As consumers look for healthy alternatives to carbonated soft drinks, apple juice is making a splash.
Image Source: Pexels user Jeshoots

The fact that soda isn't the most healthy beverage isn't news. Historically, sugar content was the quality of soda that consumers considered to be "bad for you" and diet soda was presented as a healthier alternative. Part of this perception was driven by marketing campaigns that playing up their lack of calories. That much-feared word that has become synonymous with weight gain. But in recent years, we have increasingly begun to examine the health impact of diet sodas and, more specifically, the artificial sweeteners they contain. The results have been startling. Last week a study by researchers at George Washington found that sucralose consumption is linked to weight gain; the very phenomenon so many diet soda enthusiasts are seeking to avoid.[1]

So what are health-conscious consumers to do? For a growing number of consumers, fruit juices offer a perfect solution. According to global market intelligence company Transparency Market Research, "the global juice market is [now] the most competitive segment in the beverage industry" and it's expected to grow significantly in coming years.[2] While some juice producers are responding to consumer demand for healthy alternatives to carbonated soft drinks by introducing exotic products, others are introducing organic and low-calorie alternatives to traditional juices. Chief among these is apple juice, an old favorite that is taking on new life in the rapidly changing fruit juice market. In Norway, for example, apple juice sales have nearly doubled in the past 5 years.[3]

But increasing global interest in apple juice doesn't mean juice producers can rest on their laurels. As demand for healthier beverages has grown, so too has the desire for high quality and aesthetically pleasing products. For apple juice producers, this translates to juices of the right color and clarity, making apple juice color and haze measurement more important than ever before.

Preventing enzymatic browning is imperative to preserving the color of fresh apple juice. Image Source: Flick user **stvcr**

Color Stability In Apple Juice

Apple juice is a product most of us have grown up on and so ubiquitous that it can typically be identified by appearance alone. The primary component of this identification is color; apple juice is known for its distinctive golden hue. Maintaining that color, however, can be a challenge; the color of apple juice is highly vulnerable to enzymatic browning, particularly in response to stressors such as heat during production, transportation, and storage as well as natural aging. This process doesn't just result in off-putting aesthetics but may also "adversely affect quality, nutritional value, and safety."[4] In order to minimize these effects, juice producers must implement strict production and handling protocols, such as the use of anti-browning agents and temperature controls, to keep juices looking and tasting fresh.

Color measurement is an imperative part of the apple juice production process, both during manufacturing and during testing for longer-term color stability. Spectrophotometric instrumentation offers a simple yet sophisticated way to accurately analyze apple juice via transmission color measurement at any point during the production process to ensure that juices are behaving as expected. This technology may also be employed to evaluate the impact of a new process variable that may affect juice color, including heat treatments, ultra-high pressure homogenization, and anti-oxidation additives.[5] For thorough end-to-end quality control, you may wish to analyze color behavior over time by approximating production to consumption chains, giving you insight into how your product will appear to customers.

Creating Clarity

Color, however, isn't the only critical variable when it comes to apple juice appearance; haze is an equally important part of the puzzle. While opalescence has become more desirable with the growing demand for natural-looking products, the majority of producers still seek to produce transparent juices. However, creating clarity in apple juices brings its own difficulties.

Although haze is sometimes an indicator of contamination, the majority of turbidity is caused by "tannins, proteins, or polysaccharides, either alone or in combination" present within apples themselves and appears after bottling.[6] According to Jerome Van Buren, "these haze precursors can be derived from the fruit, although some are introduced in the processing line." As proteins, starches, and tannins aggregate, their particles grow in size and settle. Haze precursors that are "not captured by the settling particles remain in the juice" cause haze to develop. There are a number of ways to minimize post-bottling haze, including limiting inclusion of haze-forming materials in the production process and "testing freshly bottled juice for potential haze-formers." If testing detects haze-forming material, a number of corrective measures, such as fining, may be taken to remove them from the upstream product prior to bottling.

For most customers, haze in apple juice is generally undesirable, which is why haze measurement is a vital part of the quality control process. By measuring the degree of turbidity both before and after bottling using spectrophotometric instrumentation, you can quantify haze and determine the best course of action to prevent it in future batches. Because haze may be an indicator of contamination, this is a particularly important step for both health and safety control as well as creating aesthetically appealing products.

Simultaneous Color and Haze Measurement in Apple Juice

Traditionally, color and haze have had to be measured separately by two different instruments. In recent years, however, strides in spectrophotometric technology have made it possible to capture

color and haze information in a single measurement using one instrument. HunterLab offers the most sophisticated culmination of these technological advances in the form of its new Vista spectrophotometer. With electronic calibration, a spill resistant compartment, and a small footprint, the Vista takes color and haze measurement to a new level, ensuring precise measurement, flexibility, and longevity.

For apple juice producers, the Vista presents new opportunities for obtaining the most accurate color and haze measurements possible while minimizing labor time. The ease of simultaneous measurements means that the analytical process becomes not only faster but more cost-efficient, increasing your ability to implement broad-spectrum quality control protocols. With a built-in library of color and haze scales and indexes, customizable workspaces, and multiple data views you have the tools you need to ensure your products live up to consumer expectations.

HunterLab Innovation

At HunterLab, we are committed to continuous innovation in response to the needs of our customers. This is what has led us to create the most comprehensive line-up of color and haze measurement instrumentsavailable today, helping companies across industries stay at the top of their game. In a time of increasing quality expectations by consumers, our technologies give you extraordinary insight into your product lines, allowing you to rapidly identify and correct color and haze issues to ensure only the best products are released into the marketplace. Contact us to learn more about our cutting-edge technologies and let us help you find the perfect spectrophotometer for your needs.

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