Making Muscadine Wine at Home (Advanced)

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with winemaking tips from

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& Board Member, North Carolina Muscadine Grape Association
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Outline of this class

Legal stuff
Supplies needed for better winemaking
Some testing equipment you need
Some useful charts/tables
A few useful equations
Recipe for making good Muscaine wine at home
How wine judges evaluate your wine
Useful references
Why are you sitting in on this class?

- To kill a morning
- I’m seeking a cheap buzz
- I’m frugal - $1.50 per bottle
- Curiosity / interest in winemaking
- To have fun!
Winemaking Philosophy

Where I stand on winemaking at home.

There are two basic positions that make sense in home winemaking.

1 - To make wine as cheaply and simply as possible without wasting time and effort - just getting by with basic table wine – also known as plonk!

2 – To make wine involving a commitment to quality bordering on the obsessive that requires a body of knowledge at a level nearing that of commercial vintners. I follow this position.

It is a lot easier to get novices started off on the right foot than to change 30-year-old bad habits of veterans.
In this class you will learn:

- a little math…
- a little physics…
- a little chemistry…
- a little zymology…
- a little bacteriology…
- a little practical lab skills…
  somewhat like cooking…

But a lot more fun!

Just chill out and take good notes – winemaking is not hard!
The aggregate amount of wine that may be produced exempt from tax with respect to any household may not exceed:

1. 200 gallons per calendar year for a household in which two or more adults reside, or
2. 100 gallons per calendar year if there is only one adult residing in the household.

Legal Stuff...

How much wine can I legally make?

Note: You can make alcohol, but you can’t concentrate it!

The U.S. Law Concerning Alcohol Production
What factors impact the quality of wine made at home?

- Quality of your must or juice source
- Sanitation level
- Ability to test/taste your wine
- Ability make necessary adjustments of acidity, sweetness, residual sulphite, etc.
- Your winemaking skills
Supplies

Winemaking supply kits
Supplies

- Airlocks
- Food grade plastic tubing
- Stirring rods
- 24” stirring paddle
- 250 ml graduated glass cylinder
Supplies

Food grade plastic buckets
Glass carboys - 1, 2, 3, 5 or 6.5 gallons
Motorized transfer pump (optional)
Measuring spoons and cups
Supplies

RO or distilled water (install under-sink or buy bottled)
Bottle drying racks
Bottling cane
Funnels
Supplies

Wine bottles (new or recycled)
Wine bottle labels (make your own)
Paper towels
Stiff paper
Hanging tags
Corks
Buy the best quality you can get
Only the glass bottle and the cork are protecting your wine
Capsules
Heat Shrink Capsule Tool
   Manual (Dip in boiling water for 3 seconds)
   Hair dryer/heat gun
   Small electric heat shrink machine

My favorite
Supplies

Masking tape or clear packing tape
Sponges (for spills)
Bottle brush & Carboy brush
Razor blades (label removal)
Glue sticks (label attachment)
Permanent marker
Supplies

