RootMaker™ Products Company, LLC

Spring 2001 Newsletter

RootMaker™ News

The winter's trade show season is behind us. The response was tremendous. Many new customers were added to the RootMaker™ family of growers. A significant number of these customers are going to be using RootMaker™ containers exclusively. Many of our current customers are planning to increase the quantity of plants grown in RootMaker™ containers. This will enhance the marketability of RootMaker™ plants for everyone.

Spring is here. If you are going to add to your inventory of RootMaker™ containers, please place your orders as soon as possible, especially if your requirements are large.

One of the things that came from the winter shows was a list of questions by both existing customer as well as those considering using our products. I sent them to Dr. Whitcomb for answers.

Question: How far off the ground should RootMaker™ propagation containers be located to get proper air-root-pruning?
Answer: It depends on your location and growing conditions. If your containers are out of doors in full sun with moderate air movement, then 10 to 12 inches is probably sufficient. If you are growing seedlings in a structure where air movement is limited, you may need to have your wire benches 16 to 24 inches above the soil. If you are seeing roots, even just small tips of roots extending a short distance out of the air-root-pruning openings, you do not have sufficient air circulation or height above the soil surface for your location.

Question: Do 1-Gallon and 3-Gallon RootMaker™ containers need to be elevated to achieve air-root-pruning?
Answer: No. The bottoms of the round and the square one gallon containers as well as the 3-Gallon containers are designed to be placed on ground cover cloth or plastic. Air-root-pruning is accomplished by air circulation around the containers at both the sidewalls and the drain holes at the sides of the bottoms. The only situation I have observed where air-root-pruning on the sides was marginal was where the square 1-Gallon containers were placed snugly together and were more than 6 containers wide. Some roots in the center or the blocks had roots extending ½" outside the openings. If you use the square 1-Gallon containers in blocks greater than 5 or 6 wide, leave a small amount of space between containers for air circulation.

Question: What is the best way to install 5-Gallon Grounders?
Answer: A 12 inch auger works well, especially if it is fitted with a depth control leg that insures that each hole is 7 inches deep, even if the ground is somewhat uneven. I took the "teeth" off my 12-inch auger and sharpened the edge of the auger flighting. This gives a clean hole with a flat bottom. If the holes are made 7 inches deep, the top ring of the side ledges with holes are in contact with the surface of the soil and the rest are below the surface. With the ring if loose soil around the holes, and with rain, soil will infiltrate back around the container and fill any voids. Auguring works best if the containers are spaced roughly 2 to 3 feet in the row and the rows are 6 feet apart.

I have also modified a single shank lister plow for installing 5-Gallon Grounders. This was accomplished by cutting off the 2 sides so that it was about 11 inches across. Then, I welded flat steel plates to both sides. When pulled through the soil, it leaves a trench at the depth your choose and about 11½ inches wide. The 5-Gallon Grounder fits into the space nicely. After all of the containers are placed in a row, soil is pushed back into the trench. This works well if the containers are spaced roughly every 2 feet in the row and the rows are 4 or 5 feet apart.

Question: How long will the socket opening in the soil for the 5-Gallon Grounder last before the field needs to be tilled or sub-soiled?

Answer: There is no precise answer here as soils are extremely variable. However, if you suspect that the soil is becoming sufficiently compacted to restrict oxygen and inhibit root growth, do a perc test. Simply remove the container, fill the hole with water, wait about 30 minutes and fill the hole again. If the hole is still holding water after 24 hours, it flunked the perc test and action should be taken at the earliest opportunity.

Question: Do I use field soil, potting mix, or a combination in the 5-Gallon Grounder?
Answer: A good soilless mix works best. Because there is little contact between the soil outside and the mix inside, a mix should be used. This is a distinct contrast to the Knit Fabric container where there is a great deal of contact between inside and outside through the thousands of small openings. Remember that the soils must drain well for a soilless mix in the Grounder to work well.

