

Fermenting Wine Grapes in a Bag

The GOfermentor enables quality improvement in small wineries

By Richard Carey



A controller hangs on the side of a specially designed bin, while a bag housing fermenting grapes sits inside.

Small wineries have multitudinous obstacles when making high-quality wines. In many respects, as home winemakers who have become commercial winemakers will attest, it is easier to make 5,000 gallons of quality wine than it is to make 5 gallons. So much of wine-making is influenced by scale. The smaller the vessel in which wine is produced and stored until bottling, the more the negative influences (such as oxygen) can detract from the quality of the wine. It has to do with surface-to-volume ratios, the opening and closing of the vessel and many other factors. For example, it takes the same amount of time to open a 5-gallon vessel, remove a sample for analysis and close the container as it does to open and close a 5,000-gallon vessel. But the impact on the wine is many times greater in the 5-gallon vessel.

Consequently, new techniques for managing small-lot production are some of the more important introductions to the wine industry. Small wineries are the backbone of the industry, and the creative outlet they bring to the industry is important for its development and management. Additionally, methods that aid in quality development often require expensive equipment that small wineries cannot afford. They can also take time away from other winemaking prac-

tices, which compromises quality. Technology that can help achieve the goal of better wine for smaller wineries can be transformative.

Just prior to the 2015 harvest, I learned about an intriguing new way to manage fermentations in small wineries. Vijay Singh, an entrepreneur who sold his biomedical business and started his own winery, had developed a different technique for use with small to medium-sized fermentations.

The product, known as GOfermentor, is designed to minimize water use and to help with the natural “messiness” of harvest. Singh’s product was in the latter stages of development, but I had the opportunity to use one of his systems during the 2015 harvest, and I have spoken with others who are testing the system. The theory behind the GOfermentor is to contain the juice during fermentation in a bag that is large enough to hold 1 ton of grapes and can be sealed off from exposure to air. The bag is supported by a specially designed bin similar in size to a 1-ton harvest bin.

How GOfermentor works

The GOfermentor fermentation bag has several access points where yeast, amendments and other materials can be added before the start of fermentation as well as filling the bag and more. Before the grapes are put in the bag, a

temperature probe is inserted to monitor fermentation temperature, and an exhaust fitting is enabled to allow CO₂ to escape. A secondary bag attached to one side of the GOfermentor comprises the compression compartment; a tube attached to the secondary bag is then connected to a control manifold.

At the time of harvest, 1 ton of grapes is crushed and sent directly into the fermentation bag. When air is pumped into the secondary bag through a tube, the air bag then pushes against

KEY POINTS

GOfermentor is a new method of managing fermentations of 1-ton lots of grapes. A large plastic bag with two compartments is placed in a specially designed bin. After crushing, the grapes are put in one compartment and sealed. As the second compartment is filled with air, it pushes against the grape bag, which forces juice through the cap.

A major advantage of the GOfermentor is the reduction of water use in the winery. The cellar stays clean during fermentation, and cleanup after fermentation is easy because pomace stays in the bag, which is recyclable.

The GOfermentor system gives a winemaker flexibility in managing small or odd-size lots of grapes.

the grapes, forcing the skins to be totally immersed in juice and evacuating the CO₂ produced during fermentation. The atmosphere above the grapes is devoid of oxygen, no matter the activity level of that fermentation.

This concept of entrapping the CO₂ over the grapes is one of the important innovations of this protocol. A common problem of fermentations on the East Coast is that grapes have high levels of Acetobacter and other organisms that may produce volatile acidity (VA). When that happens, more diligence is needed during fermentation to keep these organisms at bay so that they do not add VA to the wine. Every time a winery fails to keep the cap anoxic, the organisms can grow and contribute to VA, and the larger the VA inoculum, the more it contributes to the problem. Even with a slower fermentation, in a "sealed" atmosphere there is little or no oxygen present in the cap.

A controller is programmed to regulate what is typically called "punch downs," though in this particular case, the process would more accurately be described as "squeeze up." The second compartment on one side of the bag serves as the compression compartment. The controller can be programmed to pump air into the bag a scheduled number of times per day. The bag containing the grapes is then squeezed into a smaller volume, which forces the liquid up through the cap. The pressure is maintained for a specified time and then released. There is no voluminous pumping or aerating of the juice; just gentle pushing of juice up through the cap. The process is repeated at the predetermined set times.

The controller also has programmed alarm flags that record the time of compression of the bag, temperature of the juice, pressures over or under set points and other parameters.

This provides the winemaker with an automatic fermentation record that is collected with little time input by the user.

