

# The Brown, the Hazy, the Green and the Gold: Inert Pressing for Aromatic White Wines

Managing oxygen for specific wine types and styles

Curtis Phillips

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**THE COLORS AND AROMAS** of wine are determined by the winemaking techniques used to produce them as much as they are by the grapes from which the wines are made. While it is certainly true that the grape variety and vintage conditions set the potential for both, it is what happens between picking and bottling that determines if the final wine meets that potential. Thus, it is the winemaker's job to not "mess up" the integrity of the harvested grapes.

A red wine may be purple, garnet-red, brick-red, a dingy reddish-brown or just brown, depending on its pH, age and the degree and timing with which it has been exposed to oxygen. Similarly, a white wine's color may range from pale straw color to deep gold, and even shades of brown.

Interventionist winemaking that aims to correct for less-than-optimal grapes can make a decent wine, and is sometimes very necessary to salvage challenging vintages. I think every professional winemaker has, at one time or another, taken a heavy hand in order to have a wine worth drinking. These maneuvers should be the exception, not the rule, if the winery is getting sound fruit from the vineyard.

## The Colors of White Wine

It's easy to see how oxygen exposure leads to brown colors and oxidized aromas, but it is often less obvious that too little oxygen can also cause problems. Although these problems are usually called "reductive," as in, "the Syrah has gone reductive," (and this makes a certain amount of sense, given that reduction is the opposite chemical process from oxidation), the situation is a good deal more complex than the wine simply not having a given oxidative state. Timing matters as much as the total oxygen exposure.

In my opinion, there is no single correct value for the oxygen that a given wine needs. The need for oxygen exposure varies from cultivar to cultivar, region to region and vintage to vintage. Too much oxygen, and the resulting wines end up, well, oxidized with brown colors and muted, oxidized aromas. Too little oxygen, and the yeast may struggle to complete fermentation, resulting in a stuck fermentation and/or the production of hydrogen sulfide (H<sub>2</sub>S) which can, in turn, "bind" to form mercaptans. The goal is to find the correct balance point for the particular wine, timing any needed oxygen exposure so that it benefits, rather than detracts, from the final wine.



PHOTOS CURTIS PHILLIPS

The thiol-driven aromas in some white wines can be easily masked by oxidation.

## Brown: Oxidation and Hyper-Oxidation

Oxidation is not always a negative attribute: Sherry, Madeira, Vin Jaune, Tawny Port, Tokaji Szamorodni (dry oxidized Tokaji) as well as California's own Angelica, all depend on oxidation as part of their winemaking styles. Professor **Vernon Singleton** shared, and passed on, his appreciation of oxidative wine styles with generations of winemaking students at **UC Davis**, yours truly included.

It should be pretty self-evident that an oxidative wine style would benefit from oxidation. It may be less obvious that non-oxidative wine styles can also benefit from oxidation. Hyperoxidation is a technique that is used in white winemaking prior to fermentation. The idea is to oxidize anything that may turn the finished wine brown before the juice has been fermented. These oxidized compounds then flocculate and are either allowed to settle out of the juice or, more typically, float up to the surface via air bubbles and skimmed off. When done this way, the technique is called "flotation." This is a common technique in Europe, particularly Italy, and can result in pale straw-yellow white wines. Unfortunately, the process can strip or oxidize out the varietal aromas for aromatic white wine varieties.



The Diemme Neutral 2 uses a fresh volume of nitrogen or carbon dioxide each time the press is deflated.

### Haze: Protein Instability

In white wines, anytime measures aren't taken to remove excess proteins, as well as excess tannins and polyphenols, a hazy solution develops. Since such haze is the product of polymerization reactions, which proceed more quickly as the temperature increases, it is often called a "protein haze" or "protein instability." White wines are usually tested for their heat stability prior to bottling. Those that fail the test for heat stability are then fined with bentonite clay to remove enough protein from the wine so that it won't polymerize, flocculate, or cause a haze. As noted above, hyperoxidation can be used to ensure heat stability at the price of removing most, if not all, of the desirable aromatic compounds from the wine.