Question: If my soils are heavy and do not drain well, can I use the 5-Gallon Grounder above ground?
Answer: Yes. Simply set the container on the surface of the soil and fill with a soilless mix. As roots grow out the holes in the ledges in the sides, they will be air-root-pruned. Yet the roots that grow through the holes in the bottom will extend into the soil below and both anchors the plant and accelerate growth. Another technique that works well on heavy soils is to set the 5-Gallon Grounder on the soil and surround the containers with a good mulch material that drains well. This could be pine bark, wood chips, or simply sand. This mulch material allows roots to grow out and speed plant growth and insulates the roots in the containers from excess heat and cold. This procedure is working well for a RootMaker™ grower in the Chicago, Illinois area.

Question: Will Ligustrums grow well in the 5-Gallon Grounder?
Answer: At this point in time I know of no shrub, even shrubs that are often grown as small tree forms, that do not do well in the 5-Gallon Grounder. The only tree that I do not like in this container is Pecan and that is because the root tips are so large that they do not grow through the openings and instead circle.

Question: Do the walls of the hole need to be scarified after auguring and before the Knit Fabric container is installed?
Answer: No. When the Knit Fabric container is installed and filled with soil, the fabric is pressed firmly against the outside wall of the augured hole. When roots grow out and contact the fabric, they are guided into the surrounding soil with no opportunity to circle. However, if the soil is so heavy and/or the soil was moist enough to cause glazing of the sidewall of the hole, you should reconsider your planting procedures. By creating berms 6 to 8 inches high in the rows and installing the Knit Fabric containers in the center of the berms, drainage will be improved substantially. Remember, if oxygen is limited, root growth will be slow. If your soil is particularly subject to glazing of the sidewalls, you will likely benefit from growing a soil building crop such as sudex.

Question: What do most nurseries do with trees that have been grown in Knit Fabric containers after harvesting?
Answer: A current estimate is that 50% remove the Knit Fabric container and place the trees in above ground containers for finishing. The RootBuilder™ container is working well in this capacity. The other 50% are harvesting trees, allowing 3 or 4 days to "cure", then stretch wrapping the root ball and sending it to landscape jobs. A few are removing the container at the nursery before covering with stretch wrap in order to insure that the fabric is removed at the time of planting. **(NOTE: It is important that instructions are clear that the Knit Fabric container must be completely removed prior to installing in a landscape.)**

Question: What is the best material to use beneath RootBuilder™ containers?
Answer: If the plants are to be in the RootBuilder™ container a matter of 2 to 4 months and are not particularly tall or have a large head, it may work best to use 6 mil poly. This stops all roots from leaving the confines of the container and all are air-root-pruned. If you will cut squares of 2.5 to 3 ounce weed barrier type fabric and place inside the RootBuilder™ container after it has been placed on the plastic, the roots will grow into the thin fabric and secure to bottom more rapidly. If plants are to be grown in the RootBuilder™ for considerable time or if they are particularly tall or have a large head, it is best to use squares of the RootBuilder™ Base material. This material is a knit fabric similar to that used in the Knit Fabric containers, but has been coated with vinyl to make it especially tough and long lasting. Simply place the material on the ground cover cloth or on bare soil, set the RootBuilder™ container in place, and fill with potting mix to surround the root ball of a tree previously grown in a Knit Fabric container or harvested with a tree spade. Roots will grow through the RootBuilder™ Base and anchor the plant against all but severe winds. At the time of sale, rock the tree back and forth (most species) or tilt and cut roots with a sharp, flat bladed shovel (elms and members of the legume family).

Question: What do most customers do with trees that have been grown or established in RootBuilder™ containers at the time of sale?
Answer: It is not necessary to ship the plants in the RootBuilder™ container for the root ball to stay together. The technique that both customers and nurseries are pleased with is to lift the trees at the nursery, remove the RootBuilder™ container and cover the root ball with black stretch wrap. This gives the nursery the re-use of the container without the fuss of deposits and returns, and the customer will have less to handle and dispose of at the landscape site. It is best to use black stretch wrap instead of the clear for one simple reason – the root ball will stay cooler because heat and light are intercepted at the surface of the plastic and are re-radiated back out as long wave radiation by the black stretch wrap. Clear stretch wrap on the other hand will cause a "greenhouse effect" that will accelerate heating and lethal temperatures to roots could be reached. Another benefit to using the black wrap is there are many small spaces between the wrap and the surface of the root ball, and these spaces provide insulation and restrict heat transfer. This is a very different situation to a plant grown in a smooth conventional container and the root tips are pressed against the inner surface of the black plastic pot.♦

I want to thank all those who have written to express satisfaction with the products and the way that they are performing. Letters from satisfied customers are always welcome.

