

# CCM-200 plus Chlorophyll Content Meter



## Application

- Measure Chlorophyll in Intact Samples
- Monitor Effects of Environmental Stress
- Evaluate and Determine Nutrient Performance and Requirements
- Teaching and Research

## Features

- Non-Destructive Measurement
- Lightweight, Hand-Held Design Optimized for Field Work
- Display Chlorophyll Content Index
- Large Memory with Built-in Data-Logging
- USB and RS-232 Connectivity
- User selected sample sizes for averaging
- Stand Alone Operation- No P.C. Required

The New CCM-200 Chlorophyll Content Meter provides fast accurate, chlorophyll readings on the intact leaves of plants and crops. No more grinding or destructive assays! The measurement is rapid, accurate and simple to obtain, allowing researchers and agronomists to gather and evaluate mission critical data faster than ever before. Especially useful for improving **Nitrogen** and **Fertilizer** management programs with corn and wheat, the CCM-200*plus* can be used on a wide variety of both C<sub>3</sub> and C<sub>4</sub> plants.

The CCM-200 plus is designed to be the most repeatable portable chlorophyll content meter available. It incorporates a larger measuring area for signal averaging over a larger sample area. This approach provides a more reliable reading that takes into account small structure variations that can affect repeatability and reliability when compared to smaller area sampling. Accuracy of measurement is determined by correlation with chemical tests. Results have shown, that the CCM-200 is as accurate as any chlorophyll meter on the market and may be even more accurate on samples with very high chlorophyll content. Employing a new MEDICAL grade strict tolerance LED source insures repeatability and consistent meter to meter readings.

The CCM-200 plus has the largest on-board memory of any chlorophyll meter, storing over 94,000 measurements internally, including GPS data. Users can record months of measurements as well as input their own comment lines without worrying about limited memory or lugging additional equipment such as data loggers or Pc's into the field. Data transfer is quick and easy through its universal USB 1.1 interface.

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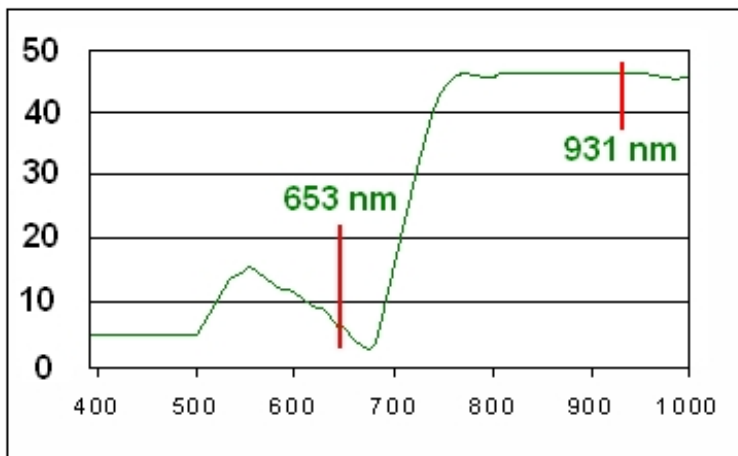
Nitrogen Status

Agriculture

Crop Production

Changes in chlorophyll content can occur as a result of nutrient deficiencies, exposure to environmental stress, exposure to certain herbicides, and differences in light environment during growth (shading). Chlorophyll content can be used to manage nutrient optimization programs that both improve crop yield and help protect the environment. Testing for herbicide damage can indicate the need for a change in herbicide selection or application methods; in order to maintain good weed control while having minimum impact on crop health.

Laboratory methods for determination of chlorophyll content are both time consuming and destructive to the sample. Typically a sample must be detached, ground up in a solvent, then assayed in a spectrophotometer. A sample can be measured only once precluding the monitoring of trends in chlorophyll content over the growing cycle. The CCM-200 provides non-destructive, rapid measurements with auto averaging calculations of relative chlorophyll content. It reduces the need for time consuming and costly chemical testing



The CCM-200 *plus* accounts for both chlorophyll transmittance and leaf thickness.

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Opti-Sciences, Inc. is continuously updating its products and reserves the right to amend its specifications as necessary.

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## Technical Specifications

**Measured Parameters:** Optical absorbance in two different wavebands: 653nm (Chlorophyll) & 931nm (Near Infra-Red).

**Measurement Area:** 9.52mm (3/8") dia. circle, (.71 mm<sup>2</sup>)

**Resolution:** .1 CCI unit

**Repeatability:** +/- 1%

**Source:** Custom 2 wavelength LED module

**Detector:** Silicon photodiode with integral amplifier for absorbance measurement, power monitoring, and temperature compensation.

**Storage Capacity:** 8 Mbyte of memory for up to 160,000 data measurements, or 94,000 with added GPS data entries.

**Data Modes:** (3) Single point, user selectable from 1-30 point averaging, and a statistical 10-30 point protocol that asks to replace data points beyond a 2 sigma standard deviation.

**User Interface:** 128 x 32 pixel graphic display, beep signals, keys for: setup, measurement protocols, diagnostics, data control and user input of alphanumeric comment lines.

**I/O:** USB 1.1 & RS-232; multi-point file output, single point out on demand, NMEA 0183 compliant for GPS data input.

**Temperature Range:** 0-50 Deg C

**Temperature Drift:** Temperature compensated source and detector circuitry for minimum drift over full range.

**Power Source:** 9V Alkaline Battery

**Auto Off Interval:** 4 minutes (no key press or download)

**Size** 152(L)x82(W)x25(D)mm,

**Weight with battery:** 162g