

Annual report to
FLORICULTURE NURSERY RESEARCH INITIATIVE
and
UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
for the period of
APRIL 2009 TO MAY 2010

PROJECT

Evaluation of locally available resources for use as alternative soil-less substrates in container-grown plant production for the Great Plains region of the United States.

PRINCIPLE INVESTIGATORS:

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SYNOPSIS

Situation: There is no local source for pine bark in Kansas thus pine bark for container-grown plant production must be shipped, typically from Texas or Arkansas to growers in the Great Plains region. This added expense might be prohibitory to many growers or at least may place growers at a competitive disadvantage when selling wholesale. Overcoming the shortage of substrate material could greatly increase the acreage of container production of nursery crops in the Great Plains and therefore increase overall gross sales of the Nursery and Greenhouse industry.

Eastern Redcedar has become a nuisance plant to many landowners across the region. Once held back by grazing and wild fires from fully entering the grasslands of the Great Plains, community development and farming have reduced these natural control measures. Additionally, the use of the species in windbreaks, for erosion control, and wildlife cover since the 1960's has increased the seed population. Although regular burning can easily control young plants, established trees are difficult to control. In many cases the only option is to hire a contractor to cut the trees, grind them, and haul away the chips. The resulting mountains of chips are then sold as landscape mulch. This, however, is a very expensive endeavor for the landowner and is often not done. As a result, Eastern Redcedar continues its march across open lands within Kansas. Any means by which the landowner could recoup some of their expense would be a welcome addition.

Program Effort: In Year 2 (2009) we conducted a 3-gallon container-grown plant study for 113 days to look at the effect of growing woody plants in chipped Eastern Redcedar (*Juniperus virginiana*). Treatments were blends of cedar (0, 5, 10, 20, 80%) with pine bark and 20% sand. There were also 2 levels of fertilizer (low and high). Plants grown included Baldcypress (*Taxodium distichum*), Chinese Pistache (*Pistachia chinensis*), Green Giant Arborviate (*Thuja* 'Green Giant') and Silver Maple (*Acer saccharinum*) from seed in 1-gal. containers.

Results and Impacts: In general, trends for fertilizer were the same for all plants with the high level of fertilizer resulting in larger plants. In the future we will conduct studies at one rate of fertilizer. Green Giant plants failed to have a response in any treatment. Other plants seemed to grow well until the highest rate of cedar was reached (80%). The physical properties data showed that there was significantly less water holding capacity and increased air space in the 80% cedar treatment. Thus, we think the differences in growth were primarily due to physical properties of the substrate rather than an allopathic response to chemicals in the cedar. Additionally, the pH of cedar is 6.57 compared to the pH of pine bark at 4.17. This could be a significant issue for plants requiring a low pH. However, most soils in Kansas (and the Great Plains) have inherently high pH (6-8) so plants grown in this region need to be suited for this climate.

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STUDENT INVOLVMENT

Graduate

Z. Starr, MS; Horticulture, Forestry and Recreation Resources, K-State, 2009 to present
J. Pool, MS; Horticulture Forestry and Recreation Resources, K-State, 2009 to present
B.M. Morales Rivera, J1 Research Scholar (Zamorano University, Honduras), 2010 to present

Undergraduate

J. Ostrander, student intern, summer 2009, K-State, KS.
P. Jemison, student intern, spring 2010, K-State, KS.

PUBLICATIONS: CONFERENCE PROCEEDINGS

Starr, Z., C. Boyer, and J. Griffin. 2010. Growth of containerized *Taxodium distichum* in a cedar-amended substrate. Proc. Southern Nurs. Assoc. Res. Conf. (In Press)

Boyer, C., J. Owen and J. Altland. 2010. Development of sustainable and alternative substrates for nursery container crops. Proc. Southern Nurs. Assoc. Res. Conf. (In Press)

ABSTRACTS

Starr, Z.W., C.R. Boyer, J.J. Griffin. 2010. Growth of containerized *Acer saccharinum* from seed in a cedar-amended substrate. HortScience 45:3971. Abstr.

PRESENTATIONS

“Alternative Substrates for Container-Grown Plants.” Wichita Area Nurseryman’s Association Field Day, Haysville, KS. June 2009.

“Alternative Substrates.” Horticulture Program Focus Team Training (County Agents), Wichita, KS. December 2009.

Growth of containerized *Taxodium distichum* in a cedar-amended substrate. Proc. Southern Nurs. Assoc. Res. Conf., Mobile, AL (**Z. Starr**). January 2010.

Faculty Tour of the John C. Pair Horticulture Research Station, Haysville, KS. May 2010.

AWARDS

Z. Starr, 3rd place: MS Student Paper/Oral Competition, Southern Nurserymen’s Association (SNA) Annual Research Conference, Mobile, AL. (2010)

DOLLARS LEVERAGED - \$6,000

Miller, F.L., R.J. Whitworth, E. DeWolf, W. Upham, C.R. Boyer, B. McCornack, L.L. Buschman, W.T. Schapaugh Jr., C.M. Smith, and T.W. Phillips. 2010. Extension IPM coordination in Kansas. USDA NIFA: Extension IPM Coordination and Support Program. 3 years. \$273,119. Year 1: \$91,040. Boyer portion: \$6,000.

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. 2010. 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; Boyer portion: \$316,101.

Boyer, C., J. Griffin, S. Warren, and K. Williams. 2009. Investigation of Eastern Red Cedar as a substrate for ornamental nursery crops. Horticultural Research Institute. 1 year. \$25,092.

Fain, G., J. Altland, J. Owen, E. Blythe, T. Bilderback, C. Boyer, L. Brannon, C. Gilliam, T. Gallagher, C. Krause, J. Griffin, S. Leavengood, C. Landgren, T. Rinehart, B. Shindler, C. Seavert, D. Sullivan, J. Sibley, K. Williams, and G. Wehtje. 2009. Sustainable nursery and greenhouse growing substrates produced from regional biomass. CSREES Specialty Crops Research Initiative. 5 years. Federal request \$3,932,801. K-State portion: \$557,753.

Griffin, J., C. Boyer, and S. Warren. 2009. Diversified substrates for Kansas nursery growers. Kansas Dept. of Ag. Specialty Crop Block Grant. \$21,256.