A GUIDE TO **HARVESTING** AND **MAINTAINING** THE **QUALITY** OF **TABLE GRAPES**

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A GUIDE TO **HARVESTING** AND **MAINTAINING** THE **QUALITY** OF **TABLE GRAPES**

Table grapes can only be harvested by hand with gloves.

Table grapes should be cooled as quickly as possible after harvest.

The ideal timing for harvesting is early morning or late evening.

Author: Prof. Dr. Sc. Tomislav Jemrić

The ripening of **table grapes** hinges on numerous factors, with variety, cultivation methods, and weather being the most important. Thus, the timing of ripening for a particular variety, even within the same vineyard, is different every year. These disparities in ripening can range from several days to as much as two weeks or more.

Grapes that are harvested prematurely tend to lack taste, displaying a sourness and a color that doesn't match the specific hue of the variety. Grapes harvested too late have a bland flavor and rapidly deteriorate after harvesting.

To accurately measure the quality of grapes, it is better to assess multiple indicators together. Moreover, considering the unique features of each grape variety and the environment in which it is cultivated is crucial.

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SIGNS OF TABLE GRAPES MATURITY

Determining the maturation of fruits can be done subjectively using the senses or objectively using instruments or chemical analyses.

Clusters of identical grape varieties in the same vineyard will not mature simultaneously because of variations in vine health, sun exposure, soil characteristics, and other factors. Clusters situated on the sunny side of the vines tend to ripen before those in shaded areas. Therefore, for a good assessment of maturation, it is important to properly sample clusters to determine ripeness.

Varieties of table grapes with a low acid content, such as 'Queen of the Vineyard', are graded on the basis of visual appeal, amount of soluble solid content, and taste. Table grapes such as 'Sultanina' require assessment, so harvesting, apart from the above indicators, is done when a favorable ratio of sugar and acid is reached. Relying solely on the ratio of sugar to acid or the total dissolved sugar content is not advisable, and it is better to assess multiple indicators together to accurately measure the quality of grapes.

HOW TO OBTAIN A GRAPE CLUSTER SAMPLE TO ASSESS ITS MATURITY?

For each grape variety or if the same variety is grafted onto various rootstocks, it is essential to gather distinct samples for each. Only when it is established that there are no noteworthy differences can a single sample be obtained for both rootstocks, but caution should be taken to maintain an equal share of clusters from each rootstock.

For each sample, 5 to 10 vines should be selected, adjusting the number based on the vineyard's size (less if the vineyard is smaller, more if the vineyard is larger). The selected vines should accurately represent the vineyard conditions in terms of their nature, vigor, lushness, and overall health. Picking vines at row ends or within the outer rows should be avoided. Chosen vines should be marked as multiple samplings will occur.

Sampling should begin approximately two weeks before the anticipated usual harvest time when the clusters start showing the distinct color typical for the variety. A sample is taken every two to three days, depending on how quickly the grapes are ripening.

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Two to three clusters are harvested from each marked vine (depending on the number of grapes per vine, ensuring enough clusters from each vine for the entire time of sampling). Clusters visibly affected by diseases or pests and those that are underdeveloped with numerous small berries should be avoided. Consistency in cluster size must be maintained and harvested from all sides of the vine and from different heights.

Samples should be taken at the same time of day and assessed within a maximum of 2 h after harvesting, as temperature fluctuations can impact the accuracy of the results.

MATURATION ASSESSMENT TESTS

The color of the clusters is the first thing to be graded, and then the quantity of soluble solid content is measured. In the end, a few berries from each cluster should be tried, bearing in mind that between each probe, a little water should be taken to rinse the mouth and prevent blending of flavors of specific clusters.

The maturation of grape clusters is a complex process, and each cluster undergoes unique changes based on factors such as temperature, grape variety, soil conditions, and cultivation technology employed. Therefore, conducting tests thoroughly and meticulously is crucial. This becomes particularly vital during years when weather significantly deviates from the multi-year average.

With time, the experience will be accumulated, and long-term data tracking across multiple years will offer invaluable insights not only on cluster quality but also on the effectiveness of the applied cultivation technology.

The size of grape berries

The berries within the cluster must be completely developed and consistent in size.

Color

The color of the grapes should display a uniform and fully developed hue characteristic of the specific grape variety. Harvesting should occur when the clusters reach full ripeness. In years when cloudy weather prevails during ripening, the color might be less pronounced, affecting both the soluble solid content (which will also be lower) and taste. Delaying harvest excessively while “waiting” for skin coloration in grape berries should be avoided.

