

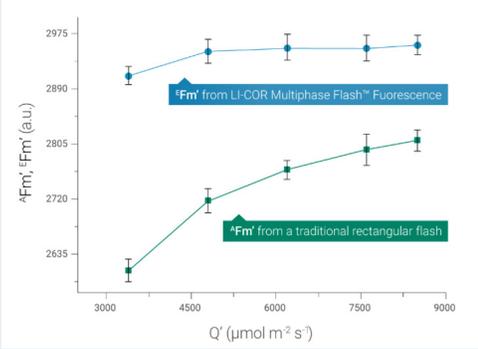
# LI-COR System Comparison

## Comparison of the LI-6800 Portable Photosynthesis System and the LI-600 Porometer/Fluorometer

	LI-6800	LI-600
Cuvette Design	Flexible design to evaluate a broad range of subject materials from small leaf areas and conifer needles to large area (36 cm <sup>2</sup> ) samples and aqueous algae samples.	Fixed small leaf area optimized for high throughput (between 120 and 200 per hour) evaluations in ambient environmental conditions.
Environmental Control	Accurate, precise, and fast measurement AND control of the important environmental drivers including; light, CO <sub>2</sub> , temperature and H <sub>2</sub> O. Ideally suited for sophisticated experiments mapping the response of subject materials to environmental drivers.	Rapid measurements of Light, H <sub>2</sub> O and Temperature; BUT NOT CO <sub>2</sub> and without any CONTROLS. Optimized for capturing a snapshot of leaf stomatal and biochemical status the instant the cuvette is applied.
Control over CO <sub>2</sub> and H <sub>2</sub> O in the air stream or cuvette	YES	NO
Controls PPFD Leaf Light environment.	YES	NO
	<b>LI-6800 Advantage:</b> With control over the light environment, you can design and implement experiments where tight control of light is important to avoid confounding light response with other variable responses or where it is desired to map the response of the leaf to a controlled change in light.	
Measures and controls CO <sub>2</sub> at the leaf.	YES	NO
<b>A<sub>net</sub>:</b> Net carbon assimilation, the balance between carbon uptake by carboxylation and carbon loss due to photorespiration and other respiratory processes.	YES	NO

	LI-6800	LI-600
<b>A<sub>sat</sub></b> : Net assimilation at a saturating light intensity.	YES	NO
<b>R<sub>PR</sub></b> : Photorespiration, the result of the oxygenase activity of RUBISCO. Where RUBISCO oxygenates rather than carboxylates the substrate RUBP. Photorespiration is a competing process to photosynthetic carbon assimilation and inevitably leads to the release of previously fixed carbon.	YES	NO
<b>A<sub>max</sub></b> : Net assimilation when neither light nor CO <sub>2</sub> are limiting photochemistry; net assimilation at a saturating light intensity and a saturating CO <sub>2</sub> concentration. <b>A<sub>max</sub></b> represents the maximum capacity of the leaf for carbon assimilation.	YES	NO
<b>R<sub>d</sub></b> : Proxy for mitochondrial respiration rate in the daylight. <b>R<sub>d</sub></b> can be estimated from nesting CO <sub>2</sub> response measurements within light response (A-Ci nested within AQ) curves.	YES	NO
<b>R<sub>n</sub></b> : Estimate of mitochondrial respiration rate in the dark. <b>R<sub>n</sub></b> can be estimated from a measure of <b>A<sub>net</sub></b> in the dark or from the y-intercept of a light response (AQ) curve.	YES	NO
<b>V<sub>c max</sub></b> : Maximum velocity of carboxylation by RUBISCO. Derived from fitting a function to the initial portion of the A-Ci curve where the availability of CO <sub>2</sub> limits the rate of carboxylation.	YES	NO
<b>V<sub>TPU</sub></b> : Velocity of triose phosphate utilization	YES	NO
<b>ΦCO<sub>2</sub></b> : Quantum yield of Carbon Assimilation. The ratio of carbon molecules assimilated to absorbed photons. In C3 plants this value has a theoretical maximum of 0.125. Theoretically, ΦCO <sub>2</sub> and Φ <sub>PSII</sub> are linearly related. However, as stresses increase, the balance between ΦCO <sub>2</sub> and Φ <sub>PSII</sub> departs from the theoretical due to a shunting of excess energy to stress response mechanisms.	YES	NO

