Current Suggested Practices for Container Nurseries

The following is a summary of suggestions based on research and experience over the last 35 years. They are practical procedures firmly founded on research and have been thoroughly tested. Will they work everywhere and for everyone? No one knows. But they have provided assistance to many growers to date**. <u>If you only want to know the minimum of WHAT to do, stop with this chapter, but it is very important to understand WHY, so read on.</u>**

Key Points

1. Water Quality: The dissolved minerals in your water supply can be either beneficial or detrimental. The key is to know the composition of your water supply and make adjustments/allowances accordingly. For example, if your water source is high in bicarbonates, it is beneficial to treat it with sulfuric acid to bring the level down to about 100 ppm. But, if you water is high in sodium, boron or chlorides there is no practical treatment. You must change the crops you grow to reduce accumulation and/or change the additives to your growth medium to minimize their undesirable effects. In some cases, the only practical answer is to seek a new source of water. ServiTech Lab, 1816 E. Wyatt Earp, Dodge City, KS 67801, phone 316-227-7509 is the lab I use. Ask for a COMPLETE NURSERY IRRIGATION WATER ANALYSIS. They need about one pint for testing.

2. Water Quantity: The more water you apply, the faster any minerals present in your irrigation water will accumulate in the container growth medium. Water is both used by the crop and lost by evaporation, but the minerals dissolved in the water stay behind, just like they do in a teakettle. Excess water is generally more undesirable to your crops than slightly insufficient water. There is no magic ideal water level, but it is better to err on the insufficient side versus over-water and suffocate roots and increase the likelihood of root rot diseases.

Because the need for water by plants is constantly changing as they grow, plus the environment changes daily, from dry, sunny days to humid, overcast days and with or without wind, it is impossible to define exactly how much water is needed. A good nursery manager routinely adjusts water relative to the many variables and crop growth. Indicator crops can be helpful in providing clues as to when the next irrigation should be done. For example, forsythia works well as an indicator plant to teach students about watering. The new growth on the forsythia will begin to droop before most other crops experience water stress sufficient to restrict growth, yet when water is provided, the forsythia will straighten back up and continue growing until the next time water becomes limiting.

ALWAYS look at the root system when evaluating watering and adjusting watering needs. If there are dry spots in the mix, you are not watering enough with each application. If there are no white roots at the bottom of the container or roots have turned black and even a hint of the "pig pen" smell, you are over watering. If there are white root tips at the bottom of the container but they are somewhat bulbous relative to what is normal for the species and if the species typically develops root hairs, but root hairs are absent, then you are watering more than necessary and/or more often than necessary but have not yet reached the point of root suffocation. If your crop has been in the container long enough to have mycorrhizae established and none are present, it may be from over-watering - but a number of other things can cause the demise of mycorrhizae as well, including many fungicides and insecticides and some herbicides. Roots are your best window into how you are watering relative to the needs of the crop. Do not fail to use this to your advantage.

3. Methods of Applying Water to Containers: There is no one best way, but lots of choices depending on your location, crops, container sizes, etc. Overhead sprinklers are inefficient when

used on containers larger than 5 gallons and especially where the plants are spaced for good top development. On the other hand, with one- to three-gallons placed close together, overhead sprinklers do a good job as long as the irrigation sprinkler spacing, piping capacity, pressure, etc. are all appropriate for the orifices used. In geographic areas where wind and low humidity are common, the efficiency of overhead sprinklers is less.

Drip irrigation or various spray-stakes on larger containers and even three-gallon containers in areas where wind is a problem or the quantity of water available is limited is a practical choice. Spray stakes aid the water distribution in the container and are especially helpful on containers holding 7 gallons or more. The greatest frustration with spray-stakes is with the "spaghetti" tubes that transfer water from a feeder line to the spray-stake emitter. These small lines are often damaged by rabbits and other rodents and can trip employees working in the area. Less than optimum water distribution can occur if there are more than a few inches of elevation change among a block of plants. Spray stakes sometimes make one say bad words when a line comes loose or is cut or becomes plugged and a good plant dies or is damaged. But, spray stakes are likely here to stay since they are much more efficient compared to overhead sprinklers. Perhaps something better will come along.

