The proven CCM-200plus Chlorophyll Content Meter provides fast and reliable, chlorophyll content readings on the intact leaves of plants. The measurement is rapid, and easy to make with single hand operation, allowing researchers to gather and evaluate data faster than ever before. The instrument is especially useful for improving Nitrogen and Fertilizer management programs with corn, wheat, and various other types of crops. The CCM-200plus can be used on a wide variety of both C₃ and C₄ plants.

The CCM-200plus is designed to be the most repeatable portable chlorophyll content meter available. It incorporates signal averaging over a larger measuring area of the sample. This approach takes into account small structure variations in leaves that can affect repeatability and reliability when compared to smaller area sampling. Reliability of measurement has been determined by correlation with chemical tests. More than 900 published citations, on a great variety of different plant samples, establish the credentials of the CCM-200 series meters.

More than 900 publication citations

Applications

• Nondestructive Chlorophyll Content Measurement
• Monitor Effects of Environmental Stress
• Evaluate and Determine Plant Nutrient Performance and Requirements
• Nitrogen Management
• Teaching
• Measure Algae blooms - New!

Features

• Lightweight, allows operation with a single hand for rapid field work
• Graphic Display of Chlorophyll Content Index with built-in optional Sample Averaging of from 2-30 measurements
• Built-in Data-Logging - for more than 100,000 measurements and GPS
• USB output - comma delineated files

The CCM-200plus has the largest on-board memory of any chlorophyll meter, with the ability to store more than 100,000 measurements internally. No separate data logger is necessary. Researchers can record months of measurements without having to repeatedly return to the lab to download data or worry about limited memory.

Downloading of data is quick and easy through its USB port. The instrument becomes a hard drive for computers and comma delineated files open directly in standard spread sheet software.

Employing new MEDICAL grade strict tolerance LED sources increases accuracy and insures consistent meter to meter readings.

Nitrogen management - The instrument also allows averaging capability for nitrogen management and fertilizer application. Researchers can select from 2 - 30 measurements for averaging.
Position accuracy:
The location accuracy is excellent. It can be accurate up to about 0.3 meters or in the worst case, up to 2.5 meters. This is dependent on the satellite systems available at the time of use.
The GPS acts automatically. The accuracy range quoted is known as CEP (circular error probable). A 2.5m CEP means that if you draw a 2.5m diameter circle around where the GPS says it is, the GPS is inside that circle.

Other characteristics
Operating temperature is -40°C to +85°C.
Anti jamming and spoofing systems included
Works one minute after turning on

How it works:
For best location accuracy, the GPS system in the CCM-200plus chlorophyll content meter automatically works with several GPS satellite systems around the world. The 72-channel system includes: SBAS L1 C/A: WAAS (Wide Area Augmentation System) US satellite system, EGNOS (European Geostationary Overlay System), MSAS (Japanese MTSAT Satellite-based Augmentation System), GAGAN (Indian GPS Aided Geo Augmented Navigation), GPS/QZSS L1 C/A Japanese satellite system, BeiDou B11 Chinese satellite system, Galileo E1B/C European Union satellite system, and the GLONASS L10F Russian satellite system.

Main instrument measuring screen image
In the upper left hand corner the GPS: + or - indicates if GPS is working or not.
GPS data information -
GPS: + means that the GPS is working
GPS: - means that the GPS is not working.

GPS data screen
Location, dilution, and satellite information report to the data file with measuring data.
LOC: Location coordinates
DOP: - Dilution of precision-
Specifies the multiplying effect of navigation satellite geometry on positional measurement precision.
Sat: indicates the number of satellites that were used to determine GPS location. Satellite systems from countries around the world automatically respond.
Researchers from the Florida US environmental protection agency and St. Johns River Water Management District used the CCM-200plus chlorophyll content meter to quantify algae blooms.

“We believe this CCM provides a useful screening tool for rapid measurement of Chl-a concentrations in the lower St. Johns River and has the potential for being an algal bloom screening tool elsewhere. However, we emphasize that calibrations are required for applying our method in different water bodies.”

More Journal Citations:

Nitrogen Maize


Nitrogen Rice


Nitrogen Potato


Nitrogen vinyard


Nitrogen Maple tree


Nitrogen Asian Pear


Iron , sulfur


Molybdenum


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Changes in chlorophyll content can occur as a result of nutrient deficiencies, exposure to environmental stress, exposure to certain herbicides, and differences in the 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 with a spectrophotometer. A sample can be measured only once precluding the monitoring of trends in chlorophyll content over the growing cycle. The CCM-200plus provides non-destructive, rapid measurements with an option for auto averaging of measurements. It reduces the need for time consuming and costly chemical testing.

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

**Technical Specifications**

Measured Parameters: Optical absorbance in two different wavebands (653 nm and 931 nm). Designed to measure chlorophyll content and compensate for leaf thickness.

Measurement Area: 3/8” diameter circle, or 9.53 mm
area is 0.11 in², or 71.22 mm²

Resolution +/- 1 CCI Unit

Repeatability +/- 1%

Source: (1) Medical grade LED (peak at 653nm)
(1) Infrared LED (peak at 931 nm)

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

Storage Capacity: 1 Gigabyte of non-volatile memory allows between 94,000 and 160,000 measurements.

Modes: Single point measurement, or selectable averaging from 2 to 30 samples. Standard deviation is available for 10 samples or more.

User Interface: 128 x 32 pixel display, 6 keys for control and data manipulation, beep signal for status and warnings.

Output: USB 1.1 interface for data transfer. Either entire measuring files, or single measurements can be output by selection.

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) x 82(W) x 25(D)mm

Weight (with battery): 162g