Conversion Factors: From Vineyard to Bottle

GRAPES 101

By Chris Gerling

*Grapes 101 is a series of brief articles highlighting the fundamentals of cool climate grape and wine production.*

How many grapes are in a bottle of wine? It's a question many consumers ask as they gaze at a vineyard outside a winery. It's also a question wineries ask as they survey the tanks and try to calculate production costs.

As with any question of this nature, there are a lot of variables to consider. What kind of grapes are we talking about? Have they swelled up with rain or dehydrated because of sun or noble rot? How were they pressed? Was it gentle, whole-cluster pressing or were enzymes and press-aids used after crushing each and every berry? Therefore, the variability of products and processes is part of the equation, and the other part is conversion factors.

**What we can learn**

Pounds of grapes in a bottle of wine
The number

150 gallons of wine per ton of grapes

Range

120-180 gallons in normal conditions

A standard bottle of wine is 750 milliliters (ml), meaning a case of 12 bottles contains 9 liters, or 2.378 gallons. At 150 gallons per ton, a ton of grapes becomes 150/2.378 gallons per case, or a little more than 63 cases of wine. With 12 bottles per case, we have 756 bottles in total.

But how many grapes are we talking about? We can go about this two ways. With the numbers we have, we can see that one bottle is about 1/756 or about 0.12% of a ton. 0.13% x 2000 pounds per ton is close to two and half (2.6) pounds of grapes per bottle. A grapevine might have seven pounds of fruit (or more, or less), so with 2.6 pounds of fruit per bottle, one vine can produce between two and three bottles of dry wine.

1,600 grams of sugar can increase the volume of wine by one liter, so if 2,000 (7,570 liters) gallons of dry wine is going to be sweetened to 50 grams/ liter of residual sugar (5%), we’re adding 50 x 7,570 = 378,500 grams of sugar. 378,500 divided by 1,600 grams per liter equals 236.5 liters, or 62.5 gallons. This number might impress you or it might not, but the winery now nearly has the equivalent of 26 cases of wine (236.5/9 liters per case) to sell that is actually sugar.

What we can learn

How many grapes are in a bottle of wine

The number

0.2 pounds per cluster of grapes

Range

0.1-0.5 pounds per cluster

Conversely, we can look at cluster weights of grape varieties and see that they range from 0.2 pounds up to a pound or more per cluster. For example, for Cabernet Franc, a lot of data from the eastern United States shows cluster weights around 0.22 pounds/cluster. This means it would take a little more than 11 clusters (2.6 pounds/ 0.22 pounds per cluster = 11.8 clusters) to fill one bottle. Actually, we
won't include the stems and seeds, which we'll call 15% of the cluster weight, so we can bump it up to 13 clusters.

If we use berry weights of 1.6 grams per berry, which is roughly the average we've seen at harvest in the Veraison to Harvest newsletter the past few years, we can convert again: 28.3 grams/ounce divided by 1.6 g/berry equals 17.7 berries per ounce. 2.6 pounds is about 41.6 ounces, and when multiplied by 17.7 berries/ounce we arrive at 736 berries. Berries or clusters that are much heavier or lighter would change the number significantly, of course. If a cluster of grapes has around 100 berries, we've got a little more than seven clusters in the bottle, and given all the variability in this conversion one might get away with saying a cluster of grapes equals a glass of wine without being called a liar.

What we can learn

How to annoy a viticulturist

The number

4 tons of grapes per acre

Range

1-30 tons per acre

An acre, as we know, is the amount of land tillable by one man and one ox in a day or the size of an American football field subtracting 10 yards and the end zones, i.e., a rectangle 90 yards long and 53 yards wide. The problem isn't the area, but all the different things that can be done within that area. Aside from the different grapes that can be grown there, the vines can be planted close together or far apart. The training system will play a big role in the yield, not to mention the soil characteristics and climate. Depending on the particular acre, a yield of four tons per acre could be far too much or far too little. In Europe, wine production figures are often reported as hectoliters per hectare. Neither of these figures is very familiar stateside, but a hectoliter (hl) is just 100 liters and a hectare (ha) is a land measure equivalent to 10,000 square meters, or approximately 2.47 acres. A recent agricultural survey from the European Union listed a range of 35 to 400 hl/ha. If we convert these numbers to tons/acre using 150 gallons per ton, we get a range of 2.5 to 28.5 tons/acre.

So there you have it. We've traveled from macro to micro to metric and back. While I think that most of the numbers I've used are reasonable, there are obviously many ways to arrive at very different answers. It is generally best to track a given wine from vineyard to bottle, and when the data has been crunched for that wine, you have some accurate information about that particular wine, period. Now
you have some quick numbers you can run to form estimates, however. The gallon to liter conversion
won't change even as the tons per hectares, acres, oxgangs, and furlongs swing wildly. If all of the
conversions are getting out of hand, just remember that there was enough volume to fill the current
bottle, and in the end isn't that all that really matters?

Chris Gerling is an enology extension associate at Cornell's New York State
Agricultural Experiment Station in Geneva, NY.