At the end of fermentation, the winemaker can use the same process of squeezing to begin pressing the grapes, although the GOfermentor system is not structurally strong enough to fully press the wine. A hose hookup is attached to remove the wine from the tote containing the bag, and then the bladder is inflated, creating pressure to remove as much wine as possible. To capture the press fraction, the bag can be lifted out of the tote and transferred into the press of your choice. Or, if you are satisfied with the degree of pressing, the pomace in the bag can be transported to the vineyard or other traditional places for disposal.

After removal of the bag, the bin used to support the GOfermentor can be collapsed to minimize storage between harvests.

An animation of how the GOfermentor system works is available in the online version of this article, or go to skyacreswinery.com/gofermentor.

Potential uses

The GOfermentor system has a wide range of potential uses in wineries. Since the whole process takes place in a contained atmosphere, and the system is designed for small lots, controlled maceration could likely be better managed with this system; the bag eliminates oxygen by exchanging the air with CO₂ produced during fermentation. If harvest was compromised by more rot than desired, a winemaker could minimize oxygen contact by flushing the bag with nitrogen, lowering production of latent VA organisms in the must.

The GOfermentor setup is not just limited to red grapes. If you want to control fermenta-

tion, a flat plate heat exchanger can be outfitted on the floor of the tote to keep the wine at the desired temperature. A solenoid valve is operated by the controller as well.

Advantages

Water usage: This is probably one of the most important advantages of GOfermentor. In California, an exemption from certain water usage regulations for wineries has existed for decades. Now, virtually all rural wineries are losing that exemption. Wineries in that state will be considering any production practices that will result in reduction of water usage. Use of GOfermentor can help mitigate production practices that add to storm water runoff. Winemaker Annette Danzer at Cima Collina Winery in Carmel Valley, Calif., and Kat Gaffney, winemaker at Center of Effort in Arroyo Grande, Calif., both said that reduction of water use was an important consideration in their use of GOfermentor.

Flexibility: The quantity of fruit at harvest is never completely predictable. GOfermentor bags give winemakers containers to ferment



An LED screen allows winemakers to input operating instructions such as temperature and timing of pumpovers.

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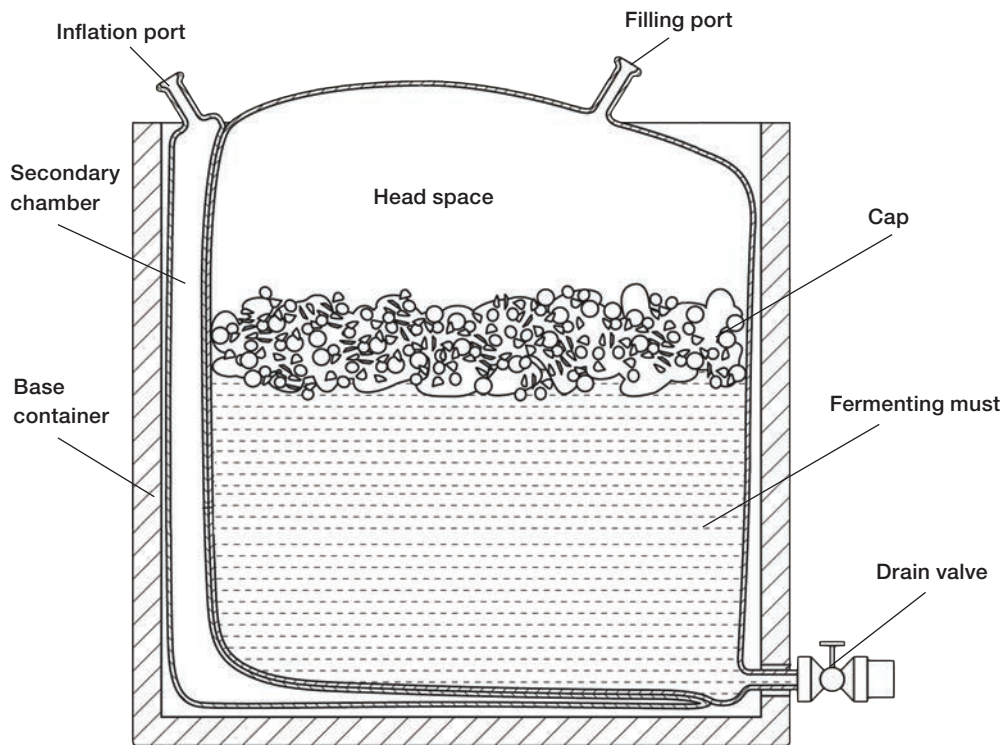
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As the secondary chamber (left) inflates, must in the primary chamber breaks through the cap, saturating it with fermenting grape juice.

additional lots of wine as well as odd-size lots. The winemaker can instantly expand production if an opportunity to acquire fruit presents itself. The bins are small enough to move into controlled-temperature spaces, where lower temperatures would further reduce the growth of unwanted organisms.