Simply placing _-inch drip irrigation line with the emitters spaced appropriately for the size of the container and the spacing used for that crop, **on top of the containers** works well, IF, the frequency of water application is sufficient. The key to using drip lines in this way is to water frequently enough so that the film of water around each particle in the mix is not depleted or broken before the next watering. If the film of water is broken then re-watering will be difficult and distribution of the water throughout the mix will be poor and the crop will suffer. In north central Oklahoma, at least three applications of water from the drip lines are typically needed to maintain the film of water around each particle (except at the surface, which remains dry in appearance which in turn reduces weed problems), and under extreme heat and wind and where the plants are large, four applications per day may be needed. RootCaps™ help a great deal.

An adaptation of drip irrigation to three-gallon containers or larger, that also works well, is the Water Trof. This device looks like a "T" where the leg of the "T" inserts into the drain hole of the container while the crossbar of the "T" is a receptacle for the drip line and emitter. Water moves from the emitter into the trough and the bottom of the container then up by capillarity (the attraction water has for water) thus the importance of the thin film of water around the particles to aid in pulling up the water that is added. This technique keeps the drip lines *on the ground and out of the way* of workers and is done with 1/2-inch tubing, which rabbits and other rodents rarely damage.

Drip irrigation is one of the most water efficient watering procedures available and IF managed properly, will produce crops equal or superior to those grown with overhead irrigation AND with fewer applications of fungicides and insecticides and fewer weeds and fewer applications of herbicides. These savings probably make up for the additional time required to position the drip lines.

RootCaps™ on top of container growth media reduce water loss by evaporation. Since 60% or more of irrigation water applied is lost by evaporation from the surface of the growth media, RootCaps™ are very worthwhile.

4. Fertilizers in containers. Incorporated slow-release fertilizers are the most practical and in the long run most economical and clearly the least polluting. With recent advances in coatings such as Osmocote 19-5-9 where the release of nutrients in a container will continue at a pace that meets the crop needs for 9 or more months, even in the Deep South and Florida, this is especially true. Keep in mind that once every year with plants in containers you should a) sell it or b) shift it into

a larger container or c) throw it away. With some species, the length of time is even shorter, but the point is that ***you can only keep a plant vibrant and healthy in a given container size for a given period of time and that time is shorter than most nursery managers realize.***

Whenever I have compared fertilizing plants in containers with liquid fertilizers vs. good slow-release products such as Osmocote, with the Osmocote either top-dressed or incorporated, the plants grown with the slow-release always win when overall health, vigor and quality are considered. Clearly, injecting lots of nitrogen gets lots of top growth, but at the expense of a proportionate growth of roots plus the additional weed problem from injecting liquid fertilizers into an overhead system is formidable. When Osmocote is compared top-dressed vs. incorporated, there are fewer weeds with incorporation simply because the environment and nutrients on the surface of the growth medium are less favorable to the germination and establishment of weed seeds.

My preferred procedure for container production ***of any crop*** is to incorporate the appropriate release Osmocote (or other slow-release fertilizer if you prefer) relative to the time the crop is expected to be in that specific size container, (the information on the current Osmocote bags in terms of lbs per cubic yard, etc. is good. Generally, use the high rate), plus 1.5 lbs of Micromax per cubic yard, plus dolomite appropriate for your water quality and all you do is manage water, weeds, pruning and pests (which still leaves plenty of challenges). If you start out with a pine bark base growth medium and add the appropriate levels of micronutrients and dolomite the pH of the mix will nearly always be in the 4.5 to 6.0 range. With soilless mixes, if you add the micronutrients they are there, if you do not, they are not there and this is independent of the pH of the mix. I threw away the pH meter for container growing years ago and with a good slow-release program, the soluble salts meter can be left on the shelf indefinitely.

In approximately the southern half of the USA, Osmocote 17-7-12 at a rate of 15 pounds, plus 1.5 pounds per cubic yard of Micromax, plus the appropriate amount of dolomite to supplement calcium and magnesium works well for most woody nursery stock and herbaceous material and is a good place to start. (The geographic area referred to is south of the Mason-Dixon line, or similarly for anyone less inclined to study history, in USDA Hardiness Zone map Zones 7, 8, and 9 or areas south of the northern borders of the states of Oklahoma, Arkansas, Tennessee, and Virginia).

5. Growth Medium. A mix of 3 parts ground pine (or other conifer bark), plus 1 part good Canadian peat, plus, 1 part concrete sand makes a good growth medium for most species of plants in containers. To this mix add the fertilizers noted above. Keep in mind that if you mix three cubic yards of ground pine bark plus one cubic yard of peat and one cubic yard of sand, you DO NOT end up with five cubic yards of mix, but rather with about four cubic yards. The reason is that the various shaped particles fit together and the volume shrinks by roughly 15% to 20%. Because plants grow in the reduced or final volume, always add any nutrient additives based on the final volume and not the initial volume. Also, a compressed 3.6 cu. ft. bale of peat expands to make about 6 cu. ft.

