

How do you like your orange juice? While preferences such as pulp vs. pulp-free may be largely individual, chances are that you prefer orange juice with an intense reddish-orange color—most people do. It's also quite likely that color is one of the primary factors informing your orange juice purchasing decision. In fact, the color of orange juice is so critical to consumer expectations that many may even perceive taste differences that don't exist simply based on hue. In order to optimize consumer perception of orange juice, judicious use of spectrophotometric analysis is essential to creating chromatic appeal.

## Color Dominates Taste

A study published in the *Journal of Consumer Research* examined the effects of orange juice color, brand, and price information on consumer taste perception. They found that while brand name and price had no effect on taste perception, the color of the juice had a significant impact. When given two cups of identical juice with one cup left natural and the other tinted with food coloring, participants overwhelmingly reported taste differences. However, the researchers also found that “when given two cups of orange juice that were the same color, with one cup sweetened with sugar, the same people failed to perceive taste differences.”<sup>1</sup> In fact, color was the dominant determinant of taste, more so than any other factor, including the actual taste itself. The exact nature of the relationship between color and taste perception was further explored by a group of European researchers, who discovered that orange juice with a greenish hue “significantly increased the perceived sourness.”<sup>2</sup> Additionally, study participants overwhelmingly expected to enjoy orange juice with more intense red hues.

## Factors Impacting Orange Juice Color

While color may alter taste perception, it is also a very real indicator of quality. Certain types of oranges, such as Valencia, are inherently more likely to produce juice of deep, appealing color along with high sugars and excellent taste while the juice of Hamlin oranges is less desirable.<sup>3</sup> Where you grow your oranges can be just as important as which oranges you grow; oranges cultivated in dry California climates tend to have intense pigmentation that naturally lends itself to high-quality scores. Florida oranges, however, tend to have lighter and more subdued coloring due to hot and humid conditions and they may require additional processing to meet color standards. This may be done by blending the orange juice with tangerine or tangerine hybrid juices to create a more satisfactory hue, a process that requires careful color monitoring to ensure success. In addition to natural variation due to orange type and growing conditions, processing methods may also impact color. For example, concentrates exposed to excessive heat may suffer from Maillard oxidation, resulting in lower color quality as well as undesirable flavoring.<sup>4</sup>

## Spectrophotometric Color Quality Analysis

The power of orange juice color is recognized not just by consumers, but by the USDA, which considers hue on par with flavor in its grading system. In order to evaluate hue, the USDA developed a specialized color scale consisting of six color standards in glass tubes originally designed for visual comparison. However, the [inconsistency of visually-based color quality evaluation](#) has been recognized for decades and researchers set about solving the problem of subjective orange juice comparison as early as the 1950s. Soon thereafter, HunterLab pioneered a new standard for precision in the citrus industry with [the introduction of the D45 Citrus Meter](#), a revolutionary spectrophotometric instrument offering objective quantification of citrus color.

Full article with photos available here:

<https://www.hunterlab.com/blog/color-food-industry/making-the-grade-utilizing-spectrophotometric-analysis-in-orange-juice-production/>