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Soluble solid content (SSC) or changes in sugar content

The content of soluble solids in grapes, as measured using a refractometer, increases as grapes ripen. There are two types of refractometers: optical and digital (**Figure 1**). Recently, digital refractometers have gained popularity because of their ease of use, and some models also measure the cluster's acidity, a valuable feature for table grapes where the balance between sugar and acid significantly impacts taste.

To measure, a small amount of juice is placed either on the prism of an optical refractometer or in the well of a digital refractometer, and a reading is taken. Using a digital instrument is simpler because it instantly provides a temperature-compensated value, eliminating the need for additional calculations. The juice extracted from a penetrometer measurement can be used, and it is sufficient to measure the value of the juice collected after measuring the entire sample.

Before measurement, the refractometer should undergo calibration by setting it to zero after placing distilled water in the basin. An additional check was performed by measuring the 10% sucrose solution. After each juice sample, the surface of the prism should be rinsed with distilled water and carefully wiped with soft tissue to prevent false readings due to sample mixing.

Figure 1 - Optical refractometer (left) and digital refractometer (right)

Source: Dr. Macarena Farcuh, University of Maryland,

Link: https://extension.umd.edu/resource/how-can-growers-determine-apple-fruit-maturity-and-optimal-harvest-dates-fs-1180

In years with high temperatures and abundant sunlight, the measured values are higher, whereas in years with ample rainfall or in vineyards with excessive clusters or heavy irrigation, the values are lower. Typically, higher values indicate better cluster quality.

High-quality grape clusters result from having a minimum of 15%–20% soluble solids, along with a soluble solid to acid ratio ranging between 24 and 35 (acid measured in g/100 mL as tartaric acid).

In years with high temperatures and abundant sunlight, grapes have more soluble solid content. Grapes from vineyards that are heavily irrigated or those that yield abundant crops often contain lower levels of soluble solids.

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HARVESTING – THE FIRST STEP IN SUCCESSFUL STORAGE

Table grapes undergo sole hand harvesting (**Figure 2**). Harvesters should wear gloves and refrain from direct contact with the berries to preserve the thin natural wax coating. This protective coating not only enhances the visual appeal of the berries but also serves an important role in shielding them from decay and water loss. The grape cluster should be gently handled by its stem and cut from the vine with scissors, taking care to avoid damaging the berries. The harvested cluster is gently placed into the packaging.

The ideal timing for harvesting is early morning or late evening when temperatures are excessively high during the day. In case of rainfall, harvesting is halted for a period of two to three days to allow the vines to dry.

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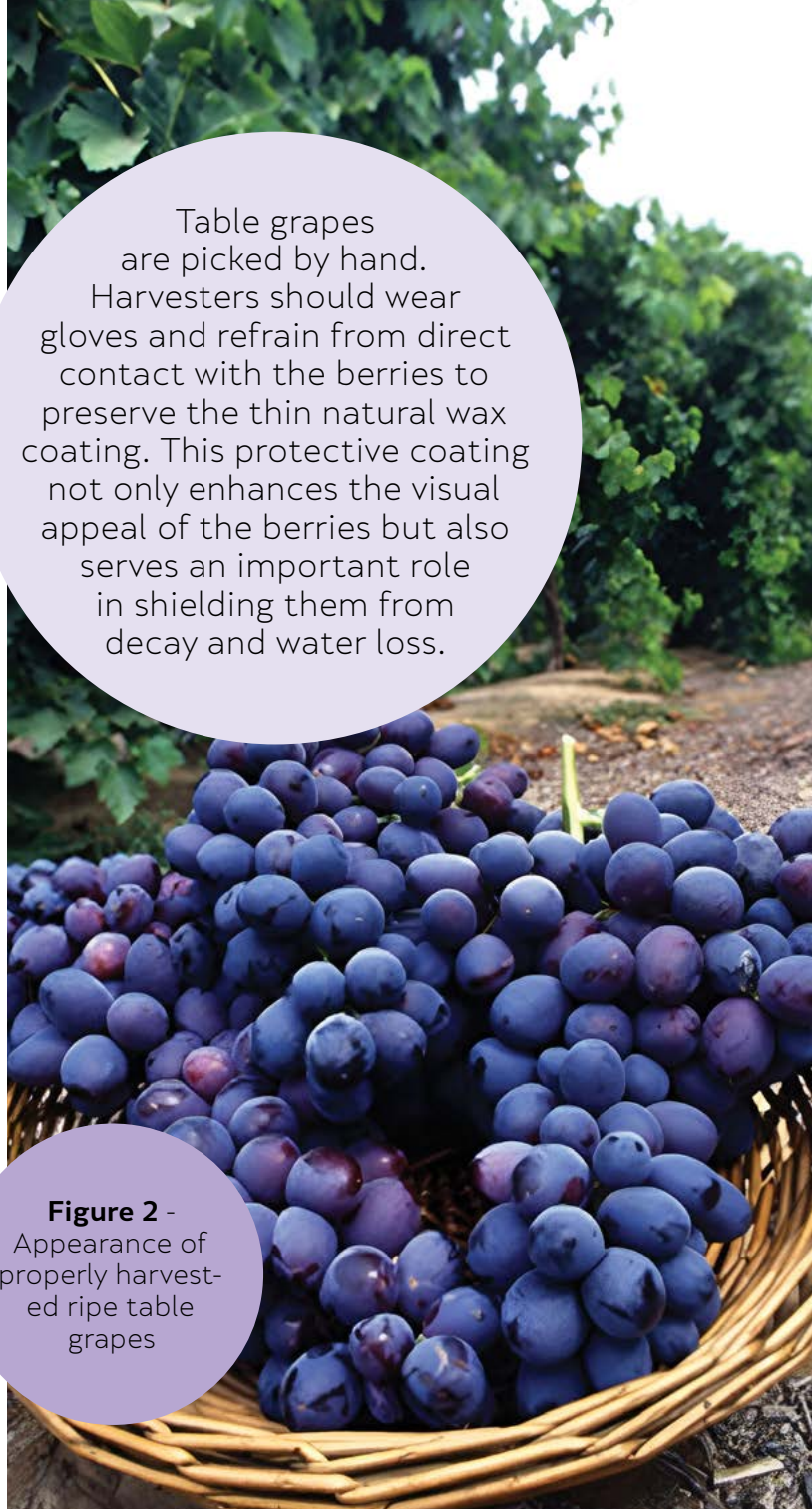

