



Ohio State HCS News

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Retractable Roof Greenhouses Offer Advantages



Tree layout inside the OSU retractable roof greenhouse.

Containerized tree liners grown in retractable roof greenhouses before being transferred to field production have higher growth and survivability rates than field bareroot material, according to Ohio State University Horticulture and Crop Science research.

The results continue to provide support for the use of retractable roof greenhouses in Midwest nursery markets. "The significance of this work is that retractable roof greenhouses continue to offer production and marketing advantages compared to conventional container production, and provide an alternative to bareroot liners by producing a superior product," said **Dr. Hannah Mathers**, an Ohio State nursery and landscape Extension specialist.

A tree liner, or whip, is referred to as a small plant that is transplanted to become a larger plant, and marketed as caliper nursery stock. The West has cornered the market in liner production, producing field-grown whips and shipping them to the Midwest and East for spring planting.



The retractable roof greenhouse in the OSU nursery production area.

Retractable roof greenhouses, which come in either a flat-roof or a peak-roof variety, can open or close those roofs and roll up their sides to help control ambient temperatures. Such capabilities allow for better temperature and humidity control and improved wind and light conditions. One use for the structures has been to expand tree liner production beyond western U.S. markets.

Ongoing research conducted by Horticulture & Crop Science Associate Professor [Dr. Mathers](#) and her colleagues focuses on four tree species (Autumn Blaze red maple, Prairifire crabapple, Eastern redbud and red oak) produced in three environments: retractable roof greenhouses, a combination heated greenhouse-outdoor system, and bareroot liners from nursery fields out West.

While two years of research results showed similarities between retractable roof greenhouses and the combination greenhouse-outdoor environment, tree liners grown in retractable roof greenhouses from March to October 2003 surpassed the performance of bareroot liners planted in April 2004. The study will continue through 2007.



Nursery and Landscape Extension Specialist Dr. Hannah Mathers is researching the advantages of retractable roof greenhouses.

Height and caliper were greater on the tree species from the retractable roof greenhouse environment, with the exception of the oak species, where the bareroot liner was superior. However, 42 percent of the oak bareroot liners died in the field. "The oak that had been grown bareroot had larger caliper and height growth, but with only 58 percent of the trees surviving, this slight growth increase would not offset any revenue lost at the nursery," said Dr. Mathers. "By comparison, no oaks grown in the retractable roof greenhouse died."

The improved performance of tree liners in retractable roof greenhouses makes them ready for fall planting. The Western counterpart liners are not available for planting until spring, which is a planting time that is less desirable in Ohio. Liners planted in the fall have a growth advantage over spring planted material. "That spells profits for nursery professionals," said Dr. Mathers. "It's all about growing the biggest tree possible in the shortest period of time. If it normally takes three years to grow a tree in the field, with a \$75 average price on that tree, and you can reduce that growth time to a year or two years, that's approximately a \$25 profit in the grower's pocket each time. In addition, you can grow a liner in Ohio for less money than you can buy one from the Western markets, resulting in an additional \$10 profit on each tree

purchased at the beginning of production."

The greenhouses themselves are affordable to build, costing only \$3 a foot for flat-roof houses and \$6 a foot for peaked-roof houses for the barebones structures. In addition, new Ohio State research data indicates liners can be produced in polyhouses with no significant growth reduction compared to those produced in retractable roof houses. This makes liner production in Ohio even more profitable.

"When the average price of a liner from the West Coast is going for \$15 plus shipping, it makes economical sense to build a retractable roof greenhouse. If that tree is established in one year, then that greenhouse is already paid for," said Dr. Mathers. "The nursery professionals can focus on buying other products. So what's good for the industry is good for the individual grower. Plus, with the price of fuel this year, West Coast-grown product is going to be less available and more expensive than in years past."

Ohio growers import approximately \$14 million worth of tree liners from the West annually. The wholesale nursery industry in Ohio is worth about \$580 million. The landscape, garden center and nursery sectors combined are worth approximately \$2.5 billion annually. Nursery production is estimated to be the fourth largest agricultural industry in Ohio, behind corn, soybeans and dairy.

Story by Candace Pollock. Photos and web editing by [Victor van Buchem](#).

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