Vinegar 101 - Anti-brewing: Vinegar

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French wine makers have a saying, “God loves to make vinegar.” Making vinegar is very easy; it will happen on its own. However, like brewing, you can control the process and make this easy but versatile product for yourself.

History

Our word vinegar comes from the French, vin aigre, sour wine [1]. Making sour wine is not hard as it will happen all by itself.

Vinegar dates back to pre-historic times. I don’t think we will know exactly where and when it was discovered but it is at least as old as brewing. The two processes are related. Supposedly, the Babylonians used vinegar as a cleaning agent as early as ~5000 BC. Ancient Egypt has evidence of vinegar as early as ~3000 BC. Ancient China has evidence of vinegar as early as ~1200 BC [2].

Vinegar is therefore ancient and in both Classical times and Medieval times, it served the same purposes. It was a cleaning agent, it was a preservative, it was a condiment, it was a medicine, and a drink. Vinegar still serves the same purposes today as well.

There are two methods of making vinegar in Classical and Medieval times. The first is the easiest. Just leave a fermented liquid (typically a wine, ale, or something below ~20% alcohol) out in the air. Wild acer-bacteria will colonize the liquid, turning the alcohol into acetic acid. The other method is known as the Orleans method. In this method, a cask is laid on its side. Air holes are drilled in the sides. Wine is added to the cask to below these airholes. A mother of vinegar is added if you have one, otherwise wild bacteria will be enter with the air. The airholes are stopped with cloth to allow air in but not insects and such. After several months, you have vinegar. About 80% of the cask would be drained to either use/sell right away or age further. More wine is added to the cask and the process allowed to continue. Acidity of up to 10% can achieved with this method [3].

What is a mother of vinegar? Wild acer-bacteria will form one in time. It is a gelantinous mass that protects the acer-bacteria. You can reuse the mother but they do get old and you can kill it. Modernly, you can buy mothers to produce different vinegars. I am unsure whether there is a significant difference between them though. I have not found any real difference in vinegar mothers.

Replace the mothers if they look brown or after a handful of vinegars. If your mother makes a new mother, capture it separately as soon as you notice it with some of the liquid (~4 oz) and keep track of how old it is. Replace periodically. Most of the bacteria will be in the liquid.

Making vinegar (the easy way)

Making vinegar is anti-brewing. That is like an anti-proton; it is similar but the opposite of brewing. Brewing is taking sugar and a microbe to make alcohol. Vinegar is taking alcohol and a microbe to make acid. Some will caution to not make vinegar and brew in the same environs.

Modernly, you just need to use caution. Sanitation is the key to both processes. When you brew you sanitize everything to remove wild yeast and bacteria. This will kill the acer-bacteria too. When you make vinegar, you do the same thing. In fact, you have to have alcohol to have vinegar so it is not unusual to brew something and then immediately turn it to vinegar. Do realize that if your beer or wine goes off, it is likely due to the acer-bacteria and you need to be more aggressive with sanitation going forward.

Sanitize a half-gallon mason jar. Add one 750 mL bottle of wine. Fasten the lid tightly to the jar. Shake vigorously for 5 minutes! This is very important. Modern wines often have sulfites added to inhibit bacteria growth. Vigorous shaking will remove the SO2 from the liquid wine. Another method is to use 1-2 mL (~1 tsp) of H2O2 per 750 ml bottle of wine (the strength you buy at the drug store is fine). The H202 will react with the SO2 to form hydrogen sulfate (a gas) and the rest will percipatate out.

Once you have shaken the wine, you want to add about 2 cups of water to the mix. Most wines will be low enough in alcohol content as to not kill the bacteria. But this is to just make sure. Then add the mother of vinegar. Put some cheesecloth over the top of the jar and use the lid ring to secure it.

Fermentation should begin in 4 days to a week. You should smell vinegar by this time. If not, the temperature may be too low. Let the jar sit in a warm spot for at least a month. The bacteria really like it to be ~80 oF to 90 oF. Temperatures in the mid 60's to 70's may produce yeast films. I leave my jars in the open in a sunny place. I have read some sources that say to put in a closet. I feel the sun helps control the temperature and keep eels and molds down. I also have purchased a seedling warmer with a thermostat. This is a good way to make sure the temperature is right. In the summer, I put the jars on my porch. It is plenty warm out there.

You may see the mother float to the top of the jar. This is cool and a good sign that things are working but it is not a necessary condition. You may also see a new mother form.