### Green: Green Juice for Aromatic Whites

I almost called this section "Green is the New White," but then I had to ask myself if it's really that simple. I think that with all winemaking, things are not as simple as that. Oxidation, especially uncontrolled oxidation, can deaden, mask or just flat out eliminate some aromas. Generally, these are notes that range from grassy to tropical fruit in character and make up some of the distinctive varietal aromas for several wine cultivars.

The thiol-driven characteristics of some aromatic wines, like Muscat (Orange Muscat, Muscat of Alexandria), Sauvignon Blanc (also Sauvignon

Vert and Sauvignon Musqué), Semillon and Riesling, are particularly interesting insofar as, in addition to being fairly volatile, they aren't found in grapes in more than trace amounts. During fermentation, the yeast synthesizes volatile thiol compounds, like 3-mercaptohexan-1-ol (AKA 3MH: grapefruit, passion fruit, gooseberry, guava aromas), 4-methyl-4-mercaptopentan-2-one (AKA 4MMP: box tree, passion fruit, broom, black currant aromas), 3-mercaptohexyl acetate (AKA 3MHA: passion fruit, grapefruit, box tree, gooseberry, guava aromas) and 4-mercapto-4-methylpentan-2-ol (AKA 4MMPOH: box tree, broom flower, cat pee aromas) from a collection of thiol precursors, including cysteine and glutathione (examples include S-3-(hexan-1-ol)-L-cysteine, S-4-(4-methylpentan-2-one)-L-cysteine, S-3-(hexan-1-ol)-glutathione and S-4-(4-methylpentan-2-one)-glutathione).

These aromas are deadened by oxidation, so it makes sense to do as much as possible to maximize them. This means minimizing the oxygen exposure of the juice until yeast are actively fermenting and therefore able to scavenge the oxygen before it can react with the thiols. About the only way to do this is to press the grapes in an inert atmosphere, which results in green juice rather than the brownish-gold juice we usually see in white wine production.

### Inert Atmosphere Pressing

Inert-atmosphere tank presses (AKA membrane presses) have been one of the more recently developed tools for the production of aromatic white wines. The basic idea is relatively simple: Take a tank press (AKA a membrane press) and fill the press with an inert atmosphere, in practice either nitrogen or carbon dioxide. The press is then filled through the door, or the axial-feed if the press has one, as per normal. Once the press is closed, the membrane (AKA "the bag") is inflated to press the grapes; but when the membrane is deflated, instead of passively letting in the outside atmosphere, more inert gas is used to fill the void over the grapes.

Since inert pressing seems to be intended only for white grapes, the juice needs to be delivered to the tank under similar inert-atmospheric conditions. This means that, at least for the few inert atmosphere presses that I have seen, the sump that catches the juice, as it exits the juice channels at the end of the press, is also filled with gas and drains immediately into an enclosed surge-tank, the ullage of which is also filled with inert gas.

Various manufacturers have been tinkering with the idea of filling a tank press with an inert gas rather than the ambient atmosphere for years. I saw a few of these units in Europe more than 15 years ago. To my knowledge, there are very few such presses in the United States.

### The Diemme Enologia Neutral 2 System

The Diemme Enologia Neutral 2 System is the most recent iteration of inert-atmosphere presses from Diemme Enologia, an earlier version of which was already a mature enough product to receive a silver medal in innovation from SITEVI (Montpellier) back in 2003.



Nitrogen CryoPak



The Diemme Neutral 2 surge tank maintains the inert atmosphere in the ullage of the press pan as juice is pumped out.

### WHAT MAKES AN INERT-ATMOSPHERE PRESS DIFFERENT?

First off, an inert-atmosphere press must have some provision for maintaining the nitrogen or CO<sub>2</sub> atmosphere inside of the press and the press-pan. Secondly, the press-pan must be enclosed, making it more of a juice surge-tank than a pan *per se*. The Neutral 2 has an additional surge-tank over the press-pan tank, which is a neat feature but not a requirement for inert pressing, strictly speaking.

