TECHNICAL SESSIONS

MONDAY MORNING, 6 OCTOBER, 2003

The Twenty-Eighth Annual Meeting of the International Plant Propagators' Society Southern Region of North America convened at 7:45 AM at the Menger Hotel, San Antonio, Texas with President Randy Jacobs presiding.

PRESIDENT RANDY JACOBS

President Jacobs welcomed everyone to San Antonio, Texas for the Twenty-Eighth Annual I.P.P.S. Southern Region of North America meeting. Jacobs complemented Program Chairman Diane Dunn for the outstanding program and speakers she assembled for the meeting. He also praised Local Site Chairman James Harden, Jr. and his committee for all of their long hours in arranging the tours, hotel, and other planning activities.

He challenged the membership to seek and share. Kay Walden-Phelps was then introduced to moderate the first morning session.

Up With Pots — Solutions for Heat, Cold, and Blow-over Problems©

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INTRODUCTION

Containers confine plant root systems to a specific volume of growth medium. Containers provide a neat and practical system for production, shipping, and handling. Plants in containers are the overwhelming preference by the gardening public. Nevertheless, growing plants in containers also provides an assortment of unique challenges, particularly, heat, cold, and blow-over. Roots of terrestrial plants evolved in soil and were often insulated by leaf liter and other debris over the surface. As a result, roots are far more sensitive to both heat and cold compared to plant tops (Barney, 1947; Havis, 1976; Nightingale, 1935; Shirley, 1936; Studer et al., 1978; Tinga, 1977). Plants that blow over do not get watered, topdressed fertilizer is spilled, roots on the exposed side of the container can be killed by heat; in some cases foliage and stem damage can occur, and if plants are actively growing and not returned to the upright position promptly distorted growth may result. An assortment of techniques have been tried to insulate roots of plants in containers from heat and cold and stop the blow-over problem (Whitcomb, 1980, 1983, 2003; Whitcomb and Mahoney 1984; Whitcomb and Euchner, 1979; Williams and Whitcomb, 1985). All have had some degree of success, but all add additional complications.

Several years ago, Bushman's Plant Farm, Cleveland, Texas, came up with the idea of using sections of 1.3-cm (0.5-inch) rebar inserted through drain holes of support containers. When four or more base containers were interconnected, production containers inserted inside the base containers would not blow over. The technique worked and the cost and assembly time reasonable. However, root zone heat reduction was slight, rebar were large enough in diameter to cause tripping of

workers or snagging of shoes by sharp ends, assembly proved challenging, and once assembled the base containers could not be moved. Our discussions led us to build upon their idea and simplify the support base.

The procedures described here were designed specifically to accommodate 1- and 3-gal RootMaker® containers. Combinations of support and production containers from other sources can be worked out with a bit of trial and error.

FOR ROUND ONE-GALLON ROOTMAKER® CONTAINERS

Use Nursery Supplies' classic 400 blow-molded containers secured at the tops as support pots. One-gallon RootMaker® containers inside the blow-molded pot are not pressed down on the thin sidewalls. A small air space around the RootMaker® production pot is open to the top. When sun hits the base support pot, heated air between the two pots rises and cool air is drawn in through drain holes creating a miniature chimney. Root zone temperatures are reduced from 5 to 8 ºC (8 to 15 ºF). Simply take four or nine Nursery Supplies Classic 400 pots and fasten them at the top rim using a heavy-duty hand operated Arrow brand, model P-35 stapler, equipped with 1 cm (3/8 inch) P-35 staples. When containers are fastened together at the tops in clusters of four or nine they will not blow over under very windy conditions even when crops reach 0.7 to1.2 m (30 to 48 inches) in height (Fig. 1).

With the nine-container configuration, production pots may be placed in every cavity [0.04 m^2 (0.45 ft^2) of bed space per production pot] or for greater spacing, alternating cavities [five plants in the nine support pots consume 0.07 m^2 (0.8 ft^2) or with four plants, each consumes 0.09 m^2 (1.0 ft^2)]. Empty clusters of nine support pots can be assembled during bad weather and stacked together for storage or transport. Units are easily removed from stacks and placed on container beds for the growing season then restacked for winter. A note of caution: build the first cluster of nine carefully and be sure the staples are installed exactly 90º or 180º. Incorrect staple placement will cause the unit to not be square and stacking will be difficult. Use the first unit as a pattern for others. Simply drop nine empty containers inside the first nine and staple at the intersections and continue for as many units as desired.