Yeast – Dry versus Liquid

Toasted oak chips (or oak powder) – adds oak flavor to wine

Campden Tablets (KMS) – kills rogue yeasts in the must

Tannin Plus – gives your wine a tannin kick

Dextrose or Simple sugar – to chaptelize low sugar musts

Yeast Energizers/Nutrients
Supplies

Corking Machines
Supplies

Floor/Table Top Corking Machine
Supplies

Testing Equipment

Mercury (silver) or alcohol (red) column thermometer

Digital thermometer
Supplies
Testing Equipment

Hydrometer
<table>
<thead>
<tr>
<th>Specific Gravity *</th>
<th>Brix (Balling)</th>
<th>% Sugar</th>
<th>% Potential Alcohol (Baume)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.059</td>
<td>14.4</td>
<td></td>
<td>8.0</td>
</tr>
<tr>
<td>1.063</td>
<td>15.4</td>
<td></td>
<td>8.5</td>
</tr>
<tr>
<td>1.066</td>
<td>16.2</td>
<td></td>
<td>9.0</td>
</tr>
<tr>
<td>1.071</td>
<td>17.1</td>
<td></td>
<td>9.5</td>
</tr>
<tr>
<td>1.075</td>
<td>18.0</td>
<td></td>
<td>10.0</td>
</tr>
<tr>
<td>1.079</td>
<td>19.0</td>
<td></td>
<td>10.5</td>
</tr>
<tr>
<td>1.083</td>
<td>20.0</td>
<td></td>
<td>11.0</td>
</tr>
<tr>
<td>1.087</td>
<td>20.8</td>
<td></td>
<td>11.5</td>
</tr>
<tr>
<td>1.091</td>
<td>21.7</td>
<td></td>
<td>12.0</td>
</tr>
<tr>
<td>1.095</td>
<td>22.5</td>
<td></td>
<td>12.5</td>
</tr>
<tr>
<td>1.099</td>
<td>23.5</td>
<td></td>
<td>13.0</td>
</tr>
<tr>
<td>1.103</td>
<td>24.3</td>
<td></td>
<td>13.5</td>
</tr>
<tr>
<td>1.108</td>
<td>25.4</td>
<td></td>
<td>14.0</td>
</tr>
<tr>
<td>1.112</td>
<td>26.3</td>
<td></td>
<td>14.0</td>
</tr>
<tr>
<td>1.116</td>
<td>27.1</td>
<td></td>
<td>15.0</td>
</tr>
</tbody>
</table>

*Make temperature corrections for Hydrometer readings*
Supplies

Put drop of juice here
What is pH?

pH - potential of Hydrogen (acidity) measured on a logarithmic scale

14 - highly basic
7 - Water - neutral
1 - highly acidic

Wines - 2.8 to 3.5

7 - Water - neutral

Wines - 2.8 to 3.5
Supplies

Testing Equipment

Portable pH Meters
Supplies

Testing Equipment

Total Acidity (TA) Test Kit - follow directions
Deficiencies in acid can be corrected by adding Tartaric acid, or an Acid Blend

Minimum TA for wines is 6 to 8 g/L for red wines

Optimum being 6.5 to 8.5 g/L for white wines
<table>
<thead>
<tr>
<th>Total Acidity (TA)</th>
<th>To obtain 6 g/L add to each gallon</th>
<th>To obtain 8 g/L add to each gallon</th>
</tr>
</thead>
<tbody>
<tr>
<td>(g/L*)</td>
<td>(g) - oz</td>
<td>(g) - oz</td>
</tr>
<tr>
<td>3.0</td>
<td>11.3 0.39</td>
<td>18.9 0.66</td>
</tr>
<tr>
<td>3.5</td>
<td>9.4 0.33</td>
<td>17.0 0.60</td>
</tr>
<tr>
<td>4.0</td>
<td>7.5 0.26</td>
<td>15.2 0.53</td>
</tr>
<tr>
<td>4.5</td>
<td>5.6 0.19</td>
<td>13.2 0.46</td>
</tr>
<tr>
<td>5.0</td>
<td>3.8 0.13</td>
<td>11.4 0.40</td>
</tr>
<tr>
<td>5.5</td>
<td>1.9 0.66</td>
<td>9.5 0.33</td>
</tr>
<tr>
<td>6.0</td>
<td></td>
<td>7.5 0.26</td>
</tr>
<tr>
<td>6.5</td>
<td></td>
<td>5.6 0.19</td>
</tr>
<tr>
<td>7.0</td>
<td></td>
<td>3.8 0.13</td>
</tr>
<tr>
<td>7.5</td>
<td></td>
<td>1.9 0.66</td>
</tr>
</tbody>
</table>

* Titratable acid as tartaric acid
Alcohol (ALC volume %) = (B * 4.16 - SG + 1000) * 0.365
Solids (sugar) (g/L) = (SG - 1000 + ALC * 1.264) * 2.52

Where SG is in 3 or 4 digits, B is the Brix reading.