Figure 2 - Appearance of properly harvested ripe table grapes

POST-HARVEST MANAGEMENT OF FRUITS

In post-harvesting, it is crucial to promptly relocate the grape clusters away from direct sunlight. The use of makeshift awnings or shaded spots within the vineyard is advisable for this purpose.

TRANSPORTATION

Efficient organization is crucial when transporting grapes from the vineyard, ideally using refrigerated trucks. If unavailable, tarpaulin trucks can suffice, but it is essential to minimize the duration of transportation to the cold store as much as possible.

FACTORS INFLUENCING POST-HARVEST QUALITY

Variety - Each variety has unique requirements that you need to know and adapt to

Maturity - Underripe and overripe fruits experience poorer preservation, resulting in substantial post-harvest losses.

Temperature control - Temperature regulation should start right at the start of the harvest and persist until the clusters are placed in a cold store. Before storage, it is important to gradually decrease the temperature to +4°C during 6–8 h. Table grapes should be maintained at a temperature of +1°C during storage.

Relative air humidity control – it should start right at the start of the harvest and persist until the clusters are placed in a cold store. Table grapes should be maintained at 95% relative humidity.

Sulfur dioxide - after subcooling, special plates are placed atop the cardboard box containing grapes. These plates release sulfur dioxide, serving to prevent decay**.**

Duration of storage - The duration of grape storage depends on factors such as the variety, ripeness, and quality of the clusters (for extended storage, only the finest clusters harvested at the peak of maturity are chosen). During the storage, consistent quality checks on the clusters are essential. If any slight signs of grape cluster drop are observed, immediate shipment to the market is advised to prevent losses. Table grapes can typically be stored for 3 to 6 months at a temperature of +1°C.

TABLE GRAPES DEFECTS AND DAMAGES

Figure 3 - Shriveled berries and browned stem

Source: OECD (2007), *Table Grapes*, International Standards for Fruit and Vegetables, OECD Publishing, Paris,

https://doi.org/10.1787/9789264031302-en-fr

Figure 4 – Sulphur dioxide damage

Source: OECD (2007), *Table Grapes*, International Standards for Fruit and Vegetables, OECD Publishing, Paris,

https://doi.org/10.1787/9789264031302-en-fr

Figure 5 – Cracked berries

Source: OECD (2007), *Table Grapes*, International Standards for Fruit and Vegetables, OECD Publishing, Paris,

https://doi.org/10.1787/9789264031302-en-fr

Figure 6 – Powdery mildew (*Erysiphe necator* Schw. (syn. *Uncinula necator* (Schw.) Burr.))

