The color of beans is an important indicator of quality, as out of spec color may indicate a substandard product
Image Source: Flickr user missuscallaway

Beans are one of the oldest cultivated plants in the world and have served as a vital source of dietary protein for thousands of years. Today, there are over 40,000 bean varieties in existence, with dozens being commercially mass-produced for the consumer market in countries around the world. Although beans share a similar general appearance, different types vary greatly in flavor and aroma profile, giving each one a unique place within the culinary spectrum.[1] For bean producers and commercial food companies that buy beans, **establishing quality control parameters** for each bean variety is essential to ensuring that bean lots consistently meets expectations.

Because the color of beans acts as a primary quality indicator, spectrophotometric color measurement is considered a critical part of quality assurance protocols and may be applied to any bean variety.[2] Not only is spectrophotometric color measurement a valuable part of your internal quality assessment processes, it is also vital to ensuring that both raw and processed beans meet federal regulations for color quality and consistency.[3] As Rachael Stothard writes:

Being a natural food stuff, there is bound to be disparity from bean to bean. All types of bean, regardless of the requirement and the reason for processing the bean, can be analyzed the same way; through reflected color measurements; all that is needed is the correct spectrophotometer.[4]

The nature of beans, however, presents special challenges to spectrophotometric color analysis. By understanding these challenges and the technologies available for overcoming them, you can choose a spectrophotometer with the features necessary to create accurate, reliable, and repeatable measurements.

https://youtu.be/x33_gqsl5DQ

Accounting for Bean Size and Shape

Spectrophotometers are renowned for their ability to capture color information more accurately and consistently than the human eye. When you're measuring the color of samples that vary in size and

shape, however, all spectrophotometers are not created equal. To obtain accurate color measurement of beans, you must use a spectrophotometer that can account for texture and size variations to ensure that the organic shape of the beans don't interfere with the instrument's ability to obtain correct data. Spectrophotometers with **integrated height measurement** are ideally suited for correctly analyzing the color of all bean types as they automatically compensate for height variation, optimizing color monitoring precision.

Measuring the Color of Beans Using Sample Averaging

The great aesthetic variation found in beans means that taking a single measurement of a sample may not adequately capture the color information you need to obtain a complete and accurate picture of product quality. As a result, you run the risk of either rejecting acceptable product or releasing substandard beans into the marketplace, both of which can have serious economic repercussions. **Sample averaging**—or averaging multiple measurements of the same sample—gives you enough data to make valid assessments of even challenging samples; as Stothard says, "[Sample averaging] would best represent the batch as a whole and provide suitable tolerances that would allow for natural variation but inhibit the allowance of substandard products." Using a spectrophotometer that rapidly takes multiple measurements and conducts automatic sample averaging allows you to easily obtain the data you need to produce reliable readings.

Spectrophotometric color measurement is a critical part of quality control for both bean producers and commercial food companies that use beans in their food products.
Image Source: Flickr user cookbookman17

HunterLab Spectrophotometers

HunterLab has been a pioneer in color measurement for over 60 years. Our ongoing to commitment to innovation and technological excellence has led us to create a comprehensive line-up of spectrophotometers capable of capturing accurate, repeatable color data from even the most challenging sample types. Today we offer an impressive range of portable, benchtop, and inline spectrophotometers designed with sophisticated features such as integrated height measurement and automatic sample averaging, giving you unprecedented insight into your products. **Contact us** to learn more about our renowned instruments, customizable software packages, and world-class

customer service and let us help you select the right spectrophotometer for your color measurement needs.

1. “Bean Varieties,” http://www.usdrybeans.com/resources/varieties/
2. “United States Standards for Beans,” December 2008, https://www.gipsa.usda.gov/fgis/standards/bean-standards.pdf
3. *The Code of Federal Regulations of the United States of America*, 1979, https://books.google.ca/books?id=twc5AAAAIAAJ&printsec=frontcover#v=onepage&q&f=false
4. “How to Measure the Color of Different Beans”, July 16, 2015, http://www.colourmeasure.com/knowledge-base/2015-07-16-how-to-measure-the-colour-of-different-beans