Up With Pots
Solutions for Heat, Cold, and Blow-Over Problems

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The procedures described here were designed specifically to accommodate one and three gallon RootMaker® containers which prevent them from blowing over and insulate roots. 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 fit INSIDE the blow molded pot leaving a small air space open to the top. When sun hits the base support pot, heated air between the two pots rises and cool air is drawn in drain holes creating a miniature chimney. Root zone temperatures are reduced from 8° to 15° F. 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 3/8 inch P-35 staples. Containers fastened in clusters of four or nine will not blow over under windy conditions even when crops reach 30 to 48 inches in height (Figure 1).

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

With the nine-container configuration, production pots may be placed in every cavity (0.45 sq.ft. of bed space per production pot) or for greater spacing, alternating cavities (five plants in the nine support pots consume 0.8 sq.ft. or with four plants, 1.0 sq.ft.). Units are easily removed from stacks and place on container beds for the growing season, then restacked for winter. Caution: build the first cluster of nine carefully and be sure the staples are installed exactly 90° or 180°. Incorrect staple placement will cause the unit not to be square and stacking will be difficult. Use the first unit as a pattern, then drop nine empty containers inside the first nine and staple at intersections.

Support pots also provide some root zone insulation. In hardiness zones 8b and 9, this may be sufficient protection for roots during most winters. 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. 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 works well:

1. Use "stock panels", 16 feet by 52 inches wide, made of 1/4 inch galvanized rod spaced 6" by 8".

2. Position wire panel with the long rods up. This leaves a smooth round rod up along the outside of the entire 16-foot length and sharp cut ends of shorter rods against ground cloth.

3. For 3 gallon RootMaker® production containers, use five gallon pots, model PC – 5S, from Plastics Inc., PO Box 1674, Jacksonville, TX. 75766, Contact Joe Belle Isle, phone 1-800-952-9417. Do NOT use blow-molded pots for this application as weight of the three gallon RootMaker® container with moist mix will collapse the bottoms and allow the production container to lean.

4. Position base pots either in a staggered 46 count pattern which leaves 3 inches between tops of RootMaker® 3 gallon containers or 1.5 sq. ft. per pot or in a 36 count pattern (three rows of 12 base containers and spacing between containers 7 inches by 3 inches or 1.9 square feet per pot).

5. Once the spots have been marked for the base 5-gallon pots, cut the wire along the long axis on either side of the weld with bolt cutters then cut out about 2 inches on one side (Figure 2).

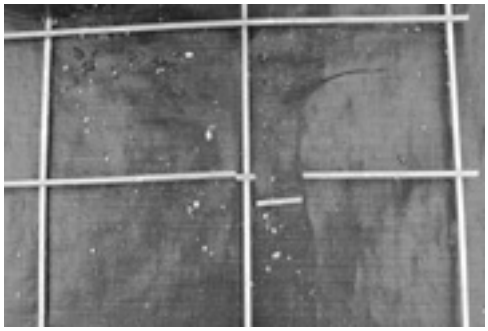

Figure 2. The long, horizontal wire must be cut on either side of the cross wire to accommodate the support pot.

6. The PC – 5S pot base 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.

7. When the base pot is in the proper position, only two cut wires are visible inside (Figure 3).

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

8. When base pots are positioned, 3 gallon RootMaker® containers can be inserted.

9. By adding Rootskirts® to base pots, not only are containers held from blowing over, but summer temperatures in the root zone are 20 to 25° F cooler, and in many locations across the southern half of the U.S., no additional winter protection is needed (Figure 4).

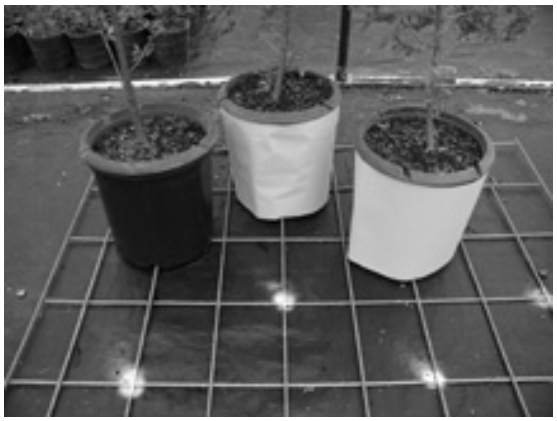

Figure 4. One option for positioning support pots with locations of next containers to be added marked with white paint. Unprotected support pot (left) and with RootSkirts® (right).

When the crop is sold, stock panel units with base pots attached can be stacked, repositioned as needed or simply left in place until the next crop. Stock panels are less expensive than ½ inch rebar or ¼ 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 (Figures 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 and no plants blew over. Up With Pots with RootSkirts® provided the greatest summer temperature moderation in a practical above-ground container production system tested to date.

Table 1. Examples of summer and winter temperatures in production pots.

Air Temperature	3-gallon RootMaker	3-gallon RootMaker w/ black support pot	3-gallon RootMaker w/ black support pot, RootSkirt	3-gallon RootMaker w/ 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 (a.m. Jan. 23)	15° F	28° F	30° F	32° F
8° F (a.m. Jan. 24)	10° F	20° F	28° F	30° F

Temperatures are against inside wall of production container on sun exposed side. High temperature on Jan. 23 was 17°F.

For years the thought of leaving plants in three-gallon containers in place on production beds for winter seemed only a dream. The idea of avoiding jamming plants in poly houses and fighting with 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 over-winter dilemma is looking for a way out

In order to evaluate winter protection of roots of plants grown in three-gallon RootMaker® containers and the effectiveness of RootSkirts®, a study was set up for the winter of 2002-2003 (Figure 5). Crapemyrtle, *Lagerstroemia indica*, lacebark elm, *Ulmus parvifolia*, shumard oak, *Quercus shumardi*, loblolly pine, *Pinus taeda*, southern catalpa, *Catalpa bignonioides* and hardy hibiscus, *Hibiscus moscheutos* in three gallon RootMaker® containers were either placed in an unheated poly house, left unprotected, placed in support pots only or placed in support pots with RootSkirts® and RootCaps®.

Figure 5. A portion of the over winter study using RootSkirts® on injection-molded support pots secured to stock panels. Many of the shumard oak, catalpa, crapemyrtle and pine trees had grown five to six feet 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.

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 two to three weeks prior to spring growth of the plants that had remained out of doors. 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. All five species had white roots when protected by RootSkirts® but severe root damage occurred when unprotected or protected only by the support pot.

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.