Source: OECD (2007), *Table Grapes*, International Standards for Fruit and Vegetables, OECD Publishing, Paris,

https://doi.org/10.1787/9789264031302-en-fr

Figure 7 – Gray mold (*Botrytis cinerea* Pers. Fr. (teleomorph *Botryotinia fuckeliana* (de Bary) Whetzel))

Source: OECD (2007), *Table Grapes*, International Standards for Fruit and Vegetables, OECD Publishing, Paris,

https://doi.org/10.1787/9789264031302-en-fr

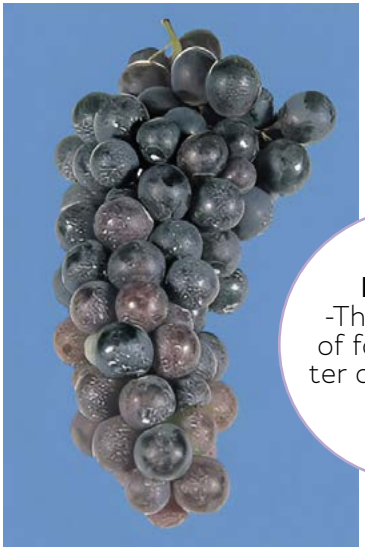

Figure 8
-The presence of foreign matter on the grape cluster

Source: OECD (2007), *Table Grapes*, International Standards for Fruit and Vegetables, OECD Publishing, Paris,

https://doi.org/10.1787/9789264031302-en-fr

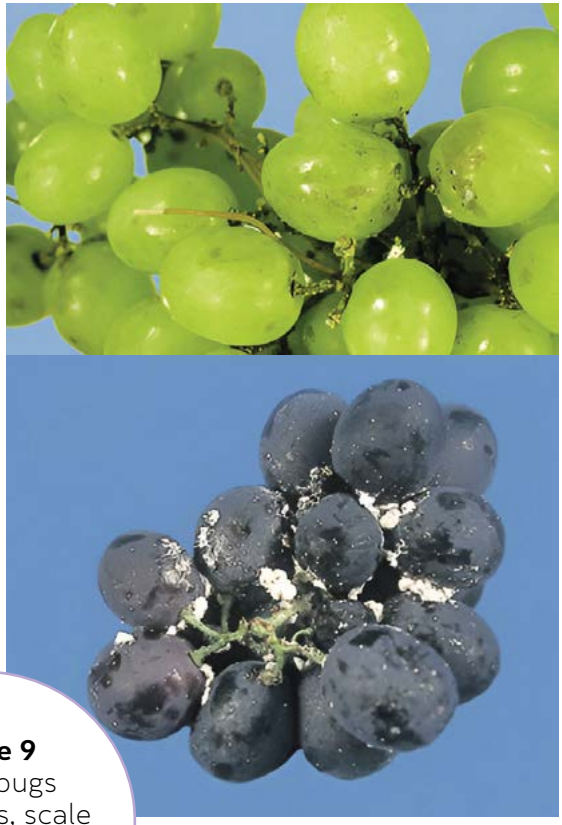

Figure 9
-Scale bugs excretions, scale bugs visible on the grape cluster

Source: OECD (2007), *Table Grapes*, International Standards for Fruit and Vegetables, OECD Publishing, Paris,

https://doi.org/10.1787/9789264031302-en-fr

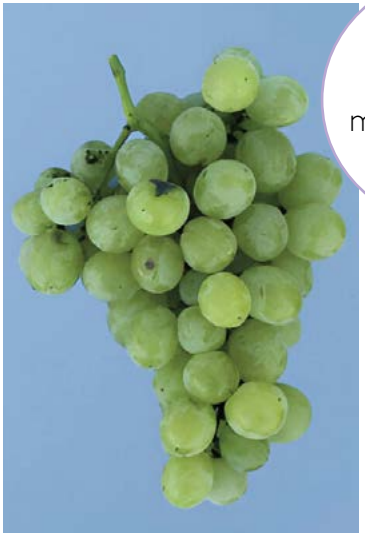

Figure 10 – Grapevine moth damage

Source: OECD (2007), *Table Grapes*, International Standards for Fruit and Vegetables, OECD Publishing, Paris,

https://doi.org/10.1787/9789264031302-en-fr

Figure 11 – Dry, browned and damaged berries

Source: OECD (2007), *Table Grapes*, International Standards for Fruit and Vegetables, OECD Publishing, Paris

https://doi.org/10.1787/9789264031302-en-fr

Figure 12 – Sunscald on grape clusters

Source: OECD (2007), *Table Grapes*, International Standards for Fruit and Vegetables, OECD Publishing, Paris, https://doi.org/10.1787/9789264031302-en-fr

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