Support pots also provide some root zone insulation. In hardiness Zones 8b and 9, this may be sufficient protection for roots during most winters (Smith, 1977). In hardiness Zones 8a, 7, and further north, there is sufficient protection for roots to allow plants to remain outside and otherwise unprotected through a number of freezes in the fall. This spreads the overwintering workload and helps insure that plants are fully dormant before placement in a structure.

FOR THREE-GALLON ROOTMAKER® CONTAINERS THE FOLLOWING PROCEDURE WORKED WELL

- Use "stock panels", [4.9 m × 1.3 m (16 ft × 4.3 ft) wide, made of 0.6 cm (1/4 inch) galvanized rod spaced 15 cm × 20 cm (6 inches × 8 inches).
- Position wire panel with the long rods up. This leaves a smooth round rod up along the outside of the entire 16-ft length and sharp cut ends of shorter rods against ground cloth.
- For 3-gal RootMaker® production containers, use 5-gal pots, model PC – 5S (Plastics Inc., P.O. Box 1674, Jacksonville, Texas 75766 ;

Figure 1. Nine support 1-gal pots (front), with production containers in each cavity (upper left) and with tall plants that need more room in five of nine cavities (upper right).

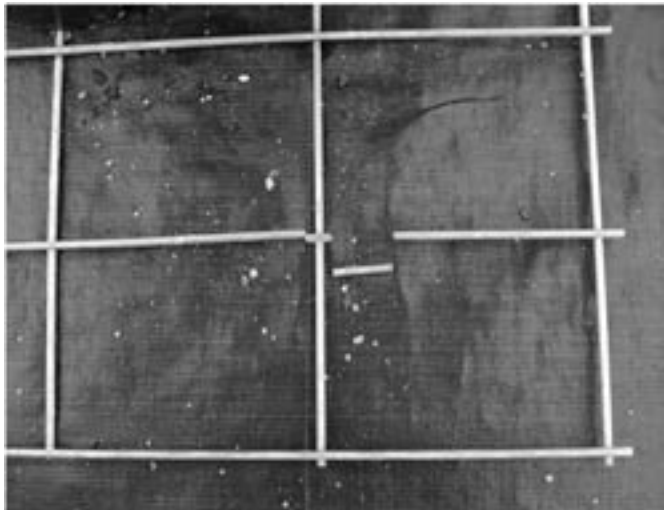

Figure 2. The long, horizontal wire must be cut on either side of the cross wire to accommodate the support pot.

contact Joe Belle Isle, 800-952-9417). Do not use blow-molded pots for this application as weight of the 3-gal RootMaker® container with moist mix will collapse the bottoms and allow the production container to lean.

- Position base pots either in a staggered 46-count pattern, with 7.6 cm (3 inches) between tops of RootMaker® 3-gal containers, or 0.14 m^2 (1.5 ft^2) per pot in a 36-count pattern [three rows of 12 base containers and spacing between containers at 18 cm (7 inches) × 8 cm (3 inches) or 0.2 m^2 (1.9 ft^2)].
- Once the spots have been marked for the base 5-gal pots, cut the wire along the long axis on either side of the weld with bolt cutters then cut out 5 cm (2 inches) on one side (Fig. 2).
- The base of the PC – 5S pot has a dome in the center. Slip the base pot onto the longest cut rod to the point where the shortest cut rod is just outside the opposite drain hole, then raise the short cut rod slightly and slip the base pot to the point where the raised cross of wire is in the center dome of the base pot. This positioning keeps the base pot from shifting in the future.
- When the base pot is in the proper position, only two cut wires are visible inside (Fig. 3).
- When base pots are positioned, 3-gal RootMaker® containers can be inserted.
- By adding Rootskirts® to base pots, not only are the containers held from blowing over, but the summer temperature in the root zone is 11 to 14 ºC (20 to 25 ºF) cooler. In many locations across the southern half of North America, no additional winter protection may be needed (Fig. 4).
- When the crop is sold, stock panel units with base pots attached can be stacked (Fig. 5), repositioned as needed or simply left in place until the next crop. Stock panels are less expensive than 1.3-cm (0.5-inch) rebar or 0.6-cm (0.25-inch) steel rod, plus they are dip galvanized. NOTE: stock panels will bend if driven over by a tractor. Normal walking on stock panels has not caused bending under our conditions.