Increased color extraction: Wines I produced using this system were darker in color than the same wine fermented in a Flextank tote and pumped over in the traditional way. At the earliest stages of wine production, there were similar levels of taste and tannin structure. It is too early to tell the degree of qualitative difference between the same wine made using the two methods of fermentation management.

Cameron Stark, winemaker at Unionville Vineyards in New Jersey said, "We did a side-by-side trial in a MacroBin. Color was slightly more extracted; flavor profile was different; it did have a slightly different mouthfeel, possibly more tannin extraction."

Because the controller can be programmed, it will be much easier to set up many squeezes during the first few percentages of alcohol production, which is when most of the color is extracted. Richard Sowalsky, head winemaker at Clos Pegase in Calistoga, Calif., said, "The biggest advantage was cap management: Just turn it on in the morning, and let it do its thing all day." As a result, color extraction begins immediately, which reduces the need for pre-fermentation maceration. Then, at the end of fermentation when CO₂ production is low or nonexistent, the bag can be sealed so that extended maceration after fermentation can

occur with minimal risk of VA forming, since the cap will be totally anoxic.

Recyclability: The bag is the primary consumable for the winery and is totally recyclable. It may be able to be used more than once, although that may occur mostly in cases where one lot is emptied and another is added immediately, and consequently no rinsing would be needed. It would be rather difficult to clean the bag properly for any longer term storage. It is GOfermentor's plan to have the bags priced at a point where the time of cleanup and the cost of the water used will more than pay for the cost of the bags.

Water: Because the GOfermentor bags completely contain must and pomace, a minimal amount of water is needed to maintain the proper level of cleanliness in the winery—even during harvest. That was one goal of Singh, the inventor: He designed his system to be as frugal with water as possible.

