

LI-COR Biosciences – NCERA-101 Station Report 2023

About:

LI-COR scientists and engineers are closely involved in the scientific community through extensive internal R&D; global collaborations with leading scientists; presentations at scientific conferences, workshops, and seminars; and publishing in leading scientific journals. By maintaining close relationships with academic, governmental, and industrial research institutions, LI-COR develops products that are at the forefront of modern technology for research in the biological and environmental sciences.

New Facilities and Equipment:



LI-600 Porometer/Fluorometer for needle and narrow leaf measurements

A new solution using the LI-600 Porometer/Fluorometer platform is currently in development, which will allow the instrument to measure stomatal conductance and chlorophyll *a* fluorescence from narrow and needle like leaves. Leaf widths suitable for measurement in the chamber are expected to be between 1.0 and 3.5 mm.

Accomplishment Summaries:

This new LI-600 Porometer/Fluorometer solution offers an unprecedented approach to measuring stomatal conductance on narrow and needle like leaves. This system is designed to make measurements on a single leaf, as narrow as 1.0 mm wide. For a leaf that narrow spanning the full chamber length, only 0.17 cm² of projected leaf area would be exposed in the chamber. At that leaf area, even a low stomatal conductances of 0.1 mol m⁻² s⁻¹ is resolvable by the LI-600 with good confidence (at 25C and 55% relative humidity, one sigma on g_{sw} is expected to be less than 5% using the instrument's low flow setting). This performance is achieved by careful consideration to mixing in the chamber, a full implementation of a leaf width by flow model for estimating boundary layer conductance, and new humidity sensor cross-calibration (matching) scheme in the instrument.

Like with the standard LI-600 stomatal conductance measurements, leaf temperature is determined with a non-contact infrared thermometer (IRT). A novel masking approach in the new chamber allows the IRT to only view a narrow band of leaf (0.8 mm wide) at its center.

User selectable gaskets in the upper chamber clip will allow it to seal to a variety of leaf geometries. Gaskets are made of solid polymer and are retained mechanically in the chamber, allowing them to be reused time and time again.

Published Written Works:

The needle and narrow leaf measurement solution is still under development and as such no publications are available with it yet. Beta collaborators are actively working with this solution, and we hope to see publications from them in the near future.