Connie's Notes: Measuring Muscadine Sugar Content

Predicting harvest time is difficult, so winemakers and growers often go into their vineyards and start taking "sugar" samples several weeks before the expected harvest time. New samples are then taken every few days and the data can be plotted in graphical form to predict harvest date.

Variations are Large

Depending on weather conditions, bloom can extend over many days. Later in the season, clusters from early blooming flowers are more mature and contain more sugar than clusters from late blooming flowers. Differences of several Brix can occur from cluster to cluster, and these differences make sugar testing difficult. Grapes from a single cluster contain different amounts of sugar. In general, grapes high on the cluster contain more sugar than grapes taken from the bottom of the cluster. Grapes taken from clusters receiving the most sun tend to contain the most sugar, and grapes taken from clusters growing back under the foliage contain less sugar. There can be significant differences in the sugar content of grapes from vines growing in different parts of a vineyard. These vine to vine variations depend upon soil conditions, water application, sun orientation, wind and many other factors. A two Brix variation over a five acre vineyard block is often seen.

Large Sample Needed

A large number of grapes must be sampled in order to obtain reasonably accurate results because of these large variations. A sample consisting of 100 individual berries is considered the minimum size sample for a small vineyard. Large operations often collect 500 to 1000 berry samples. Most winemakers consider a few hundred berries to be an adequate sample size.

Uniform Collection Necessary

Collecting sample grapes in a consistent way and from all parts of the vineyard is important for accurate results. This can be accomplished by taking samples in an X or Z formation, avoiding border rows. Take care to collect samples from all parts of the grape clusters (i.e. shoulder, body, and tip; front, side, and back). As a general rule, you should sample at least 100 grapes per acre. The most important consideration is to attempt to collect a reasonably large sized sample from the entire block that will be picked.

Another option is to pick 100 of the ripest berries on the sunny side of vines and 100 unripe berries from the shaded part of the vine, measure their Brix contents and average the two measurements.

Collection Procedure

The following procedure has produced good results in the past, but any collection method that meets the above objectives should produce satisfactory results.

1. Use a 1 quart size, heavy weight, zip-seal bag to hold the sample grapes.
2. Pick one or two grapes from each vine (or every other vine or every 5th, etc.) in order to collect 100 to 300 grapes. Be sure to sample the entire vineyard block in a uniform way.
3. When finished, seal the bag and keep it cool until the measurements are made.

Sugar Measuring Instruments

The sugar content of the sample grapes can be measured using either a Brix hydrometer or a refractometer. Both instruments are usually calibrated at 68 degrees and the accuracy of either instrument is temperature dependent. However, some refractometers are temperature compensated and the compensation reduces the temperature error considerably.

A refractometer can accurately measure the sugar content of a drop of juice. A good temperature compensated instrument will cost about $250 and it can be read directly to 0.2 Brix. A non-compensated refractometer will cost about $100. But, the temperature error can be large and must be taken into account when using a non-compensated instrument. The major advantage to a refractometer is its ability to quickly measure a very small size sample.

A short-range (16 to 25 Brix) hydrometer floated in a small cylinder requires 100 to 200 milliliters of juice. It will cost about $25 and it can be read to 0.1 Brix. The major advantage of a hydrometer is its low cost.

Readings from a good hydrometer are more precise than those from a hand held refractometer. But, the hydrometer must be used at its calibration temperature or a temperature correction must be applied to the reading. A simple way of making an accurate measurement is to make sure both the grapes and the measurement instrument are at or near the calibration temperature. Then, no temperature correction is needed.

Sugar Measurement Procedure

The following measurement procedure assumes the sugar measurement is made with a refractometer.

1. Remove the air from the zip-seal bag, seal it tightly, lay on a smooth surface and use a flat bottomed glass tumbler to lightly crush the grapes in the bag.
   OR Squeeze the mass of grapes in the bag several times with your hand. If you crush too hard, the seeds will puncture the bag and cause leaks.
2. Unseal the baggy, hold the lip of the bag over the refractometer with your left hand and carefully squeeze a couple of drops of the juice out with your right hand. With a little practice you can keep the seeds, skins and pulp in the bag.
3. When enough juice has been collected, press start and record the Brix value.

Summary

Grape to grape, cluster to cluster and vine to vine variations in sugar content can amount to several Brix. Consequently, a large sample (100 or more berries per acre) is necessary to obtain accurate results. Obtaining a uniform sample from the vines that will be picked is important. If the intent is to pick the first three rows, then the first three rows should be sampled. If the whole block will be picked, then the whole block should be sampled.

References

Chobanian, Matt. (Vineyard Manager at Childress Vineyards) Talk given August 9, 2006 at Harvest Techniques Sampling Workshop, Lexington, NC.

Eisenman, Lum. Pre-Harvest Sugar Sampling. (http://www.sdaws.org/Articles/Article9.htm)

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