Must solids mostly sugar, but also acids, other minor solid components in wine
In sweet wines, nearly all solids assumed to be sugar

Measurement accuracy affected by temperature. Essential to stabilize at same
temperature, preferably in 59 - 64.5 Fahrenheit range
Clean & sanitize EVERYTHING – bottles, glasses, corks, tubing, caps, stirrers, carboys, hands – anything that may come in contact with the wine
**Supplies for Cleaning/Sanitizing**

**One Step™** (cleaner & sanitizer)
- One tbsp per gallon of warm water
- 25 minutes soak

**KMS** (Potassium Metabisulphite - sanitizer only – you still need a cleaner)
- Two oz./gallon of water
- 20 second soak
- Works great in a spray bottle too!

**Iodophor™** (sanitizer only – you still need a cleaner)
- Two caps/5 gallons
- 60 second soak
Supplies

Grapes

Grape Crusher

Wine Press

Press bag
5.3 gallon bucket of water = 44.2 pounds
5.3 gallon bucket of juice weighs 47.5 pounds

Supplies

Carboy carrier strap

Carboy handle

Carboy dolly
Weight of Grapes Depends upon Variety

Stems - 2 to 8%
Skin - 5 to 20%
Flesh - 74 to 90%
Seeds - 0 to 6%

1 ton of vinifera yields ~ 150 gallons of juice
1 ton of muscadine grapes yields ~ 125 gallons of juice
STALK & STEMS - (pedunkles and pedicels) have pH between 4 and 5
High in potassium
Sugar content less than 1%
Polyphenols - (leucoanthocyanins & catechins which have a harsh astringent taste) make up 0.5 to 3.5% by weight
Makes up to 20% of tannin in harvested grapes

SEEDS - contain up to 50% similar tannins
Seeds contain bitter grape oils
SKINS - contain considerable sugar - about 80% of the flesh. About 10% of the total phenolics in white grapes are in skins. Dark grapes have 65% phenolics in the skins.

WAXY BLOOM - contains fatty acids and sterols which stimulate yeast and bacterial growth.
Muscadine grape must - 15 to 17 Brix (1.060-1.070 SG)

Musts falling short of these values can be corrected using several methods:
  Back sweeten
  Adding sugars
How much sugar to add to your juice to make potential alcohol higher

\[
S = \frac{W \times (B - A)}{(100 - B)}
\]

S = weight in pounds of sugar to be added to the must
W = weight in pounds of the grape must (SG x weight of water equivalent - 8#/gal)
B = desired Brix
A = original Brix of grape must

For example, if you want to raise the Brix of 10 pounds of must or juice from 15 to 23 calculate as follows:

\[
S = \frac{10 \times (23 - 15)}{(100 - 23)} = 1.04 \text{ pounds}
\]
Some common clarifiers used by home winemakers:

<table>
<thead>
<tr>
<th>Time</th>
<th>+/-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigeration</td>
<td>+/-</td>
</tr>
<tr>
<td>Super-Kleer (Kieselsol/Chitosan (shellfish))</td>
<td>+/-</td>
</tr>
<tr>
<td>Activated Carbon</td>
<td></td>
</tr>
<tr>
<td>Crushed egg shells</td>
<td></td>
</tr>
<tr>
<td>Diatomaceous earth</td>
<td></td>
</tr>
<tr>
<td>Polyvinylpyrrolidone (PVP)</td>
<td></td>
</tr>
<tr>
<td>Polyclar</td>
<td></td>
</tr>
<tr>
<td>Milk (2-3 drops per gallon)</td>
<td></td>
</tr>
<tr>
<td>Egg albumen (egg whites)</td>
<td>+</td>
</tr>
<tr>
<td>Gelatin</td>
<td>+</td>
</tr>
<tr>
<td>Isinglass (fish scales)</td>
<td>+</td>
</tr>
<tr>
<td>Casein and caseinates</td>
<td>+</td>
</tr>
<tr>
<td>Chitosan (chitin)</td>
<td>+</td>
</tr>
<tr>
<td>Sparkolloid</td>
<td>+</td>
</tr>
<tr>
<td>Enolophin / Kieselsol</td>
<td>-</td>
</tr>
<tr>
<td>Bentonite clay</td>
<td>-</td>
</tr>
</tbody>
</table>
There are six names used for sulfites:
- sulfur dioxide
- sodium sulfite
- sodium bisulfite
- potassium bisulfite
- sodium metabisulfite
- potassium metabisulfite

