



Horticultural hybrids have come a long way since Gregor Mendel. Image credit: Flickr user essie (CC BY 2.0)

Almost two hundred years have passed since Gregor Mendel discovered that the color of pea blossoms could be controlled through cross-pollination. While the theories he pioneered haven't changed, the techniques we now use to cultivate specific plant traits have progressed beyond anything Mendel probably imagined.

Consumers might be aware only that professional florists can now guarantee the color of a bouquet more-or-less matches what the customer chooses from a website. But deeper into the supply chain, professional growers bear the primary responsibility of managing plant leaf and flower color. In fact, if you're a local niche cultivator, you might stay competitive with international growers by offering color nuances that larger operations cannot match<sup>1</sup>. Portable spectrophotometers are the ideal tool to help both large and small growers meet the challenges that they face in accurately measuring plant color.

#### Human Color Perception

A primary challenge for professional horticulturalists is that human perception of plant and flower color is a function of multiple variables. These include ambient light, weather conditions, and the prevalence of contrasting or matching colors in nearby plants. These subjective perceptions limit the utility of a simple visual observation of your growing fields<sup>2</sup> and can negatively impact the management of some flower species.

An Australian study of yellow-orange flowering plants, for example, revealed that objective quantification of leaf and flower colors with colorimeters improved a cultivator's ability to distinguish invasive species from desired plantings in growing fields<sup>3</sup>. The study suggested that using a standard instrument to measure color eliminated biases that can affect human perception.



A variety of factors can make accurate color measurement difficult out-of-doors. Image credit: Flickr user kellinahandbasket ([CC BY 2.0](#))

### **Color Measurement Techniques**

In the above study, researchers scanned flower fields with digital cameras and plotted field color maps on traditional L-a-b colorimeter indices. This technique is useful for detecting variations between broad growing regions, but it is limited in its focus, in that it measures only absorbed light. Flowers and plants have translucent surfaces that absorb, reflect, and transmit different wavelengths.

Spectrophotometric analysis of fields will give you more useful information for managing flower species, allowing you to quantify real color differences and detect invasive species before they have a detrimental effect on your growing operations. Device measurements can be correlated with GPS coordinates over a large field, and those measurements can then be plotted across a map. This allows you to review the map to identify objective color variations across your field, directing you to areas that are experiencing invasive growth or that are not receiving adequate fertilization or moisture.

If your operation devotes years and considerable financial resources to the development of hybrid flowers, here, too, you might see substantial benefits from portable spectrophotometers. Undetected color variations during the course of development can extend time and cause you to exceed your initial budget. To minimize the risks of variation, your technicians can use devices like [the HunterLab MiniScan 4000S](#) to collect real leaf and flower color information with minimal distortion from gloss or plant texture. Readings that are outside your specifications will alert developers to the plant's potential for deviation from established standards.



A rose of a different name might not actually smell as sweet. Image credit: Flickr user JFXie ([CC BY 2.0](#))

Indoor greenhouse operations can also see direct returns from spectrophotometric measurements. Environments that produce too much or too little light can affect your plants' chlorophyll production and general health, but using a spectrophotometer to measure real green color saturation in your plants allows you to adjust light saturation in your indoor facilities as needed. The spectrophotometer will give you a more accurate depiction of chlorophyll levels, with measurements that account for reflectance, absorption, and transmission of specific light wavelengths, and no distortion from ambient conditions.

As long as color identification is a critical element of plant management, professional horticulturalists will need tools that give them the most objective color measurements possible. HunterLab produces a variety [of portable and benchtop spectrophotometers](#) that can be adapted to multiple industrial applications, including professional horticulture. [Get in touch with us](#) for more information about our products and the possibilities they offer for your growing operations.

1. "Why Flower Farmers Pay Attention to the Pantone Color of the Year", February 2014, <http://modernfarmer.com/2014/02/farmers-flowers-fashion/>
2. "A general model of detectability using species traits," November 2012, <http://onlinelibrary.wiley.com/doi/10.1111/j.2041-210x.2012.00257.x/abstract>

3. "Quantifying Plant Colour and Colour Difference as Perceived by Humans Using Digital Images," August

2013, <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0072296>