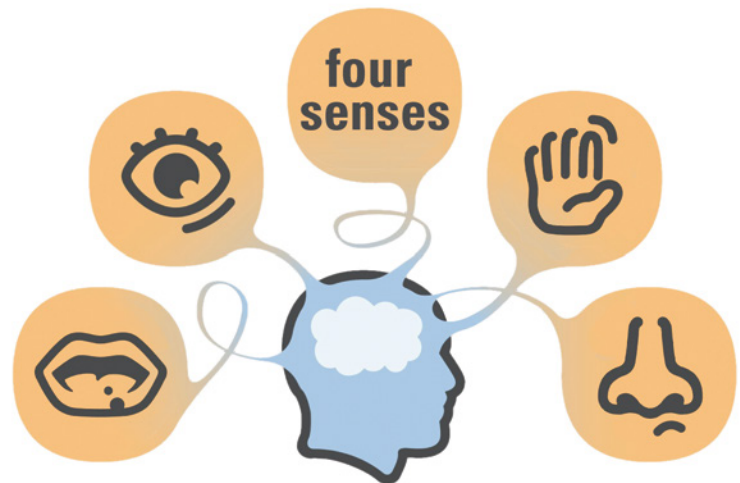


Estimating Grape Maturity by Sensory Analysis

To estimate grape harvest maturity, technological parameters including total soluble solids or °Brix, pH and titratable acidity are commonly measured. In addition to the increase of °Brix and pH and the decrease of titratable acidity during berry ripening, qualitative parameters can be used to evaluate the right time to harvest. The qualitative parameters are skin tannins, seed color, berry detachment, and berry aroma and flavors. Evaluation of these parameters involve four senses: taste, visual, touch and smell.



Tasting and evaluating grapes in the vineyard is important to gather as much information as needed for harvest decision-making.



What is the tasting evaluation of skin tannins

Skin and seed tannins are a group of polyphenols biosynthesized from monomers (one molecule) of flavanols. Through either a non-enzymatic or enzymatic mechanism, and as grapes mature during the berry development and ripening, monomers of flavanol polymerize to oligomers (4-8 molecules) and polymers (95-0 molecules). These are also called condensed tannins. Skin and seed tannins accumulate from flowering to véraison and then their concentration decreases during berry maturation. Monomers, dimers and trimers of flavanols tend to be bitter and can be perceived in ripe grapes when tannins are less present. In contrast, polymers or condensed tannins can be highly astringent depending on the chemical composition, concentration and structure of those tannins due to grape variety, climatic conditions and



Change of color and size of Marquette berries and seeds during ripening.

viticultural practices. The astringency perception is also described as the drying sensation perceived in the mouth, similar to the sensation of lacking saliva.

Some practice is required for this subjective grape maturity evaluation based on the bitterness and astringency level of skin tannins. To train yourself on this taste and mouthfeel perception, think about black coffee or the pith (white part) of an orange peel for the bitterness perception. For the astringency or drying sensation, think of tea and aronia or cranberry juices.

How to evaluate grape maturity

1. Pick a random grape berry.
2. Separate the berry skin from the pulp and chew the skin to release the tannins.
3. Press and move the tongue against the roof of the mouth or palate.
4. Spit out the chewed skin and identify the taste and mouthfeel.
 - a. If you feel a lack of saliva in your mouth and the rough sensation of your tongue, that is the drying sensation associated with not fully ripe berries and tends to be described as green or grippy.
 - b. If you feel a smooth sensation between your tongue and palate and a slight bitterness taste, that is associated with more mature berries as the concentration of skin tannins is lower compared to the concentration of small molecules of flavanols that are bitter.
5. Repeat with other random grape berries.



Example of immature grape seeds.



What is the visual evaluation of seed color

As briefly explained above, grape seeds are rich in polyphenols that tend to undergo oxidation reactions during grape ripening. In immature grape seeds, the concentration of tannins is low and the seeds are small and green. After véraison, as grape seeds mature, the concentration of tannins and their size decrease steadily until harvest maturity, which has been attributed to the oxidation of tannins. Therefore, grape seed color changes from green to brown to dark brown during fruit ripening and the color change is used as an indicator of maturity.



How to evaluate grape maturity

- Pick a random grape berry.
- Remove the skin and the pulp and look at the color of the seeds.
- Repeat with other random grape berries.
- This indicator should be used in addition to the monitoring of quantitative maturity parameters due to the large variation between grape varieties.



What is the touch evaluation of berry detachment

During grape ripening, the size of the berries increase and the cell wall material undergo enzymatic degradation leading to softened berries. Also associated with grape ripening is the berry drop or shatter, characterized by the detachment of the berry from the pedicels of the cluster. This berry detachment can be the result of a fragile tissue structure of the stalk, of the short and thin structure of the brush, or of an abscission zone formed between the pedicel and the berry. This berry detachment can be used as an indicator of grape maturity, but it should be noted that some grape varieties such as La Crescent tend to shrivel easily before harvest grape maturity.

How to evaluate grape maturity

1. In a grape cluster, remove a berry and look at whether the skin and pulp detach cleanly from the pedicel.
 - a. If the skin and pulp remain attached to the pedicel, the berry is considered unripe.
 - b. If no pulp remains attached to the pedicel, the berry is considered ripe.
2. Repeat on several berries in different clusters.



What is the smell evaluation of berry aromas and flavors

As sugar accumulates in the grape during ripening, aroma compounds are biosynthesized and the concentration of free and glycosylated aroma compounds increase. The concentration and type of aroma compounds differ between grape varieties and hundreds of compounds can contribute to the aroma and flavor of grapes. For example, in Monastrell (Mourvedre) grapes, the ratio of pleasant aroma compounds including terpenes (resembling cloves, citrus, floral) and nonanal (rose-orange) to unpleasant compounds reached its maximum at week five of ripening.



How to evaluate grape maturity

1. Training is required to distinguish different aroma compounds in grapes and wines using aroma standards.
2. Remove randomly a berry from a cluster.
3. Chew the berry for one minute and evaluate the aroma and flavors that are provided by the berry.
4. Bring some air in at the same time, as you would for a wine tasting, in order to move the aroma compounds from the berry to your nose and perceive the flavor in retronasal.
5. Repeat on other berries from other clusters.

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[5 senses graphic](https://webstockreview.net/explore/5-senses-clipart-transparent), adapted. <https://webstockreview.net/explore/5-senses-clipart-transparent>.

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