Sulfites, bisulfites, and metabisulfites are all dry chemical forms of the gas, sulfur dioxide.
Sulfite addition after fermentation and before bottling.
On-Line Sulfite Calculator

Preferred method of Sulfite addition:
- Sulfite Powder (default method)

Type of wine:
- Red (default type)

Volume of wine to be corrected:
- 3 Gallons

pH of Wine:
- 3.50 (e.g., 3.45) (see note 1)

% Alcohol by Volume:
- 12.0 (e.g., 13.5)

Temperature of the Wine:
- 75 °F

Current level of free SO₂:
- 0 mg/L

Desired level of free SO₂:
- 40 mg/L

Desired molecular SO₂:
- 0.5 mg/L (default value)

% Adjustment:
- 0 (e.g., 33)

Calculate  Clear  Print

Amount of sulfite to be added:

0.8 grams (0.03 ounces) of Sulfite powder.
Racking (siphoning) is a necessary skill to develop if you are making wine at home. There are several ways to rack wine from one container to another.
Supplies

Pouring (not recommended)
Siphon by mouth with food grade tubing (careful!)
Small motorized pump
Hand squeeze pump
The Auto-Siphon (best method for home winemakers)
Malolactic fermentation

Lactic bacteria

Carbon dioxide

Malic acid
- tasting profile: pungent and sour
- main flavors: unripe apple, vegetal notes

Nadine soldorosa < 5 mg/l
- temperatura 18-20°C
- alcol < 15%
- pH > 4

Lactic acid
- tasting profile: less pungent and sour
- main flavors: spicy notes, toasted notes, butter, caramel

Supplies

There is a phenomenon called malolactic fermentation that can make your wine taste better

BUT

can also cause problems, like bottles exploding
You may want to consider filtering before bottling if your wine has not cleared. But keep in mind that filtering also takes out many of the taste elements.
Let's Make Some Wine!

Assemble your equipment, grape juice, and supplies
Add Campden to must in a Primary Fermenting Bucket for 24 hours
Pitch the yeast (it is now wine)
Press down the cap hourly if using grapes/fruit
1st racking off skins/seeds/pulp when wine reaches 10.5% alcohol
Use air locks to prevent oxidation and growth of rogue yeasts & bacteria
4-6 hours for Muscadine
Add clarifiers after 6 months if needed
Keep air locks filled with sterile water (Iodophor or KMS mixture)
Bottle wine after 6 months for Muscadine
Preservatives

Sulphur Dioxide

a) Potassium Metabisulphate - Campden tablets - 1 tablet = 75ppm/gallon
b) Very pH dependent, lower pH requires less SO2
c) 40 ppm free SO2 usually sufficient unless pH is greater than 3.4
d) Dry wines (pH less than 3.4 & alcohol greater than 12%) relatively stable, less dependent on SO2
e) Taste threshold for SO2 for most people is ~70ppm
Sorbic Acid

a) Potassium sorbate
b) NOT active against bacteria in wine; effective against yeast and mold growth
c) Must be used with proper amount of SO2
d) Use in wines with more then 0.5% residual sugar at bottling to prevent refermentation
e) Activity is dependent upon alcohol level - Higher the alcohol, the less sorbic acid needed,
f) 200 ppm usual treatment - 1 gram potassium sorbate/gallon = 200ppm
g) Flavor not affected in sweet, fruity wines
h) Always add SO2 before adding sorbic acid

Sorbate addition is dependent upon several interdependent criteria:

Wine pH;
Concentration of free SO2;
Percent alcohol by volume;
Concentration of sorbate; and,
Viable yeast cell concentration.
Assuming that proper levels of free SO2 are maintained and the pH’s are within the desired ranges, sorbate additions can be determined by the estimated alcohol of the wine. The following table is based upon the percentage of alcohol in the wine:

<table>
<thead>
<tr>
<th>% Alcohol</th>
<th>Sorbate</th>
<th>Addition</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.20 g/l</td>
<td>0.026 oz/gal</td>
</tr>
<tr>
<td>11</td>
<td>0.17 g/l</td>
<td>0.022 oz/gal</td>
</tr>
<tr>
<td>12</td>
<td>0.135 g/l</td>
<td>0.012 oz/gal</td>
</tr>
<tr>
<td>13</td>
<td>0.10 g/l</td>
<td>0.013 oz/gal</td>
</tr>
<tr>
<td>14</td>
<td>0.07 g/l</td>
<td>0.009 oz/gal</td>
</tr>
</tbody>
</table>

Amount of sorbate required decreases as the alcohol level increases because:
1) At the lower alcohol levels, there may be a greater volume of viable yeast cells; and
2) Higher alcohols have an inhibiting effect on refermentation. 200 ppm usual treatment - 1 gram potassium sorbate/gallon = 200 ppm

Do not use sorbate in any wine that has undergone MLF because the resultant unpleasant odor will be geraniol, a geranium-like smell.
Muscadine Home Winemaking Equipment & Supplies

Equipment needed:

• **Primary Fermenter.** A 6-8 gallon bucket with a lid would be preferable - food grade plastic
• **Secondary Fermenter.** A 5 gallon narrow-necked carboy, preferably glass
• **Airlock.** To allow carbon dioxide gas to escape and keep out air. Fill and keep full with sterilizing agent
• **Siphon.** 6 feet of food grade plastic tubing or Auto-Siphon
• **Small crusher.** - to break the skins of the grapes
• **Strainer.** Either cheese cloth or a nylon bag (or small wine press)

Supplies:

• **Wine Yeast** - One packet of EC-1118 or Lalvin RC 212 (Scott Labs W15 works well too)
• **Campden tablets** - This kills off wild bacteria and yeast found on the fruit skins; acts as preservative in bottles
• **Grapes** - 90 pounds to yield 5 gallons of wine
• **Yeast Nutrient** - Lallemand Fermaid O works best.
• **Simple Sugar** - Turbinado sugar works the best for home winemaking (boil water and sugar, then cool before using)
• **Non-chlorinated water**

*Simple Sugar is turbinado sugar mixture 1:1 with water that has been boiled and cooled*
Muscadine Wine Recipe - (5 Gallons)

Pick or buy your grapes. Ripe Muscadine grapes have a sugar level of about 14-16 Brix.

Directions:

1 - For white muscadines immediately crush & press the grapes to remove the grape skins, pulp and seeds and pour juice into a carboy. Measure the Brix to determine how much sugar to add to bring the potential alcohol up to 10-11%. Next, slowly stir simple sugar* into the must making sure hydrometer reading does not go higher than 1.085 (20 Brix). Multiply the Brix reading by 0.57 to get potential alcohol. If you have an acid test kit at home, test your wine and adjust it accordingly at this point. You need a Total Acidity (TA) of about .60 to .80. Add tartaric acid if TA too low, and potassium bicarbonate if TA is too high. Mix yeast nutrient with 1-2 packets of wine yeast in a cup of warm water and add to must. Primary fermentation will begin. Seal/cover fermenter.

2. For red muscadines, crush the grapes into a primary bucket and cover. Wait for 4-6 hours, before pressing the grapes to remove the grape skins, pulp and seeds. Then slowly stir simple sugar into the must making sure hydrometer reading does not go higher than hydrometer 1.085 (20 Brix)... If you have an acid test kit at home, test your wine and adjust it accordingly at this point. You need a Total Acidity (TA) of about .60 to .80. Add tartaric acid if TA too low, and potassium bicarbonate if TA is too high. Mix well... Mix yeast nutrient with 1-2 packets of wine yeast in a cup of warm water (~ 110F) and add to must. Primary fermentation will begin. Pour juice into a carboy and seal with an airlock.

3. Let the wine ferment/age for 6 months.

4. Make a final check of the TA and taste test. Make any sweetness/acidity adjustments prior to bottling.

5. Dissolve 1 crushed Campden tablet in a small cup of water for each gallon of wine and add to carboy

6. Bottle and cork - Ready to drink now but tastes better if you can wait about 6 months.
You Have Made Some Good Wine…

Want to enter it in an Amateur Wine Competition?

