Research Pre-Proposal

OREGON DEPARTMENT OF AGRICULTURE
OAN NURSERY RESEARCH COMMITTEE

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Principal Investigator:
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Title: Investigating substrates to inform irrigation management.

Collaborators:
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Background

As any grower knows, not all mixes are created equal. Potting mixes are typically described by the percent components of the constituents. For example 80:20 peat perlite or 50:50 coir perlite. What is not typically included is how the blend affects the physical and chemical properties. For example, what is the buffering capacity, cation exchange rate, how does pH change over time under different conditions; and what is the porosity, water holding capacity, infiltration rate, and others. Typically claims are made of "stable pH", or " ideal soil moisture". It becomes further challenging for growers who are interested in switching mixes or blending their own mixes because there are non-linear responses to adding or subtracting different ingredients. In other words, if an 80:20 DFB perlite mix has 45% water holding capacity. Decreasing the perlite concentration by 5% does not relate to 5% increase in water holding.

For many years, research into soilless substrates was a primary focus for Nursery production researchers at Oregon State University. Researchers like James Altand and Jim Owen did pioneering work with DFB and alternative mixes. Unfortunately, when they moved out of State and took positions with other institutions their expertise left, as did a focus on regionally produced regionally used soilless media. The relatively uncommon, specific climate of the PNW with cool wet winters and dry summers has a unique influence on the chemical and physical structure of soilless mixes, which is why it is critical to conduct soilless media research in Oregon to support Oregon Nurseries. Herein, we propose the re-establishment of NWREC as a leader in substrate research. In 2019, the Nackley Lab made critical purchases and critical hires to initiate this process. These include investing over $10,000 in research equipment to determine the hydraulic properties of soilless media and hiring an Oregon State University soil scientist onto the Nursery production team. For 2020, with the support of the ODA-OAN we would like to launch a nursery soils and substrates testing facility at NWREC.

Project Objectives

1) *Establish a substrates testing lab at NWREC.*

Our current equipment works for saturated soils, but we need to be able to measure moisture-holding capacity of dry soils (< -0.1 MPa) to have full confidence in our soil moisture release curves. The final piece needed for our lab is an expensive piece of equipment called a

Dewpoint Water Potential Meter. Measuring the low-end of soil (and substrate) moisture release curve is critical in understanding plants' abilities to tolerate water deficits and therefore informing a grower's ability on when to water. Low substrate moisture contents are very common in soilless media mixes. For example a 1-gal pot will reach these water potentials within a day during the summer, which is why growers typically irrigate multiple times per day in can-yards. Additionally, low moisture content levels are common in the Willamette Valley fields during the summer, and very common in eastern Oregon (e.g., Milton-Freewater), where some OAN nurseries also have growing grounds.

2) *Generate physical and chemical reports for common, and specialty blends used in by OAN growers.*

We believe that having a greater understanding of the physical and chemical properties of the substrates used will enable growers to make better decisions regarding water and nutrient management cycles. For example, it's known that the pH of certain bark mixes can rapidly drop over time as the mix loses its buffering capacity. The consequence is a plant's inability to absorb many essential nutrients. We aim to support growers with greater information about their blends, as well as provide information about new blends.

Methods and Time Line

- Winter/Spring 2020. Purchase the Dewpoint Water Potential Meter and include continue the build-out of the soil and substrated testing lab.
- Summer 2020: Dr. Nackley, Mr. Hill and student, will test, validate, and refine the system.
- Summer 2020: Tour the lab to the industry at a Nursery Production Open House in August.
- Winter 2020. Report writing, creation of a website and other publications about the results.

The Benefit to Nursery Industry

Similar to our other irrigation work this proposal has been developed from the widespread hypothesis that most container-grown plants are overwatered. Moreover, we believe that by re-establish substrate research in Oregon we will be able to inform and educate students and growers increasing the human capital of Oregon Nurseries in a way that is most possible by having local research.

Budget summary

Student(s) wages		$7,468
Other Payroll Expenses		$743
Materials and supplies		
Dewpoint Water Potential Meter		$7,500
Consumables (wiring, sheeting, misc. hardware)		$500
Publication fees		$900
	Total	$17,111