The growth medium is the mix of materials used to fill the container. It is NOT soil, and should not contain any soil. Soil is a mix of aggregates and very fine particles. If a small amount of soil is added to a container growth medium the fine particles will erode to the bottom of the containers and complicate drainage. (Yes, growth medium, not growing medium, as the medium is not growing but does support growth.).

6. Growing Trees Without Staking: This is a great way to save money and grow better quality trees. The keys are timing, spacing, improved root systems, proper nutrition, shifting plants into larger containers at the proper time and leaving the side branches on as long as practical. These

six factors are critical or you get to stake and stake and tie and tie and wonder why your trees have poor stem diameter/caliper and roots.

If you leave tree seedlings too close together for only a few weeks, you may have doomed yourself to staking. Full sunlight, movement of the young stems by wind and proper nutrition are essential; then add the original RootMaker® 4 pack or RootMaker® II tray with 18 or 32 cells, to build a superior root system and you are off to a great start. **But do not forget timing**. Can you leave tree seedlings in RootMaker® containers too long? Yes, and they will start to get tall and spindly due to restriction of the roots as they run out of space to grow and they shade one another limiting light to the lower leaves and stems. **You must pay attention to timing relative to tree growth. Once trees in containers, any containers, reach the sidewalls and branch and space for further root development becomes limiting, it is like squeezing tooth past out of the tube, the growth is straight up and there is no way to get it back into the tube. And, ALWAYS leave the lower limbs on the young tree stems as long as practical**. Research has shown that leaves on the lower limbs contribute most to the development of stem diameter and strength and root growth. The sugars manufactured by the leaves in the upper part of the plant stay in the upper plant plus develop buds for the next flush of growth and for flower and fruit development. Trees properly grown will have a stem taper like a good deep-sea fishing rod. You will not get such stem development without leaving on the lower limbs AND allowing them sufficient light and space to function. Tree height is not the criteria to use when evaluating young tree quality. Stem diameter or taper is far more important. Plus tall slender trees *always* have poor root systems, because roots cannot grow without energy and the energy for their growth comes from the lower limbs.

The preferred way to grow tree seedlings and avoid the staking dilemma is as follows:
Plant seed in flats in the greenhouse in mid to late March. Transplant seedlings as soon as they germinate into RootMaker® propagation containers to stimulate root branching by air-root-pruning at both the bottom and sides of the container. Do this two-step process to have all the seedlings in flats of 24 cavities of the original RootMaker® or 18- or 32-cell RootMaker® II trays at the same stage of development, thus avoiding having a few giants and lot of runts. If you seed directly into the RootMaker® containers, the plants that germinate first shade the ones slower to germinate and the uniformity of the group is much more erratic. Yes, this takes some time, BUT by avoiding staking, in the long run you SAVE a great deal in labor and expense and have much better quality trees.

Use a mix of about 50% perlite to 50% peat or aged pine bark, peat and perlite approximately 2:1:1 by volume. To this add 6 pounds of 18-6-12 Osmocote (NO substitutes), plus one pound of Micromax, plus a small amount of dolomite ONLY if you have very little calcium in your water supply (no more than 4 lbs per cu. yd. max.). Leave the seedlings in the containers for 6 to 12 weeks, depending on the species and weather conditions. Topdress with Osmocote 19-6-12 at a rate of about 4 pounds per cu yd when the seedlings are about 2 to 3 inches tall. How do I determine the amount to apply? Consider that the original RootMaker® container holds approximately 14 cubic inches volume (the RootMaker® II 32-cell tray hold about 11 cu. in. and the 18-cell tray holds 25 cu. in.). There are 46656 cu in per cubic yard, so divide by 14, which equals about 3,300 containers to equal one cubic yard. Therefore _ pound of Osmocote should be spread over about 400 containers for the 14 cu. in. original RootMaker®, or over about 530 cavities of the 32-cell tray (16 trays) or over about 233 cavities of the 18-cell tray (13 trays). Spread the Osmocote as uniformly as possible by hand.

The objective is to have the seed germinate and the taproot reach the bottom and be air-pruned, which stimulates the production of secondary roots, then when they reach the openings in the sidewall and are air-pruned and stimulate the production of tertiary roots, it is time to transplant.

