

## **OREGON DEPARTMENT OF AGRICULTURE: Research Proposal**

**ODA/OAN Research Theme:** Sustainable Environmental Improvements

**Title:** Initial Assessments of Soil Carbon Flux in Nursery Systems: Measuring CO<sub>2</sub> Emissions and Sequestration in Field-Grown Shade Trees and Container Production"

**Date:** August 30, 2024

### **Principal Investigator:**

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### **Collaborators:**

Greg Anderson – Countryside Nursery

### **Background**

Carbon dioxide (CO<sub>2</sub>) is a significant greenhouse gas (GHG) that impacts global climate change. The Oregon Association of Nurseries (OAN) is committed to understanding and mitigating the carbon impact of nursery production systems to position itself as a carbon-negative industry. This involves demonstrating that nursery operations sequester more carbon during plant growth than they emit. The Executive Director of OAN has consistently emphasized this priority in communications and initiatives. This proposal is a direct response to these calls, addressing one of OAN's key priorities.

Soil carbon flux, the movement of carbon into and out of the soil, plays a crucial role in understanding carbon sequestration. Effective agricultural management can enhance soil carbon sequestration, thus mitigating greenhouse gas emissions. Practices such as land management, plant selection, and cultivation methods significantly impact the soil's ability to store carbon. To determine the impact of nursery production on carbon emissions, it is essential to measure and analyze soil CO<sub>2</sub> flux within different nursery systems.

Measuring soil CO<sub>2</sub> flux requires highly specialized and precise equipment designed to capture and analyze gas emissions from the soil. This equipment is both robust and reliable, having been used in scientific research for over a decade. Perhaps given the precision and reliability, the equipment is costly, reflecting its advanced technology and critical role in accurate environmental measurements. The ability to measure gas flux with such precision allows researchers to obtain detailed data on soil carbon dynamics, which is crucial for evaluating the effectiveness of carbon sequestration practices in nursery systems. Although the Nackley Lab does not currently possess soil CO<sub>2</sub> measurement systems, it is highly experienced in CO<sub>2</sub> measurement, having conducted research on plant responses to carbon dioxide enrichment and limitation for over 10 years. This expertise positions the Nackley Lab as a reliable leader for this project, ensuring that the data collected will be both accurate and insightful.

**Objectives** This proposal seeks to:

1. Purchase the necessary equipment for measuring CO<sub>2</sub> flux in nursery systems.

2. Begin initial measurements of CO<sub>2</sub> flux in two types of nursery systems: field-grown shade trees and container production.

## Methods and Timeline

### Spring 2025

- **Purchase Equipment:** Acquire the required tools for measuring soil CO<sub>2</sub> flux. This equipment will enable precise and accurate measurement of soil carbon dynamics. Attend a LiCor workshop to train on new systems and connect with national and global researchers on climate change mitigation, carbon sequestration, soil health, plant photosynthesis, and ecosystem flux.

### Summer 2025

- **Measure CO<sub>2</sub> Flux:** Conduct initial measurements of CO<sub>2</sub> flux in both field-grown shade trees and container production systems. This phase will involve setting up the equipment in the field and collecting baseline data on soil carbon emissions and sequestration.

### Fall 2025

- **Analyze Data:** Process and analyze the data collected from the CO<sub>2</sub> flux measurements. This will involve assessing the carbon dynamics in both nursery systems and evaluating their impact on overall carbon sequestration.

### Winter 2025

- **Report Findings:** Compile and present the findings in a comprehensive report. This report will detail the CO<sub>2</sub> flux data, its implications for nursery systems, and recommendations for improving carbon management practices.

**The Benefit to the Nursery Industry** Understanding soil CO<sub>2</sub> flux and its impact on carbon sequestration will provide valuable insights into the carbon footprint of nursery production. This knowledge will support the OAN's goal of becoming a carbon-negative industry by highlighting effective practices and areas for improvement. By adopting strategies that enhance soil carbon sequestration, nurseries can contribute positively to climate change mitigation while positioning themselves as leaders in sustainable horticulture. Support for equipment at NWREC will create a unique research space for Oregon growers to connect and learn about climate science and enable the OAN to promote climate science research.

| Budget   | Total | \$66,400 |
|--|-------|----------|
| • 4-Chamber Multiplexer Package (model LiCor 8250) |       | \$52,000 |
| • CO <sub>2</sub> Analyzer (model LiCor 870)       |       | \$9,000  |
| • Enclosure and 24V weatherized power supplies     |       | \$2,900  |
| • Travel to LiCor Workshop                         |       | \$2,500  |