ROOTSKIRTS® ON THE UP WITH POTS SYSTEM

RootSkirts® are white, reflective and insulating coverings that are placed over the outside of a container. RootSkirts® may be used on individual containers or on support pots (Fig. 4). By adding RootSkirts® to support pots, root zone temperature against the inside wall of the production container did not exceed air temperature during the summer in north central Oklahoma, trees grew substantially more compared to standard exposed pots (Fig. 6), and no plants blew over. Pots with RootSkirts® provided the greatest summer temperature moderation in a practical aboveground container production system tested to date (Whitcomb, 2003; Williams and Whitcomb, 1985).

What About Winter Temperatures? For years, the thought of leaving plants in 3-gal containers in place on production beds for winter seemed only a dream (Whitcomb, 2003). The idea of avoiding jamming plants in poly houses and fighting with

Figure 3. Proper positioning of the base pot is important.

Figure 4. One option for positioning support pots with locations of next containers to be added marked with white paint. Unprotected support pot (left) and with RootSkirts® (right).

Figure 5. This stack of 2.4 m (8 ft) long units was moved to the side of a production bed to allow regrading and drainage improvements.

poly and wind and then early spring new growth and aphids and mites, and on and on, just seemed too good to be true. Anyone that has experienced the poly house overwinter dilemma is looking for a way out (Gouin, 1973, 1974, 1976; Whitcomb 1980, 1983, 2003; Williams and Whitcomb, 1985).

In order to evaluate winter protection of roots of plants grown in 3-gal RootMaker® containers and the effectiveness of RootSkirts®, a study was set up for the winter of 2002-03 (Fig. 7). Crapemyrtle, *Lagerstroemia indica;* lacebark elm, *Ulmus parvifolia;* shumard oak, *Quercus shumardii;* loblolly pine, *Pinus taeda;* southern catalpa, *Catalpa bignonioides;* and hardy hibiscus, *Hibiscus moscheutos* in 3-gal RootMaker® containers were either placed in an unheated polyhouse, left unprotected, placed in support pots only or placed in support pots with RootSkirts® and RootCaps®. Plants ranged from 1.2 to 1.8 m (4 to 6 ft) tall and all had been grown in the containers during the previous growing season. Growth medium was a mix of 3 ground pine bark : 1 peat : 1 sand (by volume). Shumard oak, hibiscus, and catalpa are quite cold tolerant whereas crapemyrtle and loblolly pine are near their northern limits in north central Oklahoma and more cold sensitive.

On 23 Jan. at 8:00 AM, the air temperature was -13 ºC (8 ºF) and the temperature against the inside wall of unprotected containers averaged -9.4 ºC (15 ºF). In the same location in the production container, but aided by the support pot and RootSkirt® the temperature was -1 ºC (30 ºF) (Table 1). Air temperature reached only -8 ºC (17ºF) on 23 Jan., and dropped again to -13 ºC (8 ºF) at 8:00 AM on 24 Jan. The sustained cold period caused the temperature against the inside wall of the unprotected container to drop to -12 ºC (10 ºF), whereas with the protection of both the

Figure 6. On 7 Oct. catalpa trees were evaluated for height and stem diameter. Trees grown in a support pot with protection of RootSkirt® and RootCap® averaged 0.4 m (16 inches) greater height and 0.6 cm (1/4 inch) greater stem diameter compared to RootMaker® 3-gal container not protected [above, the background was 1.8 m (6 ft) tall]. In addition, there were few roots on the side of the black container exposed to the sun (left) whereas roots were plentiful on the sunny side with the RootSkirt® (right).

