

Progress in Measuring Plant Respiration as a Major Carbon Flux

Background

- Respiration is the process by which photosynthate (i.e., sugar that results from photosynthesis) is utilized in a variety of reactions to support life that leads to the loss of carbon dioxide. Respiration is the result of processes that utilize energy and build carbon backbones for molecules.

Approach

- We systematically reviewed the literature in both plant and animal studies of respiration to identify the most promising measurement technologies, future avenues, and research questions.

Results

- Respiration measurement tools can scale from cellular to ecosystem level and can be used together for maximum effect and to study dynamic behavior (Figure 1).
- High-throughput respiration measurements are allowing better understanding of molecular and genetic variation underpinning respiration (Figure 2).
- Respiration of seeds and roots deserve increased attention.
- Shared protocols and community engagement will allow greater impacts around the world.

Significance

- This manuscript will serve as a blueprint and guide as researchers advance research in plant carbon use and balance over the next decade in order to maximize yields and carbon sequestration.

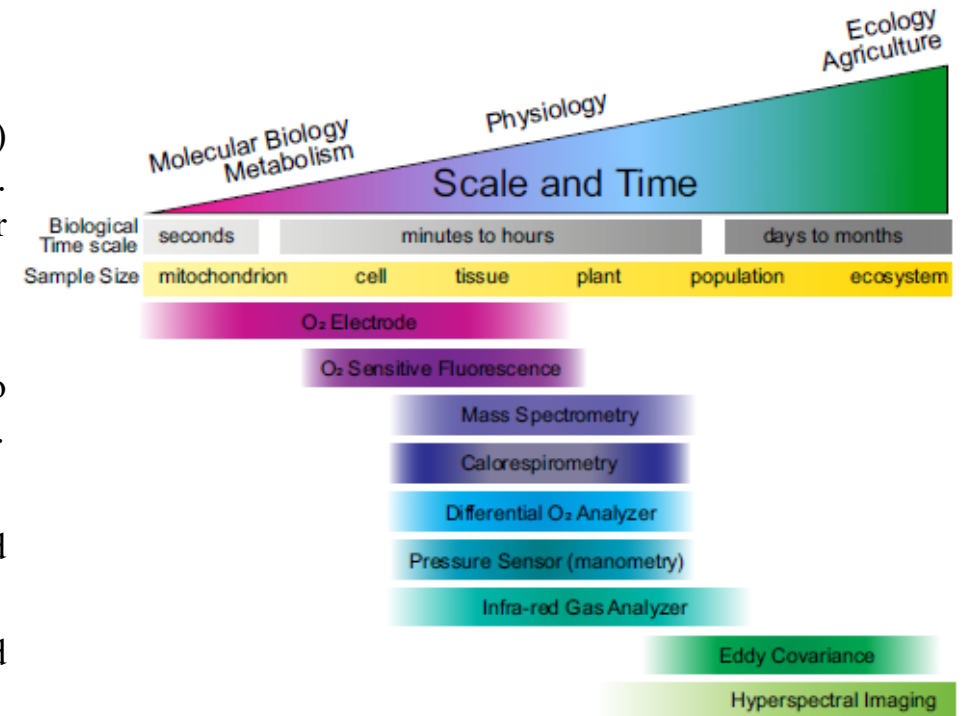


Figure 1. Available methods for quantifying respiration rates.

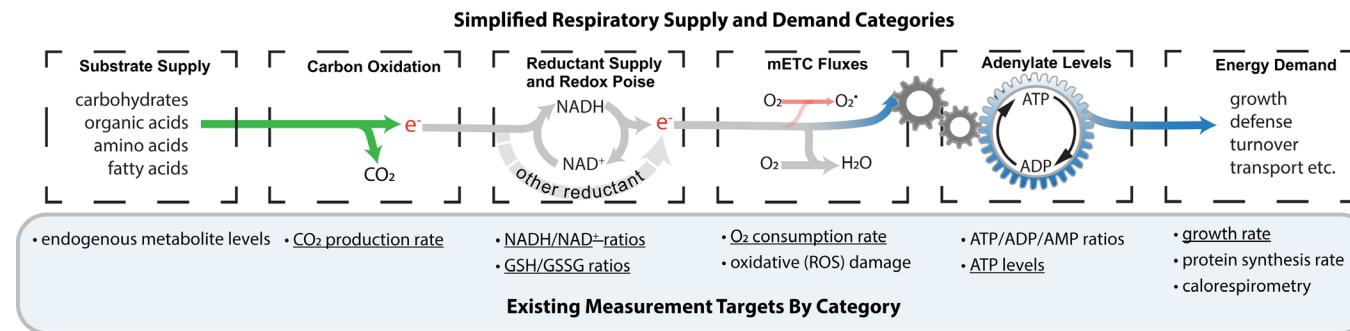


Figure 2. Major metabolic targets for targeting reduction of wasteful respiration, with measurable targets underlined.

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