Sensegood spectrophotometer for color measurement and analysis in natural and color coated seeds

Photo: Various seeds. Quality of seed is important to ensure quality and quantity of the produce. Source: www.johnnyseeds.com

Importance of color in seeds:

Published international research proves the dependency of seed quality and initial seedling growth on seed color. Color parameters b*, C*, L*, and H°, showed significant correlation with seed's quality parameters. [1] Seed color affects light requirement during germination. [2] Study also mentions that the seed coat color variation relates to the seed yield parameters. [3] Color of a seed indicates its physiochemical properties and nutrition value.

It means that seed producing firms have to develop a trust by ensuring quality seeds so farmers and producers get their returns when each seed grow into seedling. And as research cite; seed color is one of the most important parameter in determination of quality of the seed and healthy germination ahead. It becomes essential need for seed producers to regulate required seed color.

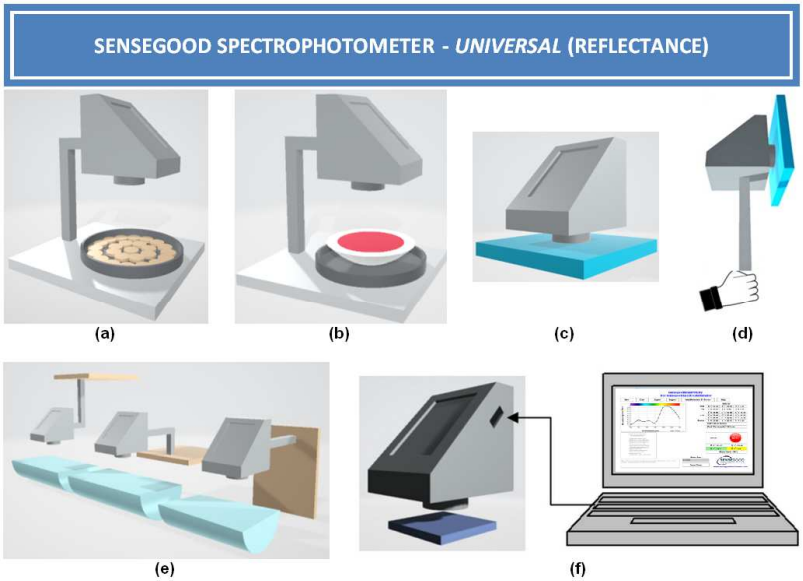
Photo: Quality enhanced color coated seeds. Source: www.crodacropcare.com

Significant effects of color on seed quality parameters is promoting crop researchers and seed producers for developing FIFRA (The Federal Insecticide, Fungicide, and Rodenticide Act) and similar other compliant seed coating colorants. Seed coating polymer is aqueous base, environment friendly, film forming stabilized carboxylated polymer. It is used extensively to coat seeds with additives such as pesticides, growth stimulants and other agro chemicals. The thin coating of polymer helps the additives to stay on seeds and to avoid dusting and pollution and also enhance appearance of the seed in good faith.

Instrumental color measurement:

In the process of visual color match; there are factors like eye fatigue, aging of the eye, stress, individual's different expressive perception toward color, and light source that affect the color match decision. Hence, it

becomes difficult to make decision of accepting, reprocessing or rejecting the sample based on visual match. And this directly hampers the quality of the final product. While on other hand there are advantages of instrumental color quality control as it provides results with same accuracy, consistency and reliability.



- ✓ 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)