Figure 7. A portion of the overwinter study using RootSkirts® on injection-molded support pots secured to stock panels. Many of the shumard oak, catalpa, crapemyrtle, and pine trees had grown 5 to 6 ft tall in one growing season. Watering at intervals during the winter was necessary as a result of evaporation from the growth medium. Trees with RootCaps required less watering.

Figure 8. Shumard oak roots protected by RootSkirts® had many white roots (left) whereas with protection of only the support pots, white roots were few and near the bottom (right)

Table 1. Examples of summer and winter temperatures in production pots. Temperatures are against inside wall of production container on sun-exposed side.

Air temperature	3-gal RootMaker	3-gal RootMaker with black support pot	3-gal Rootmaker with black support with pot and RootSkirt	3-gal Rootmaker with black support pot, RootSkirt and RootCap
99 °F (summer)	126 °F	110 °F	101 °F	100 °F
102 °F (summer)	128 °F	117 °F	102 °F	100 °F
89 °F (summer)	109 °F	99 °F	89 °F	89 °F
8 °F (AM 23 Jan)	15 °F	28 °F	30 °F	32 °F
8 °F (AM 24 Jan)	10 °F	20 °F	28 °F	30 °F

support pot and the RootSkirt® the temperature was -2 ºC (28 ºF). One week later, roots of all species against the inside wall of unprotected pots were brown while those protected by the support pot and RootSkirt® were still white and normal in appearance. RootSkirts® on support pots provide considerable winter insulation since three air impermeable barriers and two dead air spaces are created between cold temperatures and plant roots.

All species survived in support pots with RootSkirts® and made a normal spring flush of growth. Notable was the difference in all species in the support pots with RootSkirts® versus the poly over winter house. As usual, all plants in the unheated poly house began spring growth 2 to 3 weeks prior to spring growth of the plants that had remained outdoors all winter with roots protected by support pots and RootSkirts®. New growth in the poly house was soft, limber, and abnormally long. By contrast, new growth on plants with RootSkirts® was stout and of normal length for each species. Roots of plants in the study were inspected and with all five species, white roots were plentiful when protected by RootSkirts® but mostly or entirely absent when unprotected or protected only by the support pot (Fig. 8).

Overwintering and plant tolerance to cold is very difficult to study because such a myriad of factors are involved and no two seasons are the same. Only time will tell for sure how far north and how much protection results from using this technique, but it is the most practical and promising system to date. Up with pots can be modified to work with nearly all sizes of containers.

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New Landscape Plants for the South©

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INTRODUCTION

This report is an update from a previous article in the I.P.P.S. Proceedings (Creech, 2001). The SFA Mast Arboretum in Nacogdoches, Texas is in Zone 8 with an average annual rainfall of 1219 mm (48 inches). June through August is characteristically hot and dry. In recorded history, 1 Sept. 2000 was the record high, 44.4 ºC (112 ºF), and 23 Dec. 1989 was the record low -17.8 ºC (0 ºF). Soils are generally well drained, slightly acidic, and the native flora is dominated by pine, oak, river birch, sweetgum, sycamore, Florida maple, hornbeam, elm, hackberry, pecan, and hickory.

RESOURCES

The SFA Mast Arboretum, Ruby M. Mize Azalea Garden, and the Pineywoods Native Plant Center comprise 24 ha (60 acres) of on-campus property with approximately 30% under solid-set irrigation. The mission of the garden is to evaluate a wide range of plant material. Varietal collections also dominate the garden's landscape design. The three garden units employ five full-time staff. To avoid redundancy, site details of the three gardens resources can be reviewed (Creech, 2001).

WOODY PLANT EVALUATION

Ornamental plants recommended in 2001 are not described below. They remain proven performers in the Arboretum with virtues worth repeating, but to avoid redundancy this listing includes only ornamental plants that have emerged as winners in the last few years.

Acer tataricum* subsp. *ginnala. The Amur maple, has been a consistent performer for 15 years in the SFA Mast Arboretum. This multistem tree has a brief