength of the cap.

The formation of the cap and the $CO_2$ visibly bubbling through the must are clear signs of a vigorous fermentation. Four or five days into the fermentation process, you will notice that the cap is not quite as tough to push down and the amount of bubbling $CO_2$ will slow. Eventually, the cap will fall in on itself due to lack of $CO_2$ being produced. At this stage, the amount of sugar available for fermenting is quite low. Other nutrients necessary for the yeast growth are also in limited supply.
Ideally, you want to press your wine under one or some of the following conditions:

- after 4 days of active fermentation
(By this time the entire pigment coloring has absorbed into the juice. Further skin contact actually causes a reduction in color.)

- the must is at 2° to 3° brix/balling

- at the point when the tannins soften

As an educational aside*:*

The extraction of phenolics, color, etc, happens initially from heat and alcohol exposure with the skins - the first four days. From then on there is an exchange of phenolics. The major accumulation that proceeds is the alcoholic extraction of the seeds. Long skin contact, as well as seed contact, creates very phenolic wine. Strong black tea, left on the leaves is phenolic. In grape wine, especially Bordeaux style wines, you can create long chains of phenols by extended skin and seed contact. These long chains of phenols will not fit in our taste receptors - you can only taste what gets in. This is an advanced technique often used for the top line Bordeaux style wines. The wine tastes less bitter, because it is very bitter! If only life could be so.

## Time To Press

Using the Fermentation Log Chart in your Bordeaux Grape

Wine Beginnings Log, predict when the must will reach 2-3° brix. Plan your pressing for this day. If pressing is delayed and fermentation is just about over, place a 4-millimeter (or thicker) poly sheeting right on top of the cap. You will need to hold this poly sheeting down over the grape must. You can use clean sand, or marbles or even distilled water for holding down the sheeting.

The idea is to simply eliminate any airspace above the level of your must. Put your standard fermentor cover over this poly sheeting.

Pressing Hints:

- Let grapes/wine sit undisturbed for 12 hours before pressing, allowing the cap to form.

- Using a plastic or stainless steel colander, scoop off the grape skin cap, removing most of the floating skins and pulp in your wine.

- Place the drained skins into the press cage (which you rented or purchased) or into cheesecloth (within another clean pail).

- Using the colander to filter/hold **out** solids within the fermentor, you can siphon or pump free run juice from within the colander directly into carboys.

The yield from the grape must will vary. Smaller berries = more extract = less wine. The Bordeaux Grape Wine Beginnings is a low yielder. Your yield will be about 12-13 gallons.

The best, and easiest way to press the wine off the skins is to rent a wine press from your local home winemaking shop. This way you will be able to maximize your winemaking yield and have the right tool for the job.
Use the press to squeeze all of the wine out of the skins and pulp. You cannot press the skins too hard.

It should be pointed out that there is still some good character left in the pressed

skins. It is a tradition in Italy and France to have these skins re-fermented with water and sugar. This 'wine' is then distilled into what is known as Grappa. How good it can be.

Winemakers in far away places will add 1/2 the amount of wine achieved from the grapes back to the grapes in the form of water (preferably distilled), with sugar to bring the pressed must to about 24° brix, tartaric acid to bring the TA to about 0.75 and yeast nutrient. Fermented, this is called a second wine.

## Winemaking After Pressing

Siphon the free run wine, and the wine you squeeze out of the grape skins into your carboys. If the wine is still fermenting, fill the carboys up to their shoulders. You want the carboys to be as full as possible without the wine getting into the fermentation lock. If, or when the sugar fermentation is complete, make sure the carboys are filled all the way up to the neck; leave 1/2 inch of air space between the wine and the rubber stopper/airlock.

Save any excess wine in a 3-liter jug (with an airlock) so that you can top up your wine after the Gross Lees Racking. Be sure to check the carboys the day after pressing. Sometimes the wine expands, and vigorous foaming may knock off fermentation locks.

## First Racking: Gross Lees Racking

Within a few hours after pressing, you will notice that sediment begins to form at the bottom of your carboys. This is dead yeast cells or lees along with grape particles that precipitate or fall to the bottom of the carboy. After a week to two weeks of settling, you will need to rack your wine if you have more than one inch of sediment.

Racking entails siphoning or pumping the wine off the

sediment into a sterile carboy. Make sure not to splash the wine or cause it to bubble. Allowing too much oxygen to be exposed to your wine can cause it to oxidize prematurely.

