

**METOS<sup>®</sup>**  
BY PESSL INSTRUMENTS



# **DUALEX - *Optical Leafclip Meter***

*Measuring chlorophyll content  
and polyphenols in plant leaves.*



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# Sensor

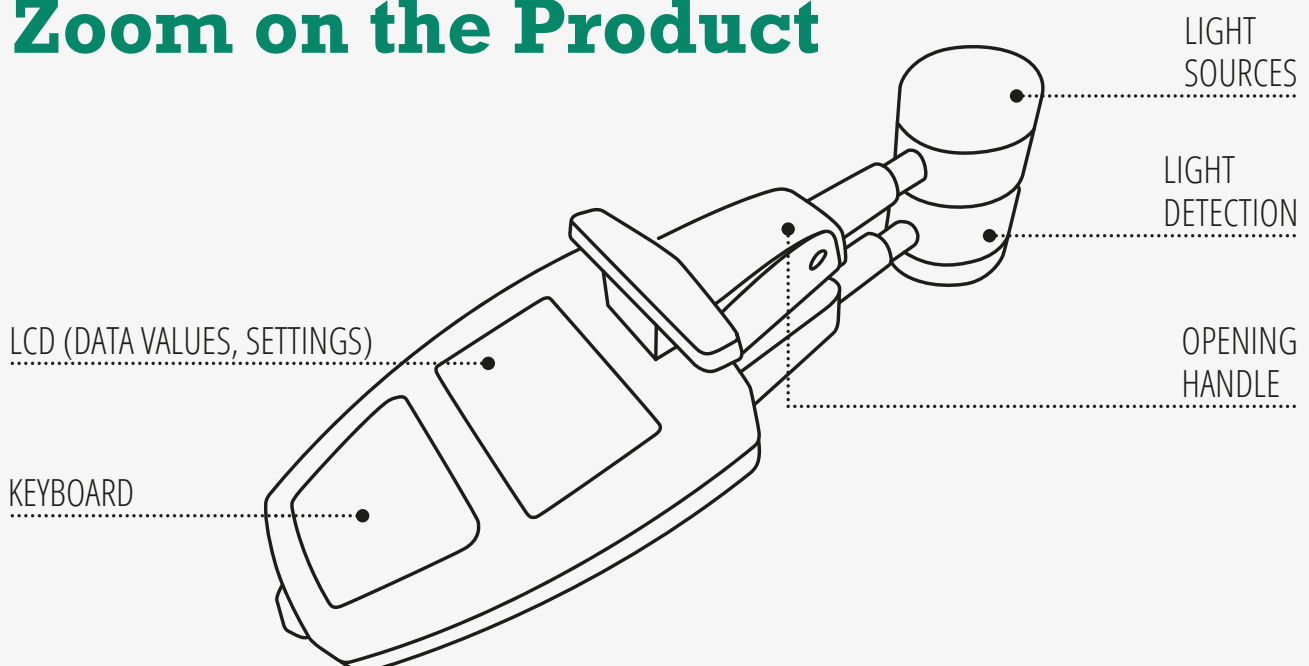


DUALEX is a **leafclip meter** that accurately measures **chlorophyll content** ( $\mu\text{g}/\text{cm}^2$ ) and provides indices for **flavonols** and **anthocyanins** in leaves.

DUALEX is extensively used in plant sciences for research on **plant responses to environmental stressors**, **nutrient management**, and **physiological studies**.

DUALEX also calculates the NBI (Nitrogen Balance Index) which has been proven to correlate best with **leaf nitrogen status**.

## Zoom on the Product





# Features

## ✓ **Non-Destructive Measurement**

Clipping the leaf **doesn't cause any damage**.

With DUALEX it's possible to measure the same leaf multiple times.

## ✓ **Adapted to Experimentation**

DUALEX offers the **possibilities to:**

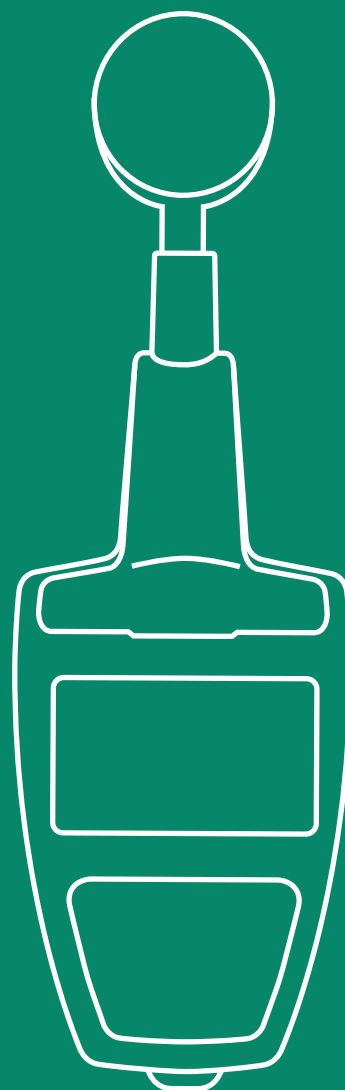
- Remove the last measurement.
- Group measurements (e.g. per plot or crop zone).
- Store more than 10,000 measurements.