To my mind, other than the gas inlets and the requirement for a closed press-pan, the main difference is the programming control system of the press, which needs to time everything correctly so that it can keep a layer of inert gas over the grapes. This gives the juice somewhere to go if it is coming out of the press more quickly than it is being pumped out of the press-pan tank or sump. There is a gas pressure relief valve on this surge-tank, like one would find on a positive-pressure bottling tank, allowing the nitrogen or CO<sub>2</sub> in the press-pan (tank) to be compressed a bit before the pressure-relief valve lifts. This, in turn, maintains the inert atmosphere in the ullage of the press-pan and surge-tanks as the juice is pumped out to the fermentor.

### INERT GAS CYCLE

Wine presses all generally do the same thing—press grapes—and use similar means to accomplish their task. The differences are in the details and how well the different designs accomplish that task. Grapes or must go into the press, the press is closed, the membrane inflates to expel the juice or wine, the membrane deflates, the press is rotated to break up the pomace and the cycle repeats.



Broken Earth Winery was the first U.S. producer to install the Diemme Neutral 2.

An inert-atmosphere press includes additional steps to ensure that the ambient atmosphere, which is about 21 percent oxygen, is purged from the inside of the press, and the press-pan before the press is filled with grapes and purged again each time the press membrane is deflated.

### KEEPING THE INERT GAS STERILE

It's an easy-to-miss detail if you're not looking for it, even though Diemme notes it prominently in all the relevant literature about the press, but the Neutral 2 uses a fresh volume of nitrogen or carbon dioxide each time the membrane in the press is deflated.

One might think that the inert gas could be captured when the membrane in the press was inflated, and thereby displace the inert gas out of the press to be reused as the membrane is deflated. As it turns out, that would be false economizing. Both nitrogen and CO<sub>2</sub> are relatively inexpensive gases, which means that attempting to reuse the inert gas represents only a modest savings—modest enough that the cost of keeping any inert gas recycling system sterile so that it wouldn't become a source of wine-spoilage microbes would quickly outstrip any savings from trying to reuse the gas. Also, and this is likely a very minor point in comparison to spoiling your wine, both nitrogen and CO<sub>2</sub> are extremely miscible with the atmosphere. Trying to reuse them would only result in the dilution of the inert gas and decrease the efficacy of the entire concept.