I take the pH of the mixture before I put it out to sit. Normally, I get a pH of 5. I let my vinegars sit out for at least 6 weeks before I test them again. My normal ending pH for wines is 2 or so. The more alcohol, the higher the ending pH. You can then age the vinegar further. The Orleans and Balsamic methods continue to age the vinegars in wood casks for several months to several years.

Ideally, try to save ~ 2 cups (1 pint) of the resulting vinegar as a starter for the next batch. The higher acidity with the other alcohol will help prevent yeast films and molds.

You can kill off the bacteria however. As the bacteria eat the alcohol, the acidity rises. Once they run out of alcohol, they can die off. So, try to rescue the mother with some of the liquid around 4 weeks or so.

I have seen continued growth after bottling. I suggest after bottling the vinegar, boil a pot of water and put the bottles in the boiling water bath for 5 to 10 minutes. This should kill off any molds and the bacteria. It makes the vinegar look better.

Other alcohols

You can use beer, cider, and harder alcohols to make a vinegar. You may not need to shake, especially if you are certain there are no sulfides in the alcohol. You may not need water for cider or beer. You may need more water for higher alcohols. You want the overall alcohol content to be below 15% for sure and closer to 10%. You will need to do the math on that.

Potential problems

Vinegar eels – these are 1- 2 mm organisms that can appear due to acidity being too low, wild fermentation, or old mothers. The Malle book doesn't say if they are harmful but they are unattractive. Brief heating to above 113 oF will kill them as will several days of sunlight.

Vinegar flies – these are a species of fruit fly. They will eat the vinegar eels. Covering the jar generally prevents them from contacting the vinegar.

Molds – this is also a possibility but it is hard to distinguish undesirable molds from the formation of a mother of vinegar. May lead to off flavors. Molds and yeast films tend to form in cooler temperatures. If it doesn't smell like vinegar, it is probably one of these things. If it smells, beery (hard to tell with a beer vinegar), or bready, it is probably a yeast film. It is a white, loose, powdery looking thing, it is probably not a mother.

Balsamic vinegar

Most of the balsamic vinegar you buy today is actually a cheap knock off. It is just red wine vinegar with caramel coloring and flavoring added.

True balsamic vinegar is expensive. Modernly, it is a protected product of the Modena region of Italy. It is made exclusively from a reduction of pressed Trebbiano and Lambrusco grapes, aged for at least 12 years in a series of specific wooden casks, ideally in a specific series of caves in Northern Italy [4].

The word "balsamic" does not appear in the historical record until 1747 AD as part of the Duke of Modena's inventory. However, vinegar from the region does figure prominently going back to 1046. Monk Donizone in the Vita Mathildis mentions a barrel of vinegar from this region being given to Holy Roman Emperor Henry II. It was given to the Emperor by Bonifacio, Matilda of Tuscany's father. From circa 1228 through 1598, particular mention is made of barrels of special vinegar, sometimes called the Duke's vinegar in inventory lists and ducal writings. Again, the word balsamic is not used at this time but given the region the vinegar came from and its' importance as an imperial gift, these authors believe it was either the same as our modern balsamic vinegar or at least proto-balsamic [5].

Where am I in the process?

I am using the easy method above to make my starters. I have an Orleans process barrel for Apple Cider vinegar. I have an oak barrel for aging a Pinot Noir vinegar for a faux Balsamic. I have begun making "shrubs."

Soak the seeds, puree with salt, add vinegar and season to taste. Brown mustard generally yields a "hotter" product, and black mustard is even hotter, but the seeds are progressively harder to find. Push it through a mesh sieve if you want to remove the seed hulls for a smoother product.Embellish the base mustard (with horseradish, or turmeric, or hot peppers, or whatever...) as one sees fit.

References

[1] Melitta Weiss Adamson, Food in Medieval Times, p 28

[2] Maggie Oster, Herbal Vinegar, p 3-5. However, many other sources make the same claims but none of these sources cite their original reference.

[3] Bettina Malle & Helge Schmickl, The Artisanal Vinegar Maker's Handbook, p. 11-12.

[4] Consorzio Produttori Aceto Balsamico Tradizionale di Modena". Archived from the original on 13 April 2010. Retrieved 2010-03-25.

[7] Giudici, Paolo, Federico Lemmetti, and Stefano Mazza. *Balsamic vinegars: tradition, technology, trade*. "Chapter 2: History of Balsamic Vinegar", Cham: Springer, 2015.