

Research Proposal

OREGON DEPARTMENT OF AGRICULTURE

OAN NURSERY RESEARCH COMMITTEE

Date: October 13, 2023

Principal Investigators:

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Title: Evaluating the growth response, outplant success and economics of root pruning containers in ornamental tree production

Collaborators:

Tyler Hoskins – Research & Development - Robinson Nursery

Background

Tree growth in nursery production systems presents a unique set of challenges, with trees undergoing multiple transplantations, and root pruning throughout their development. In field nurseries, root systems are frequently undercut during production, pruned during digging, and further shaped before storage and shipping. Meanwhile, container nurseries employ relatively small pots to optimize planting density and mobility. These practices significantly influence tree viability, as a robust root system is imperative for thriving in diverse landscapes, including urban settings with street trees or newly graded commercial or residential developments.

Despite the proliferation of various containers and root pruning practices marketed as beneficial for tree growth, there's a shortage of publicly available research that substantiates these claims or delves into their impact on plant physiology, viability, and irrigation practices. Notably, the push for 'improved root systems' has become increasingly conspicuous, with a surge in advertising and marketing during events such as the Far West show in 2023. This emphasis on improved root systems was evident on the grower tours and prominently displayed on the showcase floor. However, it's important to recognize that discussions with other pot manufacturers and growers reveal a different perspective. Many in the industry contend that the paramount consideration is the affordability, particularly the price per unit of the pot. They often express skepticism regarding the return on investment (ROI) for more expensive root-pruning pots. In this dynamic landscape, as the industry continues to explore novel containers and root pruning methods, a critical need persists for scientific research and data to support the implications of these practices for plant-water relationships and tree morphology.

Project Objectives:

This multi-year research project will yield annual measurable outcomes. Year 1 marks the project's initiation, characterized by initial setup costs for a sensor-controlled irrigation system, essential for precise water management due to differing water requirements across container styles. In Year 2, we would transition to the operational phase, focusing on system maintenance and plant growth. Year 3 will involve the critical transplanting phase, with expenses related to labor and pot-in-pot materials. Years 4 and 5 would be dedicated to maintenance, data collection, and report preparation, during which growth and water-use efficiency are continually monitored. The overarching objective is to provide valuable insights to nursery professionals, enabling informed decisions for tree cultivation and enhancing tree health throughout their journey from the nursery to their ultimate destinations. Furthermore, this project at NWREC creates opportunities for student research, engagement with the grower community, and extension teaching activities in a neutral non-marketing based environment.

Methods and Timeline

Winter 2024:

- Select tree varieties; procure root pruning pots and fabric containers; acquire flow meters, sensors, and irrigation components; receive soilless substrate; build sensor-controlled irrigation system.

Spring - Summer 2024:

- Test and manage the sensor-controlled irrigation system; purchase and plant trees; maintain plant health.

Autumn 2024:

- Measure height and caliper growth, analyze the data and prepare annual report.

The Benefit to Nursery Industry

This study holds significant value in understanding the ultimate success of outplanted trees and their performance within the broader supply chain, culminating in their use in diverse landscapes. Specifically, how trees grown in varying container styles perform when transplanted for specimen container growers, specimen field growers, or when established in landscape settings. This knowledge will enable nurseries to make informed, cost-effective decisions that enhance tree health, and optimize water use efficiency.

Budget

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|---|--------------|-----------------|
| | Total | \$20,600 |
| • Research Assistant wages and other payroll expenses | | \$8,500 |
| • Materials and supplies | | \$12,100 |
| ○ Plant materials (\$500) | | |
| ○ Sensor-control platform (\$5,000) | | |
| ○ Irrigation parts (\$5000) | | |
| ○ Pots (\$1000) | | |
| ○ Soilless substrate (\$400) | | |
| ○ Fertilizer (\$200) | | |