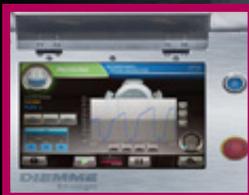
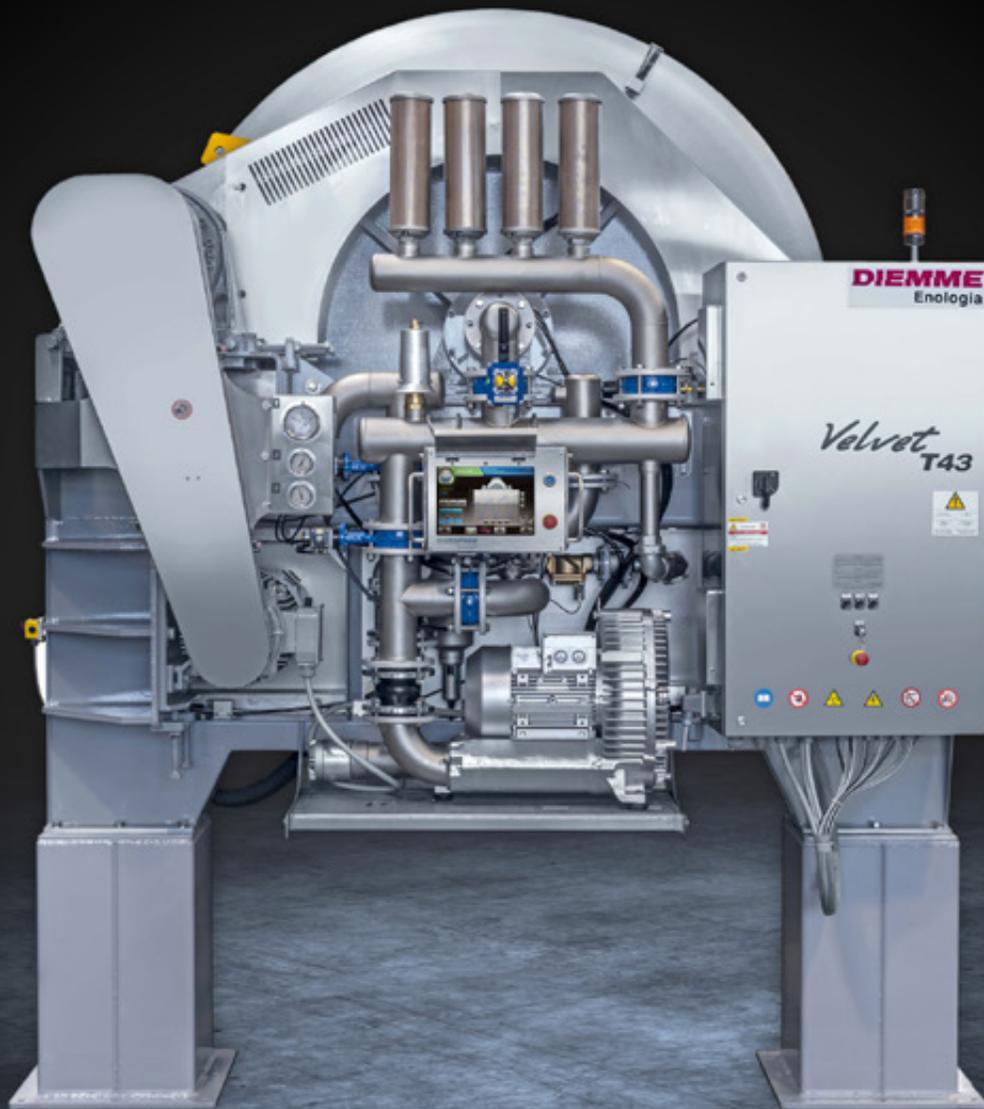
### BROKEN EARTH WINERY

Diemme told me that **Broken Earth Winery** was the first winery in the U.S. to use the Neutral 2. I visited Broken Earth Winery's temporary home in Paso Robles during the 2019 harvest in order to see the Diemme Neutral 2 inert-atmosphere press in action and to taste some of the wines from prior vintages that had been produced with this system. The wines all tasted remarkably fresh. I kept returning to the Pinot Blanc, which is not known as a particularly aromatic variety. I'm not going to bore other winemakers with a flowery wine description. I've made several Pinot Blancs, both true Pinot Blanc and Melón de Bourgogne (which is also called Pinot Blanc in California), but Broken Earth's winemaker **Chris Cameron** has me well and truly beat. It was the best Pinot Blanc I can recall having.

Pressing grapes under an inert atmosphere, also called "neutral pressing," has been around for a number of years. Ordinarily, pressing off grapes is an oxidative operation. In most cases, the juice or fermenting must becomes completely saturated with oxygen as it is splashed into the press-pan and pumped into the receiving tank. This is not necessarily a bad thing. Wine-making practices evolved with the assumption that oxygen would be introduced at this stage, and several "traditional" winemaking styles wouldn't really be feasible without it.

When I started making wine, closed-tank presses were still considered a new idea; making wine using a closed-tank press and closed-top stainless steel fermentors was considered "reductive winemaking." My career, at least, has seen a slow oscillation between the two extremes—from oxidative to reductive and back to oxidative winemaking for pretty much all wines. Only relatively recently has it become more common to view oxygen exposure as something that should vary according to the wine being made. [WBM](#)

## DEPENDABILITY THAT'S BUILT TO LAST



DIEMME membrane presses feature a high draining surface with mirror polished channels. All DIEMME presses have no minimum load. Every press is high quality built and customized based on your production requirements. The latest control panel technology offers 32 fully customizable programs on a 10" high resolution color touch screen with remote access capability. Backed by ColloPack's technical expertise, large spare part inventory and after-sales support including 24/7 harvest assistance.