Summary of Evaluation of New Containers For Nursery Production

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INTRODUCTION

Since nurseries began using containers as a major production tool in the early 1960s, there has been a constant struggle to overcome some of the problems inherent in this type of production. A few of these include maintaining adequate availability of water throughout the day and the season, reducing labor requirements, minimizing water runoff, reducing turn-over problems, moderating temperature extremes in the root zones. This paper discusses results of five research/demonstration projects evaluating these ideas.

The research evaluated sub-irrigation, Environmental Friendly Containers™, Poly-Jacket/Insulator™ and the Poly-Jacket/Water Saver™ containers, pot-in-pot above ground containers, and the Soil Sock™.

The project that started our interest in container design was one that evaluated the effects of subirrigation or collecting leachate in 2-in. saucers at the base of a container vs traditional irrigation. We discovered that live oaks grown with a constant reservoir of water at the bottom of a container had a significant increase in growth (1.5 ft) over traditional drip irrigation. Shumard oaks showed no difference in either of the treatments. (Tilt et al., 1990).

METHODS AND MATERIALS

A follow-up project to this evaluated effect of growing pecan (*Carya illininoensis* 'Melrose') and pear (*Pyrus calleryana* 'Bradford') trees in 20-gal (76 liter) containers including soil sock, low-profile, and traditional containers with drip irrigation and traditional and Soil Sock containers in 2.5-in. deep reservoirs. EFC was the sixth container in the study.

Twelve trees of each treatment were transplanted into the containers in May 1991, and grown for two years. Data for plant height, caliper, root number, root weight, and soluble salts were taken.

Average calipers of pears ranged from 1.8 in. (EFC) to 1.3 in. (low profile). Average heights ranged from 8.8 ft (EFC) to 7.7 ft (soil sock with drip irrigation). All subirrigation treatments (soil sock subirrigated, traditional subirrigated, and EFC) were significantly larger trees than drip-irrigated trees (low profile and traditional containers and soil sock with drip irrigation). Drip irrigation containers were more difficult to water effectively, especially with the large evaporative surfaces of the Soil Sock foam containers. There were no differences in root numbers/in.^{2} visible in the bottom of low profile, Soil Sock drip, EFC, and traditional drip containers for pear trees. The two treatments with constant standing water had no visible roots. Fresh root weight of roots extending from the original preplanted root ball was highest in the EFC. Soluble salt levels, measured by saturated paste extract method in August, in traditional containers with subirrigation (1.39 mmhos) were higher than traditional containers with drip irrigation (0.85 mmhos) indicating a tendency for salt accumulation in subirrigated containers. There was no difference in soluble salts for the other containers. No difference was found for any of the growth parameters for pecan trees that could be attributed to container design.

Weekly temperature data indicated that the Soil Sock did offer a reduction in extreme summer temperatures over traditional containers but provided no insulation effect against low winter temperatures. Subirrigation treatments also resulted in lower summer temperatures but not as low as the Soil Sock. Average August temperatures were 101, 96, and 91 F for traditional black containers, subirrigation black containers, and the Soil Sock container, respectively.

Speculation of the attributes of EFC's indicated a possibility of reduced irrigation requirements and reduced leaching. We initiated a study in the greenhouse evaluating 40 fashion azaleas *(Rhododendron* 'Fashion') in 1-gal (3.8 liter) containers. Half the plants were in EFC and the other half in traditional containers. We potted the plants in pine bark medium screened to 3/8 in. and took the weight of the containers at container capacity (watered until saturated and allowed to drain for 1 h). Each container was weighed daily and watered when the container reached 90% of container capacity. This target was switched to 80% in June. The difference in weight (g) of the container and the container at container capacity represented the amount of water (ml) to add to the container to bring it back to container capacity. Days between watering and volume of leachate were recorded at each watering. Soluble salts were measured in April and August during the experiment. The study was terminated in August 1992, and top growth was measured and a growth index calculated. There were no differences in soluble salts in April but August measurements showed a build up of salts in the EFC container over the traditional containers (Virginia Tech Extraction Method). There was almost a two-fold increase in leachate from the traditional container (10.9%) compared to the EFC (5.9%). EFCs require 26% (910 irrigations - EFC, 1234 irrigations - traditional) fewer irrigations than traditional containers.

Another experiment conducted at Auburn's Experiment Station in Mobile, AL evaluated the effects of EFC and traditional containers with and without copper coating on shelf life of plants in the garden center or interiorscape. Nikko blue hydrangea (*Hydrangea macrophylla* 'Nikko blue') and Natchez crapemyrtle (*Lagerstroemia* 'Natchez') were potted in 3-gal EFC and traditional containers. Half the containers were treated with copper. Plants were potted in April and allowed to grow until roots had contacted the copper and fully exploited the containers. Top growth measurements were taken and plants were moved to the greenhouse. Water was withheld and time was noted when plants wilted. Water was withheld for different periods of time to determine permanent wilting point (data is still being analyzed for this variable). No differences were found in growth as a result of the two containers or two copper treatments for the two plant species tested. There were also no differences in time to wilting suggesting no practical benefit of the treatments on shelf life.

The final two experiments evaluated five container types on growth of five plants. The experiments also studied the effects of container design on media temperatures and stability of containers. In experiment 1, three ornamental species (*Buddleja davidii* Franch 'Black Knight'; *Myrica cerifera* L.; *Viburnum* ×*pragense* Hort.) were potted in the five container types (traditional, above ground pot-in-pot, EFC, Poly Jacket Insulator, and Poly Jacket Water Saver) at Greene Hill Nursery Inc., Waverly, AL. Plants were potted in an 8 pine bark : 1 peat moss (v/v) medium. The second experiment was located at Auburn University and evaluated two azaleas— 'Fashion', and 'Delaware Valley White', in the same five container types. These plants were grown in a 100% pine bark medium.

All plants were grown in 3-gal (11.6l) containers for one growing season. There were 20 replications of each container type for each species used. A growth index was taken for each plant at the conclusion of the experiment and comparisons were made. Media temperatures taken 1 in. (2.54 cm) in from the side of the pot and 3 in. (7.62 cm) deep.

Plants (waxmyrtle, viburnum, and butterfly bush) in the standard and pot-in-pot containers grown at Greene Hill Nursery were consistently larger than plants in the other container types. There were no differences in growth among the containers for the two azalea cultivars. Temperatures in the media were more extreme in the standard container and lowest in the pot-in-pot containers. The lower temperatures and possible evaporation of water from the reservoir in the pot-in-pot containers can possibly explain the equivalent growth with the traditional containers. Pot-in-pot containers did not exhibit media temperatures above 120F (49C) which are noted as damaging. They also did not exhibit media temperature fluctuations of the magnitude observed in the other containers tested. This could be significant in terms of root damage from temperature extremes or from more efficient release of fertilizers, many of which are temperature sensitive.

Poly Jacket Water Saver containers were the most stable followed by the Poly Jacket Insulator, pot-in-pot, raised, hole, and standard containers, respectively. The Poly Jacket containers exhibited almost four times the resistance to turnover recorded by the traditional containers.

RESULTS

All of these containers have positive attributes. Evaluate new technology as it becomes available to see if it solves problems in your nursery or improves the efficiency of your production and the quality of your product.

LITERATURE CITED

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