We must increase our prices on most of the injection molded plastic containers. This increase is necessary to cover increases in raw material as well as shipping and handling cost. The items are the 1-Gallon Round container, the 1-Gallon Square container, the 3-Gallon container, and the 5-Gallon Grounder. These new prices will take effect June 1, 2001 and are as follows:

	Each	W/5% Disc.	W/10% Disc.
RMI-1R – 1-Gallon Round container -	$0.45	$0.425	$0.405
RMI-1S – 1-Gallon Square container -	$0.65	$0.62	$0.59
RMI-3R – 3-Gallon container -	$1.37	$1.30	$1.23
RMI-5G – 5-Gallon Grounder -	$1.95	$1.85	$1.76

All order placed prior to June 1, 2001 and shipped before July 1, 2001 will be priced according to the old price list.

TIP: When storing the RMII-32 Propagation trays, alternate the RootMaker™ name along the edge in the stack. This will help prevent the trays from nesting and becoming difficult to separate.♦

Lacebark Inc. News

Lacebark, Inc. has hired Andy Whitcomb as Research Assistant and Farm Manager. He will be providing valuable ideas and assistance in our research program. We have a number of experiments working for spring. Will we tell about them? Only if they work.♦

Grower News

Grower Success with 5" Knit Fabric Containers

Another customer is having very good success with the 5" Knit Fabric container (FC-5). Mike Gillespie, owner of Windmill Outback Nursery in Louisa, Virginia purchased a number of these containers last spring to conduct a comparison with 1-gallon plastic containers. He called me in January to tell me about the article that was on his web site and asked if we would like to use any of it in our Spring Newsletter. The following excerpt has been reprinted by his permission. The full article can be seen on his web site, www.windmillnursery.com.

Once the bags arrived I read over the article again and established my test plot. I chose some of the Eucalyptus that were growing in the 4" pots to be the test species. The test would consist of approximate equal size plants - half would be put into the mesh bag, the other half stepped up to one gallon size plastic nursery pots.
The media was mixed using aged pine bark, peat, perlite and vermiculite. Our standard 18-6-12 fertilizer was incorporated well into the mix and we potted up our test plants.

It did not take long for us to see results. Within 2 weeks, the plants in the mesh bags were 1/3 taller than those in the 1-gallon pots. Everything was growing in the same area, received the same amount of water, sun, etc. Why was there such a significant difference in the growth? Further investigation needed to be done.

I pulled the plants out of the cinder-block holes and looked at them. There were new, white visible roots extending out of the bag.

I realized what I was viewing were new root tips - the roots actually grow through the bag and are pruned, which makes the roots more fibrous. With increased roots, you get better overall plant growth.

So what was different between the mesh bags and the plants in the plastic pots?

I picked up one of the pots and had to quickly put it back down on the ground. The plastic pot was very hot to the touch - so much so you could not leave your hand on it. Remember, all of these test plants are growing in the same open area - receiving full sun and an equal amount of water.

I found my trusty soil thermometer and decided to take a temperature reading of both the pots and bags. The outside air temperature was 86 degrees F (early August). I inserted the thermometer between the inside of the pot and the media - the temperature on the sunny side of the pot, quite shockingly was 130 degrees! Wow! My media was being "cooked" and you just can't expect good root growth at 130 degrees! Readings taken further in toward the center of the pot had reduced cooler readings. It was logical to assume that as the sun passed around the pots, the temperature would be much higher on the side exposed to the sun. With this being the case, the outside edge of the root system was constantly being exposed to these higher temperatures and root growth would be affected. In essence, the sun was shining on the East, South and West sides of the pot during the day - clearly having a direct effect on three-fourths of the media in the pot.