## ✓ **Lightweight and Compact**

DUALEX is **easily portable and can be used frequently**. Not sensitive to ambient light, DUALEX **can be used in labs, greenhouses or fields**.

## ✓ **GPS Integration**

DUALEX can capture and store GPS coordinates for each measurement, providing precise location data essential for spatial analysis in field studies.



## **Fast & Simple**

**With only one clip**, in automatic mode, the measurement is recorded each time the device detects the presence of a leaf (manual triggering also available).

One measurement takes **less than 1 second**.

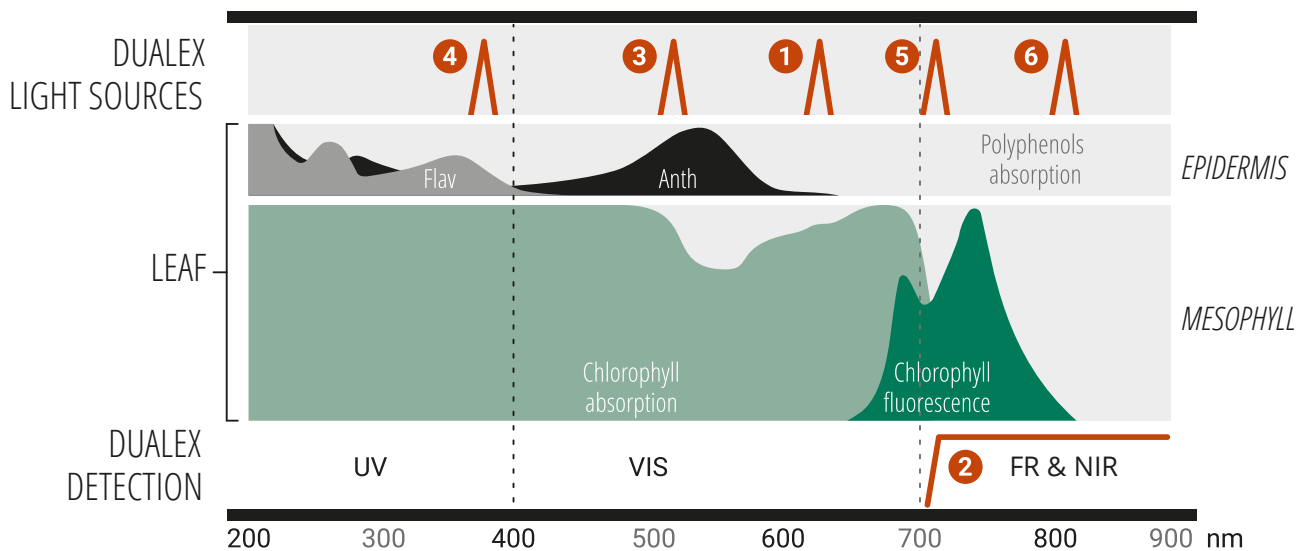
## **Reliable & Practical**

With a measurement area of 19,6 mm<sup>2</sup>, DUALEX has a good sampling area. Thanks to an 8 cm long clip **it's possible to easily reach and measure different parts of small and large leaves**.

# Principles

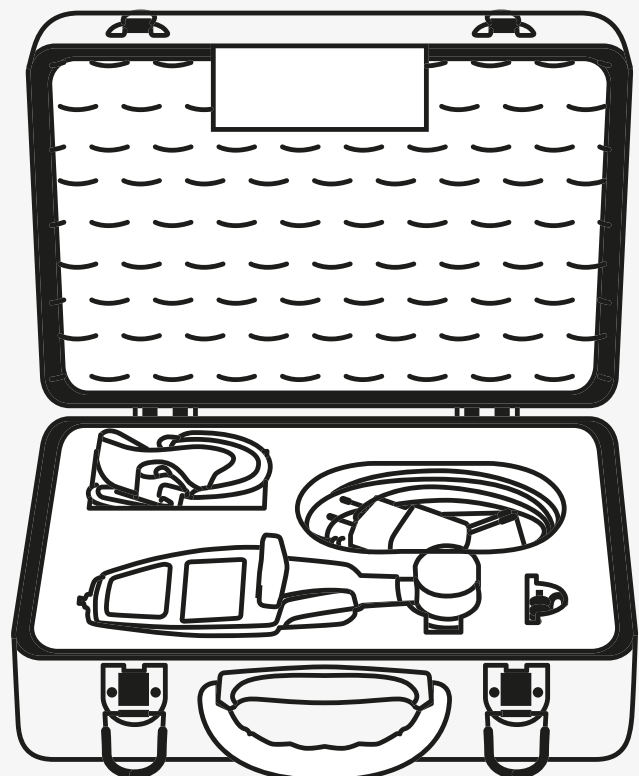
## Accurate Measurement of Chlorophyll

DUALEX determines the chlorophyll content of a leaf based on the transmittance at two specific wavelengths. One wavelength is in the far-red region **5**, which is absorbed by chlorophyll, while the other is in the near-infrared region **6**, serving as a reference.