Do NOT wait and procrastinate. Remember, your goal is to avoid staking and it is a goal worthy of attention as it will save you $$$$ and earn you $$$$. As soon as the seeds have germinated and are in the RootMaker® propagation containers, they are placed outside in full sun and with full wind. The only covering over the top is _ inch hardware cloth to break up pounding raindrops and prevent damage from hail. You want the stems to bend in the wind as the more the stems flex the larger in diameter they become (assuming you do not have some other limiting factor) and this has been confirmed by some excellent research.

7. Containers. There are big ones, small ones and all sorts of colored ones. But, **the key consideration is "what they do to the roots".** If the roots circle and become entangled, the plant will never reach it's potential and establishment in the landscape will be slow, with problems likely. **Yes, it costs more for a superior container with air-root-pruning capacity to stop roots from circling and to stimulate root-branching, but since production time is reduced and in most cases the need for staking and pruning is reduced, and there are fewer culls, you are dollars ahead in the overall cost of production.** If you do not keep accurate records, you will miss out on this very important benefit from using RootMaker® containers and/or knit grow bags and the RootTrapper® or RootBuilder® containers. The advantages from these thoroughly researched techniques are subtle but accumulative over time. The longer you evaluate crops using these methods vs. conventional smooth containers the greater benefits you will observe. Shift a plant from a one-gallon RootMaker® into a 15-gallon container (even a smooth conventional one) and watch it grow vigorously. At the same time shift a plant from a smooth conventional container into a 15-gallon and watch it set there for considerable time before it begins to grow at all.

It is a matter of root tips and their function. One root tip can absorb "X" amount of water and nutrients in a day, week or month. If, by container design and simply using air to dehydrate the root tips, thereby stimulating one root tip to branch and become 5 and 5 to become 25 and so on, the absorptive capacity of the root system increases dramatically and in turn the leaves are supplied more efficiently with water and nutrients and manufacture more sugars to run the system and positive results occur. Do one more thing, instead of using a conventional 15-gallon container, use a white 15-gallon RootTrapper® container that stimulates root branching by trapping root tips in a NON-TOXIC fabric so that they are forced to branch OR a 15-gallon RootBuilder® container with air-root-pruning throughout the vertical sidewall as a result of the honeycomb design and shaping. NON-TOXIC air pruning ALWAYS works. No pollution, no toxicity, no need to repaint the inside of the container. Not just any hole in the side of a container provides benefits. Openings in the sides of a container provide air-root-pruning benefits ONLY if the openings are strategically placed to guide the root tips into the openings. When a crop is done, simply wash out the containers, leave them out in the sun for a day and they are ready to use again. Remember ultra-violet light is a great sanitizer and it is free. I have not used fungicides or dips of toxic materials for cleaning containers in decades and disease is not a problem.

My favorite production system at the present time is as follows: Grow tree seedling or root cuttings in RootMaker® propagation containers, and then shift to one- or three-gallon Root Makers® for the first growing season. Then while the soil is still warm, plant into the field if larger plants are the goal, using the knit fabric grow bag of appropriate size for the plant I expect to harvest. With 32 openings in an area the size of a dime, when a root tip contacts the sidewall of the knit fabric grow bag in the soil, the tip extends through, but as soon as it increases only slightly in diameter, it is girdled. It is the girdling of the roots at this very small size that provides the growth and root branching benefits. Plants in the field in knit grow bags do not blow over, they do not suffer from roots being killed by high temperatures or low temperatures, and they develop more stem caliper and superior branching compared to trees in conventional

containers. When the plant gets to the desired market size, remove from the field. While fully dormant, the trees can be harvested by pulling using a nylon strap in all but the deep south (– believe it or not), (or with care, dug in active growth), the knit fabric bag is removed and the plant is placed in the appropriate size RootBuilder® container which can be made any size and is very economical and can be used over and over, or the new white RootTrapper® container. When a plant grown in the field in a knit grow bag is placed in an above-ground RootBuilder® container, or the new white RootTrapper® container, in about two months (less in the South) the plant is in full leaf (or even better, in flower) and ready for sale during the entire growing season when B&B or bareroot plants are out of the running. Further, as the plant is being held and is developing roots out into the container it is growing and increasing in value. With this procedure, excellent plants can be sold and planted successfully all summer. SELL SHADE ALL SUMMER. The nursery industry needs to focus on selling shade when shade is a premium item – in the summer. Likewise, the time to sell a tree form crapemyrtle or flowering crabapple is when it is in full flower, not when it is dormant. We now have the technology to sell container grown trees all summer and with good root systems, they will establish very quickly and by the following spring they are established and require little further maintenance. Roots grow best when the soil temperatures are 65° to 75° F, not in the spring when the soils are cold and wet. Contrary to popular belief, root growth and plant establishment is much faster in July or August versus March or April, as long as water is provided.