What about the temperatures in the mesh bags? The readings recorded were a cool 82 degrees F., 4 degrees less than the outside air temperature! Neat - but why? It appears that the block regulates the heat better - it's about 1" thick on the outside edge, so we have an insulating factor working in our favor. The thickness of the block actually serves to slow the heat absorption into the media. The media in the mesh bags was cool, that in the plastic pots significantly higher.

So what have we learned so far? Plastic pots absorb heat faster, have higher temperatures that move inward toward the center of the media. Roots don't grow at these high temperatures.

Concrete blocks regulate the heat better. The media stays cooler and the roots can grow and survive. (It would appear the same results during winter, only opposite. The concrete block would also protect the media from freezing/thawing better than a plastic pot.

There are several other benefits we gathered from our test:

1. Plastic pots can blow over in the wind - the concrete blocks don't.
2. Plastic pots require more water per plant than the blocks.
3. The blocks regulate the moisture better than the plastic pot. When watering, the plant, media and the block absorb water. As the media dries out, it wicks and pulls moisture from the block back into the media - the same can be true in reverse. If you over-water your media, the block absorbs some of the excess.
4. Plastic pots don't absorb water - our standard pot had 5 drainage holes located in the bottom so the moisture drains out. This also will require more frequent watering for the plant. Once the media has drained, there is little reserve left for the plant. The media cannot wick moisture back from the plastic pot.♦

New Product Announcement

Many users of Knit Fabric containers have asked about equipment that would speed up installation and where this equipment could be purchased. Until now we have not been able to provide a positive answer. Conner Shaw, owner of Possibility Place Nursery in Monee, Illinois, has announced that he will be manufacturing and marketing a **Grow Bag Planter** to facilitate the installation of all fabric in-ground containers which includes our Knit Fabric containers.

Possibility Place Nursery has been installing RootMaker™ Knit Fabric containers with this equipment for many years. They have fabricated several generations of this device, always improving the design. Now they have a product to offer the public. The planter in the

picture is one that has been in service for several years. Information about this equipment can be obtained by calling Conner Shaw in Monee, Illinois at (708) 534-3988.♦

A Marriage of Nursery Practices

By
Carl E. Whitcomb Ph.D.
Lacebark Research, Inc.
2104 N Cottonwood Rd.
Stillwater, Ok. 74075

I am often asked the question, "If I were starting a nursery, how would I proceed?" Nursery production can range from plants field grown and harvested bareroot, balled in burlap or with tree spades or container grown in sizes ranging from a fraction of a gallon to hundreds of gallons or pot-in-pot or various other options. In my years of research, teaching, consulting and travel, nursery production practices are a mix of "the good news and the bad news".

For field production, the good news is: Trees and shrubs grown in good soil with good care typically have better foliage density and color, far superior stem diameter and taper from soil line to the top with more dense and natural branching and until harvested have good root systems. Further, the amount of irrigation water needed is much less per tree compared to growing the same size plant in a container and drip irrigation is simple and easy to set up and operate. **The bad news is:** Harvesting is slow, labor intensive, is practical only when the plants are dormant and requires an extensive investment in machinery and labor. And worst of all, 95% or more of the plant roots are left in the field even though the soil balls are huge, heavy, and cumbersome.

For production in containers the good news is: Plants are mobile and easily moved. The entire root system is confined to the volume of the container, and if done correctly, no roots are lost at harvest. Root tips are active and quickly extend into the surrounding soil following planting in the landscape. **The bad news is:** Plant roots are damaged and some are killed by heating of the sidewall of the container even when the air temperatures are modest. Plant roots can be damaged and sometimes killed by winter's cold. Containers blow over. Much more irrigation water per plant is needed in containers compared to growing in the field and irrigation is more difficult to set up and maintain. Trees and most large shrubs are tall and spindly. Branching of trees is poor and sparse. Staking both in the nursery and after planting in the landscape is often required as trees have poor stem diameter and taper and strength. Roots in conventional containers are deformed and intertwined and often the plant is root bound. Deformed roots will **always** be in that position. Using toxic levels of copper on the inside of the container creates far more problems than it solves.

