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Sensegood spectrophotometer for color analysis in horticulture

Plant colors have ecological role. They serve to attract insects, birds, and animals for both pollination and seed dispersal.

Plant pigments are essential for the attractiveness of fruits, accumulating most often in the skin during ripening process. The most important pigments of fruits include carotenoids and anthocyanins. Beside their role in pigmentation, they are important for human health as a source of vitamin A and antioxidant compounds. [1]

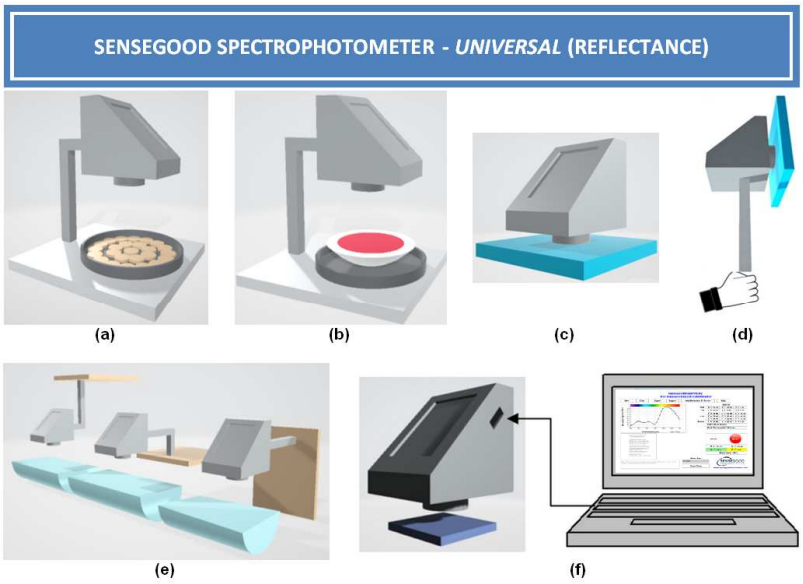
The visual appearance of flowers, fresh fruits and vegetables is one of the first quality determination made by the consumer. Often the appearance of the commodity is the most critical factor in the initial sale. There are several research papers published focusing on use of color measuring instruments to study the colors in plants, flowers, fruits, and vegetables. Further discussion narrates few of them.

Visual color evaluation, however, is often flawed. [2] There are advantages of instrumental color measurement. This is in agreement with Ayala-Silva et al. [3] where they opined that the instrumental color measurement is more precise and more informative than any other color charts while describing Amaryllis flower color. Researchers recorded data in L*, a* and b*color space coordinates.

Yousef et al., [4] studied the influence of different harvest dates and ripening periods on fruit quality. They examined the skin color parameters L*, a*, b* and C* and h^0 values considering different harvest dates and storage at 20^0 C.

Temperature affects color, hence, there are often more vivid colors in cool northern gardens than hot summer ones. Plant stress, such as from drought, insect attack, or plant nutrition (too much or little) also can cause different levels of pigments in flowers, and result into different colors. [5]

Fresh rose flowers though exquisite in their beauty are highly perishable and delicate in nature and cannot retain their beauty and fresh look for a long time in spite of using best chemicals for enhancing vase life. In this context rose flowers can be dried, preserved and processed to retain its beauty as well as everlasting value. Evaluation of the color of dried Dutch rose flowers using a color measuring instrument was carried out at Regional Horticultural Research and Extension Centre, GKVK, Bangalore. Flower chromaticity was recorded in CIE L*, C* and h° color space coordinates. [6]



- ✓ Benchtop/ Tabletop: (a) (b) (Rotating sample platform)
- ✓ Handheld/ Portable: (c) (d)
- ✓ Online/ In-process: (e)

- ✓ Solid: (a) (c) (d) (e)
- ✓ Liquid: (b) (e)
- ✓ Paste: (b) (e)
- ✓ Powder: (a) (b) (e)

- ✓ Contact measurement: (c) (d)
- ✓ Non-contact measurement: (a) (b) (e) (Adjustable height)

Works with:
- ✓ 5V adapter (cell phone charger)
- ✓ Power bank
- ✓ Computer/ Laptop (f)

- ✓ Averaging
- ✓ Auto repeat measurement mode
- ✓ Color match percentage
- ✓ Color indices (whiteness, yellowness, …)

- ✓ *SensegoodSmart* – computer interface software utility

Sensegood spectrophotometer for color measurement:
Sensegood spectrophotometer is an analytical color measurement instrument that is widely accepted in the industry and research fraternity. It comprehensively evaluates the color attributes of various samples, including solids, liquids, powders and pastes. Large viewing area (sensor's field of view) and rotating sample platform averages out sample and produces accurate repeatable color attributes. As a result, consistency can be maintained and quality standards can be met with less waste, time, and effort.

Sensegood spectrophotometer is the versatile device that is engineered to work as handheld/portable, benchtop/table-top or in-process/online color measurement instrument. Using Sensegood spectrophotometer, one can compare color between reference and sample. It gives result in percentage match. It also incorporates continuous auto measurement mode. In this mode, it wakes up at user selectable intervals, takes measurement, compares the sample color with the saved reference, displays percentage match, and alarms to the operator with beeping sound in case if the matching percentage is below preset threshold. It has provision for averaging option in normal mode as well as in auto repeat measurement mode.

Measured CIE L*a*b* values indicate strength of color parameters like: bright or dull, red – green and yellow – blue respectively. Measured color is also represented as chroma C*, hue h^0, reflectance graph, peak wavelength and color temperature on color touch LCD. Sensegood spectrophotometer is non-messy non-contact type instrument which has benefit of measuring sample's color from a distance. Because of this, sensor's optical assembly remains scratch proof enabling long life in retaining calibration. Sensegood spectrophotometer is the versatile device engineered to work as handheld, benchtop or in-process/online measurement instrument.

SensegoodSmart utility:
Sensegood spectrophotometer provides computer interface software ***SensegoodSmart*** which lets you to convey numeric color data to another Sensegood spectrophotometer located anywhere across the globe. SensegoodSmart utility enables user to store unlimited number of references to the computer. Any desired reference can be recalled and downloaded to Sensegood spectrophotometer whenever required. The utility provides all color related analytical information on single screen.

Further related read: Fruits & vegetables

References:
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[2] Voss, D. H. (1992). Relating Colorimeter Measurement of Plant Color to the Royal Horticultural Society Colour Chart, American Society for Horticultural Science, 27(12), 1256-1260. Available at: https://journals.ashs.org/hortsci/view/journals/hortsci/27/12/article-p1256.xml
[3] Ayala-Silva, T. ; Schnell, R. J. ; Meerow, A. W. ; Winterstein, M. ; Cervantes, C. ; Brown, J. S., "Determination of color and fruit traits of half-sib families of mango (Mangifera indica L.).", 118th Annual Meeting of the Florida State Horticultural Society, Marriott Tampa Westshore, Florida, USA, 5-7 June 2005.
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[5] The how and why of plant color by Dr. Leonard Perry, Horticulture Professor, University of Vermont, Available at: https://pss.uvm.edu/ppp/articles/colorwhy.html
[6] Bintory MA, Seetharamu GK, Munikrishnappa PM, Ramegowda GK, Basavaraj G (2015) Evaluation of the Colour of Dried Dutch Rose Flowers Using a Colorimeter. J Horticulture 2: 157. Available at: https://doi.org/10.4172/2376-0354.1000157

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