After you transfer the wine, you may notice that your final carboy / container is not completely filled. It is extremely important to minimize the air contact with your wine. Take your extra wine that you kept in the 3 liter jug and use this to top up your carboy. If you find that you do not have enough wine to top up the carboys, then you must use a dry commercial wine, or some distilled water to top up the wine. You can also add sterilized glass beads or marbles to displace the wine in your carboy, which will minimize air contact.

Record the smells and taste of the wine after the Gross Lees Racking in your Bordeaux Grape Wine Beginnings Log.

Wine's Coming of Age

The birth of the wine begins with the first yeast chewing on a hunk of fructose. The coming of age, the confirmation, the barmitzvah of wine is when it consumes its sweet nature and adorns the protection of an alcoholic shield. This shield is quite effective in warding off infection, as long as it is not exposed to excessive oxygen (air). Prior to and during fermentation, the juice (the must) was protected from oxygen (oxidation). Yeast are extremely effective in scavenging oxygen from their environment, all the more so if fermenting without exposure to oxygen. The $CO_2$ produced by the yeast blankets the wine from the air, a good reason for covers and airlocks. When there is no feeding yeast, the oxygen is absorbed into the wine during racking, topping, bottling, etc and oxidizes the color and phenols in the wine. We all must oxidize, and so must our wine. A critical winemaking task is to control the wine's oxidation.

There are many traditions and rituals evolved over centuries that allow oxidation of the wine in a controlled way. Everyone learned early that bigger was better for less oxidation. Limit the surface area of wine exposed to the air and you cut down on oxidation. This holds true for containers, and in particular with hoses. The surface area of a 2-inch hose (small for a winery) compared to a 3/8 inch hose is staggering. Small-scale winemaking is extremely difficult due to the wine's excessive exposure to oxygen.

I have heard that the optimum level of oxygen pickup for red wines is from 60 to 130 mg per liter during their life. Winery size operations have shown oxygen pickup of 20 mg per liter from topping up barrels and 20 mg when racking wine. There is little oxygen transfer through oak barrel staves and hardly any (measured at 0.1 mg / liter for lifetime of wine) for corks. Barrels do seem to allow the permeation of certain gases, but corks have very little in the way of redeeming value.

You need to be careful in introducing air to your wine. Sometimes it may need some air but as a policy:

- Do not splash wine in racking. Keep the racking hose under the wine.

- Maintain wine into the neck of all carboys to minimize surface area. If need be, it is better to add a dry commercial wine or distilled water to top up the carboy. You can also add sterilized glass beads or marbles to displace the wine, eliminating the airspace.

- Keep fermentation locks filled with clean, sulfite solution, well sealed.

- Maintain, after malolactic fermentation, approximately 20-25 parts per million free Sulfur Dioxide ($SO_2$) in the wine.

Potassium metabisulfite is the chemical used to add $SO_2$ to the wine. It is the chemical of choice

in combating oxidation and a host of other wine maladies. See pH & $SO_2$ Additions for more information.

## Residual Sugar Test

The wine's sugar fermentation activity will gradually slow to a stop. Using your hydrometer, the wine should measure a 0° or less on the brix / balling scale. This does not mean that the sugar fermentation is complete. Residual sugar may remain. A hydrometer is simply not accurate enough to measure the small amount of sugar left in the wine. Wine is not considered 'stable' until it is 0.2% or less residual sugar. There is not a risk of sugar-related bacterial degradation or the wine starting to re-ferment at 0.2% or less. Once all signs of $CO_2$ production has ceased, use the Dextro-Check Kit to perform the Residual Sugar test. Use a 10-drop (0.5 ml) sample of the wine to determine how much residual sugar is remaining in the wine.

Record the percentage of Residual Sugar in your Bordeaux Grape Wine Beginnings Log.

Wait until you measure less than 0.3% residual sugar before you add your malolactic culture to induce a malolactic fermentation.

## Induce A Malolactic Fermentation

If your wine measures 0.3% residual sugar, it is time to induce a Malolactic Fermentation (MLF). This is also known as the secondary fermentation in winemaking. It is considered fermentation because $CO_2$ is released in the chemical process. Lactic acid bacteria use the malic acid in the wine as an energy source converting the malic acid into lactic acid and $CO_2$. Lactic acid is perceived to be softer and milder when compared to malic acid in tasting wine.

The malolactic culture provided with your Bordeaux Grape Wine Beginnings is enough for 60-gallons of wine. If the residual

sugar of the wine is less than 0.3% and the wine temperature is about 70°F / 18°C, distribute 1/8 of the package of the malolactic powder for each 5-gallons of wine. Then put the air locks back on your containers. Save the remaining bacteria in the packet for future wines. Store, well sealed, in the freezer. It should last for about a year without losing its activity.