For pot-in-pot production the good news is: Plants do not blow over and the roots are protected from summer's heat and winter's cold. **The bad news is:** Roots are still in conventional containers with all of the spiraling and root deformities and the longer the plant is grown the more severe the problem. Using copper treated pots for only a few crop cycles pollutes the surrounding soil with copper so as to make it unsuitable for other crops in the future. Roots often escape from the inside pot and find their way to the holes in the socket pot so that harvesting is difficult if not impossible and the impact of the root loss on the plant can be as severe as B&B. The cost of setting up such a system is very expensive, and it only works on soils that drain well without the additional large expense of sub-drains.

If you could marry the good news practices of both field and container production would you do it? With the latest technology, not only is this possible, **it is one of the most economical and efficient production methods when all factors and costs are considered AND with less risk and less labor. Here is what I would do and why:**

To provide you all of the details would take more space than the newsletter can afford to devote to an article. The long version will be available in the revised 2000 version of *Production of Landscape Plants* by Carl E. Whitcomb, Ph.D. available soon as either hardback or CD, watch future issues for details.

The abbreviated short version: Work with the plant and avoid restrictions to plant growth. Remember: a plant runs on energy and the more productive the leaves at manufacturing the energy necessary for growth of tops and roots, the better. Limit restrictions as much as possible by treating water to lower bicarbonates if this treatment is needed, applying modest rates of low water solubility herbicides so as to avoid root damage, focus on the entire nutrition of the plant because it is how the 11 essential elements work in concert not the effects of just one or two elements, etc.

Consider the following 21 steps:

1) Plant seed in RootMaker™ propagation containers that destroy the taproot within a few days after germination and stimulate secondary root branching by air-root-pruning not only at the bottom but on the sides as well. This creates a root system with root tips ready to grow radially as well as downward when transplanted. When done properly and timely, root systems far superior to what occurs in nature can be produced both faster and more consistently. (This procedure also works for cuttings.)
2) Transplant the seedlings after 10 to 16 weeks into one- or three-gallon RootMaker™ containers, which continues the air-root-pruning throughout the container sidewall to stimulate root branching and accelerates plant growth. Or transplant seedlings into knit bags in cinder blocks or the 5-gallon RootMaker™ grounder if your soils drain well.
3) Leave side branches on the young trees. The only exception is to remove aggressive side branches that try to compete with the central leader. Continue to leave all lower limbs and leaves on for the first two growing seasons or longer. Remove the lower limbs only after good stem strength is achieved or roughly one growing season before the trees are to be sold at two to three inch stem diameter. The lower limbs on young trees are the main contributors of energy to stem diameter and root growth.
4) Prepare field soil by testing for nutrient levels and add any that are deficient or make adjustments for any in excess. Till the soil deep to improve aeration / oxygen for root growth.
5) During September or October of the first year, plant the vigorous, good quality seedlings into the field. Throw the runts away. Remember, it is better to throw away any marginal liner at this point versus growing it on for one or two more years only to realize that it is a cull.
6) Plant the trees in the field in fabric containers made of the latest knit fabric grow bag technology available from RootMaker™ Products Company. All openings in this special knit fabric are 5/64 inch in diameter. This is the smallest opening though which a root of a woody plant will grow. As soon as the root increases even slightly in diameter it is girdled. Three-inch caliper trees can be grown and harvested in an 18-inch diameter knit fabric container.
7) Drip irrigate the first year and whenever rains are lacking in successive years if good quality water is available.
8) Fertilize, control diseases and insects as with conventional field production.
9) When the trees reach market size, harvest while they are dormant and demand for labor is lowest.
10) Harvest the trees using a double loop nylon strap around the trunk and a lifting arm on the back of a tractor or skid loader. I have harvested 80 dormant trees of roughly three-inch caliper in one hour with two straps and one helper. Roots that have grown through the knit fabric container break at the outside face of the fabric as the tree is pulled from the earth.
11) Strip away the fabric. The knit fabric comes off far easier than the early versions of grow bags.