This is how it will be judged
Developed in collaboration with (among others) Dr. Rick Jelovsek whose certifications include: Certified Wine Specialist (CSW); Certified Wine Educator (CWE); French Wine Scholar (FWS); American Wine Society certified Wine Judge for Commercial and Amateur Wine Competitions (CWJ).

Rick is also co-author of the book “Competition Wine Judging” (2019).

Several other international wine judges & winemakers made suggestions/contributions to this document.
### Wine Judges Tasting Chart for Muscadine & Fruit Wines

<table>
<thead>
<tr>
<th>Wine: ___________________________</th>
<th>Vintage: _____</th>
<th>Date ____________</th>
</tr>
</thead>
<tbody>
<tr>
<td>TA: _____ grams/liter</td>
<td>pH: _____</td>
<td>Residual Sugar: _____ grams/liter</td>
</tr>
<tr>
<td>SIGHT</td>
<td>Score (maximum 3)</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td>0 - cloudy</td>
<td>_______</td>
<td></td>
</tr>
<tr>
<td>1 - browning or other off-color</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - clear but particulate matter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 - clear, brilliant, reflective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with characteristic color</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AROMA</td>
<td>Score (maximum 4)</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td>0  - faulted/objectionable or strong, unpleasant nasal irritation,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1  - flawed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2  - characteristic but weak aroma intensity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3  - moderate floral intensity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4  - strong characteristic intensity but not overwhelming or nasally irritating</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
AROMA

0 - faulted/objectionable or strong, unpleasant nasal irritation,
1 - flawed
2 - characteristic but weak aroma intensity
3 - moderate floral intensity
4 - strong characteristic intensity but not overwhelming or nasally irritating

Score (maximum 4) ______
TASTE

Acid level
0 - perceived acid is too low or too high
1 - medium acid level

Sweetness for the acidity level
0 - perceived sugar level is too low or too high
1 - pleasant sugar level

Tannin level
0 - tannins are excessively high or bitter
1 - tannins are at pleasant level/mouthfeel for style

Alcohol level
0 - alcohol level is too hot or too flabby
1 - pleasant ABV level

Body
0 - flavors (phenols) are too low or too high for the floral/fruit taste
1 - flavors (phenols) quite pleasant

Balance
0 - more than one taste components are too low or too predominant
1 - 1 taste component is out of balance, too high or too low
2 - very well balanced taste components
<table>
<thead>
<tr>
<th>FINISH/LENGTH:</th>
<th>Score (maximum 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - bad taste on finish</td>
<td></td>
</tr>
<tr>
<td>1 - pleasant taste but short (&lt;5 seconds)</td>
<td></td>
</tr>
<tr>
<td>2 - pleasant taste, medium finish</td>
<td></td>
</tr>
<tr>
<td>3 - pleasant taste long finish (8-10 seconds)</td>
<td></td>
</tr>
</tbody>
</table>
**OVERALL QUALITY**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>undrinkable</td>
</tr>
<tr>
<td>1</td>
<td>acceptable quality</td>
</tr>
<tr>
<td>2</td>
<td>very well made wine</td>
</tr>
<tr>
<td>3</td>
<td>outstanding, I’d buy</td>
</tr>
</tbody>
</table>

**Score (maximum 3) ____

**SCORING** (Total score out of possible 20)

**Total Score ____

---

**Wine Judging Awards**

Blue Ribbon wine 17.5-20 points;
Red Ribbon wine 15.0-17.49 points;
Yellow Ribbon wine 12.5-14.99 points
Bibliography & References

*From Vines to Wines* - Storey Books Publishing

*Making Good Wine* - Pan Macmillan Publishing
Local Winemaking Supply Sources

Asheville Brewers Supply
712 Merrimon Ave
Asheville NC 28804
(828) 285-0515
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Making Muscadine Wine at Home (Advanced)

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with winemaking tips from

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& Board Member, North Carolina Muscadine Grape Association
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Music: Chug-a-lug by Roger Miller