## DUALEX Case Contains:

- Dualex leafclip sensor.
- USB cable and charger.
- Hand wrist strap.
- Cleaning swab.



## Unique Leafclip Sensor for Measuring Flavonols and Anthocyanins

DUALEX is the only leafclip sensor capable of measuring the flavonol and anthocyanin content in the leaf epidermis. This is achieved based on the fluorescence of chlorophyll at different excitation wavelengths.



### The measurement process involves the following steps:

#### Reference Excitation Light:

Near-infrared chlorophyll fluorescence is first measured under a reference excitation light that is not absorbed by polyphenols **1**.

**Specific Sampling Light:** The reference is compared to the fluorescence measured under a second sampling light specific to the absorption by polyphenols: green light for anthocyanins and UV light for flavonols **3**, **4**.

Only a fraction of this light reaches the chlorophyll in the mesophyll and can generate near-infrared chlorophyll fluorescence **2**. This principle is known as the screening effect of polyphenols on chlorophyll fluorescence. The name Dualex, derived from its dual excitation method, reflects this clever approach to non-destructively obtaining precise indices for flavonol and anthocyanin content.

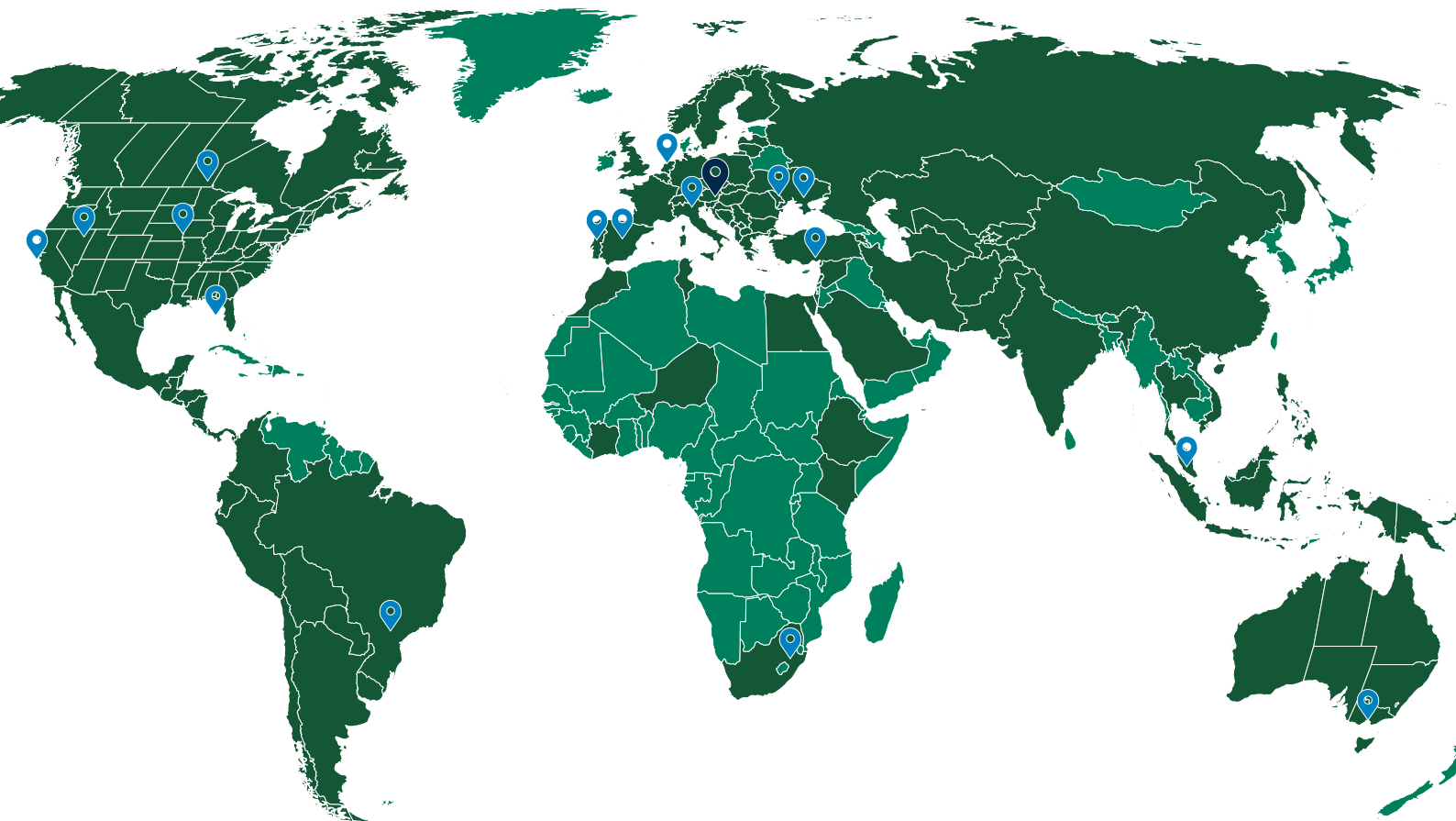
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