

Photosynthesis Educational Resource Package

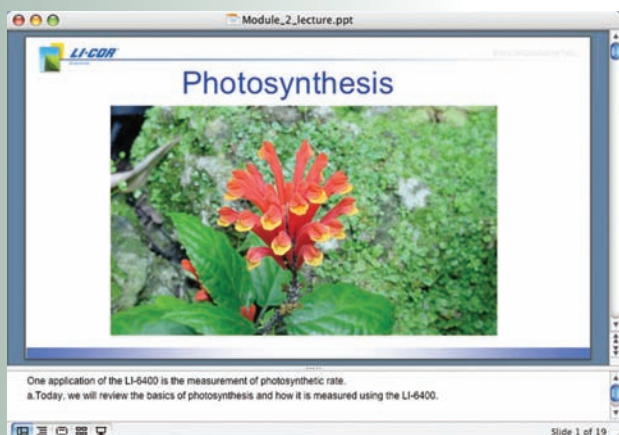
For the LI-6400/LI-6400XT

As part of the learn@LICOR initiative, LI-COR introduces the Photosynthesis Educational Resource Package, designed to assist educators in the teaching of laboratories using the LI-6400/6400XT Portable Photosynthesis System.



“Teaching photosynthesis is incredibly complex and challenging. While students may become familiar with words and descriptions of processes such as electron transport, light harvesting, oxygen evolution, and carbon fixation that are covered in lectures, they may have only a very shallow, and in some cases flawed, understanding of what these processes really are unless some form of experiments are performed in the lab.” Dr. Kent G. Apostol, Bethel University.

LI-COR scientists have collaborated with Dr. Jed Sparks, Associate Professor of Ecology and Evolutionary Biology at Cornell University to design a series of lecture topics and experiments that feature the LI-6400/6400XT. The Resource Package consists of DVDs with training modules that can be used as an additional resource for an undergraduate laboratory curriculum. The modules are applicable to general ecology, plant and animal physiology, physiological ecology, and ecosystem science courses. The training modules are shown at right.



MODULES

- Module 1: The LI-6400/6400XT Portable Photosynthesis System**
Experiment(s): Use Training DVD for LI-6400 basic setup
- Module 2: Photosynthesis**
Experiment(s): Measure light-saturated photosynthesis; Measure changes in photosynthesis
- Module 3: Leaf Respiration**
Experiment(s): Measure varying respiration rates
- Module 4: Light Response Curve**
Experiment(s): Light induction of sun and shade leaves; C_3 and C_4 light response curves
- Module 5: Temperature Response**
Experiment(s): Optimum temperature of plants (T_{opt})
- Module 6: A-Ci Response**
Experiment(s): A-Ci curve of C_3 and C_4 plants; Calculate stomatal limitation
- Module 7: C_3 and C_4 Photosynthesis**
Experiment(s): Measure quantum use efficiency of C_3 and C_4 plants at different temperatures
- Module 8: Soil Respiration**
Experiment(s): Measure soil respiration changes due to moisture and nutrient availability
- Module 9: Chlorophyll Fluorescence**
Experiment(s): F_v/F_m in dark-adapted control and cold-treated plants; Φ_{PSII} in light-adapted plants
- Module 10: Insect Respiration**
Experiment(s): Basic respiration measurements

Each training module consists of:

1. **Theoretical lecture** – PowerPoint slides and notes describing the theory behind each process. Lecture materials are provided as a resource for creating a lecture that fits course objectives.
2. **Operational file** – PowerPoint slides that demonstrate the keystrokes and processes used to make measurements with the LI-6400/6400XT. The Operational file also contains a logistic file, which is a text file that outlines the physical steps required for the experiment (e.g. propagation of plant material, when to plant seeds, etc.), and suggestions and tips, based on Dr. Sparks' experience teaching laboratory coursework, including problems he encountered, unforeseen issues, helpful suggestions, sample data sets, and user tips.
3. **Course applicability** – Text file with suggestions as to how the module can be incorporated into existing coursework.

Ordering Information:

The Photosynthesis Educational Resource Package is included with each LI-COR Environmental Education Fund (LEEF) award (see link below); it can also be purchased separately under part number 6400-520.



LI-COR has additional resources available for educators, as well, including:

Useful web links:

Benefits of the LI-6400 for Undergraduate Education
http://www.licor.com/env/Products/li6400/6400_training_undergrad.jsp

Writing Grants and Course Proposals
<http://www.licor.com/env/Products/li6400/grantwriting.jsp>

Inquiry-based Learning in Undergraduate Education Webinar
<http://www.licor.com/env/Products/li6400/iblwebinar/>

LEEF application information

<http://www.licor.com/env/Products/li6400/leef.jsp>

LI-6400XTE Educational Package

<http://www.licor.com/env/Products/li6400/6400XTE.jsp>

LI-6400/6400XT DVD Training Videos – Part number 6400-510

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Biosciences

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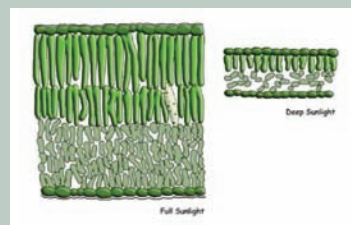
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Dr. Jed Sparks

Dr. Sparks is an Associate Professor of Ecology and Evolutionary Biology at Cornell



University in Ithaca, New York. He received a Ph.D. in Biology from Washington State University in 1998. Dr. Sparks' research centers on physiological factors governing relationships between plants and their environment, with emphasis on the interaction between terrestrial ecosystems and the atmosphere.



Dr. Sparks is uniquely qualified to present this lecture series, as he uses the

LI-6400 to teach undergraduate laboratory coursework at Cornell University. Many of the Resource Package modules feature Dr. Sparks narrating the lecture topic(s) and demonstrating the use of the LI-6400/6400XT to perform the experiments.

Many of the modules also show Dr. Sparks giving classroom presentations. Though not designed to be a comprehensive curriculum, the modules are an invaluable resource for designing undergraduate laboratory coursework that features hands-on experience with a premiere photosynthesis instrument. The modules can also be instrumental in grant applications, as the LI-6400/6400XT has a proven record of success in undergraduate programs, and fits well with inquiry-based learning models that are typically well funded.