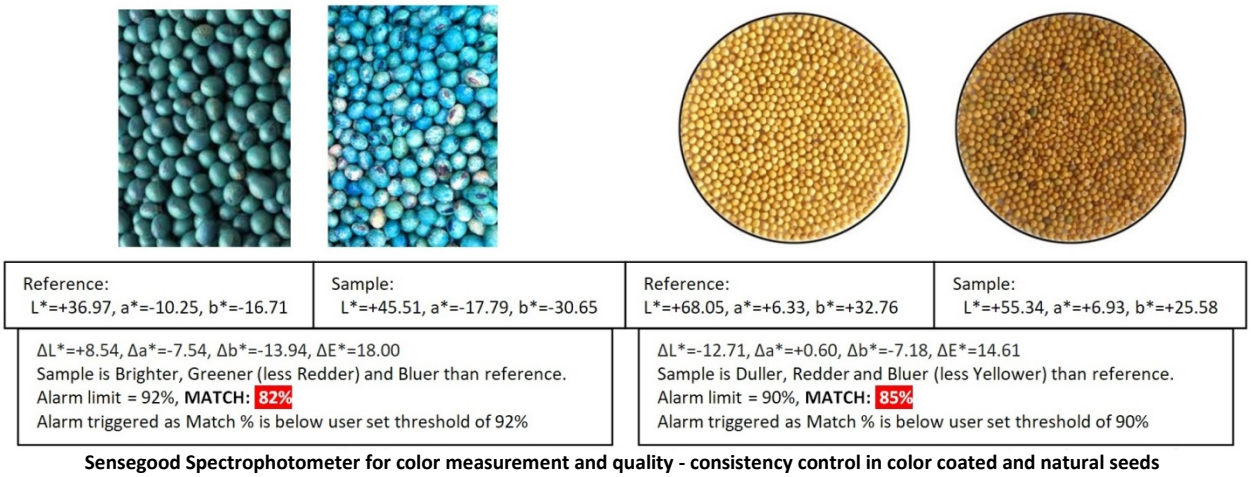
Works with:
- ✓ 5V adapter (cell phone charger)
- ✓ Power bank
- ✓ Computer/ Laptop (f)

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

- ✓ *SensegoodSmart* – computer interface software utility

Sensegood spectrophotometer for color quality and consistency control in seeds:
Sensegood spectrophotometer is an analytical color measurement instrument that is widely accepted in the industry and research fraternity. From raw material to final product, it comprehensively evaluates the color attributes of various samples, including solids, liquids, powders and pastes. Sample can be non homogeneous with different shape and size. Sensegood spectrophotometer has rotating sample platform with large viewing area (sensor's field of view). It takes multiple measurements over number of rotations and generates average result representing the sample's color. As a result, consistency can be maintained and quality standards can be met with less waste, time, and effort.

Sensegood spectrophotometer helps in picking up even the slightest color difference over the production batches. It helps in finding difference between two colors and shows result in percentage match.



Sensegood Spectrophotometer for color measurement and quality - consistency control in color coated and natural seeds

Photo: Sensegood spectrophotometer measures color difference in seeds and displays result in percentage match. If matching is below user set threshold, it warns by providing alarm and indication on LCD. Reference can be saved and used anytime to compare it with sample. In photo: Color difference measurement in color coated soybean seeds and natural brassica carinata (mustard/rape variety) seeds.

Using Sensegood spectrophotometer, seed color analysis can be done by various indices like whiteness and yellowness index. Also L*, a*, b* color space values indicate light, redness/greenness and yellowness/blueness; useful in determining quality of white, yellow, green or brown textured seeds. It also evaluates color in terms of chroma C* and hue H° along with various other color parameters.

Do more with Sensegood spectrophotometer:
Sensegood spectrophotometer 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 color is also represented as 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 remains scratch proof enabling long life in retaining calibration. Non-contact measurement avoids any sample contact and contamination on sensor measuring surface. Sensegood spectrophotometer is the versatile device that is engineered to work as handheld/portable, benchtop/table-top or in-process/online color measurement instrument.

SensegoodSmart utility:

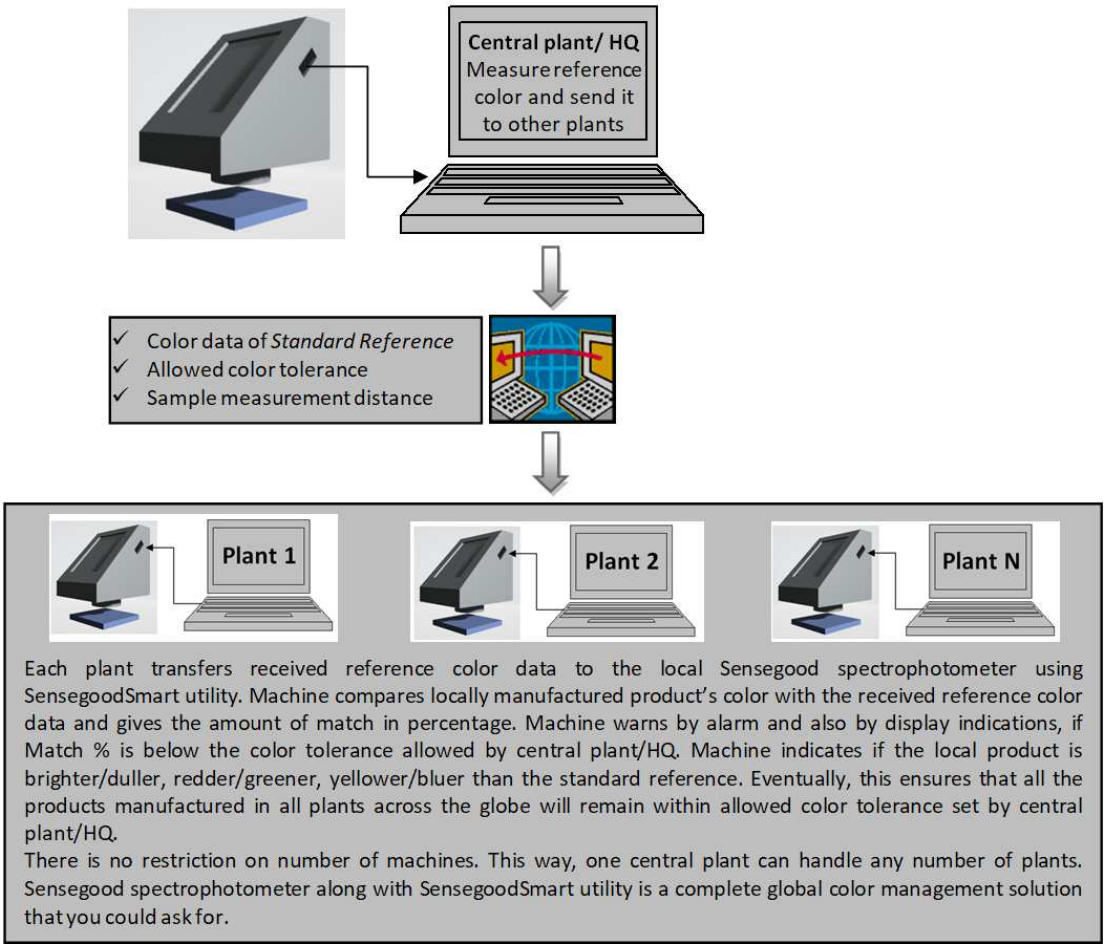


Photo: SensegoodSmart utility for color management across multiple production plants. Apart from this, SensegoodSmart utility enables user to store unlimited number of references to the computer. Any desired reference can be recalled and downloaded to Sensegood spectrophotometer whenever required. The utility provides all color related analytical information on single screen. This feature is even more desirable when using Sensegood spectrophotometer for in-process/online applications.

Sensegood spectrophotometer provides computer interface software *SensegoodSmart* which lets you to convey numeric color data across all production plants that may be located at multiple places across the globe. Each production plant uses Sensegood spectrophotometer to compare color attributes of the product manufactured in their plant with the numerical color information received from central plant or management. This enables them to reproduce each product consistently across all the plants. This feature is highly desirable for wide spread industry with plants at various places. It also assists in color consistency in packaging material supply chain.

References:

[1] Mavi K., 2010. The relationship between seed coat color and seed quality in watermelon Crimson sweet. Hort. Sci. (Prague), 37: 62–69. Available at: https://www.agriculturejournals.cz/web/hortsci/

[2] Bhatt, Arvind, Gairola, Sanjay, & El-Keblawy, Ali A.. (2016). Seed colour affects light and temperature requirements during germination in two Lotus species (Fabaceae) of the Arabian subtropical deserts. Revista de Biología Tropical, 64(2), 483-492. https://dx.doi.org/10.15517/rbt.v64i2.18575

[3] Gulgun Yildiz Tiryaki, Abdullah Cil, and Iskender Tiryaki, Revealing Seed Coat Colour Variation and Their Possible Association with Seed Yield Parameters in Common Vetch (Vicia sativa L.), International Journal of Agronomy, 30 Nov, 2016. Available at: https://doi.org/10.1155/2016/1804108

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