Things We're Dwelling on Now…

Fermentation for Distillation

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First published in *Cellar Dweller - December 2010*.

"All alcoholic drinks, rightly used, are good for body and soul alike, but as a restorative of both there is nothing like brandy."
George Saintsbury, English journalist (1845-1933)

As the snow falls and the holiday advertising grows ever more relentless, thoughts naturally turn to methods of coping with these sources of discomfort. A single solution to both the winter cold and desperate marketing plans may sound too good to be true, but I think I have just the remedy, or remedies even: Brandy, Eau de Vie, Grappa—and, if there's an electronics store going out of business nearby—Vodka. A little extra heat to remove the chill from your bones or take the edge off of car commercials could be just the ticket right about now. If you are considering producing a wine for distillation, here are some factors to keep in mind at the fermentation stage.

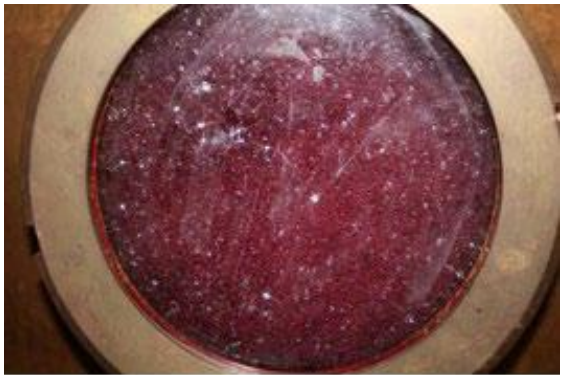
Clean, Complete Fermentation

Two major problems can arise from troubled fermentations: 1.) loss of quality and 2.) loss of yield. Sugar that is not fermented is lost, reducing the amount of spirit that can be produced from the wine lot and increasing the relative amount of energy required for its distillation. When we think of healthy, complete fermentations, we think of yeast nutrition. One yeast nutrient that is getting more attention lately is oxygen. Jean-Marie Sablayrolles and colleagues at INRA in France have found the combination of oxygen and nitrogen additions (with nitrogen in the form of di-ammonium phosphate, also known as DAP) to be very effective for finishing fermentations and finishing them quickly. Their work suggests that the optimal time for additions might be after the yeast growth phase for oxygen and at approximately half of sugar consumption for nitrogen. There are some concerns that late DAP additions could lead to sulfur off-aromas, but—luckily for the spirits producer—the wine will to go into a still containing lots of copper to bind those compounds and keep them out of the distillate.

Acetaldehyde and SO_2

Of course, as we nod our heads and think "oxygen, of course, that makes so much sense," there are parts of our brain thinking "yes, but there are reasons that oxygen is not the first thing that comes to mind when we think of substances to add to wine." Fair enough. During fermentation, when lots of

carbon dioxide is being produced, oxidation is not a major concern. Before and after fermentation, it pays to be even more careful than usual. The problem is that SO_2, our insurance policy against microbial spoilage and oxidation, is not particularly welcome near stills. SO_2 is corrosive to stills and also makes the distillery smell like a sulfite bomb has been detonated. We now believe that SO_2 does not directly interact with oxygen but binds instead to acetaldehyde, a product of ethanol oxidation by chemical or microbiological means. Acetaldehyde is also an unwelcome guest in spirits production, as it is the primary component of the "heads" cut in a final distillation run. More acetaldehyde means more of the "heads" and less of the "hearts" (the good stuff)—another reduction in yield. The goal is to minimize the need for SO_2 by using a good starter yeast culture and maintaining aggressive sanitation. These practices will hopefully prevent unwanted organisms from thriving and acetaldehyde, acetic acid, and other spoilage products from being produced. A little SO_2 before fermentation may not be too troublesome, but during fermentation it will create even more acetaldehyde (yeast need some, so if it gets bound they'll make more), and after fermentation it is a definite no-no. High acid (or, more specifically, low pH) wines are also useful here, since most spoilage organisms are less successful below pH 3.5.



Above red wine becoming clear brandy.

Enzymes and Methanol

The still in the Vinification & Brewing Lab, ready for action on a cold December day.

Enzymes are added during winemaking for a variety of reasons these days, but they can raise some issues when distillation is a factor. The problem is that liquefaction enzymes, and pectinases in particular, break down pectin and release methanol. Methanol is tasty, dangerous, and illegal in amounts over 2.8 g/L at 40% ethanol. Studies by Kris Berglund at Michigan State and Yong Hang at Cornell in Geneva have shown that spirits made from most any fruit will have dramatically higher amounts of methanol when enzymes have been used. When talking to a supplier about enzymes, ask if the product in question has any pectin methylesterase activity. Even if the supplier says no, producers I've talked with say you should still be suspicious and/or cautious with enzyme use.

The bottom line is that quality spirits are not made with faulty wines. There is no particular magic to the distillation process that creates wonderful flavors if the precursors aren't available.

What goes into the still is what comes out, only concentrated. Expecting success from a “mistake wine” is like expecting to fix your chronic back pain as you slip on an icy driveway—your optimism is admirable but the odds are against you. Speaking of icy driveways, perhaps it’s time to go inside, find a cozy spot, pour some brandy and envision sugar plums—frozen ones, falling from high altitude and destroying the windshield of every single car behind the guy on TV screaming about the no-money-down lease option.