



Spectrophotometers have played an essential role in the evaluation of fruits and vegetables for decades. Now, spectrophotometers are promoting increased produce intake. Image Source: Unsplash user [Mike Dorner](#)

As early as the 1920s, scientists have used color-based evaluation systems to determine the quality of fruits and vegetables. The first attempts were rudimentary, employing the manual use of Munsell color matching disks and other methodologies reliant on visual analysis.¹ Such approaches were inherently subjective, [dependent on the error-prone human eye](#), limiting their accuracy. But with the introduction of spectral analysis, that changed. Suddenly, there was an objective way of measuring color, one that allowed researchers to precisely [categorize the quality of fruits and vegetables](#) via spectral reflectance values rather than unreliable human sight.

Today, spectrophotometers are employed by fruit and vegetable producers all over the world to [evaluate both the appearance and the constitution of produce](#). These sophisticated instruments allow for [the highest level of quality control](#) to ensure only the most appealing products enter the marketplace. Additionally, the captured data guides horticultural practices and protects public health and safety.

But while spectrophotometers have led to the production of more consistent and visually appealing produce, this has yet to translate into increased consumption of fruits and vegetables. Now, researchers want to change that.



Despite ample evidence that that fruits and vegetables provide important health benefits, intake remains low. Image Source: Unsplash user [Sven Scheuermeier](#)

Inadequate Consumption of Fruits and Vegetables

Fruits and vegetables are invaluable parts of a healthy diet, promoting cardiovascular health, lowering disease risk, and aiding digestion.² There is even evidence that “eating a diet rich in fruits [and vegetables] can actually prevent the onset of clinical depression.”³ As a result, the US federal dietary guidelines recommend people eat 2-3 cups of vegetables per day and 1.5-2 cups of fruit in order to main good health.

But most of us aren’t eating enough fruits and vegetables to experience these benefits, despite ostensible growing interest in healthier lifestyle habits. According to researchers at the Centers for Disease Control and Prevention, “87 percent of Americans don’t meet recommendations for fruit consumption and 91 percent don’t meet recommendations for vegetable consumption.”⁴ This inadequate fruit and vegetable intake can have a profound impact, damaging both physical and mental health. Spurred by these findings, public health officials are now working to promote higher fruit and vegetable consumption, primarily via nutritional education targeted at schoolchildren. “Better dietary practices earlier in life might lead to better practices later,” the researchers note. “Increased attention to food environments in multiple settings, including childcare [and schools] might help improve fruit and vegetable intake, and thus help prevent chronic disease.”

Increasing the Appeal of Fruits and Vegetables for Young Women

Researchers in Australia, however, are taking a different route. Rather than touting the physical health benefits of fruits and vegetables to children, they want to appeal to vanity in order to promote fruit and vegetable consumption amongst Caucasian women age 18-34, who have amongst the lowest adult produce intakes. “Recent evidence has shown that young women are motivated to

change their health behaviors based on improving their appearance and looking good rather than health concerns,” they write. “Appearance-based interventions focusing on other health risk behaviors (smoking and sun exposure) in young adults have been successful in motivating behavior change.”⁵

But the researchers didn’t focus on the effects of fruits and vegetables on weight or weight loss, as one might expect. Rather, they were interested in the effects of fruit and vegetable consumption on skin color:

A recent appearance-based intervention displaying the effects of fruit and vegetable intake on participants own facial skin color found that this approach motivated increased consumption of fruits and vegetables. Interventions that focus on appearance could be a novel way of motivating young women to improve [...] fruit and vegetable intakes.

In other words, we may have been going about things the wrong way; rather than focusing on long-term health benefits, young women are driven by a desire for immediate aesthetic improvement.



Spectrophotometers allow for the accurate, noninvasive measurement of skin tone. Image Source: Unsplash user [Anna Sastre](#)

Spectrophotometric Measurement of Skin Color

In order to determine how various fruits and vegetables impact skin color, the researchers used spectrophotometric instrumentation to measure reflectance values. This non-invasive method optical method allows for accurate determination of color to precisely correlate produce constitution with changes in skin tone, demonstrating the potential for novel uses of spectrophotometers to promote better public health.

The data revealed that higher fruit and vegetable intakes were strongly associated with skin color, particularly skin yellowness. This yellowness has been found to be perceived as more desirable than

other skin colors in Caucasian women.⁶ “In the adjusted regression model, for every additional serving of combined fruit and vegetables per day there was an increased 0.8 units in overall skin yellowness and 1.0 units in unexposed skin yellowness,” the authors note. Produce with high levels of lutein/zeaxanthin were particularly strongly associated with skin yellowness, possibly due to their relatively high bioavailability. Although the raw data difference may appear to be small, it is “perceived as a visible increase in the appearance of skin as healthy and attractive.”

The authors acknowledge that more research is needed to determine whether “the observed effects could be used as a tool to motivate young women to change their dietary behavior.” However, the success of other public health campaigns in appealing to vanity suggests that such strategies could prove to be valuable in the promotion of increased fruit and vegetable intake.

HunterLab Innovation

HunterLab has been a pioneer in the field of color measurement for over 60 years. Today, we offer a [comprehensive line-up of portable, benchtop, and online spectrophotometers](#) to suit the diverse needs of our customers. From [the food industry](#) to the medical research community, our instruments offer the highest level of accuracy, precision, and flexibility for a broad variety of applications. Coupled with our [customizable software packages](#), you can gain unprecedented insight into color quality and behavior. [Contact us](#) to learn more about our renowned products and customer support services and let us help you select the perfect instrument for your purposes.

1. “Applications in Analysis of Fruits and Vegetables”,
http://baesil.engineering.ucdavis.edu/wp-content/uploads/sites/61/2015/06/Slaughter_Abbott_NIR_Review.pdf
2. “Consequences of Not Eating Fruits & Vegetables”,
<http://healthyeating.sfgate.com/consequences-not-eating-fruits-vegetables-6202.html>
3. “Your Mental Health Suffers When You Don’t Eat Enough Fruits and Vegetables”, September 22, 2015, https://docs.google.com/document/d/1X03jVaDMIU0KWZY2ZV-XxHaLqFto_crEcOxcYPkzXRo/edit
4. “Most Americans Still Don’t Eat Their Fruits & Veggies”, July 9, 2015,
<https://www.livescience.com/51500-fruit-vegetable-consumption-united-states.html>
5. “Fruit, Vegetable and Dietary Carotenoid Intakes Explain Variation in Skin-Color in Young Caucasian Women: A Cross-Sectional Study”, July 15, 2015, <http://www.mdpi.com/2072-6643/7/7/5251/htm#B5-nutrients-07-05251>
6. “Make Your Face Look As Healthy As Possible”, May 19, 2017, <https://hmri.org.au/news-article/make-your-face-look-healthy-possible>