This is where the marriage comes in:

12) Place the root ball in aboveground containers and surround with a good container growth medium (mix) that contains micronutrients and slow-release fertilizer of a form that will last roughly six to eight months.
13) The new mix around the outside insulates the fibrous concentrated tree roots in the soil ball for the remainder of the winter in most areas of hardiness zones 6, 7, 8 and 9. Some additional protection may be needed in more northern areas depending the date of planting in containers. The center of the container with the roots in field soil holds water and nutrients well. The mix around the outside provides drainage, oxygen, and an excellent environment for root growth. Water the trees normally.
14) Complete the task of shifting plants from the field to containers BEFORE spring bud swell.
15) When spring bud swell occurs, a surge of new roots will extend from the root ball of field soil out into the container mix.
16) In north central Oklahoma, trees pulled and placed in containers in February or March are rooted out and generally ready to sell or ship approximately one month after leaves immerge. Establishment in the container does not require many months or a full growing season; it is far faster if mix, nutrition, watering, and weed control are properly managed.
17) This procedure provides the quality of top that can only be achieved in the field with the convenience and mobility of plants grown in containers. Best of all, you have exceptional quality trees to sell all summer.

18) Because the expensive large containers and soilless mix are purchased only at time of harvest, you do not tie up valuable dollars for long periods of time.
19) No heavy equipment or tree spades are necessary. A 30-hp tractor with front loader or three point lifting arm will provide all the muscle you need.
20) Because the roots have not been in the container for years, the circling and deformity pit falls of conventional containers are less of a problem. An even more economical alternative is to use the RootBuilder™ container that continues the air-pruning process through a honeycomb of openings throughout the sidewall yet is very easy to remove at time of planting into the landscape, and can be used over and over.
21) Growing trees in the field in the knit fabric grow bags, and then establishing in containers prior to sales provides a maximum of energy for root growth. Plant trees grown with this procedure into the landscape during May through September, even the hottest day of August and by the following summer the trees are established. Losses should be few to none, stress tolerance is high and customer satisfaction is excellent.

At the present time this is my favorite way for growing trees and trees are available for sale when demand is greatest. The nursery industry needs to focus on selling shade in the summer when shade is a motivation to buy. Likewise, the best time to offer flowering trees for sale is when they are in full bloom. Using this procedure one can do this and 'sell the sizzle'. As one recent convert said, "The thing that convinced me was when we loaded large crapemyrtle trees in full flower in August, planted them in the landscape, and they never quit blooming. The customer thought we were magicians".

I am not saying that other nursery procedures do not work, but there are degrees of success and varying levels of return for your investment. My first vehicle was a 1939 Chevrolet coupe. It got me from point A to point B and fairly consistently. My current vehicle is a 1997 Chevrolet half-ton extended cab with air conditioning, radio, tape player, cloth bucket seats with lumbar support, power steering and with much more pep and nearly double fuel economy. Do I care to go back to my 39 Chevrolet? No, thanks. As the song goes, "It is hard to get them back on the farm after they have seen Paree".♦

Weed Control in Containers

By
Carl E. Whitcomb Ph.D.
Lacebark Inc.: Publications and Research
2104 North Cottonwood Road
Stillwater, OK. 74075

A Summary of Years of Research and Practice

Weeds have been defined in various ways, but my favorite definition is that "a weed is a thoroughly successful plant". In spite of all that you try to do to discourage weeds, they grow and flourish and continue to cause problems and restrict growth of your crops. Controlling weeds in field nursery stock is challenging, but in containers the problem is even more challenging.

