



Grape color isn't just about taste and aesthetics; it has a significant impact on the economic success of grape varieties and grape growers.

Image Source: Rohit Tandon

The color of table grapes may at first glance seem to be simply a matter of arbitrary aesthetics, but in fact, grape color has significant implications for both consumers and grape growers. As such, there is considerable interest in improving coloration via specific chemical compounds and agricultural practices designed to create deeper, richer, and more vibrant hues. Assessing the efficacy of these methods is critical to the success of color enhancing products and processes. But for the most precise results, [visual assessment alone is not enough](#); rather, researchers must turn to spectrophotometric technology to gain a complete picture of the impact that color enhancers have on these delicate fruits.

Why Table Grape Color Matters

Both red and white grapes serve as a good carbohydrate and fiber source and contain a host of vitamins and minerals that fortify health. Red grapes, however, contain something extra: resveratrol and quercetin. Resveratrol is a polyphenolic compound with anti-inflammatory and antioxidant properties that confer a number of health benefits, including heart disease protection, lowering bad cholesterol, and potentially improving brain function. Quercetin is a flavonoid that acts as a potent antioxidant, protecting from free radical damage. In studies, quercetin has been shown to reduce the growth rate of cancer cells, lower high blood pressure, and reduce symptoms of allergies, asthma, and arthritis. As such, red grapes are [sought out by health-conscious consumers](#) who want to benefit from the unique properties offered by the deeply colored fruits. ¹

For grape growers, good grape color means a more marketable product that can fetch higher prices. Poorly colored grapes can either not be sold, resulting in high levels of waste and lost revenue, or sold for reduced rates, compromising the economic viability of grape growing operations. In some cases, poor color results in grapes not even being harvested. Certain geographic areas are particularly hard-hit by color challenges; red table grape production is "particularly problematic and season after season growers have to deal with lack of color, usually with unsatisfactory results."² In Central Chile, for example, "maturity (soluble solids and acidity) is easily reached, but lack of color

delays harvest. This delay affects market prices and, on late cultivars, other concerns arise.” Even in well-equipped grape production operations in the United States, adequate fruit color can be a major problem, leading to significant economic losses.



Researchers are looking to plant growth regulators to enhance the color of red grapes, thereby increasing yields and profitability.

Image Source: Brain & Storm

Methods for Enhancing Table Grape Color

To enhance red table grape color and, thus, yields, prices, and profits, grape growers and researchers have turned to a number of innovative solutions. ProTone, for example, harnesses the power of the plant growth regulator *s*-abscisic acid (*a*-ABA) to promote color development in red table grapes. Ethephon, another widely-used plant growth regulator, enhances grape color by triggering the release of ethylene, “a plant hormone that stimulates pigment accumulation in grapes.”³ With correct application plant growth regulators can have a major impact on coloration and may be used in combination with each other and with a number of other agricultural practices designed to improve color. The success of these products, however, depends on a variety of factors and not all grape growers see optimal results. Thus, researchers continue to investigate new ways of enhancing red grape color while simultaneously adding new features, such as stress management, to existing formulations.⁴



Measuring the color of table grapes using spectrophotometric instrumentation gives researchers the highest level of insight into color behavior and the effect of color enhancing agricultural products. Image Source: Unsplash user Thomas Verbruggen

Measuring the Color of Table Grapes

Historically, grape color assessment was done on a visual basis, [an imprecise and unreliable method](#). With the advent of spectrophotometric technology, however, researchers now have an objective basis for which to measure and numerically express color. As Luis Almela *et al.* write in their study on grape color measurement:

Color is a matter of perception and subjective interpretation, and there is a wide variety of ways to express it. However, the verbal descriptions of color are too complicated and difficult, so spectrophotometers are used increasingly to express colors numerically. These measurements [...] make it possible for anyone to understand what color is being described.⁵

Almela and his research cohort found that spectrophotometric measurement of table grapes was a highly reliable method of analysis that may be “used to objectify color measurements of table grapes in experimental studies, in the description of cultivars, or in the commercial classification of this fruit, being very useful to the grape industry.”

With [spectrophotometric technology](#), the impact of color enhancing agricultural products and practices can be quickly and easily assessed using reflectance instrumentation. Designed to measure color the way the eye sees it, [reflectance instruments](#) allow you to quantify chromic information for the highest level of insight into color quality in an individual sample as well as allowing you an objective basis for analyzing and comparing color behavior in large, disparate samples over time. Today’s advanced spectrophotometers are able to account for grape characteristics that would have created significant challenges for color measurement in the past, including [gloss](#) and [texture](#), and [can perform rapid sample averaging](#) for unprecedented accuracy. By measuring table grape color instrumentally, researchers can correlate color to process variables and quantify degree of color enhancement with the ultimate precision, ultimately leading to the development of better, more effective products.

HunterLab Quality

HunterLab has been a pioneer in the field of color measurement for over 60 years. Our spectrophotometers are renowned through the food industry for their accuracy, versatility, and user-friendly designs, giving users extraordinary insight into their products. With a complete lineup of [portable, benchtop, and in-line instruments](#) to choose from, we offer solutions for even the most difficult color measurement challenges. [Contact us](#) for more information about our advanced spectrophotometers, customizable software packages, and world-class customer support services.

1. "What Are the Benefits of Purple vs. White Grapes?"

<http://healthyeating.sfgate.com/benefits-purple-vs-white-grapes-4138.html>

2. ABA Effect on Table Grape Color Development In the Central Region of Chile," June 2010, <http://www.7itgs2014.org/wp-content/uploads/2014/05/Peppi-ABA->

[colorTGS.pdf](#)

3. "Using Plant Growth Regulators to Improve the Color of Grapes," May 1, 2012, <http://articles.extension.org/pages/31613/using-plant-growth-regulators-to-improve-the->

[color-of-grapes](#)

4. "Table Grape Color Enhancer Gets Noticed," October 11,

2010, <http://farmprogress.com/story-table-grape-color-enhancer-gets-notice-9-42767>

5. "Measuring the Color of Table Grapes," December 1998, [https://www.researchgate.net/publication/230365804_Measuring_the_Color_of_Table](https://www.researchgate.net/publication/230365804_Measuring_the_Color_of_Table_Grapes)

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