Annual report to

FLORICULUTRE NURSERY RESEARCH INITIATIVE

and

UNITED STATED DEPARTMENT OF AGRICULULTURE
AGRICULTURAL RESEARCH SERVICE

for the period of

APRIL 2010 TO MAY 2011

PROJECT

Conventional and alternative soilless substrate component physiochemical properties for the Pacific Northwest United States and subsequent effect on containerized ornamental crop growth and quality.

PRINCIPLE INVESTIGATORS:

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SYNOPSIS

Situation: The effect of soilless substrate components on the physiochemical properties of the container system is poorly understood in the Pacific Northwest. Little research or information has historically been available for growers to make informed decisions when engineering soilless substrates with desired physical properties such as air space and water holding capacity or chemical properties such as pH, cation exchange capacity, anion exchange capacity, and electrical conductivity. Furthermore, we continue to investigate the interaction of culture practices, specifically fertility and irrigation, with multi-component soilless substrates.

Recently, the slump in the housing market and increased interest in energy generation from renewable resources such as woody biomass have resulted in a variable bark supply for container nurseries in the Willamette Valley. Due to the reduced supply, the price of bark has been unstable and shown an overall increase during the last two years. Many nurseries continue to report difficulty finding consistent bark in needed quantities at historical prices. Oregon Association of Nurseries, growers and allied suppliers in the Northwest have identified a need for alternative substrates as a top priority.

Program Effort: Numerous workshops and presentations to increase stakeholders' fundamental understanding of the hydrology and chemistry associated with soilless substrates have been conducted. In addition, research on individual substrate components and their effect on Douglas Fir bark based soilless substrates, to determine nutrient contribution, effect on pH, water availability, and their overall effect on crop growth and water use efficiency have been completed or underway. We continue to conduct research and education programs focused on the interconnected topics of soilless substrates (conventional and alternative), crop fertility, and water management.

In an effort to find multi-faceted solution to the bark shortage, we have begun to screen numerous, readily available products that show promise as an alternative soilless substrate and occur within a 200 mile radius of the Oregon nursery epic center (northern Willamette valley). These may include but are not be limited to: Douglas fir logging slash, whole-tree hybrid poplar, whole-tree ponderosa pine, culled shade trees, culled or disposed Christmas trees, rye grass seed straw, and bamboo.

Results and Impacts: These efforts continue to result in leveraging additional dollars via non-governmental grants and private contracts as well as continued in-kind support from nursery grower and allied suppliers. Research on conventional soilless substrate components continue to result in growers assessing their need and use during the economic downturn, thus resulting in elimination of components (such as peat or pumice) that provide no proven benefit for a given crop or production system. Screening alternative soilless substrates has resulted in narrowing suitable Pacific Northwest alternatives to Douglas fir slash, culled Christmas trees and chipped poplar. All alternatives can be utilized to supplement up to one-third of the Douglas fir bark currently utilized while growing a comparable crop. On-going research is investigating the impact of these alternatives on water, substrate pH, and nitrogen fertility. We believe that with continued research we will be able to make grower recommendations that can result in suitable soilless substrates dominantly comprised of alternative components. We continue to investigate bamboo, which could be produced by the grower or allied supplier to be utilized entirely as an alternative substrate. Research efforts continue to result in scientific, industry and extension publications. Furthermore, information is disseminated via the World Wide Web and stakeholder presentations.

INSTITUTIONAL COOPERATORS:

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STUDENT INVOLVMENT

Graduate

D. Bailey, MS, Biological & Ecological Engineering, 2010 to present
R. Costello, MS, Crop and Soil Science, OSU, 2009 to present

Undergraduate

S. Sydow, student intern, summer 2010, University of Minnesota, MN
M. Kapsimalis, student intern, summer 2010, University of Rhode Island, RI

PUBLICATIONS

Boyer, C.R., J.S. Owen, Jr. and J.E. Altland. 2010. Development of sustainable and alternative substrates for nursery container crops. Proc. Southern Nurs. Assoc. Res. Conf. 55:410-412.

Stoven, H.M. and J.S. Owen, Jr. 2010. Into the blue: A comparison of substrate amendments for the adjustment of hydrangea flower color. Digger 54: 25-30.

ABSTRACTS

Owen, J.S. Jr., H.M. Stoven, J.E. Altland, W.J. Pruett, J. Klick. 2010. Crop response to hybrid poplar alternative soilless substrate component for pacific northwest ornamental container production. HortScience 45:S110-S111 (Abstr.)

Albano, J.P., J.S. Owen, Jr., J.E. Altland, T. Evans, S. Reed, and T. Yeager. 2010. Composted algae as an alternative substrate for horticultural crop production: Chemical and physical properties. HortScience 45:S164-S165 (Abstr.)

Owen, J.S. Jr., M. Zazirska-Gabriel, D.M. Sullivan, J.E. Altland, and J.P. Albano. 2010. Water use and growth of two woody taxa produced in varying indigenous Douglas fir based soilless substrates. HortScience 45:S111 (Abstr.)

PRESENTATIONS

Developing Local, Sustainable Substrate Resources for the Pacific Northwest. Horticulture Research Institute Alternative Substrates Conference, January 2011. Mobile, AL.

A roundtable discussion on innovations in effective container fertility. Clean Water Services, March, 2010, Tigard, OR.

Water Management Tools for Container Nurseries. August 2010, NWREC, OSU, Aurora, OR.

Integrating Nursery Irrigation Systems for Automation: Basing Daily Irrigation Decisions Using Real Time Data, August 2010, Oregon Association of Nurseries, Portland, OR.

OSU Nursery Research and Extension Field Day, September, NWREC, OSU, Aurora,

Annual Oregon Shade Tree Growers Meeting, October, NWREC, OSU, Aurora, OR.

DOLLARS LEVERAGED

Owen, Jr., J.S., J.E. Atland, and H.M Stoven. 2011. Integrating selected alternative substrates for woody ornamental container production: From substrate properties to cultural management. Oregon Department of Agriculture - $26,932.

GRANTS NOT-AWARDED

Fain, G., J. Altland, J. Owen, C. Boyer, E. Blythe, C. Gilliam, S. Leavengood, C. Landgren, T. Rinehart, C. Seavert, D. Sullivan, and G. Wehtje. 2011. Development of cost effective, renewable and regional substrates for production of containerized specialty crops. NIFA Specialty Crops Research Initiative. 5 years. Total request: $4,183,871