8. New White RootTrapper® Containers. My preferred way to either grow large plants or finish plants grown in the field in knit fabric containers has changed with my latest invention, the root-tip-trapping container. Consider the problems with aboveground containers – heat, cold, high water use, circling roots, blow-over, stem damage during shipping and on and on. Now there is a new container that solves or reduces ALL of these problems PLUS is economical and easy to ship and can be reused. The new white RootTrapper® reduces water use by 30% to 35%, reduces root zone heat in summer by 20° to 25° F, stops root circling, stimulates root branching, reduces blow over, reduces heat loss during winter, reduces shipping cost, eliminates stem damage during shipping, plus the white sides look great and show off the plant. Removal of trees from RootTrappers® is far easier than from some conventional smooth containers where saws, axes, and hatchets are often required. Best of all, once planted, trees grown in RootTrappers® establish quickly which makes both the landscape contractor and customer happy.

9. Up-With-Pots and RootSkirts®. Keeping one- and three-gallon RootMaker® containers from blowing over is no longer a problem. The Up-With-Pots technique uses 52 inch wide by 16-foot long, stock panels as a base. By cutting the _-inch galvanized rods at the right spot and slipping a support pot onto the wire, then inserting the production RootMaker® container inside, the plant does not blow over even at a height of 6 to 7 feet, plus it is easy to assemble and economical. By inserting a production container inside the support container, a dead air space is created, but the insulation effect is not sufficient to prevent all heat damage to roots on the sunny side. However, after working with the new laminated fabric used in the RootTrapper® containers, it occurred to me that if a skirt was made of this fabric and placed around the support container, additional insulation would result. When a RootSkirt® is in place there is the outer layer of white poly, then the inner layer of fabric, a dead air space, the wall of the support container, another dead air space, the wall of the production container and finally roots. Studies during the summer of 2002 revealed that this technique dropped the temperature in the production container to air temperature, even when the air temperature was 102° F. Further, root growth was the same on the sunny side of the production container as on the shaded side and top growth was accelerated. With the much cooler temperatures in the production containers water use was also decreased. Data from two growing seasons suggests a savings of 30% to 35% or more. Extended life of

Osmocote or other resin-coated slow-release fertilizers is another benefit that has not yet been evaluated. Lower root zone temperatures should reduce nutrient loss as well.

If you have not yet obtained a copy of the article "Up-With-Pots" which has all the details plus photos of this unique system, get one. You WILL like never having to set up blown over one- and three-gallon containers again.

10. Copper. Questions about copper-coated pots abound. In the late 1960's Tok Furuta at University of California, Riverside, worked with copper-coated pots. I worked with copper-coated containers in the early 1970's. After considerable study, we both rejected the idea. Copper is NOT the answer. Copper is elemental; it does not break down. It starts out as copper and will always be copper. In order to be effective the copper level has to be high enough to KILL the root tip. To say the copper causes root branching by stunting the root is fiction. Copper is an essential element for plant growth, but copper-coated pots release huge quantities of copper into the container growth medium, thereby destroying the desirable ratios and proportions among the micronutrients. John Ruter reported that about 3,000 ppm of copper was needed to do root pruning. When copper is in excess, absorption of iron is restricted, thus the common chlorosis of plants in copper-coated pots is iron deficiency caused by the excessive copper. Copper coatings do not affect some species at all. Interestingly, the species that naturally have fibrous roots are most affected by the copper-coated containers while species that do not have fibrous roots and thus would benefit most from root branching are least affected. What happens to the soils around the nursery after a few years of huge quantities of copper leaching out of the containers? I would not want that problem hanging over my head. I have walked the land around copper mines in Tasmania and Montana and it is not a pretty sight.

11. Weed Control. This is an ever-evolving challenge in containers; the better you make the growing conditions for the crop, the better the weeds grow. In containers, NEVER use a preemergent herbicide with more than one ppm water solubility. Further, there are only six compounds that are currently available that meet this requirement. They are, Treflan, Goal, Ronstar, Prowl (pendimethalin), Factor (prodiamine) and Gallery (isoxaben). Combinations such as Rout contain Goal and Surflan (which has a water solubility of 2.6 ppm and is NOT on my suggested list). Ornamental Herbicide II (Goal and Prowl) and Snapshot TG (Gallery and Treflan) combinations work well. At the present time, the best buy and one of the most effective on containers as long as it is reapplied every 6 to 8 weeks and at the label rate, is Treflan 5G but do not use an excessive rate.