	LI-6800	LI-600
<b>J<sub>max</sub></b> : Maximum electron transport rate when light and CO <sub>2</sub> are non-limiting.	YES	NO
Measures Leaf Temperature (Similar advantages as in Light Control).	YES	YES
Controls Leaf Temperature (Similar advantages as in Light Control).	YES	NO
Measures Water Vapor at the leaf.	YES	YES
Controls Water Vapor at the leaf.	YES	NO
<b>g<sub>s</sub></b> : Water vapor stomatal conductance	YES	YES
<b>g<sub>m</sub></b> : CO <sub>2</sub> mesophyll conductance. Measured with A-Ci or A-Q response curves in conjunction with electron transport measurements from fluorescence.	YES	NO
<b>VPD<sub>leaf</sub></b> : Vapor pressure difference between the air and the leaf intercellular air space.	YES	YES
<b>WUE<sub>g</sub></b> : Intrinsic water use efficiency. The ratio of net carbon assimilation ( <b>A<sub>net</sub></b> ) to stomatal conductance to water vapor ( <b>g<sub>s</sub></b> ); a metric that describes the potential water cost of carbon assimilation.	YES	NO
Fluorescence measurement environment	In the LI-6800, fluorescence is measured while precisely controlling the environmental variables including light, CO <sub>2</sub> , temperature, and H <sub>2</sub> O, avoiding confounding effects of changing conditions.	In the LI-600, fluorescence is measured in the absence of environmental control. With no environmental control, equilibration before measurement is very fast allowing the instrument to capture a snapshot of leaf biochemical state the instant the cuvette is applied.
<b>F<sub>o</sub></b> : Minimum fluorescence yield in a dark-adapted leaf.	YES	YES
<b>F<sub>m</sub></b> : Maximum fluorescence yield in a dark-adapted leaf and during a saturation flash.	YES	YES
<b>F<sub>v</sub>/F<sub>m</sub></b> : Maximum quantum efficiency of PSII photochemistry. $([F_m - F_o]/F_m)$ .	YES	YES

	LI-6800	LI-600
<b>F<sub>s</sub></b> : Minimum fluorescence yield in a light adapted leaf.	YES	YES
<b>F<sub>m</sub>'</b> : Maximum fluorescence yield in a light adapted leaf during a MultiPhase saturation flash (F <sub>m</sub> '). 	YES	YES
<b>Φ<sub>PSII</sub></b> : Quantum yield of PSII ((F <sub>m</sub> '-F <sub>s</sub> )/F <sub>m</sub> '). The operating quantum efficiency at the current light intensity.	YES	YES
<b>ETR</b> : Electron transport rate (Φ <sub>PSII</sub> * α * f <sub>II</sub> * PPF). Derived from Φ <sub>PSII</sub> , photosynthetic photon flux density (PPFD) incident on the leaf, an estimate of the fraction of PPF absorbed by the leaf (α) and the partitioning ratio of photons between photosystem (PS)II and PSI (f <sub>II</sub> ).	YES	YES
<b>NPQ</b> : Non-photochemical quenching ((F <sub>m</sub> -F <sub>m</sub> ')/F <sub>m</sub> '). Proportional to excess light energy beyond what the leaf can use for photochemistry. Therefore, an increase in NPQ in the absence of an increase in light intensity represents a decrease in photochemistry and/or its efficiency. Increases in NPQ are typically observed in stressed material. NPQ estimates require measurements of chlorophyll fluorescence on leaves in a dark adapted and light adapted state.	YES	YES
<b>F<sub>o</sub>'</b> : In a light-adapted leaf, measures the minimum fluorescence yield in a transiently darkened leaf while simultaneously applying a far-red pulse which preferentially excites PSI leaving PSII electron acceptors fully oxidized and 'open'.	YES	NO

	LI-6800	LI-600
<p><b>q<sub>L</sub></b>: The proportion of 'open' (i.e., oxidized) PSII reaction centers; requires transient dark period while simultaneously applying far-red light.  <math display="block">([F_m' - F_s] / [F_m' - F_o']) * (F_o' / F_s)</math></p>	YES	NO
<p><b>OJIP</b>: A measure of the high frequency (μs to ms) fluorescence yield transients in a dark-adapted leaf during a saturation flash. Measurements require fast electronic sampling.</p>	YES	NO
Non-steady state measurements	YES	NO
Design custom flashes in the software.	YES	NO
High Intensity Quenching Flashes (HIQ)	YES	NO
Built in bar code reader for high throughput experiments.	NO	YES
Barcode generator (software)	NO	YES
Leaf angle measurements	NO	Software calculates a leaf's angle of incidence using measurements from the accelerometer/magnetometer and GPS.
GPS receiver	NO	YES

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