At this point, your wine will be finishing up (or have finished) its primary sugar fermentation. Keep the wine in a warm environment. The malolactic culture is most active at temperatures between 65-75°F / 18-22°C. Below or above these temperatures can retard the malolactic fermentation. You must keep the temperature in your winemaking environment constant.

After adding the malolactic bacteria and storing the wine for a few days at proper temperature, take a look at the bubbles forming along the edges of the carboy. The $CO_2$ bubbles formed during sugar fermentation tend to be larger than the pinpoint sized malolactic fermentation bubbles.

This 'secondary' fermentation is as natural as gray hair. You should count on it happening even if you didn't add the bacteria. It is not an event you have the option to ignore. Once the wine reaches about 70°F / 21°C, malolactic fermentation is almost spontaneous in the wine due to naturally occurring lactic acid bacteria.

Malolactic fermentation can be inhibited by temperature, $SO_2$, alcohol content of the wine, clarity of the wine, isolation from the malolactic bugs (filtration), or by the addition of Lysozyme.

## Oak Flavoring

The customs in the world of wine die hard. Containers of old often imparted flavors into the wines. The pitch-coated clay amphorae of the Mediterranean basin imparted their resin flavor

to the wine, a custom still being inflicted on some Greek wine.

Oak certainly is more than a container, it is a component of the wine which imparts flavor and aromatics. Bordeaux style wines combine well with oak.

The smallest oak barrel recommended for oak aging would be 30-gallons, 15-gallons is the absolute minimum. Even though 5 and 10-gallon oak barrels do exist, it is not recommended that you purchase one for aging your wine. Resist the temptation.

With small volumes of wine, we recommend using oak cubes or pieces of oak for adding oak complexity to your wine. The oak should be air dried for at least 18 months and ideally for 24 months. Only the heartwood is acceptable. The oak should be toasted from a light to heavy char. Medium plus toasting is the average. The larger the wood pieces, the longer the extraction period. The depth of wood adds complication to the aromas, mouth feel and overall flavor of the wine. Over time, the oak will settle to the bottom of the carboy.

At the same time you add your malolactic culture to your wine, go ahead and proportionately distribute the oak pieces provided into the carboys. Record in your Bordeaux Grape Wine Beginnings Log the date you add the oak to your wine.

Monitor and record the oak complexity by tasting your wine every couple of weeks.

## Wine Stability

If any residual sugar is left in wine that has been bottled, it is possible that this sugar can be fermented in the bottle by surviving yeast. This will cause the bottle to spoil, retain dissolved carbon dioxide or even explode. Malic acid in the wine can produce similar effects. Naturally occurring lactic acid bacteria can make it into your bottled wine and create a malolactic fermentation. Thus, to have a truly stable wine, all the sugar must be fermented

and malic acid must be converted. Only at this point is a wine considered stable enough for bottling.

At this point in the winemaking, you have tested the wine for residual sugar and it is at or below 0.2%. You do not know if the malolactic fermentation is complete. To test for malolactic fermentation, you will need to send a sample to a laboratory for testing.

Malolactic fermentation can take weeks to months to complete. The best way to monitor the progress is to simply look closely at the wine in the carboy. You will be able to see the tiny bubbles of $CO_2$ rising to the top. Sometimes you may even see your airlock jump or bubble when the $CO_2$ builds up. As the malolactic fermentation nears completion, the rate of the $CO_2$ bubbling will slow down.

You can monitor the malolactic fermentation by paper chromatography methods. Unfortunately you cannot determine when the malolactic fermentation is complete by this method. Once you do not see any bubbles evolving from the wine (storing it at 65-75°F / 18-22°C during this time), this is a good indication that the malolactic fermentation is complete. At this point, you need to send a sample of the wine for testing.

## Send a sample to a wine lab

Contact a wine-testing laboratory for instructions on how to send a sample. A list of testing laboratories can be found at the end of your Bordeaux Grape Wine Beginnings Log.

You will want to have them test for Malic Acid Conversion by an enzymatic method. This will tell you if your malolactic fermentation is complete.
If the wine testing laboratory confirms that the malolactic fermentation is complete, have them test the pH of the wine.

Brehm Vineyards has designed the Bordeaux Grape Wine Beginnings to create a blend of

grapes whose individual characteristics mix together making a good winemaking starting point.