Sanitation is crucial if you are going to stay ahead of the weeds in containers. Blowing weed seeds or "flipping" weed seeds of oxalis and bittercress can create loads of problems. Plus, if you want to encourage mite problems, leave the oxalis unchecked. You can generally find aphids on bittercress before they start on your crops. Problems cause problems. Groundcover cloth is probably the safest and most economical overall way to control weeds in and around a container nursery. NEVER, NEVER, NEVER use soil sterilants such as OUST or any other sulfonylurea herbicide. Simizine and/or Karmex can be used, but watch out, as they are sufficiently water soluble to move. If you recycle water, leave them alone. If you feel you must treat some soil areas with an herbicide around a container nursery, use Ronstar or Goal. They stay put unless there is severe soil erosion and even then, they stay attached to the soil particles and settle to the bottom.

Fill containers, plant liners, and water thoroughly once by hand, then apply Treflan, Ronstar or Pendulum granules within 24 hours and rarely pull a weed. **REMEMBER WITH WEEDS, IF YOU PROCRASTINATE, YOU LOSE.** Try Ronstar 50

WP at the highest label rate around the greenhouse and container beds and on roadways for weed control outside the areas covered with groundcover cloth.

One other point about herbicides, but it also applies to other pesticides as well, if your water is alkaline that you put in the spray tank, it can neutralize an acid such as Roundup (glyphosate) in a relatively short time and the more alkaline (high pH, high bicarbonates and calcium) the water, the faster the inactivation of the acid pesticide. Muratic acid, commonly sold for treating swimming pools, is a very economical way to maintain the effectiveness of Roundup. For example, begin to fill a 50-gallon spray tank, add about one cup full of muratic acid and fill the tank to about _ full, then add the Roundup. Prior to treating the spray water with muratic acid, if the tank sat over night, the effectiveness of the Roundup was greatly reduced. By acidifying the water, Roundup is still good whether used the same day or a week later. In one test, Roundup was kept from late October and used on Johnson grass in May of the following year with good kill. A tablespoon of muratic acid in a backpack sprayer will keep Roundup ready for whenever the next weed spraying need arises.

12. Other Suggestions. Work with the plant. Consider that when you place plants in one-gallon containers you are dictating the amount they can grow in a given period of time as limited by the volume. But, if you want to have plants in 3, 5, or 7-gallon containers to sell, the sooner you shift from the one-gallon to the larger containers, the faster the plants will grow. How big can the container be? How much space do you have, and how many large containers can you afford? Simply put, the larger the container, the faster the plant grows, up to some practical point.

Remember the 4-inch Rule. From my research it is clear that when you prune a root, secondary root branches form roughly four inches back from the point of pruning — just like when you prune a branch on a shrub or limb on a tree. If you shift a plant from a 6-inch diameter one-gallon RootMaker® container, then the maximum diameter of the new container should not exceed roughly 14 inches (6 + 4 + 4 =14) OR a 10-inch diameter three-gallon RootMaker® should be shifted into a container no larger than 18 inches in diameter (10+ 4 + 4 = 18). The reason is to insure full root branching and utilization of and benefit from the new growth medium provided and in the shortest period of time. In practical terms, a one-gallon RootMaker® would be shifted into a five-gallon RootMaker® or a seven-gallon RootTrapper® that is 12 inches in diameter. A three-gallon RootMaker® would be shifted into a 15-gallon RootTrapper® that is 18 inches in diameter. Try it and watch the results. If you respect the 4-inch rule you will avoid the loose rootball problem that comes from shifting plants into excessively large containers.

Likewise, one of the best things about good slow-release fertilizer programs, is the fact that the nutrients are there and available and the plant does not have to wait until you get around to fertilize to make the next flush of growth. Work with the plant, think about what the plant needs, and try to complement it as much as possible.

Remember, it is not how many seeds you plant or plants you grow, but rather how many you sell that is important. Quality counts not only in the tops, but in the root systems both to you as a grower and to your customer. Plants that die are costly and undesirable to the landscape contractor and big turn-offs to the homeowner or gardener. We now have the technology to grow plants faster and with superior root systems to those produced in nature. The better the overall quality of the product you provide to your customer and the greater their success, the more they come back. Saving a few cents on cheap fertilizer or containers is “false prosperity” in the big picture and always ends up costing more.