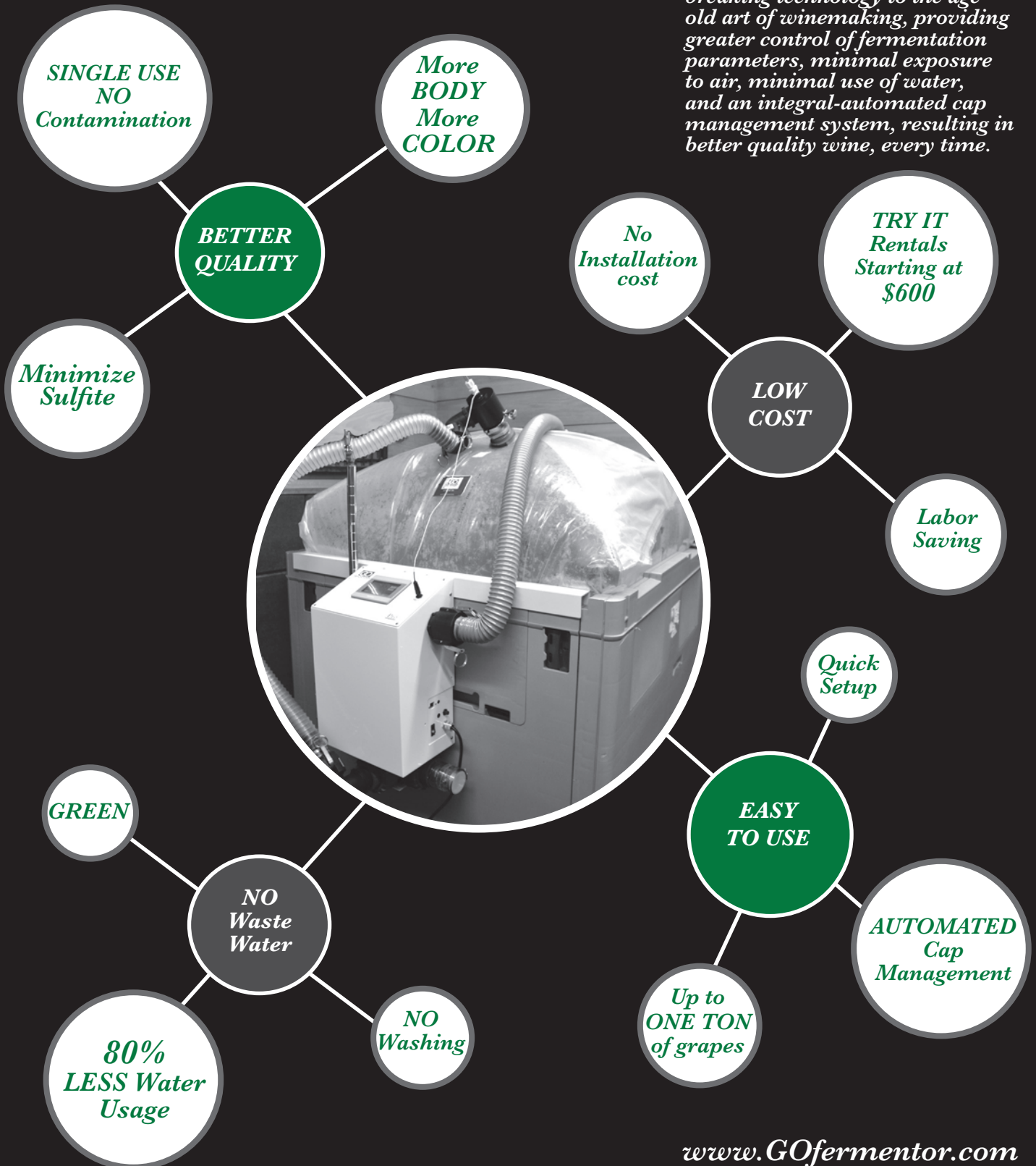
Wine from GOfermentor

Quality: When it comes to wine quality, the GOfermentor has several advantages. The reduced number of fruit flies was mentioned by several of the review winemakers, including Paul Ancill, winemaker at Sans Soucy Vineyards in Brookneal, Va. Another important advantage is that the anoxic environment presented by the bags produced fruitier wines, and as Mark Wysling, winemaker at Parejas Cellars in Yakima Valley, Wash., said "Flavor-wise, the GOfermentor was probably fruitier, brighter fruit flavors. So far, the quality of the wine is good."

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Another result of this fermentation was intensity of flavors was stated by Bruce Regalia, head winemaker at Materra | Cunat Family Vineyards, Napa, Calif. "The wine tasted good. It was a little more intense. I have made Cabernet Franc from the vineyard (we used in this study) before; I would have to say that it was a little more intense. The automatic punch is the biggest advantage." (See page 50 for more information about Materra's new winemaking facility.)

Research

Vitec Parc Tecnologic Del Vi in the Priorat region of Spain harvested Tempranillo, Grenache Noir and Cabernet Sauvignon and fermented them in GOfermentors and in traditional tanks. Their findings

fermentation, the controller is the invention that manages the operation of the bags. (It hangs on the side of the specially designed bin that holds the bag.) The device is simple to set up. It has an LED screen for input and choices for operation. The controller pumps air into the bag and exhausts the air from the secondary compartment. This forces the juice in the primary compartment to move from under the cap to fully infuse the cap.

When reviewing a developing product, many questions can arise about the direction the project is going. One of the first questions that came up was the relative cost of the controller per unit versus the product that could be produced. A solution proffered by wineries using the device was that

The quantity of fruit at harvest is never completely predictable. GOfermentor bags give winemakers containers to ferment additional lots of wine.

showed the GOfermentor had a fermentation curve that was virtually a straight line from start to finish, whereas the standard fermentation had a longer lag phase then rapidly sped up to a faster drop in Brix, only to slow down toward the end. They both finished fermentation on the same day.

Vitec also constructed spider graphs from wines made during the harvest from both methods of fermentation. Their report stated: "GOfermentor wine obtained higher ratings for almost every attribute evaluated, except for both petroleum and vegetative descriptors. GOfermentor wine obtained a better overall rating."

The parts and pieces

The bag has a screwcap fitting that allows CO₂ to escape but also allows for introduction of amendments into the bag during fermentation. The temperature probe inside the bag keeps tabs on the fermentation's temperature; a glycol switch is activated if needed, based upon the set point of the temperature probe.

While the bag is obviously the implementer of this new means of

one controller should manage more than one fermentor bin to spread the cost of operation to more than 1 ton of fruit at a time. The concept envisions a manifold that connects the pumping of air into the compression compartment. In this way, multiple totes could be controlled.

GOfermentor will sell the controller, bags and various accessories needed to control the bag. The bins can be leased for a harvest season if the winery does not want to own them.

Conclusion

From my experience working with GOfermentor, I believe there is a significant place in the wine industry for this product, because it allows such a degree of control over your fermentation that even in poor years, decent wines are likely to be vinted, and in good years, a winery can get more out of its fruit. 🍷

Dr. Richard Carey is a wine consultant with Tamanend Wine Consulting in Lancaster, Pa. He has written numerous articles about new technologies for the grape and wine industry as well as a series of articles on laboratory analyses in Wine East.