Some of the wine's other important components are the pH, total acidity, and the malic acid concentration. These tests can be difficult to impossible to perform at home and always include a large investment in equipment.

It is for this reason that we encourage you to begin a relationship with a wine-testing laboratory. Brehm Vineyards knows the average sugar, pH, total acidity, etc. of the vineyard a day or two before harvest. Samples are taken at harvest. Your pails of grapes will have labels reflecting these averages. In white juice they are quite accurate. Hand harvested, black grapes are averages only. Each pail will be different; the more pails used, the closer the average. You are usually safe by following the labels instructions for the sugar fermentation.

## Total Acidity and pH

The balance between acids and bases is a hypothetical measurement that quantifies the way elements are, and helps us predict the future. The pH of the wine affects the amount of free $SO_2$ that is available to the wine. The actual amount of $SO_2$ to add to a wine can only be determined once the pH of the wine is known. The pH of a wine can change dramatically between harvest and the end of fermentation. Often potassium will be released into the wine from the skins causing a dramatic rise in pH. The cold maceration of the skins prior, during, and after freezing will raise the pH of the grapes from their pre-harvest readings. The alcohol will lower the tartaric acid content, as does the freezing. After the sugar fermentation is complete, it is a good time to check out where the wine stands.

The probability of a successful and complete malolactic fermentation is dependent on many things, most notably on the wine's pH. Temperature, $SO_2$

content, nutrient availability, the malolactic culture's characteristics as well as the alcohol percentage of the wine are all considerations. If the pH of the wine is less than 3.20, malolactic fermentation becomes more difficult. As the pH decreases, special cultures may be required. Malolactic bacteria are inhibited by wine with over 14.5% alcohol. At 15% only special cultures will work reliably. Temperatures below 65°F / 18°C will inhibit malolactic fermentation. Free and / or combined $SO_2$ inhibits malolactic fermentation.

With deeply colored wines, the Total Acidity (TA in the United States is measured in grams of tartaric acid per 100 milliliters) becomes difficult to determine. Wines with acidity above 0.75 TA usually will benefit from a malolactic fermentation; below 0.55 TA, the wine will probably benefit from the addition of tartaric or citric acid.

Citric acid is only added after malolactic fermentation; tartaric acid may be added at any time. Tartaric acid has the nasty habit of precipitating cream of tartar after addition to the wine. In your future wines, if it is necessary to add more tartaric acid, make sure to add it at least 6 weeks before bottling. Holding the wine at 35-40°F / 1.7-4.5°C two weeks before bottling will help settle out cream of tartar, lessening deposits in the finished bottles. This is called cold stabilization.

## Subsequent racking

Unless you filter your wine, you will always have microscopically small particles of grapes in your wine. These particles, if denser than the wine, will fall to the bottom as sediment. The more you rack your wine, the more particles you are able to remove from the wine. However, you always lose some wine when you rack. Racking is part of the oxidation of the wine. Burgundy style wines are hardly racked, whereas commercial Bordeaux style wines are often splashed when racked to increase oxidation of the wine.

Ideally, you will have 3 rackings of the wine after you press:

- The first racking is a few days to a couple of weeks after pressing. This is the Gross Lees Racking. It is desirable to bring over a small amount of the sediment - no more than 1/8 inch. This sediment will help the malolactic fermentation.

- The second racking is approximately 6 weeks prior to bottling the wine. The wine at this point should be stable (malolactic and sugar fermentation completed), $SO_2$ has been added and the wine exposed to the oak. The oak should be in contact with the wine for at least 60 days, 90 days is better. Any off smells or fining may require another racking.

- The third and final racking will be approximately 2 weeks before you bottle your wine.

## pH & $SO_2$ Additions

Sulfur Dioxide, $SO_2$, is a gas which is used as a preservative in winemaking. There are many methods for adding $SO_2$ to your wine and many different theories for when to add $SO_2$. Brehm Vineyards feels that as long as the wine is active, either undergoing the primary sugar fermentation or the secondary malolactic fermentation, the addition of $SO_2$ is not necessary with fruit in good condition.

There are some conditions that require an addition of $SO_2$ at harvest. The fruit provided for your Bordeaux Grape Wine Beginnings was harvested clean and will hold up without $SO_2$ addition, under conscientious winemaking care, until after the malic acid reduction, or malolactic fermentation, is complete.

Upon receipt of the laboratory results of your wine sample, record these results in your Bordeaux Grape Wine Beginnings Log.

