Growth of 'Kanzan' Cherry and 'Chanticleer' Pear in Above-Ground and Pot-in-Pot Production Systems

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Nature of Work: In 1997 I began a research project at the Center for Applied Nursery Research to look at the growth of two ornamental tree species produced with conventional above-ground (CAG) or pot-in-pot (PIP) production systems. Pot-in-pot production offers a number of advantages to growers such as protection of the root system from extreme temperature fluctuations and preventing containers from blowing over. One of the primary problems with PIP production is rooting-out and anchoring into the surrounding soil, thus making harvesting difficult. Two innovations to prevent rooting-out are being evaluated in this study. The first is a copper hydroxide coated piece of nonwoven polypropylene fabric known as a Tex-R Insert which is installed between the planted container and the holder pot. The second method uses a new pot design from Lerio known as a "moat pot". The moat pot has raised drainage holes in the bottom center of the pot which causes the bottom to retain water, thereby eliminating or reducing rooting-out via water root pruning.

The study was initiated on 2 June 1997 at the Center for Applied Nursery Research in Dearing, GA. Uniform liners of *Prunus x* 'Kanzan' (Kwanzan cherry) and *Pyrus calleryana* 'Chanticleer' ('Cleveland Select' pear) were planted into #15 containers in the spring of 1997. Potting substrate consisted of milled pine bark and sand (5:1 by vol) amended with following (in lb/yd^3): 12# High-N 22-4-7 + minors, 1# Micromax, 2# gypsum, 10# dolomitic limestone, and 2# Talstar insecticide. All plants were topdressed with 375 g of Scotts 22-4-6 + minors in February, 1998. Holder pots were placed in the ground with 1 in. at the top of the pot remaining above grade.

The experiment was arranged as a randomized complete block with two species, three production treatments (CAG, PIP + Tex-R insert, and PIP + moat pot), and eight replications. Irrigation was applied as needed (4 gal/day) using low volume spray emitters. Initial plant height and stem diameter measurements were taken on 2 June 1997 with end of season measurements being taken on 16 October, 1997. Final plant height and stem diameter measurements were made on 8 October, 1998. Several containers from each treatment were evaluated for degree of root control in October 1997. Harvestability (could two men harvest the planted container) was rated and roots growing outside of the planted container were harvested on 8 October, 1998. Harvested roots were dried in a forced-air oven for 72 hr at 150F before dry weights were determined. Leaf Greenness Index was determined using a Minolta SPAD-502 Chlorophyll meter.

Results and Discussion: For `Kanzan' cherry, plant height in October 1997 was greatest for the PIP + Tex-R treatment (7.6 ft). The PIP + moat pot treatment (7.3 ft) was not different from the PIP + Tex-R or the CAG treatment (6.8 ft). Production system had no influence on stem diameter when measured in 1997(range 1.21 to 1.30 in). At the end of the study in 1998 both PIP treatments (8.4 ft) were not taller than the CAG treatment (7.8 ft). Final stem diameter was greatest for the PIP + moat trees (2.0 in) with the CAG trees having a diameter of 1.8 in. Leaf Greenness Index was 42.4 for CAG trees compared to 47.3 for PIP + moat, indicating that the trees grown in the moat pots had darker green foliage compared to the above-ground plants. Six cherry trees died in the spring of 1998 from attacks by the Asian Ambrosia Beetle (*Xylosandrus crassiusculus*). Production system did not appear to influence tree choice by the borers.

Production system had no influence on the height (range 7.5 to 7.8 ft) or stem diameter (range 1.29 to 1.32 in) of 'Chanticleer' pear in 1997. In 1998 final height was greatest (9.4 ft) for the PIP treatments compared to CAG (8.6 ft). A similar trend was seen for stem diameter with both PIP treatments having greater measurements (1.9 in) compared to CAG (1.7 in). Leaf Greenness Index was greatest for PIP + moat (47.8) compared to PIP + Tex-R (43.8) and CAG (42.9).

None of the plants observed were rooted-out to the point where they could not be removed from the holder pot in 1997. As of October, the 'Chanticleer' pear had more roots outside of the planted container than did the 'Kanzan' cherry. No roots were observed to have grown through the Tex-R inserts for either species. The pear trees had more roots between the pots in the PIP + moat pot treatment than did the cherries. For both species grown with the moat pots, the roots were thick and fleshy, similar to roots which have been grown in a hydroponic solution. No roots from either species were observed exiting the drainage holes of the moat pot.

In 1998 all pots except one cherry and one pear grown with the moat pots were harvestable in October. For the 'Kanzan' cherries the PIP + Tex-R treatment had an average of 45 g of roots outside of the planted container compared to 397 g of roots for the PIP + moat treatments. With 'Chanticleer' pear the PIP + Tex-R treatments had 26 g of roots outside of the planted container compared to 101 g for the PIP + moat treatments. Few roots of either species grew through the Tex-R fabric. Some of the cherry trees completely filled the moat reservoir with roots. The only roots which escaped from the moat pots were from holes in the center of the bottom of the planted container.

Significance to Industry: Preliminary results suggested that the PIP production system may have been more beneficial to the growth of 'Kanzan' cherry than for 'Chanticleer' pear. This is not unexpected since cherries are more sensitive to environmental extremes during production compared with callery pears. At the end of the second year it was obvious that trees grown PIP were generally larger than plants grown above ground. Growth and color advantages for the plants grown in the moat pots were due to trapping of leached nutrients in the moat and the availability of those nutrients and water to the plants in the second year of production.

Both the Tex-R inserts and the moat pot successfully controlled rooting-out such that the plants could be manually harvested at the end of the study. However, the large root mass on the trees

grown in the moat pots, particularly the cherries, would make postproduction handling difficult and removing the root mass would certainly be stressful to the plants, particularly if harvested in the summer months. The moat pot cannot be recommended for production of these two species due to the roots growing outside of the planted container and into the water reservoir of the moat. The copper-coated Tex-R insert appears to be suitable for controlling rooting-out of the two species used in this study.