Consider that no plant is native to a container, as a container is a totally artificial environment created for our convenience. What works in Mother Nature's soil rarely works the same way in the unique environment of a container. The "mix or growth medium" in a modern container nursery contains NO field soil, but rather a mix of pine bark, sand, peat or other material. Because of the ever-present perched water table at the bottom of the container, coarse materials are necessary to provide drainage and avoid root suffocation from excess water, while retaining sufficient water to support the crop between irrigation cycles. Further, because we have restricted the root system of the plant to the volume of the container, and that volume is generally quite limited relative to the root system the plant would develop in the landscape, water must be reapplied frequently. The water loss from the container is also accelerated by the fact that the temperature of the growth medium in the container is typically from 20 to 50 degrees warmer than in soil in a landscape, and this heat "cooks" out the water and restricts root growth. The end requirement is that lots of water, applied frequently, is necessary to grow plants in containers.

In my early research trying to sort out the factors involved and most effective ways to control weeds in containers, two key points surfaced: 1) the high content of organic matter in the growth medium (pine bark, peat, etc.) binds or adsorbs (like iron shavings sticking to a magnet) substantial quantities of herbicides, thus the rates must be higher than for the same herbicide applied in the field, and 2) the more water soluble the herbicide, the faster it moves downward through the mix and the greater likelihood of damaging the crop.

From over 30 years of study in this area, my suggestions are as follows:

A) Use only pre-emerge herbicides with water solubilies LESS than ONE PPM.

B) The compounds currently available that fit this requirement are:
Treflan (trifluralin) @ 0.3 PPM water solubility
Goal (oxyfluorfen) @ 0.1 PPM
Ronstar (oxadiazon) @ 0.7 PPM
Prowl, Pendulum, Southern WeedGrass Control (pendimethalin) @ 0.5 PPM
Barricade, Factor (prodiamine) @ 0.013 PPM
Gallery (isoxaben) @ 1.0 PPM
Rout – is a combination of Goal and Surflan
Snapshot 80 DF – is a combination of Gallery and Surflan
Snapshot 2.5 TG – is a combination of Gallery and Treflan
Ornamental Herbicide II – is a combination of Goal and Prowl
Surflan (oryzalin) @ 2.6 PPM, appears in Rout and Snapshot 80 DF
(I do not recommend Surflan either to be used alone or in combination with other compounds, as crop stunting is common.)
(Factor, Barricade – must be applied at high rates in order to have sufficient herbicide soluble to control weeds. Remember, if too little of the herbicide is soluble weed control will be poor, whereas if too much of the herbicide is soluble weed control may be good but the crop will be stunted.)

C) None of these compounds will last more than about two months on the surface of a container. This is due to the elevated temperature and microbial activity. YOU MUST, watch carefully your calendar and for the presence of the first germination of weed seeds and reapply regularly. In nearly all cases, it is better to reapply a bit early as opposed to wait too long and have to pull weeds by hand.

D) The practical sequence that works well is to a) pot up either new liners or shift up plants into larger containers, b) water the plants in WELL by HAND, c) then the next day, apply the pre-emergent herbicide and d) water it in by sprinkler irrigation.

Because of the low water solubility of the suggested compounds, they do not move below about ½ inch deep into the growth medium. Since nearly all weed seeds require light to germinate, it is essential that the herbicide remain on the surface where it is needed and away from the roots of the crop.

Sanitation and control of weeds anywhere near plants being grown in containers is also a critical part of the weed control program. The more weed seeds available to blow onto your plants in containers, the more likelihood you will have weed problems.

IF you recycle your irrigation water, adherence to a program to use ONLY those herbicides with water solubilities less than one PPM, ANYWHERE on the nursery is my advice. For example, the soil sterilant herbicide Hyvar X has a water solubility of 815 PPM and goes wherever water goes. Roundup is NOT likely to cause problems because it adheres to soil and organic particles very strongly and is broken down quickly by microbes. NEVER, EVER let anyone talk you into using an herbicide at you nursery until you know the water solubility. Further, ALWAYS do a small test area before treating the entire nursery. When reading about results of an herbicide test, look to see if they had a double control. A double control is where one control receives no herbicide and the weeds are allowed to grow, while the second control receives no herbicides but is kept free of weeds. Only with a double control will you know whether or not the herbicides in the test are stunting the crop.

You will always have weeds, but they need not be a major problem. ♦