The pH of the wine, after completion of malolactic fermentation, will be the guide in determining how much $SO_2$ is

necessary to properly preserve your wine. We use Potassium Metabisulfite to add $SO_2$ to wine.
Read the tenths and hundredths position of your pH reading and this will tell you the amount of potassium metabisulfite, in parts per million to add to your wine. If the pH is 3.78 you should add 78 parts per million $SO_2$ to the wine. If the pH is 3.45, add 45 parts per million $SO_2$ to effectively protect the wine.

Refer to the Potassium Metabisulfite Addition Chart in your Bordeaux Grape Wine Beginnings Log for instructions on making a solution of $SO_2$ for easy addition to your wine.

- You must add $SO_2$ as soon as the malolactic fermentation is complete.

- Add $SO_2$ into containers from which you will bottle.

## Fining The Wine

Tannin is perceived as a drying effect on the tongue and sides of your mouth when tasting wine. Too much tannin can make the wine undrinkable; the tannin is too aggressive. These are the tannins that enter and fill up your taste receptors. Tannin comes from the skins and seeds of grapes. Grapes such as Cabernet Sauvignon, Syrah and Zinfandel are usually high in tannin. Tannin is also what allows a wine to age. The astringency does subside over time. Many Cabernets are not ready to drink for a minimum of 5 years after bottling to allow an oxidation of some of the phenols.

To reduce tannins, you can let the wine age or you can fine the wine. Fining refers to the addition of an ingredient that assists the wine in clarification or modification of taste, smell and appearance.

With Bordeaux style wines, reducing the amount of tannins is fairly common. A traditional method of fining a red wine is to first get a freshly laid chicken egg (store bought will do). Discard the yolk. Take about a 1/2-tablespoon of the white of

the egg (for 5 gallons of wine) and whisk with water and a dash of salt. Do not froth. Thoroughly mix this egg white mixture into the wine.

Note: If you are allergic to egg whites, please contact your home winemaking equipment supplier for alternative fining methods.

The albumin in the egg white will bind to free tannin and eventually the complex molecule will precipitate to the bottom of the carboy. Let your wine settle for at least three weeks before racking.

If you do find that the tannin in your wine is too aggressive, you might wish to fine it. Fine one of your two carboys first so that you have a point of reference. After tasting the fined wine, you may wish to fine your second carboy. Be sure to first take an equal sample of the fined wine, and the un-fined wine and taste this mixture. The reduction in tannins from half of your total volume of wine might be the right amount.

## Bottling the Wine

The wine is now stable. It has undergone a complete sugar fermentation and has had a complete reduction in malic acid. We have maintained a free $SO_2$ presence in the wine to inhibit oxidation. The wine should be young and aggressive, but pleasant without any off smells or flavors.

After your last racking, the wine is finally prepared for bottling. Any fining or cloudy wine should be racked at least once before this final racking. You wish the wine to have sufficient $SO_2$ when entering the bottle. Add the final amount of $SO_2$ to the bottom of the carboy from which you will bottle. This amount of $SO_2$ is based on the pH of the wine. This should be the same amount you added after you received confirmation that malolactic fermentation was complete. Rack without splashing the wine. Set the carboy(s) on a bench or shelf from which you can siphon the wine.

I recommend beer, wine, soda or champagne bottles that can receive a crown cap for bottling. Bottle caps are extremely cost effective. Corks cost a lot of money and offer an inferior seal when compared to crown caps. You need to spend at least $60.00 on a corker to get one that really works. The most recent corks I bought were over 20¢ each.
I do not want to project an image of a 'Wacko'. I use corks in my wine bottles because I do not want to distract the recipient from tasting the grapes. Here you are paying me for my best thoughts. For use in your home, for the best seal available, bottle with crown caps. The wine will age with crown caps equally as well if the bottle were corked.

Be careful in filling the bottles. Some folks will blanket the wine (fill the bottle) with $CO_2$ or nitrogen before filling. The $CO_2$ will give the wine a slight spritz, especially if bottled cool. Nitrogen or argon are the best gases to use. A full-bodied red, like this wine, does not need to be blanketed.

If you decide to use corks and rent or buy a corker, make sure to get an irised floor model:

- Don't soak your corks before bottling. Use #9 corks with a light paraffin coating of good quality at least 1-1/2 inches long.

- Allow the corked bottles to stand upright for three days before putting them on their sides or upside down.

Age the bottled wine for about 5 months in cool, constant temperature, and then give one a try. This wine will start becoming enjoyable in 18 to 24 months.
Smaller bottles age faster than large.

Good Winemaking! Peter Brehm